

## PART 1 MONOKETONES

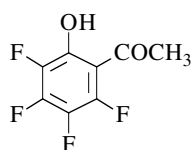
### Chapter 1. Compounds derived from acetic acid

#### 1-(2,3,4,5-Tetrafluoro-6-hydroxyphenyl)ethanone

[182951-74-2]

C<sub>8</sub>H<sub>4</sub>F<sub>4</sub>O<sub>2</sub>

mol.wt. 208.11



##### Synthesis

-Obtained by hydrolytic cleavage of 2-amino-3-(2-hydroxy-3,4,5,6-tetrafluorobenzoyl)acrylic acid (**I**) or of 3-(2-hydroxy-3,4,5,6-tetrafluorobenzoylmethylene)-piperazin-2-one (**II**) in boiling aqueous sodium hydroxide for 20 min (53% and 44% yields, respectively) [179].

m.p. 36° [179]; <sup>1</sup>H NMR [179], <sup>19</sup>F NMR [179], IR [179].

#### 1-(2,3,5,6-Tetrafluoro-4-hydroxyphenyl)ethanone

[145797-51-9]

C<sub>8</sub>H<sub>4</sub>F<sub>4</sub>O<sub>2</sub>

mol.wt. 208.11



##### Synthesis

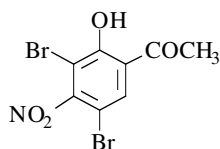
-Preparation by reaction of acetyl chloride on 2,3,5,6-tetrafluorophenol with aluminium chloride in carbon disulfide at 5° (10%) [720].

m.p. 109-111° [720].

#### 1-(3,5-Dibromo-2-hydroxy-4-nitrophenyl)ethanone

C<sub>8</sub>H<sub>5</sub>Br<sub>2</sub>NO<sub>4</sub>

mol.wt. 338.94



##### Synthesis

-Preparation by reaction of bromine on 2-hydroxy-4-nitroacetophenone in refluxing acetic acid-sodium acetate mixture (68%) [1649].

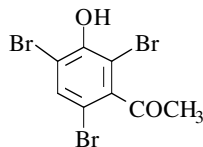
m.p. 157° [1649].

#### 1-(2,4,6-Tribromo-3-hydroxyphenyl)ethanone

[49605-14-3]

C<sub>8</sub>H<sub>5</sub>Br<sub>3</sub>O<sub>2</sub>

mol.wt. 372.84



##### Synthesis

-Preparation by bromination of 3-hydroxyacetophenone in water at 50° (94%) [521] [650].

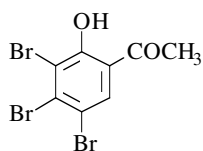
m.p. 127°5 [521] [650].

**1-(3,4,5-Tribromo-2-hydroxyphenyl)ethanone**

[145666-19-9]

C<sub>8</sub>H<sub>5</sub>Br<sub>3</sub>O<sub>2</sub>

mol.wt. 372.84

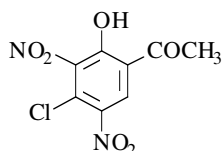


Synthesis not yet described.

-Refer to: [1205] (compound 1h).

**1-(4-Chloro-2-hydroxy-3,5-dinitrophenyl)ethanone**C<sub>8</sub>H<sub>5</sub>ClN<sub>2</sub>O<sub>6</sub>

mol.wt. 260.59



Syntheses

-Preparation by nitration of 4-chloro-2-hydroxy-acetophenone (77%) [924].

-Also obtained (by-product) by nitration of 2-acetyl-5-chlorophenyl acetate in sulfuric acid solution at -10° (24%) [924].

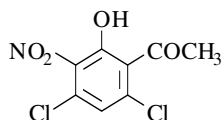
m.p. 149-150° [924].

**1-(4,6-Dichloro-2-hydroxy-3-nitrophenyl)ethanone**

[81515-01-7]

C<sub>8</sub>H<sub>5</sub>Cl<sub>2</sub>NO<sub>4</sub>

mol.wt. 250.04



Synthesis

-Preparation by nitration of 2,4-dichloro-6-hydroxy-acetophenone with potassium nitrate in concentrated sulfuric acid, first between -10° and 0°, then at r.t. [1483].

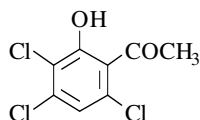
m.p. 62-64° [1483].

**1-(3,4,6-Trichloro-2-hydroxyphenyl)ethanone**

[126712-08-1]

C<sub>8</sub>H<sub>5</sub>Cl<sub>3</sub>O<sub>2</sub>

mol.wt. 239.48



Synthesis

-Preparation by Fries rearrangement of 2,3,5-trichlorophenyl acetate with aluminium chloride without solvent at 130-140° (49%) [1778].

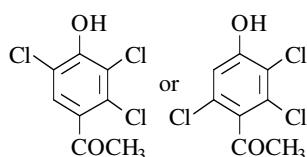
m.p. 103-104° [1778]; <sup>1</sup>H NMR [1778], MS [1778].

**1-(Trichloro-4-hydroxyphenyl)ethanone**

[94650-96-1]

C<sub>8</sub>H<sub>5</sub>Cl<sub>3</sub>O<sub>2</sub>

mol.wt. 239.48



Synthesis not yet described.

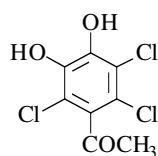
- Identified in wheat and rye straw pulp bleaching and combined mill effluents [617].
- Identified during control of effluent from the manufacturing of bleached pulp and paper from sugarcane bagasse [616].

**1-(2,3,6-Trichloro-4,5-dihydroxyphenyl)ethanone**

[154638-87-6]

C<sub>8</sub>H<sub>5</sub>Cl<sub>3</sub>O<sub>3</sub>

mol.wt. 255.48



Synthesis

- Obtained (by-product) by chlorination of 4-hydroxy-3-methoxyacetophenone in dioxane-water mixture at 40° (4%) [1456].

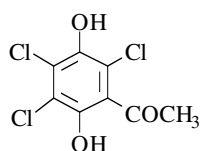
MS [1456].

**1-(2,4,5-Trichloro-3,6-dihydroxyphenyl)ethanone**

[7714-14-9]

C<sub>8</sub>H<sub>5</sub>Cl<sub>3</sub>O<sub>3</sub>

mol.wt. 255.48



Syntheses

- Preparation by reaction of chlorine on 2,5-dihydroxyacetophenone in chloroform solution containing a drop of triethylamine, under UV light, at 0° (50%) [944].
- Preparation by reaction of excess of chlorine on acetyl-1,4-benzoquinone in chloroform, followed by treatment of

the adduct obtained with hydrochloric acid in ethyl ether (60%) [180].

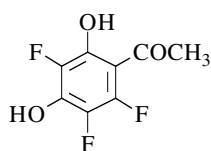
m.p. 127°5-129° [180], 79-81° [944]. One of the reported melting points is obviously wrong.  
<sup>1</sup>H NMR [180], IR [180], MS [180].

**1-(2,3,5-Trifluoro-4,6-dihydroxyphenyl)ethanone**

[182951-75-3]

C<sub>8</sub>H<sub>5</sub>F<sub>3</sub>O<sub>3</sub>

mol.wt. 206.12



Syntheses

- Obtained by treatment of 2-amino-3-(2-hydroxy-3,4,5,6-tetrafluorobenzoyl)acrylic acid with boiling aqueous sodium hydroxide for 2 h (40%) [179].
- Also obtained by treatment of 3-(2-hydroxy-3,4,5,6-tetrafluorobenzoylmethylene)piperazin-2-one with boiling aqueous sodium hydroxide for 2 h (30%) [179].

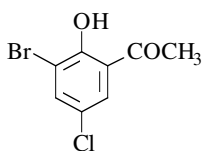
m.p. 146-147° [179]; <sup>1</sup>H NMR [179], <sup>19</sup>F NMR [179], IR [179].

**1-(3-Bromo-5-chloro-2-hydroxyphenyl)ethanone**

[59443-15-1]

C<sub>8</sub>H<sub>6</sub>BrClO<sub>2</sub>

mol.wt. 249.49

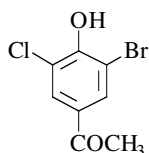
**Syntheses**

- Preparation by bromination of 5-chloro-2-hydroxyacetophenone in acetic acid (65%) [152].
- Preparation by Fries rearrangement of 2-bromo-4-chlorophenyl acetate with aluminium chloride without solvent at 140° [1647].
- Also refer to: [153] [1204] (compound 1b), [1205] (compound 1e) and [1547] (compound 1c).

m.p. 104-105° [152].

**1-(3-Bromo-5-chloro-4-hydroxyphenyl)ethanone**C<sub>8</sub>H<sub>6</sub>BrClO<sub>2</sub>

mol.wt. 249.49

**Synthesis**

- Preparation by bromination of 3-chloro-4-hydroxyacetophenone [1024] [1167].

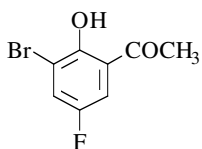
m.p. 170° [1024] [1167].

**1-(3-Bromo-5-fluoro-2-hydroxyphenyl)ethanone**

[393-62-4]

C<sub>8</sub>H<sub>6</sub>BrFO<sub>2</sub>

mol.wt. 233.04

**Syntheses**

- Preparation by bromination of 5-fluoro-2-hydroxyacetophenone in acetic acid [334].
- Preparation by Fries rearrangement of 2-bromo-4-fluorophenyl acetate with aluminium chloride without solvent at 130° [919].

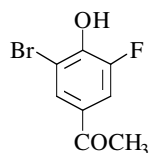
m.p. 97° [334] [919].

**1-(3-Bromo-5-fluoro-4-hydroxyphenyl)ethanone**

[402-84-6]

C<sub>8</sub>H<sub>6</sub>BrFO<sub>2</sub>

mol.wt. 233.04

**Synthesis**

- Preparation by bromination of 3-fluoro-4-hydroxyacetophenone in acetic acid [335].

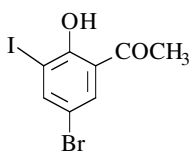
m.p. 173° [335].

**1-(5-Bromo-2-hydroxy-3-iodophenyl)ethanone**

[28467-11-0]

C<sub>8</sub>H<sub>6</sub>BrIO<sub>2</sub>

mol.wt. 340.94



## Synthesis

-Preparation by reaction of iodine-iodic acid mixture on 5-bromo-2-hydroxyacetophenone in ethanol (75-85%) [484], (68%) [341].

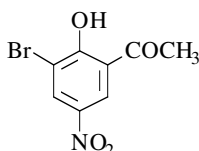
m.p. 116° [341], 105° [484]; <sup>1</sup>H NMR [484], IR [484].

**1-(3-Bromo-2-hydroxy-5-nitrophenyl)ethanone**

[90004-97-0]

C<sub>8</sub>H<sub>6</sub>BrNO<sub>4</sub>

mol.wt. 260.04



## Syntheses

-Preparation by reaction of bromine on 2-hydroxy-5-nitroacetophenone in refluxing acetic acid-sodium acetate mixture (83%) [1649].

-Also obtained by treatment of 2-hydroxy-5-nitroacetophenone with NBS in acetonitrile (56%) (compound 31) [1848].

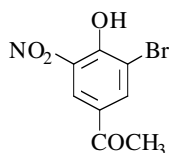
m.p. 132° [1649]; <sup>1</sup>H NMR [1848], MS [1848].

**1-(3-Bromo-4-hydroxy-5-nitrophenyl)ethanone**

[90004-98-1]

C<sub>8</sub>H<sub>6</sub>BrNO<sub>4</sub>

mol.wt. 260.04



## Synthesis

-Preparation by reaction of bromine on 4-hydroxy-3-nitroacetophenone in refluxing acetic acid-sodium acetate mixture (83%) [1649].

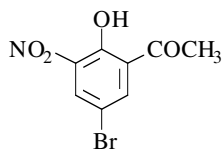
m.p. 136° [1649].

**1-(5-Bromo-2-hydroxy-3-nitrophenyl)ethanone**

[70978-54-0]

C<sub>8</sub>H<sub>6</sub>BrNO<sub>4</sub>

mol.wt. 260.04



## Syntheses

-Preparation by nitration of 5-bromo-2-hydroxyacetophenone in refluxing carbon tetrachloride (88%) [1866].

-Preparation by reaction of nitric acid on 5-bromo-2-hydroxyacetophenone in concentrated sulfuric acid between -2 to 0° (75%) [1646].

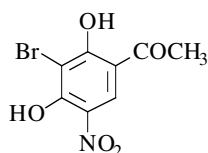
m.p. 99°5 [1646]; IR [1023].

**1-(3-Bromo-2,4-dihydroxy-5-nitrophenyl)ethanone**

[116465-22-6]

C<sub>8</sub>H<sub>6</sub>BrNO<sub>5</sub>

mol.wt. 276.04

**Syntheses**

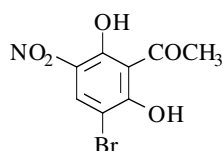
- Preparation by bromination of 5-nitroresacetophenone in acetic acid at 90° [870].
- Obtained by saponification of 8-bromo-7-hydroxy-2-methyl-6-nitrochromone with 10% aqueous sodium hydroxide [1288].

-Also obtained by reaction of nitric acid on 3,3'-diacetyl-5,5'-dibromo-4,4',6,6'-tetrahydroxy-diphenyl thioether in acetic acid at r.t. [868].

m.p. 182-183° [868] [870], 181-182° [1288].

**1-(3-Bromo-2,6-dihydroxy-5-nitrophenyl)ethanone**C<sub>8</sub>H<sub>6</sub>BrNO<sub>5</sub>

mol.wt. 276.04

**Syntheses**

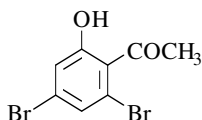
- Preparation by bromination of 2,6-dihydroxy-3-nitroacetophenone in acetic acid [1288].
- Preparation by reaction of nitric acid on 3,5-dibromo-2,6-dihydroxyacetophenone in acetic acid at 0° [1288].
- Obtained by saponification of 6-bromo-5-hydroxy-

2-methyl-8-nitrochromone or of 8-bromo-5-hydroxy-2-methyl-6-nitrochromone with 10% aqueous sodium hydroxide at reflux [1288].

m.p. 127-128° [1288].

**1-(2,4-Dibromo-6-hydroxyphenyl)ethanone**C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 293.94

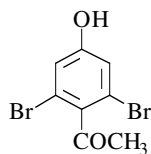
**Synthesis**

- Preparation by reaction of acetyl chloride on 3,5-dibromo-anisole with aluminium chloride in refluxing carbon disulfide (33%) [114].

m.p. 96-97° [114].

**1-(2,6-Dibromo-4-hydroxyphenyl)ethanone**C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 293.94

**Synthesis**

- Obtained by reaction of acetyl chloride on 3,5-dibromo-anisole with aluminium chloride in refluxing carbon disulfide (10%) [114].

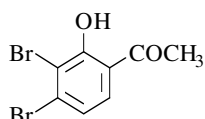
m.p. 141-142° [114].

**1-(3,4-Dibromo-2-hydroxyphenyl)ethanone**

[145666-18-8]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 293.94



## Synthesis

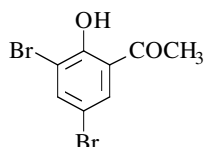
-Refer to: [1205] (compound 1f).

**1-(3,5-Dibromo-2-hydroxyphenyl)ethanone**

[22362-66-9]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 293.94



## Syntheses

-Preparation by Fries rearrangement of 2,4-dibromophenyl acetate with aluminium chloride without solvent between 150° and 165° [400] [411] [1788], (46%) [411], (51%) [400].

-Preparation by reaction of acetic anhydride on 2,4-dibromophenol with aluminium chloride in nitrobenzene at 120° (41%) [411] [1788].

-Preparation by bromination of 2-hydroxyacetophenone [330] [1511], (61%) [330] or 5-bromo-2-hydroxyacetophenone in acetic acid (78%) [152].

-Preparation by reaction of bromine on 2-hydroxyacetophenone in acetic acid-potassium acetate mixture (55%) [1511].

-Also obtained (by-product) by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent at 180° (2%) [540].

-Also obtained by reaction of sodium iodide on 3,5-dibromo-2-hydroxy- $\alpha,\alpha,\alpha$ -tribromoacetophenone in acetic acid-dioxane-hydrochloric acid mixture (50%) [7].

-Also obtained by action of hydriodic acid with 3,5-dibromo-2-hydroxy- $\alpha,\alpha,\alpha$ -tribromoacetophenone [7].

m.p. 111° [330], 110° [411], 109-110° [7] [152] [400], 108-109° [540] [1511], 108° [121];

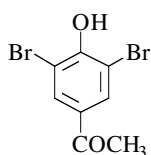
<sup>1</sup>H NMR [540] [1698], <sup>13</sup>C NMR [736], UV [1161] [1698], fluorescence spectra [1698].

**1-(3,5-Dibromo-4-hydroxyphenyl)ethanone**

[2887-72-1]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 293.94



## Syntheses

-Preparation by bromination of 4-hydroxyacetophenone in dilute acetic acid [1024] [1167] [1320], (94%) [1446], (80%) [1511], (75%) [89], (62%) [335].

-Preparation by reaction of bromine on 4-hydroxyacetophenone in acetic acid-potassium acetate mixture (91%) [89], (80%) [1511].

-Preparation by bromination of 4-hydroxyacetophenone [917].

-Preparation by Fries rearrangement of 2,6-dibromophenyl acetate with aluminium chloride without solvent at 120° (60%) [917].

-Also refer to: [436] (compound 9) and [1702].

m.p. 187° [1024] [1167], 184° [917], 181° [335] [1446] [1511], 180-184° [89];

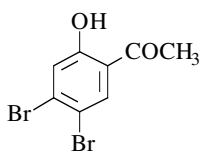
UV [1160].

**1-(4,5-Dibromo-2-hydroxyphenyl)ethanone**

[30186-15-3]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>2</sub>

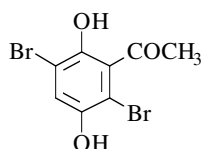
mol.wt. 293.94

**Syntheses**

- Obtained (by-product) by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent at 180° (1%) [540].
- Also obtained (by-product) by Fries rearrangement of 3-bromophenyl acetate with aluminium chloride without solvent at 175-180° [1786].

m.p. 136° [1786], 130-131° [540]; <sup>1</sup>H NMR [540] [1786].**1-(2,5-Dibromo-3,6-dihydroxyphenyl)ethanone**C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>3</sub>

mol.wt. 309.94

**Synthesis not yet described**

- Obtained by alkaline hydrolysis of 5,8-dibromo-6-hydroxy-2-methylchromone [516].
  - Also obtained by bromination of quinacetophenone [516].
- N.B.:** The results of reference [516] were erroneous [170].

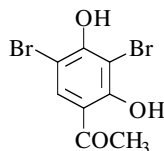
m.p. 86° [516].

**1-(3,5-Dibromo-2,4-dihydroxyphenyl)ethanone**

[36772-98-2]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>3</sub>

mol.wt. 309.94

**Syntheses**

- Preparation by bromination of resacetophenone in acetic acid [475] [508] [686] [947] [1850] [1877].
- Preparation by saponification of 6,8-dibromo-7-hydroxy-2-methylchromone with 5% aqueous sodium hydroxide [506] [1288].
- Obtained by reaction of bromine on 3,3'-diacetyl-4,4',6,6'-tetrahydroxydiphenyl thioether in acetic acid at 50° [868].
- Preparation by saponification of 6,8-dibromo-7-hydroxyflavone with refluxing 10% aqueous sodium hydroxide [1287].
- Preparation by saponification of 3-benzoyl-6,8-dibromo-7-hydroxyflavone with 10% ethanolic potassium hydroxide in a water bath [1287].
- Also obtained (by-product) by reaction of bromine with resacetophenone in ethanol at -78° [637].

m.p. 174° [506], 173-174° [475] [508] [686] [1877], 173° [686], 172-173° [1287] [1288].

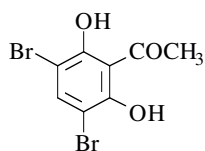


**1-(3,5-Dibromo-2,6-dihydroxyphenyl)ethanone**

[63411-84-7]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>3</sub>

mol.wt. 309.94



## Syntheses

- Preparation by bromination of 2-acetylresorcinol in acetic acid [1288].
- Obtained by saponification of 6,8-dibromo-5-hydroxy-2-methylchromone with 10% aqueous sodium hydroxide at reflux [1288].
- Also refer to: [1287] (compound IVc).

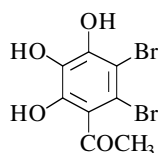
m.p. 173° [1288].

**1-(2,3-Dibromo-4,5,6-trihydroxyphenyl)ethanone**

[65883-24-1]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>4</sub>

mol.wt. 325.94



## Synthesis

- Preparation by reaction of bromine on gallacetophenone in chloroform at 10° [1542] [1543].

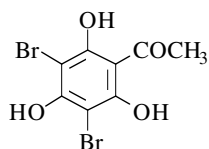
Pale yellow crystals [1542] [1543].

**1-(3,5-Dibromo-2,4,6-trihydroxyphenyl)ethanone**

[63990-67-0]

C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>4</sub>

mol.wt. 325.94



## Syntheses

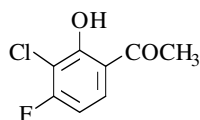
- Preparation by reaction of acetyl chloride or acetic anhydride on 2,4-dibromophloroglucinol with boron trifluoride (72-78%) [1915].
- Preparation by bromination of phloracetophenone with cupric bromide in refluxing chloroform-ethyl acetate mixture [391].

m.p. 202-204° [1915], 200-202° [391]; <sup>1</sup>H NMR [391], MS [391].**1-(3-Chloro-4-fluoro-2-hydroxyphenyl)ethanone**

[703-97-9]

C<sub>8</sub>H<sub>6</sub>ClFO<sub>2</sub>

mol.wt. 188.59



## Synthesis not yet described

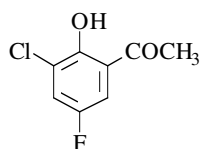
- There is a single reference, erroneous, concerning the 3-chloro-5-fluoro-2-hydroxyacetophenone [919].

**1-(3-Chloro-5-fluoro-2-hydroxyphenyl)ethanone**

[445-38-5]

C<sub>8</sub>H<sub>6</sub>ClFO<sub>2</sub>

mol.wt. 188.59



## Syntheses

- Preparation by Fries rearrangement of 2-chloro-4-fluorophenyl acetate with aluminium chloride without solvent at 130° [919].
- Preparation by reaction of chlorine on 5-fluoro-2-hydroxyacetophenone in acetic acid solution [334].

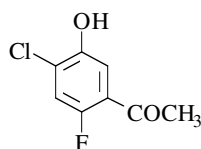
m.p. 84° [334] [919].

**1-(4-Chloro-2-fluoro-5-hydroxyphenyl)ethanone**

[148254-30-2]

C<sub>8</sub>H<sub>6</sub>ClFO<sub>2</sub>

mol.wt. 188.59



## Synthesis

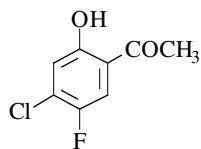
- Refer to: [1748] (Japanese patent).

**1-(4-Chloro-5-fluoro-2-hydroxyphenyl)ethanone**

[105533-69-5]

C<sub>8</sub>H<sub>6</sub>ClFO<sub>2</sub>

mol.wt. 188.59



## Synthesis

- Preparation by reaction of acetyl chloride on 3-chloro-4-fluorophenol with aluminium chloride at 95-100° (86%) [1191].

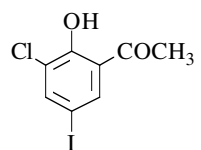
m.p. 72° [1191].

**1-(3-Chloro-2-hydroxy-5-iodophenyl)ethanone**

[292144-84-4]

C<sub>8</sub>H<sub>6</sub>ClIO<sub>2</sub>

mol.wt. 296.49



## Synthesis

- Preparation by iodination of 3-chloro-2-hydroxyacetophenone with iodine (1 mol) and iodic acid (1 mol) in ethanol at 35-40° for 1.5 h (75-85%) [484].

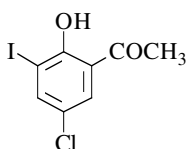
m.p. 112° [484].

**1-(5-Chloro-2-hydroxy-3-iodophenyl)ethanone**

[175655-11-5]

C<sub>8</sub>H<sub>6</sub>ClIO<sub>2</sub>

mol.wt. 296.49

**Synthesis**

-Preparation by iodination of 5-chloro-2-hydroxyacetophenone with iodine (1 mol) and iodic acid (1 mol) in ethanol at 35-40° for 1.5 h (75-85%) [484].

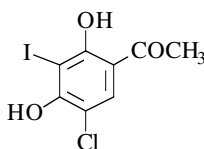
m.p. 89° [484].

**1-(5-Chloro-2,4-dihydroxy-3-iodophenyl)ethanone**

[102297-89-2]

C<sub>8</sub>H<sub>6</sub>ClIO<sub>3</sub>

mol.wt. 312.49

**Synthesis**

-Preparation by reaction of a iodine-iodic acid mixture on 5-chloro-2,4-dihydroxyacetophenone in water (73%) [569].

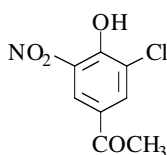
m.p. 173-176° [569]; <sup>1</sup>H NMR [569].

**1-(3-Chloro-4-hydroxy-5-nitrophenyl)ethanone**

[52129-62-1]

C<sub>8</sub>H<sub>6</sub>ClNO<sub>4</sub>

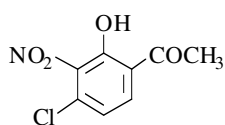
mol.wt. 215.59

**Synthesis**

-Preparation by reaction of potassium nitrate on 3-chloro-4-hydroxyacetophenone in concentrated sulfuric acid between 5-10° [315] [1404].

**1-(4-Chloro-2-hydroxy-3-nitrophenyl)ethanone**C<sub>8</sub>H<sub>6</sub>ClNO<sub>4</sub>

mol.wt. 215.59

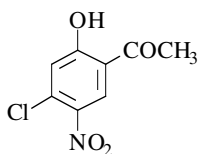
**Synthesis**

-Obtained (by-product) by nitration of 2-acetyl-5-chlorophenyl acetate in sulfuric acid at -20° [924].

m.p. 105-106° [924]; IR [924].

**1-(4-Chloro-2-hydroxy-5-nitrophenyl)ethanone**C<sub>8</sub>H<sub>6</sub>ClNO<sub>4</sub>

mol.wt. 215.59

**Syntheses**

-Obtained by Fries rearrangement of 3-chloro-4-nitrophenyl acetate with aluminium chloride in nitrobenzene at 120° (18%) [924].

-Preparation by nitration of 2-acetyl-5-chlorophenyl acetate in sulfuric acid solution at -10° (50%) [924].

-Preparation by hydrolysis of 2-acetyl-5-chloro-4-nitrophenyl 4-methyl-3-nitrobenzenesulfonate with 2 N sodium hydroxide (86%) [924].

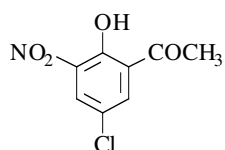
m.p. 104-105° [924]; IR [924].

### 1-(5-Chloro-2-hydroxy-3-nitrophenyl)ethanone

[84942-40-5]

C<sub>8</sub>H<sub>6</sub>ClNO<sub>4</sub>

mol.wt. 215.59



#### Syntheses

-Preparation by reaction of nitric acid on 5-chloro-2-hydroxyacetophenone in acetic acid at r.t. [125] [318] [774], (98%) [318], (63%) [774].

-Preparation by reaction of nitric acid on 5-chloro-2-hydroxyacetophenone in concentrated sulfuric acid between -2 to 0° (80%) [1646].

-Preparation by reaction of copper nitrate on 5-chloro-2-hydroxyacetophenone in acetic anhydride [125].

-Also refer to: [667].

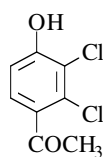
m.p. 135-136° [318], 132° [1646], 131-132° [774]; IR [774].

### 1-(2,3-Dichloro-4-hydroxyphenyl)ethanone

[2977-53-9]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04



#### Syntheses

-Preparation by reaction of aluminium chloride on 2,3-dichloro-4-methoxyacetophenone in methylene chloride at 5° [1897].

-Preparation by reaction of aluminium chloride on 2,3-dichloro-4-methoxyacetophenone (or 2,3-dichloro-4-ethoxyacetophenone) in heptane [1221] [1222] [1679].

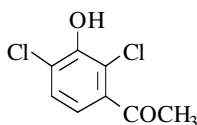
m.p. 153-155° [1679].

### 1-(2,4-Dichloro-3-hydroxyphenyl)ethanone

[92119-05-6]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04



#### Syntheses

-Preparation from 3-hydroxyacetophenone by chlorination of its ethylene ketal using two equivalents of tert-butyl hypochlorite. Hydrolysis of the obtained dichloroketal with dilute hydrochloric acid in tetrahydrofuran gave essentially

2,4-dichloro-3-hydroxyacetophenone [344].

-Also obtained (by-product) by reaction of tert-butyl hypochlorite on 3-hydroxyacetophenone in chloroform at 15°, in subdued light (9%) [344].

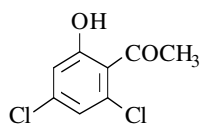
oil [344].

**1-(2,4-Dichloro-6-hydroxyphenyl)ethanone**

[57051-50-0]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Syntheses**

-Preparation by reaction of acetyl chloride on 3,5-dichloroanisole with aluminium chloride in boiling carbon disulfide [114] [1788], (35-40%) [114].

-Preparation by Fries rearrangement of 3,5-dichlorophenyl acetate with aluminium chloride without solvent at 120° [114] [1483].

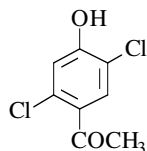
m.p. 49-50° [114], 48-49° [1483].

**1-(2,5-Dichloro-4-hydroxyphenyl)ethanone**

[73239-04-0]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Syntheses**

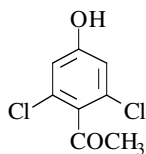
-Preparation by reaction of acetyl chloride on 2,5-dichloroanisole with aluminium chloride at 110° (36%) [1448].

-Preparation by Fries rearrangement of 2,5-dichlorophenyl acetate with aluminium chloride without solvent at 155-165° (36%) [559].

m.p. 151-152° [1448], 148-149° [559]; <sup>1</sup>H NMR [1448], IR [1448], UV [1448].

**1-(2,6-Dichloro-4-hydroxyphenyl)ethanone**C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Synthesis**

-Obtained by reaction of acetyl chloride on 3,5-dichloroanisole with aluminium chloride in refluxing carbon disulfide (30%) [114].

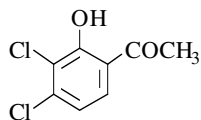
m.p. 117-119° [114]; b.p.<sub>14</sub> 197° [114].

**1-(3,4-Dichloro-2-hydroxyphenyl)ethanone**

[55736-71-5]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Syntheses**

-Preparation by Fries rearrangement of 2,3-dichlorophenyl acetate with aluminium chloride without solvent at 130-140° [517] [1257] [1778] [1788], (75%) [1778].

-Also obtained by reaction of 40% peracetic acid on 2-(benzyloxy)-3,4-dichloroacetophenone in acetic acid at 50° (40%) [862].

-Preparation by reaction of aqueous sodium hydroxide solution on 7,8-dichlorochromone-2-carboxylic acid at 95° (38%) [608].

m.p. 113-114° [862], 109-111° [608], 109-110° [1778];

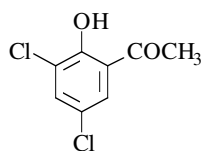
<sup>1</sup>H NMR [1778], IR [1778], MS [1778].

**1-(3,5-Dichloro-2-hydroxyphenyl)ethanone**

[3321-92-4]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Syntheses**

- Preparation by Fries rearrangement of 2,4-dichlorophenyl acetate with aluminium chloride in tetrachloroethane at 150-160° [1833] and without solvent between 115-170° (43-75%) [214] [399] [683] [896] [1581] [1773].
- Preparation by reaction of chlorine on 2-hydroxy-

acetophenone with ferric chloride in dilute acetic acid [315] [1404].

- Preparation by reaction of hydrated sodium sulfide (containing 7 to 9 mol of water) with 2-piperidino-4-[3,5-dichloro-2-hydroxyphenyl]-1,3-dithiolane perchlorate in ethanol (63%) [357].

m.p. 100-101° [357], 97° [896], 95-96° [315] [399] [683] [1404], 95°5 [1833], 94-96° [1773]; b.p.<sub>18</sub> 132-134° [214] [1581];

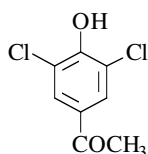
<sup>1</sup>H NMR [357] [683] [1698], UV [1698], IR [357], MS [683], fluorescence spectra [1698].

**1-(3,5-Dichloro-4-hydroxyphenyl)ethanone**

[17044-70-1]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Syntheses**

- Preparation by Fries rearrangement of 2,6-dichlorophenyl acetate with aluminium chloride without solvent at 140-150° [829] [1774], (69%) [1774].
- Preparation by chlorination of 4-hydroxyacetophenone in acetic acid [315] [602] [1404].

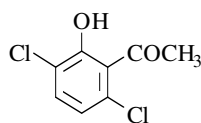
m.p. 164-165°5 [1774], 164-165° [315], 160-160°5 [602];  
pK<sub>a</sub> [602].

**1-(3,6-Dichloro-2-hydroxyphenyl)ethanone**

[55736-72-6]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Syntheses**

- Preparation by Fries rearrangement of 2,5-dichlorophenyl acetate with aluminium chloride,  
\*without solvent, at 155-165° (57%) [559];  
\*in nitrobenzene, at 130° (42%) [1628].

- Preparation by reaction of methyl 3,6-dichloro-2-methoxybenzoate with carbanion reagent (78% yield), followed by ether cleavage (95%) [727].

- Preparation by reaction of aqueous sodium hydroxide solution on 5,8-dichlorochromone-2-carboxylic acid on a steam bath (92%) [608].

- Preparation by hydrolysis of 5,8-dichlorochromone with 10% sodium hydroxide at 100° (80%) [728].

- Also refer to: [608] [1346] [1629], and [921] (compound III); [502] (compound VIIIk); [1347] (compound 11).

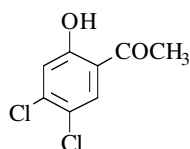
m.p. 55-56° [608].

**1-(4,5-Dichloro-2-hydroxyphenyl)ethanone**

[22526-30-3]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 205.04

**Syntheses**

-Preparation by Fries rearrangement of 3,4-dichlorophenyl acetate with aluminium chloride without solvent between 120 to 140° [517] [1108] [1519] [1778] [1788], (72-73%) [1519] [1778], (52%) [1108] or at 200° [445].

-Also obtained by cleavage of 5,6-dichloro-2,3-dimethyl-benzofuran with chromium trioxide in acetic acid at 50°,

the keto ester formed was saponified with potassium hydroxide (70%) [1519].

m.p. 104-105° [1778], 102° [1519], 99-105° [1108];

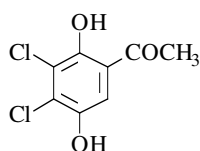
b.p.<sub>15</sub> 151° [1519]; <sup>1</sup>H NMR [1778], IR [1778], MS [1778].

**1-(3,4-Dichloro-2,5-dihydroxyphenyl)ethanone**

[79755-07-8]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 221.04

**Syntheses**

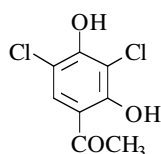
-The preparation from acetylhydroquinone required conversion into its ethylene acetal, oxidation to the quinone with silver oxide, addition of chlorine in acetic acid and enolisation and cleavage of the acetal with, at first hydrogen chloride in ethyl ether, then sulfuric acid in aqueous ethanol (overall yield of 51%) [180].

-Also obtained by Fries rearrangement of 2,3-dichlorohydroquinone diacetate with aluminium chloride without solvent at 165° (poor yield) [180].

m.p. 219-220° [180]; <sup>1</sup>H NMR [180], IR [180], MS [180].

**1-(3,5-Dichloro-2,4-dihydroxyphenyl)ethanone**C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 221.04

**Syntheses**

-Preparation by reaction of chlorine on resacetophenone in acetic acid solution [288] [1578].

-Also obtained by reaction of sulfonyl chloride on the 3,3'-diacetyl-4,4',6,6'-tetrahydroxydiphenyl thioether with a crystal of bismuth chloride as a catalyst [868].

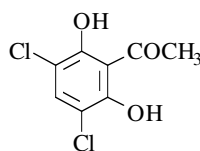
m.p. 195-196° [288] [868] [1578].

**1-(3,5-Dichloro-2,6-dihydroxyphenyl)ethanone**

[87953-95-5]

C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 221.04

**Syntheses**

-Preparation by reaction of chlorine on 2,6-dihydroxyacetophenone in ethanol at 0° (84%) [1111].

-Also refer to: [1067] (compound 1d).

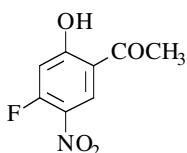
m.p. 174°5-175° [1111]; IR [1111].

**1-(4-Fluoro-2-hydroxy-5-nitrophenyl)ethanone**

[119994-02-4]

C<sub>8</sub>H<sub>6</sub>FNO<sub>4</sub>

mol.wt. 199.14

**Syntheses**

-Preparation by reaction of fuming nitric acid with 4-fluoro-2-hydroxyacetophenone, first between -5° and 0°, then at 0° for 30 min [572].  
 -Also refer to: [571] [573] [574] (Japanese patents).

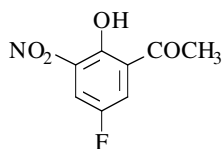
m.p. 96° [572].

**1-(5-Fluoro-2-hydroxy-3-nitrophenyl)ethanone**

[70978-39-1]

C<sub>8</sub>H<sub>6</sub>FNO<sub>4</sub>

mol.wt. 199.14

**Synthesis**

-Preparation by nitration of 5-fluoro-2-hydroxyacetophenone with nitric acid (d = 1.42) in concentrated sulfuric acid between -15 to -5° (46%) [620] [1463].

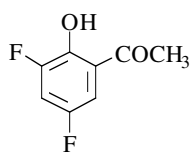
m.p. 87-90° [1463], 87-89° [620].

**1-(3,5-Difluoro-2-hydroxyphenyl)ethanone**

[140675-42-9]

C<sub>8</sub>H<sub>6</sub>F<sub>2</sub>O<sub>2</sub>

mol.wt. 172.13

**Syntheses**

-This compound can be easily obtained by Fries rearrangement of 2,4-difluorophenyl acetate with aluminium chloride without solvent at 150°, and purified by recrystallization from ethanol (80-90%) [1168]; the 2,4-difluorophenyl acetate is prepared by reaction of acetic anhydride on 2,4-difluorophenol [1857] [1905].

-Also refer to: [276].

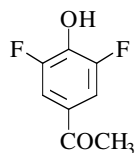
**N.B.:** This compound was purchased from Fluorochem Ltd., (Old Glossop, UK) - Catalogue 1993-1994 page 48-reference F-02826 [736].

m.p. 108-110° [736]; <sup>13</sup>C NMR [736].**1-(3,5-Difluoro-4-hydroxyphenyl)ethanone**

[133186-55-7]

C<sub>8</sub>H<sub>6</sub>F<sub>2</sub>O<sub>2</sub>

mol.wt. 172.13

**Syntheses**

-Preparation by Fries rearrangement of 2,6-difluorophenyl acetate (b.p. 62-63°) with aluminium chloride at 140-150° for 5 h under nitrogen atmosphere (56%) [1630].  
 -Also refer to: [1080].

**N.B.:** Refer to: [1050] (Japanese patent) and [1904]; there is one erroneous reference. It concerns the 2,6-difluorophenyl



acetate (compound 11) [1904]. This ester, by Fries rearrangement with aluminium chloride, can easily give the aforesaid ketone.

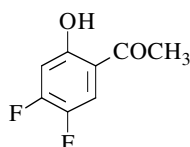
black solid [1630];  $^1\text{H}$  NMR [1630], IR [1630].

**1-(4,5-Difluoro-2-hydroxyphenyl)ethanone**

[199586-38-4]

$\text{C}_8\text{H}_6\text{F}_2\text{O}_2$

mol.wt. 172.13



Synthesis

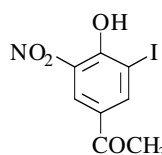
-Refer to: [1063].

**1-(4-Hydroxy-3-iodo-5-nitrophenyl)ethanone**

[76748-71-5]

$\text{C}_8\text{H}_6\text{INO}_4$

mol.wt. 307.04



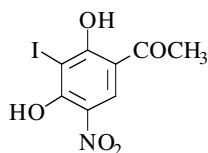
Synthesis

-Refer to: [1717] [1934] (compound NIP).

**1-(2,4-Dihydroxy-3-iodo-5-nitrophenyl)ethanone**

$\text{C}_8\text{H}_6\text{INO}_5$

mol.wt. 323.04



Syntheses

-Preparation by nitration of 2,4-dihydroxy-3-iodo-acetophenone [928].

-Preparation by iodination of 2,4-dihydroxy-5-nitro-acetophenone [928].

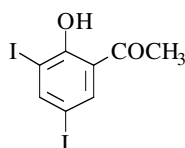
m.p.  $189^\circ$  [928].

**1-(2-Hydroxy-3,5-diiodophenyl)ethanone**

[7191-46-0]

$\text{C}_8\text{H}_6\text{I}_2\text{O}_2$

mol.wt. 387.94



Syntheses

-Preparation by iodination of 2-hydroxyacetophenone, \*with iodine in aqueous sodium carbonate at r.t.

[437] [439] [440] [443] [1425], (25%) [443], (42%) [1425];

\*with iodine and iodic acid in ethanol at  $35-40^\circ$  for 1.5 h (75-85%) [484] or at  $60^\circ$  [1849] [1850], (75%) [1849].

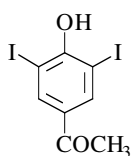
m.p.  $128^\circ$  [484],  $127^\circ$  [1849],  $126^\circ$  [439],  $125^\circ-126^\circ$  [440] [443]; UV [443].

**1-(4-Hydroxy-3,5-diiodophenyl)ethanone**

[7191-55-1]

C<sub>8</sub>H<sub>6</sub>I<sub>2</sub>O<sub>2</sub>

mol.wt. 387.94

**Syntheses**

- Preparation by reaction of iodine on 4-hydroxyacetophenone in aqueous sodium carbonate solution at r.t. [438] [440] [441] [442] [1425], (75%) [441] [1425].
- Preparation by iodination of 4-hydroxyacetophenone with iodine-iodic acid mixture in ethanol at 35-40° for 1.5 h

(75-85%) [484] or in 50% aqueous ethanol (61-69%) [370] [1849] [1850].

-Preparation by iodination of 4-hydroxyacetophenone by treatment with iodine monochloride (good yield) [535] [1562].

-Also obtained by Fries rearrangement of 2-iodophenyl acetate with aluminium chloride [370].

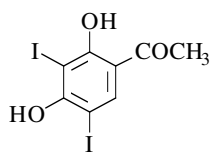
m.p. 174-175° [441], 172-173° [535] [1562], 171-172° [370], 162° [484], 158° [1849]; UV [441].

**1-(2,4-Dihydroxy-3,5-diiodophenyl)ethanone**

[62069-34-5]

C<sub>8</sub>H<sub>6</sub>I<sub>2</sub>O<sub>3</sub>

mol.wt. 403.94

**Syntheses**

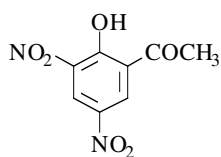
- Preparation by addition of an aqueous iodine and potassium iodide solution on resacetophenone in 30% ammonium hydroxide solution at r.t. (93%) [1558].
- Preparation by addition of an aqueous iodine and iodic acid solution on resacetophenone in ethanol at ambient temperature (86%) [1600] [1850].

m.p. 189-190° [1558], 180° [1600]; <sup>1</sup>H NMR [1558].**1-(2-Hydroxy-3,5-dinitrophenyl)ethanone**

[69027-37-8]

C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>6</sub>

mol.wt. 226.15

**Syntheses**

- Preparation by nitration of 2-hydroxyacetophenone, \*in acetic acid (27-36%) [923] [1015];
- \*without solvent (34%) [253].

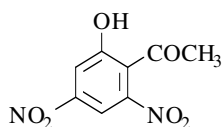
m.p. 123°5-124°5 [1015], 123-124° [923]; IR [1125].

**1-(2-Hydroxy-4,6-dinitrophenyl)ethanone**

[13684-24-7]

C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>6</sub>

mol.wt. 226.15

**Synthesis not yet described**

- Claimed to be prepared by reaction of boiling 50% nitric acid with 2-hydroxyacetophenone (34%) [253].

**N.B.:** No physical data is indicated in the patent for this compound. According to the rules dealing with aromatic

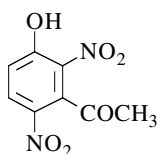
substitution (Holleman rules) [791] and electronic induction using the Hammett substituent constants [376], the obtained product most likely is the 2-hydroxy-3,5-dinitroacetophenone.

### 1-(3-Hydroxy-2,6-dinitrophenyl)ethanone

[172669-49-7]

C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>6</sub>

mol.wt. 226.15



#### Syntheses

- Obtained by action of concentrated nitric acid ( $d = 1.42$ ) with 3-hydroxyacetophenone in concentrated sulfuric acid at  $-20^\circ$  for 15 min (25%) [455].
- Also refer to: [326].

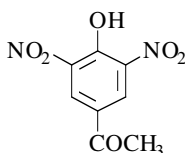
m.p.  $182-183^\circ$  [455];  $^1\text{H}$  NMR [455]; Crystal data [455].

### 1-(4-Hydroxy-3,5-dinitrophenyl)ethanone

[52129-61-0]

C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>6</sub>

mol.wt. 226.15



#### Syntheses

- Preparation by nitration of 4-hydroxyacetophenone with potassium nitrate in concentrated sulfuric acid at  $5-10^\circ$  [315] [1404].
- Preparation by nitration of 4-hydroxy-3-nitroacetophenone with potassium nitrate in sulfuric acid at  $5-10^\circ$  (64-70%) [173] [270].

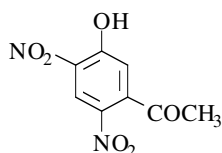
m.p.  $123.2-123.5^\circ$  [173],  $119-121^\circ$  [315],  $119-120.5^\circ$  [270].

### 1-(5-Hydroxy-2,4-dinitrophenyl)ethanone

[22633-36-9]

C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>6</sub>

mol.wt. 226.15



#### Synthesis not yet described

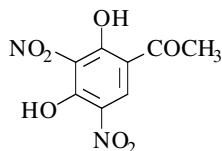
- There is a single reference, erroneous. It concerns the 2-hydroxy-3,5-dinitroacetophenone or 6'-hydroxy-2',4'-dinitroacetophenone [1125].

### 1-(2,4-Dihydroxy-3,5-dinitrophenyl)ethanone

[54917-82-7]

C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>7</sub>

mol.wt. 242.14



#### Syntheses

- Preparation by reaction of nitric acid on resacetophenone [7] [1217] or 4-acetoxy-2-hydroxyacetophenone in acetic acid [7].
- Also obtained by reaction of nitric acid on 3-benzoyl-2,4-dihydroxyacetophenone 4- $\beta$ -glucopyranoside (35-36%) [1480].

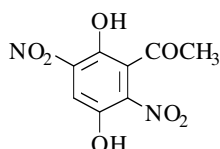
- Also obtained by reaction of nitric acid on 3,3'-diacetyl-4,4',6,6'-tetrahydroxydiphenyl thioether in a water bath [868].
- Resacetophenone by treatment with cerium (IV) ammonium nitrate in hot acetic acid yields 2,4-dihydroxy-3,5-dinitroacetophenone (22%) [380].
- Preparation by reaction of an ammonia liquor on 7-hydroxy-4-methyl-3,6,8-trinitrocoumarin in a boiling water bath [1286].
- Also obtained by hydrolysis of 7-hydroxy-2-methyl-6,8-dinitrochromone by heating its solution in sodium hydroxide (4%) on a steam bath [1217].
- Also obtained by reaction of concentrated nitric acid ( $d = 1.42$ ) or fuming nitric acid on the 7-hydroxy-2-methylchromone in acetic acid, heated on a steam bath [1217].
- Also obtained by hydrolysis of 7-hydroxy-8-nitroflavone by refluxing with 10% sodium hydroxide solution [1217].

m.p. 168-169° [1286], 168° [380], 167° [254] [1217], 166-167° [7] [868],  
165-167° [1480].

#### 1-(2,5-Dihydroxy-3,6-dinitrophenyl)ethanone

$C_8H_6N_2O_7$

mol.wt. 242.14



##### Syntheses

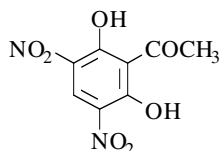
- Obtained by alkaline hydrolysis of 6-hydroxy-2-methyl-5,8-dinitrochromone [516].
- Also obtained by nitration of quinacetophenone [516].
- N.B.:** The results of reference [516] were erroneous [170].

m.p. 69-70° [516].

#### 1-(2,6-Dihydroxy-3,5-dinitrophenyl)ethanone

$C_8H_6N_2O_7$

mol.wt. 242.14



##### Synthesis

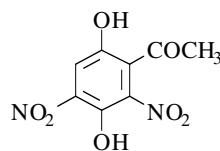
- Preparation by nitration of 2,6-dihydroxyacetophenone (31%) [1291].

m.p. 104° [1291].

#### 1-(3,6-Dihydroxy-2,4-dinitrophenyl)ethanone

$C_8H_6N_2O_7$

mol.wt. 242.14



##### Synthesis

- Preparation by Fries rearrangement of 3,5-dinitro-4-hydroxyphenyl acetate with aluminium chloride in nitrobenzene (61%) [577].

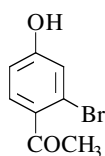
m.p. 133-134° [577].

**1-(2-Bromo-4-hydroxyphenyl)ethanone**

[61791-99-9]

C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>

mol.wt. 215.05

**Syntheses**

-Obtained (by-product) by Fries rearrangement of 3-bromophenyl acetate with aluminium chloride without solvent at 45° (10%) [385].

-Also refer to: [349] [1416] and [1711] (Japanese patent).

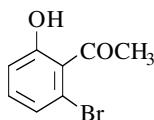
m.p. 85-89° [385].

**1-(2-Bromo-6-hydroxyphenyl)ethanone**

[55736-69-1]

C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>

mol.wt. 215.05

**Synthesis**

-Preparation by diazotization of 2-amino-6-bromoacetophenone, followed by hydrolysis of the obtained diazonium salt (50%) [608].

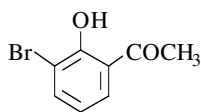
m.p. 106-108° [608].

**1-(3-Bromo-2-hydroxyphenyl)ethanone**

[1836-05-1]

C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>

mol.wt. 215.05

**Syntheses**

-Preparation by diazotization of 5-amino-3-bromo-2-hydroxyacetophenone, followed by hydrolysis of the obtained diazonium salt (49%) [540].

-Also obtained (by-product) by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent at 120-140° (11-13%) [477] [479] [540].

-Also obtained by reaction of bromine on 2-hydroxyacetophenone with tert-butylamine in methylene chloride at -70° (12%) [538] or in aqueous acetic acid [736].

m.p. 33° [540], 30°5-32°5 [743] [744]; b.p. 140-145° [477];

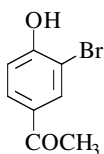
<sup>1</sup>H NMR [540], <sup>13</sup>C NMR [736], UV [477] [479].

**1-(3-Bromo-4-hydroxyphenyl)ethanone**

[1836-06-2]

C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>

mol.wt. 215.05

**Syntheses**

-Preparation by reaction of acetyl chloride on 2-bromophenol with aluminium chloride in refluxing carbon disulfide (86%) [1069].

-Preparation by bromination of 4-hydroxyacetophenone (70%) [1190].

-Preparation by diazotization of 3-amino-4-hydroxyacetophenone and replacement of the diazonium group by bromine (Sandmeyer reaction) (51%) [560].

-Preparation by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent at 100-120° [386] [477] [479] [540], (68%) [540].

-Also obtained by reaction of ammonium tribromide on 4-hydroxyacetophenone in methylene chloride-methanol mixture [1183].  
 -Also refer to: [1702].

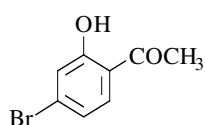
m.p. 129° [540], 125-128° [1069], 119-121° (anhydrous) [1190], 112° [560],  
 97-99° (hydrate) [1190], 95° [477], 93-94° [1183], 92-95° [386];  
<sup>1</sup>H NMR [540], UV [477] [479].

### 1-(4-Bromo-2-hydroxyphenyl)ethanone

[30186-18-6]

C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>

mol.wt. 215.05



#### Syntheses

-Preparation by Fries rearrangement of 3-bromophenyl acetate with aluminium chloride [383] [385] [390] [410] [1789],  
 \*without solvent, at 170-180° (85-88%) [383] [385] [390];  
 \*in chlorobenzene, heating in a water bath [1789].

-Also obtained (by-product) by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent at 180° (6%) [540] (intermolecular bromine migration).  
 -Also refer to: [225] [819] [1043].

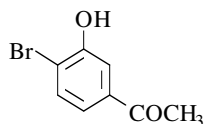
m.p. 43° [1789], 42-43° [383] [385] [390]; <sup>1</sup>H NMR [540], IR [1923].

### 1-(4-Bromo-3-hydroxyphenyl)ethanone

[73898-22-3]

C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>

mol.wt. 215.05



#### Synthesis

-Preparation by diazotization of 4-amino-3-hydroxyacetophenone and replacement of the diazonium group by bromine (Sandmeyer reaction) (36%) [1069].

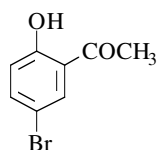
m.p. 122-123° [1069].

### 1-(5-Bromo-2-hydroxyphenyl)ethanone

[1450-75-5]

C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>

mol.wt. 215.05



#### Syntheses

-Preparation by Fries rearrangement of 4-bromophenyl acetate with aluminium chloride without solvent between 110-160° [186] [372] [477] [479] [990] [1334] [1426] [1850] [1866], (84-91%) [186] [477] [1426] [1866].  
 -Preparation by reaction of acetic acid on 4-bromophenol with boron trifluoride in a sealed tube at 120° (44%) [979].

-Preparation by bromination of 2-hydroxyacetophenone in acetic acid [152] [330] [736] [812], (63%) [330].

-Also obtained by reaction of bromine on 2-hydroxyacetophenone with tert-butylamine in methylene chloride at -70° (17%) [538].

-Also obtained by reaction of sodium ethoxide on 6-bromo-4-phenacylidene flavene in refluxing ethanol [594] [1011].

-Also obtained (by-product) by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent at 180° (6%) [540].

-Also refer to: [419] [1472].

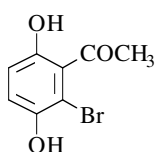
m.p. 62-63° [477], 62° [330], 61-62° [152] [594] [1011], 59-60° [372] [387], 59° [1334], 57°4-59°2 [812], 57°3 [990], 56° [979], 55-56° [186], 43-44° [1426];  
 b.p.<sub>7</sub> 110-115° [1426], b.p.<sub>20</sub> 143° [186], b.p.<sub>20</sub> 145-148° [330];  
<sup>1</sup>H NMR [540] [914], <sup>13</sup>C NMR [736] [914], IR [186] [1923], UV [186] [477] [479];  
 pK<sub>a</sub> [1697].

**1-(2-Bromo-3,6-dihydroxyphenyl)ethanone**

[30095-76-2]

C<sub>8</sub>H<sub>7</sub>BrO<sub>3</sub>

mol.wt. 231.05

**Synthesis**

-Obtained from 5-bromo-6-hydroxy-2-methylchromone by alkaline degradation with 10% aqueous sodium hydroxide solution at reflux (22%) [170].

m.p. 143-144° [170];

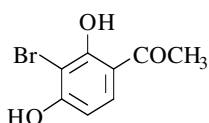
<sup>1</sup>H NMR [170], IR [170], UV [170].

**1-(3-Bromo-2,4-dihydroxyphenyl)ethanone**

[60990-39-8]

C<sub>8</sub>H<sub>7</sub>BrO<sub>3</sub>

mol.wt. 231.05

**Syntheses**

-Obtained by reaction of cupric bromide on resacetophenone in refluxing chloroform-ethyl acetate mixture (6%) [1137].

-Also obtained by reaction of acetic acid on 2-bromo-resorcinol with zinc chloride (Nencki reaction) (26%) [1287].

-Also obtained by saponification of 8-bromo-7-hydroxyflavone with 10% aqueous sodium hydroxide on a steam bath (14%) [1287].

-Preparation by bromination of resacetophenone in acetic acid with bromine in the presence of quinoline sulfate while cooling (90%) [1515] according to the method [1509] or in ethanol at -78° (43%) [637].

m.p. 139° [1515], 134-135° [1137], 133° [1287], 118-121° [637];

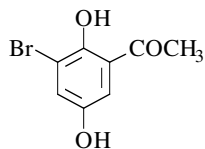
<sup>1</sup>H NMR [637] [1137], IR [637], MS [637].

**1-(3-Bromo-2,5-dihydroxyphenyl)ethanone**

[33857-20-4]

C<sub>8</sub>H<sub>7</sub>BrO<sub>3</sub>

mol.wt. 231.05

**Syntheses**

-Preparation from 3-bromo-2-hydroxyacetophenone by persulfate oxidation (Elbs reaction) [743].

-Also obtained by hydrolysis of 8-bromo-6-hydroxy-2-methylchromone with a 10% aqueous solution of sodium hydroxide, heated on a sand bath [516].

-Also obtained by reaction of bromine on quinacetophenone in acetic acid at r.t. [516].

-Also refer to: [667] [668].

**N.B.:** All the results of reference [516] were erroneous [170].

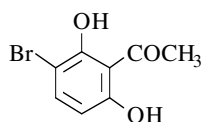
m.p. 142-144° [743], 132° [516].

**1-(3-Bromo-2,6-dihydroxyphenyl)ethanone**

[82320-47-6]

C<sub>8</sub>H<sub>7</sub>BrO<sub>3</sub>

mol.wt. 231.05

**Syntheses**

-Obtained by saponification of 8-acetyl-6-bromo-7-hydroxy-4-methylcoumarin with 10% aqueous sodium hydroxide solution at reflux (64%) [1593] [1594].

-Also obtained by decarboxylation of 3-acetyl-5-bromo-

2,4-dihydroxybenzoic acid with dilute acetic acid containing few drops of concentrated hydrochloric acid, at reflux (40%) [1593] [1594].

-Preparation by reaction of 2-carboxyethyltriphenylphosphonium perbromide on 2,6-dihydroxyacetophenone in tetrahydrofuran at r.t. [1077].

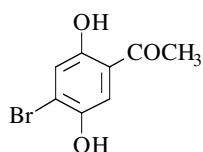
m.p. 143° [1593] [1594], 140-142° [1077]; <sup>1</sup>H NMR [1077].

**1-(4-Bromo-2,5-dihydroxyphenyl)ethanone**

[52376-19-9]

C<sub>8</sub>H<sub>7</sub>BrO<sub>3</sub>

mol.wt. 231.05

**Syntheses**

-Preparation by reaction of boron tribromide on 4-bromo-2,5-dimethoxyacetophenone in methylene chloride at -70° (90%) [176].

-Preparation by Fries rearrangement of 2-bromo-hydroquinone diacetate with aluminium chloride without

solvent between 160 and 180° (66%) [680], (25%) [1604].

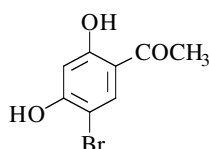
m.p. 152° [176], 148-149° [680], 132° [1604].

**1-(5-Bromo-2,4-dihydroxyphenyl)ethanone**

[60965-25-5]

C<sub>8</sub>H<sub>7</sub>BrO<sub>3</sub>

mol.wt. 231.05

**Syntheses**

-Preparation by reaction of acetic acid on 4-bromoresorcinol with zinc chloride (Nencki reaction) [366] [1578].

-Preparation by bromination of resacetophenone in acetic acid at r.t. [508].

-Preparation by bromination of resacetophenone with cupric bromide in refluxing chloroform-ethyl acetate mixture (26%) [1137].

-Preparation by saponification of 4-acetoxy-5-bromo-2-hydroxyacetophenone with sodium hydroxide in dilute methanol at r.t. (76-83%) [947] [1571].

-Also obtained by saponification of 3-benzoyl-6-bromo-7-hydroxyflavone with 10% ethanolic potassium hydroxide in a water bath [1287].

-Preparation by Fries rearrangement of 4-bromoresorcinol diacetate with aluminium chloride in boiling nitrobenzene [947].

m.p. 171° [947], 170-171° [1137], 167° [366] [508] [1287], 165-170° [1571];

<sup>1</sup>H NMR [1137] [1571].

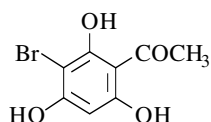


**1-(3-Bromo-2,4,6-trihydroxyphenyl)ethanone**

[155818-27-2]

C<sub>8</sub>H<sub>7</sub>BrO<sub>4</sub>

mol.wt. 247.05

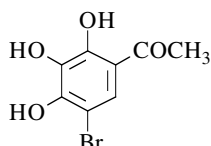
**Synthesis**

-Preparation by reaction of cupric bromide on phloracetophenone in refluxing chloroform-ethyl acetate mixture [391].

<sup>1</sup>H NMR [391].

**1-(5-Bromo-2,3,4-trihydroxyphenyl)ethanone**C<sub>8</sub>H<sub>7</sub>BrO<sub>4</sub>

mol.wt. 247.05

**Syntheses**

-Preparation by bromination of gallacetophenone in acetic acid with bromine in the presence of quinoline sulfate while cooling [337], (95%) [1515] according to the method [1509].

-Also obtained by reaction of acetyl chloride with 4-bromopyrogallol [337].

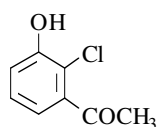
m.p. 186° [1515], 183° [337].

**1-(2-Chloro-3-hydroxyphenyl)ethanone**

[69240-96-6]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Syntheses**

-Preparation by reaction of tert-butyl hypochlorite on 3-hydroxyacetophenone in chloroform at 15°, in subdued light (49%) [344].

-Also refer to: [1009] (compound XVIIa) and to [1933].

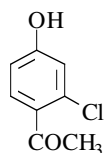
m.p. 61-63° [344]; <sup>1</sup>H NMR [344], IR [344].

**1-(2-Chloro-4-hydroxyphenyl)ethanone**

[68301-59-7]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Syntheses**

-Obtained (by-product) by Fries rearrangement of 3-chlorophenyl acetate with aluminium chloride [146] [410] [1603].

-Preparation by reaction of acetyl chloride on 3-chlorophenol with aluminium chloride (Friedel-Crafts reaction) [410].

-Also refer to: [1009] (compound XVIIb) and to [1933].

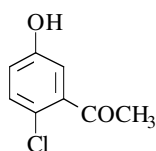
m.p. 110° [1603].

**1-(2-Chloro-5-hydroxyphenyl)ethanone**

[58020-38-5]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Syntheses**

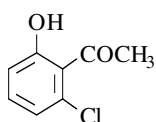
- Obtained by reaction of tert-butyl hypochlorite on 3-hydroxyacetophenone in chloroform at 15°, in subdued light (24%) [344].
- Also refer to: [963] (Japanese patent), [1009] (compound XVIIc) and to [1933].

**1-(2-Chloro-6-hydroxyphenyl)ethanone**

[55736-04-4]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Synthesis**

- Preparation by diazotization of 2-amino-6-chloroacetophenone, followed by hydrolysis of the obtained diazonium salt (55%) [608].
- The reference [1039] is erroneous. The compound above

mentioned is, in reality, the 5-chloro-2-hydroxyacetophenone.

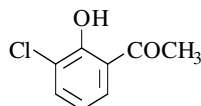
oil [608], b.p.<sub>0.5</sub> 78-80° [608].

**1-(3-Chloro-2-hydroxyphenyl)ethanone**

[3226-34-4]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Syntheses**

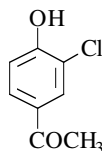
- Preparation by Fries rearrangement of 2-chlorophenyl acetate with aluminium chloride, \*without solvent, between 110° and 180° (40 to 21%) [479] [540] [1586] [1603] [1850]; \*in tetrachloroethane at 70-80° [1833].
  - Preparation in two steps: At first, by reaction of acetyl chloride on 2-chlorophenol with aluminium chloride in refluxing petroleum ether, one obtains the 2-acetoxy-3-chloroacetophenone (83%); the saponification of this keto ester leads to the 3-chloro-2-hydroxyacetophenone (93%) [214] [1581].
  - Obtained by reaction of acetyl chloride on 2-chlorophenol with ferric chloride at r.t. (22%) [478].
- m.p. 84° [1586], 55° [1603], 49-50° [540], 48°5 [1833]. One of the reported melting points is obviously wrong.  
b.p.<sub>6</sub> 66-67° [478], b.p.<sub>1</sub> 87-89° [214] [1581], b.p.<sub>20</sub> 148-153° [1833]; UV [478] [479].

**1-(3-Chloro-4-hydroxyphenyl)ethanone**

[2892-29-7]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Syntheses**

- Preparation by reaction of acetyl chloride on 2-chlorophenol with aluminium chloride in refluxing carbon disulfide (98%) [1069].
- Preparation by diazotization of 3-amino-4-hydroxyacetophenone and replacement of diazonium group by chlorine (Sandmeyer reaction) [560] [1810], (84%) [560].

- Preparation by Fries rearrangement of 2-chlorophenyl acetate with aluminium chloride without solvent [386] [478] [479] [540] [1024] [1603], (60-66%) [478] [540].
- Preparation by Fries rearrangement of 2-chlorophenyl acetate with aluminium chloride in nitrobenzene at 100° (30%) [1603].
- Preparation by Fries rearrangement of 2-chlorophenyl acetate with aluminium chloride in tetrachloroethane at 70-80° [1833].
- Also obtained by reaction of acetyl chloride on 2-chlorophenol with ferric chloride [478] [1320] [1321].
- Also obtained (by-product) by reaction of acetyl chloride on 2-chloroanisole or 2-chlorophenetole with aluminium chloride [788].

m.p. 107-108° [1833], 107° [788], 100-100.5 [540], 96° [1320] [1603] [1810],  
95° [560], 94-95° [478], 93° [1024], 92-95° [386] [1069];

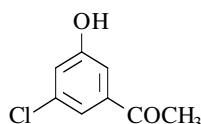
<sup>1</sup>H NMR [540], IR [1833], UV [478] [479]; pK<sub>a</sub> [1697].

### 1-(3-Chloro-5-hydroxyphenyl)ethanone

[23164-97-8]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60



Synthesis not yet described

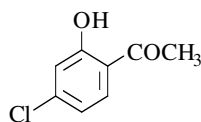
- The reference [479] is erroneous. In this one, the compound **4** is, in reality, the 5-chloro-2-hydroxyacetophenone.
- Also refer to: [1627].

### 1-(4-Chloro-2-hydroxyphenyl)ethanone

[6921-66-0]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60



Syntheses

- Preparation by Fries rearrangement of 3-chlorophenyl acetate with aluminium chloride,  
\*without solvent at 130-135° (74-75%) [309] [1589], between 135 and 200° [146] [309] [383] [449] [924] [1589] [1603], and 175-200° (85-89%) [383] [924];  
\*with solvent, at r.t., in nitrobenzene (88%) [1589], in tetrachloroethane (50%) [1603] or in chlorobenzene [1789].
- Also obtained by treatment of 4-chloroacetophenone with sodium trifluoroacetate in nitromethane-trifluoroacetic acid-trifluoroacetic anhydride mixture in the presence of a platinum electrode followed by treatment of the intermediate trifluoroacetate ester with 10% potassium hydrogen carbonate solution (51%) [1661] (hydroxylation of aromatic compounds).
- Preparation by reaction of methyl magnesium iodide on 4-chloro-2-hydroxybenzoyl chloride in ethyl ether, at -70°, followed by hydrolysis of the complex so obtained [39].

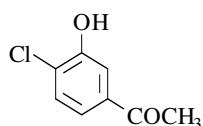
m.p. 50-51° [146], 26° [449]. One of the reported melting points is obviously wrong.  
b.p.<sub>2</sub> 96° [1589], b.p.<sub>14</sub> 119-122° [924], b.p.<sub>10</sub> 120-122° [309], b.p.<sub>15</sub> 121-124° [383],  
b.p.<sub>16</sub> 126° [449], b.p. 247° [1789];  
IR [924] [1923], (Sadtlér: standard n° 8980);  
pK<sub>a</sub> [1697].

**1-(4-Chloro-3-hydroxyphenyl)ethanone**

[61124-56-9]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Syntheses**

- Preparation by diazotization of 3-amino-4-chloroacetophenone (quantitative yield) [39], (16-18%) [1069].
- Obtained by treatment of 4-chloroacetophenone with sodium trifluoroacetate in nitromethane-trifluoroacetic acid-trifluoroacetic anhydride mixture in the presence of a platinum electrode, followed by treatment of the intermediate trifluoroacetate ester with 10% potassium hydrogen carbonate solution (33%) [1661] (hydroxylation of aromatic compound).
- Preparation by reaction of pyridinium chloride on 4-chloro-3-methoxyacetophenone between 170 to 200° (40%) [1069].
- Preparation from 3-hydroxyacetophenone by chlorination of its 2,3-butylene ketal or its ethylene ketal using tert-butyl hypochlorite. The hydrolysis of these chloroketals with concentrated hydrochloric acid in tetrahydrofuran-water mixture gave 3-hydroxy-4-chloroacetophenone (94 and 48% yields, respectively) [344].
- Also obtained by reaction of acetyl chloride on 2-chlorophenol with ferric chloride [1320].
- Also obtained (by-product) by reaction of tert-butyl hypochlorite on 3-hydroxyacetophenone in chloroform at 15° (6%) [344].

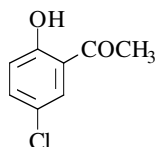
m.p. 106-107° [344], 103-104° [1069], 96° [1320]; <sup>1</sup>H NMR [344], IR [344].

**1-(5-Chloro-2-hydroxyphenyl)ethanone**

[1450-74-4]

C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>

mol.wt. 170.60

**Syntheses**

- Preparation by Fries rearrangement of 4-chlorophenyl acetate with aluminium chloride without solvent between 110° and 200° [107] [125] [214] [285] [372] [478] [479] [613] [812] [991] [1334] [1581] [1582] [1603] [1683] [1850] [1894], (90-100% yield) [107] [285] [478] [613] [812] [1582] [1603] [1683] [1894].
- Preparation by Fries rearrangement of 4-chlorophenyl acetate with aluminium chloride, \*in tetrachloroethane at 150-160° [1833];
- \*in chlorobenzene, in a sealed tube and subjected to high power microwave irradiation for 2 min only (85%) [1683].
- Preparation by Fries rearrangement of 4-chlorophenyl acetate with boron trifluoride in acetic acid at 125°, in a sealed tube (91%) [979].
- Preparation by photo-Fries rearrangement of 4-chlorophenyl acetate with potassium carbonate in hexane at r.t. (88%) [660].
- Preparation by reaction of acetyl chloride on 4-chlorophenol with ferric chloride [107] [1320] [1321].
- Preparation by reaction of acetyl chloride on 4-chlorophenol with aluminium chloride in refluxing petroleum ether, and saponification of the obtained keto ester, the 2-acetoxy-5-chloroacetophenone (90%) [1581].
- Preparation by reaction of acetic acid on 4-chlorophenol with boron trifluoride at 150°, in a sealed tube (94%) [979].
- Preparation by diazotization of 5-amino-2-hydroxyacetophenone and replacement of the diazonium group by chlorine (Sandmeyer reaction) [395].
- Also obtained (by-product) by heating 4-chlorophenyl 3,3-dimethylacrylate at 255-260°, in a sealed tube (4%) [1650].
- Also refer to: [153] (compound 1b); [1204] (compound 1a); and to [1205] (compound 1d).

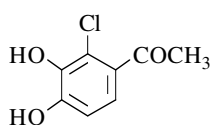
m.p. 72° [613], 57° [395], 56-57° [1603], 55° [478] [1320], 54° [979] [991],  
 53°5-54°5 [1894], 53-54° [372] [1582], 53° [1650] [1833], 52°5-53° [387],  
 52°2-53°6 [812], 52°5 [1334], 52-53° [285], 52° [125], 50-52° [660];  
 b.p.<sub>2</sub> 97-99° [991], b.p.<sub>12</sub> 107-109° [214] [1581], b.p.<sub>14</sub> 125-126° [979],  
 b.p.<sub>28</sub> 126-128° [1581], b.p.<sub>26-27</sub> 134-136° [285];  
<sup>1</sup>H NMR [914] [1698], <sup>13</sup>C NMR [914], IR [613] [1923],  
 UV [478] [479] [812] [1698], fluorescence spectra [1698]; pK<sub>a</sub> [1697].

### 1-(2-Chloro-3,4-dihydroxyphenyl)ethanone

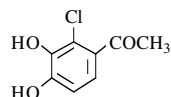
[56961-48-9]

C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>

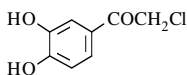
mol.wt. 186.59



**N.B.:** The titled compound seems, to our knowledge, to have never been prepared so far [1166]. However, in the various considered publications which mentioned the usage of this compound, for example [234], it is always another substance that is used as starting material, namely [99-40-1].



1-(2-Chloro-3,4-dihydroxyphenyl)ethanone

[56961-48-9] *titled compound*

2-Chloro-1-(3,4-dihydroxyphenyl)ethanone

[99-40-1] *starting material*

As far as the titled compound is concerned, the same confusion occurs when consulting the **Chemical Abstracts Service, Registry Handbook**, Number Section, (1975 supplement, p. 2202RD) and the **Beilstein Institut zur Foerderung der Chemischen Wissenschaften** (Copyright 1988-2001), Beilstein Registry Number 4921697.

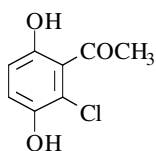
Both above mentioned documents use the same Registry Number [56961-48-9], though both compounds are different even if haven the same raw formula C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>.

### 1-(2-Chloro-3,6-dihydroxyphenyl)ethanone

[52095-12-2]

C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>

mol.wt. 186.59



#### Syntheses

- Preparation by reaction of aluminium chloride on 2-acetylquinone in acetone (87%) [586].
- Preparation by reaction of hydrochloric acid on 2-acetylquinone in benzene (89%) [586].

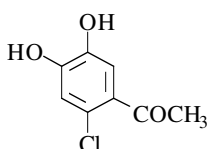
m.p. 94-96° [586]; <sup>1</sup>H NMR [586], IR [586].

### 1-(2-Chloro-4,5-dihydroxyphenyl)ethanone

[69240-97-7]

C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>

mol.wt. 186.59



#### Synthesis

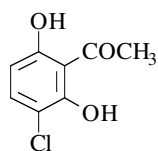
- Refer to: [1009] (compound XVIIId).

**1-(3-Chloro-2,6-dihydroxyphenyl)ethanone**

[87953-93-3]

C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>

mol.wt. 186.59

**Syntheses**

-Preparation by reaction of sulfuryl chloride on 2,6-dihydroxyacetophenone in refluxing ethyl ether (90%) [1112].

-Preparation by hydrolysis of 8-acetyl-6-chloro-7-hydroxy-4-methylcoumarin with 10% aqueous sodium hydroxide solution at reflux [1593] [1594].

-Obtained by decarboxylation of 3-acetyl-5-chloro-2,4-dihydroxybenzoic acid [1593] [1594].

-Preparation by reaction of thionyl chloride on 2,6-dihydroxyacetophenone in refluxing acetic acid (77%) [827] [828].

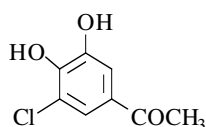
m.p. 135° [1112], 134-135° [1593] [1594].

**1-(3-Chloro-4,5-dihydroxyphenyl)ethanone**

[154638-86-5]

C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>

mol.wt. 186.59

**Synthesis**

-Obtained (by-product) by chlorination of 4-hydroxy-3-methoxyacetophenone (acetoguaiacone) in dioxane-water mixture at 40° (8%) [1456].

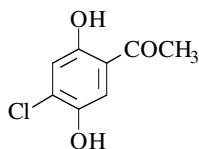
MS [1456].

**1-(4-Chloro-2,5-dihydroxyphenyl)ethanone**

[90110-31-9]

C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>

mol.wt. 186.59

**Syntheses**

-Preparation by Fries rearrangement of 2-chloro-1,4-dihydroxyphenyl diacetate with aluminium chloride without solvent [514] [1604], at 160° (35%) [1604].

-Also refer to: [1927].

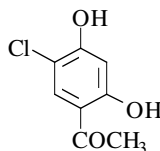
m.p. 145° [514] [1604].

**1-(5-Chloro-2,4-dihydroxyphenyl)ethanone**

[90110-32-0]

C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>

mol.wt. 186.59

**Syntheses**

-Preparation by reaction of acetic acid on 4-chlororesorcinol with zinc chloride at 145° (Nencki reaction) (31%) [366].

-Preparation by reaction of acetic anhydride on 4-chlororesorcinol with polyphosphoric acid in the presence of

one drop of concentrated sulfuric acid at reflux (12%) [1445].

-Also obtained by reaction of cuprous cyanide on 5-chloro-2,4-dihydroxy-3-iodoacetophenone in HMPT at 90° (conditions of the Rosenmund-von Braun reaction) (80%) [569].

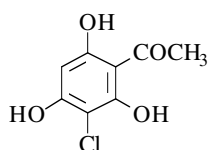
m.p. 176-177° [1445], 174° [569], 171° [366].

### 1-(3-Chloro-2,4,6-trihydroxyphenyl)ethanone

[130435-29-9]

C<sub>8</sub>H<sub>7</sub>ClO<sub>4</sub>

mol.wt. 202.59



#### Synthesis

-Preparation by reaction of sulfonyl chloride on phloracetophenone in ethyl ether at r.t. (86%) [1887].

m.p. 215-218° [1887];

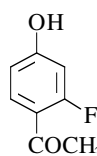
<sup>1</sup>H NMR [1887], MS [1887].

### 1-(2-Fluoro-4-hydroxyphenyl)ethanone

[98619-07-9]

C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>

mol.wt. 154.14



#### Synthesis

-Preparation by reaction of acetyl chloride on 3-fluorophenol with aluminium chloride in refluxing ethylene dichloride [968].

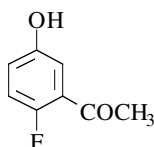
<sup>1</sup>H NMR [968], IR [968], MS [968].

### 1-(2-Fluoro-5-hydroxyphenyl)ethanone

[145300-04-5]

C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>

mol.wt. 154.14



#### Synthesis

-Preparation by aromatization of 5-acetyl-4-fluoro-3-cyclohexenone promoted by cupric bromide-lithium bromide mixture in refluxing acetonitrile (70%) [120] [197].

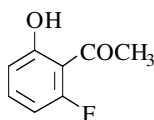
m.p. 97° [120] [197]; <sup>1</sup>H NMR [197], IR [197].

### 1-(2-Fluoro-6-hydroxyphenyl)ethanone

[93339-98-1]

C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>

mol.wt. 154.14



#### Syntheses

-Preparation by reaction of boron tribromide on 2-fluoro-6-methoxyacetophenone (**I**) in methylene chloride at -65 to -80° [277] [396], (56%) [396]. The precursor (**I**) was obtained by reaction of methyl magnesium iodide on

2-fluoro-6-methoxybenzonitrile in refluxing toluene (quantitative yield) [277].

-Preparation from 2-fluoro-6-methoxybenzonitrile [737] according to the procedure [739].

oil [277] [396]; b.p.<sub>0.2</sub> 170-172° [277];

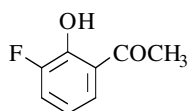
<sup>1</sup>H NMR [396] [737], <sup>13</sup>C NMR [737], <sup>19</sup>F NMR [737], MS [737].

**1-(3-Fluoro-2-hydroxyphenyl)ethanone**

[699-92-3]

C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>

mol.wt. 154.14

**Syntheses**

-Obtained by Fries rearrangement of 2-fluorophenyl acetate with aluminium chloride without solvent at 115° [683], 150° [277] or at 180-190° (16%) [382] [389].

-Also obtained by Fries rearrangement of 2-fluorophenyl acetate with aluminium chloride in chlorobenzene at 100° for 24 h (38%) [1837].

m.p. 75-77° [277], 75-76° [683], 72-73° [382] [389];

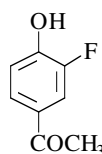
<sup>1</sup>H NMR [683] [1837], MS [683].

**1-(3-Fluoro-4-hydroxyphenyl)ethanone**

[403-14-5]

C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>

mol.wt. 154.14

**Syntheses**

-Preparation by reaction of pyridinium chloride on 3-fluoro-4-methoxyacetophenone at reflux (78%) [336].

-Preparation by reaction of acetyl chloride on 2-fluorophenol with aluminium chloride in refluxing carbon disulfide (74%) [1069].

-Preparation by Fries rearrangement of 2-fluorophenyl acetate with aluminium chloride without solvent at 115° [683] or 140° (51-52%) [920] [969] [1127] [1236].

m.p. 128-128°5 [683], 127-129° [1069], 126-127° [969], 125-126°6 [1236], 125° [336];

b.p.<sub>2</sub> 125-135° [1236];

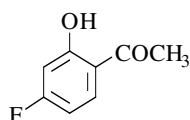
<sup>1</sup>H NMR [683], IR [969], MS [683] [969].

**1-(4-Fluoro-2-hydroxyphenyl)ethanone**

[1481-27-2]

C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>

mol.wt. 154.14

**Syntheses**

-Preparation by Fries rearrangement of 3-fluorophenyl acetate with aluminium chloride without solvent at 160-180° [369] [773] [1678], (75%) [1678], (88-90%) [369] [773].

-Preparation by Fries rearrangement of 3-fluorophenyl acetate with alumina in methanesulfonic acid for 3 h at 160° (60%) [1613].

-Preparation by Friedel-Crafts acylation of 3-fluorophenol with acetic acid in the presence of alumina in methanesulfonic acid for 2 h at 120° (63%) [1613].

-Also refer to: [572] [1117] [1875].

m.p. 24° [369] [773].

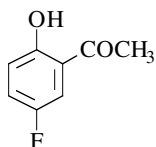


**1-(5-Fluoro-2-hydroxyphenyl)ethanone**

[394-32-1]

C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>

mol.wt. 154.14

**Syntheses**

- Preparation by Fries rearrangement of 4-fluorophenyl acetate with aluminium chloride without solvent between 115 and 150° [372] [431] [683] [773] [918] [919] [1721], (88-89%) [372] [431] [773], (62-63%) [918] [1721].
- Preparation by reaction of acetic acid on 4-fluorophenol with boron trifluoride at 150°, in a sealed tube (89%) [979].
- Preparation by reaction of pyridinium chloride on 5-fluoro-2-methoxyacetophenone at reflux (74%) [334], (59%) [812].
- Preparation by reaction of acetyl chloride on 4-fluoroanisole with aluminium chloride in carbon tetrachloride (44%) [678] [679].
- Also obtained (by-product) by reaction of acetyl chloride on 4-fluoroanisole with aluminium chloride in carbon disulfide [334].
- Also refer to: [1927].

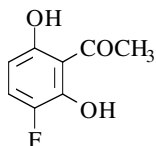
m.p. 57-58° [372] [387], 57° [334] [979], 56°4-57°6 [812], 56°5-57° [431],  
 56-57° [678] [679], 56-56°5 [1721], 56° [773], 55° [683];  
 b.p.<sub>8</sub> 65-66° [918], b.p.<sub>12</sub> 94-99° [1721], b.p.<sub>13</sub> 103-104° [334], b.p.<sub>16</sub> 105° [979];  
<sup>1</sup>H NMR [678] [683], <sup>13</sup>C NMR [736], UV [812], MS [678] [683]; pK<sub>a</sub> [1697].

**1-(3-Fluoro-2,6-dihydroxyphenyl)ethanone**

[117902-14-4]

C<sub>8</sub>H<sub>7</sub>FO<sub>3</sub>

mol.wt. 170.14

**Synthesis**

- Obtained (by-product) by reaction of boron tribromide on 2,6-dimethoxy-3-fluoroacetophenone in methylene chloride-methanol mixture (14%) [192].

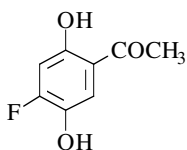
m.p. 134-135° [192]; <sup>1</sup>H NMR [192].

**1-(4-Fluoro-2,5-dihydroxyphenyl)ethanone**

[88772-48-9]

C<sub>8</sub>H<sub>7</sub>FO<sub>3</sub>

mol.wt. 170.14

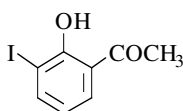
**Synthesis**

- Preparation by Fries rearrangement of 2-fluoro-hydroquinone diacetate with aluminium chloride in nitrobenzene at 140° (66%) [502].

m.p. 210° [502]; <sup>1</sup>H NMR [502], IR [502].

**1-(2-Hydroxy-3-iodophenyl)ethanone**C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>

mol.wt. 262.05

**Synthesis**

-Preparation by diazotization of 3-amino-2-hydroxyacetophenone with sodium nitrite in dilute sulfuric acid at 0°, and replacement of the diazonium group by iodine with potassium iodide at 65° (Sandmeyer reaction) [370] [372] [389], (50%) [372].

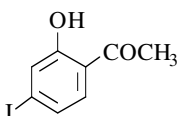
m.p. 59°5-60°5 [370], 58-59° [372] [389].

**1-(2-Hydroxy-4-iodophenyl)ethanone**

[39730-66-0]

C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>

mol.wt. 262.05

**Syntheses**

-Preparation by Fries rearrangement of 3-iodophenyl acetate with aluminium chloride [383] [385] [390] [410] [1001] [1789],

\*in chlorobenzene, at 125-135° (64%) [383] [1789];

\*in nitrobenzene, at 110-140° (40-45%) [383] [390] [1001].

-Preparation by diazotization of 4-amino-2-hydroxyacetophenone and replacement of the diazonium group by iodine (Sandmeyer reaction) (46%) [383].

-Preparation by reaction of acetyl chloride on 3-iodoanisole with aluminium chloride in refluxing carbon disulfide (14%) [1001].

-Also refer to: [569] (compound 6).

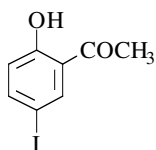
m.p. 54° [1789], 53-54° [383] [385] [390], 52-54° [1001].

**1-(2-Hydroxy-5-iodophenyl)ethanone**

[7191-41-5]

C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>

mol.wt. 262.05

**Syntheses**

-Preparation by saponification of ethyl 4-hydroxy-6-iodocoumarin-3-carboxylate with boiling 10% aqueous potassium hydroxide solution (92%) [443] [444].

-Preparation by diazotization of 2-hydroxy-5-nitroacetophenone and replacement of the diazonium group

by iodine (Sandmeyer reaction) [370] [372] [387] [1273], (75-80%) [372] [387].

-Preparation by diazotization of 4-acetamido-2-methoxyacetophenone and replacement of the diazonium group by iodine (73%) [387].

-Also obtained by reaction of iodine on 2-hydroxyacetophenone in aqueous sodium carbonate solution (37%) [1425], (14%) [440] [443].

-Also obtained by Fries rearrangement of 4-iodophenyl acetate with aluminium chloride in nitrobenzene at 25° (13%) [384].

-Also refer to: [819].

m.p. 91-92° [372], 90-92° [370] [387], 90° [1273], 88-89° [443] [444], 67-69° [384]. One of the reported melting points is obviously wrong.

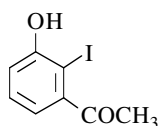
UV [443].

**1-(3-Hydroxy-2-iodophenyl)ethanone**

[348616-32-0]

C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>

mol.wt. 262.05

**Synthesis**

-Obtained by debenzoylation of 3-(benzyloxy)-2-iodoacetophenone (m.p. 53-55°) with boron tribromide in methylene chloride at -70° for 50 min (93%) [784].

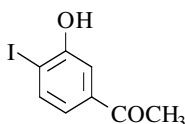
m.p. 93-97° [784]; <sup>1</sup>H NMR [784], <sup>13</sup>C NMR [784], IR [784], MS [784].

**1-(3-Hydroxy-4-iodophenyl)ethanone**

[73898-23-4]

C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>

mol.wt. 262.05

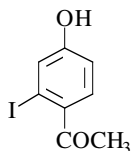
**Synthesis**

-Obtained by reaction of iodine-potassium iodide mixture in aqueous solution with 3-hydroxyacetophenone in concentrated aqueous ammonia at r.t. (15%) [1069].

m.p. 134-135° [1069].

**1-(4-Hydroxy-2-iodophenyl)ethanone**C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>

mol.wt. 262.05

**Syntheses**

-Preparation by reaction of 48% hydrobromic acid on 2-iodo-4-methoxyacetophenone in acetic acid at 100°, in a sealed tube (45%) [1001].  
 -Also obtained (by-product) by reaction of acetyl chloride on 3-iodoanisole with aluminium chloride in refluxing carbon disulfide (9%) [1001].

-Also obtained in very small quantities by Fries rearrangement of 3-iodophenyl acetate with aluminium chloride in nitrobenzene at 90-95° [385].

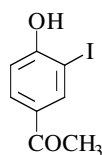
m.p. 131-132° [1001], 128-136° [385].

**1-(4-Hydroxy-3-iodophenyl)ethanone**

[62615-24-1]

C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>

mol.wt. 262.05

**Syntheses**

-Preparation by reaction of iodine and potassium iodide on 4-hydroxyacetophenone in aqueous ammonium hydroxide at r.t. [246] [1069] [1571], (54-57%) [1069] [1571].  
 -Preparation by adding an aqueous solution of potassium iodide to a solution of 4-hydroxyacetophenone in

concentrated ammonium hydroxide at 35° (49%) [1065].

-Preparation by adding a 5% aqueous solution of sodium hypochlorite to a solution of 4-hydroxyacetophenone and sodium iodide in methanol at 15° (60%) [1665].

-Also refer to: [929].

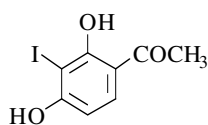
m.p. 155-156° [1665], 154-156° [1571], 153-155° [1065], 153-154° [1069];  
<sup>1</sup>H NMR [1065] [1571] [1665], IR [1065].

**1-(2,4-Dihydroxy-3-iodophenyl)ethanone**

[71243-12-4]

C<sub>8</sub>H<sub>7</sub>IO<sub>3</sub>

mol.wt. 278.05



**Syntheses**

-Preparation by iodination of resacetophenone,  
 \*with iodine and iodic acid in dilute ethanol at r.t. [15]  
 [319] [655] [928] [1600] [1850], (82-84%) [319] [1600];  
 \*with iodine in the presence of diisopropylamine in methanol  
 at r.t. (14%) [319];

\*with potassium iodate and potassium iodide in dilute acetic acid [1578].

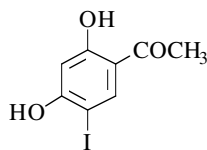
m.p. 164° [1600], 158-162° [319], 158-159° [1578]; <sup>1</sup>H NMR [319].

**1-(2,4-Dihydroxy-5-iodophenyl)ethanone**

[62069-33-4]

C<sub>8</sub>H<sub>7</sub>IO<sub>3</sub>

mol.wt. 278.05



**Syntheses**

-Preparation by selective deiodination of 2,4-dihydroxy-  
 3,5-diiodoacetophenone with stannous chloride in refluxing  
 acetic acid (40%) [1558].  
 -Also obtained by reaction of aqueous iodine-potassium  
 iodide solution on resacetophenone in 22% aqueous  
 ammonia at r.t. (15%) [1600].

-Preparation by iodination of resacetophenone using iodine and iodic acid in dilute ethanol at r.t.  
 [1850].

-Preparation by reaction of boron tribromide with 2,4-bis(benzyloxy)-5-iodoacetophenone (SM) in  
 methylene chloride with stirring for 5 min at -70° (97%). SM was obtained from 2,4-bis-  
 (benzyloxy)acetophenone with iodine in the presence of silver trifluoroacetate in chloroform (89%)  
 [1665].

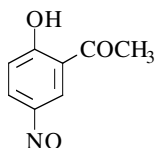
m.p. 185-186° [1558], 184° [1600], 180-181° [1665]; <sup>1</sup>H NMR [1558] [1665].

**1-(2-Hydroxy-5-nitrosophenyl)ethanone**

[15516-61-7]

C<sub>8</sub>H<sub>7</sub>NO<sub>3</sub>

mol.wt. 165.15



**Synthesis**

-Refer to: [1337] (compound XVII).

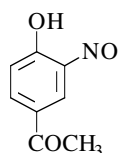
UV [1337].

**1-(4-Hydroxy-3-nitrosophenyl)ethanone**

[97871-70-0]

C<sub>8</sub>H<sub>7</sub>NO<sub>3</sub>

mol.wt. 165.15

**Synthesis**

-Preparation by direct nitrosation [1851] of 4-hydroxy-acetophenone with aqueous sodium nitrite solution in dilute hydrochloric acid between 0 to 5° [1175].

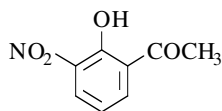
UV [1175]; pK<sub>a</sub> [1175].

**1-(2-Hydroxy-3-nitrophenyl)ethanone**

[28177-69-7]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15

**Syntheses**

- Preparation by reaction of boiling 5% aqueous potassium hydroxide on 8-nitrochromone (78%) [474].
- Also obtained by reaction of nitric acid on 2-hydroxy-acetophenone in acetic acid [526], (30%) [827] [828], (9 to 10%) [1015] [1895], (2%) [37] [372] [923].
- Preparation by diazotization of 5-amino-2-hydroxy-3-nitroacetophenone, followed by decomposition of the obtained diazonium salt (90%) [471], (56%) [955].
- Also obtained by reaction of boiling 20% aqueous hydrochloric acid on 2-hydroxy-3-nitro-acetophenone oxime [1104].
- Also obtained by nitration and hydroxylation of acetophenone with pernitrous acid (2%) [779].
- Also refer to: [957] [1278] [1457] [1473].

m.p. 103-104° [474], 99-101° [743], 98°5-99°5 [1895], 97-98° [526], 90° [779], 89-90° [1104], 84-85° [372], 82-83° [37] [471] [923] [955] [1015];

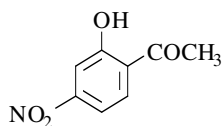
<sup>1</sup>H NMR [471] [957], IR [471]; pK<sub>a</sub> [957].

**1-(2-Hydroxy-4-nitrophenyl)ethanone**

[1834-91-9]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15

**Syntheses**

- Obtained by Fries rearrangement of 3-nitrophenyl acetate with aluminium chloride without solvent at 125° [675] [1726] [1728], (20%) [1728], (32%) [675].
  - Also obtained by reaction of acetyl chloride on 3-nitro-phenol with aluminium chloride at 125° (16-18%) [1728].
  - Claimed to be prepared by reaction of boiling 50% nitric acid on 2-hydroxyacetophenone (59%) [253].
- N.B.:** No physical data is indicated in the patent for this compound. According to the rules dealing with aromatic substitution (Holleman rules) [791] and electronic induction using the Hammett substituent constants [376], the obtained product most likely is the 2-hydroxy-5-nitro-acetophenone.

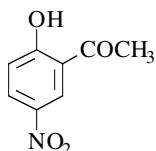
m.p. 67-68° [646] [675] [1727], 67° [1728]; <sup>1</sup>H NMR [1923], IR [1923].

**1-(2-Hydroxy-5-nitrophenyl)ethanone**

[1450-76-6]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15

**Syntheses**

- Obtained by nitration of 2-hydroxyacetophenone oxime, followed by treatment of this oxime with boiling 20% hydrochloric acid (73%) [395] [1104].
- Preparation by reaction of acetyl chloride on 4-nitrophenol with aluminium chloride in nitrobenzene at 130° (44%) [923].
- Preparation by Fries rearrangement of 4-nitrophenyl acetate with aluminium chloride,
  - \*without solvent, at 140-150° (28%) [647];
  - \*with solvent, in nitrobenzene, at 120-130° (20-35%) [377] [646] [923] [1726] [1729].
- Preparation by nitration of 2-hydroxyacetophenone,
  - \*in acetic acid (20-30%) [37] [372] [923] [1015] [1895];
  - \*without solvent (59%) [253].
- Also obtained by reaction of acetic anhydride on 4-nitrophenol with aluminium chloride [377].
- Also obtained from mixture of 2-chloro-5-nitroacetophenone, sodium acetate and acetamide heated at 180-200° (49%) [1646].
- Also refer to: [1935].

m.p. 111-112° [1104], 102-103° [377] [646] [1015] [1726], 101-102° [372] [647], 99°5 [923] [1646], 98°5-99°5 [1895], 98-99° [37];

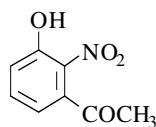
<sup>1</sup>H NMR [914] [1923], <sup>13</sup>C NMR [914], IR [1923].

**1-(3-Hydroxy-2-nitrophenyl)ethanone**

[53967-72-9]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15

**Syntheses**

- Preparation by nitration of 3-hydroxyacetophenone,
  - \*with concentrated nitric acid in concentrated sulfuric acid at -20° (35-45%) [326];
  - \*with nitric acid (d = 1.4) in acetic acid at 70° (16%) [994];
- \*with cupric nitrate in acetic acid-acetic anhydride mixture between 12 to 15° (18%) [326] [552].
- Preparation by demethylation of 3-methoxy-2-nitroacetophenone with pyridinium chloride at 200° [1676].

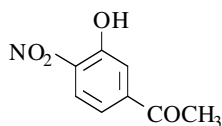
m.p. 138° [326], 136° [1676], 135° [994]; IR [994], UV [326] [994]; pK<sub>a</sub> [994].

**1-(3-Hydroxy-4-nitrophenyl)ethanone**

[89942-63-2]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15

**Syntheses**

- Obtained (poor yield) by nitration of 3-hydroxyacetophenone,
  - \*with nitric acid (d = 1.4) in acetic acid, at 70° (10%) [994];
  - \*with cupric nitrate in acetic acid-acetic anhydride mixture, between 12 to 15° (< 1%) [326].

m.p. 131-132° [646], 71°5-72°5 [326], 69-70° [994]; IR [994], UV [326] [994]; pK<sub>a</sub> [994].

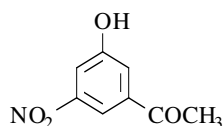
**N.B.:** The melting point 131-132° [646] was erroneous. This melting point is the one of an isomer, the 3-nitro-4-hydroxyacetophenone (130-131°2) [296].

### 1-(3-Hydroxy-5-nitrophenyl)ethanone

[70284-07-0]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15



#### Syntheses

-Obtained in two steps: First, a mixture of 3-hydroxyacetophenone and dysprosium nitrate in ethyl acetate were refluxed (85-105°) for 75 min. Then, the isolated intermediate (C<sub>8</sub>H<sub>6</sub>NO<sub>4</sub>)<sub>3</sub>Dy (59%) was dissolved in 6 N hydrochloric acid (50%) [707].

-Also refer to: [1134] (compound NP), [1245].

**N.B.:** Dy (III) salt [193693-92-4] [707].

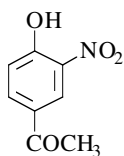
m.p. 122-124° [707]; MS [707].

### 1-(4-Hydroxy-3-nitrophenyl)ethanone

[6322-56-1]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15



#### Syntheses

-Preparation by nitration of 4-hydroxyacetophenone [154] [173] [270] [560] [649] [994] [1430] [1810], (85%) [560] [1810], (70-75%) [173] [649] [1430], (56%) [994].

-Also obtained by nitration of 4-hydroxyacetophenone, \*using properties of dinitrogen tetroxide complexes of iron

— Fe(NO<sub>3</sub>)<sub>3</sub>. 1.5 N<sub>2</sub>O<sub>4</sub> — and copper nitrates — Cu(NO<sub>3</sub>)<sub>2</sub>. N<sub>2</sub>O<sub>4</sub> — in acetone for 5-10 min at r.t. (97-100%) [600];

\*by reaction of ferric nitrate nonahydrate — Fe(NO<sub>3</sub>)<sub>3</sub>. 9 H<sub>2</sub>O — in ethanol for 24 h at 65° (91%) [1428].

-Also obtained by reaction of peroxyxynitrite (ONOO<sup>-</sup>) with 4-hydroxyacetophenone in aqueous phosphate buffer and acetonitrile solution [1336].

-Also obtained from aromatic nucleophilic substitution of 3,4-dichloroacetophenone with sodium nitrite in DMSO (40%) [1957].

-Preparation by reaction of acetyl chloride on 2-nitrophenol with aluminium chloride in nitrobenzene (46-47%) [296] [360] [923] [1471].

-Also obtained by reaction of acetyl chloride on 2-nitroanisole with aluminium chloride (11%) [1694].

-Preparation by Fries rearrangement of 2-nitrophenyl acetate with aluminium chloride in nitrobenzene (40-45%) [675] [923], (30%) [296] [1727].

-Also obtained by Fries rearrangement of 2-nitrophenyl acetate [1730], which occurs under mild conditions on K 10 montmorillonite using microwave radiations [931].

-Also obtained on heating 4-bromo-3-nitroacetophenone with acetamide-sodium acetate mixture between 175 to 200° (low yield) [272].

-Also obtained by mononitration of 4-hydroxyacetophenone with a combination,

\*trichloroisocyanuric acid, sodium nitrite and wet silicone dioxide (50% w/w) in methylene chloride at r.t. for 20 min (97%) [1958];

\*magnesium bisulfate or sodium bisulfate monohydrate, sodium nitrite and wet silicone dioxide (50% w/w) in methylene chloride at r.t. for 3 h (80-82%) [1959].

-Also refer to: [181] [624] [957] [1488] [1853] [1870] [1874] [1914].

**N.B.:** Na salt [42247-95-0] [1907].

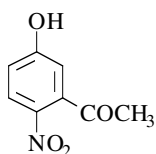
m.p. 135-136° [994], 135° [1430], 133-134° [173], 133° [649], 132-132°5 [296], 132° [923], 131-132° [1471], 130°5 [1694], 130° [272] [1810], 129°5 [560], 128-130° [675], 123° [1428], 122-124° [1958] [1959];  
 pK<sub>a</sub> [957] [994] [1471]; GC [1957];  
<sup>1</sup>H NMR [957] [1428], <sup>17</sup>O NMR [278], IR [994] [1428], UV [994] [1471], MS [1957].

### 1-(5-Hydroxy-2-nitrophenyl)ethanone

[30879-49-3]

C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>

mol.wt. 181.15



#### Syntheses

-Preparation by nitration of 3-hydroxyacetophenone,  
 \*with nitric acid (d = 1.4) in acetic acid, at 70° (31%) [994], (15%) [649];  
 \*with cupric nitrate in acetic acid-acetic anhydride mixture, between 12 to 15° (20%) [326] [552].

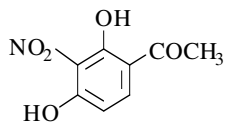
m.p. 148-149° [326] [649] [994]; IR [994], UV [324] [326] [994]; pK<sub>a</sub> [994].

### 1-(2,4-Dihydroxy-3-nitrophenyl)ethanone

[89684-58-2]

C<sub>8</sub>H<sub>7</sub>NO<sub>5</sub>

mol.wt. 197.15



#### Syntheses

-Resacetophenone by treatment with cerium (IV) ammonium nitrate in acetic acid at 50-60° yields 2,4-dihydroxy-3-nitroacetophenone (good yield) [378], (23%) [380].  
 -Preparation by reaction of acetic anhydride on 2-nitroresorcinol with aluminium chloride in nitrobenzene at 100° [48] [1591], (53%) [48].  
 -Also obtained by reaction of aqueous hydrochloric acid-acetic acid mixture on 5-acetyl-2,4-dihydroxy-3-nitrobenzoic acid in a sealed tube at 140-145° [1286].  
 -Also refer to: [1290].

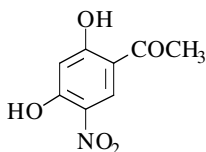
m.p. 103° [1591], 102° [48], 93° [254] [368] [1286], 90-91° [378] [380];  
<sup>1</sup>H NMR [378], IR [378].

### 1-(2,4-Dihydroxy-5-nitrophenyl)ethanone

[3328-77-6]

C<sub>8</sub>H<sub>7</sub>NO<sub>5</sub>

mol.wt. 197.15



#### Syntheses

-Preparation by nitration of resacetophenone [138] [1319], (71%) [1362], (54-50%) [947] [1289], (44%) [471].  
 -Also obtained by reaction of nitric acid on 3,3'-diacetyl-4,4',6,6'-tetrahydroxydiphenyl thioether in acetic acid at r.t. [868].  
 -Also obtained (by-product) by reaction of acetic anhydride on 4-nitroresorcinol with aluminium chloride in nitrobenzene (6%) [1291].  
 -Also obtained by reaction of sodium hydroxide on 3-benzoyl-2,4-dihydroxy-5-nitroacetophenone in boiling aqueous ethanol [1480].  
 -Resacetophenone by treatment with cerium (IV) ammonium nitrate in hot acetic acid yields 2,4-dihydroxy-5-nitroacetophenone (31%) [380].



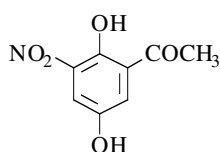
m.p. 145-147° [471], 145° [947], 143° [380],  
142° [138] [254] [868] [1289] [1291] [1319] [1362] [1480] [1591].  
<sup>1</sup>H NMR [471], IR [471].

**1-(2,5-Dihydroxy-3-nitrophenyl)ethanone**

[30095-74-0]

C<sub>8</sub>H<sub>7</sub>NO<sub>5</sub>

mol.wt. 197.15

**Syntheses**

-Preparation by nitration of 3-acetyl-4-hydroxyphenyl acetate, followed by hydrolysis of the obtained keto ester with hydrochloric acid in refluxing methanol (61%) [170].  
-Also obtained by hydrolysis of 6-hydroxy-2-methyl-8-nitrochromone with 10% aqueous sodium hydroxide [516].

-Also obtained by nitration of quinacetophenone in acetic acid [516].  
-Also obtained by demethylation of 2-hydroxy-5-methoxy-3-nitroacetophenone with 48% hydrobromic acid in the presence of red phosphorous at 85-90° for 16 h under argon atmosphere (90%) [471].

**N.B.:** All the results of reference [516] were erroneous [170].

m.p. 141-142° [170], 136-138° [471], 58° [516]. One of the reported melting points is obviously wrong.

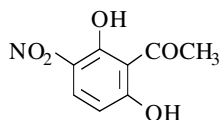
<sup>1</sup>H NMR [170] [471], IR [170], UV [170].

**1-(2,6-Dihydroxy-3-nitrophenyl)ethanone**

[25205-34-9]

C<sub>8</sub>H<sub>7</sub>NO<sub>5</sub>

mol.wt. 197.15

**Syntheses**

-Preparation by reaction of acetic anhydride on 4-nitroresorcinol with aluminium chloride in nitrobenzene [1291] [1591], (37%) [1291].

-Preparation by Fries rearrangement of 4-nitroresorcinol diacetate with aluminium chloride in nitrobenzene at 95-100° (38%) [49].  
-Also obtained by nitration of 2,6-dihydroxyacetophenone (77%) [471], (27%) [1291].  
-Also obtained by demethylation of 2,6-dimethoxy-3-nitroacetophenone with aluminium chloride or with boiling 10% aqueous sodium hydroxide (quantitative yield) [1291].  
-Also obtained by reaction of 4-methoxy-2-methyl-8-nitrochromone or its 3-acetyl derivative with boiling 10% aqueous sodium carbonate (50% and 58% yields, respectively) [1155].  
-Also refer to: [1592].

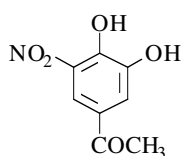
m.p. 119° [1291] [1591], 116-117° [49], 114-115° [471]; <sup>1</sup>H NMR [471], IR [471].

**1-(3,4-Dihydroxy-5-nitrophenyl)ethanone**

[116313-84-9]

C<sub>8</sub>H<sub>7</sub>NO<sub>5</sub>

mol.wt. 197.15

**Syntheses**

-Preparation from 4-hydroxy-3-methoxyacetophenone by nitration and subsequent demethylation of 4-hydroxy-3-methoxy-5-nitroacetophenone obtained,  
\*with boiling concentrated hydrobromic acid [202];  
\*with concentrated hydrobromic acid in acetic acid (35%) [122].

-Preparation by demethylation of 3,4-dimethoxy-5-nitroacetophenone with concentrated hydrobromic acid at 140° [202].

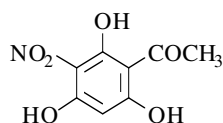
m.p. 161-169° [122], 159-160° [202]; pK<sub>a</sub> [271].

**1-(2,4,6-Trihydroxy-3-nitrophenyl)ethanone**

[81325-88-4]

C<sub>8</sub>H<sub>7</sub>NO<sub>6</sub>

mol.wt. 213.15



**Syntheses**

-Preparation by addition of a mixture of concentrated sulfuric acid and fuming nitric acid into a solution of phloracetophenone in concentrated sulfuric acid and hexane mixture under cooling with an ice bath (70-80%) [1921].

-Also obtained by adding acetic anhydride to a mixture of 1,3,5-trihydroxy-2-nitrobenzene and aluminium chloride in nitrobenzene and heating on a steam bath for 7 h (20%) [2].

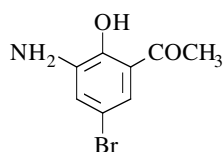
m.p. 133-135° [1921], 131-132° [2]; <sup>1</sup>H NMR [2] [1921], IR [1921], MS [1921].

**1-(3-Amino-5-bromo-2-hydroxyphenyl)ethanone**

[70977-85-4]

C<sub>8</sub>H<sub>8</sub>BrNO<sub>2</sub>

mol.wt. 230.06



**Synthesis**

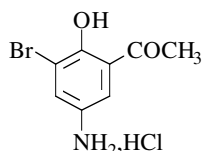
-Preparation by reaction of 20% aqueous titanium trichloride solution on 5-bromo-2-hydroxy-3-nitroacetophenone in toluene, at r.t., in a sealed tube [620] [1463], (31%) [620].

m.p. 99-102° [620] [1463].

**1-(5-Amino-3-bromo-2-hydroxyphenyl)ethanone (Hydrochloride)**

[30186-22-2]

C<sub>8</sub>H<sub>8</sub>BrNO<sub>2</sub>, HCl mol.wt. 266.52



**Synthesis**

-Preparation by reduction of 3-bromo-2-hydroxy-5-nitroacetophenone with an excess of tin in concentrated hydrochloric acid at 100° (82%) [540].

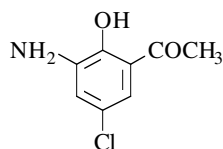
m.p. 200°(d) [540].

**1-(3-Amino-5-chloro-2-hydroxyphenyl)ethanone**

[21312-85-6]

C<sub>8</sub>H<sub>8</sub>ClNO<sub>2</sub>

mol.wt. 185.61



**Syntheses**

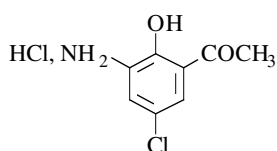
-Preparation by reaction of acetic anhydride on 2-amino-4-chlorophenol with aluminium chloride in 1,2,4-trichlorobenzene at 120° [753].

-Preparation by reaction of 75% hydrochloric acid solution on 3-acetamido-5-chloro-2-hydroxyacetophenone; the mixture was heated on a steam bath (98%) [1388].

m.p. 110-112° [1388]; UV [1388].

**1-(3-Amino-5-chloro-2-hydroxyphenyl)ethanone (Hydrochloride)**

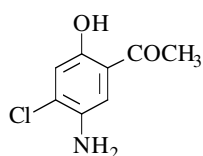
[153404-65-0]

C<sub>8</sub>H<sub>8</sub>ClNO<sub>2</sub>, HCl mol.wt. 222.07**Synthesis**

-Preparation by reaction of acetic anhydride on 2-amino-4-chlorophenol hydrochloride with aluminium chloride in 1,2,4-trichlorobenzene at 120° (79%) [753].

**1-(5-Amino-4-chloro-2-hydroxyphenyl)ethanone**C<sub>8</sub>H<sub>8</sub>ClNO<sub>2</sub>

mol.wt. 185.61

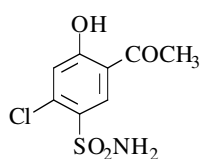
**Synthesis**

-Preparation by reduction of 4-chloro-2-hydroxy-5-nitroacetophenone with iron powder in dilute acetic acid at 95° (93%) [924] (Béchamp reduction).

m.p. 117-118° [924]; IR [924].

**1-[5-(Aminosulfonyl)-4-chloro-2-hydroxyphenyl]ethanone**C<sub>8</sub>H<sub>8</sub>ClNO<sub>4</sub>S

mol.wt. 249.67

**Synthesis**

-Preparation by reaction of ammonia gas on 4-chloro-5-chlorosulfonyl-2-hydroxyacetophenone in tetrahydrofuran at r.t. (57%) [924].

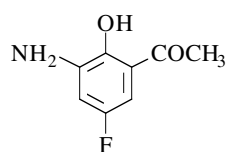
m.p. 181-182° [924].

**1-(3-Amino-5-fluoro-2-hydroxyphenyl)ethanone**

[70977-84-3]

C<sub>8</sub>H<sub>8</sub>FNO<sub>2</sub>

mol.wt. 169.16

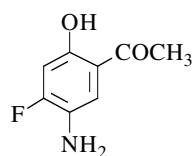
**Synthesis**

-Preparation by catalytic hydrogenation of 5-fluoro-2-hydroxy-3-nitroacetophenone in the presence of 5% Pd/C in ethanol at 25° [620] [1463], (99%) [620].

m.p. 113-114° [620].

**1-(5-Amino-4-fluoro-2-hydroxyphenyl)ethanone**C<sub>8</sub>H<sub>8</sub>FNO<sub>2</sub>

mol.wt. 169.16

**Synthesis**

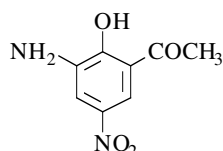
-Refer to: [572] (Japanese patent).

**1-(3-Amino-2-hydroxy-5-nitrophenyl)ethanone**

[70977-79-6]

C<sub>8</sub>H<sub>8</sub>N<sub>2</sub>O<sub>4</sub>

mol.wt. 196.16

**Synthesis**

-Preparation by reaction of sodium sulfide on 2-hydroxy-3,5-dinitroacetophenone with ammonium chloride in refluxing methanol [620] [1463], (55%) [1463], (72%) [620].

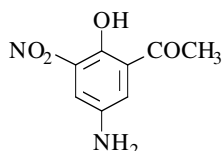
m.p. 172-175° [1463], 172-174° [620].

**1-(5-Amino-2-hydroxy-3-nitrophenyl)ethanone**

[108129-55-1]

C<sub>8</sub>H<sub>8</sub>N<sub>2</sub>O<sub>4</sub>

mol.wt. 196.16

**Synthesis**

-Preparation by hydrolysis of 5-acetamido-2-hydroxy-3-nitroacetophenone (96%) [471], (82%) [955].

m.p. 141-142° [955], 129-130° [471];

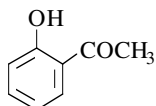
<sup>1</sup>H NMR [471], IR [471].

**1-(2-Hydroxyphenyl)ethanone**

[118-93-4]

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>

mol.wt. 136.15

**Syntheses**

-Preparation by Fries rearrangement of phenyl acetate,

**with Lewis acids**

\*aluminium chloride,

*with solvent:*

-in petroleum ether at 25° (80%) [1724] (result not reproducible).

-in nitrobenzene [461] [1177] [1349] [1642] at 60° (26%) [1349].

-in nitroethane at 60° (12%) [1909].

-in chlorobenzene at 60-65° (23%) [1119] or in a sealed tube and subjected to high power microwave irradiation for 2 min only (30%) [1683].

*without solvent:*

\*between 130 to 165° (63-82%) [232] [1220] [1334] [1512] [1683] [1785] [1839].

\*between 120 to 180° (35-46%) [320] [461] [627] [1443] [1731] [1828] [1936].

\*between 90 to 200° (25-31%) [110] [113] [443] [445] [625] [632] [789] [1024] [1220] [1266].

\*at 60° (7%) [1911].

\*boron trifluoride etherate, in boiling benzene (70%) [974].

\*aluminium chloride-sodium chloride mixture at 240-250° (47%) [810].

\*boron trifluoride at 90° (43%) [789].

\*titanium tetrachloride at 110° (22%) [1925].

\*scandium tris(trifluoromethanesulfonate), in nitromethane, at 50° (17%) [1000].

\*zinc chloride between 125 to 160° (4-7%) [433] [789].

**with Protic acids**

- \*p-toluenesulfonic acid at 160° (25%) [789].
- \*methanesulfonic acid at 160° (22%) [789].
- \*polyphosphoric acid at 100° (20%) [1296].
- \*monohydrated sulfuric acid at 190° (20%) [789].
- \*methanetrissulfonic acid at 160° (11%) [789].
- \*phosphoric acid at 190° (8%) [789].

**with a Cation exchange resin**

- \*sulfonated polystyrene resin,
  - \*(Dowex 50 X 8) at 150° (8%) [789].
  - \*(Dowex 50 WX 8) at 115° (6%) [789].
- \*Nafion-XR 500 at 100° [1364].

**with Zeolites molecular sieves**

- \*Ga ZSM-5 at 250° (46%) [1469].
- \*ZSM-5 (Si/Al = 20) in sulfolane, at 180° (34%) [1852].
- \*H-Nu-2 (unknown structure) at 170° (6%) [468].
- \*H-ZSM-5 (MFI structure) at 210° (4%) [468].
- \*HY (Si/Al = 3) at 400° (3%) [1438].
- \*fluorided alumina (Al<sub>2</sub>O<sub>3</sub>-F; 3 % wt. F) at 400° (3%) [1438].
- \*H-ZSM-5 (Si/Al = 45) at 400° (1%) [1438].
- Also obtained by Fries rearrangement of 4-trimethylsilylphenyl acetate with aluminium chloride without solvent at 140° (60%) [1537].
- Also obtained by reaction of triethylamine hydrochloride on phenyl acetate at 260°, in a sealed tube [989].
- Also obtained (by-product) by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent, at 180° (15%) [540].
- Also obtained by reaction of acetic acid on phenol,
  - \*with polyphosphoric acid at 100° (20%) [1296];
  - \*with zinc chloride (Nencki reaction) at reflux (2-5%) [433] [1266] [1398].
- Also obtained by reaction of acetyl chloride on phenol, in nitrobenzene, between 45 to 60°,
  - \*with aluminium chloride (14-15%) [458] [1177];
  - \*with titanium tetrachloride (11%) [458].
- Also obtained by reaction of acetyl chloride on phenyl borate with aluminium chloride in refluxing carbon disulfide (54%) [1792].
- Also obtained by reaction of acetic anhydride on phenol, using a steam bath,
  - \*with 70% HClO<sub>4</sub> (51%) [1084];
  - \*with aluminium chloride (38%) [1084];
  - \*with zinc chloride at 145-150° (36%) [62].
- Also obtained by reaction of acetylacetone on phenyl benzoate with aluminium chloride in nitrobenzene, at 45° (3%) [1177].
- Preparation by diazotization of 2-aminoacetophenone and hydrolysis of the obtained diazonium salt [121] [629] [1776].
- Also obtained by demethylation of 2-methoxyacetophenone with hydrochloric acid, in a sealed tube (low yield) [629] or at 130° [1740].
- Also obtained by hydroxylation of acetophenone,
  - \*This reaction was accomplished by oxidation of acetophenone at platinum in methylene chloride-trifluoroacetic acid mixture containing tetraethylammonium fluoborate, at r.t. (85% yield) [1662];
  - \*This reaction was realized by treatment of acetophenone with sodium trifluoroacetate in nitromethane-trifluoroacetic acid-trifluoroacetic anhydride mixture in the presence of a platinum electrode, followed by treatment of the intermediate trifluoroester with 10% potassium hydrogen carbonate solution (50% yield) [1661];
  - \*The 2-hydroxyacetophenone was obtained by nitration and hydroxylation of acetophenone with pernitrous acid (2% yield) [779].

- Also obtained by reaction of boiling dilute potassium hydroxide solution on flavone [1639].
- Also obtained by reaction of sodium ethoxide on chromone in refluxing ethanol [781].
- Also obtained by reaction of aqueous potassium hydroxide on 4-hydroxycoumarin (benzotetronic acid) at 180° (80%) [1398].
- Also obtained by reaction of sodium ethoxide on 4-phenacylidene-flavone in refluxing ethanol [594].
- Also obtained by reaction of aqueous potassium hydroxide solution on methyl or ethyl 4-hydroxycoumarin-3-carboxylate at 180° (80%) [66].
- Also obtained by reaction of potassium hydroxide on the 2-hydroxyseneciophenone (2'-hydroxy-3,3-dimethylacrylophenone) in boiling ethanol (60%) [1650].
- Also obtained by UV light irradiation of phenyl acetate (photo-Fries rearrangement),
  - \*in hexane, at 25° (13%) [660],
  - in the presence of potassium carbonate (78%) [660].
- \*in benzene (59%) [1723].
- \*in cyclohexane, at 25° (43%) [724].
- \*in methanol (28%) [1723].
- \*in water, at 25-30° (25-28%) [1350] [1843].
  - in the presence of  $\beta$ -cyclodextrin (89%) [1723], (35%) [1843], (11%) [1350].
  - in the presence of Methyl  $\alpha$ -D-glucopyranoside (32%) [1350].
- \*in ethyl ether, at 25° (24%) [724].
- \*in ethanol [57] [58], at 30° (19%) [57].
- \*in isopropanol, at 25° (9%) [724].
- Also obtained by UV light irradiation of 2-methoxyphenyl acetate in benzene (14%) [280], in ethyl ether (4%) [724].
- Also obtained (by-product) on UV light irradiation of 2-hydroxy- $\alpha$ -chloroacetophenone in ethanol (3%) [59].

#### Isolation from natural sources

- From essential oil of *Chione Glabra* (Rubiaceae) [555].
- From essential oil of *Acacia farnesiana* Willd [1057].

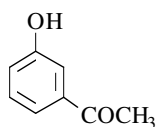
m.p. 28° [433];  
 b.p.<sub>0.2</sub> 56° [540], b.p.<sub>6</sub> 73° [1724], b.p.<sub>7</sub> 86° [1084], b.p.<sub>13</sub> 91-92° [627],  
 b.p.<sub>10</sub> 92-94° [1731], b.p.<sub>7</sub> 93-94° [1828], b.p.<sub>11</sub> 95-100° [1650], b.p.<sub>10</sub> 96-97° [66],  
 b.p.<sub>15</sub> 96-98° [1731], b.p.<sub>15</sub> 97-98° [1024], b.p.<sub>6</sub> 98° [625], b.p.<sub>15</sub> 99-100° [1443],  
 b.p.<sub>14</sub> 100° [110], b.p.<sub>15</sub> 101-101°<sup>5</sup> [810], b.p.<sub>17</sub> 101-102° [1220], b.p.<sub>20</sub> 104-105° [443],  
 b.p.<sub>20</sub> 106° [1936], b.p.<sub>17</sub> 106° [1839], b.p.<sub>17</sub> 106-107° [110], b.p.<sub>17</sub> 109° [1334],  
 b.p.<sub>32</sub> 109-110° [838], b.p.<sub>15</sub> 110° [433], b.p.<sub>33</sub> 113°<sup>5</sup>-113°<sup>8</sup> [1180],  
 b.p.<sub>30</sub> 115-120° [1537], b.p.<sub>22</sub> 130-133° [1776] [1777], b.p.<sub>34</sub> 160-165° [555],  
 b.p.<sub>717</sub> 213° [660] [1740], b.p. 213-214° [62] [1398], b.p. 215-218° [1119],  
 b.p. 216-217° [1266], b.p. 218° [113] [594], b.p.<sub>744</sub> 220° [660];  
<sup>1</sup>H NMR [540] [622] [738] [765] [914] [1374] [1435] [1923],  
<sup>13</sup>C NMR [735] [736] [738] [914] [1486], IR [765] [839] [994] [1024] [1435] [1923],  
 UV [447] [570] [813] [994] [1161] [1163] [1266] [1776]; pK<sub>a</sub> [743] [994] [1697] [1899].

#### 1-(3-Hydroxyphenyl)ethanone

[121-71-1]

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>

mol.wt. 136.15



#### Syntheses

- Preparation by diazotization of 3-aminoacetophenone, followed by hydrolysis of the obtained diazonium salt [220] [326] [520] [578] [650] [1349] [1419] [1530] [1776] [1838], (78-82%) [326] [650].

- Synthesis of 3-hydroxyacetophenone by means of organocadmium derivatives (77%) [1485].
- Preparation by reductive deamination of 2-amino-5-hydroxyacetophenone [682].
- Preparation by aromatization of 5-acetyl-2-cyclohexenone [197] promoted by,
  - \*cupric bromide and lithium bromide in refluxing acetonitrile (75%).
  - \*Pd/C in refluxing xylene (40%).
- Also obtained by treatment of acetophenone with sodium trifluoroacetate in nitromethane-trifluoroacetic acid-trifluoroacetic anhydride mixture in the presence of a platinum electrode, followed by treatment of the intermediate trifluoroester with 10% potassium hydrogen carbonate solution (14%) [1661], (hydroxylation of aromatic compounds).
- Also obtained (trace) by UV irradiation of phenyl acetate in ethanol at r.t. [57].
- Also obtained from 3-(allyloxy)acetophenone by cleavage of allyl group with bis(benzonitrile)-palladium (II) chloride in refluxing benzene (90%) [302].
- Also refer to: [1666].

## Isolation from natural sources

- From *Propolis* and *Populus nigra* bud exudate (compound 36) [1128].
- From commercial wood vinegar liquor (*Cryptomeria japonica*) [978].

**N.B.:** Toxic action of 3-hydroxyacetophenone to the ciliate *Tetrahymena pyriformis* [74] [1482].

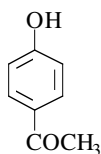
m.p. 96° [1349] [1485] [1838], 95-96° [1419], 95° [1530], 94-96° [344],  
 94-95° [520] [650] [682], 94° [1776] [1777], 92-93° [220], 92° [326], 86-88° [302];  
 b.p.<sub>0.01</sub> 82° [302], b.p.<sub>5</sub> 153° [578], b.p.<sub>756</sub> 296° [578];  
 HPLC [1128]; GC-MS [1128]; pK<sub>a</sub> [994] [1697] [1899];  
<sup>13</sup>C NMR [520], IR [994] [1922], UV [994] [1161] [1776] [1838], MS [978].

**1-(4-Hydroxyphenyl)ethanone**

[99-93-4]

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>

mol.wt. 136.15



## Syntheses

- Preparation by Fries rearrangement of phenyl acetate

**with Lewis acids**

- \*aluminium chloride,

*with solvent:*

- \*in nitrobenzene at 20-25° [443] [1512] [1642] [1839] or at 50-60° [461] [1349] [1512] [1642] [1683], (75-76%) [461] [1512] [1683], (60-64%) [1349] [1642].
- \*in chlorobenzene between 45 to 65° [1119] [1177], (69%) [1119] or in a sealed tube and subjected to high power microwave irradiation for 2 min only (36%) [1683].
- \*in nitroethane at 60° (44%) [1909].
- \*in carbon disulfide at 45° (40%) [560].
- \*in petroleum ether at 50° (20%) [1724].

*without solvent:* [102] [119] [320] [461] [625] [632] [789] [1024] [1220] [1731] [1785] [1911] [1936], but between 130 to 175° (40-60%) [102] [320] [461] [789] [1220] [1936].

- \*aluminium chloride-sodium chloride mixture at 240-250° (10%) [810].
- \*boron trifluoride at 90° (56%) [789].
- \*scandium tris(trifluoromethanesulfonate), in nitromethane, at 50° (39%) [1000].
- \*titanium tetrachloride at 90-100° (34%) [625].
- \*ferric chloride at 65° (25%) [830].
- \*zinc chloride at 125° (8%) [433].

**with Protic acids**

- \*hydrofluoric acid [480] [482] [1641], between 20 to 100° (94%) [482], (81%) [480].
- \*polyphosphoric acid, between 20 to 100° (69%) [1660], (50-53%) [662] [1296], (44%) [1298].

**with a Cation exchange resin**

- \*Nafion-XR 500, sulfonic acid type at 100° [1364].

**with Zeolites molecular sieves**

- \*ZSM-5, in sulfolane, at 180° (28%) [1852].
- \*H-ZSM-5 at 400° [1438] or at 210° (6%) [468].
- \*H-Nu-2 at 170° (15%) [468].
- \*HY (Si/Al = 3) or fluorided alumina (Al<sub>2</sub>O<sub>3</sub>-F; 3 % wt. F), at 400° [1438].
- Also obtained by Fries rearrangement of 4-trimethylsilylphenyl acetate with aluminium chloride in refluxing carbon disulfide (55%) [1537].
- Also obtained (by-product) by Fries rearrangement of 2-bromophenyl acetate with aluminium chloride without solvent at 180° (8%) [540].
- Preparation by reaction of acetic acid on phenol,
  - \*with boron trifluoride, between 30 to 80° (95%) [1146], (85%) [432], (77%) [1126].
  - \*with polyphosphoric acid [662] [1298] [1660], between 70 to 100° (65-67%) [662] [1660].
  - \*with hydrofluoric acid, at 100° (61%) [480].
  - \*with zinc chloride (Nencki reaction) [433] [1230] [1398] [1776], (11%) [1398].
  - \*with Nafion-XR 500, sulfonic acid type, at 100° [1364].
- Preparation by reaction of acetyl chloride on phenol,
  - \*with aluminium chloride, in nitrobenzene, between 45 to 60° (70-74%) [102] [458], (50-55%) [1177] [1565].
  - \*with titanium tetrachloride, in nitrobenzene, at 60° (70%) [458].
  - \*with butanesulfonic acid, at 85-90° (23%) [1794].
  - \*with ferric chloride, in carbon disulfide [1320] [1419], (21%) [1320].
  - \*with zinc chloride [578].
- Also obtained by reaction of acetyl chloride on phenyl borate with aluminium chloride in refluxing carbon disulfide (35%) [1349].
- Preparation by reaction of acetic anhydride on phenol,
  - \*with 70% perchloric acid (20%) [1084].
  - \*with aluminium chloride (48%) [1210], (19%) [1084].
  - \*with zinc chloride at 145-150° (40%) [62].
- Also obtained by reaction of phenyl 2-acetoxybenzoate on phenol with aluminium chloride at 180° (18%) [216].
- Preparation by reaction of acetonitrile on phenol with triflic acid (trifluoromethanesulfonic acid) at r.t. (74%) [268].
- Preparation by dealkylation of 4-ethoxyacetophenone [98] [751], (70%) [751] or 4-methoxyacetophenone (70%) [751] with aluminium chloride between 140 to 180°.
- Also obtained by UV light irradiation of phenyl acetate (photo-Fries rearrangement),
  - \*in water, at 25-30° (24-25%) [1350] [1843].
    - in the presence of β-cyclodextrin [1350] [1723], (69%) [1350].
    - in the presence of methyl α-D-glucopyranoside (32%) [1350].
  - \*in benzene or methanol, at r.t. (38-39%) [1723].
  - \*in cyclohexane, ethyl ether, ethanol or isopropanol, at 25-30° (10-15%) [57] [58] [724].
  - \*in hexane, at 25° (4%) [660].
    - in the presence of potassium carbonate (10%) [660].
- Also obtained by UV light irradiation of 4-methoxyphenyl acetate in ethyl ether, at 25° (7%) [724].
- Also obtained by UV light irradiation of 4-hydroxy-α-chloroacetophenone in ethanol (26%) [59].
- Also obtained by reaction of acetylacetone on phenyl benzoate with aluminium chloride in nitrobenzene at 45° (12%) [1177].
- Preparation by diazotization of 4-aminoacetophenone, followed by hydrolysis of the obtained diazonium salt [992] [1414].



- Also obtained by treatment of acetophenone with sodium trifluoroacetate in nitromethane-trifluoroacetic acid-trifluoroacetic anhydride mixture in the presence of a platinum electrode, followed by treatment of the intermediate trifluoroester with 10% potassium hydrogen carbonate solution (16%) [1661], (hydroxylation of aromatic compounds).
- Also obtained by reaction of stannous chloride on 4-hydroxyacetophenone 2,4-dinitro-phenylhydrazone in refluxing aqueous acetic acid-hydrochloric acid mixture (66%) [460].

Isolation from natural sources:

- From the roots of *Paeonia broteroi* (Paeoniaceae) [490].
- The Picein or 4-hydroxyacetophenone-D-glucoside has been isolated from leaves of *Picea Glehnii* Masters (Coniferae). This compound, by hydrolysis with dilute mineral acids or with emulsin leads to 4-hydroxyacetophenone [953] [1772].
- Hinokiflavone has been isolated from *Chamaecyparis obtusa* (Coniferae) [951]. When treated with potassium hydroxide, Hinokiflavone produces 4-hydroxyacetophenone [644].
- From spruce needles (*Picea abies* L. Karst) [1369].
- Also obtained by saponification of Apiin or Apigenin with boiling 25% aqueous sodium hydroxide (87%) [1856]. Apiin or 4',5,7-trihydroxyflavone-7-apiosylglucoside was isolated from parsley or from celery [1854] [1855].

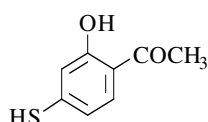
m.p. 115° [810], 112° [1856], 110-111° [1177], 110° [560] [1419] [1724], 109-110° [1024], 109° [216] [443] [1146] [1349] [1660] [1772] [1776] [1777], 108-110° [1641], 108-109° [604] [1084] [1119] [1537], 108° [460] [461] [625] [830] [1220] [1230] [1320] [1398] [1512] [1839], 107-109° [57] [480] [662] [1731], 107°5-108° [1126], 107-108° [953] [1456], 107° [268] [420] [578] [751] [992] [1298] [1369], 106°2-107°8 [625], 106-107° [320] [433] [1565] [1722], 105-108° [432], 104-106° [62];  
b.p.<sub>3</sub> 147-148° [1398], b.p.<sub>20</sub> 170-194° [662], b.p.<sub>4</sub> 175° [443], b.p.<sub>15</sub> 190° [433];  
<sup>1</sup>H NMR [268] [490] [540] [1369], <sup>13</sup>C NMR [520], IR [994] [1024] [1369],  
UV [347] [994] [1082] [1160] [1161] [1163] [1266] [1369] [1776];  
pK<sub>a</sub> [994] [1697] [1899].

### 1-(2-Hydroxy-4-mercaptophenyl)ethanone

[35204-52-5]

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>S

mol.wt. 168.22



#### Syntheses

- Preparation by reaction of stannous chloride with 2-acetyl-5-chlorosulfonylphenol in acetic acid previously saturated with gaseous hydrochloric acid (63%) [71].
- Also refer to: [1680].

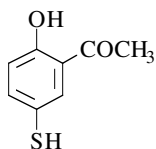
m.p. 60-62° [71].

### 1-(2-Hydroxy-5-mercaptophenyl)ethanone

[35204-45-6]

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>S

mol.wt. 168.22



#### Synthesis

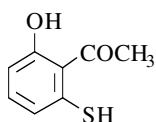
- Refer to: [421].

**1-(2-Hydroxy-6-mercaptophenyl)ethanone**

[83080-88-0]

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>S

mol.wt. 168.22

**Synthesis**

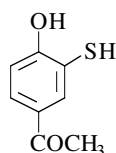
-Preparation by reaction of 2 N aqueous sodium hydroxide on 2-dimethylcarbamylthio-6-hydroxyacetophenone in refluxing methanol (65%) [91].

**1-(4-Hydroxy-3-mercaptophenyl)ethanone**

[66264-55-9]

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>S

mol.wt. 168.22

**Synthesis**

-Preparation by reaction of stannous chloride dihydrate on 3-(chlorosulfonyl)-4-hydroxyacetophenone with gaseous hydrochloric acid in acetic acid at 25-30° (31%) [1421] [1692].

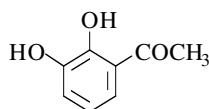
m.p. 117-120° [1421] [1692].

**1-(2,3-Dihydroxyphenyl)ethanone**

[13494-10-5]

C<sub>8</sub>H<sub>8</sub>O<sub>3</sub>

mol.wt. 152.15

**Syntheses**

- Preparation by reaction of acetic anhydride on pyrocatechol with 70% perchloric acid on a steam bath (58%) [1084], at 100° (4%) [623].
- Preparation by demethylation of 2,3-dimethoxyacetophenone [115] [134] [988] [1020] [1437], (73%) [134], (50%) [1020], itself obtained by oxidation of 2,3-dimethoxyphenyl methyl carbinol [115] [988] [1020] [1437]. This "carbinol" was prepared either from 2,3-dimethoxybenzaldehyde by an organomagnesium synthesis [115] [988] [1020] or from 2,3-dimethoxycinnamic acid by Posner's method [1020] [1437].
- Also obtained by acid hydrolysis of 8-hydroxyflavone [1020].
- Also obtained by UV light irradiation of pyrocatechol monoacetate in ethanol at 30° (19-22%) [57] [58] [893].
- Also obtained (low yield) by degradation of an aqueous solution (pH 4.5) of D-xylose at 96° (0.5%) [1433].
- Also obtained (low yields) by degradation of aqueous solutions (pH 3.5 and 4.5) of D-glucuronic acid at 96° (0.3% and 0.2% yields, respectively) [1433].
- Also obtained from 3-acetyl-1-oxocyclohexane-2,3,6-triol, either on sublimation at 0.5 mm Hg (70% yield) or when heated in an aqueous solution (pH 4.5) and 96° (50% yield). The above triol was obtained in crystalline form (m.p. 149-150°) by reaction of D-glucuronic acid in aqueous solutions (pH 3.5 and 4.5) at 96° [1433].
- Also obtained (by product) by UV light irradiation of 3-methyl-1,2-benzisoxazole in 96% sulfuric acid (10%) [547] [673].
- Also obtained by hydrolytic rearrangement of 2-acetoacetyl-2,5-dimethoxytetrahydrofuran in refluxing 0.1 N hydrochloric acid (88%) [240], (52%) [1427].
- Also obtained by hydrolysis of (2,2-dimethyl-1,3-benzodioxol-4-yl)acetone (m.p. 72-73°) with concentrated hydrochloric acid in refluxing ethanol under argon atmosphere (84%) [826].

m.p. 98-98°5 [240], 98° [57] [58] [134], 97-98° [893] [1020], 97° [1084], 96°5-97°5 [547], 96-98° [623] [1433], 96-97° [826], 95-96° [1427];

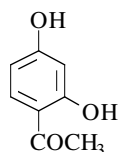
<sup>1</sup>H NMR [547] [826] [893] [1427], <sup>13</sup>C NMR [826], IR [547], UV [547], MS [547] [826].

**1-(2,4-Dihydroxyphenyl)ethanone** (*Resacetophenone*)

[89-84-9]

C<sub>8</sub>H<sub>8</sub>O<sub>3</sub>

mol.wt. 152.15



Syntheses

-Preparation by reaction of acetic acid on resorcinol,

\*with zinc chloride (Nencki reaction)

[418] [453] [475] [551] [686] [906] [982] [1319] [1501]

[1529] [1775] [1877], (94%) [1501], (57-65%)

[551] [906] [1319];

\*with boron trifluoride [1146] [1229] [1345], (85-94%)

[1146] [1345];

\*with Amberlite IR-120 (a cation exchange resin, sulfonic acid type) (87%) [1445];

\*with polyphosphoric acid [1298] [1308], (63%) [1308];

\*with 70% perchloric acid (33%) [1229].

-Preparation by reaction of acetonitrile on resorcinol,

\*with triflic acid (trifluoromethanesulfonic acid) (87%) [268];

\*with zinc chloride (Hoesch reaction) [782] [790] [1259] [1955] [1956], (77%) [1955], (70%) [790].

-Preparation by reaction of acetic anhydride on resorcinol,

\*with boron trifluoride (91%) [975];

\*with 70% perchloric acid (90%) [1084], (70%) [548];

\*with Amberlite IR-120 (83%) [1445];

\*with zinc chloride at 145-150° (2%) [62];

\*with a trace of concentrated sulfuric acid at 130° (75%) [860].

-Preparation by reaction of acetyl chloride on resorcinol,

\*with aluminium chloride in nitrobenzene at r.t. (65%) [507], (50%) [1513];

\*with Amberlite IR-120 (52%) [1445];

\*with zinc chloride [579] [580].

-Preparation by Fries rearrangement of resorcinol monoacetate with 70% perchloric acid in acetic anhydride at r.t. (83%) [1084].

-Preparation by Fries rearrangement of resorcinol diacetate,

\*with Amberlite IR-120 (64%) [1445];

\*with aluminium chloride [511] [514] [1130], (63%) [1130], (60%) [514];

\*with boron trifluoride etherate in benzene at reflux (60%) [974];

\*with zinc chloride [711] [1319], (52%) [711].

-Preparation by Fries rearrangement of 3-methoxyphenyl acetate with aluminium chloride without solvent at 180-185° (60%) [514].

-Also obtained by UV light irradiation of resorcinol diacetate in methanol at 25° [1389].

-Also obtained by demethylation of 2-hydroxy-4-methoxyacetophenone,

\*with potassium hydroxide [1285];

\*with hydriodic acid [1285].

-Also obtained by reaction of concentrated sulfuric acid on resacetophenone diacetate [511].

-Also obtained by reaction of potassium hydroxide on 4-methylumbelliferone [1399] or on 4-methylene-2-phenyl-4*H*-chromen-7-ol [317].

-Also obtained by decarboxylation of 2-acetyl-3,5-dihydroxybenzoic acid with copper powder in quinoline at 220-230° [1249].

-Also obtained by decarboxylation of 3-acetyl-2,6-dihydroxybenzoic acid with dilute hydrochloric acid at reflux [1596] [1602].

-Also obtained by decarboxylation of 5-acetyl-2,4-dihydroxybenzoic acid with dilute hydrochloric acid at 160-170°, in a sealed tube [47].

## Isolation from natural sources

-From Chinese Moutan Cortex, the root of *Paeonia suffruticosa* Andrews (Paeoniaceae) [1924].  
 -Also obtained by thermal decomposition of the resin from *Ferula pyramidata* (Kar. et Kir.) eug. kor. [982].

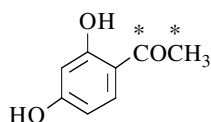
m.p. 147° [475] [1146] [1345], 146° [507] [548] [860], 145-146° [982], 145° [782] [1445], 144-145° [790] [975], 144° [62], 143° [47] [1229], 142-144° [551], 142-143° [878] [1596], 142° [134] [418] [420] [453] [711] [873] [1130] [1285] [1298] [1308] [1319] [1513] [1776] [1777], 141-142° [1249] [1399], 141° [686], 140-141° [906], 138-140° [268], 133-140° [1501];  
 b.p. 303-305° (d) [1319];  
 $d^{141^\circ}_D = 1.18$  [578];  $n_D^{141^\circ} = 1.56467$  [578];  
 $^1\text{H}$  NMR [43] [44] [268] [622],  $^{13}\text{C}$  NMR [520] [736] [1396] [1400],  
 UV [43] [447] [448] [1775], MS [684];  $\text{pK}_a$  [1697].

**1-(2,4-Dihydroxyphenyl)ethanone- $^{13}\text{C}_2$** 

[74291-78-4]

 $\text{C}_8\text{H}_8\text{O}_3$ 

mol.wt. 154.13



## Synthesis

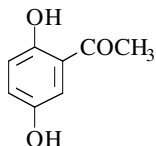
-Preparation by reaction of [1,2- $^{13}\text{C}_2$ ]acetyl chloride with resorcinol in nitrobenzene in the presence of aluminium chloride for 24 h at r.t. (65%) [34].

**1-(2,5-Dihydroxyphenyl)ethanone (Quinacetophenone)**

[490-78-8]

 $\text{C}_8\text{H}_8\text{O}_3$ 

mol.wt. 152.15



## Syntheses

-Preparation by Fries rearrangement of hydroquinone diacetate,  
 \*with aluminium chloride [45] [50] [510] [512] [513] [514] [812] [1240] [1510] [1572] [1608] [1895], (91%) [513], (76%) [1608] [1895], (63-77%) [45] [50] [1572], (55-60%) [512] [514] [812] [1240];  
 \*with zinc chloride in refluxing acetic acid (quantitative yield) [1468];  
 \*with boron trifluoride etherate in benzene at reflux (65%) [974].  
 -Preparation by Fries rearrangement of hydroquinone diacetate with aluminium chloride in the presence of hydroquinone (54%) [1510].  
 -Also obtained by UV light irradiation of hydroquinone diacetate in methanol (35%) [1614].  
 -Preparation by Fries rearrangement of 4-methoxyphenyl acetate with aluminium chloride without solvent at 130° (40%) [46].  
 -Preparation by Fries rearrangement of 4-(benzoyloxy)phenyl acetate with aluminium chloride without solvent at 125-130° (22%) [46].  
 -Preparation by reaction of acetic acid on hydroquinone,  
 \*with zinc chloride (Nencki reaction) [418] [512] [1200] [1318] [1321] [1468] [1531] [1776], (25-28%) [1200] [1531];  
 \*with boron trifluoride [723] [1051] [1052] [1146] [1345], (95%) [1052], (66-70%) [1146] [1345];  
 \*with Amberlite IR-120 or Zeokarb 225 (22%) [1445].  
 -Preparation by reaction of acetyl chloride on hydroquinone with aluminium chloride [418] [512] [1510], (35-40%) [512] [1510].

- Also obtained by reaction of acetic anhydride on hydroquinone,
  - \*with zinc chloride at 145-150° (76%) [62];
  - \*with Amberlite IR-120 (27%) [1445].
- Also obtained (by-product) by reaction of acetic acid on 1,4-dimethoxybenzene with boron trifluoride at 70° [1345].
- Preparation by dealkylation of,
  - \*2,5-dimethoxyacetophenone with aluminium bromide in refluxing carbon disulfide (81%) [995];
  - \*2-hydroxy-5-methoxyacetophenone with hydriodic acid [693];
  - \*2,5-diethoxyacetophenone or 5-ethoxy-2-hydroxyacetophenone with aluminium chloride [418].
- Preparation by diazotization of 5-amino-2-hydroxyacetophenone, connected with hydrolysis of the obtained diazonium salt [1104] [1475].
- Preparation by hydrolysis of keto esters further on,
  - \*5-(benzyloxy)-2-hydroxyacetophenone with concentrated sulfuric acid at r.t. [46];
  - \*5-acetoxy-2-hydroxyacetophenone,
    - with 5% aqueous sodium hydroxide (96%) [1240],
    - with a 5% solution of hydrogen chloride in methanol (75%) [1487],
    - with aluminium chloride in refluxing carbon disulfide (55%) [1240].
- Also obtained by reduction of 2-acetyl-1,4-benzoquinone,
  - \*with aqueous sodium hydrosulfite, in ethyl ether [995];
  - \*with allyltrimethylstannane, in benzene (36%) [1171].
- Also obtained by reaction of acetaldehyde on 1,4-benzoquinone with sunlight, in a sealed tube (good yield) [993].
- Also obtained (by-product) from 5-bromo-6-hydroxy-2-methylchromone by alkaline degradation with 10% aqueous sodium hydroxide solution at reflux (50%) [170].
- Also obtained (poor yield) by alkaline degradation of a solution of D-xylose or D-glucose in 0.63 M sodium hydroxide at 96° under nitrogen [623].
- Also obtained by UV light irradiation of 3-methyl-1,2-benzisoxazole in 96-98% sulfuric acid (52-57%) [547] [673].
- Also obtained by heating 5'-cinnamyloxy-2'-hydroxyacetophenone at 220° (64%) [303].
- Also obtained from 5-(allyloxy)-2-hydroxyacetophenone by cleavage of allyl group with bis(benzonitrile)palladium (II) chloride in refluxing benzene (89%) [302].

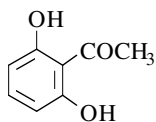
m.p. 206° [512], 205-206° [623] [1487], 204°6-205°4 [812], 204° [1052],  
 202°6-203°6 [547], 202-204° [1445], 202-203° [50] [1240] [1572],  
 202° [134] [418] [513] [693] [993] [1104] [1146] [1318] [1345] [1510]  
 [1608] [1614], 201-203° [1171], 201-202° [45] [46] [420] [995] [1200] [1468],  
 201° [1776] [1777], 200-201° [1531], 200° [62], 198-200° [130],  
 197°5-198°5 [1895], 196-198° [302] [303];  
 b.p.<sub>0.01</sub> 86° [302]; pK<sub>a</sub> [1697];  
<sup>1</sup>H NMR [723] [1240], (Sadtler: standard n° 4286); <sup>13</sup>C NMR [736] [1396],  
 IR [547] [1171] [1240], (Sadtler: standard n° 10815);  
 UV [547] [720] [723] [1776], (Sadtler: standard n° 6276); MS [723] [1171].

### 1-(2,6-Dihydroxyphenyl)ethanone (*γ*-Resacetophenone)

[699-83-2]

C<sub>8</sub>H<sub>8</sub>O<sub>3</sub>

mol.wt. 152.15



#### Syntheses

- Preparation by hydrolysis of 8-acetyl-4-methyl-umbelliferone (8-acetyl-7-hydroxy-4-methylcoumarin) with aqueous sodium hydroxide solution at reflux (56-73%) [139] [447] [1306] [1867], (77-89%) [609] [1534] [1610] [1632] [1707] [1709], (89%-100%) [5] [1092] [1533] [1534].

- Preparation by hydrolysis of 8-acetyl-4-phenylumbelliferone with aqueous sodium hydroxide solution at reflux (33%) [1093].
- Preparation by demethylation of 2,6-dimethoxyacetophenone with aluminium chloride in toluene at 120° (24%) [1707] [1709], (59%) [1198]. The 2,6-dimethoxyacetophenone was obtained from 2,6-dimethoxybenzonitrile and methylmagnesium iodide.

#### From Microorganisms

- Isolation from *Daldinia concentrica* [665].

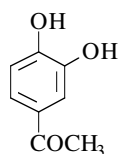
m.p. 157-158° [1198], 157° [134] [1092] [1093], 156-157° [139] [1707] [1709] [1867], 155-156° [447], 154-157° [238], 154-156° [1533], 154-155° [1534] [1610] [1632], 154° [1306], 152-154° [5];  
<sup>1</sup>H NMR [238] [738], <sup>13</sup>C NMR [520] [738], UV [40] [447].

#### 1-(3,4-Dihydroxyphenyl)ethanone

[1197-09-7]

C<sub>8</sub>H<sub>8</sub>O<sub>3</sub>

mol.wt. 152.15



#### Syntheses

- Preparation by Fries rearrangement of pyrocatechol diacetate with aluminium chloride in nitrobenzene between 75 to 95° [893] [1271] [1510], (80%) [1510], (64%) [893], (43%) [1271] or in chlorobenzene at 80° (83%) [1250].
- Also obtained by Fries rearrangement of guaiacol acetate with aluminium chloride in nitrobenzene at r.t. (30%) [1510] or without solvent between 20 to 50° (6%) [1939].
- Preparation by reaction of acetic acid on pyrocatechol,
  - \*with boron trifluoride in a sealed tube at 150° (43%) [1345];
  - \*with zinc chloride (Nencki reaction) [433] [1317], (20%) [433];
  - \*with polyphosphoric acid (10%) [1308].
- Also obtained by reaction of acetic anhydride on pyrocatechol,
  - \*with perchloric acid at 100° (6%) [623];
  - \*with zinc chloride at 145-150° (51%) [62].
- Preparation by reaction of acetyl chloride with pyrocatechol with aluminium chloride at 140° [818].
- Also obtained by UV light irradiation of pyrocatechol monoacetate in ethanol at 30° (18%) [57] [58].
- Also obtained by reaction of 5% aqueous potassium hydroxide on Luteolin, at reflux [1405].
- Preparation by demethylation of acetovanillone,
  - \*with dilute hydrochloric acid in a sealed tube at 140-150° [1317];
  - \*using aluminium chloride and pyridine [684] [1064].
- Also obtained by reaction of zinc powder [226] [420] [558] [626] [1690] or stannous chloride [558] and hydrochloric acid on 3,4-dihydroxy- $\alpha$ -chloroacetophenone (quantitative yield) [420] [558], (45-49%) [626].
- Also obtained by reaction of aluminium bromide on (3,4-methylenedioxy)acetophenone (acetopiperone) in nitrobenzene at r.t. (48%) [1267].
- Also obtained from 3,4-diacetoxyacetophenone [226],
  - \*by heating with a concentrated solution of sodium carbonate;
  - \*by refluxing with 5% sulfuric acid;
  - \*by treatment with porcine pancreatic lipase in diisopropyl ether and n-butanol at 42-45° (80%) [1381] [1382].
- Also obtained (by-product) by chlorination of acetoguaiacone in dioxane-water mixture at 40° (3%) [1456].
- Also obtained (poor yield) by alkaline degradation of a solution of D-xylose or D-glucose in 0.63 M sodium hydroxide at 96° under nitrogen (< 1%) [623].
- Also obtained from neutral glucose and fructose solutions heated at 120° [1718].

## Isolation from natural sources

- From the needles of *Picea obovata* Ledeb. and *Picea koraiensis* Nakai (Pinaceae) [864].
- This ketone was shown to occur in natural humic acids\* and fulvic acids by hydrolysis with 2 N sodium hydroxide at 170° [1569]. Allomelanins\* found in soils, coals and peat, resulting from the decomposition of organic matter, particularly dead plants [1790].
- By hydrolysis of its 3-O-β-D-glucopyranoside (*poungenoside*) (m.p. 200-202°) [864].
- N.B.:** it was found to be an antimicrobial substance in coffee residue [1329].

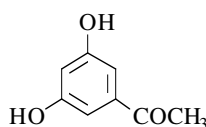
m.p. 122° [57] [58], 120° [1345], 119-121° [626], 119°2-119°7 [818],  
 118-120° [623], 117-118° [1267], 117° [684], 116-117° [864],  
 116° [62] [433] [558] [1064] [1271] [1308] [1510], 115-116° [420] [893],  
 114-116° [1405], 114-115° [226], 114° [1690], 110-112° [1250], 96-98° [1317];  
 b.p.<sub>11</sub> 127-133° [1308]; pK<sub>a</sub> [994]; TLC [864]; HPLC [1329];  
<sup>1</sup>H NMR [623] [864] [893] [1329], <sup>13</sup>C NMR [1329], IR [623] [864] [994] [1569],  
 UV [57] [864] [893] [994], MS [623] [684] [1329] [1456] [1569].

**1-(3,5-Dihydroxyphenyl)ethanone**

[51863-60-6]

C<sub>8</sub>H<sub>8</sub>O<sub>3</sub>

mol.wt. 152.15



## Syntheses

-Preparation from 3,5-dimethoxyacetophenone (SM) by demethylation with aluminium chloride in refluxing chlorobenzene (71%) [1193]. The starting material (SM) was prepared by a three-step procedure from 3,5-dimethoxybenzoic acid.

-Preparation from 3,5-diacetoxyacetophenone by hydrolysis with 10% sulfuric acid at reflux (41%) [832]. The starting ketone was prepared by reaction of methyl bromide on 3,5-diacetoxybenzoyl chloride in the presence of dimethyl cadmium.

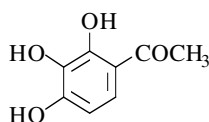
m.p. 148° [832], 147-148° [1193].

**1-(2,3,4-Trihydroxyphenyl)ethanone (Gallacetophenone)**

[528-21-2]

C<sub>8</sub>H<sub>8</sub>O<sub>4</sub>

mol.wt. 168.15



## Syntheses

-Preparation by Fries rearrangement of pyrogallol triacetate with aluminium chloride without solvent [510] [511], (very good yield) [510].

-Preparation by reaction of acetic anhydride on pyrogallol,

\*with Amberlite IR-120 or Zeokarb 225, at 160° (84%) [1445];

\*with few drops sulfuric acid at 130° (65%) [860];

\*with zinc chloride at 145-150° (53%) [62] or in the presence of acetic acid (58-63%) [124] [750];

\*with sulfuric acid and benzene-1,3-disulfonic acid mixture at 135° (54%) [998];

\*with 70% perchloric acid on a steam bath (44%) [1084].

-Preparation by reaction of acetyl chloride on pyrogallol with aluminium chloride [565] [606] [631] [1513].

-Preparation by reaction of acetic acid on pyrogallol.

\*with boron trifluoride at 28-30° (90%) [1053] [1146] alone or in ethyl ether at 0° (90%) [347];

\*with Amberlite IR-120 or Zeokarb 225 at 160° (75%) [1445];

\*with zinc chloride at 140-150° (Nencki reaction) (good yield) [453] [605] [1319] [1776], (58% [749];

\*with 70% perchloric acid, at reflux (30%) [1229].

- Also obtained by dealkylation of 2,3-dihydroxy-4-methoxyacetophenone with aluminium chloride in refluxing chlorobenzene [1194].
- Also obtained by hydrolysis of 3,4-diacetoxy-2-hydroxyacetophenone [1614].
- By other method (90%), also refer to: [348].
- Preparation by reaction of hydrogen peroxide on 3-formylresacetophenone in 1 N aqueous sodium hydroxide (79%) [1306].
- Also obtained by cleavage of 4-methylene-2-phenyl-4*H*-chromene-7,8-diol with boiling 10% potassium hydroxide [317].

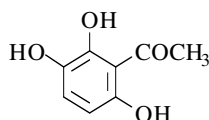
m.p. 186° [511], 173° [605] [606] [1053] [1084] [1146] [1229], 172° [1776] [1777], 171-173° [62], 171-172° [124] [750], 171° [347] [565], 170° [749], 169-171° [1445], 169-170° [860] [1614], 168° [420] [453] [631] [1194] [1306] [1319], 167° [1513]; IR [1053], UV [347] [1776].

### 1-(2,3,6-Trihydroxyphenyl)ethanone

[85918-30-5]

C<sub>8</sub>H<sub>8</sub>O<sub>4</sub>

mol.wt. 168.15



#### Syntheses

-Photolysis of 1,2,4-triacetoxybenzene gave a complex mixture from which 2-acetyl-3,6-diacetoxyphenol could be isolated. The triacetate of this one, by deacetylation afforded 3-acetyl-1,2,4-trihydroxybenzene [1614].

- Preparation by reaction of potassium persulfate on 2,6-dihydroxyacetophenone in aqueous sodium hydroxide solution at 15-20° (29%) [140].
- Preparation by reaction of hydrogen peroxide on 3-formyl-2,6-dihydroxyacetophenone in 1 N aqueous sodium hydroxide (71-74%) [1304] [1306].

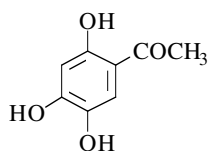
m.p. 160° [1614], 157° [1306], 230° (d) [140], 96° [1304]. These reported melting points are obviously wrong. (The triacetate melted to 155° [140]).

### 1-(2,4,5-Trihydroxyphenyl)ethanone

[1818-27-5]

C<sub>8</sub>H<sub>8</sub>O<sub>4</sub>

mol.wt. 168.15



#### Syntheses

-Preparation by Fries rearrangement of 1,2,4-triacetoxybenzene,  
 \*with aluminium chloride in nitrobenzene [147] [365] [511] [1197] [1203], (30-43%) [365] [1197] [1203];  
 \*with zinc chloride at 135-140° [159] [168] [998] [1566], (49-53%) [159] [998];

- \*with *p*-toluenesulfonic acid in refluxing tetrachloroethane or benzene or without solvent at 135-140° (60%) [998].
- Also obtained by reaction of potassium persulfate on resacetophenone (Elbs reaction),
- \*in aqueous solution of potassium hydroxide at r.t. (24-30%) [1068] [1900];
- \*with ferrous sulfate in aqueous sodium hydroxide at r.t. (18%) [168].
- Preparation by reaction of acetonitrile on hydroxyquinol with zinc chloride (Hoesch reaction) [365] [766] [1197] [1203], (25%) [365].
- Also obtained by reaction of acetic acid-acetic anhydride mixture on hydroxyquinol with zinc chloride at 140-150° (32%) [365].
- Also obtained by reaction of acetic anhydride on hydroxyquinol with concentrated sulfuric acid at 135° (61-81%) [998].



-Preparation by reaction of acetic anhydride on p-quinone with concentrated sulfuric acid alone or with benzenesulfonic acid, p-toluenesulfonic acid, dl-camphorsulfonic acid or benzene-m-disulfonic acid at 135° (53 to 70%) [998].  
 -Also refer to: [687].

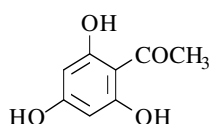
m.p. 208° [1566], 206-207° [365] [511] [1197] [1203], 206° [766], 202-204° [1068],  
 200-202° [159] [168];  
<sup>13</sup>C NMR [897], MS [684].

### 1-(2,4,6-Trihydroxyphenyl)ethanone (*Phloracetophenone*)

[480-66-0]

C<sub>8</sub>H<sub>8</sub>O<sub>4</sub>

mol.wt. 168.15



#### Syntheses

-Preparation by reaction of acetic anhydride on phloroglucinol,  
 \*with concentrated sulfuric acid at 130° (70%) [860];  
 \*with boron trifluoride at 10° (62.5-68%) [1915];  
 \*with zinc chloride at 145-150° (50%) [62];  
 \*with Amberlite IR-120 or Zeokarb 225 (cation exchange resins, sulfonic acid type) at 160° (39%) [1445].  
 -Preparation by reaction of acetonitrile on phloroglucinol,  
 \*with zinc chloride (Hoesch reaction) [347] [416] [712] [713] [790] [817] [905] [1502], (93%) [817], (74-87%) [416] [713] [790] [905];  
 \*with triflic acid, at r.t. (40%) [268].  
 -Preparation by reaction of acetyl chloride on phloroglucinol,  
 \*with boron trifluoride, at 10° (62.5-68%) [1915];  
 \*with aluminium chloride, in nitrobenzene [511] [1513] [1633], (25-30%) [511] [1633];  
 \*with ferric chloride, in a boiling water bath [1321].  
 -Preparation by reaction of acetic acid on phloroglucinol with zinc chloride (Nencki reaction), and then saponification of 5,7-dihydroxy-4-methylene-2-(2,4,6-trihydroxyphenyl)-4*H*-benzopyran first formed (76%) [1590].  
 -Preparation by reaction of phenyl acetate on phloroglucinol with boron trifluoride etherate in refluxing benzene (30%) [974].  
 -Also obtained by Fries rearrangement of phloroglucinol triacetate with aluminium chloride in nitrobenzene at 27° (10%) [511].  
 -Also obtained by deacetylation of 4,6-diacetoxy-2-hydroxyacetophenone [1614].  
 -Also obtained (high yields) by hydrolysis of undermentioned compounds with water at 160-170° [1086],  
 \*ethyl 5,7-dihydroxy-2,4-dioxo-chroman-8-carboxylate;  
 \*ethyl 3-ethoxycarbonylacetyl-2,4,6-trihydroxybenzoate;  
 \*diethyl 5-ethoxycarbonylacetyl-2,4,6-trihydroxy-isophthalate.  
 -Also obtained by cleavage of 4-methylene-2-phenyl-4*H*-chromen-5,7-diol with boiling 10% potassium hydroxide (low yield) [317] [769].

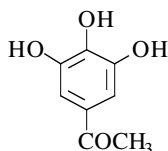
m.p. 284-285° [1590], 280° [317], 221-223° [1915], 220-222° [1445],  
 219° [712], 218° [817], 218-219° [713] [905], 218° [511] [790] [1086] [1513],  
 217-218° [416], 216-218° [268], 214-216° [62], 214-215° [879],  
 213-214° [860] [1633], 209-210° [769];  
 TLC [763]; tautomerism [1674];  
<sup>1</sup>H NMR [268] [738] [1493], <sup>13</sup>C NMR [520] [738] [1396] [1878], IR [1493],  
 UV [347] [645], MS [684].

**1-(3,4,5-Trihydroxyphenyl)ethanone**

[33709-29-4]

C<sub>8</sub>H<sub>8</sub>O<sub>4</sub>

mol.wt. 168.15

**Syntheses**

- Preparation by reaction of aluminium chloride on gallacetophenone trimethyl ether in refluxing chlorobenzene (71%) [1192].
- Preparation from diethyl 3,4,5-triacetoxybenzoylmalonate by hydrolysis and decarboxylation with 10% sulfuric acid in acetic acid at 80° (92%) [652].

-Also refer to: [704] [946].

**Isolation from natural sources**

-This ketone was shown to occur in natural humic acids\* and fulvic acids by hydrolysis with 2 N sodium hydroxide at 170° [1569]. Allomelanins\* found in soils, coals and peat, resulting from the decomposition of organic matter, particularly dead plants [1790].

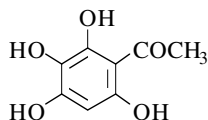
m.p. 187-188° [1192]; 178-180° [652]; IR [1569], MS [652] [1569].

**1-(2,3,4,6-Tetrahydroxyphenyl)ethanone**

[63635-39-2]

C<sub>8</sub>H<sub>8</sub>O<sub>5</sub>

mol.wt. 184.15

**Syntheses**

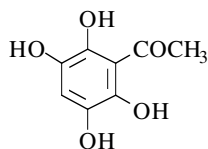
- Preparation by reaction of acetic acid on 1,2,3,5-tetrahydroxybenzene by heating with zinc chloride (Nencki reaction) [758] [1328], (84-85%) [1328].
- Preparation by reaction of acetonitrile on 1,2,3,5-tetrahydroxybenzene (Hoesch reaction) [1342] [1343], (65%) [1343].
- Also obtained by demethylation of 3,6-dihydroxy-2,4-dimethoxyacetophenone with aluminium chloride in boiling chlorobenzene (42%) [1199].
- Also refer to: [758] (compound I); [1344] (compound 9); [1365] (compound 2); [1366] (compound 12).

m.p. 243-244° [1199], 236-238° [1342] [1343], 204-205° [1328];

<sup>1</sup>H NMR [1343], IR [1343], MS [1343].

**1-(2,3,5,6-Tetrahydroxyphenyl)ethanone**C<sub>8</sub>H<sub>8</sub>O<sub>5</sub>

mol.wt. 184.15

**Syntheses**

- Preparation by reaction of aluminium bromide on 2,3,5,6-tetramethoxyacetophenone in refluxing benzene (84%) [1560].
- Preparation by reaction of concentrated hydrochloric acid on 2,3,5,6-tetraacetoxyacetophenone in refluxing methanol (77%) [1560].

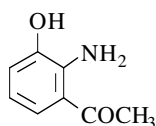
m.p. 134° [1560].

**1-(2-Amino-3-hydroxyphenyl)ethanone**

[4502-10-7]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17

**Syntheses**

- Preparation from 3-hydroxy-2-nitroacetophenone, \*by catalytic hydrogenation in the presence of Raney nickel in ethanol (good yield) [328] or in the presence of 5% Pt/C catalyst in THF under normal pressure at r.t. for 5 h [996], (96%) [575];
- \*by reduction with iron filings in aqueous hydrochloric acid [1676] (Béchamp reduction).
- Preparation by reaction of hydriodic acid with 3-methoxy-2-nitroacetophenone in the presence of phosphorous. Simultaneous demethylation and reduction of the nitro group occur [1676].
- Also obtained as a side product by photolysis of 3-methylanthranil in 98% sulfuric acid (6%) [545] [546] [673].
- Also obtained from 2-azidoacetophenone, by thermal decomposition in 98% sulfuric acid (9%) [545] [546] or by photolysis in dioxane/water/sulfuric acid mixture (3%) [545] [546].
- Also refer to: [259] (compound 8b) and [321] [329].

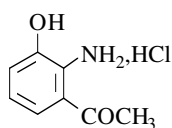
**Isolation from natural sources**

- By alkaline degradation,
- \*of *3-hydroxykynurenine* [322] [323] [325], (13%) [327], itself obtained by gentle alkaline degradation of *Xanthommatin* [325];
- \*of *Ommine* (SM) by heating with 2 N sodium hydroxide in a water bath for 4 h under oxygen atmosphere (53%) [323]. SM was isolated from the eyes of silkworms (*Bombyx Mori*) and prawns (*Crangon vulgaris*);
- \*of *Ommatin D* [322] according to the method [327];
- \*of *Ommochromes* (*Xanthommatin*, *Rhodommatin*, *Ommatin D* and *Bombyx Ommine*) with 2 N sodium hydroxide by heating in a water bath for 2 h [322].
- Also refer to: [1555].

m.p. 185-187° [575], 185° [1676], 184-185° [546], 183° [327];  
 paper chromatography [322] [323];  
<sup>1</sup>H NMR [546] [575], <sup>13</sup>C NMR [575], IR [327] [546], UV [322] [323] [324] [546],  
 MS [546].

**1-(2-Amino-3-hydroxyphenyl)ethanone (Hydrochloride)**C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HCl

mol.wt. 187.63

**Syntheses**

- Obtained by reaction of gaseous hydrochloric acid on 2-amino-3-hydroxyacetophenone in ethanol-ethyl ether mixture (93%) [328].
- Also refer to: [329].

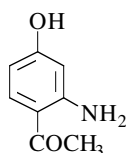
m.p. 215° (d) [328].

**1-(2-Amino-4-hydroxyphenyl)ethanone**

[90033-64-0]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17

**Syntheses**

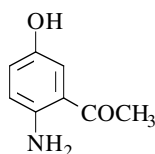
- Preparation by reaction of aluminium chloride with 2-amino-4-methoxyacetophenone in methylene chloride (63%) [297].
- Preparation from 3-hydroxyaniline using acetonitrile with boron trichloride as a catalyst [1710] or by classical Friedel-Crafts techniques [429].

<sup>1</sup>H NMR [297].**1-(2-Amino-5-hydroxyphenyl)ethanone**

[30954-71-3]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17

**Syntheses**

- Preparation by catalytic hydrogenation of 5-hydroxy-2-nitroacetophenone in the presence of platinum oxide in methanol (quantitative yield) [994].
- Also obtained by UV light irradiation of, \*3-methyl-2,1-benzisoxazole (3-methylantranil), in 98% sulfuric acid (83%) [546], (87%) [545] [673] or in 66% sulfuric acid at 80-90° (88-95%) [682]; \*3-methyl-1*H*-indazole, at 11-15°, in dilute sulfuric acid (26-28%) [672] [673] or in methanol, water and sulfuric acid mixture (19%) [673].
- Also obtained from 2-azidoacetophenone, \*by thermal decomposition in 98% sulfuric acid (67%) [545] [546];
- \*by UV light irradiation in dioxane, water and sulfuric acid mixture (21%) [545] [546].

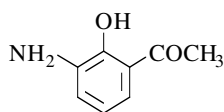
m.p. 178-179° [546] [672], 176-177° [682] [994];

<sup>1</sup>H NMR [546] [672], IR [546] [672], UV [546] [672], MS [546] [672].**1-(3-Amino-2-hydroxyphenyl)ethanone**

[70977-72-9]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17

**Syntheses**

- Preparation by catalytic hydrogenation of 2-hydroxy-3-nitroacetophenone in the presence of Pt/C in ethanol at 25° (90%) [1463].
- Preparation by reaction of stannous chloride on 2-hydroxy-3-nitroacetophenone with hydrochloric acid [372].
- Preparation by hydrogenolysis of 3-amino-5-chloro-2-hydroxyacetophenone [753].
- Preparation by reduction of 2-hydroxy-3-nitroacetophenone (65%) [955].

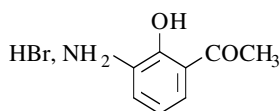
m.p. 95-97° [1463], 95-96° [955], 93-94° [372] [389].

**1-(3-Amino-2-hydroxyphenyl)ethanone** (*Hydrobromide*)

[136450-03-8]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HBr

mol.wt. 232.08



## Synthesis

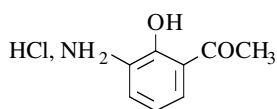
-Preparation by catalytic hydrogenation of 5-bromo-2-hydroxy-3-nitroacetophenone in presence of Pd/C in solution of methanol and methylene chloride mixture at r.t. (99%) [1866].

**1-(3-Amino-2-hydroxyphenyl)ethanone** (*Hydrochloride*)

[90005-55-3]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HCl

mol.wt. 187.63



## Synthesis

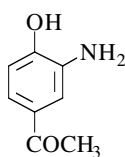
-Preparation by catalytic hydrogenolysis of 3-amino-5-chloro-2-hydroxyacetophenone hydrochloride at 25° in the presence of Pd/C in isopropanol (94%) [753].

**1-(3-Amino-4-hydroxyphenyl)ethanone**

[54255-50-4]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17



## Syntheses

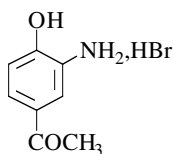
-Preparation by hydrolysis of 3-acetamido-4-hydroxyacetophenone with boiling aqueous hydrochloric acid at 50% HCl [925] or 10 N HCl (78%) [26].  
 -Preparation from 4-hydroxy-3-nitroacetophenone,  
 \*by catalytic hydrogenation in acetone [154] [1810], (67%)

[154] or in the presence of 10% Pd/C in methanol at r.t. (95%) [360];  
 \*by reaction of tin in boiling concentrated hydrochloric acid [560].

m.p. 127-128° [26], 98-99° [360], 98° [154] [925] [1810]. One of the reported melting points is obviously wrong.  
 oil [560]; <sup>1</sup>H NMR [26], IR [26].

**1-(3-Amino-4-hydroxyphenyl)ethanone** (*Hydrobromide*)C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HBr

mol.wt. 232.08



## Synthesis

-Refer to: [360].

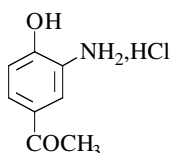
m.p. 250° (d) [360].

**1-(3-Amino-4-hydroxyphenyl)ethanone** (*Hydrochloride*)

[14347-14-9]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HCl

mol.wt. 187.63



## Synthesis

-Obtained on saturating with dry hydrogen chloride gas an acetone-ethyl ether solution of the amine [154].

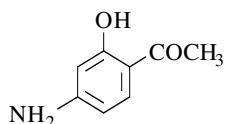
m.p. > 250° (d) (anhydrous) [154],  
232° (monohydrate) [360].

**1-(4-Amino-2-hydroxyphenyl)ethanone**

[2476-29-1]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17



## Synthesis

-Preparation by hydrolysis of 4-acetamido-2-hydroxyacetophenone with boiling aqueous hydrochloric acid at 50% HCl [925] or at 15% HCl [383] [681], (86%) [383].

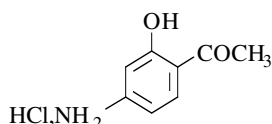
m.p. 130° [925], 129-130° [383], 122-123° [681].

**1-(4-Amino-2-hydroxyphenyl)ethanone** (*Hydrochloride*)

[51410-07-2]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HCl

mol.wt. 187.63



## Synthesis

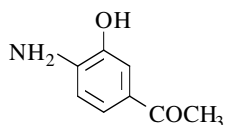
-Refer to: [819].

**1-(4-Amino-3-hydroxyphenyl)ethanone**

[54903-54-7]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17



## Syntheses

-Preparation from 6-acetyl-2-(3*H*)-benzoxazolinone by alkaline hydrolysis with boiling 10% aqueous sodium hydroxide solution (90 to 100%) [26] [266].

-Also refer to: [203] (compound VI) and [259], (compound 8d).

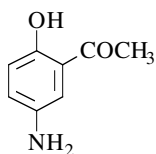
m.p. 170° [26] [266]; <sup>1</sup>H NMR [26], IR [26], UV [324].

**1-(5-Amino-2-hydroxyphenyl)ethanone**

[50-80-6]

C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>

mol.wt. 151.17

**Syntheses**

- Preparation by hydrolysis of 5-acetamido-2-methoxyacetophenone (80%) [387].
- Preparation by hydrolysis of 5-acetamido-2-hydroxyacetophenone with boiling aqueous hydrochloric acid solution [372] [395] [681] [925] [1047] [1048] [1273], (50%) [395] [1047], (84%) [372].
- Preparation by reduction of 2-hydroxy-5-nitroacetophenone, \*with stannous chloride [372] [395] [1104], (53%) [1104]; \*by electrolytic way in concentrated sulfuric acid [666].
- The 5-amino-2-hydroxyacetophenone hydrochloride, by treatment with ammonia gave the keto-base [1475].
- Also obtained by electrolytic reduction of 3-nitroacetophenone in concentrated sulfuric acid [1694].

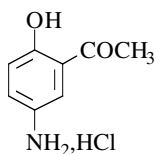
m.p. 121-122° [1104], 118° [1273] [1475], 112-113°5 [387],  
112-113° [372], 110° [395] [666] [925] [1694], 105° [1047] [1048].

**1-(5-Amino-2-hydroxyphenyl)ethanone (Hydrochloride)**

[57471-32-6]

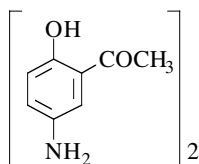
C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HCl

mol.wt. 187.63

**Synthesis**

- Obtained by reaction of gaseous hydrochloric acid on 5-amino-2-hydroxyacetophenone in ethanol [372] [1273] or in ethyl ether [1047] [1048].

m.p. 230-240° (d) [372], 231° [1475], 155° (d) [1047] [1048].

**1-(5-Amino-2-hydroxyphenyl)ethanone (Sulfate)**2 C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub> mol.wt. 400.41H<sub>2</sub>SO<sub>4</sub>**Synthesis**

- Easily obtained by reaction of sulfuric acid on 5-amino-2-hydroxyacetophenone in ethyl ether [1048].

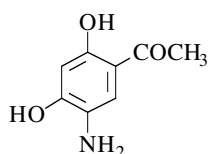
m.p. 150° [1048].

**1-(5-Amino-2,4-dihydroxyphenyl)ethanone**

[5528-13-2]

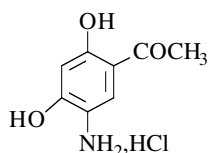
C<sub>8</sub>H<sub>9</sub>NO<sub>3</sub>

mol.wt. 167.16

**Synthesis**

- Preparation from 2,4-dihydroxy-5-nitroacetophenone by reduction in acetone solution using Raney catalyst [1362].

m.p. 137-142° (d) [1362].

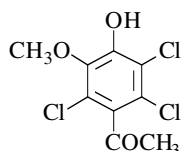
**1-(5-Amino-2,4-dihydroxyphenyl)ethanone (Hydrochloride)**C<sub>8</sub>H<sub>9</sub>NO<sub>3</sub>, HCl      mol.wt. 203.61**Synthesis**

-Prepared by passing dry hydrochloric acid in 2,4-dihydroxy-5-aminoacetophenone in acetone solution, and adding ethyl ether when needed for precipitation [1362].

m.p. > 300° [1362].

**1-(2,3,6-Trichloro-4-hydroxy-5-methoxyphenyl)ethanone**

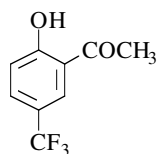
[94649-69-1]

C<sub>9</sub>H<sub>7</sub>Cl<sub>3</sub>O<sub>3</sub>      mol.wt. 269.51**Synthesis not yet described**

-Identified in wheat and rye straw pulp bleaching and combined mill effluents [617].  
-Identified on control of effluent from the manufacturing of bleached pulp and paper from sugarcane bagasse [616].

**1-[2-Hydroxy-5-(trifluoromethyl)phenyl]ethanone**

[67589-15-5]

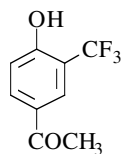
C<sub>9</sub>H<sub>7</sub>F<sub>3</sub>O<sub>2</sub>      mol.wt. 204.15**Synthesis**

-Preparation by reaction of acetyl chloride with p-(trifluoromethyl)phenol in hydrofluoric acid for 6 h to 100° under 3 atmospheres (88%) [1225].

<sup>1</sup>H NMR [1225], IR [1225].

**1-[4-Hydroxy-3-(trifluoromethyl)phenyl]ethanone**

[149105-11-3]

C<sub>9</sub>H<sub>7</sub>F<sub>3</sub>O<sub>2</sub>      mol.wt. 204.15**Synthesis**

-Obtained by heating to 180° under nitrogen a mixture of 4-methoxy-3-(trifluoromethyl)acetophenone and pyridinium chloride (39%) [1373].

m.p. 168-170° [1373].

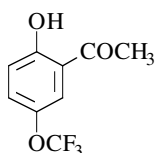


**1-[2-Hydroxy-5-(trifluoromethoxy)phenyl]ethanone**

[146575-64-6]

C<sub>9</sub>H<sub>7</sub>F<sub>3</sub>O<sub>3</sub>

mol.wt. 220.15

**Synthesis**

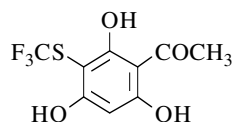
-Preparation by reaction of pyridinium dichromate with 4-trifluoromethoxy-2-( $\alpha$ -hydroxyethyl)phenol in the presence of Celite in methylene chloride at r.t. (85%) [1919] [1920].

**1-[2,4,6-Trihydroxy-3-[(trifluoromethyl)thio]phenyl]ethanone**

[66625-03-4]

C<sub>9</sub>H<sub>7</sub>F<sub>3</sub>O<sub>4</sub>S

mol.wt. 268.21

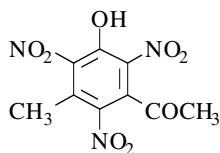
**Synthesis**

-Preparation by reaction of trifluoromethanesulfonyl chloride with phloracetophenone in chloroform in the presence of a slight excess of pyridine, first at -40°, then at 60° for 3 h (33%) [456].

m.p. 139-140° [456]; <sup>1</sup>H NMR [456], IR [456].

**1-(3-Hydroxy-5-methyl-2,4,6-trinitrophenyl)ethanone**C<sub>9</sub>H<sub>7</sub>N<sub>3</sub>O<sub>8</sub>

mol.wt. 285.17

**Synthesis**

-Obtained by reaction of nitric acid on 3-hydroxy-5-methylacetophenone in acetic anhydride at 10° (23%) [324].

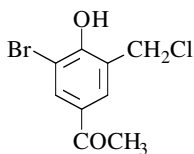
m.p. 195-196° [324].

**1-[3-Bromo-5-(chloromethyl)-4-hydroxyphenyl]ethanone**

[107724-60-7]

C<sub>9</sub>H<sub>8</sub>BrClO<sub>2</sub>

mol.wt. 263.52

**Synthesis**

-Preparation by adding a methylene chloride solution of bromine to a methanol/methylene chloride solution of 3-(chloromethyl)-4-hydroxyacetophenone at 0° (85%) [273].

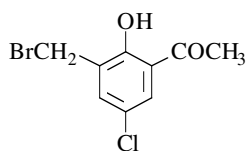
m.p. 120-121° [273]; <sup>1</sup>H NMR [273], IR [273], MS [273].

**1-[3-(Bromomethyl)-5-chloro-2-hydroxyphenyl]ethanone**

[50317-56-1]

C<sub>9</sub>H<sub>8</sub>BrClO<sub>2</sub>

mol.wt. 263.52



## Syntheses

- Preparation by heating 3,3'-diacetyl-5,5'-dichloro-2,2'-dihydroxydibenzyl ether with an 48% aqueous hydrobromic acid solution during 8 h (61%) [284].
- Preparation by [Quelet (bromomethylation) reaction] of 5-chloro-2-hydroxyacetophenone [284] according to [1141].

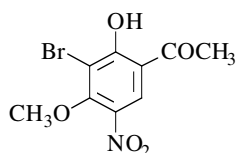
m.p. 74-76° [284].

**1-(3-Bromo-2-hydroxy-4-methoxy-5-nitrophenyl)ethanone**

[134700-74-6]

C<sub>9</sub>H<sub>8</sub>BrNO<sub>5</sub>

mol.wt. 290.07



## Synthesis

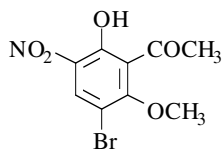
- Refer to: [63] (compound 1d).

**1-(3-Bromo-6-hydroxy-2-methoxy-5-nitrophenyl)ethanone**

[7253-20-5]

C<sub>9</sub>H<sub>8</sub>BrNO<sub>5</sub>

mol.wt. 290.07



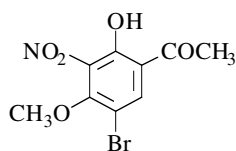
## Syntheses

- Preparation by bromination of 2-hydroxy-6-methoxy-3-nitroacetophenone [476] [1023] [1094], (44%) [1023].
- Obtained by reaction of nitric acid (d = 1.4) on 2,2'-dihydroxy-3,3'-diacetyl-4,4'-dimethoxy-5,5'-dibromophenyl thioether, at 0° [476].

m.p. 160-162° [1023], 156-157° [476] [1094]; IR [1023].

**1-(5-Bromo-2-hydroxy-4-methoxy-3-nitrophenyl)ethanone**C<sub>9</sub>H<sub>8</sub>BrNO<sub>5</sub>

mol.wt. 290.07



## Synthesis

- Preparation by reaction of nitric acid on 5-bromo-2-hydroxy-4-methoxyacetophenone in acetic acid at r.t. [7].

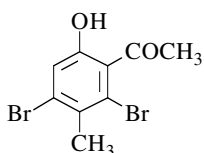
m.p. 112-114° [7].

**1-(2,4-Dibromo-6-hydroxy-3-methylphenyl)ethanone**

[212494-38-7]

C<sub>9</sub>H<sub>8</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 307.97



Synthesis

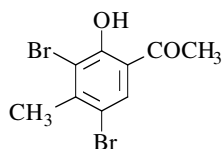
-Refer to: [1292].

**1-(3,5-Dibromo-2-hydroxy-4-methylphenyl)ethanone**

[145666-17-7]

C<sub>9</sub>H<sub>8</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 307.97



Syntheses

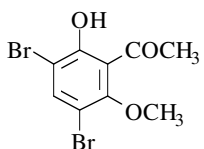
-Preparation by reaction of bromine with 2-hydroxy-4-methylacetophenone in aqueous acetic acid (68%) [228].  
 -Also refer to: [1205] (compound 1b).

m.p. 107-108° [228]; <sup>1</sup>H NMR [228], IR [228].**1-(3,5-Dibromo-2-hydroxy-6-methoxyphenyl)ethanone**

[16290-04-3]

C<sub>9</sub>H<sub>8</sub>Br<sub>2</sub>O<sub>3</sub>

mol.wt. 323.97



Synthesis

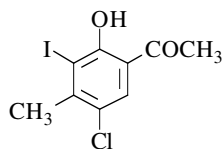
-Preparation by reaction of bromine with 2-hydroxy-6-methoxyacetophenone in acetic acid at 35° (62%) [403].

m.p. 90-90°5 [403]; <sup>1</sup>H NMR [403].**1-(5-Chloro-2-hydroxy-3-iodo-4-methylphenyl)ethanone**

[292144-86-6]

C<sub>9</sub>H<sub>8</sub>ClIO<sub>2</sub>

mol.wt. 310.52



Synthesis

-Preparation by iodination of 5-chloro-2-hydroxy-4-methylacetophenone with iodine (1 mol) and iodic acid (1 mol) in ethanol at 35-40° for 1.5 h (75-85%) [484].

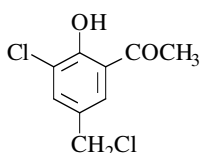
m.p. 76° [484].

**1-[3-Chloro-5-(chloromethyl)-2-hydroxyphenyl]ethanone**

[66883-87-2]

C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 219.07

**Syntheses**

- Preparation from 3-chloro-2-hydroxyacetophenone in acetic acid solution by introduction of the chloromethyl group into aromatic ring by treatment with formaldehyde and hydrogen chloride in the presence of zinc chloride (44%) [719] [Blanc (Chloromethylation) reaction].
- Also refer to: [717] [718].

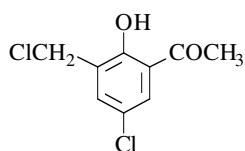
m.p. 145° [719].

**1-[5-Chloro-3-(chloromethyl)-2-hydroxyphenyl]ethanone**

[34987-36-5]

C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 219.07

**Syntheses**

- Preparation from 5-chloro-2-hydroxyacetophenone in ethylene dichloride solution by introduction of the chloromethyl group into aromatic ring by treatment with 37% formalin and hydrogen chloride in the presence of zinc chloride at 60-65° (76-68%) [283] [285], [Blanc (Chloromethylation) reaction].
- Preparation by reaction of concentrated hydrochloric acid with 5-chloro-2-hydroxy-3-hydroxy-methylacetophenone for 5 days at 20° (95%) [284].
- Also refer to: [289] [717] [718].

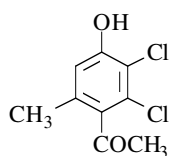
m.p. 68°-69° [285], 67-68° [284];  
 b.p.<sub>2</sub> 130-135° [285], b.p.<sub>3</sub> 140-142° [284]; IR [283].

**1-(2,3-Dichloro-4-hydroxy-6-methylphenyl)ethanone**

[21472-87-7]

C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>2</sub>

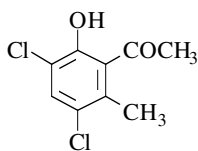
mol.wt. 219.07

**Synthesis**

- Obtained as a trace during the rearrangement of 1,2,3,3-tetrachlorocyclopropane-cis-1,2-diacetone by heating with a saturated solution of sodium bisulfate in acetic acid at 100° (< 1%) [767].

m.p. 107-108° [767]; <sup>1</sup>H NMR [767], IR [767].**1-(3,5-Dichloro-2-hydroxy-6-methylphenyl)ethanone**C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 219.07

**Syntheses**

- Obtained by Fries rearrangement of 2,4-dichloro-5-methylphenyl acetate with aluminium chloride at 135° (21%) [452].
- Obtained by reaction of pyridinium chloride on 3,5-dichloro-2-methoxy-6-methylacetophenone at 210° (21%) [452].

-Also obtained by reaction of levulinic acid on 3,5-dichloro-2-hydroxy-6-methylacetophenone hydrazone in 1 N hydrochloric acid using a steam bath (15%) [452].  
 -Also obtained by basic hydrolysis of 6,8-dichloro-2,5-dimethylchromone with 5% aqueous sodium hydroxide in refluxing methanol (4%) [452].

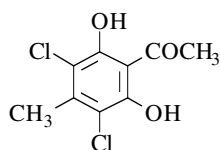
m.p. 104-105° [452].

**1-(3,5-Dichloro-2,6-dihydroxy-4-methylphenyl)ethanone**

[3361-23-7]

C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 235.07



Synthesis

-Preparation by reaction of sulfonyl chloride with 2,6-dihydroxy-4-methylacetophenone in ethyl ether (71%) [612].

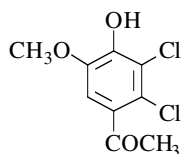
m.p. 164-165° [612].

**1-(2,3-Dichloro-4-hydroxy-5-methoxyphenyl)ethanone**

[154638-85-4]

C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 235.07



Synthesis

-Obtained by chlorination of acetoguaiacone in dioxane-water mixture at 40° (29%) [1456].

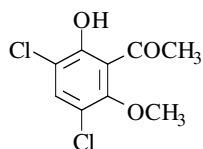
MS [1456].

**1-(3,5-Dichloro-2-hydroxy-6-methoxyphenyl)ethanone**

[87953-94-4]

C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 235.07



Syntheses

-Preparation by reaction of chlorine on 2-hydroxy-6-methoxyacetophenone in chloroform at r.t. (50%) [502].  
 -Preparation by reaction of sulfonyl chloride on 2-hydroxy-6-methoxyacetophenone in refluxing acetic acid [1112].  
 -Also obtained by reaction of dimethyl sulfate on

3,5-dichloro-2,6-dihydroxyacetophenone with potassium carbonate in refluxing benzene (very low yield) [1112].

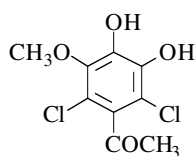
m.p. 99° [502], 97-98° [1112].

**1-(2,6-Dichloro-3,4-dihydroxy-5-methoxyphenyl)ethanone**

[75322-34-8]

C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>4</sub>

mol.wt. 251.07



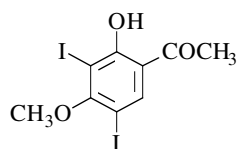
Synthesis

-Preparation by chlorination of acetosyringone (main product) [1224].

Visible light absorption spectra [1224].

**1-(2-Hydroxy-3,5-diiodo-4-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>8</sub>I<sub>2</sub>O<sub>3</sub>

mol.wt. 417.97



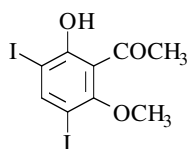
## Syntheses

- Obtained by reaction of an aqueous iodine-iodic acid solution on paeonol in ethanol at r.t. (8%) [1600].
- Also obtained by hydrolysis of 6,8-diiodo-7-methoxy-2-methylchromone by boiling 10% aqueous sodium hydroxide solution [1600].

m.p. 98-99° [1600].

**1-(2-Hydroxy-3,5-diiodo-6-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>8</sub>I<sub>2</sub>O<sub>3</sub>

mol.wt. 417.97



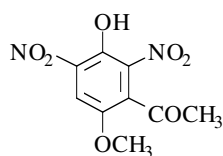
## Syntheses

- Preparation by reaction of an aqueous iodine-iodic acid solution on 2-hydroxy-6-methoxyacetophenone in ethanol at r.t. (76%) [1600].
- Also obtained by hydrolysis of 6,8-diiodo-5-methoxy-2-methylchromone by boiling 10% aqueous sodium hydroxide solution [1600].

m.p. 111° [1600].

**1-(3-Hydroxy-6-methoxy-2,4-dinitrophenyl)ethanone**C<sub>9</sub>H<sub>8</sub>N<sub>2</sub>O<sub>7</sub>

mol.wt. 256.17



## Synthesis

- Preparation by reaction of dimethyl sulfate on 3,6-dihydroxy-2,4-dinitroacetophenone with sodium hydroxide in water at 60-65° (53%) [577].

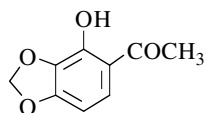
m.p. 94-96° [577]; IR [577], UV [577].

**1-(4-Hydroxy-1,3-benzodioxol-5-yl)ethanone**

[23780-60-1]

C<sub>9</sub>H<sub>8</sub>O<sub>4</sub>

mol.wt. 180.16



## Synthesis

- Obtained (poor yield) by reaction of methylene iodide with gallacetophenone in the presence of potassium carbonate in refluxing acetone for 48 h (9%) [1384] [1385].

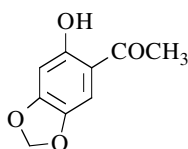
m.p. 85-86° [1384] [1385]; TLC [1385]; column chromatography [1384];  
<sup>1</sup>H NMR [1384] [1385], IR [1384] [1385], UV [1384] [1385].

**1-(6-Hydroxy-1,3-benzodioxol-5-yl)ethanone**

[66003-50-7]

C<sub>9</sub>H<sub>8</sub>O<sub>4</sub>

mol.wt. 180.16

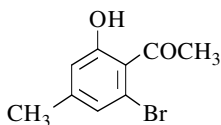
**Syntheses**

- Obtained by refluxing methylene iodide and 2,4,5-trihydroxyacetophenone in acetone in the presence of potassium carbonate (56%) [1670], (51%) [687].
- Also obtained by Fries rearrangement of 5-acetoxy-1,3-benzodioxole with aluminium chloride in nitrobenzene at -10 to 7°, then 3 days at r.t. (5%) [1506].
- Also obtained by Friedel-Crafts acylation of 5-hydroxy-1,3-benzodioxole (*Sesamol*) with acetic anhydride in the presence of boron trifluoride etherate for 1 h at 80-90° (75%) [1892].
- Also obtained by reaction of acetonitrile with 5-hydroxy-1,3-benzodioxole (Hoesch reaction) [1670], (35%) [641], (31%) [401].
- Also obtained by reaction of acetyl chloride with sesamol methyl ether (b.p.<sub>18</sub> 110-114°) in the presence of aluminium chloride in ethyl ether at r.t. overnight (36%) [641].
- Also obtained (poor yield) by reaction of acetic acid with sesamol in the presence of boron trifluoride for 3 h, then heating at 80-90° for 1.5 h (5%) [641].
- Also refer to: [401] [641].

m.p. 114° [1506], 113-114° [641], 112° [1670], 111-112° [401] [1892];

<sup>1</sup>H NMR [401] [1670], IR [401] [641] [1670], UV [401], MS [401].**1-(2-Bromo-6-hydroxy-4-methylphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>BrO<sub>2</sub>

mol.wt. 229.07

**Synthesis**

- Obtained by reaction of acetyl chloride with 3-bromo-5-methylanisole in the presence of aluminium chloride in refluxing carbon disulfide [111].

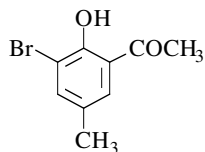
m.p. 50-52° [111].

**1-(3-Bromo-2-hydroxy-5-methylphenyl)ethanone**

[56609-15-5]

C<sub>9</sub>H<sub>9</sub>BrO<sub>2</sub>

mol.wt. 229.07

**Syntheses**

- Preparation by Fries rearrangement of 2-bromo-4-methylphenyl acetate,
    - \*with aluminium chloride without solvent at 110° or in refluxing nitrobenzene (90%) [1798];
    - \*with zinc chloride or boron trifluoride in nitrobenzene at 100° (80-85%) [1798];
    - \*with ferric chloride or stannic chloride in nitrobenzene at 100° (55-70%) [1798].
  - Preparation by reaction of bromine on 2-hydroxy-5-methylacetophenone in acetic acid at r.t. (quantitative yield) [1893], (65-70%) [152] [330] [1152] [1206].
  - Also refer to: [1204] [1205] [1207] [1208].
  - Preparation by reaction of N-bromosuccinimide with 2-hydroxy-5-methylacetophenone in DMF at r.t. (93-96%) [527] [528].
- N.B.:** It is mentioned in the patent [1149] (page 26) that this hydroxyketone, the 1-(3-bromo-2-hydroxy-5-methylphenyl)ethanone (**I**) has been prepared by Fries rearrangement (AlCl<sub>3</sub>/165°) of

4-bromo-3-methylphenyl acetate, itself obtained from the 4-bromo-3-methylphenol. This is impossible. The Fries rearrangement of the above ester always leads to 1-(5-bromo-2-hydroxy-4-methylphenyl)ethanone (**II**). There are two possibilities:

\*either the ester used for Fries rearrangement was the 2-bromo-4-methylphenyl acetate and provides (**I**).

\*or the obtained hydroxyketone should be (**II**). This appears confirmed later on by obtaining 6-bromo-3,4-dihydro-2,2,7-trimethyl-2*H*-1-benzopyran-4-one with this hydroxyketone [1149].

m.p. 95° [1152], 94-95° [152], 89° [330], 88°5-89°5 [1893], 88-89° [527] [528].

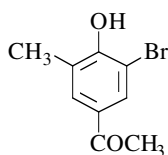
b.p.<sub>2</sub> 126-127° [1798]; p*K*<sub>a</sub> [1387]; <sup>1</sup>H NMR [527], MS [527].

### 1-(3-Bromo-4-hydroxy-5-methylphenyl)ethanone

[127923-55-1]

C<sub>9</sub>H<sub>9</sub>BrO<sub>2</sub>

mol.wt. 229.07



#### Synthesis

-Preparation by reaction of bromine with 4-hydroxy-3-methylacetophenone in aqueous acetic acid, first at 5°, then at r.t. (89%) [89].

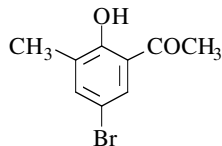
m.p. 145-146° [89].

### 1-(5-Bromo-2-hydroxy-3-methylphenyl)ethanone

[72422-80-1]

C<sub>9</sub>H<sub>9</sub>BrO<sub>2</sub>

mol.wt. 229.07



#### Syntheses

-Preparation by reaction of bromine with 2-hydroxy-3-methylacetophenone in acetic acid at r.t. (80%) [227] (66%) [152].

-Also refer to: [1204] (compound 1e) and [1205] (compound 1a).

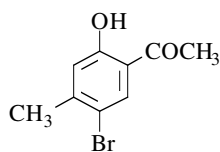
m.p. 78-79° [227], 77-78° [152]; <sup>1</sup>H NMR [227], IR [227].

### 1-(5-Bromo-2-hydroxy-4-methylphenyl)ethanone

[50342-17-1]

C<sub>9</sub>H<sub>9</sub>BrO<sub>2</sub>

mol.wt. 229.07



#### Syntheses

-Preparation by reaction of bromine on 2-hydroxy-4-methylacetophenone in chloroform at < -10° (74%) [653] or in acetic acid at r.t. (38%) [152].

-Preparation by Fries rearrangement of 4-bromo-3-methylphenyl acetate with aluminium chloride without solvent at 165-180° [653] [1149], (80%) [653].

-Also refer to: [1205].

m.p. 86° [152], 81-82° [1149], 80° [653]; <sup>1</sup>H NMR [653].

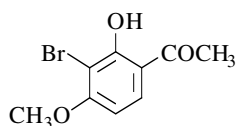


**1-(3-Bromo-2-hydroxy-4-methoxyphenyl)ethanone**

[39503-62-3]

C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

**Syntheses**

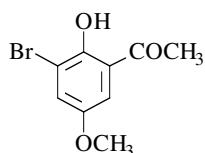
- Preparation by reaction of bromine on 2-hydroxy-4-methoxyacetophenone with titanium tetrachloride in methylene chloride at r.t. (65%) [454].
- Also obtained (by-product) by reaction of cupric bromide with 2-hydroxy-4-methoxyacetophenone in refluxing dioxane (3%) [1137].

m.p. 130-131° [454], 120-122° [1137]; <sup>1</sup>H NMR [454] [1137].**1-(3-Bromo-2-hydroxy-5-methoxyphenyl)ethanone**

[37113-61-4]

C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

**Syntheses**

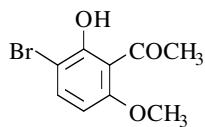
- Preparation by reaction of bromine on 2-hydroxy-5-methoxyacetophenone with aluminium chloride, \*in chloroform at 10° (80%) [850];
- \*in carbon disulfide at r.t. (65%) [374].

m.p. 78-79° [850], 76-76°5 [374]; <sup>1</sup>H NMR [850], IR [850].**1-(3-Bromo-2-hydroxy-6-methoxyphenyl)ethanone**

[37113-62-5]

C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

**Syntheses**

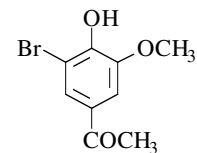
- Preparation by diazotization of 3-amino-2-hydroxy-6-methoxyacetophenone and replacement of the diazonium group by bromine (Sandmeyer reaction) (28%) [371], (19%) [1213].
- Preparation by bromination of 2-hydroxy-6-methoxyacetophenone, with bromine [371], in methylene chloride (76%) [1873], in chloroform [543] [850] [1213], (68%) [1213] or in acetic anhydride (44%) [190] or with N-bromosuccinimide (41%) [371].

m.p. 102-103° [543], 101-102° [190], 101° [1873], 100-101° [371] [850], 99-100° [1213]; <sup>1</sup>H NMR [190] [543] [850], IR [850].**1-(3-Bromo-4-hydroxy-5-methoxyphenyl)ethanone**

[103653-14-1]

C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

**Syntheses**

- Preparation by reaction of bromine with acetovanillone in aqueous acetic acid at 0°, then at r.t. (54%) [1937].
- Preparation by adding bromine to a solution of acetovanillone, sodium acetate and potassium bromide in aqueous methanol cooled to -60° [549].

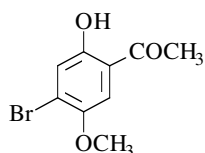
m.p. 156-157° [1937], 155-157° [549].

**1-(4-Bromo-2-hydroxy-5-methoxyphenyl)ethanone**

[90971-91-8]

C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

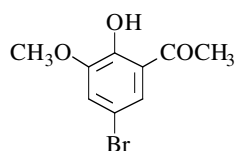
**Synthesis**

-Preparation by reaction of methyl iodide on 4-bromo-2,5-dihydroxyacetophenone with potassium carbonate in refluxing methyl ethyl ketone [1604].

m.p. 115° [1604].

**1-(5-Bromo-2-hydroxy-3-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

**Syntheses**

-Preparation by reaction of bromine on 2-hydroxy-3-methoxyacetophenone in the presence of sodium bromide in 1:1 aqueous ethanol at 25° (48%) [813].

-Preparation by reaction of hydrobromic acid on 5-bromo-2,3-dimethoxyacetophenone in acetic acid (36%) [813].

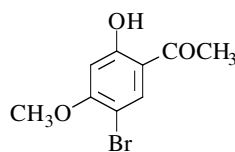
m.p. 108-109° [813]; UV [813].

**1-(5-Bromo-2-hydroxy-4-methoxyphenyl)ethanone**

[39503-61-2]

C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

**Syntheses**

-Preparation by reaction of bromine on paeonol (2-hydroxy-4-methoxyacetophenone),

\*in methylene chloride at r.t. (quantitative yield) [454];

\*in acetic acid at r.t. [7] [943] [947] [982] [1626], (60%) [947];

\*in acetic anhydride (48%) [190].

-Preparation by diazotization of 5-amino-2-hydroxy-4-methoxyacetophenone and replacement of the diazonium group by bromine (Sandmeyer reaction) [947].

-Also obtained by reaction of dimethyl sulfate on 5-bromoresacetophenone in sodium hydroxide [947].

-Also obtained as one of the products of bromination of paeonol acetate in carbon disulfide [306].

-Also obtained as one of the products of reaction of cupric bromide on paeonol in refluxing dioxane (17%) [1137].

-Also obtained (by-product) by reaction of acetic anhydride on 4-bromoresorcinol dimethyl ether with aluminium chloride in refluxing carbon disulfide [1644].

-Also obtained (by-product) by reaction of N-bromosuccinimide on 2,4-dimethoxyacetophenone with benzoyl peroxide in refluxing carbon tetrachloride [1644].

-Also refer to: [1248].

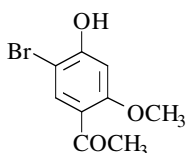
m.p. 172-174° [1626], 172-172°5 [454], 172° [947], 171-172° [1644],

171° [306], 170-172° [190], 169-170° [1137], 169° [7], 168-170° [982];

<sup>1</sup>H NMR [190] [454] [1137].

**1-(5-Bromo-4-hydroxy-2-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>

mol.wt. 245.07

**Synthesis**

-Preparation by bromination of isopaeonol (4-hydroxy-2-methoxyacetophenone) in chloroform [947].

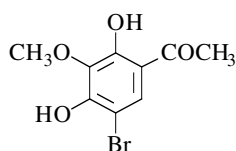
m.p. 198° [947].

**1-(5-Bromo-2,4-dihydroxy-3-methoxyphenyl)ethanone**

[62615-25-2]

C<sub>9</sub>H<sub>9</sub>BrO<sub>4</sub>

mol.wt. 261.07

**Synthesis**

-Preparation by bromination of 2,4-dihydroxy-3-methoxyacetophenone with bromine in 80% acetic acid at r.t. (64%) [1571].

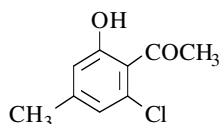
m.p. 110°5-112°5 [1571]; <sup>1</sup>H NMR [1571].

**1-(2-Chloro-6-hydroxy-4-methylphenyl)ethanone**

[24490-25-3]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Synthesis not yet described**

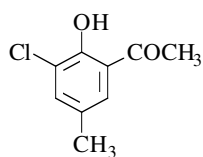
-Refer to: [1813]; this sole reference mentioned for this compound (Chem. Abstr., **71**, 86368b (1969)) is erroneous. Actually, the ketone described as being the 2'-chloro-6'-hydroxy-4'-methylacetophenone is in fact the 5'-chloro-2'-hydroxy-4'-methylacetophenone in original publication.

**1-(3-Chloro-2-hydroxy-5-methylphenyl)ethanone**

[7507-88-2]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Syntheses**

-Preparation by Fries rearrangement of 2-chloro-4-methylphenyl acetate with aluminium chloride without solvent at 120° (quantitative yield) [1512].

-Obtained by reaction of aluminium chloride on a mixture of 2-chloro-4-methylphenyl acetate and 4-methylphenyl

benzoate without solvent at 150° (33-37%) [103].

-Obtained by reaction of aluminium chloride on a mixture of 2,4,6-trimethylphenyl acetate or 4-methylphenyl acetate and 2-chloro-4-methylphenyl benzoate without solvent at 150° (67% yield and small amounts, respectively) [103].

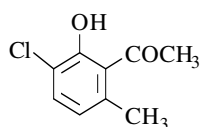
m.p. 91° [103] [1512]; pK<sub>a</sub> [1387].

**1-(3-Chloro-2-hydroxy-6-methylphenyl)ethanone**

[85128-50-3]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

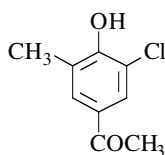
mol.wt. 184.62

**Synthesis**-Refer to: [1346] and [1347] (ketone **13**).**1-(3-Chloro-4-hydroxy-5-methylphenyl)ethanone**

[54556-95-5]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Syntheses**

-Preparation by Fries rearrangement of 2-chloro-6-methylphenyl acetate in the presence of aluminium chloride without solvent at 140° (74%) [1574].

-Preparation by chlorination of 4-hydroxy-3-methylacetophenone [1574].

-Also refer to: [1573].

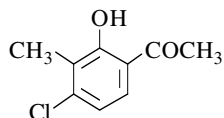
m.p. 123°5-124° [1574]; IR [1574].

**1-(4-Chloro-2-hydroxy-3-methylphenyl)ethanone**

[198344-86-4]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Synthesis**

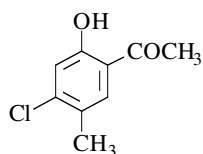
-Refer to: [3].

**1-(4-Chloro-2-hydroxy-5-methylphenyl)ethanone**

[57051-51-1]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Synthesis**

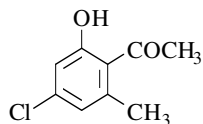
-Preparation by Fries rearrangement of 3-chloro-4-methylphenyl acetate with aluminium chloride without solvent at 125° [1788].

**1-(4-Chloro-2-hydroxy-6-methylphenyl)ethanone**

[87239-37-0]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Synthesis**

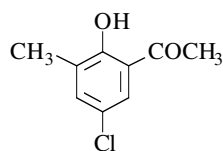
-Refer to: [1042].

**1-(5-Chloro-2-hydroxy-3-methylphenyl)ethanone**

[50343-12-9]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Syntheses**

- Preparation by Fries rearrangement of 4-chloro-2-methylphenyl acetate with aluminium chloride without solvent at 120° (97%) [284], (75%) [367].
- Preparation by adding zinc dust to an acetic acid solution of 5-chloro-3-(chloromethyl)-2-hydroxyacetophenone at 100° (82%) [284].

-Also obtained (by-product) by chloromethylation of 5-chloro-2-hydroxyacetophenone (5%) [283].  
 -Also obtained (poor yield) by treatment of 5-chloro-3-(chloromethyl)-2-hydroxyacetophenone with zinc chloride in methylene chloride in the presence of water for 45 h at 60° (5%) [283].

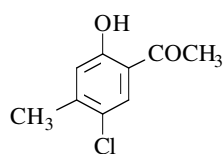
m.p. 70° [367], 65-66° [284], 63-64° [283]; b.p.<sub>16</sub> 141° [284].

**1-(5-Chloro-2-hydroxy-4-methylphenyl)ethanone**

[28480-70-8]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Syntheses**

- Preparation by reaction of acetic acid on 4-chloro-3-methylphenol with boron trifluoride at 70-100° (80-85%) [979].
- Preparation by Fries rearrangement of 4-chloro-3-methylphenyl acetate with aluminium chloride without solvent

between 110 to 155° [214] [895] [991] [1512] [1538] [1581] [1894], (quantitative yield) [1538] [1894], (64%) [214] [1581].

-Also obtained by reaction of acetyl chloride on 4-chlorothymol methyl ether with aluminium chloride in carbon disulfide at r.t. (8%) [1524].  
 -Also refer to: [895] (compound CHMA).

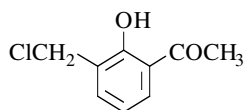
m.p. 75°5 [1538], 71-72° [1512], 71° [991], 70°5 [979], 70° [1524], 69-70° [1894];  
 b.p.<sub>15</sub> 137° [1512], b.p.<sub>21</sub> 140-142° [214] [1581];  
<sup>1</sup>H NMR [1698], UV [1698], fluorescence spectra [1698] [1813].

**1-[3-(Chloromethyl)-2-hydroxyphenyl]ethanone**

[87165-49-9]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Synthesis**

- Preparation by reaction of polyoxymethylene with 2-hydroxyacetophenone in the presence of concentrated hydrochloric acid at 50-60° [289].

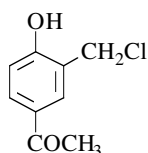
m.p. 45° [289]; <sup>1</sup>H NMR [289], IR [289].

**1-[3-(Chloromethyl)-4-hydroxyphenyl]ethanone**

[24085-05-0]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Syntheses**

-Preparation by introduction of the chloromethyl group into 4-hydroxyacetophenone by treatment with formaldehyde and hydrochloric acid [775] [935] [1667] [1812], in the presence of zinc chloride [182], [Blanc (Chloromethylation) reaction], (85-92%) [775] [1667] [1812].  
 -Also refer to: [576] [1122].

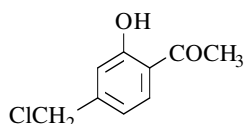
m.p. 160° (d) [775] [1812].

**1-[4-(Chloromethyl)-2-hydroxyphenyl]ethanone**

[107223-42-7]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Synthesis**

-Preparation by reaction of ethyl chloroformate with 4-(dimethylaminomethyl)-2-hydroxyacetophenone in toluene (22%) [530].

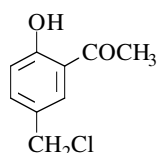
m.p. 34-37° [530].

**1-[5-(Chloromethyl)-2-hydroxyphenyl]ethanone**

[30787-43-0]

C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>

mol.wt. 184.62

**Syntheses**

-Preparation by reaction of formaldehyde solution with hydrochloric acid on 2-hydroxyacetophenone at 25-30° (57-61%) [1811].  
 -Preparation by reaction of polyoxymethylene with 2-hydroxyacetophenone in the presence of hydrochloric acid at 50-60° [289].

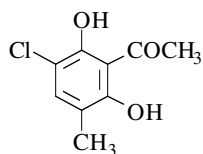
m.p. 94-95° [1811].

**1-(3-Chloro-2,6-dihydroxy-5-methylphenyl)ethanone**

[56581-46-5]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62

**Synthesis**

-Preparation by reaction of chlorine on 2,6-dihydroxy-3-methylacetophenone in acetic acid at r.t. [1746].

m.p. 152° [1746];

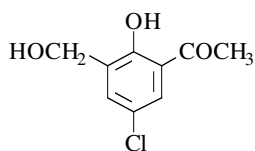
<sup>1</sup>H NMR [1746], IR [1746], MS [1746].

**1-[5-Chloro-2-hydroxy-3-(hydroxymethyl)phenyl]ethanone**

[50317-52-7]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62



## Syntheses

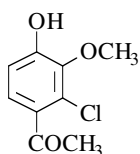
-Preparation by boiling an aqueous solution of 5-chloro-3-(chloromethyl)-2-hydroxyacetophenone for 6 h (73%) [284].  
 -Also obtained as a labile intermediate product during the chloromethylation of 5-chloro-2-hydroxyacetophenone (< 5%) [283].

m.p. 82°-84° [284]; b.p.<sub>1</sub> 155° [284].**1-(2-Chloro-4-hydroxy-3-methoxyphenyl)ethanone**

[151340-06-6]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62



## Synthesis

-Preparation from the acetate of 2-chlorovanillin by reaction with diazomethane and subsequent hydrolysis [1657] [1659].

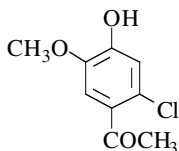
m.p. 97-98° [1657] [1659];

<sup>1</sup>H NMR [1657], <sup>13</sup>C NMR [1657], MS [1657].**1-(2-Chloro-4-hydroxy-5-methoxyphenyl)ethanone**

[69240-98-8]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62



## Syntheses

-Obtained from the acetate of 6-chlorovanillin by reaction with diazomethane and subsequent hydrolysis [1657] [1659], (11-17%) [892] [1657].  
 -Also refer to: [1009] (compound XVIIe).

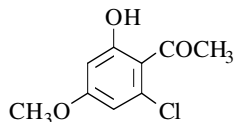
m.p. 109-110° [892], 107-108° [1657];

<sup>1</sup>H NMR [1657], <sup>13</sup>C NMR [1657], MS [1657].**1-(2-Chloro-6-hydroxy-4-methoxyphenyl)ethanone**

[112954-19-5]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62



## Syntheses

-Preparation by reaction of acetyl chloride with 3,5-dimethoxy-1-chlorobenzene in the presence of aluminium chloride (Friedel-Crafts reaction) (38%) [985].  
 -Also refer to: [741] [984].

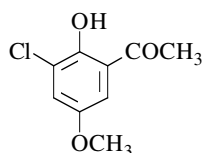
<sup>1</sup>H NMR [985].

**1-(3-Chloro-2-hydroxy-5-methoxyphenyl)ethanone**

[286931-53-1]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62

**Synthesis**

-Preparation by chlorination of 2-hydroxy-5-methoxyacetophenone with N-chlorosuccinimide in acetic acid containing magnesium acetate at r.t. for 24 h under nitrogen atmosphere (80%) [221] [1830].

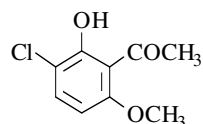
m.p. 78-79° [1830]; <sup>1</sup>H NMR [1830], MS [1830].

**1-(3-Chloro-2-hydroxy-6-methoxyphenyl)ethanone**

[87953-91-1]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62

**Syntheses**

-Preparation by reaction of dimethyl sulfate on 3-chloro-2,6-dihydroxyacetophenone with potassium carbonate in refluxing benzene (38%) [1112].

-Preparation by diazotization of 3-amino-2-hydroxy-

6-methoxyacetophenone with sodium nitrite in dilute sulfuric acid at 0°, and replacement of the diazonium group by chlorine with a solution of cuprous chloride in 2 N hydrochloric acid at 100° (Sandmeyer reaction) (37%) [502].

-Also obtained (by-product) by reaction of sulfuryl chloride on 2-hydroxy-6-methoxyacetophenone in refluxing acetic acid [1112].

-Also obtained (crude product) by a one-pot acylation-deprotection of 4-methoxy-2-methoxymethoxychlorobenzene (about 93%). No physical data available [1757].

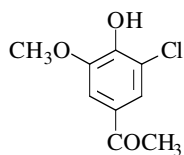
m.p. 88°5-89° [1112], 82° [502].

**1-(3-Chloro-4-hydroxy-5-methoxyphenyl)ethanone**

[116296-35-6]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62

**Syntheses**

-Preparation from the acetate of 5-chlorovanillin by reaction with diazomethane and subsequent hydrolysis [892] [1657] [1659], (35%) [1657], (23%) [892].

-Also obtained by chlorination of acetoguaiacone in dioxane-water mixture at 40° (21%) [1456].

-Preparation by adding sodium hypochlorite solution to a solution of acetovanillone and sodium acetate in methanol cooled to -60° [549].

-Also obtained (by-product) by chlorination of apocynol in dioxane-ethyl ether mixture at 40° (3%) [1456].

m.p. 124-126° [549], 124-125° [892], 123-124° [1657]; MS [1456] [1657].

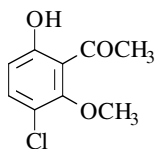


**1-(3-Chloro-6-hydroxy-2-methoxyphenyl)ethanone**

[87953-86-4]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62

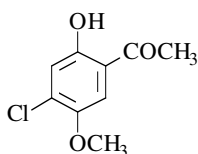


## Syntheses

- Preparation by reaction of sulfonyl chloride on 2-hydroxy-6-methoxyacetophenone in refluxing ethyl ether (93%) or in refluxing acetic acid (66%) [1112].
- Preparation by reaction of chlorine on 2-hydroxy-6-methoxyacetophenone in carbon tetrachloride at -20° (62%) [502].

m.p. 31° [1112], 30-35° [502]; b.p.<sub>0.001</sub> 40° [1112], b.p.<sub>2</sub> 120° [502].**1-(4-Chloro-2-hydroxy-5-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62



## Synthesis

- Preparation by reaction of methyl iodide on 4-chloro-2,5-dihydroxyacetophenone with potassium carbonate in refluxing acetone [1604].

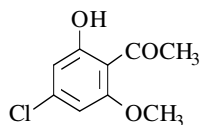
m.p. 130° [1604].

**1-(4-Chloro-2-hydroxy-6-methoxyphenyl)ethanone**

[140155-06-2]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62



## Syntheses

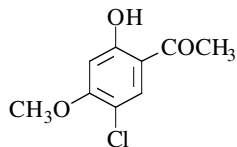
- Preparation by reaction of acetyl chloride with 3,5-dimethoxy-1-chlorobenzene in the presence of aluminium chloride (Friedel-Crafts reaction) (38%) [985].
- Also refer to: [741] [984].

<sup>1</sup>H NMR [985].**1-(5-Chloro-2-hydroxy-4-methoxyphenyl)ethanone**

[116265-99-7]

C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>

mol.wt. 200.62



## Syntheses

- Preparation by diazotization of 5-amino-2-hydroxy-4-methoxyacetophenone and replacement of diazonium group by chlorine (Sandmeyer reaction) [1626].
- Preparation by reaction of acetyl chloride with 4-chloro-resorcinol dimethyl ether in the presence of aluminium chloride in ethylene dichloride (79%) [1553].
- Also refer to: [1477].

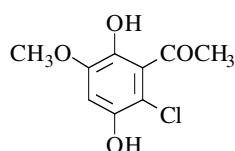
m.p. 154-155° [1553], 153-155° [1626].

**1-(2-Chloro-3,6-dihydroxy-5-methoxyphenyl)ethanone**

[34603-08-2]

C<sub>9</sub>H<sub>9</sub>ClO<sub>4</sub>

mol.wt. 216.62

**Synthesis**

-Preparation by metallation of 2-chloro-5-methoxyhydroquinone-bis-[tetrahydropyranyl-(2)-ether], followed by treatment of the intermediate aryllithium compound with acetic anhydride in tetrahydrofuran at r.t. (56%) [1561].

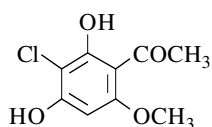
m.p. 100° [1561].

**1-(3-Chloro-2,4-dihydroxy-6-methoxyphenyl)ethanone**

[200878-65-5]

C<sub>9</sub>H<sub>9</sub>ClO<sub>4</sub>

mol.wt. 216.62

**Synthesis**

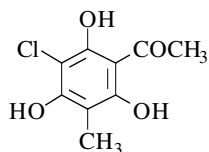
-Refer to: [76].

**1-(3-Chloro-2,4,6-trihydroxy-5-methylphenyl)ethanone**

[23053-47-6]

C<sub>9</sub>H<sub>9</sub>ClO<sub>4</sub>

mol.wt. 216.62

**Synthesis**

-Preparation by reaction of sulfuryl chloride with methylphloracetophenone in ethyl ether, first at 0°, then at r.t. (58%) [836].

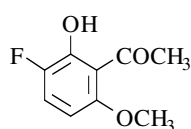
m.p. 223-224° [836].

**1-(3-Fluoro-2-hydroxy-6-methoxyphenyl)ethanone**

[117902-13-3]

C<sub>9</sub>H<sub>9</sub>FO<sub>3</sub>

mol.wt. 184.17

**Synthesis**

-Preparation by demethylation of 2,6-dimethoxy-3-fluoroacetophenone with boron tribromide (62%) [192].

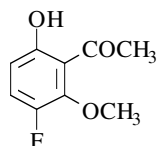
m.p. 87-88° [192]; <sup>1</sup>H NMR [192].

**1-(3-Fluoro-6-hydroxy-2-methoxyphenyl)ethanone**

[117902-12-2]

C<sub>9</sub>H<sub>9</sub>FO<sub>3</sub>

mol.wt. 184.17

**Synthesis**

-Obtained (by-product) by demethylation of 2,6-dimethoxy-3-fluoroacetophenone with boron tribromide (6%) [192].

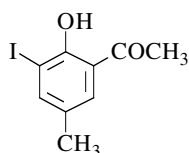
<sup>1</sup>H NMR [192].

**1-(2-Hydroxy-3-iodo-5-methylphenyl)ethanone**

[175655-10-4]

C<sub>9</sub>H<sub>9</sub>IO<sub>2</sub>

mol.wt. 276.07



## Syntheses

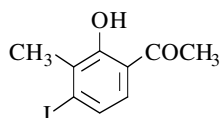
-Preparation by iodination of 2-hydroxy-5-methylacetophenone with iodine (1 mol) and iodic acid (1 mol) in ethanol at 35-40° for 1.5 h (75-85%) [484].  
-Also refer to: [1376] [1579].

m.p. 80° [484]; <sup>1</sup>H NMR [484].**1-(2-Hydroxy-4-iodo-3-methylphenyl)ethanone**

[40591-02-4]

C<sub>9</sub>H<sub>9</sub>IO<sub>2</sub>

mol.wt. 276.07



## Synthesis

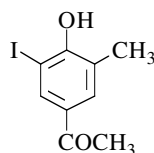
-Obtained (by-product) by Fries rearrangement of 3-iodo-4-methylphenyl acetate with aluminium chloride without solvent at 120° [1786].

m.p. 80° [1786]; <sup>1</sup>H NMR [1786].**1-(4-Hydroxy-3-iodo-5-methylphenyl)ethanone**

[292144-89-9]

C<sub>9</sub>H<sub>9</sub>IO<sub>2</sub>

mol.wt. 276.07

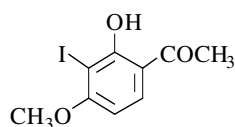


## Synthesis

-Preparation by iodination of 4-hydroxy-3-methylacetophenone with iodine (1 mol) and iodic acid (1 mol) in ethanol at 35-40° for 1.5 h (75-85%) [484].

m.p. 149° [484]; <sup>1</sup>H NMR [484].**1-(2-Hydroxy-3-iodo-4-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>IO<sub>3</sub>

mol.wt. 292.07



## Syntheses

-Obtained from 8-iodo-7-methoxy-2-methylchromone by boiling 10% aqueous sodium hydroxide solution [1600].  
-Preparation by adding an aqueous solution of iodine and iodic acid to an ethanolic solution of 2-hydroxy-4-methoxyacetophenone (15%) [1600].

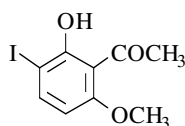
m.p. 152° [1600].

**1-(2-Hydroxy-3-iodo-6-methoxyphenyl)ethanone**

[103440-57-9]

C<sub>9</sub>H<sub>9</sub>IO<sub>3</sub>

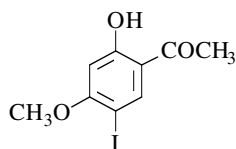
mol.wt. 292.07

**Syntheses**

- Preparation by reaction of iodine monochloride with 2-hydroxy-6-methoxyacetophenone in acetic acid at 17° (88%) [1873].
- Also obtained from 8-iodo-5-methoxy-2-methylchromone by boiling 10% aqueous sodium hydroxide solution [1600].
- Preparation by adding an aqueous solution of iodic acid and iodine to an ethanolic solution of 2-hydroxy-6-methoxyacetophenone (85%) [794].

m.p. 115° [794] [1873], 57° [1600]; <sup>13</sup>C NMR [1873], IR [1873].**1-(2-Hydroxy-5-iodo-4-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>IO<sub>3</sub>

mol.wt. 292.07

**Syntheses**

- Obtained by reaction of an aqueous iodine-potassium iodide solution on paeonol in 22% aqueous ammonia; then, the mixture was poured into excess of dilute ice-cold sulfuric acid (13%) [1600].
- Also obtained by hydrolysis of 6-iodo-7-methoxy-2-methylchromone by boiling 10% aqueous sodium hydroxide solution [1600].

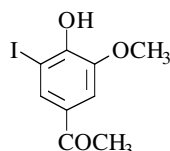
m.p. 161° [1600].

**1-(4-Hydroxy-3-iodo-5-methoxyphenyl)ethanone**

[103440-59-1]

C<sub>9</sub>H<sub>9</sub>IO<sub>3</sub>

mol.wt. 292.07

**Syntheses**

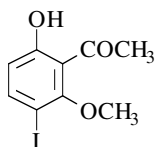
- Preparation by reaction of iodine with acetovanillone in 0.8 N aqueous sodium hydroxide (94%) [1937].
- Preparation by adding an aqueous solution of iodine and potassium iodide to an aqueous solution of acetovanillone and sodium bicarbonate at 80° (82%) [451].
- Preparation by adding potassium iodide and iodine to an aqueous solution of acetovanillone and sodium acetate at 90° [549].
- Preparation by adding 0.1 M hydrogen peroxide to a solution of acetovanillone and potassium iodide in 0.025 M phosphate buffer (pH 3) (75%) [1074].

m.p. 179° [1937], 178-179° [451] [1938], 174-176° [549];

<sup>1</sup>H NMR [1074], MS [1074].

**1-(6-Hydroxy-3-iodo-2-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>IO<sub>3</sub>

mol.wt. 292.07



## Synthesis

-Preparation by iodination of 2-hydroxy-6-methoxyacetophenone with an aqueous iodine-iodic acid solution in ethanol at r.t. (68%) [1600].

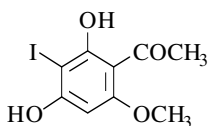
m.p. 116° [1600].

**1-(2,4-Dihydroxy-3-iodo-6-methoxyphenyl)ethanone**

[74047-32-8]

C<sub>9</sub>H<sub>9</sub>IO<sub>4</sub>

mol.wt. 308.07



## Synthesis

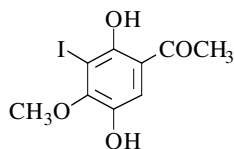
-Preparation by adding an aqueous solution of iodine and periodic acid to an ethanolic solution of 2,4-dihydroxy-6-methoxyacetophenone at 60-70° [15] [18] [537], (86%) [537], (74%) [18].

m.p. 198-200° [537], 193-195° [18];

<sup>1</sup>H NMR [537], <sup>13</sup>C NMR [537], IR [537], MS [537].

**1-(2,5-Dihydroxy-3-iodo-4-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>9</sub>IO<sub>4</sub>

mol.wt. 308.07



## Synthesis

-Obtained from 2-hydroxy-3-iodo-4-methoxyacetophenone oxidised with potassium persulfate in aqueous sodium hydroxide solution (21%) [1600] (Elbs persulfate oxidation).

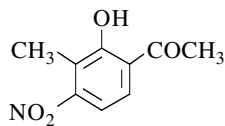
m.p. 174° (d) [1600].

**1-(2-Hydroxy-3-methyl-4-nitrophenyl)ethanone**

[190730-40-6]

C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17



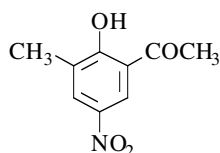
## Syntheses

-Preparation by reaction of acetyl chloride (1.3 mol) with 2-methyl-3-nitrophenol (1 mol) in nitrobenzene under nitrogen. The reaction mixture was warmed at 45°, a small amount of aluminium chloride was added and the reaction mixture was stirred at 45° for 1 h. After the addition of another portion of aluminium chloride (1 mol), the temperature rose to 60° and the reaction mixture was slowly heated at 120° and allowed to stirring for another 16 h (72%) [1227].  
-Also refer to: [1226] [1685].

m.p. 40-41° [1227]; <sup>1</sup>H NMR [1227], IR [1227], MS [1227].

**1-(2-Hydroxy-3-methyl-5-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17

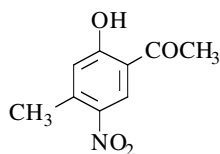
**Synthesis**

-Preparation by reaction of nitric acid on 2-hydroxy-3-methylacetophenone in acetic acid at 0° (58%) [397]; first at 0°, then 30° (72%) [923].

m.p. 115-116° [397], 114-114°5 [923].

**1-(2-Hydroxy-4-methyl-5-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17

**Synthesis**

-Preparation by reaction of nitric acid on 2-hydroxy-4-methylacetophenone in acetic acid first at 0°, then 30° (72%) [923].

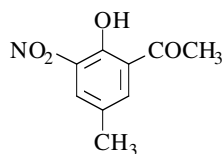
m.p. 99°5 [923].

**1-(2-Hydroxy-5-methyl-3-nitrophenyl)ethanone**

[66108-30-3]

C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17

**Syntheses**

-Preparation by reaction of nitric acid on 2-hydroxy-5-methylacetophenone in acetic acid [125] [287] [318] [923], (90%) [318], (64%) [923].

-Preparation by reaction of potassium nitrate on 2-hydroxy-5-methylacetophenone in dilute sulfuric acid (77%) [1895].

-Also obtained by reaction of copper nitrate on 2-hydroxy-5-methylacetophenone in ice-cooled acetic anhydride solution (80%) [125].

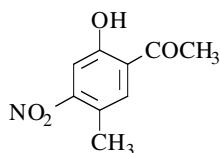
m.p. 135-136° [318], 135° [125], 132° [287] [923], 130-130°5 [1895]; pK<sub>a</sub> [1387].

**1-(2-Hydroxy-5-methyl-4-nitrophenyl)ethanone**

[56609-14-4]

C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17

**Synthesis not yet described**

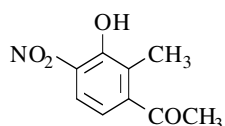
-There is a single reference, erroneous. It concerns the 2-hydroxy-5-methyl-3-nitroacetophenone [1387]; (see above).

**1-(3-Hydroxy-2-methyl-4-nitrophenyl)ethanone**

[89877-53-2]

C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17

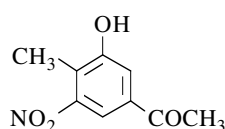


## Synthesis

-Refer to: [1671].

**1-(3-Hydroxy-4-methyl-5-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17



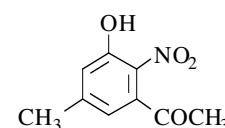
## Synthesis

-Preparation by diazotization of 3-amino-4-methyl-5-nitroacetophenone (m.p. 158-159°), followed by hydrolysis of the diazonium salt so obtained (62%) [633].

m.p. 152°5-153°5 [633].

**1-(3-Hydroxy-5-methyl-2-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17



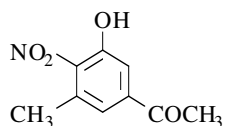
## Synthesis

-Obtained (by-product) by reaction of fuming nitric acid on 3-hydroxy-5-methylacetophenone in ethyl ether between -20 to -10° (4%) [324].

m.p. 66-67° [324].

**1-(3-Hydroxy-5-methyl-4-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17



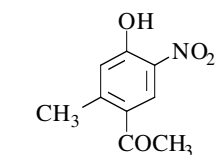
## Synthesis

-Preparation by reaction of fuming nitric acid on 3-hydroxy-5-methylacetophenone in ethyl ether between -20 to -10° (23%) [324].

m.p. 148-150° [324].

**1-(4-Hydroxy-2-methyl-5-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17



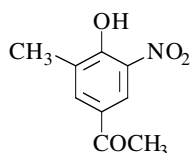
## Synthesis

-Preparation by reaction of nitric acid on 4-hydroxy-2-methylacetophenone in acetic acid first at 0°, then 30° (61%) [923].

m.p. 125-126° [923].

**1-(4-Hydroxy-3-methyl-5-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17



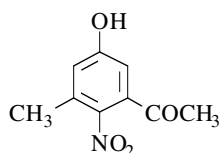
## Syntheses

- Preparation by reaction of nitric acid on 4-hydroxy-3-methylacetophenone in acetic acid first at 0°, then 30° (67%) [923].
- Preparation by reaction of acetyl chloride on 2-methyl-6-nitrophenol with aluminium chloride in nitrobenzene at 130° (50%) [923].

m.p. 131°5 [923].

**1-(5-Hydroxy-3-methyl-2-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>

mol.wt. 195.17



## Synthesis

- Preparation by reaction of fuming nitric acid on 3-hydroxy-5-methylacetophenone in ethyl ether between -20 to -10° (29%) [324].

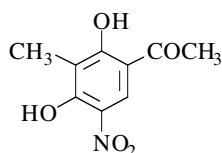
m.p. 148-150° [324]; UV [324].

**1-(2,4-Dihydroxy-3-methyl-5-nitrophenyl)ethanone**

[118824-94-5]

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



## Synthesis

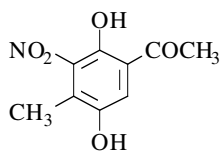
- Preparation by reaction of acetic anhydride on 2-methyl-4-nitroresorcinol with aluminium chloride in nitrobenzene at 80° (73%) [1470].

m.p. 178-179° [1470]; <sup>1</sup>H NMR [1470], IR [1470].**1-(2,5-Dihydroxy-4-methyl-3-nitrophenyl)ethanone**

[43140-83-6]

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



## Synthesis

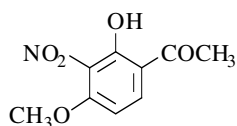
- Preparation by demethylation of 2-hydroxy-5-methoxy-4-methyl-3-nitroacetophenone with aluminium bromide in carbon disulfide at r.t. (96%) [1741].

m.p. 179° [1741]; <sup>1</sup>H NMR [1741], IR [1741].



**1-(2-Hydroxy-4-methoxy-3-nitrophenyl)ethanone**C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



## Syntheses

-Preparation by reaction of dimethyl sulfate on 2,4-dihydroxy-3-nitroacetophenone with potassium carbonate in refluxing acetone [1591].  
 -Also refer to: [1290].

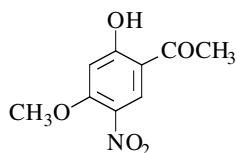
m.p. 211-212° [1591].

**1-(2-Hydroxy-4-methoxy-5-nitrophenyl)ethanone**

[102877-53-2]

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



## Syntheses

-Preparation by nitration of 2-hydroxy-4-methoxyacetophenone (paeonol) with nitric acid (d = 1.42) in acetic acid [7] [947] [1484] [1626], (47%) [947].  
 -Also obtained by reaction of concentrated nitric acid with 3,3'-diacetyl-4,4'-dihydroxy-6,6'-dimethoxydiphenyl thioether at r.t. overnight [869].  
 -Also refer to: [63] (compound 1b).

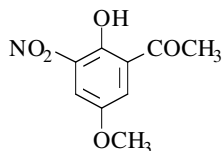
m.p. 157-158° [1626], 155° [7] [869], 154° [947], 153° [1484].

**1-(2-Hydroxy-5-methoxy-3-nitrophenyl)ethanone**

[90564-25-3]

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



## Syntheses

-Preparation from 2-hydroxy-5-methoxyacetophenone by reaction,  
 \*with nitric acid (d = 1.2) in acetic acid at < 15° (83%) [956];  
 \*with nitric acid (d = 1.5) in ice-cooled acetic acid and acetic anhydride mixture [170] [467] [698] [1340], (57%) [698].

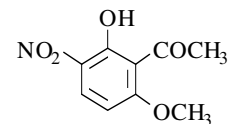
m.p. 113-114° [956], 112° [698], 110-112° [467] [1340]; IR [774] [1023].

**1-(2-Hydroxy-6-methoxy-3-nitrophenyl)ethanone**

[38226-01-6]

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



## Syntheses

-Obtained by reaction of acetic anhydride on 5-methoxy-2-nitrophenol with aluminium chloride in nitrobenzene at 135° [1291].  
 -Obtained by reaction of nitric acid (d = 1.42) on 2-hydroxy-6-methoxyacetophenone in acetic acid at r.t. [371] [1023] [1213] [1291], (43%) [371], (26%) [1023].

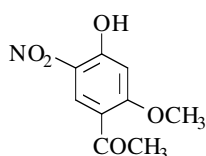
-Also obtained by reaction of fuming nitric acid with 2-hydroxy-6-methoxyacetophenone in acetic acid, first at r.t. for 40 min, then at 45-50° for 16 h (30%) [471].  
 -Also obtained (small quantity) by partial methylation of 2,6-dihydroxy-3-nitroacetophenone with dimethyl sulfate in the presence of potassium carbonate in boiling acetone [1291].  
 -Also obtained by partial demethylation of 2,6-dimethoxy-3-nitroacetophenone,  
 \*with aluminium chloride in nitrobenzene, heated on a steam bath (by-product) [1291];  
 \*with concentrated hydrochloric acid in boiling acetic acid [1291];  
 \*with boiling concentrated hydrochloric acid [1291];  
 \*with concentrated sulfuric acid at 30° [1291];  
 \*with potassium hydroxide in boiling ethanol [1291].  
 -Also obtained by reaction of nitric acid (d = 1.4) on 2,2'-dihydroxy-3,3'-diacetyl-4,4'-dimethoxyphenyl thioether at 0° [476].

m.p. 104-105° [371], 102-103° [476] [1291], 100°5-101°5 [1023], 98-100° [471];  
<sup>1</sup>H NMR [471], <sup>13</sup>C NMR [734], IR [471] [1023].

#### 1-(4-Hydroxy-2-methoxy-5-nitrophenyl)ethanone

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



##### Synthesis

-Obtained by reaction of fuming nitric acid on 4-hydroxy-2-methoxyacetophenone (isopaeonol) at 10° (24%) [947].

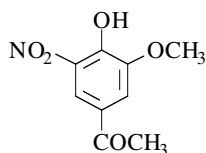
m.p. 95° [947].

#### 1-(4-Hydroxy-3-methoxy-5-nitrophenyl)ethanone

[20716-41-0]

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



##### Synthesis

-Preparation by nitration of 4-hydroxy-3-methoxyacetophenone with 70% nitric acid in acetic acid, first at 10°, then at 25° (95%) [813].

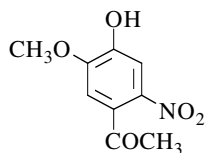
m.p. 148°1-149°5 [813].

#### 1-(4-Hydroxy-5-methoxy-2-nitrophenyl)ethanone

[418759-58-7]

C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>

mol.wt. 211.17



##### Syntheses

-Preparation by treatment of 4-benzyloxy-5-methoxy-2-nitroacetophenone (m.p. 142-143°) with trifluoroacetic acid at r.t. for 14 h (89%) [1247].  
 -Also refer to: [1779].

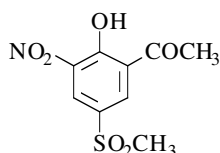
m.p. 151°5-152°5 [1247]; Crystal data [1247];  
<sup>1</sup>H NMR [1247], <sup>13</sup>C NMR [1247].

**1-[2-Hydroxy-5-(methylsulfonyl)-3-nitrophenyl]ethanone**

[70978-46-0]

C<sub>9</sub>H<sub>9</sub>NO<sub>6</sub>S

mol.wt. 259.24

**Syntheses**

-Preparation by nitration of 2-hydroxy-5-(methylsulfonyl)-acetophenone in concentrated sulfuric acid,  
 \*with 100% nitric acid at r.t. (89%) [318];  
 \*with nitric acid (d = 1.42) between -15 to -5° [620] [1463], (50%) [620].

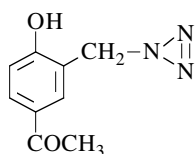
m.p. 192-193° [318], 189-191° [620] [1463].

**1-[3-(Azidomethyl)-4-hydroxyphenyl]ethanone**

[154603-69-7]

C<sub>9</sub>H<sub>9</sub>N<sub>3</sub>O<sub>2</sub>

mol.wt. 191.19

**Synthesis**

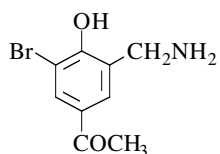
-Preparation by action of sodium azide with 3-chloromethyl-4-hydroxyacetophenone in DMF at 30° for 4 h (60%) [413].

**1-[3-(Aminomethyl)-5-bromo-4-hydroxyphenyl]ethanone**

[109314-52-5]

C<sub>9</sub>H<sub>10</sub>BrNO<sub>2</sub>

mol.wt. 244.09

**Synthesis**

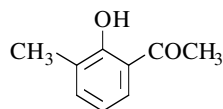
-Refer to: [1912] (Japanese patent).

**1-(2-Hydroxy-3-methylphenyl)ethanone**

[699-91-2]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18

**Syntheses**

-Preparation by reaction of acetic acid on o-cresol with zinc chloride at reflux (Nencki reaction) (20%) [200].  
 -Preparation by Fries rearrangement of o-tolyl acetate with aluminium chloride without solvent between 130° and 180° [112] [113] [461] [827] [828] [959] [1180] [1512], (45-55%) [112] [959] [1512], (18-26%) [113] [461] [827] [828].  
 -Also obtained (by-product) by Fries rearrangement of o-tolyl acetate with aluminium chloride, ferric chloride or titanium tetrachloride in nitrobenzene as solvent between 20° and 60° (3-5%) [461] [463] [464] [465].  
 -Preparation by reaction of acetic anhydride on o-cresol without solvent, at 120°,  
 \*with 70% perchloric acid (56%) [1084];  
 \*with aluminium chloride (27%) [397].

- Also obtained (by-product) by reaction of acetyl chloride on o-cresol with aluminium chloride or titanium tetrachloride in nitrobenzene at 30-60° (3-6%) [458] [465].
- Preparation by treatment of methyl 4-hydroxy-8-methylcoumarin-3-carboxylate with potassium hydroxide (69%) [66].
- Also obtained by reaction of stannous chloride on 2-hydroxy-3-methylacetophenone 2,4-dinitro-phenylhydrazone in refluxing aqueous acetone-hydrochloric acid mixture (81%) [460].
- Also obtained by UV light irradiation of o-tolyl acetate at 25° (photo-Fries rearrangement), in the presence of potassium carbonate in hexane (74%) [660] or without potassium carbonate in hexane (32%) [660] or in ethyl ether (16%) [724].
- Also refer to: [289].

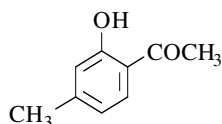
b.p.<sub>1</sub> 62-63° [397], b.p.<sub>5</sub> 91°7-91°9 [1180], b.p.<sub>9</sub> 103-104° [113],  
 b.p.<sub>9</sub> 103-105° [959], b.p.<sub>10</sub> 105° [1084], b.p.<sub>10-10.5</sub> 106-107° [66] [200],  
 b.p.<sub>12</sub> 107° [460], b.p.<sub>11</sub> 108° [660], b.p.<sub>15</sub> 111-112° [813], b.p. 235-237° [113];  
<sup>1</sup>H NMR [1180], UV [813] [1180].

### 1-(2-Hydroxy-4-methylphenyl)ethanone

[6921-64-8]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18



#### Syntheses

- Preparation by treatment of methyl 4-hydroxy-7-methylcoumarin-3-carboxylate with potassium hydroxide at 200° (87%) [66].
- Preparation by Fries rearrangement of m-tolyl acetate [112] [550] [1165] [1276],

#### with solvent:

- \*with aluminium chloride,
  - in tetrachloroethane at 130-135° (99%) [1714];
  - in nitrobenzene at 25-30° or at 165° (44-45%) [151] [461].
- \*with titanium tetrachloride in nitrobenzene at 165° (73%) [461].

#### without solvent:

- \*with aluminium chloride,
  - at 165-170° (88-95%) [461] [1512] [1926];
  - between 120 to 165° (70-90%) [113] [690] [827] [828] [926] [1785];
  - between 60 to 165° (38-65%) [959] [1237] [1512].
- \*with titanium tetrachloride at 95° (83%) [1926];
- \*with hydrofluoric acid at 100° (80%) [480];
- \*with zinc chloride at 140-160° (20%) [66] [1651].
- Preparation by reaction of acetic acid on m-cresol,
  - \*with boron trifluoride at 70° (65%) [980];
  - \*with zinc chloride (Nencki reaction) (25%) [200].
- Preparation by reaction of acetic anhydride on m-cresol with 70% perchloric acid,
  - at r.t. (63%) [1084];
  - at 125-135° (30%) [548].
- Preparation by reaction of acetyl chloride on m-cresol,
  - \*with titanium tetrachloride,
    - in nitrobenzene at 60° (75%) [458];
    - in ethylene dichloride at 25° (40%) [458].
  - \*with aluminium chloride,
    - in nitrobenzene at 60° (48%) [458];
    - in ethylene dichloride at 25° (42%) [458].
  - \*with zinc chloride at r.t. (11%) [1651] or at 140-160° [580].

- Preparation by dehydrogenation of 6-acetyl-3-methyl-2-cyclohexen-1-one,
  - \*with a 5% palladium-barium sulfate catalyst at reflux (47%) [1059];
  - \*with refluxing 16% solution of bromine in acetic acid [1059].
- Also obtained by treatment of 4-methylacetophenone with sodium trifluoroacetate in nitromethane-trifluoroacetic acid-trifluoroacetic anhydride mixture in the presence of a platinum electrode, followed by treatment of the intermediate trifluoroester with 10% aqueous potassium carbonate solution (33%) [1661], (hydroxylation of aromatic compound).
- Preparation by UV light irradiation of m-tolyl acetate, at r.t. (photo-Fries rearrangement) [1723], in ethanol (37%), with aqueous  $\beta$ -cyclodextrin solution (54%) or with  $\beta$ -cyclodextrin (solid) (95%).

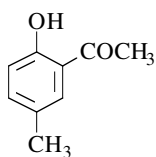
colourless oil [690]; m.p. 21° [66] [548] [580] [1512], 20-21° [480];  
 b.p.<sub>0.6</sub> 82-84° [926], b.p.<sub>0.22</sub> 87° [690], b.p.<sub>8</sub> 101° [113] [959],  
 b.p.<sub>7.5</sub> 102-104° [550], b.p.<sub>7</sub> 103° [66] [580] [1084], b.p.<sub>9</sub> 105-106° [66],  
 b.p.<sub>7</sub> 107° [548], b.p.<sub>15</sub> 115° [480], b.p.<sub>14</sub> 116-119° [980],  
 b.p.<sub>17</sub> 123-125° [1237], b.p.<sub>20</sub> 126° [66] [200] [580], b.p.<sub>20</sub> 126-127° [1276],  
 b.p.<sub>760</sub> 245° [66] [200] [580] [1651] [1926];  
<sup>1</sup>H NMR [690] [1923], IR [690] [1923], MS [690].

### 1-(2-Hydroxy-5-methylphenyl)ethanone

[1450-72-2]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18



#### Syntheses

- Obtained by treatment of methyl 4-hydroxy-6-methyl-coumarin-3-carboxylate with potassium hydroxide at 200° (82%) [66].
- Preparation by Fries rearrangement of p-tolyl acetate [125] [137],

#### with solvent:

- \*with titanium tetrachloride in nitrobenzene at 50° (92%) [462] [466];
- \*with alumina in methanesulfonic acid for 5 min at 160° (92%) [1613];
- \*with zirconium chloride in nitrobenzene at 60° (86%) [466];
- \*with zirconium chloride in methylene chloride at r.t. for 24 h (83%). The same reaction performed in a simple ultrasound cleaning bath at r.t. for 24 h also leads to 83% yield [748];
- \*with stannic chloride in nitrobenzene at 60° (78%) [466];
- \*with aluminium chloride, (90%) [1668], (86%) [526], at 130° (90%) [1669] or at 160° (70%) [1363];
  - in nitrobenzene at 60° (92%) [463], (68%) [466], at 25° (84%) [461];
  - in diphenyl ether at 160° (30%) [446];
  - in chlorobenzene, in a sealed tube and subjected to high power microwave irradiation for 2 min only (85%) [1683];
  - in the presence of 4-ethyl-2,6-dimethylphenyl chloroacetate at 150° (72%) [103];
  - in the presence of 2-chloro-4-methylphenyl benzoate at 150° (50%) [103];
- \*on K 10 montmorillonite using microwave radiations (640 w, 5 min) (86%) or in refluxing DMF during 4 h (75%) [931].

#### without solvent:

- \*with aluminium chloride,
  - between 110 to 170° (85-99%) [318] [461] [793] [1512] [1582] [1894] [1926];
  - between 120 to 150° (60-74%) [1220] [1334] [1541];
  - at 120° (36-45%) [675] [959], (90%) [1683];
- \*with titanium tetrachloride at 120° (70%) [1926];
- \*with hydrofluoric acid at 120-125° (63%) [480];
- \*with beryllium chloride at 150° (63%) [286] [287].

- Preparation by reaction of acetyl chloride on p-cresol,
- \*with titanium tetrachloride in nitrobenzene at 60° (93%) [458];
- \*with aluminium chloride,
  - in nitrobenzene at 60° (75-80%) [458] [1143];
  - in ethylene dichloride at 110-120° (56%) [1033];
  - without solvent at 180° (64-72%) [1016].
- Preparation by reaction of acetyl chloride with p-cresol in the presence of aluminium chloride during 30 min at 180°, *via* a Fries rearrangement (98%) [976].
- Preparation by acylation of p-cresol with acetic acid in the presence of alumina in methanesulfonic acid for 5 min at 120° (90%) [1613].
- Preparation by reaction of acetyl chloride on 4-methylanisole with aluminium chloride [104] [110] [113].
- Also obtained by reaction of acetyl chloride on p-tolyl borate with aluminium chloride in refluxing carbon disulfide (15%) [1792].
- Preparation by reaction of acetic anhydride on p-cresol with 70% perchloric acid at 100° (53%) [1084], at 125-135° (30%) [548].
- Preparation by reaction of acetic acid on p-cresol,
- \*with boron trifluoride at 70° (95%) [980];
- \*with zinc chloride at reflux (14%) [200] (Nencki reaction).
- Preparation by dealkylation of,
- \*2-methoxy-5-methylacetophenone,
  - with pyridinium chloride at reflux (56%) [1237];
  - with hydrobromic acid in acetic acid (7%) [813];
- \*2-ethoxy-5-methylacetophenone with aluminium chloride [98].
- Also obtained from 2-hydroxy-5-methyl- $\alpha$ -chloroacetophenone by treatment with zinc powder in acetic acid [104].
- Also obtained by treatment of 2-hydroxy-5-methyl- $\alpha,\alpha,\alpha$ -trifluoroacetophenone with 2 N sodium hydroxide at r.t. (100%) [1885].
- Also obtained by reaction of stannous chloride on 2-hydroxy-5-methylacetophenone 2,4-dinitrophenylhydrazine in refluxing aqueous acetic acid-hydrochloric acid mixture (80%) [460].
- Also obtained by reaction of mesityl acetate on p-cresol with aluminium chloride at 150° (72%) [103].
- Also obtained by reaction of various aryl acetates on p-tolyl benzoate with aluminium chloride at 150°, which produce the acetyl cation [103],
- \*with mesityl acetate (77%);
- \*with 2-chloro-4-methylphenyl acetate (57%);
- \*with 2,6-dimethylphenyl acetate (33%).
- Also obtained by degradation of 3-bromo-6-methylchromanone with alkali in boiling water [1031].
- Also obtained by hydrogenation of 2,4-dimethylindoxazen in acetic acid in the presence of Pd/BaSO<sub>4</sub> during 4 to 6 h [1103].
- Also obtained by hydrolysis of 2-(2-hydroxy-5-methylphenyl)-2-methyl-1,3-dioxolane by a catalytic amount of carbon tetrabromide (20%) in acetonitrile/water solvent mixture under sonication in a commercial ultrasonic cleaning bath for 2 h at 45° (98%) [1070].
- Also obtained by UV light irradiation of p-tolyl acetate at 25°,
- \*in hexane,
  - in the presence of potassium carbonate (86%) [660];
  - without potassium carbonate (35%) [660], (6%) [280];
- \*in ethyl ether (32%) [724], in ethanol [280] [867], (8%) [280], in benzene (6%) [280] or in methanol [867].
- Also refer to: [153] (compound 1a), [811] [1109] [1204] (compound 1c), [1376].

#### Isolation from natural sources

- From the coriander seed essential oil [583].
- Detected in the sorghum malt beverage [1061].
- Identified in powdered turmeric (curcuminoids) [785].

**N.B.:** Na salt [52166-70-8] [217] [1668].

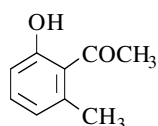
m.p. 50° [66] [104] [110] [113] [125] [200] [460] [461] [462] [463] [480] [548] [811] [959] [1143] [1363] [1512] [1582] [1926], 49°5 [675], 49-50° [931] [980], 48-49° [446] [1033], 48° [1103], 47-48° [287] [318], 47° [1541], 46°5 [1334], 46-48° [103], 46-47°5 [813], 45-46° [660] [1894], 45° [526];  
b.p.<sub>0.2</sub> 60-62° [1541], b.p.<sub>7</sub> 101-103° [1084], b.p.<sub>15</sub> 112° [113], b.p.<sub>13</sub> 118° [980], b.p.<sub>15</sub> 118-121° [1237], b.p.<sub>7</sub> 120-130° [446], b.p.<sub>16</sub> 124° [480], b.p.<sub>740</sub> 209° [526];  
GC-MS [583] [785] [1061]; pK<sub>a</sub> [1387] [1697];  
<sup>1</sup>H NMR [265] [867] [914] [931] [976] [1541] [1923], <sup>13</sup>C NMR [914], IR [931] [1541] [1923], UV [265] [813] [1541].

### 1-(2-Hydroxy-6-methylphenyl)ethanone

[41085-27-2]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18



#### Syntheses

- Preparation from 2-hydroxy-6-methylbenzonitrile and methylmagnesium bromide in ethyl ether-tetrahydrofuran mixture at 50° (67%) [913].
- Preparation by adding a solution of methyl lithium in ethyl ether to 6-methylsalicylic acid in tetrahydrofuran and maintain a gentle reflux for 8 h. Then, the solution was cooled and acidified with hydrochloric acid (62%) [1876].
- Preparation by demethylation of 2-methoxy-6-methylacetophenone,
  - \*with pyridinium chloride at 200-215° (44%) [452], (31%) [1930];
  - \*with boron tribromide in methylene chloride at r.t. [356] [435], (70%) [356].
- Preparation by diazotization of 2-amino-6-methylacetophenone, connected with hydrolysis of the diazonium salt obtained [619].
- Also obtained by a potassium fluoride catalyzed self-condensation of 2,4-pentanedione in DMF solution [415] [1753].
- Also obtained by UV light irradiation of 3-methylphenyl acetate, in ethanol (36%) [1723] or in ethanol in the presence of β-cyclodextrin (42%) [1723].
- Also obtained (poor yield) by irradiation of dehydroacetic acid and vinyl acetate in an ethyl acetate solution [1753] [1754], (4%) [1754].

#### Isolation from natural sources

- The 2-hydroxy-6-methylacetophenone was isolated as exocrine compound in several neotropical species of ants in the dolichoderine genus *Hypoclinea* (*Hypoclinea analis*, *Hypoclinea abrupta*, *Hypoclinea bidens* A). The ants were collected in Belem, Para, Brazil [235] [913]. It was also isolated from the bodies of *Rhytidoponera aciculata* (Australian ponerine ant) [293] [1780].
- The hydrolytic cleavage of Peripentadenine gave the 2-hydroxy-6-methylacetophenone. The Peripentadenine was obtained from dried milled bark of *Peripentadenia mearnsii* (Elaeocarpaceae), collected at Boonjie (North Queensland) [1062].
- From the essential oil of *Cistus ladanifer* L. (Cistaceae) [1447].
- From the aerial parts of *Gerbera ambigua* (Compositae), collected in Transvaal [248].

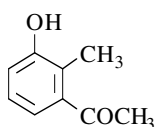
oil [248] [356] [619] [913] [1754] [1780] [1876] [1930];  
after two recrystallizations from water and two sublimations (130°/0.09 mm) gave a white powder, m.p. 93-98° [1930];  
b.p.<sub>7</sub> 100° [1876], b.p.<sub>18</sub> 138-142° [356];  
<sup>20</sup>n<sub>D</sub> = 1.5612 [619], <sup>23</sup>n<sub>D</sub> = 1.5600 [1876];  
<sup>1</sup>H NMR [235] [248] [356] [913] [1447] [1753] [1754] [1876], <sup>13</sup>C NMR [1062], IR [248] [356] [452] [913] [1062] [1876], MS [235] [248] [293] [913] [1447].

**1-(3-Hydroxy-2-methylphenyl)ethanone**

[69976-81-4]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18

**Syntheses**

-Preparation by diazotization of 6-amino-3-hydroxy-2-methylacetophenone, followed by hydrolysis of the obtained diazonium salt in the presence of hypophosphorous acid at 0° (42%) [546].

-Preparation by passing a solution of 3-hydroxy-2-methylbenzoic acid in hot acetic acid over a pelleted thoria catalyst at 470-480° during 4 h (32%) [499].

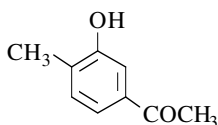
m.p. 121° [499], 120°8-121°7 [546]; <sup>1</sup>H NMR [546].

**1-(3-Hydroxy-4-methylphenyl)ethanone**

[33414-49-2]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18

**Syntheses**

-Preparation by diazotization of 3-amino-4-methylacetophenone, followed by hydrolysis of the obtained diazonium salt [904] [1069] [1501], (75%) [1501], (40%) [1069].

-Obtained by treatment of 4-methylacetophenone with sodium trifluoroacetate in nitromethane-trifluoroacetic acid-trifluoroacetic anhydride mixture in the presence of a platinum electrode followed by treatment of the intermediate trifluoroacetate ester with 10% potassium hydrogen carbonate solution (40%) [1661], (of aromatic compounds).

**Isolation from natural sources**

-From *Laurencia chilensis* De Toni, Forte and Howe (Rhodomelaceae) [1835].

m.p. 119-120° [1069] [1501], 105-107° [1835];

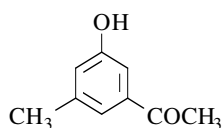
<sup>1</sup>H NMR [1835], UV [1835], IR [1835], (Sadtlar: standard n° 8331), MS [1835].

**1-(3-Hydroxy-5-methylphenyl)ethanone**

[43113-93-5]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18

**Syntheses**

-Preparation by diazotization of 3-amino-5-methylacetophenone, followed by hydrolysis of the obtained diazonium salt (70%) [324].

-Preparation by hydrolysis of diethyl 3-acetoxy-5-methylbenzoylmalonate with concentrated sulfuric acid in boiling aqueous acetic acid (70%) [324].

-Also obtained by solvolysis of 3-acetyl-5-methylphenol tetrahydropyranyl ether with p-toluene-sulfonic acid in methanol at r.t. (73%) [144].

-Preparation by aromatization of 5-acetyl-3-methyl-2-cyclohexen-1-one with cupric bromide and lithium bromide in boiling acetonitrile (46%) [324].

-Also obtained by alkaline transformation of methyl, tert-butyl or benzyl esters of 4-acetonyl-5-hydroxy-2,5-dimethyl-3-furoic acid with 2 N sodium hydroxide in ethanol at r.t. (35-50%) [358].

-Preparation by oxidation of 5-acetyl-3-methyl-2-cyclohexen-1-one with air in alkaline medium or by catalytic hydrogenation of the latter in the presence of Pd/C in p-cymene [358].

-Also obtained (poor yield) by alkaline degradation of a solution of D-xylose or D-glucose in 0.63 M sodium hydroxide at 96° under nitrogen [623].



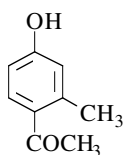
m.p. 122-123° [324] [623], 118-121° [358], 118-120° [144];  
<sup>1</sup>H NMR [144] [358], IR [144] [358], UV [358], MS [144] [358].

### 1-(4-Hydroxy-2-methylphenyl)ethanone

[875-59-2]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18



#### Syntheses

- Preparation by dealkylation of 4-hydroxy-2-methyl-5-isopropylacetophenone with aluminium chloride in chlorobenzene at 50° (80%) [901].
- Also obtained by reaction of aluminium chloride on 4-acetoxy-2-methylacetophenone at 130° (51%) or on 4-(benzoyloxy)-2-methylacetophenone at 170° [1512].
- Preparation by Fries rearrangement of m-tolyl acetate,
  - \*with aluminium chloride in nitrobenzene at r.t. (80-85%) [1512], (60-66%) [103] [151] [459] [461] [1422], (54%) [674];
  - \*with aluminium chloride without solvent [113] [461] [1237] [1785] [1926], at 65° (88%) [1926], at 60-70° (28%) [1237], at 130° (16%) [1785] and at 165° (7%) [461];
  - \*with zinc chloride and hydrochloric acid at r.t. (30%) [1651];
  - \*with hydrofluoric acid at 20° (17%) [480];
  - \*with titanium tetrachloride at 95° (7%) [1926].
- Also obtained by reaction of acetyl chloride on m-cresol,
  - \*with aluminium chloride in nitrobenzene at 25° (63%) [458];
  - \*with titanium tetrachloride in nitrobenzene at 25° (25%) [458];
  - \*with zinc chloride [579] [580] [1651], (14%) [1651];
  - \*with ferric chloride in carbon disulfide [1320].
- Also obtained by reaction of acetic acid on m-cresol,
  - \*with boron trifluoride at 70° (16%) [980];
- \*by heating the mixture with phosphorous oxychloride (by-product) [112].
- Also obtained by reaction of acetic anhydride on m-cresol with 70% perchloric acid at r.t. (6%) [1084].
- Also obtained by UV light irradiation on p-tolyl acetate in methanol at 25° (26%) [1389]. (There is a 1,2-migration of the methyl group).
- Also obtained by UV light irradiation of m-tolyl acetate in ethanol (13%) [1723].
- Also obtained by reduction of 4-hydroxy-2-methyl- $\alpha$ -chloroacetophenone with zinc dust in aqueous ethanolic acetic acid [359].

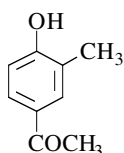
m.p. 131° [980], 129° [901], 128-130° [1389], 128-129° [1422],  
 128° [113] [359] [580] [674] [1084] [1237] [1926], 127° [459] [461] [1512] [1651],  
 126° [1320], 125° [480];  
 b.p.<sub>17</sub> 158-160° [1237], b.p. 313° [580];  
<sup>1</sup>H NMR [1389] [1422], IR [1389], UV [151].

### 1-(4-Hydroxy-3-methylphenyl)ethanone

[876-02-8]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18



#### Syntheses

- Preparation by dealkylation of 4-hydroxy-5-methyl-2-isopropylacetophenone with aluminium chloride in chlorobenzene at 50° (53%) [901].
- Preparation by Fries rearrangement of o-tolyl acetate [113] [433].

*with solvent:*

- \*with aluminium chloride in nitrobenzene at r.t. (83-85%) [463] [1512], (41-49%) [89] [150] [465] [472] or at 60° (82%) [461];
- \*with aluminium chloride in diphenyl ether at 175° (54%) [446];
- \*with titanium tetrachloride in nitrobenzene at 30° (78%) [464] [465];
- \*with ferric chloride in nitrobenzene at 50° (60%) [465].

*without solvent:*

- \*with aluminium chloride at 160-180° (61%) [461], (27%) [959];
- \*with ferric chloride (42%) [465].

- Preparation by reaction of acetyl chloride on o-cresol,
- \*with hydrofluoric acid at 50° (98%) [263];
- \*with aluminium chloride,
  - in refluxing carbon disulfide (96%) [1069];
  - in nitrobenzene at 60° (86%) [458];
- \*with titanium tetrachloride in nitrobenzene at 30° (66%) [465] or at 60° (78%) [458];
- \*with ferric chloride in carbon disulfide [1320].
- Preparation by reaction of acetonitrile on o-cresol with triflic acid at r.t. (67%) [268].
- Also obtained by reaction of acetic anhydride with o-cresol in anhydrous hydrofluoric acid at 50° (quantitative yield) [89] or in 70% perchloric acid at 120° (31%) [1084].
- Also obtained by reaction of acetic acid on o-cresol with zinc chloride (Nencki reaction) (10%) [200].
- Preparation by diazotization of 4-amino-3-methylacetophenone with sodium nitrite in dilute hydrochloric acid and replacement of the diazonium group by hydroxyl group [992].
- Also obtained by UV light irradiation of o-tolyl acetate, at 25°,
  - \*in ethyl ether (10%) [724];
  - \*in hexane, in the presence of potassium carbonate (12%) [660] or without potassium carbonate (3%) [660].
- Also refer to: [1702].

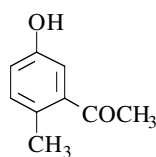
m.p. 110° [446] [901], 108-109° [89], 108° [463], 107-109° [1069], 106-108° [150], 105°-106° [268], 104-105° [420], 104° [113] [200] [461] [464] [465] [992] [1320];  
 b.p.<sub>7.5</sub> 166-167° [959], b.p.<sub>5</sub> 170-175° [446]; pK<sub>a</sub> [1697];  
<sup>1</sup>H NMR [268], IR [268], MS [268].

### 1-(5-Hydroxy-2-methylphenyl)ethanone

[40180-70-9]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>

mol.wt. 150.18



#### Syntheses

- Preparation from 5-acetyl-4-methyl-3-cyclohexenone by aromatization promoted,
- \*by cupric bromide with lithium bromide in refluxing acetonitrile (80%) [197];
- \*by 10% Pd/C in refluxing xylene (50%) [197].

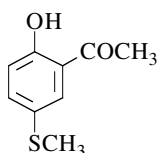
m.p. 128° [197]; <sup>1</sup>H NMR [197], IR [197].

**1-[2-Hydroxy-5-(methylthio)phenyl]ethanone**

[135936-88-8]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>S

mol.wt. 182.24



Synthesis

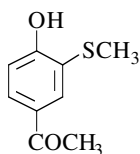
-Refer to: [421].

**1-[4-Hydroxy-3-(methylthio)phenyl]ethanone**

[66264-56-0]

C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>S

mol.wt. 182.24



Syntheses

-Preparation by reaction of methyl iodide on 4-hydroxy-3-mercaptoacetophenone with potassium carbonate in acetone at r.t. (83%) [1421] [1692].  
 -Preparation by reaction of acetyl chloride on 2-(methylthio)phenol with aluminium chloride in nitrobenzene at 65° (34%) [1421] [1692].

-Also refer to: [1702].

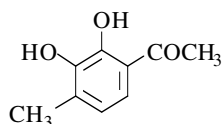
m.p. 117-120° [1421] [1692].

**1-(2,3-Dihydroxy-4-methylphenyl)ethanone**

[69751-81-1]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



Syntheses

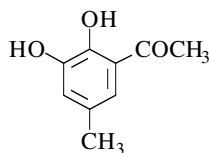
-Preparation by Fries rearrangement of 3-methylpyrocatechol diacetate with a molten mixture of aluminium chloride and sodium chloride at 200° (15%) [1116].  
 -Also obtained by UV light irradiation of 3,6-dimethyl-1,2-benzisoxazole in 96% sulfuric acid (5%) [547] [673].

m.p. 70° [1116], 67-68° [547]; <sup>1</sup>H NMR [547], IR [547] [1116], UV [547], MS [547].**1-(2,3-Dihydroxy-5-methylphenyl)ethanone**

[69751-80-0]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



Syntheses

-Preparation by reaction of acetic acid on creosol with boron trifluoride at 160° (78%) [473].  
 -Also obtained by UV light irradiation of 3,5-dimethyl-1,2-benzisoxazole in 96% sulfuric acid (6%) [547].

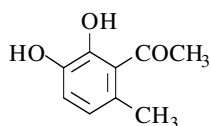
m.p. 87°-88° [547], 86-88° [473];  
<sup>1</sup>H NMR [547], IR [547], UV [547], MS [547].

**1-(2,3-Dihydroxy-6-methylphenyl)ethanone**

[59862-07-6]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Synthesis**

-Obtained (poor yield) by alkaline degradation of a solution of D-xylose or D-glucose in 0.63 M sodium hydroxide at 96° under nitrogen [623].

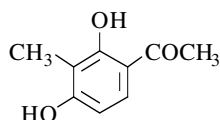
m.p. 82-83° [623]; <sup>1</sup>H NMR [623], IR [623], MS [623].

**1-(2,4-Dihydroxy-3-methylphenyl)ethanone**

[10139-84-1]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Preparation by reaction of acetic anhydride on 2-methyl-resorcinol with boron trifluoride-ethyl ether complex at 70-80° (78%) [1470].
- Preparation by reaction of acetic acid on 2-methyl-resorcinol with zinc chloride (Nencki reaction) (59%) [777].
- Preparation by reaction of acetonitrile on 2-methylresorcinol (Hoesch reaction) [447] [1464].
- Preparation by demethylation of 2-hydroxy-4-methoxy-3-methylacetophenone with hydriodic acid in a boiling mixture of phenol and acetic anhydride [447] [1464].
- Also obtained by catalytic reduction of 2',4'-dihydroxy-3'-(1-piperidylmethyl)acetophenone in the presence of Pd/C [937] [939], (65%) [939]. The starting material was obtained by treatment of resacetophenone in ethanol with methylene-bis-piperidine.
- Also refer to: [1264].

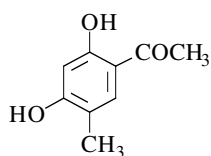
m.p. 157-158° [937] [939] [1470], 156-157° [1464], 155-156° [447];  
<sup>1</sup>H NMR [939] [1470], <sup>13</sup>C NMR [736], IR [939] [1470], UV [447], MS [1470].

**1-(2,4-Dihydroxy-5-methylphenyl)ethanone**

[93578-16-6]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Preparation by reaction of acetonitrile on 4-methylresorcinol (Hoesch reaction) (75%) [1277], (50-59%) [1215] [1259].
- Preparation from 2,4-dimethoxy-5-methylacetophenone by reaction with boron tribromide in methylene chloride at r.t. (48%) [256] [257].
- Preparation by reaction of acetic acid on 4-methylresorcinol with zinc chloride (Nencki reaction) (46-60%) [339] [448] [1499] [1913].
- Preparation by Fries rearrangement of 4-methylresorcinol diacetate with aluminium chloride in nitrobenzene (63%) [339].

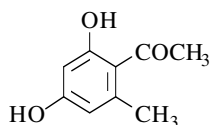
m.p. 170-171° [448], 170° [1277] [1913], 169° [1215], 168-169° [339];  
<sup>1</sup>H NMR [339], IR [339], UV [447].

**1-(2,4-Dihydroxy-6-methylphenyl)ethanone***(Orcacetophenone; Orsacetophenone; β-Orcacetophenone)*

[703-29-7]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Preparation by reaction of acetonitrile on orcinol (Hoesch reaction) [790] [860] [1597] [1598], (75%) [448], (62%) [790].
- Preparation by reaction of acetyl chloride on orcinol with aluminium chloride in nitrobenzene (56%) [507].
- Preparation by reaction of acetic acid with orcinol in the presence of boron trifluoride etherate at 102-115°, then hydrolysis of complex obtained with boiling dilute ethanol (65%) [1686].
- Preparation from 3,3'-dimethyl-5,5'-diisoxazolyl-methane by performing hydrogenolysis and subsequent hydrolysis with hydrochloric acid (80%) [97] or with 50% sulfuric acid [96].
- Preparation by reaction of 50% sulfuric acid with nonan-2,4,6,8-tetraone diethylene ketal for 10 min (77%) [1693].
- Preparation by hydrolysis of 2,8-di-(1-pyrrolidinyl)-2,7-nonanedione-4,6-dione (SM) C<sub>17</sub>H<sub>26</sub>N<sub>2</sub>O<sub>2</sub> **4** (m.p. 196-199°) with refluxing 2 N sulfuric acid for 30 min (69%) [1691]. SM was obtained by reaction of 3-acetoacetyl-4-hydroxy-6-methyl-2-pyrone with an excess of pyrrolidine.
- Preparation by hydrolysis of an ionic complex C<sub>22</sub>H<sub>27</sub>NO<sub>5</sub> **10** (m.p. 161-162°) with refluxing 2 N sulfuric acid for 1 h (87%) [1691].
- Also obtained from 7-hydroxy-4,5-dimethylcoumarin by heating in a boiling water bath with 10% aqueous sodium hydroxide [1597].
- Also obtained by degradation of 3,8-diacetyl-4,5-dihydroxy-7-methylcoumarin by heating with aqueous sodium hydroxide solution [1640].
- Also obtained by decarboxylation of 3-acetyl-p-orsellinic acid (3-acetyl-2,6-dihydroxy-4-methylbenzoic acid) with copper in boiling quinoline [1546].
- Also obtained (by-product) by reaction of trifluoroacetic anhydride on 2-acetoxy-4-methoxy-6-methylbenzoic in the presence of orcinol at 25° (8%) [9].
- Also obtained (by-product) by Fries rearrangement of orcinol diacetate in the presence of aluminium chloride in nitrobenzene at 75-80° (5%) [1351].
- Also obtained (by-product) by reaction of acetyl chloride on orcinol dimethyl ether with aluminium chloride in carbon disulfide (3%) [1705].

**Isolation from natural sources**

- From *Scolecotrichum graminis* Fuckel [1734].

m.p. 160-161° [1705], 159-160° [507], 159° [790] [860] [1640] [1693], 158-160° [9], 158-159° [448] [1691], 158° [97] [1546], 157-159° [1597], 140° [1686];

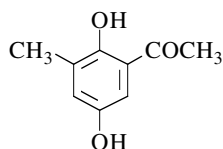
<sup>1</sup>H NMR [97] [1734], IR [1686] [1734], UV [447] [1686] [1734], MS [97] [1734].

**1-(2,5-Dihydroxy-3-methylphenyl)ethanone**

[274259-41-5]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Synthesis**

- Preparation by demethylation of 2-hydroxy-5-methoxy-3-methylacetophenone with boron tribromide in methylene chloride at r.t. for 5 h (71%) [20].

m.p. 111-113° [20];

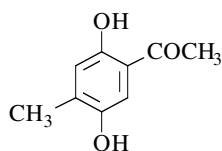
<sup>1</sup>H NMR [20], IR [20], MS [20].

**1-(2,5-Dihydroxy-4-methylphenyl)ethanone**

[54698-17-8]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Preparation by Fries rearrangement of 2-methylhydroquinone diacetate with aluminium chloride without solvent [148] [338] [514] [1392], between 120 to 160° (53-54%) [338] [1392].
- Preparation by reaction of acetic acid on 2-methylhydroquinone with boron trifluoride [1051] [1052] [1145], (85%) [1052].
- Also obtained by saponification of 2,5-diacetoxy-4-methylacetophenone with aqueous sodium hydroxide [1051].
- Also obtained by demethylation of 2-hydroxy-5-methoxy-4-methylacetophenone and 2,5-dimethoxy-4-methylacetophenone with boiling pyridinium chloride [1524].
- Also obtained by UV light irradiation of 3,6-dimethyl-1,2-benzisoxazole in 96-98% sulfuric acid (44%) [547] [673].
- Also refer to: [33] [64] [1081].

**Isolation from natural sources**

- From Chinese Moutan Cortex, the root of *Paeonia suffruticosa* Andrews (Paeoniaceae) [1924].

m.p. 148-149° [1392], 147-147°5 [547], 147° [1524], 145-146° [338], 145° [1051], 141° [514] [1052];

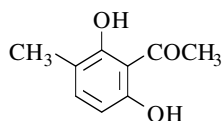
<sup>1</sup>H NMR [547], IR [547] [1392], UV [547], MS [547].

**1-(2,6-Dihydroxy-3-methylphenyl)ethanone**

[29183-78-6]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Obtained from 8-acetyl-4,6-dimethyl-7-hydroxycoumarin by alkaline degradation with 20% aqueous sodium hydroxide solution at reflux (42%) [447] [1913].
- Obtained from 4-acetoxy-3-acetyl-2-hydroxy-5-methylbenzoic acid by hydrolysis with 10% ethanolic potassium hydroxide, followed by decarboxylation [1745].

**Isolation from natural sources**

- From dihydrousnic acid [84] [1746] or from tetrahydrodeoxyusnic acid [84] (from Lichens substances) by potassium permanganate oxidation in 10% aqueous potassium hydroxide at r.t., followed by distillation (5%) [1746].
- From methylhydrousnic acid [1745], either by potassium permanganate oxidation, followed by vacuum distillation [1743], or by vacuum distillation, followed by ozone oxidation [1743].

m.p. 138-139° [447], 138° [84] [1746] [1913], 136-137° [1743], 134-136° [1745];

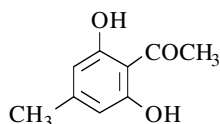
<sup>1</sup>H NMR [1745], UV [447] [1743] [1745].

**1-(2,6-Dihydroxy-4-methylphenyl)ethanone** ( $\gamma$ - or *p*-orcacetophenone)

[1634-34-0]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Preparation by reaction of acetic anhydride on orcinol, \*with concentrated sulfuric acid at 130° (65%) [860].
- \*with Amberlite IR-120 or Zeokarb-225, cation exchange resins (sulfonic acid type) at 160° (20%) [1445].
- Preparation by reaction of acetyl chloride on orcinol with aluminium chloride in boiling nitrobenzene (50%) [447] [515].
- Preparation by reaction of acetic acid on orcinol, \*with zinc chloride (Nencki reaction) [1121];
- \*with phosphorous oxychloride at 100-110° [505] [790] [1474].
- Also obtained by reaction of acetyl chloride on 2,5-dimethoxytoluene (?) with aluminium chloride in carbon disulfide (26%) [723].
- Also obtained by partial deacylation of 2,4-diacetylorcinol with 85% sulfuric acid at r.t. [510] [513] [1546], (39%) [513] or with boiling solution of 1 N sodium hydroxide [1546].
- Also obtained by decarboxylation of methyl 3-acetyl-2,4-dihydroxy-6-methylbenzoate, \*by reaction of boiling solution of 1 N sodium hydroxide [1546];
- \*by heating at 180°, followed by distillation [1744].
- Also obtained by reaction of boiling solution of 1 N sodium hydroxide on methyl 3,5-diacetyl-2,4-dihydroxy-6-methylbenzoate, decarbonylation and decarboxylation occurring simultaneously [1546].
- Also obtained by reaction of 2-acetoxy-4-methoxy-6-methylbenzoic acid on orcinol with trifluoroacetic anhydride at 25° (5%) [9].
- Also obtained by degradation of 3,8-diacetyl-4,7-dihydroxy-5-methylcoumarin by heating with aqueous sodium hydroxide solution [1640].
- Also obtained by reaction of potassium hydroxide with 2-acetyl-3-dimethylamino-5-hydroxy-5-methyl-2-cyclohexenone in ethanol at 40° (48%) [562].
- Also refer to: [1760].

**Isolation from natural sources**

- From *Rumex patientia* (Polygonaceae) [1058].
- The occurrence of 2-acetylorcinol and its monoglucoside was established in Tissue Cultures from *Rumex alpinus* (Polygonaceae) [1841].

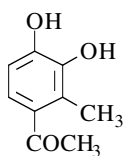
m.p. 147-149° [1445], 146-147° [447] [723], 146° [513] [790] [860] [1121] [1474] [1546] [1744], 144-146° [562], 142-144° [515], 142-143° [9] [1640];  
<sup>1</sup>H NMR [562] [723] [738] [1745], <sup>13</sup>C NMR [738], IR [562] [723] [1640] [1744],  
 UV [447] [1744], MS [562] [723].

**1-(3,4-Dihydroxy-2-methylphenyl)ethanone**

[66296-84-2]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Obtained (poor yield) by treatment of dihydroxyacetone in aqueous solution (pH 4.5) at 96° (2%) [1434].
- Also obtained (poor yield) by reaction of acetic anhydride on 3-methyl-1,2-benzenediol with perchloric acid [1110].
- Also obtained (poor yield) by Fries rearrangement of 3-methylpyrocatechol diacetate with aluminium chloride in nitrobenzene at 75-80° (< 19%) [1271].

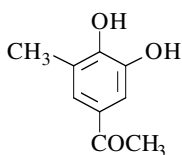
m.p. 149-152° [1434]; <sup>1</sup>H NMR [1434], MS [1434].

**1-(3,4-Dihydroxy-5-methylphenyl)ethanone**

[80547-86-0]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

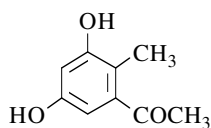
-Preparation by heating 3-methylpyrocatechol in boron trifluoride-acetic acid at 60-70° (62%) [1116].  
 -Preparation by Fries rearrangement of 3-methylpyrocatechol diacetate,  
 \*with aluminium chloride in chlorobenzene at 110° (71%) [269] or in nitrobenzene at 75-80° (< 19%) [1271];

\*with a molten mixture of aluminium chloride and sodium chloride at 200° (40%) [1116].  
 -Also obtained from neutral glucose and fructose solutions heated at 120° [1718].

m.p. 197-199° [1116], 139-140° [269]; <sup>1</sup>H NMR [269], IR [269] [1116].

**1-(3,5-Dihydroxy-2-methylphenyl)ethanone**C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

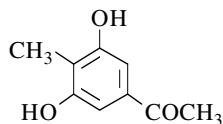
**Synthesis**

-Preparation by diazotization of (3 or 5)-amino-(5 or 3)-hydroxy-2-methylacetophenone hydrochloride (m.p. 110°5-111°), followed by hydrolysis of the diazonium salt so obtained (51%) [633].

m.p. 160°5-161°2 [633].

**1-(3,5-Dihydroxy-4-methylphenyl)ethanone**C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Synthesis**

-Preparation by diazotization of 3-amino-5-hydroxy-4-methylacetophenone hydrochloride, followed by hydrolysis of the diazonium salt so obtained (43%) [633].

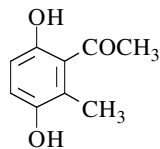
m.p. 190-191° [633].

**1-(3,6-Dihydroxy-2-methylphenyl)ethanone**

[176177-16-5]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Synthesis**

-Preparation by total demethylation of 2,5-dimethoxy-6-methylacetophenone (SM) with aluminium chloride in refluxing chlorobenzene for 4 h (74%) [21]. SM was obtained in three steps from 2,5-dimethoxy-6-methylaniline *via* the sequence: first, 6-bromo-2,5-dimethoxytoluene (m.p. 97-98°5), then 6-(1-hydroxyethyl)-2,5-dimethoxytoluene (m.p. 40°5-42°5) and finally SM (m.p. 59-59°5).

m.p. 122°5-123°5 [21]; sublimation at 86-90°/0.1 mm [21];

<sup>1</sup>H NMR [21], IR [21], MS [21].

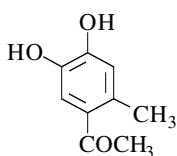


**1-(4,5-Dihydroxy-2-methylphenyl)ethanone**

[18087-17-7]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Preparation by reaction of zinc powder on 4,5-dihydroxy-2-methyl- $\alpha$ -chloroacetophenone in dilute acetic acid between 40 to 70° [1020] [1690], (good yield) [1020].
- Preparation by Fries rearrangement of 4-methylpyrocatechol diacetate with aluminium chloride in nitrobenzene at 75-85° (87-97%) [1271] [1391], (34%) [304].

-Also obtained (poor yield) by reaction of acetic anhydride with 3,4-dihydroxytoluene in the presence of 70% perchloric acid on a steam bath for 3 h (10%) [1432].  
 -Also obtained (by-product) by Fries rearrangement of creosol acetate with aluminium chloride in nitrobenzene at 80° for 1 h (6%) [1150].  
 -Also refer to: [398].

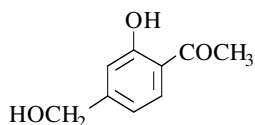
m.p. 170°5-171° [1432], 169° [1150], 168-170° [304],  
 168-169° [1020] [1391], 164° [1690], 160° [1271];  
<sup>1</sup>H NMR [1432], MS [1432].

**1-[2-Hydroxy-4-(hydroxymethyl)phenyl]ethanone**

[22518-00-9]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Isolation from natural sources**

- By acidic hydrolysis of two esters isolated from *Gaillardia aristata*, the 7-isobutyryloxy-8,9-epoxythymol and 7-(2-methylbutyryloxy)-8,9-epoxythymol isobutyrate [250].
- From the aerial parts of *Calea nelsonii* Robinson and Greenman (Asteraceae) [1170].

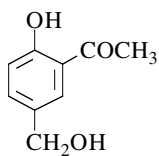
m.p. 61°5-62° [250]; <sup>1</sup>H NMR [250], IR [250], UV [250].

**1-[2-Hydroxy-5-(hydroxymethyl)phenyl]ethanone**

[31611-90-2]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Synthesis**

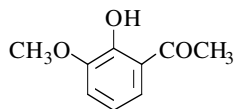
- Obtained by hydrolysis of 2-hydroxy-5-chloromethyl-acetophenone [316].

**1-(2-Hydroxy-3-methoxyphenyl)ethanone (ortho-Acetovanillone)**

[703-98-0]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18

**Syntheses**

- Preparation from 2,3-dimethoxybenzonitrile and methylmagnesium iodide in refluxing ethyl ether (Grignard reaction) [51] [736], (75%) [51].
- Preparation by reaction of aluminium chloride on

- the 2,3-dimethoxyacetophenone, in boiling ethyl ether (96%) [140] or in boiling toluene (67%) [1481].
- Also obtained by reaction of hydrobromic acid on 2,3-dimethoxyacetophenone in acetic acid at 25° [813].
  - The usual method of synthesis involves the successive conversion of o-veratraldehyde to the 2,3-dimethoxyphenyl methyl carbinol, 2,3-dimethoxyacetophenone and demethylation [51].
  - Preparation by UV light irradiation of guaiacol acetate, in benzene (48%) [280] or in ethyl ether (20%) [724].
  - Also obtained (by-product) by Fries rearrangement of guaiacol acetate with zinc chloride at reflux [1481] or with aluminium chloride without solvent between 20 to 50° (9-11%) [1939].

m.p. 54° [140], 53-54° [1481], 52-53° [813], 50-53° [51];

b.p.<sub>0.5</sub> 110-120° [1481];

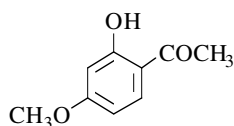
<sup>1</sup>H NMR [280], <sup>13</sup>C NMR [736], IR [280], UV [813].

### 1-(2-Hydroxy-4-methoxyphenyl)ethanone (*Paenol*)

[552-41-0]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



#### Syntheses

- Preparation by reaction of methyl iodide [578] [702] [1738], or dimethyl sulfate [7] [69] [156] [157] [790] [943] [1105] [1201] [1666] [1809] on resacetophenone in sodium hydroxide or potassium hydroxide solution (quantitative yield) [790], (70-75%) [7], (good yield) [1738], (60%) [1105], (52%) [69].
- Preparation by reaction of methyl iodide on resacetophenone,
  - \*with potassium carbonate in boiling acetone (92%) [1066], (73%) [5], (55-64%) [907];
  - \*with lithium carbonate in DMF at 55° (81%) [1899].
- Preparation by reaction of dimethyl sulfate with resacetophenone in the presence of potassium carbonate in refluxing acetone (81%) [971].
- Also obtained by reaction of methyl iodide on resacetophenone silver salt in boiling acetone [982].
- Preparation by reaction of diazomethane with resacetophenone in ethyl ether/methanol solution (90%) [1259].
- Preparation by reaction of acetic acid,
  - \*on the resorcinol monomethyl ether, in the presence of polyphosphoric acid (25%) [1308] or zinc chloride at reflux (Nencki reaction) (29%) [433];
  - \*on the resorcinol dimethyl ether with boron trifluoride at 125° (42%) [1345].
- Preparation by reaction of acetonitrile on resorcinol monomethyl ether (Hoesch reaction) (27%) [790].
- Preparation by reaction of bromoacetyl bromide on resorcinol dimethyl ether with aluminium chloride [233].
- Preparation by Fries rearrangement of 3-methoxyphenyl acetate with zirconium chloride in methylene chloride for 48 h at r.t. (85%) [748].
- Also obtained by Fries rearrangement of 3-methoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (13%) [1196] [1202].
- Also obtained by reaction of zinc powder on 2,4-dimethoxy- $\alpha$ -bromoacetophenone in acetic acid in a water bath [105].
- Also obtained (by-product) by reaction of zinc powder and silver chloride on 2-hydroxy-4-methoxy- $\alpha$ -chloroacetophenone in benzene and crotonaldehyde mixture at 60-70° [1038].
- Also obtained by reaction of 2 N sodium hydroxide on 2-hydroxy-4-methoxy- $\alpha,\alpha,\alpha$ -trifluoroacetoacetophenone at r.t. (quantitative yield) [1885].
- Also obtained by acetylation of resorcinol monomethyl ether by treatment with complex mixture (acetyl chloride/acetic anhydride/acetic acid/anisole/sodium perchlorate) at 60° (8%) [1176].

- Also obtained by reaction of aluminium chloride on 2,4-dimethoxyacetophenone in benzene at 100-110° [1626] or in acetonitrile for 6 h at 45° (40%) [962].
- Also obtained on treatment of ethyl 2-acetyl-5-methoxyphenoxyacetate with boron trichloride in methylene chloride, first at -70°, then at r.t. for 5 min (84%). The ethoxycarbonylmethyl group was selectively removed without difficulty [496].

## Isolation from natural sources

- From the root bark of *Paeonia Moutan* (Ranunculaceae) [684] [1159] [1285] [1738], of *Paeonia broteroi* [490] and of *Paeonia suffruticosa* Andrews (mudanpi) (Paeoniaceae) [1924] or *Paeonia suffruticosa* Anhr. (mudanpi) (Ranunculaceae) (major component) [1098].
- From *paeonia radix* (SM) [696] [1100] [1898]. SM is the dried roots of *paeonia veitchii* Lynch or *paeonia lactiflora* Pall, yet named *paeonia albiflora* Pall.
- From macadamia nuts and shells [1451].
- From the roots of *Pentecost rose* (*paeonia arborea*, also named *paeonia Moutan* in China or *paeonia Botan* in Japan) (Renonculaceae) by hydrolysis of its glucoside [1159] [1201] [1415].
- From the roots of *cynanchum paniculatum* [714] [1114] [1715].
- From the volatile oil of *dioscorea japonica* [1242].
- From the leaves of *ficus krishnae* [849].
- As a major component in the steam distillates of the resins from various species of *Xanthorrhoea* (*X.*); *X. tateana* F. Muell. and *X. preissi* [1484], but also from *X. arborea* R. Br. and *X. reflexa* [596].
- By thermal decomposition of the resin from *Ferula pyramidata* (Kar. et Kir.) eug. kor. [982].

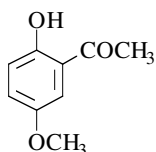
m.p. 51°3 [1418], 51° [1038] [1308], 50-51° [1809], 50° [7] [156] [157] [433] [578] [684] [790] [927] [1105] [1196] [1202] [1285] [1345] [1626] [1738], 49-50° [5] [1066], 49° [596] [702] [982] [1484], 48-50° [907] [1415], 48° [971] [1795], 47-49° [1899], 45° [1159];  
 b.p.<sub>0.001</sub> 90-100° [1038], b.p.<sub>3</sub> 135-137° [982], b.p.<sub>20</sub> 154° [69], b.p.<sub>18</sub> 155-165° [596], b.p.<sub>20</sub> 158° [1484], b.p.<sub>5</sub> 180° [1809], b.p.<sub>30</sub> 210° [1809];  
 $n_D^{15} = 1.5745$  [982];  $d_{20}^{40} = 1.1604$  [982];  
 TLC [1451] [1832]; HPLC [1100] [1120]; GC [714] [1242]; GC-MS [1242];  
<sup>1</sup>H NMR [43] [44] [490] [683] [1066], <sup>13</sup>C NMR [5] [735] [736] [1396] [1400] [1401], IR [490] [1923], UV [43] [490], MS [684] [1832].

**1-(2-Hydroxy-5-methoxyphenyl)ethanone**

[705-15-7]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



## Syntheses

- Preparation by reaction of dimethyl sulfate on 2,5-dihydroxyacetophenone [723] [943] [1010] [1200], \*with potassium carbonate in acetone at r.t. (74%) [723]; \*with aqueous sodium hydroxide solution at reflux (35%) [1010] [1200].
- Preparation by reaction of aluminium chloride on 2,5-dimethoxyacetophenone in refluxing ethyl ether (53%) [140].
- Preparation by reaction of methyl iodide on 2,5-dihydroxyacetophenone with potassium carbonate in refluxing acetone [1077] [1858], (55-64%) [1858].
- Also obtained by reaction of acetic acid on hydroquinone dimethyl ether with boron trifluoride at 70° (26%) [1345].
- Also obtained by Fries rearrangement of 4-methoxyphenyl acetate with aluminium chloride without solvent at 60-65° (24%) [46].
- Also obtained by reaction of acetyl chloride on hydroquinone dimethyl ether with aluminium chloride,

- \*in boiling ethyl ether (57%) [1357];
- \*in nitrobenzene, at r.t. (45%) [1888];
- \*in methylene chloride, at r.t. (16%) [1635];
- \*in carbon disulfide, at r.t. (7%) [958] or by heating at 95°, after elimination of the solvent (72%) [374].

-Preparation by UV light irradiation of 4-methoxyphenyl acetate at 25°,

- \*in hexane (75%) [660];
- \*in hexane with potassium carbonate, (89%) [660];
- \*in ethyl ether (38%) [724];
- \*in ethanol [1575] [1623], (40-42%) [1623].

-Also obtained by UV light irradiation of 4-methoxyphenyl 3-(ethylenedioxy)-butanoate in hexane at r.t. (34%) [42].

-Also obtained by UV light irradiation of 2,4-dimethoxyphenyl acetate in benzene or ethanol (11-13%) [280].

-Also refer to: [289] [1311] [1666].

#### Isolation from natural sources

-From the essential oil of the rhizomes of *Primula acaulis*, an European variety of stemless primrose [693].

m.p. 52° [1010] [1345] [1582] [1888], 51° [1357], 50-51° [46] [140] [958] [1200], 50° [660] [1623], 49-49°5 [1635], 49° [374] [693], 48-50° [1036] [1858], 48-49° [813] [1077], 47-49° [723], 46° [1575];

b.p.<sub>12</sub> 138-142° [140], b.p.<sub>15</sub> 146-150° [1345];

<sup>1</sup>H NMR [723] [914], <sup>13</sup>C NMR [736] [914] [1396] [1759], IR [723] [1923],

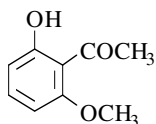
UV [723] [813]; pK<sub>a</sub> [1697].

#### 1-(2-Hydroxy-6-methoxyphenyl)ethanone

[703-23-1]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



#### Syntheses

-Preparation by reaction of methyl iodide on 2,6-dihydroxyacetophenone with potassium carbonate in boiling acetone [736] [1077] [1307], (56%) [1307].

-Preparation by reaction of dimethyl sulfate on 2,6-dihydroxyacetophenone,

\*with potassium carbonate in boiling benzene (71-73%) [136] [1111];

\*with potassium carbonate in boiling acetone [520] [1873], (quantitative yield) [1873];

\*with potassium hydroxide in benzene, in a water bath (54%) [1610];

\*with 20% solution of sodium hydroxide (68%) [1867];

\*with 30% solution of sodium hydroxide (20%) [447] [1092].

-Also obtained by partial demethylation of 2,6-dimethoxyacetophenone with aluminium chloride in acetonitrile for 6 h at 45° (30%) [962].

-Also obtained from 3-acetyl-5-methoxy-2-methylchromone by refluxing with 2% sodium carbonate solution [1289].

m.p. 60° [136] [1092] [1289] [1867], 59-60° [1610], 58°5 [1307], 58-59° [447], 57-59° [1111], 57-58° [520], 55-56° [1077], 55° [1873];

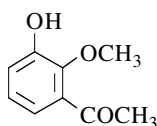
<sup>1</sup>H NMR [238], <sup>13</sup>C NMR [520] [736], UV [447].

**1-(3-Hydroxy-2-methoxyphenyl)ethanone**

[204781-71-5]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



Isolation from natural sources

-Detected in liquid smoke flavouring preparations (compound **61**) [708].

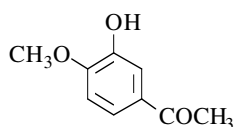
GC [708]; GC/MS [708].

**1-(3-Hydroxy-4-methoxyphenyl)ethanone** (*Isoacetovanillone*)

[6100-74-9]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



Syntheses

-Preparation by saponification of 3-acetoxy-4-methoxyacetophenone [1164] [1568] [1577], (90%) [1577], (59%) [1164].

-Preparation by hydrolysis of 3,4-dimethoxyacetophenone with concentrated sulfuric acid at 65° (58%) [295].

-Preparation by reaction of methyl iodide on 3,4-dihydroxyacetophenone with lithium carbonate in DMF at 55° (90%) [1899].

-Preparation by reaction of activated zinc dust on 3-hydroxy-4-methoxy- $\alpha$ -chloroacetophenone with 10% acetic acid in refluxing ethanol (48%) [1706].

-Preparation by Fries rearrangement of guaiacol acetate,

\*with hydrofluoric acid at 0° (28%) [480];

\*with zinc chloride at reflux (6%) [1481].

-Preparation by reaction of acetic acid on guaiacol,

\*with hydrofluoric acid at 0° (25%) [480];

\*with phosphorous oxychloride on a steam bath (20%) [433].

-Preparation by reaction of acetic anhydride on guaiacol,

\*with concentrated sulfuric acid at 80° (20-24%) [1568]. (The *in situ* formed sulfoacetic acid during the reaction was the actual acylating agent);

\*with zinc chloride [684].

-Obtained by reaction of sodium acetate on 3-chloroacetoxy-4-methoxyacetophenone in refluxing methanol [1831].

-Also refer to: [1368].

Isolation from natural sources

-From Chinese Moutan Cortex, the root of *Paeonia suffruticosa* Andrews or Anhr. (*mudanpi*) (minor component) (Paeoniaceae) [1924], (Ranunculaceae) [1098].

m.p. (anhydrous): 93° [480], 92-93° [295] [1098], 92° [1164], 91-92° [433] [1577], 91° [1568], 89° [1899], 87-88° [1706];

m.p. (hydrate): 67-68° [1481] [1577], 66-69° [1568], 65-68° [1831], 64-65° [684], 59-60° [433];

b.p.<sub>15</sub> 180-200° [433], b.p.<sub>18</sub> 195-200° [1568];<sup>1</sup>H NMR (Sadtlar: standard n° 28211 M);

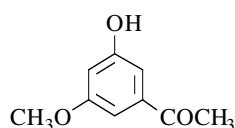
IR [1164] and (Sadtlar: standard n° 55283); UV [1164], MS [684].

**1-(3-Hydroxy-5-methoxyphenyl)ethanone**

[35999-23-6]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



Synthesis

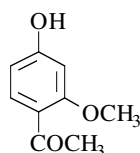
-Refer to: [1791].

**1-(4-Hydroxy-2-methoxyphenyl)ethanone** (*Isopaeonol*)

[493-33-4]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



Syntheses

- Preparation by reaction of acetonitrile on resorcinol monomethyl ether (Hoesch reaction) (27%) [790], (10%) [138].
- Preparation by reaction of acetic acid on resorcinol monomethyl ether,

\*with polyphosphoric acid (27%) [1308];

\*using perchloric acid liberated *in situ*, at 60° (6%) [1176].

-Preparation by hydrolysis of 4-acetyl-3-methoxyphenyl acetate with boiling 10% sodium hydroxide solution (58%) [1131] or 4-acetyl-3-methoxyphenyl benzoate with potassium hydroxide in refluxing methanol (85%) [874].

-Also obtained (by-product) by Fries rearrangement of 3-methoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (11%) [1196] [1202] or at 90° (4%) [138].

-Also refer to: [1311] and [1868] (compound **8**).

Isolation from natural sources

-This ketone was identified in the extract from "Redgold" apple flowers [1361].

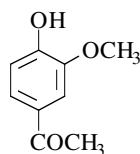
m.p. 139-140° [874] [1131], 138° [138] [790] [1196] [1202], 137-138° [1176], 134° [1308]; <sup>13</sup>C NMR [1396].

**1-(4-Hydroxy-3-methoxyphenyl)ethanone** (*Apocynin*; *Acetovanillone*; *Acetoguaiacone*)

[498-02-2]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



Syntheses

- Preparation by reaction of acetyl chloride on guaiacol [1568].
- Preparation by reaction of acetic anhydride on guaiacol with polyphosphoric acid in a water bath (29%) [1831].
- Preparation by Fries rearrangement of guaiacol acetate,

\*with aluminium chloride in nitrobenzene at r.t. [155] [201] [1268] [1294] [1939], (49-51%) [1268] [1939] or at 80° (40%) [201];

\*with hydrofluoric acid at 0° (50%) [480];

\*with zinc chloride at 200° (25-26%) [433] [1481].

-Preparation by reaction of acetic acid on guaiacol,

\*with hydrofluoric acid at 0° (38%) [480];

\*with polyphosphoric acid (36%) [1308];

- \*with zinc chloride at reflux (4%) [433];
- \*with aluminium chloride-zinc chloride mixture at 140-150° [1370] [1568], (low yield) [1370].
- Also obtained by hydrolysis of 4-acetyl-2-methoxyphenyl acetate with boiling water [1568].
- Also obtained by saponification of 4-acetyl-2-methoxyphenyl benzoate with boiling aqueous sodium hydroxide (56%) [599].
- Also obtained (low yield) by treatment of 4-hydroxy-3-methoxybenzoic acid (vanillic acid) with calcium carbonate in boiling dilute acetic acid [1317].
- Also obtained from 4-hydroxy-3-methoxy- $\alpha$ -bromoacetophenone [1492] or 4-hydroxy-3-methoxy- $\alpha$ -chloroacetophenone [1442] by reductive removal of the halogen atom with iron filings and 10% sulfuric acid in aqueous ethanol at 60°.
- Also obtained by UV light irradiation,
- \*of guaiacol acetate in benzene (12-14%) [280] [724];
- \*of 2,4-dimethoxyphenyl acetate in benzene (8%) [280] or in ethanol (4%) [280].
- Also refer to: [1666] [1702].

## Isolation from natural sources

- From rhizomes of Canadian hemp, *Apocynum cannabinum*, of *Apocynum androsaemifolium* (Apocynaceae) [598] [1258], of several species of *Apocynum* [684].
- From the essential oil of the rhizomes of *Iris* (Iridaceae) [1312].
- From the roots of *Paeonia broteroi* (Paeoniaceae) [490].
- From the root of *Paeonia suffruticosa* Andrews (Paeoniaceae) [1924].
- From the bulbs of *Buphane disticha*, Herb. (Amaryllidaceae) [1829].
- From spruce lignin sulfonic acid by treatment with hot aqueous alkali (0.2-0.3%) [1079].
- Described by Shimamoto as one of the fragrant components of Soy [1294].

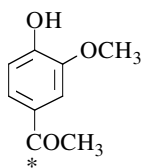
m.p. 116° [480], 115-116° [201] [1481], 115-115°5 [1312],  
 115° [598] [599] [684] [1258] [1268] [1317] [1370] [1442] [1829],  
 114-115° [1831], 114° [1308], 113°5-114°5 [1079], 113-114° [433] [1492],  
 112-114° [1456];  
 b.p.<sub>13</sub> 160-170° [1268], b.p.<sub>15-20</sub> 233-235° [1317], b.p.<sub>760</sub> 280-300° [1370], b.p. 300° [598];  
<sup>1</sup>H NMR [490], IR [490], UV [490] [1082], MS [684] [1456].

**1-(4-Hydroxy-3-methoxyphenyl)ethanone-1-<sup>13</sup>C**

[199793-91-4]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 167.17



## Synthesis

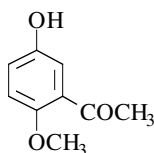
- Obtained by condensation of [1-<sup>13</sup>C]acetic acid with guaiacol [1682].

**1-(5-Hydroxy-2-methoxyphenyl)ethanone**

[31405-60-4]

C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 166.18



## Syntheses

- Preparation by reaction of concentrated hydrochloric acid on 5-(benzyloxy)-2-methoxyacetophenone in acetic acid at 65-70° (31%) [130].
- Also obtained (by-product) by reaction of dimethyl sulfate on 5-acetoxy-2-hydroxyacetophenone with potassium carbonate in acetone at r.t. (4%) [723].

- Preparation by reaction of methyl iodide on quinacetophenone with lithium carbonate in DMF at 60° (54%) [1899].
- Preparation by partial demethylation of 2,5-dimethoxyacetophenone with sulfuric acid at 45-55° (42%) [1078].

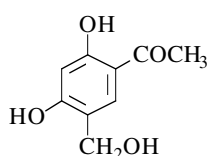
m.p. 83° [130], 82-83° [1078], 81-83° [1899], 64-65° [1124], 62-63° [723];  
<sup>1</sup>H NMR [723], IR [723], UV [723] [1124].

### 1-[2,4-Dihydroxy-5-(hydroxymethyl)phenyl]ethanone

[117705-66-5]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18



#### Synthesis

- Preparation by hydrogenation of 5-formyl-2,4-dihydroxyacetophenone in the presence of 10% Pd/C in ethanol (74%) [777].

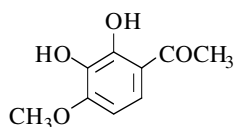
m.p. 51-52° [777].

### 1-(2,3-Dihydroxy-4-methoxyphenyl)ethanone

[708-53-2]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18



#### Syntheses

- Preparation by reaction of acetic acid on pyrogallol 1-methyl ether, \*with zinc chloride at reflux (155-160°) (Nencki reaction), (62%) [136], (46%) [141];
- \*with boron trifluoride on a steam bath (77%) [1053].
- Preparation by reaction of methyl iodide on gallacetophenone monopotassium salt in boiling methanol [1409].
- Preparation by hydrolysis of 3-acetoxy-2-hydroxy-4-methoxyacetophenone with concentrated hydrochloric acid in refluxing aqueous ethanol (84%) [814].
- Also obtained by reaction of acetyl chloride on 2,6-dimethoxyphenol with zinc chloride at r.t. (8%) [1194].
- Also obtained by Fries rearrangement of 2,6-dimethoxyphenyl acetate with zinc chloride at 120° (6%) [1194].
- Also obtained by partial dealkylation of 2-hydroxy-3,4-dimethoxyacetophenone [663] [1194] with hydrobromic acid in acetic acid at r.t. (46%) [663] or by partial dealkylation of 3-ethoxy-2-hydroxy-4-methoxyacetophenone in the same conditions (22%) [663].

#### Isolation from natural sources

- From the roots of *Paeonia broteroi* Boiss & Reuter (Paeoniaceae) [490] or from the root cortex of *Paeonia suffruticosa* Anhr. [mudanpi in Chinese] (Ranunculaceae) (minor component) [1098].

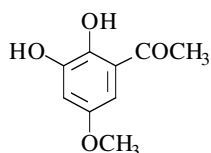
m.p. 132-133° [1053] [1194] [1408] [1409], 132° [141], 131-132° [1098],  
 130-134° [814], 130-132° [663];

<sup>1</sup>H NMR [490] [1053], IR [490] [1053], UV [490], MS [490] [684].



**1-(2,3-Dihydroxy-5-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Synthesis**

-Obtained by reaction of potassium persulfate on 2-hydroxy-5-methoxyacetophenone in aqueous sodium hydroxide solution (1%) [140].

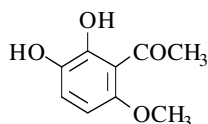
m.p. 120° [140].

**1-(2,3-Dihydroxy-6-methoxyphenyl)ethanone**

[56358-73-7]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

-Preparation by reaction of 3% hydrogen peroxide on 3-acetyl-2-hydroxy-4-methoxybenzaldehyde into solution of 1 N sodium hydroxide (Dakin reaction) (62-65%) [130] [1305].

-Preparation by reaction of 3% hydrogen peroxide on the 3-acetyl-2-hydroxy-6-methoxyacetophenone into solution of 1 N sodium hydroxide at r.t. (33%) [130].

-Also obtained by reaction of concentrated hydrochloric acid on 2,3-bis(benzyloxy)-6-methoxyacetophenone in acetic acid at 60° [130].

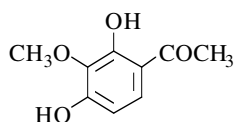
m.p. 148-149° [130], 147° [1305]; <sup>1</sup>H NMR [238], MS [238].

**1-(2,4-Dihydroxy-3-methoxyphenyl)ethanone**

[62615-26-3]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

-Preparation by catalytic hydrogenolysis of 4-(benzyloxy)-2-hydroxy-3-methoxyacetophenone in the presence of 5% Pd/C in ethyl acetate [972] [1571], (90%) [972].

-Preparation by reaction of boron trifluoride-acetic acid complex with the pyrogallol 2-methyl ether at 100° (79-85%) [1053] [1360].

-Preparation by reaction of acetonitrile on pyrogallol 2-methyl ether with triflic acid at r.t. (60%) [1458].

-Also obtained by reaction of aluminium chloride on gallacetophenone trimethyl ether in boiling ethyl ether (15%) [135].

-Also obtained by reaction of methyl iodide on gallacetophenone monopotassium salt in boiling methanol (10%) [1407] [1409].

-Also obtained by hydrolysis of 2,4-diacetoxy-3-methoxyacetophenone with boiling aqueous sodium carbonate solution [1406].

**N.B.:** The melting points of the 1-(2,4-dihydroxy-3-methoxyphenyl)ethanone are conflicting [1458]. One shall thus mention that the melting points of this product, that are in the range 130-135°, can be compared to those of the 1-(2,3-dihydroxy-4-methoxyphenyl)ethanone (132-133°). However, <sup>1</sup>H NMR spectral data of this ketone of m.p. 68° [1458] is identical with those reported for the compound of m.p. 141-144° [1571].

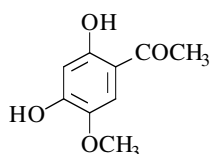
m.p. 141-144° [1571], 134-135° [1406], 132-133° [1407] [1409], 130-131° [135],  
76° [972] [1360], 75-76° [1053], 68° [1458];  
<sup>1</sup>H NMR [1458] [1571], IR [1053] [1458], MS [1458].

### 1-(2,4-Dihydroxy-5-methoxyphenyl)ethanone

[7298-21-7]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18



#### Syntheses

- Preparation by debenzoylation of 4-(benzyloxy)-2-hydroxy-5-methoxyacetophenone,  
\*by catalytic hydrogenolysis with 5 to 10% Pd/C in ethyl acetate at r.t. (quantitative yield) [8] [60];  
\*with concentrated hydrochloric acid in boiling acetic acid [1068].
- Preparation by partial demethylation of 2,4,5-trimethoxyacetophenone with hydrobromic acid in acetic acid [156] [157].
- Preparation by Fries rearrangement of 2,4-diacetoxyanisole with aluminium chloride [147].

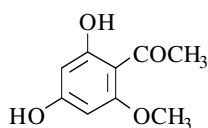
m.p. 174° [1068], 172-173° [60], 171-172° [147], 170-171° [8], 166° [156] [157].

### 1-(2,4-Dihydroxy-6-methoxyphenyl)ethanone

[3602-54-8]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18



#### Syntheses

- Preparation by reaction of acetonitrile on phloroglucinol monomethyl ether (Hoesch reaction) [174] [736] [761] [1673] [1945], (87%) [1945], (73%) [174], (62%) [1673].
- Preparation by catalytic hydrogenolysis of 2,4-bis-(benzyloxy)-6-methoxyacetophenone in the presence of 10% Pd/C (89%) [1822] in ethyl acetate (64%) [841].
- Preparation by reaction of aluminium chloride,  
\*on the 2,4,6-trimethoxyacetophenone [710] [761] [873] [1140] [1625] in boiling chlorobenzene (29-35%) [710] [1140];  
\*on the 2-hydroxy-4,6-dimethoxyacetophenone in boiling chlorobenzene [876] [877] [879] [1142], (58%) [877] according to the method [1142], (58%) [879];  
\*on the 4-hydroxy-2,6-dimethoxyacetophenone in boiling benzene [1037].
- Preparation by partial demethylation of 4-hydroxy-2,6-dimethoxyacetophenone with boron trichloride in cooled methylene chloride (74%) [496].
- Also obtained by hydrolysis of 2,4-dihydroxy-6-methoxyacetophenone diacetate [1131].
- Also obtained by reaction of concentrated hydrochloric acid on 4-(benzyloxy)-2-hydroxy-6-methoxyacetophenone in acetic acid [1281].

#### Isolation from natural sources

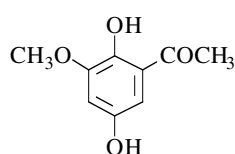
- From the stem of *Kniphofia foliosa* (Asphodelaceae) [1917].
  - From the aerial parts of *Tanacetum densum* subsp. *eginense* [692].
  - From the roots of *Sanguisorba officinalis* [1101].
  - From phloracetophenone 2,4-di-O-(2,3,4,6-tetra-O-acetyl)-β-D-galactopyranoside. This one was methylated with methyl iodide in the presence of silver carbonate in refluxing acetone for 8 h. The obtained methyl ether was deacetylated, then hydrolyzed with 5% sulfuric acid [1008].
  - By reductive cleavage of *isofoliosone*, itself isolated from *Kniphofia foliosa* Hochst [1917].
- N.B.:** Mg (II) salt [1548].

m.p. 207-209° [1037], 207° [1625], 205-207° [85] [1008] [1673] [1675],  
205-206° [877], 205° [873], 204-205° [879], 203-204° [1131] [1281],  
203° [710] [876] [1142] [1945], 201-202° [841] [1822], 195-198° [1917];  
<sup>1</sup>H NMR [841] [1493] [1917], <sup>13</sup>C NMR [117] [736] [1917], IR [841] [1493],  
UV [1322], MS [841] [1917].

### 1-(2,5-Dihydroxy-3-methoxyphenyl)ethanone

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18



#### Synthesis

-Obtained by reaction of potassium persulfate on 2-hydroxy-3-methoxyacetophenone in aqueous sodium hydroxide solution (26%) [1643], (2%) [140].

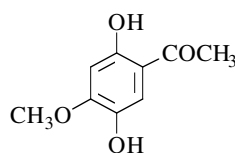
m.p. 172-174° [1643], 172° [140].

### 1-(2,5-Dihydroxy-4-methoxyphenyl)ethanone

[22089-12-9]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18



#### Syntheses

-Preparation by Fries rearrangement of 2-methoxy-hydroquinone diacetate,  
\*with boron trifluoride in acetic acid (97%) [498], (62%) [118];  
\*with aluminium chloride in nitrobenzene at r.t. [147] [1196] [1202], (38%) [1202], (31%) [1196].

-Preparation by reaction of dimethyl sulfate with 2,4,5-trihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (65%) [1900].  
-Preparation from paeonol by persulfate oxidation [147] [156] [157] [971], (Elbs reaction) (18-22%) [156] [157] [971].  
-Preparation by partial demethylation of 2-hydroxy-4,5-dimethoxyacetophenone with hydrobromic acid in refluxing acetic acid [1068].  
-Preparation by diazotization of 5-amino-2-hydroxy-4-methoxyacetophenone, followed by decomposition of the diazonium salt obtained [1626].

#### Isolation from natural sources

-From Chinese Moutan Cortex, the root of *Paeonia suffruticosa* Andrews (Paeoniaceae) [Botanpi] in Japanese [1924]. The root cortex of *Paeonia suffruticosa* Anhr. (Ranunculaceae) is also known as [mudanpi] in Chinese. In this, the ketone is a minor component [1098].

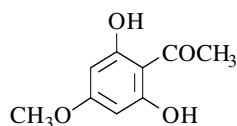
m.p. 166-167° [1098], 166° [118] [498], 165-166° [1196] [1202], 164-166° [1900],  
164-165° [1068] [1626], 164° [156] [157] [971];  
<sup>1</sup>H NMR [118], IR [118], MS [684].

**1-(2,6-Dihydroxy-4-methoxyphenyl)ethanone**

[7507-89-3]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

-Obtained by reaction of boiling aqueous potassium hydroxide,  
\*on the Methyl 3-acetyl-2,4-dihydroxy-6-methoxybenzoate (quantitative yield) [73] [1884];

\*on the 3-trichloroacetyl-2,6-dihydroxy-4-methoxyacetophenone [5] [73] [1884], (quantitative yield) [73] [1884].

-Preparation by adding a solution of 2,6-diacetoxy-4-hydroxyacetophenone in dioxane at r.t.. The residual pale yellow oil obtained after elimination of solvent was hydrolyzed with dilute hydrochloric acid in refluxing methanol (83%) [311].

-Preparation by selective deacetylation of 2,4-diacetyl-5-methoxyresorcinol with sodium methoxide in refluxing methanol [761] [762] [764], (76%) [761] or with boiling 1 N sodium hydroxide (70%) [342].

-Preparation by reaction of diazomethane on phloracetophenone in ethyl ether at r.t. [361] [554] [1673] [1674], (37%) [361].

-Preparation by reaction of dimethyl sulfate on phloracetophenone with potassium carbonate in refluxing acetone (62%) [1006].

**Isolation from natural sources**

-From the root tissue of *Sanguisorba minor* (Rosaceae) [1006].

-As a decomposition product of sakuranin, a glucoside isolated from the bark of *Prunus pseudocerasus* Lindl., (Var. Sieboldi Maxim.), also called *Prunus yedoensis* Matsumura [85].

-By alkaline hydrolysis of artocarpetin, a flavonoid pigment isolated from the heartwood of *Artocarpus integrifolia* [481].

-Claimed to be obtained as a minor component in the steam distillates of the resins from various species of *Xanthorrhoea* (X.); *X. tateana* F. Muell. and *X. preissi* (m.p. 79°) [1484], but also from *X. arborea* R. Br. and *X. reflexa*. (m.p. 79°) [596]. Thus, this compound, the 2,6-dihydroxy-4-methoxyacetophenone has a melting point of 136-137° (see below). Two possibilities may then occur:

\*either this compound is a monomethyl ether derived from phloracetophenone, as the authors do pretend, and in this case, it would be at the time the 2,4-dihydroxy-6-methoxyacetophenone (m.p. 205-207°) [85] [1673] [1675]. It is not possible;

\*or, it is a dimethyl ether [1675], and in this case, it would be the 2-hydroxy-4,6-dimethoxyacetophenone (*Xanthoxylin*) (m.p. 78-79°) [1564], (80°) [1675], (82°) [223], what is later confirmed [223].

m.p. 139-140° [85], 139-139°5 [311], 139° [481], 138-140° [361],  
137-139° [342], 136-137° [761] [1037] [1625] [1673] [1675] [1884], 134-136° [5];  
b.p.<sub>0.5</sub> 145-150° [481];

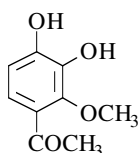
<sup>1</sup>H NMR [5] [311] [342] [738] [761], <sup>13</sup>C NMR [5] [738], IR [761], UV [1006],  
MS [1006].

**1-(3,4-Dihydroxy-2-methoxyphenyl)ethanone**

[27829-93-2]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

-Obtained by debenzoylation of 3,4-bis(benzyloxy)-2-methoxyacetophenone with 15% ethanolic hydrochloric acid, on a steam bath (22%) [1053].  
 -Also refer to: [1029] (compound 5).

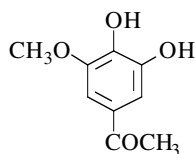
m.p. 84-85° [1053]; <sup>1</sup>H NMR [1053], IR [1053].

**1-(3,4-Dihydroxy-5-methoxyphenyl)ethanone**

[3934-89-2]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

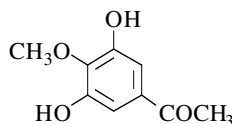
-Cyclic voltammetry showed the electrochemical oxidation of 3,5-dimethoxy-4-hydroxyacetophenone gave 3,4-dihydroxy-5-methoxyacetophenone as the major product by a one electron oxidation process (20% isolated yield), but 30 to 40% estimated by thin layer chromatography [292].  
 -Also refer to: [617] [618] [1244] [1638].

**1-(3,5-Dihydroxy-4-methoxyphenyl)ethanone**

[148204-58-4]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Isolation from natural sources**

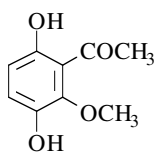
-Characterization in liquid wastes from eucalyptus wood and kraft lignin charring by flame-ionization gas-chromatography and gas-chromatography/mass-spectrometry [1504].

**1-(3,6-Dihydroxy-2-methoxyphenyl)ethanone**

[33539-20-7]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

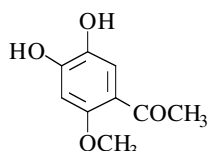
-Preparation from 2-hydroxy-6-methoxyacetophenone by persulfate oxidation (Elbs reaction) (26-33%) [136] [1307] [1867].  
 -Preparation by reduction of 2-acetyl-3-methoxy-1,4-benzoquinone using conventional methods [587].

-Also obtained (low yield) by reaction of 2-acetyl-1,4-benzoquinone with an excess of methanol at r.t., with exclusion of light [587].

m.p. 91° [1307], 90° [136] [587] [1867]; <sup>1</sup>H NMR [238] [587], IR [587], MS [238].

**1-(4,5-Dihydroxy-2-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Synthesis**

-Obtained by reaction of the Dakin solution on 2,4-diacetyl-5-methoxyphenol [147].

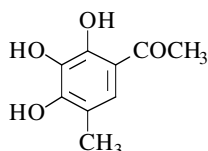
m.p. 173-175° [147].

**1-(2,3,4-Trihydroxy-5-methylphenyl)ethanone**

[59862-06-5]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

-Preparation by reaction of acetic anhydride and acetic acid on 1,2,3-trihydroxy-4-methylbenzene with zinc chloride at 140-145°, then deacylation of keto esters mixture obtained with boron trifluoride etherate in methanol (25%) [623].

-Also obtained (poor yield) by alkaline degradation of a solution of D-xylose or D-glucose in 0.63 M sodium hydroxide at 96° under nitrogen [623].

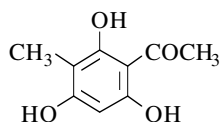
m.p. 167-168° [623]; <sup>1</sup>H NMR [623], IR [623], MS [623].

**1-(2,4,6-Trihydroxy-3-methylphenyl)ethanone**

[2657-28-5]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 182.18

**Syntheses**

-Preparation by reaction of acetonitrile on 2-methylphloroglucinol (Hoesch reaction) [469] [1185] [1564] [1887], (83%) [1887], (70%) [1185], (33%) [1564].

-Preparation by reduction of 3-formylphloroacetophenone with hydrochloric acid and amalgamated zinc in gently heated aqueous methanol (53%) [1498].

-Preparation by demethylation of 2,4-dimethoxy-6-hydroxy-3-methylacetophenone, \*with boron tribromide in methylene chloride at 0° (77%) [837];

\*with aluminium chloride in refluxing benzene (87%) [1272].

-Preparation by reaction of 2-methylphloroglucinol with boron trifluoride-acetic acid complex at 28-30° (50%) [1146].

-Also obtained from phloroacetophenone using methyl iodide and alkali in methanolic solution [623] [628] [875] [883] [1491], (50%) [875], (31%) [883].

m.p. 211-212° [469] [837] [1272] [1564], 211° [1185], 210-211° [875] [1498] [1887], 210° [1146], 209-210° [350], 205-206° [883];

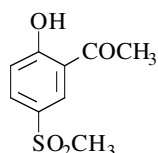
<sup>1</sup>H NMR [350] [837] [1887], IR [837], UV [1491], MS [1887].

**1-[2-Hydroxy-5-(methylsulfonyl)phenyl]ethanone**

[20951-24-0]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>S

mol.wt. 214.24

**Synthesis**

-Preparation by Fries rearrangement of 4-(methylsulfonyl)-phenyl acetate with aluminium chloride without solvent at 120° (42%) [318].

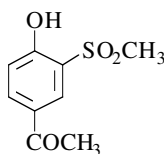
m.p. 139-140° [318].

**1-[4-Hydroxy-3-(methylsulfonyl)phenyl]ethanone**

[56490-43-8]

C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>S

mol.wt. 214.24

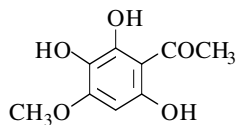
**Synthesis**

-Preparation by Fries rearrangement of 2-(methylsulfonyl)-phenyl acetate in the presence of aluminium chloride in nitrobenzene at 50-60° (75%) [935].

m.p. 168-169° [935].

**1-(2,3,6-Trihydroxy-4-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>10</sub>O<sub>5</sub>

mol.wt. 198.18

**Syntheses**

-Preparation by reduction of 2-acetyl-3-hydroxy-5-methoxy-quinone,  
 \*with sulfur dioxide in water [1466];  
 \*with sodium hydrosulfite in boiling water (59%) [1845].

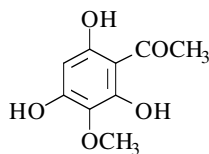
m.p. 170-171° [1466] [1845].

**1-(2,4,6-Trihydroxy-3-methoxyphenyl)ethanone**

[16297-01-1]

C<sub>9</sub>H<sub>10</sub>O<sub>5</sub>

mol.wt. 198.18

**Syntheses**

-Preparation by reaction of acetonitrile on 2-methoxy-1,3,5-trihydroxybenzene (2-methoxyphloroglucinol or iretol), (Hoesch reaction) [1341] [1420], (71%) [1420].  
 -Also obtained (poor yield) by partial demethylation of 2,4-dihydroxy-3,6-dimethoxyacetophenone with aluminium chloride in nitrobenzene at 100° [1605].

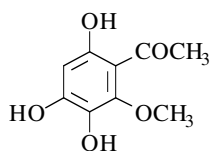
m.p. 188° [1605], 169-170° [1341], 168° [1420].

**1-(3,4,6-Trihydroxy-2-methoxyphenyl)ethanone**

[73239-52-8]

C<sub>9</sub>H<sub>10</sub>O<sub>5</sub>

mol.wt. 198.18

**Synthesis**

-Refer to: [379].

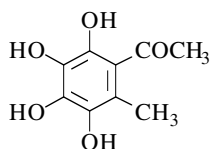
TLC [379].

**1-(2,3,4,5-Tetrahydroxy-6-methylphenyl)ethanone**

[66296-85-3]

C<sub>9</sub>H<sub>10</sub>O<sub>5</sub>

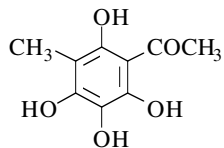
mol.wt. 198.18

**Synthesis**

-Obtained (poor yield) by treatment of dihydroxyacetone in aqueous solution (pH 4.5) at 96° (2%) [1434].

m.p. 178-181° [1434]; <sup>1</sup>H NMR [1434], MS [1434].**1-(2,3,4,6-Tetrahydroxy-5-methylphenyl)ethanone**C<sub>9</sub>H<sub>10</sub>O<sub>5</sub>

mol.wt. 198.18

**Syntheses**

-Preparation by reaction of sulfur dioxide on 2-acetyl-3,5-dihydroxy-6-methyl-2,5-cyclohexadiene-1,4-dione in dilute methanol (92%) [1490].

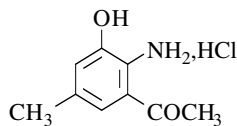
-Preparation by hydrolysis of 3-amino-2,4,6-trihydroxy-5-methylacetophenone hydrochloride (89%) [1490].

-Preparation by reaction of aluminium bromide on 2,5-dihydroxy-4,6-dimethoxy-3-methylacetophenone in chlorobenzene at 80-85° (61%) [1490].

m.p. 191-192° [1490].

**1-(2-Amino-3-hydroxy-5-methylphenyl)ethanone (Hydrochloride)**C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>, HCl

mol.wt. 201.65

**Synthesis**

-Preparation by reaction of hydrogen on 3-hydroxy-5-methyl-2-nitroacetophenone with Raney nickel in methanol (80%) [324].

m.p. 194-196° (d) [324]; UV [324].

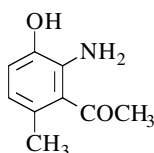


**1-(2-Amino-3-hydroxy-6-methylphenyl)ethanone**

[38968-45-5]

C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>

mol.wt. 165.19

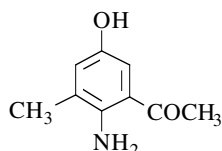


## Syntheses

- Obtained (trace) by photolysis of 3,4-dimethylantranil in 98% sulfuric acid [545].
- Also obtained (trace) by thermal decomposition of 2-azido-6-methylacetophenone in 98% sulfuric acid [545].

**1-(2-Amino-5-hydroxy-3-methylphenyl)ethanone**C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>

mol.wt. 165.19



## Synthesis

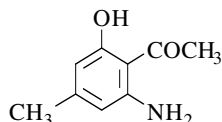
- Refer to: [546] (compound **8e**).

**1-(2-Amino-6-hydroxy-4-methylphenyl)ethanone**

[97066-15-4]

C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>

mol.wt. 165.19



## Synthesis

- Obtained by reaction of potassium hydroxide with 2-acetyl-3-amino-5-hydroxy-5-methyl-2-cyclohexenone in ethanol at 40° (44%) [562].

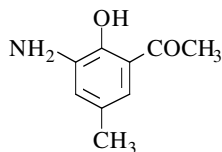
m.p. 91-92° [562]; IR [562], UV [562], MS [562].

**1-(3-Amino-2-hydroxy-5-methylphenyl)ethanone**

[70977-71-8]

C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>

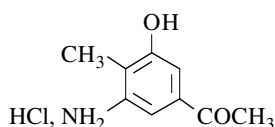
mol.wt. 165.19



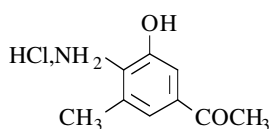
## Syntheses

- Preparation by hydrogenation of 2-hydroxy-5-methyl-3-nitroacetophenone using 5% Pd/C catalyst in ethanol (68%) [1463], (48%) [620].
- Preparation by reduction of 2-hydroxy-5-methyl-3-nitroacetophenone with stannous chloride dihydrate in hydrochloric acid (50%) [956].

m.p. 71-72° [956], 56-58° [1463], 55-57° [620].

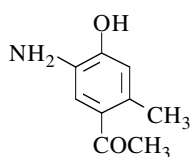
**1-(3-Amino-5-hydroxy-4-methylphenyl)ethanone (Hydrochloride)**C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>, HCl      mol.wt. 201.65**Synthesis**

-Preparation by reduction of 3-hydroxy-4-methyl-5-nitroacetophenone with tin and 25% hydrochloric acid heated under reflux on a steam bath (87%) [633].

**1-(4-Amino-3-hydroxy-5-methylphenyl)ethanone (Hydrochloride)**C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>, HCl      mol.wt. 201.65**Synthesis**

-Preparation by reaction of hydrogen on 3-hydroxy-5-methyl-4-nitroacetophenone with Raney nickel in methanol (92%) [324].

m.p. 195-198° [324]; UV [324].

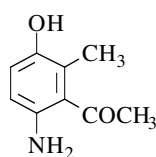
**1-(5-Amino-4-hydroxy-2-methylphenyl)ethanone**C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>      mol.wt. 165.19**Synthesis**

-Obtained by reduction of 4-hydroxy-2-methyl-5-nitroacetophenone with sodium hydrosulfite in boiling alkaline solution (66%) [1377].

m.p. 116° [1377].

**1-(6-Amino-3-hydroxy-2-methylphenyl)ethanone**

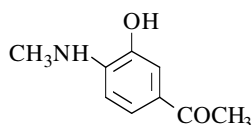
[69976-76-7]

C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>      mol.wt. 165.19**Synthesis**

-Preparation by irradiation of 3,4-dimethyl-2,1-benzisoxazole in 96% sulfuric acid (91%) [546].

**1-[3-Hydroxy-4-(methylamino)phenyl]ethanone**

[54903-57-0]

C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>      mol.wt. 165.19**Syntheses**

-Preparation from 6-acetyl-3-methylbenzoxazolinone by alkaline hydrolysis with boiling 10% aqueous sodium hydroxide solution (90 to 100%) [266], (60%) [1270].

-Also refer to: [203] (compound VII) and [1269].

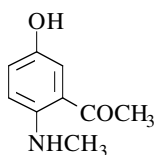
m.p. 169-170° [266] [1270].

**1-[5-Hydroxy-2-(methylamino)phenyl]ethanone**

[63609-52-9]

C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>

mol.wt. 165.19



**Synthesis**

-Preparation by UV light irradiation of 1,3-dimethylindazole in aqueous sulfuric acid at 11-15° (38-44%) [672] [673].

m.p. 142-143° [672];

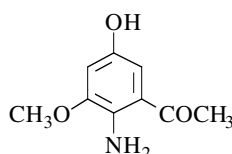
<sup>1</sup>H NMR [672], IR [672], UV [672], MS [672].

**1-(2-Amino-5-hydroxy-3-methoxyphenyl)ethanone**

[126893-27-4]

C<sub>9</sub>H<sub>11</sub>NO<sub>3</sub>

mol.wt. 181.19



**Synthesis**

-Obtained (by-product) by reaction of stannous chloride on 3,5-dimethoxy-2-nitroacetophenone in concentrated hydrochloric acid at r.t. [1503].

m.p. 136-138° [1503];

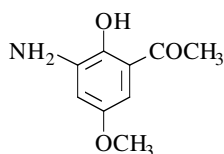
<sup>1</sup>H NMR [1503], <sup>13</sup>C NMR [1503], IR [1503], UV [1503], MS [1503].

**1-(3-Amino-2-hydroxy-5-methoxyphenyl)ethanone**

[55008-15-6]

C<sub>9</sub>H<sub>11</sub>NO<sub>3</sub>

mol.wt. 181.19



**Syntheses**

-Preparation by reduction of 2-hydroxy-5-methoxy-3-nitroacetophenone with stannous chloride dihydrate in hydrochloric acid (47%) [956].

-Preparation according to [955] by [1036].

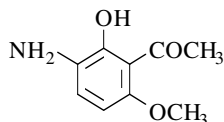
m.p. 107-108° [956].

**1-(3-Amino-2-hydroxy-6-methoxyphenyl)ethanone**

[75452-86-7]

C<sub>9</sub>H<sub>11</sub>NO<sub>3</sub>

mol.wt. 181.19



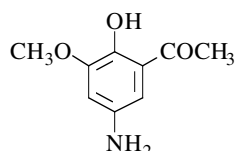
**Synthesis**

-Preparation by reaction of stannous chloride on 2-hydroxy-6-methoxy-3-nitroacetophenone in refluxing concentrated hydrochloric acid [371] [1213], (51%) [1213].

m.p. 66° [1213].

**1-(5-Amino-2-hydroxy-3-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>11</sub>NO<sub>3</sub>

mol.wt. 181.19

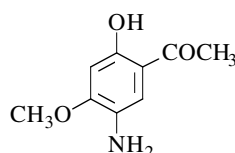
**Synthesis**

-Preparation from 2-hydroxy-3-methoxyacetophenone that was coupled with diazotized sulfanilic acid and the resulting azo dye reduced with sodium hydrosulfite to 5-amino-2-hydroxy-3-methoxyacetophenone (41%) [1643].

m.p. 145°-147° [1643].

**1-(5-Amino-2-hydroxy-4-methoxyphenyl)ethanone**C<sub>9</sub>H<sub>11</sub>NO<sub>3</sub>

mol.wt. 181.19

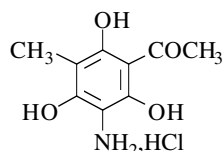
**Synthesis**

-Preparation by reduction of 2-hydroxy-4-methoxy-5-nitroacetophenone [1626] with tin in concentrated hydrochloric acid heated in a water bath [7] [947].

m.p. 113-114° [1626], 113° [947], 112-113° [7].

**1-(3-Amino-2,4,6-trihydroxy-5-methylphenyl)ethanone (Hydrochloride)**C<sub>9</sub>H<sub>11</sub>NO<sub>4</sub>, HCl

mol.wt. 233.65

**Synthesis**

-Preparation by reaction of stannous chloride on 2,4,6-trihydroxy-3-methyl-5-phenylazoacetophenone in acetic acid at 85-90°, in the presence of concentrated hydrochloric acid [1490].

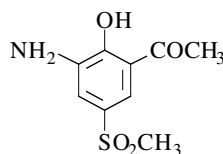
m.p. 210-211° [1490].

**1-[3-Amino-2-hydroxy-5-(methylsulfonyl)phenyl]ethanone**

[70977-88-7]

C<sub>9</sub>H<sub>11</sub>NO<sub>4</sub>S

mol.wt. 229.26

**Synthesis**

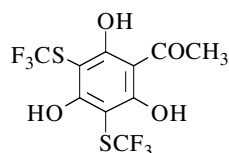
-Preparation by catalytic hydrogenation of 2-hydroxy-5-(methylsulfonyl)-3-nitroacetophenone in the presence of 5% Pd/C in ethanol at 25° [1463].

**1-[2,4,6-Trihydroxy-3,5-bis[(trifluoromethyl)thio]phenyl]ethanone**

[66625-04-5]

C<sub>10</sub>H<sub>6</sub>F<sub>6</sub>O<sub>4</sub>S<sub>2</sub>

mol.wt. 368.28



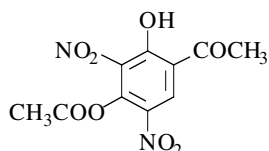
## Synthesis

-Preparation by reaction of trifluoromethanesulfonyl chloride with phloracetophenone in chloroform in the presence of a slight excess of pyridine and a small quantity of iron powder, first at -40°, then at 60° for 3 h (40%) [456].

m.p. 113-115° [456]; <sup>1</sup>H NMR [456], IR [456].

**1-[4-(Acetyloxy)-2-hydroxy-3,5-dinitrophenyl]ethanone**C<sub>10</sub>H<sub>8</sub>N<sub>2</sub>O<sub>8</sub>

mol.wt. 284.18



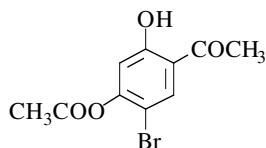
## Synthesis

-Preparation by reaction of nitric acid on 4-acetoxy-2-hydroxyacetophenone in acetic acid or in acetic acid-ethanol mixture [7].

m.p. 121-122° [7].

**1-[4-(Acetyloxy)-5-bromo-2-hydroxyphenyl]ethanone**C<sub>10</sub>H<sub>9</sub>BrO<sub>4</sub>

mol.wt. 273.08



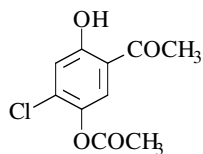
## Synthesis

-Preparation by reaction of bromine on 4-acetoxy-2-hydroxyacetophenone in 80% acetic acid at r.t. (34%) [947] [1571].

m.p. 85° [1571], 84° [947]; <sup>1</sup>H NMR [1571].

**1-[5-(Acetyloxy)-4-chloro-2-hydroxyphenyl]ethanone**C<sub>10</sub>H<sub>9</sub>ClO<sub>4</sub>

mol.wt. 228.63



## Syntheses

-Preparation by Fries rearrangement of 2-chlorohydroquinone diacetate with aluminium chloride [514].  
-Also obtained by partial acetylation of 4-chloro-2,5-dihydroxyacetophenone [514].

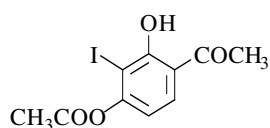
m.p. 129° [514].

**1-[4-(Acetyloxy)-2-hydroxy-3-iodophenyl]ethanone**

[149810-09-3]

C<sub>10</sub>H<sub>9</sub>IO<sub>4</sub>

mol.wt. 320.08

**Synthesis**

-Preparation by reaction of acetyl chloride with 2,4-dihydroxy-3-iodoacetophenone in the presence of triethylamine in methylene chloride for 1 h at 0° and for 2.5 h at r.t. (77%) [1265].

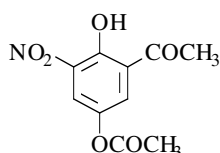
m.p. 101-102° [1265]; <sup>1</sup>H NMR [1265], IR [1265], MS [1265].

**1-[5-(Acetyloxy)-2-hydroxy-3-nitrophenyl]ethanone**

[30095-73-9]

C<sub>10</sub>H<sub>9</sub>NO<sub>6</sub>

mol.wt. 239.18

**Synthesis**

-Preparation by reaction of nitric acid (d = 1.5) on 5-acetoxy-2-hydroxyacetophenone in acetic acid at 10° (41%) [170].

m.p. 112-113° [170];

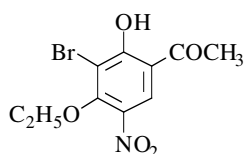
<sup>1</sup>H NMR [170], IR [170], UV [170].

**1-(3-Bromo-4-ethoxy-2-hydroxy-5-nitrophenyl)ethanone**

[134716-11-3]

C<sub>10</sub>H<sub>10</sub>BrNO<sub>5</sub>

mol.wt. 290.09

**Synthesis**

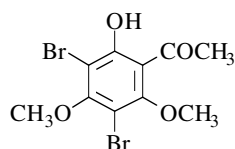
-Refer to: [63] (compound 1h).

**1-(3,5-Dibromo-2-hydroxy-4,6-dimethoxyphenyl)ethanone**

[13410-83-1]

C<sub>10</sub>H<sub>10</sub>Br<sub>2</sub>O<sub>4</sub>

mol.wt. 354.00

**Syntheses**

-Preparation by bromination of 2-hydroxy-4,6-dimethoxyacetophenone (Xanthoxylin) in chloroform containing 6% of pyridine (96%) [541].  
-Also refer to: [362].

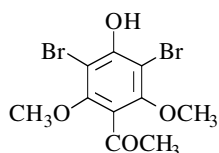
m.p. 111° [541]; IR [541].

**1-(3,5-Dibromo-4-hydroxy-2,6-dimethoxyphenyl)ethanone**

[57393-65-4]

C<sub>10</sub>H<sub>10</sub>Br<sub>2</sub>O<sub>4</sub>

mol.wt. 354.00

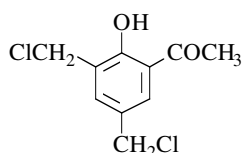
**Synthesis**

-Obtained (by-product) by reaction of bromine on 4-hydroxy-2,6-dimethoxyacetophenone in chloroform in the presence of aqueous sodium acetate solution (5%) [539].

m.p. 117-118° [539]; <sup>1</sup>H NMR [539].

**1-[3,5-Bis(chloromethyl)-2-hydroxyphenyl]ethanone**C<sub>10</sub>H<sub>10</sub>Cl<sub>2</sub>O<sub>2</sub>

mol.wt. 233.09

**Synthesis**

-Preparation by reaction of 37% formaldehyde solution on 2-hydroxyacetophenone with hydrochloric acid in a boiling water bath (81-87%) [1811].

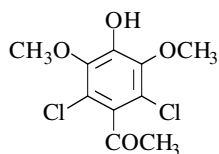
m.p. 83° [1811].

**1-(2,6-Dichloro-4-hydroxy-3,5-dimethoxyphenyl)ethanone**

[94649-71-5]

C<sub>10</sub>H<sub>10</sub>Cl<sub>2</sub>O<sub>4</sub>

mol.wt. 265.09

**Syntheses**

-Preparation by chlorination of acetosyringone (4-hydroxy-3,5-dimethoxyacetophenone) in dioxane with 2.0-2.5 mol. equiv. chlorine in acetic acid [1657] [1659], (37%) [1657].  
 -Identified in wheat and rye straw pulp bleaching and combined mill effluents [617].

-Identified on control of effluent from the manufacturing of bleached pulp and paper from sugarcane bagasse [616].

-Also refer to: [1658].

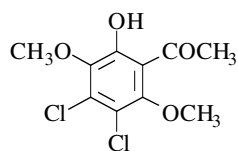
m.p. 114-115° [1657] [1659]; <sup>1</sup>H NMR [1657], <sup>13</sup>C NMR [1657], MS [1657].

**1-(3,4-Dichloro-6-hydroxy-2,5-dimethoxyphenyl)ethanone**

[88771-63-5]

C<sub>10</sub>H<sub>10</sub>Cl<sub>2</sub>O<sub>4</sub>

mol.wt. 265.09

**Synthesis**

-Preparation by reaction of chlorine on 4-chloro-3,6-dimethoxy-2-hydroxyacetophenone in chloroform at r.t. (57%) [502].

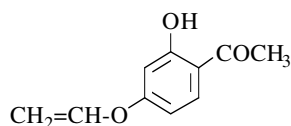
m.p. 96° [502].

**1-[4-(Ethenyloxy)-2-hydroxyphenyl]ethanone**

[109661-95-2]

C<sub>10</sub>H<sub>10</sub>O<sub>3</sub>

mol.wt. 178.19

**Synthesis**

-Preparation by reaction of potassium tert-butoxide with 2-hydroxy-4-(2-chloroethoxy)acetophenone in refluxing tert-butanol (70%) [1529].

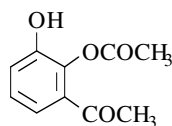
<sup>1</sup>H NMR [1529], IR [1529].

**1-[2-(Acetyloxy)-3-hydroxyphenyl]ethanone**

[145723-28-0]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19

**Synthesis**

-Obtained by photooxygenation of 2,3-dimethyl-7-hydroxy-benzofuran in methylene chloride at -5° (13%) [4].

m.p. 53-55° [4];

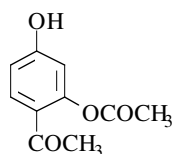
<sup>1</sup>H NMR [4], <sup>13</sup>C NMR [4], IR [4], UV [4].

**1-[2-(Acetyloxy)-4-hydroxyphenyl]ethanone**

[52751-42-5]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19

**Syntheses**

-Preparation by Fries rearrangement of resorcinol diacetate with ferric chloride in boiling acetic acid (46%) [711].

-Also obtained by enzymatic deacylation of 2,4-diacetoxyacetophenone with porcine pancreas lipase in tetrahydrofuran at 42-45° (80%) [1381] [1383].

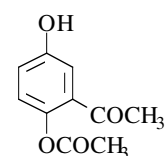
m.p. 119-120° [711], 87-88° [1383]; <sup>1</sup>H NMR [1383].

**1-[2-(Acetyloxy)-5-hydroxyphenyl]ethanone**

[144152-29-4]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19

**Syntheses**

-Obtained by photooxygenation of 2,3-dimethyl-5-hydroxy-benzofuran in methylene chloride at -5° (10%) [4].

-Also obtained by alcoholysis of 2,5-diacetoxyacetophenone with n-butanol mediated by *Pseudomonas cepacia* lipase in cyclohexane/tert-amyl alcohol at 40° (65%) [1326].

-Also obtained by enzymatic deacylation of 2,5-diacetoxyacetophenone with porcine pancreas lipase in tetrahydrofuran at 42-45° (60%) [1381] [1383].

m.p. 105-106° [4], 93-95° [1383];

<sup>1</sup>H NMR [4] [1383], <sup>13</sup>C NMR [4], IR [4], UV [4].

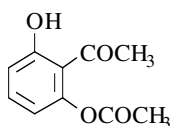


**1-[2-(Acetyloxy)-6-hydroxyphenyl]ethanone**

[26674-05-5]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19

**Syntheses**

-Preparation by acylation of 2,6-dihydroxyacetophenone (compound **49**) [1335].

-Refer to: [1352]; this reference indicated in Chem. Abstr., **89**, 179792x (1978) for the monoacetate mentioned

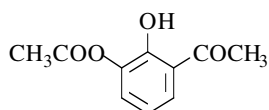
actually concerns the diacetate, that is to say the 1,3-diacetoxy-2-acetylbenzene.

**1-[3-(Acetyloxy)-2-hydroxyphenyl]ethanone**

[144224-87-3]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19

**Synthesis**

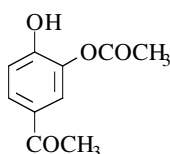
-Refer to: [1264].

**1-[3-(Acetyloxy)-4-hydroxyphenyl]ethanone**

[115436-75-4]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19

**Synthesis**

-Obtained (by-product) by reaction of acetic anhydride on pyrocatechol with zinc chloride at 145-150° (8%) [62].

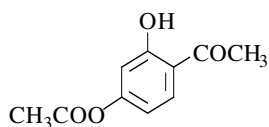
m.p. 74-76° [62].

**1-[4-(Acetyloxy)-2-hydroxyphenyl]ethanone**

[42059-48-3]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19

**Syntheses**

-Preparation by reaction of acetic anhydride on resacetophenone,

\*at reflux [1230] [1319] [1637] [1877];

\*with sodium acetate [137] [453] [475] [1739], (78%) [137];

\*with pyridine (95%) [130], (54-59%) [1571] [1637].

-Preparation by reaction of acetic acid on resacetophenone with polyphosphoric acid (39%) [1298].

-Also obtained by reaction of acetyl chloride on resorcinol at reflux [1138] [1877].

-Also obtained (by-product) by reaction of acetic acid on resorcinol with polyphosphoric acid (3%) [1298].

-Also obtained by reaction of vinyl acetate on resacetophenone mediated by *Pseudomonas cepacia* lipase in cyclohexane/tert-amyl alcohol at 40° (55-65%) [1326].

-Also refer to: [1264].

m.p. 76° [1298], 75-76° [130] [137], 75° [453], 74° [711] [1230],  
72-73° [475] [1637], 72° [1319] [1739], 69-71° [1571];

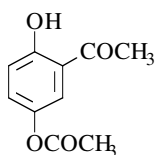
b.p. 303° [1230] [1637];  
<sup>1</sup>H NMR [1326] [1571]; <sup>13</sup>C NMR [1326], IR [1326].

**1-[5-(Acetyloxy)-2-hydroxyphenyl]ethanone**

[21222-04-8]

C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 194.19



**Syntheses**

- Preparation by reaction of boiling acetic anhydride on quinacetophenone [993].
- Preparation by reaction of acetic anhydride and sodium acetate mixture on quinacetophenone at 50° [139].
- Preparation by Fries rearrangement of hydroquinone diacetate.

\*with boron trifluoride etherate at 120° (90%) [1240];  
 \*with aluminium chloride at 115-120° [723] [1240] [1487], (predominantly) [1487], (31%) [1240].  
 -Also obtained by UV light irradiation of hydroquinone diacetate in methanol (15%) [1614].  
 -Also obtained by reaction of vinyl acetate on quinacetophenone mediated by *Pseudomonas cepacia* lipase in cyclohexane/tert-amyl alcohol at 40° (97%) [1326].  
 -Also obtained by alcoholysis of quinacetophenone diacetate with n-butanol mediated by *Pseudomonas cepacia* lipase in cyclohexane/tert-amyl alcohol at 40° (28%) [1326].

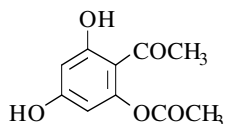
m.p. 91° [139] [993], 83-84° [1614], 81-82° [1240], 80-85° [1487];  
<sup>1</sup>H NMR [723] [1240] [1326] [1614], <sup>13</sup>C NMR [1326],  
 IR [723] [1240] [1326] [1614], UV [723], MS [723]; pK<sub>a</sub> [1697].

**1-[2-(Acetyloxy)-4,6-dihydroxyphenyl]ethanone**

[52751-41-4]

C<sub>10</sub>H<sub>10</sub>O<sub>5</sub>

mol.wt. 210.19



**Synthesis**

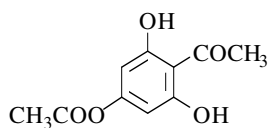
- Refer to: [25].

**1-[4-(Acetyloxy)-2,6-dihydroxyphenyl]ethanone**

[29376-65-6]

C<sub>10</sub>H<sub>10</sub>O<sub>5</sub>

mol.wt. 210.19



**Synthesis**

- Preparation by reaction of acetic anhydride on phloroacetophenone in pyridine at r.t. (17-20%) [5] [1019].

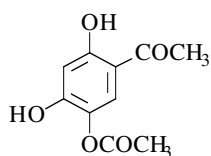
m.p. 165-166° [1019]; <sup>13</sup>C NMR [5].

**1-[5-(Acetyloxy)-2,4-dihydroxyphenyl]ethanone**

[55168-29-1]

C<sub>10</sub>H<sub>10</sub>O<sub>5</sub>

mol.wt. 210.19

**Syntheses**

-Obtained by partial Fries rearrangement of 1,2,4-triacetoxybenzene,  
 \*with boron trifluoride-acetic acid complex at 100° (78%) [703];  
 \*with zinc chloride in acetic acid at 120° (21%) [1566] or at 140° (7%) [1335].

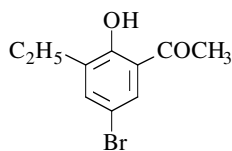
m.p. 171° [1566], 169-170° [1335], 163° [703];  
<sup>1</sup>H NMR [703] [1335] [1566], IR [703] [1335] [1566].

**1-(5-Bromo-3-ethyl-2-hydroxyphenyl)ethanone**

[81591-17-5]

C<sub>10</sub>H<sub>11</sub>BrO<sub>2</sub>

mol.wt. 243.10

**Synthesis**

-Preparation by Fries rearrangement of 4-bromo-2-ethylphenyl acetate with aluminium chloride without solvent in an oil bath (40%) [1787].

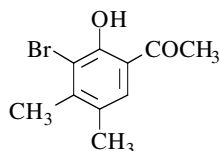
m.p. 42° [1787].

**1-(3-Bromo-2-hydroxy-4,5-dimethylphenyl)ethanone**

[112747-62-3]

C<sub>10</sub>H<sub>11</sub>BrO<sub>2</sub>

mol.wt. 243.10

**Syntheses**

-Preparation by reaction of hydrated sodium sulfide (containing 7 to 9 mol of water) with 2-dimethylamino-4-[3-bromo-2-hydroxy-4,5-dimethylphenyl]-1,3-dithiole bisulfate in refluxing ethanol (85%) [357].  
 -Preparation by reaction of bromine with 2-hydroxy-4,5-dimethylacetophenone in chloroform (69%) [229].

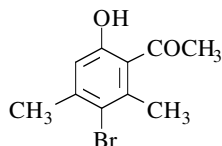
m.p. 105-106° [357], 100-101° [229]; <sup>1</sup>H NMR [229] [357], IR [229] [357].

**1-(3-Bromo-6-hydroxy-2,4-dimethylphenyl)ethanone**

[71582-57-5]

C<sub>10</sub>H<sub>11</sub>BrO<sub>2</sub>

mol.wt. 243.10

**Syntheses**

-Preparation by reaction of acetic acid on 4-bromo-3,5-dimethylphenol with boron trifluoride [422].  
 -Preparation by Fries rearrangement of 4-bromo-3,5-dimethylphenyl acetate (b.p.<sub>15</sub> 110°) with aluminium chloride at 120° [1085].

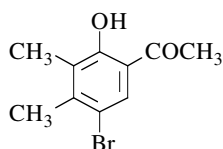
m.p. 99-103° [422], 95-97° [1085]; <sup>1</sup>H NMR [1085], IR [1085].

**1-(5-Bromo-2-hydroxy-3,4-dimethylphenyl)ethanone**

[319923-51-8]

C<sub>10</sub>H<sub>11</sub>BrO<sub>2</sub>

mol.wt. 243.10

**Synthesis**

-Preparation by reaction of bromine with 2-hydroxy-3,4-dimethylacetophenone in methylene chloride (61%) [229].

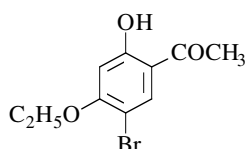
m.p. 65-66° [229]; <sup>1</sup>H NMR [229], IR [229].

**1-(5-Bromo-4-ethoxy-2-hydroxyphenyl)ethanone**

[131359-44-9]

C<sub>10</sub>H<sub>11</sub>BrO<sub>3</sub>

mol.wt. 259.10

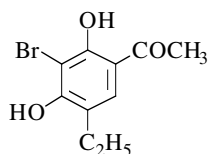
**Syntheses**

-Preparation by reaction of bromine on 4-ethoxy-2-hydroxyacetophenone in acetic acid [982].  
-Also refer to: [63] and [172] (compound 1g).

m.p. 109-110° [982].

**1-(3-Bromo-5-ethyl-2,4-dihydroxyphenyl)ethanone**C<sub>10</sub>H<sub>11</sub>BrO<sub>3</sub>

mol.wt. 259.10

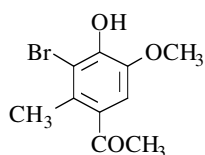
**Synthesis**

-Preparation by bromination of 2,4-dihydroxy-5-ethylacetophenone with bromine in acetic acid [506] [1151] or in chloroform [1606].

m.p. 131° [1151], 123-125° [1606], 121° [506].

**1-(3-Bromo-4-hydroxy-5-methoxy-2-methylphenyl)ethanone**C<sub>10</sub>H<sub>11</sub>BrO<sub>3</sub>

mol.wt. 259.10

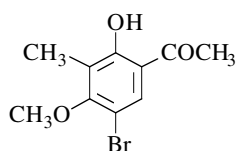
**Synthesis**

-Preparation by reaction of acetyl chloride on 2-bromo-6-methoxy-3-methylphenol with aluminium chloride in carbon disulfide at 50° (50%) [305].

m.p. 82° [305].

**1-(5-Bromo-2-hydroxy-4-methoxy-3-methylphenyl)ethanone**C<sub>10</sub>H<sub>11</sub>BrO<sub>3</sub>

mol.wt. 259.10

**Synthesis**

-Preparation by reaction of bromine on 2-hydroxy-4-methoxy-3-methylacetophenone in carbon disulfide [1411].

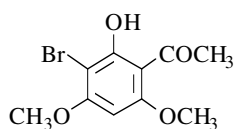
m.p. 63-64° [1411].

**1-(3-Bromo-2-hydroxy-4,6-dimethoxyphenyl)ethanone**

[18064-89-6]

C<sub>10</sub>H<sub>11</sub>BrO<sub>4</sub>

mol.wt. 275.10

**Syntheses**

-Preparation by reaction of bromine on 2,4-dimethoxy-6-hydroxyacetophenone [190] [373] [542] [908] [1402] [1559] [1580],  
\*in acetic acid at r.t. (98%) [190], (43%) [373];

\*in carbon tetrachloride (85%) [190];

\*in acetic anhydride (50%) [190];

\*in chloroform [190] [908], (33%) [190].

-Preparation by bromination of 2,4-dimethoxy-6-hydroxyacetophenone with cupric bromide in refluxing chloroform-ethyl acetate mixture [391] [894], (62%) [894].

-Preparation by reaction of cupric bromide on 2-acetoxy-4,6-dimethoxyacetophenone in refluxing chloroform-ethyl acetate mixture (76%) [894].

m.p. 188-189° [1402], 187-189° [894], 187° [908] [1559] [1580], 186-187° [190] [373];

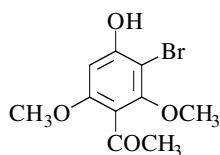
<sup>1</sup>H NMR [190] [391] [894], MS [391].

**1-(3-Bromo-4-hydroxy-2,6-dimethoxyphenyl)ethanone**

[57517-42-7]

C<sub>10</sub>H<sub>11</sub>BrO<sub>4</sub>

mol.wt. 275.10

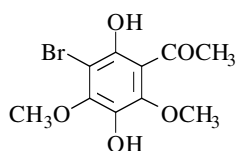
**Synthesis**

-Preparation by reaction of bromine on 4-hydroxy-2,6-dimethoxyacetophenone in chloroform in the presence of aqueous sodium acetate solution (88%) [539].

m.p. 156-157° [539]; <sup>1</sup>H NMR [539].

**1-(3-Bromo-2,5-dihydroxy-4,6-dimethoxyphenyl)ethanone**C<sub>10</sub>H<sub>11</sub>BrO<sub>5</sub>

mol.wt. 291.10

**Synthesis**

-This compound is obtained by reaction of alkaline potassium persulfate on 3-bromo-2-hydroxy-4,6-dimethoxyacetophenone [542].

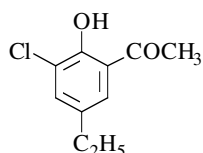
m.p. 147-149° [542].

**1-(3-Chloro-5-ethyl-2-hydroxyphenyl)ethanone**

[58483-48-0]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

**Synthesis**

-Preparation by Fries rearrangement of 2-chloro-4-ethyl-phenyl acetate with aluminium chloride without solvent at 150° (75%) [1041].

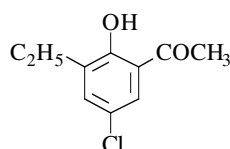
m.p. 74° [1041].

**1-(5-Chloro-3-ethyl-2-hydroxyphenyl)ethanone**

[53347-06-1]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

**Synthesis**

-Preparation by Fries rearrangement of 4-chloro-2-ethyl-phenyl acetate with aluminium chloride without solvent at 120° [107] or by heating in an oil bath (50%) [1787].

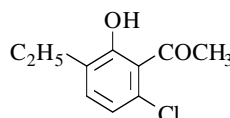
oil [107]; b.p.<sub>12</sub> 145-146° [107], b.p. 265° [1787].

**1-(6-Chloro-3-ethyl-2-hydroxyphenyl)ethanone**

[81591-14-2]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

**Synthesis**

-Preparation by Fries rearrangement of 5-chloro-2-ethyl-phenyl acetate with aluminium chloride without solvent by heating in an oil bath (40%) [1787].

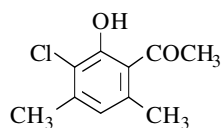
b.p. 258° [1787].

**1-(3-Chloro-2-hydroxy-4,6-dimethylphenyl)ethanone**

[71582-56-4]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

**Synthesis**

-Preparation by reaction of acetic acid on 2-chloro-3,5-dimethylphenol with boron trifluoride [422].

m.p. 74-75° [422].

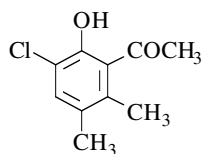
**1-(3-Chloro-2-hydroxy-5,6-dimethylphenyl)ethanone**

[90743-03-6]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

## Synthesis



-Refer to: [1347] (ketone 16).

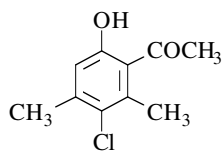
**1-(3-Chloro-6-hydroxy-2,4-dimethylphenyl)ethanone**

[50343-13-0]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

## Syntheses



-Preparation by Fries rearrangement of 4-chloro-3,5-dimethylphenyl acetate with aluminium chloride without solvent between 120 to 155° [422] [991] [1587], (90%) [1587].

-Preparation by reaction of aluminium chloride on

3-chloro-6-methoxy-2,4-dimethylacetophenone without solvent at 140-150° [114].  
 -Also obtained by ozonization of 6-chloro-3,4,5,7-tetramethylcoumarin in ethyl acetate, followed first by hydrolysis of the ozonide so formed, then saponification of the resulting oil by sodium hydroxide in refluxing aqueous methanol for 1 h (59%) [6].

m.p. 110-112° [6], 106-109° [114], 94° [1587], 89°7 [991].

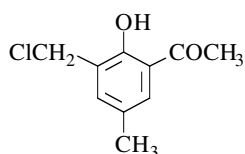
**1-[3-(Chloromethyl)-2-hydroxy-5-methylphenyl]ethanone**

[87165-62-6]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

## Syntheses



-Preparation from 2-hydroxy-5-methylacetophenone by introduction of the chloromethyl group into aromatic ring by treatment with formaldehyde and hydrogen chloride at 70° [694] according to [1812].

-Also refer to: [273] (compound 11).

m.p. 59-60° [694]; b.p.<sub>0.4</sub> 110-116° [289]; <sup>1</sup>H NMR [694].

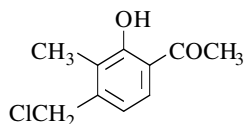
**1-[4-(Chloromethyl)-2-hydroxy-3-methylphenyl]ethanone**

[97582-37-1]

C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 198.65

## Synthesis



-Preparation by reaction of ethyl chloroformate with 4-(dimethylaminomethyl)-2-hydroxy-3-methylacetophenone in toluene [529] [530], (72%) [530].

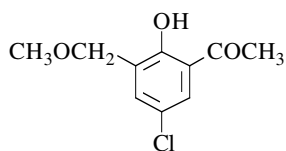
m.p. 57-59° [530]; b.p.<sub>3</sub> 190-200° [529]; <sup>1</sup>H NMR [529], IR [529].

**1-[5-Chloro-2-hydroxy-3-(methoxymethyl)phenyl]ethanone**

[87165-59-1]

C<sub>10</sub>H<sub>11</sub>ClO<sub>3</sub>

mol.wt. 214.65

**Synthesis**

-Obtained by reaction of sodium methoxide with 5-chloro-3-chloromethyl-2-hydroxyacetophenone in refluxing methanol for 2 h (28%) [289].

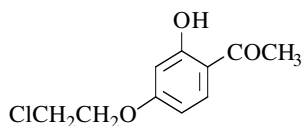
b.p.<sub>0.6</sub> 121-131° [289]; <sup>1</sup>H NMR [289], IR [289].

**1-[4-(2-Chloroethoxy)-2-hydroxyphenyl]ethanone**

[109661-96-3]

C<sub>10</sub>H<sub>11</sub>ClO<sub>3</sub>

mol.wt. 214.65

**Synthesis**

-Preparation by reaction of 1,2-ethylene dichloride with resacetophenone in the presence of n-tetrabutylammonium bromide and potassium hydroxide in water at 60° (41%) [1529].

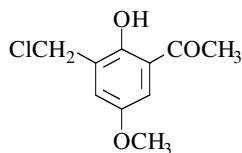
m.p. 98-100° [1529]; <sup>1</sup>H NMR [1529].

**1-[3-(Chloromethyl)-2-hydroxy-5-methoxyphenyl]ethanone**

[87165-70-6]

C<sub>10</sub>H<sub>11</sub>ClO<sub>3</sub>

mol.wt. 214.65

**Synthesis**

-Preparation by reaction of polyoxymethylene with 2-hydroxy-5-methoxyacetophenone in the presence of concentrated hydrochloric acid at 50° (61%) [289].

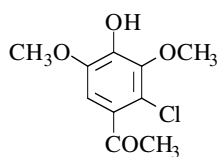
m.p. 71° [289]; <sup>1</sup>H NMR [289], IR [289].

**1-(2-Chloro-4-hydroxy-3,5-dimethoxyphenyl)ethanone**

[94649-70-4]

C<sub>10</sub>H<sub>11</sub>ClO<sub>4</sub>

mol.wt. 230.65

**Syntheses**

-Preparation by chlorination of acetosyringone (4-hydroxy-3,5-dimethoxyacetophenone) in dioxane with 1.0-1.1 mol. equiv. chlorine in acetic acid [1657] [1659], (24%) [1657].  
-Identified in wheat and rye straw pulp bleaching and combined mill effluents [617].

-Identified on control of effluent from the manufacturing of bleached pulp and paper from sugarcane bagasse [616].

-Isolated from the pyrolysis products of beech wood [1439].

m.p. 93-94° [1657] [1659]; GC-MS [1439];

<sup>1</sup>H NMR [1657], <sup>13</sup>C NMR [1657], MS [1657].

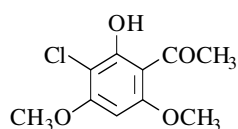


**1-(3-Chloro-2-hydroxy-4,6-dimethoxyphenyl)ethanone**

[81325-85-1]

C<sub>10</sub>H<sub>11</sub>ClO<sub>4</sub>

mol.wt. 230.65

**Syntheses**

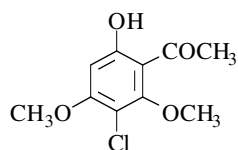
- Preparation by Fries rearrangement of 2-chloro-3,5-dimethoxyphenyl acetate with aluminium chloride in chlorobenzene at reflux (94%) [1424] or in nitrobenzene, from 90 to 130° (24%) [1803].
- Preparation by reaction of acetyl chloride with 2-chloro-3,5-dimethoxyphenol in the presence of aluminium chloride in nitrobenzene at r.t. (87%) [554].
- Also obtained by reaction of chlorine with 2-hydroxy-4,6-dimethoxyacetophenone in carbon tetrachloride (15%) [2].
- Preparation by diazotization of 3-amino-2-hydroxy-4,6-dimethoxyacetophenone and treating with cuprous chloride (Sandmeyer reaction) [2].
- Preparation by partial demethylation of 3-chloro-2,4,6-trimethoxyacetophenone with aluminium chloride in acetonitrile for 4 h at 30° (95%) [962].
- Also refer to: [544].

m.p. 191-192° [2] [554], 188° [1803]; <sup>1</sup>H NMR [2] [1803], IR [554].**1-(3-Chloro-6-hydroxy-2,4-dimethoxyphenyl)ethanone**

[81325-86-2]

C<sub>10</sub>H<sub>11</sub>ClO<sub>4</sub>

mol.wt. 230.65

**Syntheses**

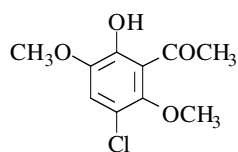
- Preparation by reaction of chlorine with 2-hydroxy-4,6-dimethoxyacetophenone in carbon tetrachloride (57%) [2].
- Also obtained (poor yield) by Fries rearrangement of 4-chloro-3,5-dimethoxyphenyl acetate with aluminium chloride in nitrobenzene at 90° and then 130° (11%) [1087].
- Also refer to: [544] [1802].

m.p. 193-194° [1087], 91° [2]; <sup>1</sup>H NMR [2] [1087].**1-(3-Chloro-6-hydroxy-2,5-dimethoxyphenyl)ethanone**

[88771-58-8]

C<sub>10</sub>H<sub>11</sub>ClO<sub>4</sub>

mol.wt. 230.65

**Synthesis**

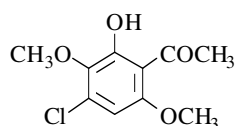
- Preparation by reaction of N-chlorosuccinimide on 3,6-dimethoxy-2-hydroxyacetophenone in refluxing carbon tetrachloride (59%) [502].

m.p. 108° [502]; <sup>1</sup>H NMR [502].**1-(4-Chloro-2-hydroxy-3,6-dimethoxyphenyl)ethanone**

[88771-46-4]

C<sub>10</sub>H<sub>11</sub>ClO<sub>4</sub>

mol.wt. 230.65

**Synthesis**

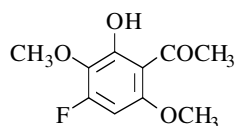
- Refer to: [502].

**1-(4-Fluoro-2-hydroxy-3,6-dimethoxyphenyl)ethanone**

[88771-57-7]

C<sub>10</sub>H<sub>11</sub>FO<sub>4</sub>

mol.wt. 214.19



Synthesis

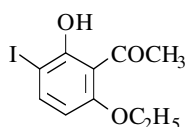
-Refer to: [502].

**1-(6-Ethoxy-2-hydroxy-3-iodophenyl)ethanone**

[35292-36-5]

C<sub>10</sub>H<sub>11</sub>IO<sub>3</sub>

mol.wt. 306.10



Synthesis

-Preparation by adding an aqueous solution of iodic acid and iodine to an ethanolic solution of 2-ethoxy-6-hydroxyacetophenone (88%) [794].

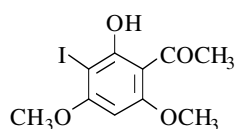
m.p. 106° [794].

**1-(2-Hydroxy-3-iodo-4,6-dimethoxyphenyl)ethanone**

[59656-68-7]

C<sub>10</sub>H<sub>11</sub>IO<sub>4</sub>

mol.wt. 322.10



Syntheses

-Preparation by adding an ethanolic solution of iodine and phloracetophenone dimethyl ether to an aqueous solution of iodic acid at r.t. (81%) [388].

-Preparation by adding an acetic acid solution of nitric acid to an acetic solution of iodine and phloracetophenone dimethyl ether at 0° [655] [656] [1302], (75%) [1302].

-Preparation by reaction of iodine with phloracetophenone dimethyl ether in methanol in the presence of potassium hydroxide [1903].

-Also refer to: [544] (compound 23).

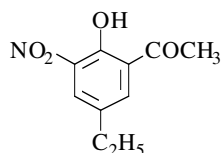
m.p. 201° [1302], 199°5-200°5 [388].

**1-(5-Ethyl-2-hydroxy-3-nitrophenyl)ethanone**

[71002-71-6]

C<sub>10</sub>H<sub>11</sub>NO<sub>4</sub>

mol.wt. 209.20



Syntheses

-Preparation by nitration of 5-ethyl-2-hydroxyacetophenone, \*with 100% nitric acid in acetic acid at r.t. (85%) [318]; \*with nitric acid (d = 1.42) in concentrated sulfuric acid between -15 to -5° [620] [1463], (44%) [620].

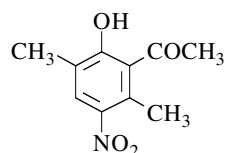
m.p. 127-128° [318], 120-122° [1463], 118-120° [620].

**1-(2-Hydroxy-3,6-dimethyl-5-nitrophenyl)ethanone**

[207281-53-6]

C<sub>10</sub>H<sub>11</sub>NO<sub>4</sub>

mol.wt. 209.20

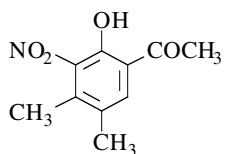


Synthesis

-Refer to: [697].

**1-(2-Hydroxy-4,5-dimethyl-3-nitrophenyl)ethanone**C<sub>10</sub>H<sub>11</sub>NO<sub>4</sub>

mol.wt. 209.20



Synthesis

-Preparation by reaction of nitric acid (d = 1.42) on 2-hydroxy-4,5-dimethylacetophenone in acetic acid at r.t. (71%) [142].

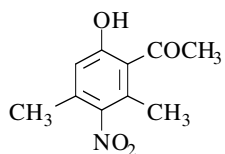
m.p. 143-144° [142].

**1-(6-Hydroxy-2,4-dimethyl-3-nitrophenyl)ethanone**

[125249-30-1]

C<sub>10</sub>H<sub>11</sub>NO<sub>4</sub>

mol.wt. 209.20



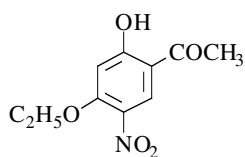
Synthesis

-Preparation is made by adding successively nitromethane, then 3-acetyl-2,6-dimethyl-4*H*-pyran-4-one in a suspension of potassium tert-butoxide in tert-butyl alcohol at 40° under nitrogen (40%) [564].m.p. 112-114° [564]; <sup>1</sup>H NMR [564], IR [564], MS [564].**1-(4-Ethoxy-2-hydroxy-5-nitrophenyl)ethanone**

[76951-07-0]

C<sub>10</sub>H<sub>11</sub>NO<sub>5</sub>

mol.wt. 225.20



Syntheses

-Prepared by nitration of 2-hydroxy-4-ethoxyacetophenone in glacial acetic acid [922].

-Also refer to: [63] and [172] (compound 1f).

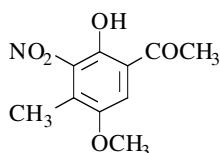
m.p. 132° [922].

**1-(2-Hydroxy-5-methoxy-4-methyl-3-nitrophenyl)ethanone**

[43140-82-5]

C<sub>10</sub>H<sub>11</sub>NO<sub>5</sub>

mol.wt. 225.20

**Synthesis**

-Preparation by reaction of 10% nitric acid with 2-hydroxy-5-methoxy-4-methylacetophenone at 17-20° (40%) [1741].

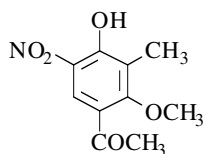
m.p. 132° [1741]; <sup>1</sup>H NMR [1741], IR [1741].

**1-(4-Hydroxy-2-methoxy-3-methyl-5-nitrophenyl)ethanone**

[118824-98-9]

C<sub>10</sub>H<sub>11</sub>NO<sub>5</sub>

mol.wt. 225.20

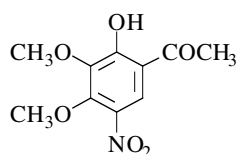
**Synthesis**

-Preparation by reaction of concentrated nitric acid on 4-hydroxy-2-methoxy-3-methylacetophenone in acetic acid [912] [1470], (64%) [1470].

m.p. 70° [912], 69° [1470];  
<sup>1</sup>H NMR [1470], IR [1470], MS [1470].

**1-(2-Hydroxy-3,4-dimethoxy-5-nitrophenyl)ethanone**C<sub>10</sub>H<sub>11</sub>NO<sub>6</sub>

mol.wt. 241.20

**Synthesis**

-Preparation by reaction of nitric acid with 3,4-dimethoxy-2-hydroxyacetophenone in ethanol (33%) [663].

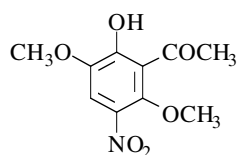
m.p. 83-83°8 [663].

**1-(2-Hydroxy-3,6-dimethoxy-5-nitrophenyl)ethanone**

[88771-59-9]

C<sub>10</sub>H<sub>11</sub>NO<sub>6</sub>

mol.wt. 241.20

**Synthesis**

-Preparation by reaction of nitric acid on 3,6-dimethoxy-2-hydroxyacetophenone in acetic acid at 10° (52%) [502].

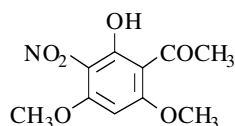
m.p. 120° [502]; <sup>1</sup>H NMR [502].

**1-(2-Hydroxy-4,6-dimethoxy-3-nitrophenyl)ethanone**

[81325-87-3]

C<sub>10</sub>H<sub>11</sub>NO<sub>6</sub>

mol.wt. 241.20

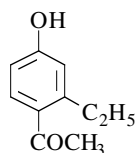
**Synthesis**

-Obtained (poor yield) by adding nitric acid (d = 1.42) in acetic acid to an ice-cold solution of 2-hydroxy-4,6-dimethoxyacetophenone in acetic anhydride (2%) [2].

m.p. 104-105° [2]; <sup>1</sup>H NMR [2].

**1-(2-Ethyl-4-hydroxyphenyl)ethanone**C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

-Obtained by Fries rearrangement of 3-ethylphenyl acetate with aluminium chloride,  
\*in nitrobenzene at 0° (varying yield, maximum 50%) [970];  
\*without solvent between 130 and 165° (4-7%) [1461] [1785].

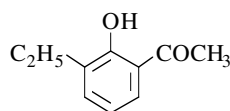
m.p. 102° [970] [1461]; b.p.<sub>0.45</sub> 150-152° [970], b.p.<sub>20</sub> 195-200° [1461].

**1-(3-Ethyl-2-hydroxyphenyl)ethanone**

[103323-22-4]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

-Obtained by Fries rearrangement of 2-ethylphenyl acetate with aluminium chloride at 130-140° [102].  
-Also refer to: [1018] [1457].

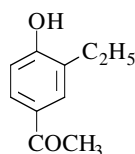
b.p.<sub>3</sub> 90-95° [1018], b.p. 213° [102].

**1-(3-Ethyl-4-hydroxyphenyl)ethanone**

[22934-47-0]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

-Preparation by reaction of acetyl chloride on 2-ethylphenol with aluminium chloride,  
\*in refluxing carbon disulfide (60%) [1069];  
\*in nitrobenzene at 60° (39%) [186].  
-Preparation by acetylation of 2-ethylphenol (60%) [1211].

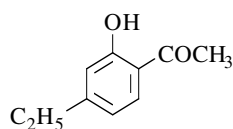
m.p. 95° [1211], 92-93° [186], 89-91° [1069];  
b.p.<sub>1</sub> 170-180° [1211], b.p.<sub>20</sub> 190-195° [186]; UV [186].

**1-(4-Ethyl-2-hydroxyphenyl)ethanone**

[5896-50-4]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

-Preparation by Fries rearrangement of 3-ethylphenyl acetate, \*with aluminium chloride, without solvent between 120 and 165° (80-88%) [550] [1461] [1584] [1585] [1588] [1785], in nitrobenzene at 25° (84-89%) [1585] [1588] or at 60° (65%) [1584], in toluene or in xylene at 100° (56-57%) [1584];

\*with titanium tetrachloride, without solvent at 120° (88%) [1585] or in nitrobenzene at 25° (66%) [1585];

\*with stannic chloride, without solvent at 120° (84%) [1585] or in nitrobenzene at 25° (86%) [1585];

\*with zinc chloride, without solvent at 120° (56%) [1585] or in nitrobenzene at 25° (58%) [1585].

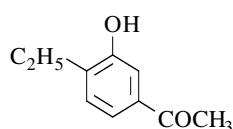
b.p.<sub>2.5</sub> 97° [550], b.p.<sub>4</sub> 140° [1588], b.p.<sub>20</sub> 142° [1461].

**1-(4-Ethyl-3-hydroxyphenyl)ethanone**

[73898-20-1]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Synthesis**

-Preparation by diazotization of 3-amino-4-ethylacetophenone followed by hydrolysis of the diazonium salt obtained (46%) [1069].

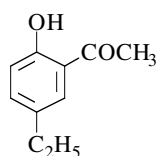
m.p. 94-95° [1069].

**1-(5-Ethyl-2-hydroxyphenyl)ethanone**

[24539-92-2]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

-Preparation by Fries rearrangement of 4-ethylphenyl acetate with aluminium chloride without solvent at 115-120° [102] [318] [683], (96%) [318], (70%) [102].

-Preparation by reaction of acetyl chloride on 4-ethylphenol with aluminium chloride in ethylene dichloride at 110-120° (71%) [1033].

b.p.<sub>2.3</sub> 94-96° [683], b.p.<sub>4</sub> 102-104° [1033], b.p.<sub>10</sub> 114-116° [318],

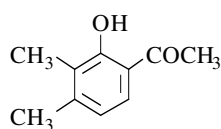
b.p.<sub>12</sub> 119-121° [102]; <sup>1</sup>H NMR [683], MS [683].

**1-(2-Hydroxy-3,4-dimethylphenyl)ethanone**

[5384-55-4]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

-Preparation by reaction of acetic anhydride on 2,3-dimethylphenol with 70% perchloric acid at 125-135° (35%) [548].

-Preparation by Fries rearrangement of 2,3-dimethylphenyl acetate,  
 \*with aluminium chloride, without solvent, between 100 to 165° (85%) [997], (70-80%) [1026] [1788] [1844], (54-69%) [102] [661] [1025] [1654] or in refluxing carbon disulfide (20%) [1844];  
 \*with titanium tetrachloride at 100° (60%) [113] [1026] [1788].

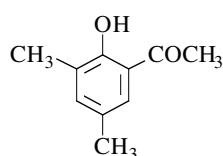
colourless oil [997]; m.p. 6-8° [1026];  
 b.p.<sub>7</sub> 105-110° [548], b.p.<sub>8</sub> 120-124° [1654], b.p.<sub>12</sub> 122-124° [102],  
 b.p.<sub>10.5</sub> 127-129° [1654], b.p.<sub>15</sub> 131-132° [1026], b.p.<sub>12</sub> 140° [661];  
<sup>1</sup>H NMR [997], <sup>13</sup>C NMR [997], IR [997] [1026], MS [997].

### 1-(2-Hydroxy-3,5-dimethylphenyl)ethanone

[1198-66-9]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20



#### Syntheses

-Preparation by reaction of acetyl chloride on 2,4-dimethylphenol with aluminium chloride in nitrobenzene at 50° (80%) [458].  
 -Preparation by Fries rearrangement of 2,4-dimethylphenyl acetate with aluminium chloride, in nitrobenzene at 50° (80%) [458] or in the presence of 2,4-dimethylanisole in refluxing carbon disulfide (50%) [103] or without solvent [103] [112] [113] [148] [1788] at 130-140° (good yield) [103], (42%) [148].  
 -Also obtained by Fries rearrangement of 2,5-dimethylphenyl acetate with aluminium chloride without solvent [101] [112], at 80-90° (25%) [101].  
 -Also obtained (by-product) by Fries rearrangement of 2,6-dimethyl-4-ethylphenyl acetate with aluminium chloride without solvent (4%) [100].  
 -Also obtained by reaction of acetyl chloride on 2,4-dimethylanisole with aluminium chloride in refluxing carbon disulfide [101].  
 -Also obtained by reaction of zinc powder on 3,5-bis(chloromethyl)-2-hydroxyacetophenone in aqueous acetic acid (8%) [1811].  
 -Preparation by UV light irradiation of 2,4-dimethylphenyl acetate at 25°, in benzene (54%) [280] or in hexane, with potassium carbonate (90%) [660] or without potassium carbonate (34%) [660].  
 -Preparation by reaction of ethyl acetoacetate with 2-methyl-2-pentenal in the presence of pyridine and piperidine as catalysts, in refluxing benzene (49%). The 2-methyl-2-pentenal was first obtained by self-condensation of propionaldehyde in the presence of 15% potassium hydroxide solution [940] [941] [942].  
 -Also refer to: [891] [1535].

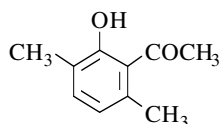
m.p. 55° [660], 54° [101] [103] [458], 53-54° [112] [113] [1811],  
 53-53°5 [940] [941] [942];  
 b.p.<sub>12</sub> 106-135° [101], b.p.<sub>16</sub> 124°5-126° [113], b.p.<sub>33</sub> 126-140° [940] [941] [942];  
<sup>1</sup>H NMR [280] [940] [941] [942], IR [280] [940] [941] [942], UV [940] [941] [942].

### 1-(2-Hydroxy-3,6-dimethylphenyl)ethanone

[90743-02-5]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20



#### Syntheses

-Obtained by UV irradiation of 2,5-dimethylphenyl acetate in methanol at 254 nm under nitrogen at r.t. (39%) [1703].  
 -Also refer to: [732] and [1347] (ketone **14**).

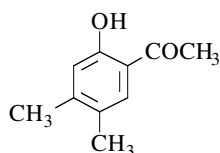
viscous oil [1703]; <sup>1</sup>H NMR [1703], <sup>13</sup>C NMR [1703],  
 IR [1703], MS [1703].

**1-(2-Hydroxy-4,5-dimethylphenyl)ethanone**

[36436-65-4]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

- Preparation by Fries rearrangement of 3,4-dimethylphenyl acetate with aluminium chloride without solvent between 110 to 150° [112] [123] [142] [839] [1528] [1788] [1799] [1844], (86-100%) [123] [1528] [1799], (70-72%) [142] [1844], (23%) [839].
- Preparation by isomerisation of 2-hydroxy-4,6-dimethylacetophenone with an excess of aluminium chloride without solvent at 140-180° (quantitative yield) [123].
- Preparation by reaction of acetic acid on 3,4-dimethylphenol,
  - \*with boron trifluoride at 70° (80%) [980];
  - \*with polyphosphoric acid (75%) [1528].
- Preparation by demethylation of 2-methoxy-4,5-dimethylacetophenone with pyridinium chloride at reflux (81%) [1524].
- Preparation by dehydrogenation of 6-acetyl-3,4-dimethyl-2-cyclohexen-1-one,
  - \*with a 5% palladium-barium sulfate catalyst at reflux [1059];
  - \*with refluxing 16% solution of bromine in acetic acid [1059].
- Also obtained by reaction of sodium methoxide on 2-acetyl-4,5-dimethyl-4-nitro-1,4-dihydrophenyl acetate in methanol [601].
- Also obtained (by-product) by reaction of aluminium chloride on 2,4,5-trimethylphenyl acetate (pseudocumenol acetate) without solvent at 130-140° [112].

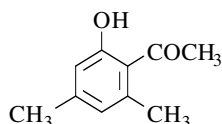
m.p. 74° [123], 71°-72° [1059], 71-72° [601], 71° [112] [980] [1799] [1844],  
 70°-71° [839], 70-71° [142], 70° [1524];  
 b.p.<sub>18</sub> 143-144° [980];  
<sup>1</sup>H NMR [601] [1698], <sup>13</sup>C NMR [736], IR [601] [839], UV [1698],  
 fluorescence spectra [1698], MS [601].

**1-(2-Hydroxy-4,6-dimethylphenyl)ethanone**

[16108-50-2]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

- Preparation by reaction of acetic acid on 3,5-dimethylphenol with boron trifluoride at 60-70° (93%) [980].
- Preparation by Fries rearrangement of 3,5-dimethylphenyl acetate,
  - \*with aluminium chloride,
    - without solvent, between 100 to 150° [109] [123] [143] [345] [497] [1584] [1585] [1654] [1712] [1788], (81-100%) [123] [1584] [1585], (67-75%) [497] [1654];
    - in nitrobenzene at 25° (78%) [1585] or at 60° (67%) [1584];
    - in toluene or xylene at 100° (61-62%) [1584];
    - in refluxing carbon disulfide (60%) [109].
  - \*with titanium tetrachloride,
    - without solvent at 120° (82%) [1585];
    - in nitrobenzene at 25° (86%) [1585].
  - \*with stannic chloride,
    - without solvent at 120° (78%) [1585];
    - in nitrobenzene at 25° (76%) [1585].
  - \*with zinc chloride,
    - without solvent at 120° (54%) [1585];



- in nitrobenzene at 25° (52%) [1585].
- Also obtained by reaction of 2 N sodium hydroxide on 4,6-dimethyl-2-hydroxy- $\alpha,\alpha,\alpha$ -trifluoro-acetoacetophenone at r.t. (quantitative yield) [1885].
- Also obtained by reaction of acetyl chloride,
  - with 3,5-dimethylanisole with aluminium chloride (60-70%) [99];
  - with 3,5-dimethylphenol in refluxing carbon disulfide (60%) [109].
- Also obtained by heating on a steam bath a mixture of 2-acetoxy-4,6-dimethylacetophenone and aluminium chloride (33%) [1712].
- Also obtained by self-condensation of acetylacetone,
  - \*with refluxing 2 N sodium hydroxide, then by heating the residue at 145° [768];
  - \*catalyzed with potassium fluoride in DMF solution [414] [1753], (64%) [414]; also refer to "ERRATUM" [415].
- Also obtained by reaction of acetic anhydride on 3,5-dimethylanisole with aluminium chloride in refluxing carbon disulfide (46%) [651].
- Preparation by dehydrogenation of 6-acetyl-3,5-dimethyl-2-cyclohexen-1-one with a 5% palladium-barium sulfate catalyst at reflux [1059].
- Also obtained by photoreaction of dehydroacetic acid followed by hydrolysis of the obtained dimer (46%) [1712].
- Also obtained by UV light irradiation of 3,5-dimethylphenyl acetate at 25°, in isopropanol or cyclohexane (32%) [724] or in ethyl ether (9%) [724].
- Also refer to: [1927].

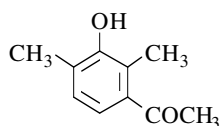
m.p. 62° [980], 60° [123], 59-60° [345], 58-59° [1059], 58° [143] [768],  
 57-58°5 [1654], 57-58° [99] [109], 56-58° [1712] [1753], 55-56° [414] [415];  
 b.p.<sub>18</sub> 140-141° [99] [109], b.p.<sub>15</sub> 140°5-141°5 [980], b.p.<sub>13</sub> 144° [1654];  
<sup>1</sup>H NMR [414] [415] [1753], <sup>13</sup>C NMR [414] [415] [1540], IR [143] [414] [415],  
 MS [414] [415]; pK<sub>a</sub> [1387].

### 1-(3-Hydroxy-2,4-dimethylphenyl)ethanone

[99892-63-4]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20



#### Synthesis

-The 1 $\alpha$ ,6 $\alpha$ ,8 $\alpha$ -trimethyl-2 $\alpha$ -H, 4 $\alpha$ -H, 5 $\alpha$ -H -3,9-dioxatricyclo[3.3.1.0<sup>2,4</sup>]nonan-7-one was rearranged by treatment with sodium ethoxide in ethanol to form 3-hydroxy-2,4-dimethylacetophenone in 11% yield [615].

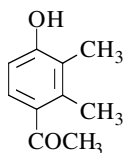
m.p. 70° [615]; <sup>1</sup>H NMR [378], IR [378], MS [378].

### 1-(4-Hydroxy-2,3-dimethylphenyl)ethanone

[5384-57-6]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20



#### Syntheses

-Obtained by Fries rearrangement of 2,3-dimethylphenyl acetate,  
 \*with aluminium chloride, in nitrobenzene at r.t. (50-60%) [661] [1844], in carbon disulfide at r.t. (10%) [1844] or without solvent at 100° (17%) [1025] [1026];  
 \*with titanium tetrachloride without solvent at 100° (6%) [1025] [1026].

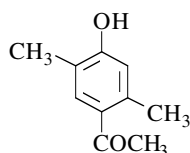
m.p. 148° [1844], 145° [661], 144° [1026].

**1-(4-Hydroxy-2,5-dimethylphenyl)ethanone**

[26216-10-4]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

- Preparation by reaction of acetic acid on 2,5-dimethylphenol with boron trifluoride at 70° (95%) [980].
- Preparation by Fries rearrangement of 2,5-dimethylphenyl acetate with aluminium chloride without solvent at 80-90° (65-70%) [104] [112], (49%) [531].

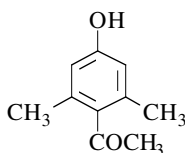
m.p. 131-132° [531] [980], 130-131° [104] [112]; <sup>1</sup>H NMR [531], MS [531].

**1-(4-Hydroxy-2,6-dimethylphenyl)ethanone**

[91060-92-3]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Synthesis**

- Preparation by diazotization of 4-amino-2,6-dimethylacetophenone, followed by hydrolysis of the obtained diazonium salt (68%) [36] [1621].

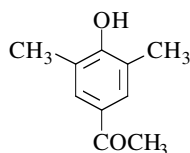
m.p. 119-120° [35] [36] [1540] [1621];  
<sup>1</sup>H NMR [36], <sup>13</sup>C NMR [1540], IR [36], MS [36].

**1-(4-Hydroxy-3,5-dimethylphenyl)ethanone**

[5325-04-2]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

- Preparation by Fries rearrangement of 2,6-dimethylphenyl acetate,  
 \*with aluminium chloride [638], without solvent at 120-140° [102] [603] [604], (81 to 100%) [102], in nitrobenzene at r.t. (75%) [103] or in nitromethane, first at 0°, then at 50° for 48 h under argon atmosphere (61%) [740];  
 \*with aluminium bromide without solvent at 130° (71%) [151].
- Preparation by reaction of 46% hydrobromic acid solution with 4-(benzyloxy)-3,5-dimethylacetophenone in the presence of tetrabutylammonium bromide in refluxing methylene chloride (53%) [205].
- Also obtained by heating various 2,6-dimethyl-4-alkylphenyl acetates\*\* with aluminium chloride without solvent, the reaction being accompanied by an alkyl group elimination,  
 \*\*alkyl = benzyl (quantitative yield) [100], ethyl (50%) [102], (39%) [100], dodecyl (38%) [100], propyl (31%) [100], butyl (27%) [100] and heptyl (12%) [100].
- Also refer to: [1554].

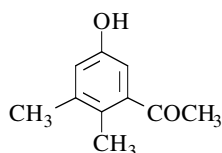
m.p. 162° [205], 156-157° [638], 151-152° [151] [603] [740], 150-151° [102], 150° [103]  
<sup>1</sup>H NMR [205] [638] [740], <sup>13</sup>C NMR [740], IR [205] [740], MS [205] [740].

**1-(5-Hydroxy-2,3-dimethylphenyl)ethanone**

[127701-70-6]

C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

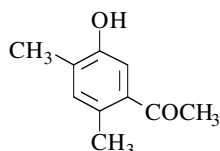
**Synthesis**

-Preparation by rearrangement of 3-acetyl-4,4-dimethyl-cyclohexa-2,5-dienone with 49% sulfuric acid at 20° (quantitative yield) [691].

<sup>1</sup>H NMR [691].

**1-(5-Hydroxy-2,4-dimethylphenyl)ethanone**C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Syntheses**

-Preparation by demethylation of 5-methoxy-2,4-dimethyl-acetophenone with aluminium chloride (50%) [101].

-Also obtained by reaction of acetyl chloride on 2,4-dimethylphenol with aluminium chloride in nitrobenzene at 50° (9%) [458].

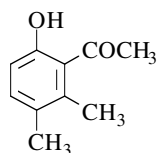
-Also obtained (by-product) by Fries rearrangement of 2,4-dimethylphenyl acetate with aluminium chloride, without solvent [148] or in nitrobenzene at 50° (9%) [458].

-Also obtained by reaction of zinc powder on 5-hydroxy-2,4-dimethyl- $\alpha$ -chloroacetophenone in acetic acid [101].

m.p. 135° [458], 130-131° [101].

**1-(6-Hydroxy-2,3-dimethylphenyl)ethanone**C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 164.20

**Synthesis**

-Preparation by demethylation of 6-methoxy-2,3-dimethyl-acetophenone with aluminium chloride in boiling benzene (30%) [839]. The above keto anisole itself was obtained by reaction of dimethylcadmium on 6-methoxy-2,3-dimethylbenzoyl chloride in boiling benzene.

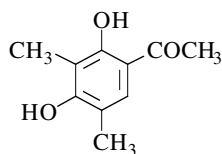
m.p. 73°-8-75° [839]; b.p.<sub>4.5</sub> 126° [839]; IR [839].

**1-(2,4-Dihydroxy-3,5-dimethylphenyl)ethanone (Clavatul)**

[577-45-7]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by reaction of acetonitrile on 2,4-dimethyl-resorcinol (Hoesch reaction) (56-68%) [755] [1259].

-Preparation by reaction of acetic acid on 2,4-dimethyl-resorcinol with zinc chloride (Nencki reaction) [665] [1655].

-Also obtained by reaction of methyl iodide with 2,4-di-

hydroxy-5-methylacetophenone in the presence of potassium hydroxide in methanol, in an ice-chest overnight (19%) [448].

#### From Microorganisms

- Also obtained by hydrolysis of Sorbicillin (a pigment produced by the mold *Penicillium notatum*) with refluxing 2 N sodium hydroxide solution (16%) [448].
- Also obtained by direct methylation of resacetophenone or 3-methylresacetophenone using washed cells of *Streptomyces risomus* [665].
- Isolated in small quantities from cultures of *Aspergillus clavatus* grown in Czapek-Doz medium with molasses as an additional substrate [199] [665].

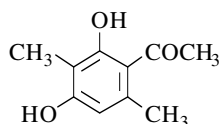
m.p. 184-186° [199], 183° [755], 181-182° [448]; UV [447] [448].

#### 1-(2,4-Dihydroxy-3,6-dimethylphenyl)ethanone

[69082-35-5]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20



#### Syntheses

- Obtained by reaction of methyl iodide with 2,4-dihydroxy-6-methylacetophenone in the presence of potassium hydroxide in methanol in an ice-chest overnight (27%) [448].
- Preparation by reaction of acetonitrile on  $\beta$ -orcinol (1,3-dihydroxy-2,5-dimethylbenzene) (Hoesch reaction) [726] [1351], (70%) [726].

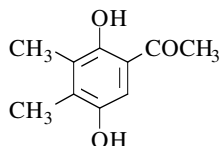
m.p. 153° [1351], 149-150° [448]; <sup>1</sup>H NMR [726], IR [726], UV [447], MS [726].

#### 1-(2,5-Dihydroxy-3,4-dimethylphenyl)ethanone

[71582-59-7]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20



#### Synthesis

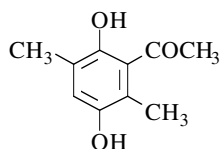
- Preparation by reaction of acetic acid on 2,3-dimethylhydroquinone with boron trifluoride, followed by saponification of the monoacetate [422] [1144] or diacetate [1051] obtained (84-91%) [1051] [1144].

m.p. 151° [1051], 150° [1144].

#### 1-(2,5-Dihydroxy-3,6-dimethylphenyl)ethanone

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20



#### Synthesis

- Obtained (poor yield) by reaction of acetic acid on 2,5-dimethylhydroquinone with boron trifluoride (1%) [1145].

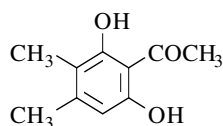
m.p. 88-90° [1145].

**1-(2,6-Dihydroxy-3,4-dimethylphenyl)ethanone**

[7743-16-0]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Obtained from 4,5-dimethylresorcinol by reaction,  
 \*with acetyl chloride in the presence of aluminium chloride in nitrobenzene, first at r.t., then at 60° (9%) [447];  
 \*with acetic acid in the presence of boron trifluoride etherate at reflux [1178].

-Also obtained (by-product) by Fries rearrangement of 4,5-dimethylresorcinol diacetate in the presence of aluminium chloride at 115-120° (10%) [363].

-Preparation by heating a mixture of 2-acetyl-4,5-dihydroxy-4,5-dimethylcyclohexane-1,3-dione and zinc dust in 50% acetic acid at 65° (71%) [363]. The same reaction carried out with 2-acetyl-6-hydroxy-5,6-dimethylcyclohex-4-ene-1,3-dione leads to 82% yield [363].

m.p. 125-127° [363], 122-124° [1178] and 82-83° [447]. One of the reported melting points is obviously wrong.

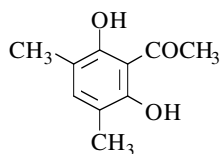
<sup>1</sup>H NMR [363], <sup>13</sup>C NMR [363], IR [363], UV [363] [447].

**1-(2,6-Dihydroxy-3,5-dimethylphenyl)ethanone**

[37467-68-8]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Obtained by reaction of acetic anhydride with 4,6-dimethylresorcinol in the presence of 45% solution of boron trifluoride etherate at r.t. (15%) [447] or boron trifluoride-acetic acid complex for 2 h at 100° [343].

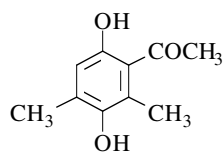
m.p. 144-146° [343], 139-140° [447]; UV [447].

**1-(3,6-Dihydroxy-2,4-dimethylphenyl)ethanone**

[71582-58-6]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

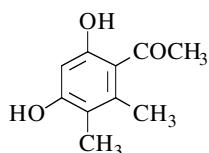
-Preparation by reaction of acetic acid on 2,6-dimethylhydroquinone with boron trifluoride [422] [1145], (76%) [1145].

-Preparation by reaction of ammonium persulfate on 2-hydroxy-4,6-dimethylacetophenone (Elbs reaction) (34%) [67].

m.p. 135-136° [67], 133-134° [1145]; IR [67].

**1-(4,6-Dihydroxy-2,3-dimethylphenyl)ethanone**C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Preparation by reaction of acetonitrile on 3,5-dihydroxy-o-xylene (Hoesch reaction) (69%) [448].

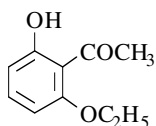
m.p. 155-156° [448]; UV [447].

**1-(2-Ethoxy-6-hydroxyphenyl)ethanone**

[2750-25-6]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Preparation by reaction of ethyl iodide on 2,6-dihydroxyacetophenone with potassium carbonate in refluxing acetone (64%) [1567].

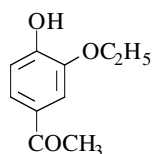
m.p. 84-85° [1567].

**1-(3-Ethoxy-4-hydroxyphenyl)ethanone**

[78268-45-8]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by Fries rearrangement of 2-ethoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (50%) [501].

-Preparation by refluxing 4-(benzyloxy)-3-ethoxyacetophenone in mixture of acetic acid and hydrochloric acid [549] according to [670].

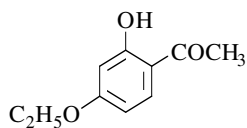
m.p. 66° [501], 59-60° [549]; <sup>1</sup>H NMR [501].

**1-(4-Ethoxy-2-hydroxyphenyl)ethanone**

[37470-42-1]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by reaction of ethyl iodide on resacetophenone, \*with potassium hydroxide in refluxing ethanol [364] [418] [578] [702] [1012] [1775] [1776], (25%) [364] or boiling acetone [982];

\*with potassium carbonate in boiling acetone [313] [1652], (88%) [1652].

-Also obtained by reaction of aluminium chloride on 2,4-diethoxyacetophenone [418].

-Also refer to: [63] and [172] (compound 1e).

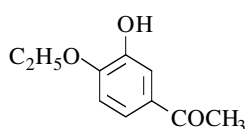
m.p. 50° [1776] [1777], 49-50° [982] [1652], 49° [364] [1012], 48° [418] [578] [702], 45-46° [313]; UV [1776] [1777].

**1-(4-Ethoxy-3-hydroxyphenyl)ethanone**

[78269-19-9]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Preparation by Fries rearrangement of 2-ethoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (50%) [501].

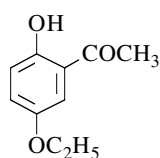
m.p. 100° [501]; <sup>1</sup>H NMR [501].

**1-(5-Ethoxy-2-hydroxyphenyl)ethanone**

[56414-14-3]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by reaction of ethyl bromide with quinacetophenone in the presence of potassium hydroxide in boiling ethanol [1014].

-Also obtained by condensation of hydroquinone diethyl ether with acetyl chloride according to the Friedel-Crafts method [106] [189].

-Also obtained by reaction of aluminium chloride on quinacetophenone diethyl ether [106] [189].

-Also obtained by alkaline degradation of 6,3'-diethoxyflavone\* with sodium ethoxide in refluxing ethanol for some hours [236]. **N.B.:** Former nomenclature (2,3'-diethoxyflavone\*).

-Refer to: [184] [1479] [1666].

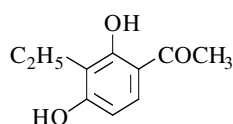
m.p. 57° [1014], 55° [106] [189].

**1-(3-Ethyl-2,4-dihydroxyphenyl)ethanone**

[111224-13-6]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by reaction of acetic acid on 2-ethylresorcinol with zinc chloride (Nencki reaction) at 140° [1096] [1499] [1521], (73%) [1096].

-Preparation from 2-ethylresorcinol (SM) by reaction with acetyl chloride in the presence of aluminium chloride. The starting material (SM) was prepared by a three-step procedure from resorcinol dimethyl ether [1158].

-Also obtained by alkaline degradation of 8-acetyl-6-ethyl-4-methylumbelliferone (m.p. 137°) in refluxing N sodium hydroxide for 1 h (96%) [1097].

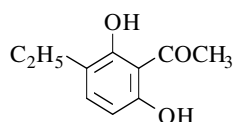
m.p. 137° [1096], 130° [1097]; <sup>1</sup>H NMR [1158], MS [1158].

**1-(3-Ethyl-2,6-dihydroxyphenyl)ethanone**

[54337-59-6]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by degradation of 8-acetyl-6-ethyl-7-hydroxy-4-methylcoumarin with refluxing 2 N sodium hydroxide [507].

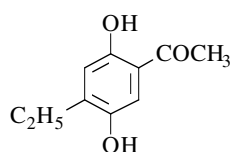
-Preparation by decarboxylation of 3-acetyl-5-ethyl-2,4-dihydroxybenzoic acid,  
 \*with refluxing aqueous hydrochloric acid (62%) [1595];  
 \*with 10% aqueous sodium hydroxide heated in a sand bath [507].  
 -Also refer to: [343].

m.p. 135° [507], 130° [1595].

#### 1-(4-Ethyl-2,5-dihydroxyphenyl)ethanone

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20



##### Synthesis

-Obtained (poor yield) by reaction of aqueous ammonium persulfate solution on 4-ethyl-2-hydroxyacetophenone with 10% potassium hydroxide, in aqueous pyridine solution at r.t. (3%) [1461].

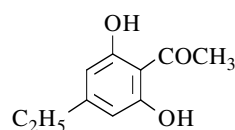
m.p. 100° [1461].

#### 1-(4-Ethyl-2,6-dihydroxyphenyl)ethanone

[209746-96-3]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20



##### Synthesis

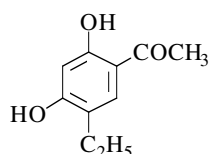
-Refer to: [1819].

#### 1-(5-Ethyl-2,4-dihydroxyphenyl)ethanone

[4460-42-8]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20



##### Syntheses

-Preparation by reaction of acetic acid on 4-ethylresorcinol with zinc chloride (Nencki reaction) [777] [930] [1151] [1606] [1879], (67-77%) [777] [1606] [1879].  
 -Preparation by Fries rearrangement of 4-ethylresorcinol diacetate with aluminium chloride in nitrobenzene at 50-60° (quantitative yield) [1514] or without solvent at 40-50° (47%) [1514].  
 -Preparation by reaction of acetonitrile on 4-ethylresorcinol (Hoesch reaction) [1151] [1606].  
 -Preparation from 5-ethyl-2-hydroxy-4-methoxyacetophenone by demethylation with boiling pyridinium chloride (40%) [1521].  
 -Preparation from 5-ethyl-2,4-dimethoxyacetophenone by demethylation with boron tribromide in methylene chloride at r.t. (36%) [256] [257].  
 -Also obtained by hydrolysis of 6-ethyl-7-hydroxy-2-methylchromone with refluxing aqueous 1 N sodium hydroxide solution [509].

m.p. 118-119° [1606], 118° [509] [1151], 117-118° [1514], 116° [1521], 115-116° [777], 115° [1277] [1879].

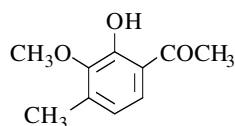


**1-(2-Hydroxy-3-methoxy-4-methylphenyl)ethanone**

[77869-43-3]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Isolated as a co-product from the preparation of 2,3-dimethoxy-4-methylacetophenone, obtained by conversion of 2,3-dimethoxy-4-methylbenzoyl chloride with methyl cadmium (10%) [1235].

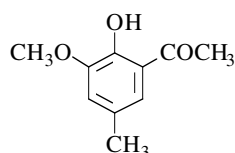
crystalline compound [1235]; <sup>1</sup>H NMR [1235], MS [1235].

**1-(2-Hydroxy-3-methoxy-5-methylphenyl)ethanone**

[7452-85-9]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by reaction of methylmagnesium iodide on 2-acetoxy-3-methoxy-5-methylbenzonitrile in refluxing ethyl ether (72%) [298].  
 -Preparation by Fries rearrangement of 2-methoxy-4-methylphenyl acetate with aluminium chloride without solvent (24%) [148].

-Also obtained by reaction of dimethyl sulfate on 2,3-dihydroxy-5-methylacetophenone with potassium carbonate in acetone (18%) [473].

-Preparation by UV light irradiation (photo-Fries rearrangement) of 2-methoxy-4-methylphenyl acetate (creosol acetate) in ethanol (68%), in benzene or in hexane (56-55%) [280].

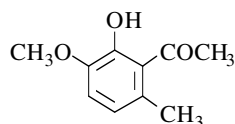
m.p. 84-85° [473], 82-84° [298]; <sup>1</sup>H NMR [280], IR [280].

**1-(2-Hydroxy-3-methoxy-6-methylphenyl)ethanone**

[4223-86-3]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by partial demethylation of 2,3-dimethoxy-6-methylacetophenone with aluminium chloride in refluxing methylene chloride (77%) [1873].  
 -Preparation by chromic acid degradation of 7-methoxy-2,3,4-trimethylbenzofuran (46%) [1521].

-Also obtained (poor yield) by photo-Fries rearrangement of 2-methoxy-5-methylphenyl acetate in ethanol under nitrogen (2%) [247].

pale yellow oil [247] [1521] [1873]; b.p.<sub>12</sub> 156-158° [1521];

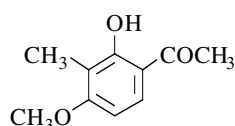
<sup>23</sup>n<sub>D</sub> = 1.5527 [1521]; <sup>1</sup>H NMR [247], <sup>13</sup>C NMR [1873], IR [247] [1873].

**1-(2-Hydroxy-4-methoxy-3-methylphenyl)ethanone**

[69469-91-6]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Preparation by reaction of acetonitrile on 3-methoxy-2-methylphenol (Hoesch reaction) (46%) [910].
- Preparation by reaction of methyl iodide on resacetophenone,

\*with potassium hydroxide in refluxing methanol [702] [1455] [1501], (19-25%) [1455] [1464] [1501];

\*with sodium methoxide in boiling methanol [1411].

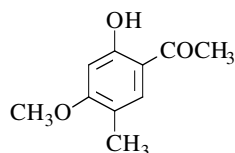
m.p. 83-84° [1411] [1455], 83° [910], 82-83° [1464], 80-82° [1501], 80-81° [702].

**1-(2-Hydroxy-4-methoxy-5-methylphenyl)ethanone**

[81511-52-6]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Preparation by partial methylation of 2,4-dihydroxy-5-methylacetophenone,
- \*with methyl iodide in the presence of potassium carbonate in refluxing acetone (78%) [1185];
- \*with diazomethane in solution of ethyl ether-methanol mixture (92%) [1259].

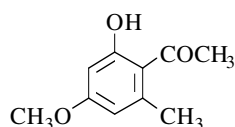
m.p. 94° [1185].

**1-(2-Hydroxy-4-methoxy-6-methylphenyl)ethanone** (*Acetoevernone*)

[6540-66-5]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Preparation by partial methylation of 2,4-dihydroxy-6-methylacetophenone (orcacetophenone or β-orcacetophenone), with diazomethane (78%) [1705] or dimethyl sulfate [790] [1598].
- Preparation by Fries rearrangement of 3-methoxy-5-methylphenyl acetate with aluminium chloride in nitrobenzene at r.t. (52%) [1196] [1202].
- Preparation by reaction of acetonitrile on 3-methoxy-5-methylphenol with zinc chloride and hydrochloric acid in ethyl ether at r.t. (Hoesch reaction) [790] [860], (28%) [790].
- Also obtained (by-product) by reaction of acetyl chloride on orcinol dimethyl ether with aluminium chloride in carbon disulfide at r.t. [14] [723] [1705] [1761], (5-8%) [723] [1705].

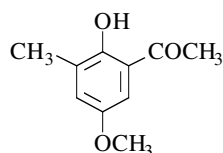
m.p. 79-80° [723], 79° [790] [860] [1196] [1202] [1761], 78-78°5 [1705];  
<sup>1</sup>H NMR [723] [1705], IR [723] [1705], UV [723] [1705], MS [723] [1705].

**1-(2-Hydroxy-5-methoxy-3-methylphenyl)ethanone**

[77936-48-2]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Preparation by Fries rearrangement of 4-methoxy-2-methylphenyl acetate,
- \*with boron trifluoride in ethylene dichloride for 3 h (97%) [20];
- \*with aluminium chloride (11%) [148].

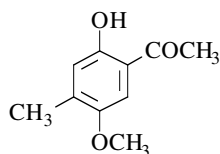
m.p. 52-53° [20]; sublimation 54-58°/0.2 mm [20];  
<sup>1</sup>H NMR [20], IR [20], MS [20] [267].

**1-(2-Hydroxy-5-methoxy-4-methylphenyl)ethanone**

[4223-84-1]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Obtained by reaction of acetyl chloride on 2,5-dimethoxy-4-isopropyltoluene with aluminium chloride in boiling carbon disulfide (14%) [1524].
- Also obtained by chromic acid degradation of 5-methoxy-2,3,6-trimethylbenzofuran (10%) [1521].
- Also obtained (by-product) by reaction of acetyl chloride with 2,5-dimethoxytoluene in the presence of aluminium chloride in carbon disulfide at 20-25° (4%) [1741].
- Also obtained by photo-Fries rearrangement of 4-methoxy-3-methylphenyl acetate in ethanol under nitrogen (19%) [247].

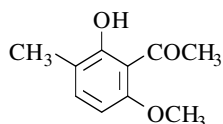
m.p. 114° [1741], 112° [1524], 111-112° [1521]; <sup>1</sup>H NMR [1741], IR [1741].

**1-(2-Hydroxy-6-methoxy-3-methylphenyl)ethanone**

[56504-43-9]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Preparation by partial methylation of 2,6-dihydroxy-3-methylacetophenone,
- \*with methyl iodide in the presence of potassium carbonate in refluxing acetone (55%) [1185];
- \*with diazomethane in ethyl ether at r.t. (16%) [1746].
- Also obtained by reduction of 3-formyl-2-hydroxy-6-methoxyacetophenone with hydrochloric acid and amalgamated zinc in methanol at 50° (11%) [1185].

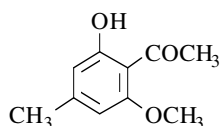
m.p. 59° [1185], 58° [1746]; <sup>1</sup>H NMR [1746], IR [1746].

**1-(2-Hydroxy-6-methoxy-4-methylphenyl)ethanone**

[31405-63-7]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

-Preparation by reaction of acetic anhydride on orcinol monomethyl ether with concentrated sulfuric acid, at reflux (45%) [860].

-Also obtained by reaction of dimethyl sulfate on 2,6-dihydroxy-4-methylacetophenone (p-oracetophenone) with sodium hydroxide [860] or potassium hydroxide [1121].

-Also obtained by reaction of acetyl chloride on orcinol dimethyl ether with aluminium chloride in carbon disulfide at r.t. [723] [1705] [1761], (11%) [723], (4%) [1705].

m.p. 81° [860], 80-81° [1705], 76-77° [1760], 74-75° [723];

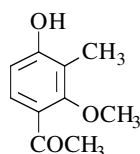
<sup>1</sup>H NMR [723] [1705], IR [723] [1705], UV [723] [1705], MS [723] [1705].

**1-(4-Hydroxy-2-methoxy-3-methylphenyl)ethanone**

[118824-97-8]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

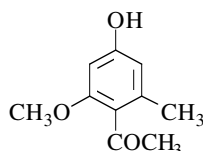
-Preparation by catalytic hydrogenolysis of 4-(benzyloxy)-2-methoxy-3-methylacetophenone at r.t. under pressure in the presence of 10% Pd/C in ethanol (92%) [1470], (84%) [912].

m.p. 130-132° [1470], 130° [912];

<sup>1</sup>H NMR [1470], IR [1470], MS [1470].

**1-(4-Hydroxy-2-methoxy-6-methylphenyl)ethanone** (*Isoacetovernone*)C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

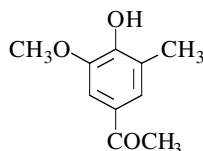
**Synthesis**

-Preparation by reaction of acetonitrile on orcinol monomethyl ether (Hoesch reaction) (32%) [790].

m.p. 150° [790].

**1-(4-Hydroxy-3-methoxy-5-methylphenyl)ethanone**C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Preparation by Fries rearrangement of 2-methoxy-6-methylphenyl acetate with aluminium chloride in refluxing carbon disulfide (58%) [561].

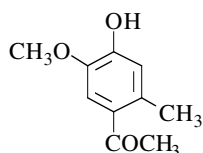
m.p. 94° [561].

**1-(4-Hydroxy-5-methoxy-2-methylphenyl)ethanone**

[162853-20-5]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Preparation by reaction of acetyl chloride on isocresol (2-methoxy-5-methylphenol) with aluminium chloride in nitrobenzene at r.t. (87%) [582].
- Preparation by Fries rearrangement of isocresol acetate with aluminium chloride in nitrobenzene at r.t. (75%) [305].

-Also obtained by photo-Fries rearrangement of 2-methoxy-5-methylphenyl acetate under nitrogen in ethanol (20%) [247] or in methanol at 254 nm at r.t. (21%) [1703].

m.p. 167-168° [1703], 124° [305], 123° [582];

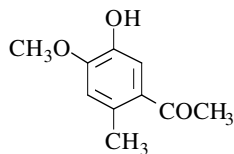
<sup>1</sup>H NMR [1703], <sup>13</sup>C NMR [1703], IR [1703], MS [1703].

**1-(5-Hydroxy-4-methoxy-2-methylphenyl)ethanone**

[6948-37-4]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Syntheses**

- Preparation by reaction of acetic acid on creosol (2-methoxy-4-methylphenol) with boron trifluoride at 25° [280] [473], (88%) [473].
- Preparation by Fries rearrangement of creosol acetate with aluminium chloride, in methylene chloride at 0° [1275]

or at 20° (82%) [1169], in nitrobenzene at 80° (70%) [1150] or without solvent (8%) [148].

-Also obtained by reaction of acetyl chloride on homoveratrole (3,4-dimethoxytoluene) with aluminium chloride in carbon disulfide [585].

m.p. 129-130° [473], 129° [1150] [1169], 128-129° [1275], 124-126° [280], 123° [585];

<sup>1</sup>H NMR [280] [1169], (Sadler: standard n°49332 M);

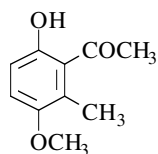
IR [280] [1169], (Sadler: standard n° 76405 K); UV [1169].

**1-(6-Hydroxy-3-methoxy-2-methylphenyl)ethanone**

[71452-36-3]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

- Obtained by photo-Fries rearrangement of 4-methoxy-3-methylphenyl acetate in ethanol under nitrogen (18%) [247].

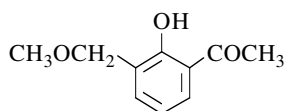
oil [247]; <sup>1</sup>H NMR [247], IR [247], MS [247].

**1-[2-Hydroxy-3-(methoxymethyl)phenyl]ethanone**

[87165-50-2]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Preparation from 3-chloromethyl-2-hydroxyacetophenone (m.p. 45°) by reaction with methanol in the presence of concentrated hydrochloric acid and iron powder at reflux for 3.5 to 4 h (88%) [289].

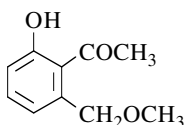
b.p.<sub>0.3</sub> 89-91° [289]; <sup>1</sup>H NMR [289], IR [289].

**1-[2-Hydroxy-6-(methoxymethyl)phenyl]ethanone**

[161358-64-1]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 180.20

**Synthesis**

-Obtained by treatment of 2-(methoxymethoxy)-6-(methoxymethyl)acetophenone with aqueous trifluoroacetic acid at r.t. for 16 h (93%) [435].

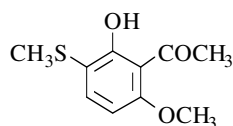
pale yellow oil [435]; b.p.<sub>1</sub> 165-170° [435];  
<sup>1</sup>H NMR [435], IR [435], MS [435].

**1-[2-Hydroxy-6-methoxy-3-(methylthio)phenyl]ethanone**

[126405-81-0]

C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>S

mol.wt. 212.27

**Synthesis**

-Preparation by adding 2-hydroxy-3-iodo-6-methoxyacetophenone and cuprous oxide to a solution of sodium methyl sulfhydrate, first prepared from methanethiol and sodium hydride in DMF [1873].

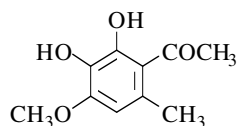
m.p. 83° [1873]; <sup>1</sup>H NMR [1873], IR [1873].

**1-(2,3-Dihydroxy-4-methoxy-6-methylphenyl)ethanone**

[127940-12-9]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Synthesis**

-Preparation by reaction of acetyl chloride on 1,2,3-trimethoxy-5-methylbenzene with aluminium chloride in refluxing methylene chloride (45%) [1782].

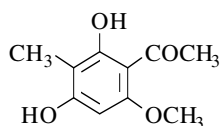
m.p. 132° [1782]; <sup>1</sup>H NMR [1782], <sup>13</sup>C NMR [1782], IR [1782], MS [1782].

**1-(2,4-Dihydroxy-6-methoxy-3-methylphenyl)ethanone**

[83459-37-4]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation by reduction of 3-formyl-2,4-dihydroxy-6-methoxyacetophenone with hydrochloric acid and amalgamated zinc in gently heated aqueous methanol (64%) [1500].

-Also obtained by reaction of acetonitrile on 3,5-dihydroxy-4-methylanisole (Hoesch reaction) [470].

**Isolation from natural sources**

-From Yuexiandaji (*Euphorbia ebracteolata*) [1951].

-From the roots of *Euphorbia ebracteolata* Hayata [536] [1950].

-From *Pancratium maritimum* (Amaryllidaceae) [1931].

m.p. 225° [1500], 224° [470], 202-203° (d) [1931]; HPLC [1951];

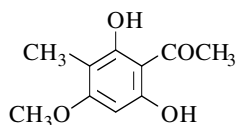
<sup>1</sup>H NMR [1931], <sup>13</sup>C NMR [1931], IR [1931], EIMS [1931], HRMS [1931].

**1-(2,6-Dihydroxy-4-methoxy-3-methylphenyl)ethanone**

[69480-06-4]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation by reaction of acetonitrile on 3,5-dihydroxy-2-methylanisole (Hoesch reaction) (73%) [470].

-Also obtained by reaction of 2 N aqueous sodium hydroxide on 2,4-diacetyl-3,5-dihydroxy-6-methylanisole at 80° (decarbonylation reaction) [494].

-Preparation by catalytic hydrogenolysis of 6-(benzyloxy)-2-hydroxy-4-methoxy-3-methylacetophenone in the presence of Pd/C in acetic acid (75%) [1186].

-Also obtained (by-product) by reaction of acetic anhydride on 3,5-dihydroxy-2-methylanisole with boron trifluoride in ethyl ether at 20° [494].

**Isolation from natural sources**

-From the pericarps of *Mallotus japonicus* Muell. Arg. (Euphorbiaceae) [77] [78] [1017].

-Also obtained by reductive alkaline cleavage of 3-(3,3-dimethylallyl)-5-(3-acetyl-2,4-dihydroxy-5-methyl-6-methoxybenzyl)phloroacetophenone (I) [1622], according to [1115]. The ketone (I) was isolated from *Mallotus japonicus* (Euphorbiaceae) [1622].

m.p. 200-201° [1017], 198° [494], 197-200° [1622], 197-198° [470], 196-198° [78], 196° [1186];

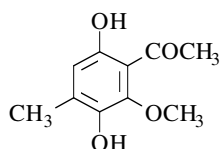
<sup>1</sup>H NMR [78] [1017] [1622], UV [78], MS [78] [1017] [1622].

**1-(3,6-Dihydroxy-2-methoxy-4-methylphenyl)ethanone**

[90377-24-5]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



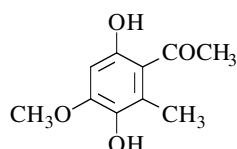
Isolation from natural sources

-From *Trocholejeunea sandvicensis* (Lejeuneaceae) [87].**1-(3,6-Dihydroxy-4-methoxy-2-methylphenyl)ethanone**

[68531-86-2]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



Synthesis

-Preparation by nuclear oxidation of 2-hydroxy-4-methoxy-6-methylacetophenone with alkaline persulfate (Elbs reaction) (45%) [16].

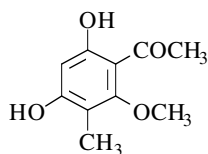
m.p. 164-165° [16].

**1-(4,6-Dihydroxy-2-methoxy-3-methylphenyl)ethanone** (*Pseudoaspidinol-A*)

[52200-61-0]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



Syntheses

-Preparation by catalytic hydrogenolysis of 4,6-bis-(benzyloxy)-2-methoxy-3-methylacetophenone in the presence of Pd/C in acetic acid (quantitative yield) [1883], (86%) [1186].

-Preparation by reaction of dimethyl sulfate on 4,6-bis-(benzyloxy)-2-hydroxy-3-methylacetophenone with

potassium carbonate in boiling acetone (46%) [1883].

-Also obtained by heating methyl 5-acetyl-2,6-dihydroxy-4-methoxy-3-methylbenzoate in aqueous glycerol at 180-200° for 30 min (29%) [1563].

-Also refer to: [219] [1184].

Isolation from natural sources

-From *stereocaulon vesuvianum*, a foliose lichen, abundantly growing over volcanic rocks [258].

m.p. 143-144° [258], 142° [1186] [1883], 138-140° [1563]; TLC [258];

<sup>1</sup>H NMR [258] [1563], IR [258] [1563], UV [258], MS [258].

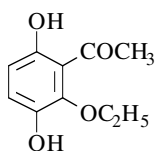


**1-(2-Ethoxy-3,6-dihydroxyphenyl)ethanone**

[33539-21-8]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

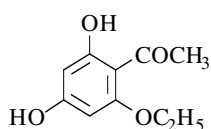
mol.wt. 196.20

**Syntheses**

- Easy preparation by reduction of 2-acetyl-3-ethoxy-1,4-benzoquinone using conventional methods [587].
- Also obtained (low yield) by reaction of 2-acetyl-1,4-benzoquinone with an excess of ethanol at r.t., with exclusion of light [587].

m.p. 102-103°5 [587]; <sup>1</sup>H NMR [587], IR [587].**1-(2-Ethoxy-4,6-dihydroxyphenyl)ethanone**C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

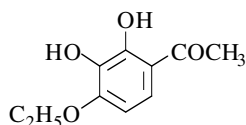
**Synthesis**

- Preparation by reaction of acetonitrile on phloroglucinol monoethyl ether (Hoesch reaction) (63%) [73].

m.p. 178° [73].

**1-(4-Ethoxy-2,3-dihydroxyphenyl)ethanone**C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

- Preparation by reaction of ethyl iodide on gallacetophenone monopotassium salt in boiling methanol [1409].
- Preparation by reaction of hydrobromic acid with

2,4-diethoxy-3-methoxyacetophenone (43%) or 3,4-diethoxy-2-hydroxyacetophenone (20%) in acetic acid at r.t. [663].

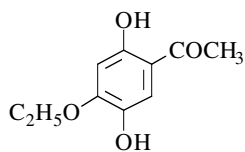
m.p. 102°2-103°2 [663], 102° [1408] [1409].

**1-(4-Ethoxy-2,5-dihydroxyphenyl)ethanone**

[58084-93-8]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Synthesis**

- Preparation from 4-ethoxy-2-hydroxyacetophenone by persulfate oxidation (Elbs reaction) (quantitative yield) [1652], (24%) [212].

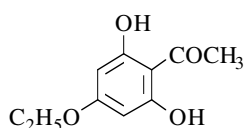
m.p. 129-130° [212], 125-126° [1652]; <sup>1</sup>H NMR [1652].

**1-(4-Ethoxy-2,6-dihydroxyphenyl)ethanone**

[35028-01-4]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Synthesis**

-Preparation from 2,4-diacetyl-5-ethoxyresorcinol by selective deacetylation by refluxing in 1 N sodium hydroxide for 1 h [342].

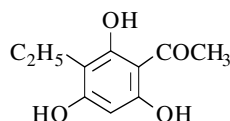
m.p. 164-165° [342]; <sup>1</sup>H NMR [342].

**1-(3-Ethyl-2,4,6-trihydroxyphenyl)ethanone**

[84653-58-7]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Synthesis**

-Refer to: [350] (compound **VII**).

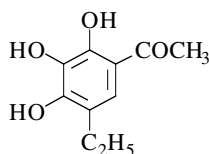
m.p. 187-189° [350]; <sup>1</sup>H NMR [350].

**1-(5-Ethyl-2,3,4-trihydroxyphenyl)ethanone**

[86989-84-6]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation by reaction of acetyl chloride on 4-ethyl-pyrogallol with aluminium chloride [420].  
 -Preparation by reaction of acetic acid with 4-ethylpyrogallol in the presence of boron trifluoride in ethyl ether at 0° (78%) [347].

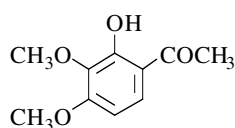
m.p. 141° [347] [420]; UV [347].

**1-(2-Hydroxy-3,4-dimethoxyphenyl)ethanone**

[5396-18-9]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation by reaction of acetyl chloride on pyrogallol trimethyl ether,  
 \*with aluminium chloride in carbon disulfide [169] [282] [1412] [1413] [1444], (50%) [1444], in boiling ethyl ether (77%) [1357] or in benzene at 45-50° (77%) [635];

\*with mercuric chloride without solvent at 100° (40%) [1153] [1154].

-Preparation by Fries rearrangement of 2,3-dimethoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (61%) [1196] [1202].

-Preparation by partial methylation of gallacetophenone,

\*with methyl iodide,

-in the presence of sodium methoxide in boiling methanol [1410] [1411];

-in the presence of potassium carbonate in refluxing acetone (47%) [196] or in acetone-DMF mixture [831].

\*with dimethyl sulfate,

-in the presence of potassium carbonate in refluxing benzene (65%) [135], (51%) [141];

-in the presence of 40% potassium hydroxide [282] [483] [1194].

-Preparation by partial methylation of 2,3-dihydroxy-4-methoxyacetophenone with methyl iodide in the presence of potassium hydroxide in methanol [1408] [1409].

-Also obtained by selective demethylation of 2,3,4-trimethoxyacetophenone,

\*with boron trichloride in methylene chloride at 0° (88%) [1083];

\*with aluminium chloride in refluxing ethyl ether [736] or in acetonitrile at 30° for 3 h (95%) [962];

\*with aniline hydriodide in aniline for 7 h at 95° (54%) [1351];

\*with cupric bromide in refluxing chloroform-ethyl acetate mixture (4%) [894].

m.p. 83° [169] [1351], 78-80° [282], 78-79° [196] [483] [635] [1194] [1196] [1202],

78° [831], 77-78° [1409] [1410] [1411], 77° [135] [1412] [1413] [1444],

75-77° [141], 72-76° [1083], 68-72° [894],

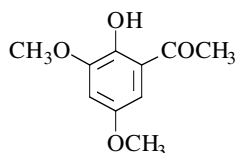
<sup>1</sup>H NMR [635] [894] [1083], <sup>13</sup>C NMR [736], IR [635] [1083].

### 1-(2-Hydroxy-3,5-dimethoxyphenyl)ethanone

[17605-00-4]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



#### Syntheses

-Preparation by reaction of dimethyl sulfate on 2,5-dihydroxy-3-methoxyacetophenone with potassium carbonate in refluxing acetone (54%) [1643].

-Preparation by photo-Fries rearrangement of 2,4-dimethoxyphenyl acetate in ethanol (61%) or in benzene (55%) [280].

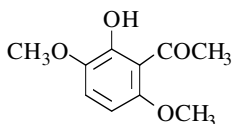
m.p. 84-86° [1643]; <sup>1</sup>H NMR [280], IR [280].

### 1-(2-Hydroxy-3,6-dimethoxyphenyl)ethanone

[52099-27-1]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



#### Synthesis

-Preparation by reaction of concentrated hydrochloric acid on 2-(benzyloxy)-3,6-dimethoxyacetophenone in acetic acid at 60° (99%) [140].

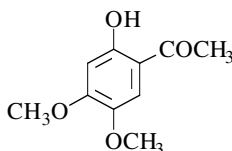
m.p. 61° [140].

### 1-(2-Hydroxy-4,5-dimethoxyphenyl)ethanone

[20628-06-2]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



#### Syntheses

-Preparation by partial methylation of 2,5-dihydroxy-4-methoxyacetophenone,

\*with methyl iodide in the presence of potassium carbonate in refluxing acetone (81%) [118];

\*with dimethyl sulfate in the presence of potassium

carbonate in refluxing acetone (71%) [1900], in the presence of sodium methoxide in methanol (by-product) [147] [156] [157] [164] or in the presence of sodium hydroxide in boiling aqueous ethanol (37%) [1196] [1202];

\*with an excess of ethereal diazomethane in methanol (93%) [971].

-Preparation by reaction of acetonitrile on 3,4-dimethoxyphenol with zinc chloride (Hoesch reaction) (47%) [911].

-Also obtained (by-product) by reaction of acetyl chloride on 1,2,4-trimethoxybenzene with aluminium chloride in carbon disulfide at r.t. [147] [158] [164].

-Also obtained by partial demethylation of 2,4,5-trimethoxyacetophenone with boiling aqueous hydrochloric acid [147] [164] or aluminium chloride in acetonitrile for 6 h at 45° (50%) [962].

-Preparation by reaction of boiling acetic acid on 3,4-dimethoxyphenyldiazonium borofluoride. The 3,4-dimethoxyphenyl acetate which was first formed was rearranged by the boron trifluoride produced during the reaction (62%) [1653].

-Also refer to: [41].

#### Isolation from natural sources

-From various plants belonging to the Polypodiaceae family, namely *Inomotosou* (*Pteris multifida* Poiret), *Oobainomotosou* (*Pteris cretica* L.) and *Hitotsuba* (*Pyrrosia "ingua* Farw.) [1353].

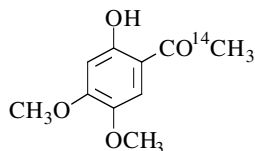
m.p. 115° [164], 114-116° [1900], 114-115° [156] [157], 112-114° [971],  
112° [118] [911] [1653], 111-112° [1196] [1202]; b.p.<sub>0.004</sub> 125° [911];  
GC [1353], GC-MS [1353];  
<sup>1</sup>H NMR [118], <sup>13</sup>C NMR [897], IR [118] [1353].

#### 1-(2-Hydroxy-4,5-dimethoxyphenyl)ethanone-2-<sup>14</sup>C

[77184-92-0]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 198.20



#### Synthesis

-Preparation by heating a mixture of 3,4-dimethoxyphenol, boron trifluoride-acetic acid complex and sodium acetate-2-<sup>14</sup>C (250 μCi) at 100° for 25 min (54%) [729].

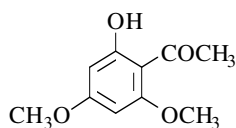
m.p. 112-113° [729];  
specific radioactivity 1.50 μCi/mmol [729].

#### 1-(2-Hydroxy-4,6-dimethoxyphenyl)ethanone (*Xanthoxylin*; *Brevifolin*)

[90-24-4]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



#### Syntheses

-Preparation by reaction of acetonitrile on phloroglucinol dimethyl ether (Hoesch reaction) [352] [1037].

-Also obtained by partial methylation of phloracetophenone, \*with dimethyl sulfate in the presence of potassium carbonate

in refluxing acetone [481] [866], (86%) [481] or in solution of acetone-benzene mixture at reflux (78-83%) [416] [721] [1302], (65%) [1551];

\*with diazomethane in ethyl ether, at r.t. [1262] [1673];

\*with methyl iodide in the presence of potassium carbonate in boiling acetone (83%) [841], (6%) [1564].

-Also obtained by partial methylation of 2,4-dihydroxy-6-methoxyacetophenone [1675] or 2,6-dihydroxy-4-methoxyacetophenone with diazomethane [85] [1675], (quantitative yield) [85].

-Preparation by acetylation of phloroglucinol dimethyl ether,

- \*with the boron trifluoride-acetic acid complex at 100° (24%) [1146];
- \*with a mixture of acetic anhydride-acetic acid in the presence of boron trifluoride at 0° (54%) [1129];
- \*with acetic anhydride in the presence of boron trifluoride in ethyl ether at 15° (49%) [494];
- \*with acetylating complex mixture at 60° (17%) [1176].
- Preparation by partial demethylation of phloracetophenone trimethyl ether,
- \*with hydriodic acid in acetic anhydride at r.t. (96%) [840];
- \*with aluminium chloride [194] [962] [1013] [1140] [1625], in nitrobenzene (sole product) [1140], in acetonitrile for 6 h at 45° (90%) [962], in boiling ethyl ether (79%) [194] or without solvent at 110° (30%) [1013];
- \*with hydrobromic acid in acetic acid [840].
- Also obtained by reaction of boron trifluoride etherate on 2,4-diacetyl-3,5-dimethoxyphenol in acetic acid (61%) [494].
- Also obtained (major product) by reaction of acetyl chloride on phloroglucinol trimethyl ether with aluminium chloride in boiling petroleum ether [630].
- Preparation by UV light irradiation of 3,5-dimethoxyphenyl acetate at 25° [724] (photo-Fries rearrangement), in cyclohexane (62%), in isopropanol (45%) or in ethyl ether (32%).

## Isolation from natural sources

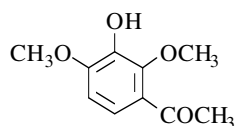
- From the Bark of *Phytophthora* — and *Hendersonula* — infected *Citrus limon* [752].
  - From *Xanthoxylum piperitum* De Candolle [1688] [1689], from the essential oils of *Xanthoxylum aubertia* (*Evodia aubertia*) (10%) [1580] and of *Xanthoxylum alatum* Roxb. (Rutaceae) [1580].
  - From the root bark of *Fagara okinawaensis* Nakai (0.5%) [1262].
  - From the leaves of *Hippomane mancinella* L. [1559].
  - From the essential oil of *Artemisia brevifolia* Wallich [1656] or indigenous species of *Artemisia gallica* Willd. [890].
  - From the essential oil of *Eucalyptus Bakeri* Maiden [1402].
  - From various species of *Geijera* [1402].
  - From *Blumea balsamifera* DC [908] [909].
  - A new flavone, hinokiflavone was obtained from the leaves of *Chamaecyparis obtusa* Endlicher (Cupressaceae) [951]. Hinokiflavone pentamethyl ether treated with alkali gave Xanthoxylin, \*with potassium hydroxide [644];
  - \*by boiling in methanolic barium hydroxide solution (77%) [952].
  - A flavonoid, Sciadopitysin, was obtained from the leaves of *Sciadopitys verticillata*. Xanthoxylin was obtained in high yield by degradation of sciadopitysin trimethyl ether in boiling methanolic barium hydroxide solution [952] [965].
  - A flavonoid, Tricin, was obtained from the Khapli wheat leaves (*Triticum Dicoccum*). Xanthoxylin was obtained by degradation of tricin trimethyl ether in boiling 80% solution of potassium hydroxide in ethanol [56].
  - In the steam distillates of resins from *Xanthorrhoea preissi*, *Xanthorrhoea reflexa*, *Xanthorrhoea tateana* F. Muell. and *Xanthorrhoea arborea* R. Br. [223] [596] [875] [1484].
- m.p. 87-88° [879], 86° [866], 85-88° [630], 85° [1580], 84-85° [1037] [1176], 83°5' [1559], 83° [721] [1673], 82-83° [373] [908] [1013] [1262] [1263] [1302] [1402] [1551], 82° [223] [481] [570] [1129] [1146], 81°5' [494], 81° [194], 80°5'-81° [752], 80-85° [56], 80-81° [2] [352], 80° [1656], 79° [596] [1484], 78°5'-79°5' [841], 78-80° [1689], 78-79° [416] [1564];
- b.p.<sub>18</sub> 175-185° [596], b.p.<sub>20</sub> 185° [1484].
- <sup>1</sup>H NMR [622] [752] [841], <sup>13</sup>C NMR [736], IR [622] [752] [841] [866] [1262], UV [570] [752] [1559], MS [752] [841].

**1-(3-Hydroxy-2,4-dimethoxyphenyl)ethanone**

[23133-83-7]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation from 2,6-dimethoxyphenol or its acetate by reaction of refluxing acetic anhydride in the presence of few drops of concentrated sulfuric acid, followed by saponification of 3-acetoxy-2,4-dimethoxyacetophenone formed with 2 N sodium hydroxide (good yield) [282].

-Preparation from 3-acetoxy-2,4-dimethoxyacetophenone by hydrolysis with 2 N hydrochloric acid in refluxing methanol (78%) [1053].

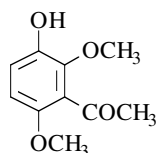
m.p. 79-80° [282] [1053]; <sup>1</sup>H NMR [1053], IR [1053].

**1-(3-Hydroxy-2,6-dimethoxyphenyl)ethanone**

[56358-74-8]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Isolation from natural sources**

-Identification in liquid wastes from eucalyptus wood and kraft lignin charring [1504].

**From Microorganisms**

-Ketone identified from metabolism of 2,6-dimethoxyacetophenone in the rat [238].

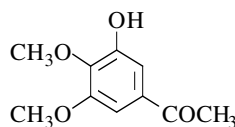
<sup>1</sup>H NMR [238], MS [238].

**1-(3-Hydroxy-4,5-dimethoxyphenyl)ethanone**

[114012-82-7]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Isolation from natural sources**

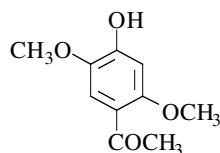
-Identified by flame-ionization gas-chromatography and gas chromatography-mass spectrometry into liquid wastes from eucalyptus wood and kraft lignin charring [1504].

**1-(4-Hydroxy-2,5-dimethoxyphenyl)ethanone**

[13909-71-2]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation by Fries rearrangement of 2,5-dimethoxyphenyl acetate with aluminium chloride [147].

-Preparation by nuclear oxidation of 2,5-dimethoxyacetophenone with peracetic acid [147].

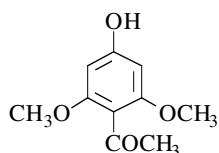
m.p. 117-118° [147].

**1-(4-Hydroxy-2,6-dimethoxyphenyl)ethanone**

[13246-14-5]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

- Preparation by reaction of acetic anhydride on phloroglucinol dimethyl ether with boron trifluoride, \*in ethyl ether at 15° (49%) [494]; \*in acetic acid at 0° (24%) [1129].
- Preparation by reaction of phloroglucinol dimethyl ether with boron trifluoride-acetic acid complex at 100° (40%) [1146].
- Preparation by reaction of acetonitrile on phloroglucinol dimethyl ether (Hoesch reaction) [352] [1037], (32%) [352].
- Preparation by reaction of aluminium chloride on phloracetophenone trimethyl ether in refluxing chlorobenzene [1037].
- Also obtained from 4-(benzyloxy)-2,6-dimethoxyacetophenone by heating with concentrated hydrochloric acid in acetic acid [1281].
- Also obtained by saponification of 4-(benzyloxy)-2,6-dimethoxyacetophenone with 8% methanolic potassium hydroxide at r.t. [352].

**Isolation from natural sources**

- From *Pancratium maritimum* (Amaryllidaceae) [1931].

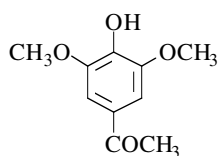
m.p. 186° [1037], 185° [352], 185° [1146], 184-185° [1129], 183-184° [1281], 76-78° [1931]. One of the reported melting points is obviously wrong.  
<sup>1</sup>H NMR [1931], <sup>13</sup>C NMR [1931], IR [1931], EIMS [1931].

**1-(4-Hydroxy-3,5-dimethoxyphenyl)ethanone (Acetosyringone)**

[2478-38-8]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

- Preparation by adding a solution of 4-hydroxy-3-iodo-5-methoxyacetophenone and cupric chloride in DMF to a solution of sodium methoxide in methanol and heating between 105 to 120° (86%) [1937].
- Preparation by reaction of sodium methoxide with 5-iodoacetovanillone in methanol in the presence of copper catalyst (53%) [451].
- Also obtained by debenzoylation of 4-(benzyloxy)-3,5-dimethoxyacetophenone by means of a cold saturated solution of hydrogen bromide in acetic acid (52%) [279].
- Also obtained by Fries rearrangement of 2,6-dimethoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (8-14%) [1079] [1195] [1403].
- Also refer to: [1702].

**Isolation from natural sources**

- From hairy roots cultures of *Nicotiana tabacum* and of *Atropa belladonna* [1672].
- In cell suspension cultures of *Hyoscyamus albus* [1231].
- From birch lignin sulfonic acid by treatment with hot aqueous "alkali" (0.8%) [1079].
- Identified by flame-ionization gas chromatography and gas chromatography-mass spectrometry into liquid wastes from eucalyptus wood and kraft lignin charring [1504].

m.p. 125° [1937], 123-124° [451], 122-123° [1195], 121-122° [1403],

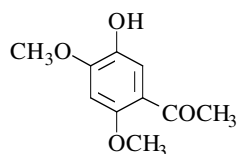
120°5-121°5 [1079], 120-125° [1938], 117° [279];  
<sup>1</sup>H NMR [1672], UV[1082] [1672], MS [1672].

**1-(5-Hydroxy-2,4-dimethoxyphenyl)ethanone**

[91061-75-5]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



**Syntheses**

-Preparation by Fries rearrangement of 2,4-dimethoxyphenyl acetate,  
 \*with aluminium chloride in nitrobenzene at 25° [147] [149], (50%) [149];  
 \*with 36.2% boron trifluoride in acetic acid, first at r.t. overnight, then at 70° for 2 h (81%) [1397].

-Preparation by saponification of 5-acetyl-2,4-dimethoxyphenyl acetate with sodium hydroxide in dilute ethanol at 40° (90%) [498].

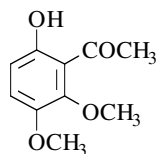
m.p. 155-156° [149] [1397], 154° [498].

**1-(6-Hydroxy-2,3-dimethoxyphenyl)ethanone**

[22248-13-1]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



**Syntheses**

-Preparation by reaction of dimethyl sulfate on 3,6-dihydroxy-2-methoxyacetophenone with potassium carbonate in boiling benzene (67%) [136].  
 -Also refer to: [1708] (compound III).

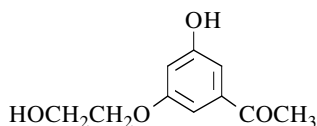
b.p.<sub>22</sub> 162-163° [136].

**1-[3-Hydroxy-5-(2-hydroxyethoxy)phenyl]ethanone**

[63437-86-5]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



**Synthesis**

-Obtained by reaction of 2-chloroethanol with 3,5-dihydroxyacetophenone in refluxing aqueous sodium hydroxide for 5 h under nitrogen atmosphere (29%) [486].

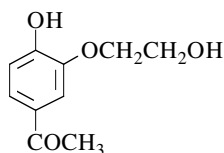
m.p. 140° [486].

**1-[4-Hydroxy-3-(2-hydroxyethoxy)phenyl]ethanone**

[63437-85-4]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20



**Synthesis**

-Preparation by hydrogenolysis of 4-(benzyloxy)-3-(2-hydroxyethoxy)acetophenone in ethanol under hydrogen atmosphere in the presence of 5% Pd/C for 45 min (98%) [486].

m.p. 108-109° [486].

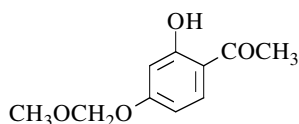


**1-[2-Hydroxy-4-(methoxymethoxy)phenyl]ethanone**

[65490-08-6]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation by reaction of chloromethyl methyl ether, \*with resacetophenone in the presence of potassium carbonate in acetone at r.t. for 2.5 h (65%) [1395], at 20° for 20 h (70-75%) [1720] or at reflux for 3-6 h [1505];  
 \*with resacetophenone disodium salt in a methanol/toluene mixture (27%) [193].

**N.B.:** Preparation by selective methoxymethylation of resacetophenone (no accuracy) (91%) [945].  
 -Also refer to: [1612].

oily residue [1395], colourless oil [945]; TLC [1720];  
 b.p.<sub>0.15</sub> 110° [1720], b.p.<sub>0.2</sub> 118-122° [193], b.p.<sub>3</sub> 138° [1395].

**CAUTION!** Traces of acids or water in the residue may result in a violent decomposition of the material during distillation [1395]; m.p. 36° [193];

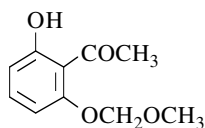
<sup>1</sup>H NMR [945] [1395] [1720], <sup>13</sup>C NMR [1720], IR [1395] [1720], MS [945] [1720].

**1-[2-Hydroxy-6-(methoxymethoxy)phenyl]ethanone**

[78646-28-3]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Obtained by treatment of 2,6-dihydroxyacetophenone with methoxymethyl chloride in the presence of potassium carbonate in refluxing acetone for 2 h (85%) [824].

-Also obtained by adding methoxymethyl chloride to a solution of 2,6-dihydroxyacetophenone monosodium salt prepared by reaction of sodium hydride with the keto phenol in DMF at r.t. (60%) [1107].

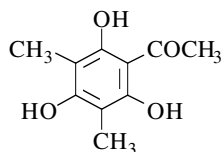
light yellow oil [824]; <sup>1</sup>H NMR [824], IR [824], EIMS [824].

**1-(2,4,6-Trihydroxy-3,5-dimethylphenyl)ethanone**

[13383-63-6]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 196.20

**Syntheses**

-Preparation by reaction of acetonitrile on 1,3-dimethyl-phloroglucinol (Hoesch reaction) [262] [346], (66%) [262].

-Preparation by Friedel-Crafts acylation of 1,3-dimethyl-phloroglucinol with acetic acid in the presence of boron trifluoride (63%) [1902].

-Also obtained by reaction of methyl iodide with phloracetophenone in the presence of potassium hydroxide in 80% aqueous methanol (12%) [1489], of potassium hydroxide in anhydrous methanol (5%) [645] [875] or sodium methoxide in methanol [1491].

-Also obtained by demethylation of 2-hydroxy-4,6-dimethoxy-3,5-dimethylacetophenone [1118].

-Also refer to: [861] [1090] [1871].

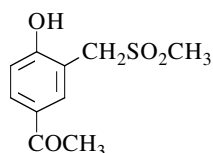
m.p. 226-229° [1902], 221-222° [346], 220-222° [875], 219° [1489], 218° [262];  
 UV [1489] [1491], MS [262].

**1-[4-Hydroxy-3-[(methylsulfonyl)methyl]phenyl]ethanone**

[49640-12-2]

C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>S

mol.wt. 228.27

**Syntheses**

-Obtained by reaction of 3'-chloromethyl-4'-hydroxy-acetophenone with magnesium methylsulfinate in refluxing aqueous methanol for 18 h (52%) [935].  
 -Also refer to: [425] [932] [933] [934].

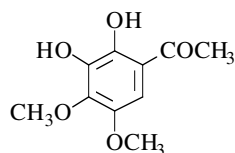
m.p. 207-209° [935].

**1-(2,3-Dihydroxy-4,5-dimethoxyphenyl)ethanone**

[119892-31-8]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Synthesis**

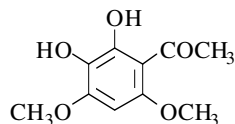
-Refer to: [981] (Japanese patent).

**1-(2,3-Dihydroxy-4,6-dimethoxyphenyl)ethanone**

[21919-66-4]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Syntheses**

-Preparation by hydrolysis of 3-acetoxy-2-hydroxy-4,6-dimethoxyacetophenone,  
 \*with 6 N hydrochloric acid in refluxing ethanol (92%) [815];  
 \*with 10% potassium hydroxide at r.t. [1303] [1309], (90%) [1303].  
 -Preparation by hydrolysis of 2-hydroxy-3,4,6-trimethoxyacetophenone with 30% hydrobromic acid in acetic acid at r.t. (42%) [663].  
 -Preparation by catalytic hydrogenolysis of 2,3-bis(benzyloxy)-4,6-dimethoxyacetophenone in the presence of 10% Pd/C in ethyl acetate (89%) [215].  
 -Also obtained by reaction of hydrobromic acid with 3-ethoxy-2-hydroxy-4,6-dimethoxyacetophenone in acetic acid at r.t. (major compound) [198].  
 -Also obtained (by-product) by reaction of acetyl chloride with 1,2,3,5-tetramethoxybenzene in ethyl ether (3%) [198].  
 -Also refer to: [799] [1295].

m.p. 165°2-166°5 [663], 165-167°5 [198], 164-165° [1303], 160-165° [815],  
 160-162° [215];

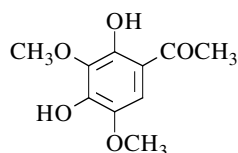
<sup>1</sup>H NMR [198], IR [198] [215], MS [198].

**1-(2,4-Dihydroxy-3,5-dimethoxyphenyl)ethanone**

[198203-68-8]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Synthesis**

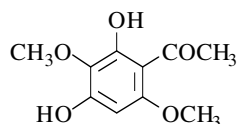
-Obtained (poor yields) by treatment of 4-hydroxy-3,5-dimethoxyacetophenone or 3,4,5-trimethoxyacetophenone with alkaline hydrogen peroxide (pH 11) irradiating with UV light (254 nm) at 40° for 2 h (< 1%) [1716]. **N.B.:** The silylated product was analyzed by gas chromatography-mass spectrometry (GC-MS).

**1-(2,4-Dihydroxy-3,6-dimethoxyphenyl)ethanone**

[7499-99-2]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Syntheses**

-Preparation by reaction of acetonitrile, (Hoesch reaction),  
\*on 2,6-bis(benzyloxy)-1,4-dimethoxybenzene (47%) [1452],  
(71%) [1552];  
\*on 2,5-dimethoxyresorcinol [664] [1605] [1882].

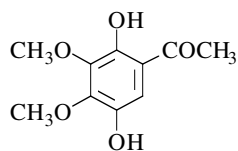
m.p. 129° [1605] [1882], 128-129° [1552], 125-130° [1452].

**1-(2,5-Dihydroxy-3,4-dimethoxyphenyl)ethanone**

[69616-56-4]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Synthesis**

-Obtained from 2-hydroxy-3,4-dimethoxyacetophenone by persulfate oxidation (Elbs reaction) (30%) [135], (10%) [169].

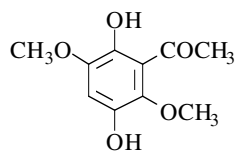
m.p. 119-121° [169], 119° [135].

**1-(2,5-Dihydroxy-3,6-dimethoxyphenyl)ethanone**

[6212-45-9]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Syntheses**

-Preparation by metallation of 2,5-dimethoxyhydroquinone-bis-[tetrahydropyranyl-(2)-ether], followed by treatment of the intermediate aryllithium compound with acetic anhydride in tetrahydrofuran at r.t. (82%) [1561].

-Preparation by reaction of acetic acid on 2,5-dimethoxy-

hydroquinone diacetate with boron trifluoride etherate at 75° [67] [1460], (55%) [1460].  
-Preparation by catalytic hydrogenolysis of 2,5-bis(benzyloxy)-3,6-dimethoxyacetophenone in the presence of palladium oxide in ethanol (96%) [1560].

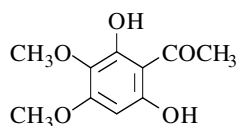
m.p. 170° [1460], 94° [1560] [1561].

**1-(2,6-Dihydroxy-3,4-dimethoxyphenyl)ethanone**

[74556-32-4]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Syntheses**

- Preparation by reaction of dimethyl sulfate on 2,3,4,6-tetrahydroxyacetophenone with sodium hydroxide in boiling ethanol (94%) [1328].
- Also obtained by reaction of acetyl chloride on 5-hydroxy-1,2,3-trimethoxybenzene (antiarol) with aluminium chloride in nitrobenzene [375].
- Also obtained by reaction of acetyl chloride on 1,2,3,5-tetramethoxybenzene with aluminium chloride in nitrobenzene at r.t. [160] [163] [375].
- Preparation by cleavage of 2,6-dihydroxy-3,4-dimethoxyacetophenone mono-2,4-dinitrophenyl ether with piperidine by heating in a steam bath (76%) [815].
- Also obtained by cleavage of 2,3,4-trimethoxy-6-isopropoxyacetophenone or 6-hydroxy-2,3,4-trimethoxyacetophenone with hydrobromic acid in acetic acid (23%) [815].

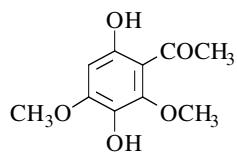
m.p. 166-168° [1328], 162-163° [160] [163], 160-161° [375], 135°-135°9 [815].

**1-(3,6-Dihydroxy-2,4-dimethoxyphenyl)ethanone**

[6962-57-8]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Syntheses**

- Preparation by Fries rearrangement of 1,4-diacetoxy-2,6-dimethoxybenzene with aluminium chloride in nitrobenzene at r.t. [815] [858] [1199] [1354], (57%) [1354], (47-56%) [858] and (34%) [1199].
- Preparation by reaction of 2,6-dimethoxyhydroquinone with boron trifluoride-acetic acid complex at 28-30° (60%) [1146].
- Preparation from 2-hydroxy-4,6-dimethoxyacetophenone by persulfate oxidation (Elbs reaction) (36%) [1551], (7%) [841].
- Also obtained (by-product) by reaction of acetyl chloride on 1,2,3,5-tetramethoxybenzene with aluminium chloride in carbon disulfide [161].
- Preparation by hydrolysis of 3-acetoxy-6-hydroxy-2,4-dimethoxyacetophenone with refluxing 5% methanolic hydrochloric acid (major product) [1055] or refluxing 10% ethanolic hydrochloric acid [815].
- Also refer to: [783] [1311].

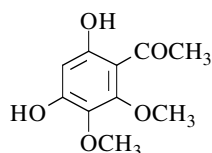
m.p. 164-165° [1551], 162-163° [161] [1055] [1199] [1354], 162-162°5 [815], 162° [858] [1146], 161-162° [841];

<sup>1</sup>H NMR [841] [1055], <sup>13</sup>C NMR [1396], IR [841] [1055], UV [1055], MS [841] [1055].**1-(4,6-Dihydroxy-2,3-dimethoxyphenyl)ethanone**

[103777-42-0]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Synthesis**

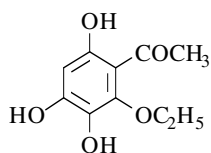
- Preparation from 4-(benzyloxy)-6-hydroxy-2,3-dimethoxyacetophenone by hydrogenolysis with hydrogen in the presence of Pd/C [807].

**1-(2-Ethoxy-3,4,6-trihydroxyphenyl)ethanone**

[63635-41-6]

C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 212.20

**Synthesis**

-Preparation by hydrogenolysis of 2-ethoxy-3,4,6-tris-(benzyloxy)acetophenone with 5% Pd/C in ethanol at r.t. (96%) [757] [758].

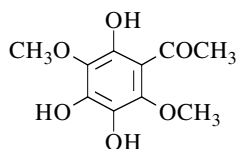
m.p. 169° [757] [758];  
<sup>1</sup>H NMR [757] [758], IR [757] [758].

**1-(2,4,5-Trihydroxy-3,6-dimethoxyphenyl)ethanone**

[15994-32-8]

C<sub>10</sub>H<sub>12</sub>O<sub>6</sub>

mol.wt. 228.20

**Syntheses**

-Obtained by hydrogenolysis of 4-benzyloxy-2,5-dihydroxy-3,6-dimethoxyacetophenone with hydrogen in the presence of 30% Pd/C [1071].

-Also obtained by persulfate oxidation of 2,4-dihydroxy-3,6-dimethoxyacetophenone (Elbs reaction) [844].

-Also refer to: [290] [291].

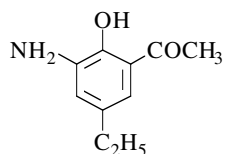
m.p. 142-144° [290], 140-142° [640], 137°5'-138°5' [1071], 131-134° [54];  
<sup>1</sup>H NMR [844], IR [640] [844].

**1-(3-Amino-5-ethyl-2-hydroxyphenyl)ethanone**

[70977-78-5]

C<sub>10</sub>H<sub>13</sub>NO<sub>2</sub>

mol.wt. 179.22

**Synthesis**

-Preparation by catalytic hydrogenation of 5-ethyl-2-hydroxy-3-nitroacetophenone in the presence of 5% Pd/C in ethanol at 25° (70%) [1463], (60%) [620].

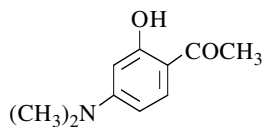
m.p. 50-51° [1463], 48-51° [620].

**1-[4-(Dimethylamino)-2-hydroxyphenyl]ethanone**

[107070-69-9]

C<sub>10</sub>H<sub>13</sub>NO<sub>2</sub>

mol.wt. 179.22

**Syntheses**

-Preparation by reaction of dimethyl sulfate with 4-amino-2-hydroxyacetophenone in the presence of sodium carbonate in boiling water for 40 min (49%) [1495].

-Also refer to: [1544] [1751].

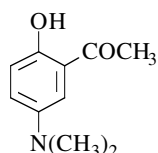
m.p. 118° [1495]; <sup>1</sup>H NMR [1495], <sup>13</sup>C NMR [1494], IR [1495].

**1-[5-(Dimethylamino)-2-hydroxyphenyl]ethanone**

[49619-68-3]

C<sub>10</sub>H<sub>13</sub>NO<sub>2</sub>

mol.wt. 179.22

**Synthesis**

-Preparation by catalytic hydrogenation of 2-hydroxy-5-nitroacetophenone with formalin in the presence of palladium chloride (82%) [1335].

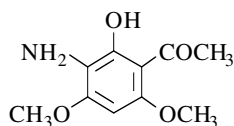
m.p. 76°5-77°5 [1335]; <sup>1</sup>H NMR [1335], IR [1335].

**1-(3-Amino-2-hydroxy-4,6-dimethoxyphenyl)ethanone**

[81325-91-9]

C<sub>10</sub>H<sub>13</sub>NO<sub>4</sub>

mol.wt. 211.22

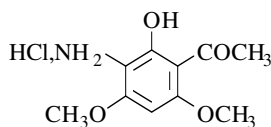
**Synthesis**

-Preparation by adding a hot solution of stannous chloride in hydrochloric acid to a solution of 2-acetoxy-4,6-dimethoxy-3-nitroacetophenone in ethanol containing zinc dust and heating the mixture in a steam bath (48%) [2].

m.p. 118-119° [2]; <sup>1</sup>H NMR [2], IR [2].

**1-(3-Amino-2-hydroxy-4,6-dimethoxyphenyl)ethanone (Hydrochloride)**

[81325-92-0]

C<sub>10</sub>H<sub>13</sub>NO<sub>4</sub>, HCl mol.wt. 247.68**Synthesis**

-Preparation by treatment of a solution of 2-hydroxy-4,6-dimethoxy-3-nitroacetophenone in ethanol with zinc dust and a solution of stannous chloride in hydrochloric acid, and heating in a steam bath (50%) [2].

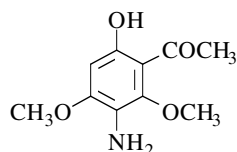
m.p. 171° [2].

**1-(3-Amino-6-hydroxy-2,4-dimethoxyphenyl)ethanone**

[81325-95-3]

C<sub>10</sub>H<sub>13</sub>NO<sub>4</sub>

mol.wt. 211.22

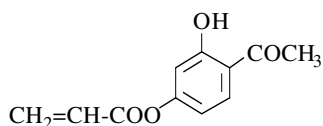
**Synthesis**

-Preparation by adding a solution of stannous chloride in hydrochloric acid to a hot solution of 6-hydroxy-2,4-dimethoxy-3-phenylazoacetophenone in ethanol containing zinc dust, and heating the mixture in a steam bath (73%) [2].

m.p. 75° [2]; <sup>1</sup>H NMR [2].

**1-[4-(Acryloyloxy)-2-hydroxyphenyl]ethanone**C<sub>11</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 206.20

**Synthesis**

-Preparation by reaction of acryloyl chloride with resacetophenone in the presence of triethylamine in ethyl ether (25%) [1529].

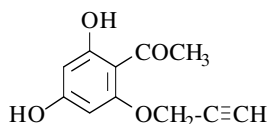
m.p. 55-57° [1529]; <sup>1</sup>H NMR [1529], IR [1529].

**1-[2,4-Dihydroxy-6-(2-propynyloxy)phenyl]ethanone**

[53771-24-7]

C<sub>11</sub>H<sub>10</sub>O<sub>4</sub>

mol.wt. 206.20

**Synthesis**

-Obtained (poor yield) by reaction of 2-propynyl bromide with phloracetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (5%) [427].

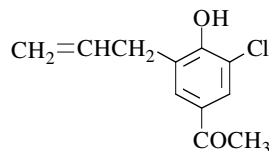
m.p. 142-143° [427]; UV [427].

**1-[3-Chloro-4-hydroxy-5-(2-propenyl)phenyl]ethanone**

[51832-82-7]

C<sub>11</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 210.66

**Synthesis**

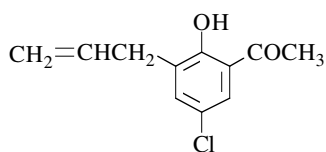
-Preparation by Claisen rearrangement of 4-(allyloxy)-3-chloroacetophenone [275] [950].

**1-[5-Chloro-2-hydroxy-3-(2-propenyl)phenyl]ethanone**

[186956-46-7]

C<sub>11</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 210.66

**Synthesis**

-Obtained by Claisen rearrangement of 2-(allyloxy)-5-chloroacetophenone in refluxing N,N-diethylaniline at 220° for 4 h [1476].

Colourless oil [1476]; b.p.<sub>0.1</sub> 140° [1476];

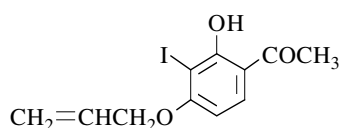
<sup>1</sup>H NMR [1476], IR [1476].

**1-[2-Hydroxy-3-iodo-4-(2-propenyloxy)phenyl]ethanone**

[72511-76-3]

C<sub>11</sub>H<sub>11</sub>IO<sub>3</sub>

mol.wt. 318.11

**Synthesis**

-Obtained by partial allylation of 2,4-dihydroxy-3-iodoacetophenone with allyl bromide in the presence of potassium carbonate in refluxing acetone for 4-5 h (52%) [17].

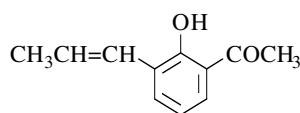
m.p. 91-92° [17]; <sup>1</sup>H NMR [17].

**1-[2-Hydroxy-3-(1-propenyl)phenyl]ethanone**

[67127-96-2]

C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 176.22

**Synthesis**

-Preparation by isomerization of 3-allyl-2-hydroxyacetophenone using bis(benzonitrile)-palladium chloride in refluxing toluene (90%) [620] [621].

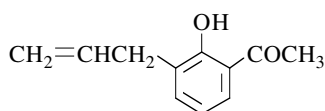
b.p.<sub>18</sub> 153-155° [620] [621].

**1-[2-Hydroxy-3-(2-propenyl)phenyl]ethanone**

[58621-39-9]

C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 176.22

**Syntheses**

-Preparation by thermal Claisen rearrangement of 2-(allyloxy)acetophenone (m.p. 19-21°) [29],  
 \*in refluxing N,N-diethylaniline at 220° for 4 h [1476];  
 \*in boiling dichlorobenzene (30%) [677];

\*without solvent at 260-270° (85%) [1747];

\*without solvent at reflux under nitrogen atmosphere for 5 h [27], (66%) [29].

-Also obtained by photolysis of o-allylphenyl acetate in cyclohexane (major product) (photo-Fries rearrangement) [1238].

-Also refer to: [28] [504] [1836].

light yellow liquid [29], colourless oil [1476];

b.p.<sub>0.3</sub> 110° [29], b.p.<sub>20</sub> 135-138° [1747], b.p.<sub>0.1</sub> 135-138° [1476], b.p. 258° [504];

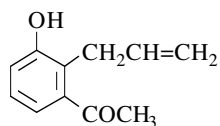
<sup>1</sup>H NMR [29] [677] [1476], <sup>13</sup>C NMR [29], IR [29] [677] [1476], MS [29].

**1-[3-Hydroxy-2-(2-propenyl)phenyl]ethanone**

[58621-37-7]

C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 176.22

**Syntheses**

-Preparation by thermal Claisen rearrangement of 3-(allyloxy)acetophenone,  
 \*in boiling dichlorobenzene (10%) [677];  
 \*in DMF at 220° (53%) [303];



\*without solvent at 220° (43%) [303].

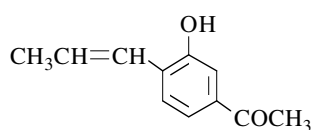
oil [303]; <sup>1</sup>H NMR [303] [677], IR [303] [677], MS [303].

**1-[3-Hydroxy-4-(1E)-1-propenylphenyl]ethanone**

[430474-15-0]

C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 176.22



**Synthesis**

-Obtained by isomerization of 1-[3-hydroxy-4-(2-propenyl)phenyl]ethanone in the presence of polymer-supported iridium catalyst in THF at r.t. (92% *trans*) [177] [178].

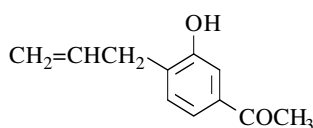
<sup>1</sup>H NMR [178].

**1-[3-Hydroxy-4-(2-propenyl)phenyl]ethanone**

[58621-38-8]

C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 176.22



**Syntheses**

-Preparation by thermal Claisen rearrangement of 3-(allyloxy)acetophenone,  
 \*in boiling dichlorobenzene (50%) [677];  
 \*in DMF at 220° (27%) [303];  
 \*without solvent at 220° (22%) [303].

-Also obtained by UV light irradiation of 3-(allyloxy)acetophenone in benzene or cyclohexane under nitrogen (8%) [677].

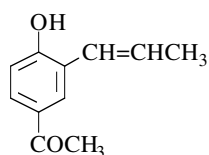
m.p. 75-76° [677], 62-64° [303]; <sup>1</sup>H NMR [303] [677], IR [303] [677], MS [303].

**1-[4-Hydroxy-3-(1-propenyl)phenyl]ethanone**

[53889-99-9]

C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 176.22



**Synthesis**

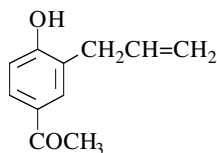
-Refer to: [239].

**1-[4-Hydroxy-3-(2-propenyl)phenyl]ethanone**

[1132-05-4]

C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 176.22



**Syntheses**

-Preparation by thermal Claisen rearrangement of 4-(allyloxy)acetophenone,  
 \*in boiling N,N-dimethylaniline [333];  
 \*in diphenyl ether at 185° [688] or at reflux (76%) [1886];  
 \*without solvent at 200-210° (78%) [80], at 200-230°

(96%) [1156] or at 260-270° (64%) [1747].

-Also obtained by UV light irradiation of 4-(allyloxy)acetophenone in benzene or cyclohexane under nitrogen (13%) [677].

m.p. 115°-116° [1886], 115-116° [80], 115° [333];

b.p.<sub>4</sub> 164-165° [1747], b.p.<sub>21</sub> 200-201° [333];

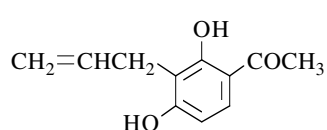
<sup>1</sup>H NMR [677], IR [677], UV [1886], MS [1156].

### 1-[2,4-Dihydroxy-3-(2-propenyl)phenyl]ethanone

[38987-00-7]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



#### Syntheses

-Preparation by thermal Claisen rearrangement of 4-(allyloxy)-2-hydroxyacetophenone without solvent at 200-210° (85%) [132].

-Also refer to: [132] [1028] [1372].

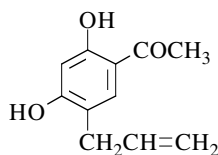
m.p. 133° [132]; UV [1028].

### 1-[2,4-Dihydroxy-5-(2-propenyl)phenyl]ethanone

[38987-01-8]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



#### Syntheses

-Preparation by demethylation of 5-allyl-4-hydroxy-2-methoxyacetophenone with aluminium chloride in ethyl ether or acetonitrile [1028].

-Preparation by reaction of boron tribromide on 5-allyl-4-hydroxy-2-methoxyacetophenone in methylene chloride, first at -78°, then at -45° (52%) [256] [257] [777].

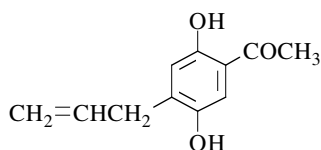
m.p. 74-76° [256] [257] [777], 55° [1028]; <sup>1</sup>H NMR [256] [257], UV [1028].

### 1-[2,5-Dihydroxy-4-(2-propenyl)phenyl]ethanone

[174901-51-0]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



#### Synthesis

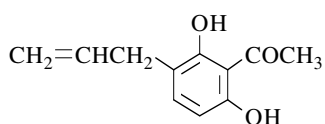
-Refer to: [700].

**1-[2,6-Dihydroxy-3-(2-propenyl)phenyl]ethanone**

[17488-71-0]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



## Syntheses

-Obtained from 8-acetyl-6-allyl-7-hydroxy-4-methylcoumarin by alkaline degradation with 12% aqueous sodium hydroxide solution by heating in a water bath (80%) [1648].  
 -Also refer to: [343] [734].

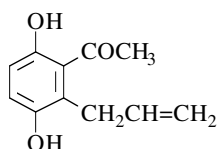
m.p. 63-65° [1648]; <sup>13</sup>C NMR [734].

**1-[3,6-Dihydroxy-2-(2-propenyl)phenyl]ethanone**

[40815-79-0]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



## Syntheses

-Preparation by thermal Claisen rearrangement of 5-(allyloxy)-2-hydroxyacetophenone without solvent at 200-220° (36%) [1156] or at 220-230° (74-75%) [131] [303].  
 -Also obtained by thermal reaction of 2-acetyl-1,4-benzoquinone.

\*with allyltrimethylstannane in benzene (27%) or acetonitrile (18%) [1171];

\*with allyltributylstannane in benzene (29%) [1171].

m.p. 107°5 [131], 103-104° [303], 78-80° [1171];

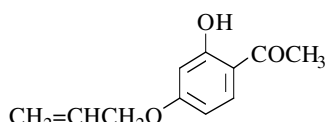
<sup>1</sup>H NMR [303] [1156] [1171], IR [303] [1171], MS [303] [1156] [1171].

**1-[2-Hydroxy-4-(2-propenyloxy)phenyl]ethanone**

[40815-74-5]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



## Syntheses

-Preparation by reaction of allyl bromide on resacetophenone with potassium carbonate,  
 \*in refluxing methyl ethyl ketone (90%) [256] [257] [777];  
 \*in refluxing acetone (70%) [132].

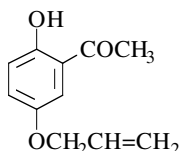
oil [256] [257] [777]; b.p.<sub>9</sub> 156-157° [132].

**1-[2-Hydroxy-5-(2-propenyloxy)phenyl]ethanone**

[40815-75-6]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



## Synthesis

-Preparation by reaction of allyl bromide on quinacetophenone with potassium carbonate in refluxing acetone (86%) [302] [303], (73%) [131] or in refluxing methyl ethyl ketone (52%) [1156].

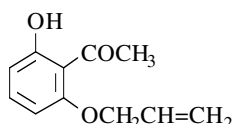
m.p. 59-60° [131] [302] [303];  
<sup>1</sup>H NMR [303] [1156], IR [303], MS [303] [1156].

**1-[2-Hydroxy-6-(2-propenyloxy)phenyl]ethanone**

[23226-84-8]

C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 192.21



**Synthesis**

-Preparation by reaction of allyl bromide with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (52%) [343].

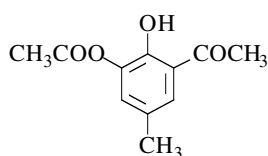
m.p. 45°-46° [343]; b.p.<sub>0.15</sub> 128-132° [343].

**1-[3-(Acetyloxy)-2-hydroxy-5-methylphenyl]ethanone**

[77347-23-0]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21



**Synthesis**

-Preparation by reaction of m-chloroperoxybenzoic acid with 2,6-diacetyl-4-methylphenol using chloroform and trifluoroacetic acid as solvent at r.t. (39%) [171].

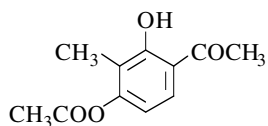
m.p. 80-81° [171]; <sup>1</sup>H NMR [171], MS [171].

**1-[4-(Acetyloxy)-2-hydroxy-3-methylphenyl]ethanone**

[144224-86-2]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21



**Syntheses**

-Preparation by reaction of acetyl chloride with 2,4-dihydroxy-3-methylacetophenone in the presence of triethylamine in methylene chloride at 0° for 2 h then at r.t. overnight (82%) [1265].  
 -Also refer to: [1264].

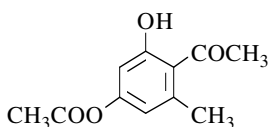
m.p. 71-73° [1265]; <sup>1</sup>H NMR [1265], <sup>13</sup>C NMR [1265], IR [1265].

**1-[4-(Acetyloxy)-2-hydroxy-6-methylphenyl]ethanone**

[57600-87-0]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21



**Synthesis**

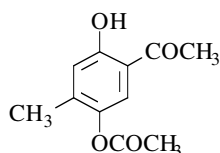
-Preparation by treatment of a mixture of alkylated resorcinols with acetic anhydride and acetic acid in the presence of zinc chloride at 140-145°, followed by suitable separation [936].

**1-[5-(Acetyloxy)-2-hydroxy-4-methylphenyl]ethanone**

[126570-32-9]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21



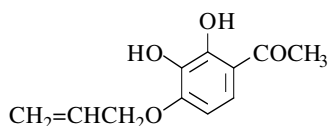
## Syntheses

-Preparation by partial acetylation of 2,5-dihydroxy-4-methylacetophenone [514].  
 -Also obtained (by-product) by Fries rearrangement of 2-methylhydroquinone diacetate with aluminium chloride [514].

m.p. 109° [514].

**1-[2,3-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone**C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21



## Synthesis

-Obtained by reaction of allyl bromide on gallacetophenone with sodium bicarbonate in refluxing acetone-ethanol mixture (16%) [972].

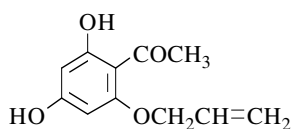
m.p. 84° [972].

**1-[2,4-Dihydroxy-6-(2-propenyloxy)phenyl]ethanone**

[76609-35-3]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21



## Synthesis

-Preparation by tosylation of phloracetophenone with p-toluenesulfonyl chloride (2.2 mol) in acetone in the presence of potassium carbonate, followed by allylation with allyl bromide (1.2 mol) and final detosylation with methanolic potassium hydroxide [13].

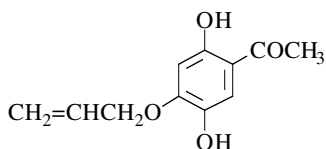
m.p. 144-145° [13].

**1-[2,5-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone**

[92831-82-8]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21



## Synthesis

-Preparation from 4-(allyloxy)-2-hydroxyacetophenone by persulfate oxidation (Elbs reaction) (24%) [82].

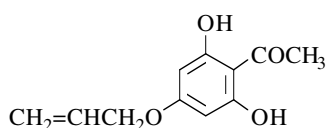
m.p. 79-80° [82]; <sup>1</sup>H NMR [82].

**1-[2,6-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone**

[35028-03-6]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21

**Synthesis**

-Preparation from 2,4-diacetyl-5-(allyloxy)resorcinol by selective deacetylation by refluxing in 1 N sodium hydroxide for 1 h [342].

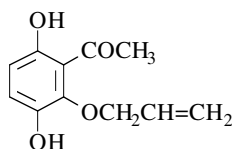
m.p. 145-146° [342]; <sup>1</sup>H NMR [342].

**1-[3,6-Dihydroxy-2-(2-propenyloxy)phenyl]ethanone**

[33539-24-1]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21

**Syntheses**

-Easy preparation by reduction of 2-acetyl-3-(allyloxy)-1,4-benzoquinone using conventional methods [587].  
 -Obtained (low yield) by reaction of 2-acetyl-1,4-benzoquinone with an excess of allyl alcohol at r.t., with exclusion of light [587].

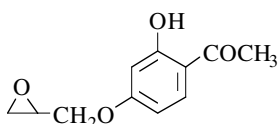
m.p. 68-69° [587]; <sup>1</sup>H NMR [587], IR [587].

**1-[2-Hydroxy-4-(oxiranylmethoxy)phenyl]ethanone**

[61270-24-4]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21

**Synthesis**

-Preparation by reaction of epichlorohydrin with resacetophenone in the presence of potassium hydroxide, in refluxing ethanol [71] or in a concentrated aqueous solution at 120° [1284].

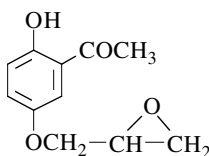
m.p. 78° [1284], 72-73° [71].

**1-[2-Hydroxy-5-(oxiranylmethoxy)phenyl]ethanone**

[16139-53-0]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21

**Synthesis**

-Refer to: [610] [611].

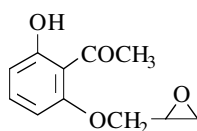
m.p. 76-79° [611].

**1-[2-Hydroxy-6-(oxiranylmethoxy)phenyl]ethanone**

[16130-28-2]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 208.21

**Synthesis**

-Preparation by reaction of epichlorohydrin with 2,6-dihydroxyacetophenone in the presence of potassium hydroxide in refluxing ethanol [71].

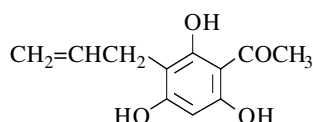
m.p. 61-63° [71].

**1-[2,4,6-Trihydroxy-3-(2-propenyl)phenyl]ethanone**

[118062-86-5]

C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>

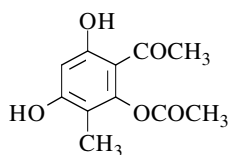
mol.wt. 208.21

**Synthesis**

-Refer to: [402] (Japanese patent).

**1-[2-(Acetyloxy)-4,6-dihydroxy-3-methylphenyl]ethanone**C<sub>11</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 224.21

**Synthesis**

-Obtained (poor yield) by hydrolysis of the ozonide formed from 4,6-dihydroxy-2,3,7-trimethylbenzofuran (m.p. 178°(d)) with dilute ozone (7%) [745] in ethyl acetate at -30° (13%) [1570].

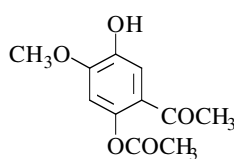
m.p. 161-164° [1570].

**1-[2-(Acetyloxy)-5-hydroxy-4-methoxyphenyl]ethanone**

[144152-30-7]

C<sub>11</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 224.21

**Synthesis**

-Obtained by enzymatic deacylation of 2,5-diacetoxy-4-methoxyacetophenone with *Candida cylindracea* lipase in diisopropyl ether at 42-45° (65%) [1381] [1383].

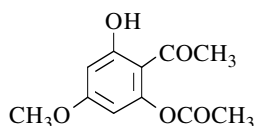
pale yellow viscous oil [1383]; <sup>1</sup>H NMR [1383].

**1-[2-(Acetyloxy)-6-hydroxy-4-methoxyphenyl]ethanone**

[63013-36-5]

C<sub>11</sub>H<sub>12</sub>O<sub>5</sub>

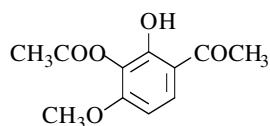
mol.wt. 224.21

**Synthesis**

-Refer to: [1046] (compound 5) (48%).

**1-[3-(Acetyloxy)-2-hydroxy-4-methoxyphenyl]ethanone**C<sub>11</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 224.21

**Syntheses**

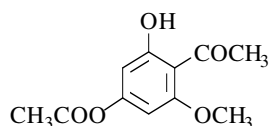
- Preparation by reaction of a mixture of acetic anhydride and acetic acid with 2,6-dimethoxyphenol in the presence of boron trifluoride at 30° (67%) [814].
- Preparation by reaction of acetyl chloride with 2,3-dihydroxy-4-methoxyacetophenone in pyridine at 0° (52%) [1053].

m.p. 123°4-125° [814], 122-123° [1053]; <sup>1</sup>H NMR [1053], IR [1053].**1-[4-(Acetyloxy)-2-hydroxy-6-methoxyphenyl]ethanone**

[29376-66-7]

C<sub>11</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 224.21

**Synthesis**

- Preparation by reaction of diazomethane with 4-acetoxy-2,6-dihydroxyacetophenone in tetrahydrofuran at r.t. (55%) [1019].

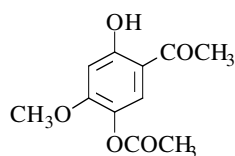
m.p. 86-89° [1019].

**1-[5-(Acetyloxy)-2-hydroxy-4-methoxyphenyl]ethanone**

[69470-86-6]

C<sub>11</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 224.21

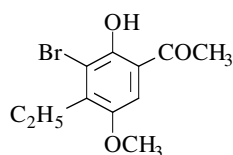
**Syntheses**

- Preparation by Fries rearrangement of 2-methoxyhydroquinone diacetate with boron trifluoride in acetic acid (90%) [498].
- Obtained by reaction of methyl iodide with 5-acetoxy-2,4-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (19%) [703].

m.p. 104° [498] [703].

**1-(3-Bromo-4-ethyl-2-hydroxy-5-methoxyphenyl)ethanone**C<sub>11</sub>H<sub>13</sub>BrO<sub>3</sub>

mol.wt. 273.13

**Synthesis**

- Obtained by reaction of bromine on 4-ethyl-2-hydroxy-5-methoxyacetophenone in ethyl ether containing a trace of aluminium chloride [1459].

m.p. 83° [1459].

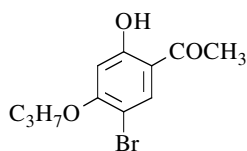


**1-(5-Bromo-2-hydroxy-4-propoxyphenyl)ethanone**

[57442-27-0]

C<sub>11</sub>H<sub>13</sub>BrO<sub>3</sub>

mol.wt. 273.13

**Synthesis**

-Preparation by bromination of 2-hydroxy-4-propoxyacetophenone (1 mol) in 80% acetic acid with bromine (1 mol) at r.t. (25-30°) (90%) [1148].

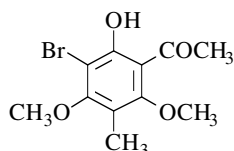
m.p. 118° [1148].

**1-(3-Bromo-2-hydroxy-4,6-dimethoxy-5-methylphenyl)ethanone**

[39701-15-0]

C<sub>11</sub>H<sub>13</sub>BrO<sub>4</sub>

mol.wt. 289.13

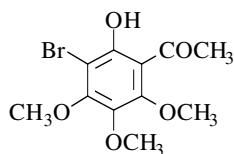
**Synthesis**

-Preparation by adding an aqueous solution of bromine and potassium bromide to an ethanolic solution of 2-hydroxy-4,6-dimethoxy-5-methylacetophenone (46%) [837].

m.p. 75-76° [837]; <sup>1</sup>H NMR [837], IR [837].

**1-(3-Bromo-2-hydroxy-4,5,6-trimethoxyphenyl)ethanone**C<sub>11</sub>H<sub>13</sub>BrO<sub>5</sub>

mol.wt. 305.13

**Syntheses**

-Preparation by methylation of 3-bromo-2,5-dihydroxy-4,6-dimethoxyacetophenone [542].

-Preparation by bromination of 6-hydroxy-2,3,4-trimethoxyacetophenone [542].

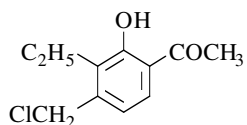
m.p. 89-90° [542].

**1-[4-(Chloromethyl)-3-ethyl-2-hydroxyphenyl]ethanone**

[97582-38-2]

C<sub>11</sub>H<sub>13</sub>ClO<sub>2</sub>

mol.wt. 212.68

**Synthesis**

-Preparation by reaction of ethyl chloroformate with 4-(dimethylaminomethyl)-3-ethyl-2-hydroxyacetophenone [529] [530], (71%) [530].

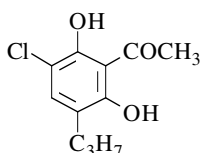
m.p. 55-57° [530]; b.p.<sub>0.5</sub> 120-130° [529]; <sup>1</sup>H NMR [529], IR [529].

**1-(3-Chloro-2,6-dihydroxy-5-propylphenyl)ethanone**

[102624-59-9]

C<sub>11</sub>H<sub>13</sub>ClO<sub>3</sub>

mol.wt. 228.68

**Syntheses**

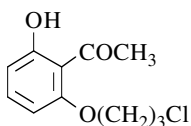
-Preparation according to literature procedures [1067] (compound 1c).  
 -Also refer to: [92].

**1-[2-(3-Chloropropoxy)-6-hydroxyphenyl]ethanone**

[105277-74-5]

C<sub>11</sub>H<sub>13</sub>ClO<sub>3</sub>

mol.wt. 228.68

**Synthesis**

-Preparation by reaction of 1-bromo-3-chloropropane with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h (quantitative yield) [872].

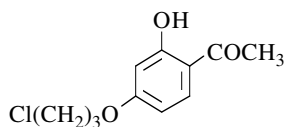
m.p. 60°5-62°5 [872]; <sup>1</sup>H NMR [872], MS [872].

**1-[4-(3-Chloropropoxy)-2-hydroxyphenyl]ethanone**

[172739-45-6]

C<sub>11</sub>H<sub>13</sub>ClO<sub>3</sub>

mol.wt. 228.68

**Syntheses**

-Preparation by reaction of 1-bromo-3-chloropropane with resacetophenone [614], in the presence of potassium carbonate in refluxing acetone for 5 h (84%) [314] or for 16 h (69%) [260].  
 -Also refer to: [261].

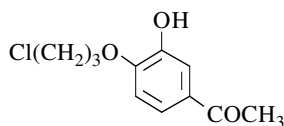
m.p. 73-74° [260], 73° [314]; <sup>1</sup>H NMR [260], IR [260].

**1-[4-(3-Chloropropoxy)-3-hydroxyphenyl]ethanone**

[151719-65-2]

C<sub>11</sub>H<sub>13</sub>ClO<sub>3</sub>

mol.wt. 228.68

**Syntheses**

-Obtained by demethylation of 1-[4-(3-chloropropoxy)-3-methoxyphenyl]ethanone in concentrated sulfuric acid at 65° for 23 h (22%) [1701].  
 -Also refer to: [1283].

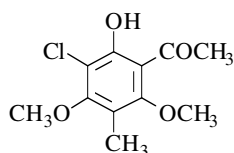
m.p. 101-103° [1701]; <sup>1</sup>H NMR [1701], MS [1701].

**1-(3-Chloro-2-hydroxy-4,6-dimethoxy-5-methylphenyl)ethanone**

[31913-64-1]

C<sub>11</sub>H<sub>13</sub>ClO<sub>4</sub>

mol.wt. 244.67

**Synthesis**

-Preparation by reaction of sulfonyl chloride with 6-hydroxy-2,4-dimethoxy-3-methylacetophenone in chloroform at -3° (59%) [1359].

Isolation from natural sources

-Also obtained by alkaline hydrolysis of sordidone dimethyl ether (8-chloro-5,7-dimethoxy-2,6-dimethylchromone) [83] [1359] with refluxing 5% aqueous potassium hydroxide under nitrogen (83%) [1359]. Sordidone is a metabolite isolated from the lichen *Lecanora rupicola* (L.) Zahlbr. (syn. *Lecanora sordida* Th. Fr.) [1359].

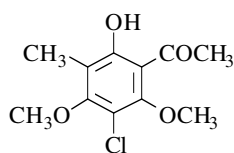
m.p. 94° [83] [1359]; <sup>1</sup>H NMR [1359], IR [1359], MS [1359].

**1-(3-Chloro-6-hydroxy-2,4-dimethoxy-5-methylphenyl)ethanone**

[23053-45-4]

C<sub>11</sub>H<sub>13</sub>ClO<sub>4</sub>

mol.wt. 244.67

**Syntheses**

-Preparation by adding of ethereal solution of diazomethane to a solution of 3-chloro-2,4,6-trihydroxy-5-methylacetophenone in a mixture of acetone-ethyl ether at r.t. (76%) [836].

-Preparation by reaction of sulfonyl chloride with

2-hydroxy-4,6-dimethoxy-3-methylacetophenone in chloroform at -3° (43%) [1359].

-Also obtained by alkaline hydrolysis of isosordidone dimethyl ether (6-chloro-5,7-dimethoxy-2,8-dimethylchromone) with refluxing 5% aqueous potassium hydroxide under nitrogen (55%) [1359].

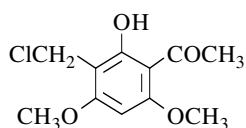
m.p. 108-109° [836], 108° [1359]; <sup>1</sup>H NMR [1359], IR [1359], MS [1359].

**1-[3-(Chloromethyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone**

[40356-82-9]

C<sub>11</sub>H<sub>13</sub>ClO<sub>4</sub>

mol.wt. 244.67

**Synthesis**

-Preparation by chloromethylation of 2-hydroxy-4,6-dimethoxyacetophenone with chloromethyl methyl ether in acetic acid for 1 h at r.t. (57%) [1300] [1301].

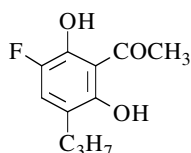
m.p. 133-135° (d) [1300] [1301].

**1-(3-Fluoro-2,6-dihydroxy-5-propylphenyl)ethanone**

[102624-71-5]

C<sub>11</sub>H<sub>13</sub>FO<sub>3</sub>

mol.wt. 212.22



## Syntheses

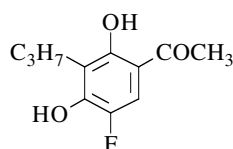
-Preparation according to literature procedures [1067] (compound 1f).  
 -Also refer to: [92].

**1-(5-Fluoro-2,4-dihydroxy-3-propylphenyl)ethanone**

[119257-53-3]

C<sub>11</sub>H<sub>13</sub>FO<sub>3</sub>

mol.wt. 212.22



## Synthesis

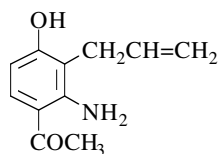
-Refer to: [1889].

**1-[2-Amino-4-hydroxy-3-(2-propenyl)phenyl]ethanone**

[118684-00-7]

C<sub>11</sub>H<sub>13</sub>NO<sub>2</sub>

mol.wt. 191.23



## Synthesis

-Preparation by thermal Claisen rearrangement of 4-(allyloxy)-2-aminoacetophenone without solvent at 200° (54%) [297].

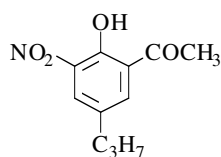
colourless oil [297]; <sup>1</sup>H NMR [297].

**1-(2-Hydroxy-3-nitro-5-propylphenyl)ethanone**

[70978-38-0]

C<sub>11</sub>H<sub>13</sub>NO<sub>4</sub>

mol.wt. 223.23



## Synthesis

-Preparation by reaction of nitric acid (d = 1.42) on 2-hydroxy-5-propylacetophenone in concentrated sulfuric acid between -15 to -5° [620] [1463], (42%) [620].

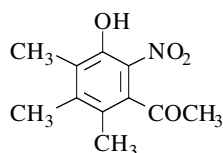
m.p. 67-69° [1463], 67-68° [620].

**1-(3-Hydroxy-4,5,6-trimethyl-2-nitrophenyl)ethanone**

[13667-21-5]

C<sub>11</sub>H<sub>13</sub>NO<sub>4</sub>

mol.wt. 223.23

**Synthesis**

-Preparation by adding a solution of nitric acid ( $d = 1.38$ ) in concentrated sulfuric acid to a solution of 5-hydroxy-2,3,4-trimethylacetophenone in acetic acid and carbon tetrachloride mixture between  $-5^{\circ}$  and  $0^{\circ}$  (80%) [1034] [1804].

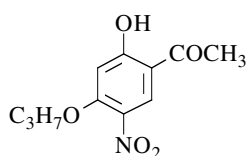
m.p.  $99-100^{\circ}$  [1034] [1804]; IR [1804].

**1-(2-Hydroxy-5-nitro-4-propoxyphenyl)ethanone**

[70668-14-3]

C<sub>11</sub>H<sub>13</sub>NO<sub>5</sub>

mol.wt. 239.23

**Synthesis**

-Preparation by nitration of 2-hydroxy-4-propoxyacetophenone in acetic acid with concentrated nitric acid at  $0^{\circ}$  [1601].

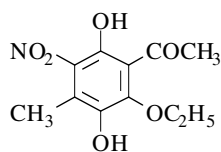
m.p.  $104^{\circ}$  [1601].

**1-(2-Ethoxy-3,6-dihydroxy-4-methyl-5-nitrophenyl)ethanone**

[43140-85-8]

C<sub>11</sub>H<sub>13</sub>NO<sub>6</sub>

mol.wt. 255.23

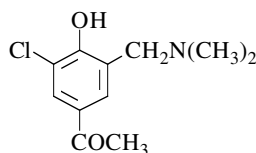
**Synthesis**

-Preparation by adding to a solution of 5-acetyl-2-methyl-3-nitro-1,4-benzoquinone in ethanol, a solution of pyrrolidine in ethanol. After stirring for 3 min, the solvent was eliminated, excess sulfurous acid was added, and the mixture was allowed to stand overnight (31%) [1741].

yellow viscous oil [1741]; <sup>1</sup>H NMR [1741], IR [1741].

**1-[3-Chloro-4-hydroxy-5-[(dimethylamino)methyl]phenyl]ethanone**C<sub>11</sub>H<sub>14</sub>ClNO<sub>2</sub>

mol.wt. 227.69

**Synthesis**

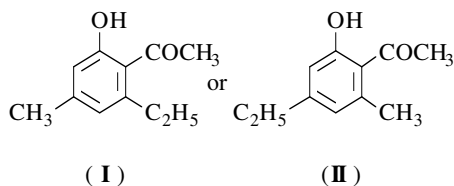
-Preparation by aminomethylation of 3-chloro-4-hydroxyacetophenone with dimethylamine and formalin in water at  $35-40^{\circ}$  for 4 h (60%) [1040].

m.p.  $112^{\circ}$  [1040]; <sup>1</sup>H NMR [1040], IR [1040].

**1-(2-Ethyl-6-hydroxy-4-methylphenyl)ethanone**  
 or  
**1-(4-Ethyl-2-hydroxy-6-methylphenyl)ethanone**

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

-Mixture obtained by Fries rearrangement of 3-ethyl-5-methylphenyl acetate with aluminium chloride, \*at 160-170° for 3 h. The two isomeric ketones were separated *via* their semicarbazide derivatives. However, the respective structures of the isolated ketones

have not been attributed. The melting point of one of them (I) or (II) is 93° (6% yield) and the melting point of the other (II) or (I) is 18-19° (30% yield) [954];

\*without solvent at 130° (80%) [1589];

\*in nitrobenzene at 25° (85%) [1589].

**N.B.:** The 4-ethyl-2-hydroxy-6-methylacetophenone (II) is the most likely formula. However, one does not exclude to deal with a mixture (I + II), especially if working without solvent at 130° [1589].

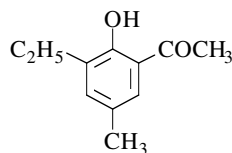
b.p.<sub>8</sub> 170° [1589].

**1-(3-Ethyl-2-hydroxy-5-methylphenyl)ethanone**

[81591-15-3]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

-Obtained by reaction of acetyl chloride on 2-ethyl-4-methylanisole with aluminium chloride in boiling carbon disulfide [101].

-Also obtained by Fries rearrangement of 2-ethyl-4-methylphenyl acetate [112] [1787], (40%) [1787] or 2-ethyl-5-methylphenyl acetate (41%) [112] with aluminium chloride at 130-140°.

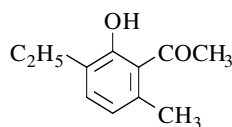
b.p.<sub>25</sub> 144-146° [101], b.p.<sub>30</sub> 153° [112], b.p. 260° [1787].

**1-(3-Ethyl-2-hydroxy-6-methylphenyl)ethanone**

[81591-16-4]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

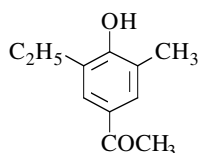
-Obtained (by-product) by reaction of acetyl chloride on 2-ethyl-5-methylanisole with aluminium chloride in carbon disulfide [102].

-Preparation by Fries rearrangement of 2-ethyl-5-methylphenyl acetate by heating with aluminium chloride (30%) [1787].

b.p.<sub>12</sub> 137-138° [102], b.p. 270° [1787].

**1-(3-Ethyl-4-hydroxy-5-methylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

- Preparation by Fries rearrangement at high temperature of 2-ethyl-6-methylphenyl acetate with aluminium chloride (50%) [102].
- Also obtained (poor yield) by Fries rearrangement of 4-dodecyl-2-ethyl-6-methylphenyl acetate with aluminium chloride (13%) [100].

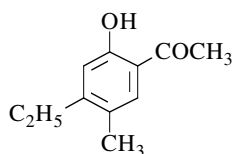
m.p. 101-102° [100], 95°5-96°5 [102]; b.p.<sub>12</sub> 180-200° [100].

**1-(4-Ethyl-2-hydroxy-5-methylphenyl)ethanone**

[93351-16-7]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

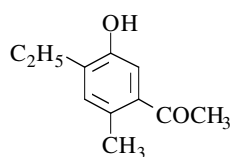
**Syntheses**

- Obtained by oxidation of 6-ethyl-2,3,5-trimethylbenzofuran with chromium trioxide in acetic acid at 50° for 30 min, followed by saponification of the resulting keto ester with potassium hydroxide in boiling aqueous ethanol for 2 h (65%) [1527].
- Also obtained by Friedel-Crafts acylation of 2,5-diethyl-4-methylanisole (SM) (1 mol) with acetyl chloride (1.5 mol) in the presence of aluminium chloride (1.5 mol) in boiling carbon disulfide. There is elimination of the ortho ethyl group in SM during the reaction [101].
- Also obtained by dehydrogenation of 6-acetyl-3-ethyl-4-methyl-2-cyclohexen-1-one, \*with a 5% palladium-barium sulfate catalyst at reflux [1059]; \*with a refluxing solution of bromine (16%) in acetic acid [1059] [1060].
- Also refer to: [532].

yellow oil [101]; m.p. 52° [532] [1059] [1060] [1527];  
b.p.<sub>15</sub> 144-147° [101], b.p.<sub>18</sub> 154-155° [1527]; IR [1527].

**1-(4-Ethyl-5-hydroxy-2-methylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

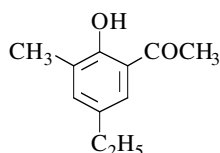
**Syntheses**

- Preparation by reaction of acetyl chloride on 2-ethyl-4-methylanisole with aluminium chloride in boiling carbon disulfide [101].
- Preparation by reaction of aluminium chloride on 4-ethyl-5-methoxy-2-methylacetophenone [101].

m.p. 120-121° [101].

**1-(5-Ethyl-2-hydroxy-3-methylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

- Preparation by Fries rearrangement of 4-ethyl-2-methylphenyl acetate with aluminium chloride (77%) [102].
- Also obtained by heating the following phenyl esters with aluminium chloride at high temperature (in these reactions, there is elimination or migration of the bulky alkyl or

arylalkyl group located in ortho position of the ester group),  
 \*from 2-allyl-4-ethyl-6-methylphenyl acetate (74%) [100];  
 \*from 2-benzyl-4-ethyl-6-methylphenyl acetate (54%) [100];  
 \*from 2-ethyl-6-methylphenyl acetate (noticeable quantity) [102];  
 \*from 4-ethyl-2-methyl-6-propylphenyl acetate (12%) [100].

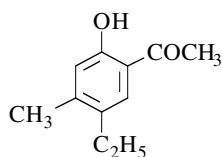
b.p.<sub>20</sub> 120-136° [100], b.p.<sub>11</sub> 129-131° [102], b.p.<sub>12</sub> 130-132° [102], b.p.<sub>18</sub> 130-142° [100],  
 b.p.<sub>13</sub> 142-150° [100].

**1-(5-Ethyl-2-hydroxy-4-methylphenyl)ethanone**

[27513-07-1]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

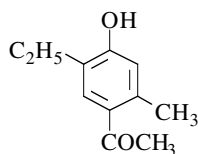
**Syntheses**

- Preparation by Fries rearrangement of 4-ethyl-3-methylphenyl acetate with aluminium chloride at 120° (quantitative yield) [1512], (70%) [102], (52%) [1518].
- Also obtained (by-product) by reaction of acetyl chloride on 2,4-diethyl-5-methylanisole with aluminium chloride in carbon disulfide [102].
- Preparation by chromic acid degradation of 5-ethyl-2,3,6-trimethylbenzofuran (60%) [1518].
- Preparation by dehydrogenation of 6-acetyl-4-ethyl-3-methyl-2-cyclohexen-1-one,  
 \*with a 5% palladium-barium sulfate catalyst at reflux [313] [1059];  
 \*with a refluxing solution of bromine (16%) in acetic acid [313] [1059].

m.p. 96°5-97° [1059], 96-97° [1512], 94-95° [102], 94° [1518], 92-94° [313];  
 b.p.<sub>15</sub> 142-143° [1512].

**1-(5-Ethyl-4-hydroxy-2-methylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

- Obtained (by-product) by Fries rearrangement of 2-ethyl-5-methylphenyl acetate with aluminium chloride at 130-140° [112].

m.p. 117-118° [112].

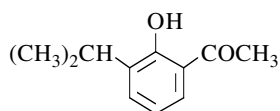


**1-[2-Hydroxy-3-(1-methylethyl)phenyl]ethanone**

[104175-18-0]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

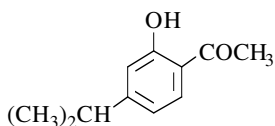
-Preparation by reaction of acetyl chloride with a suspension of aluminium tri-o-isopropylphenoxide in benzene in the presence of aluminium chloride, first at r.t. for 1 h, then on a water bath for 2 h (50%) [1018].

b.p.<sub>3</sub> 108-110° [1018].**1-[2-Hydroxy-4-(1-methylethyl)phenyl]ethanone**

[91969-72-1]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

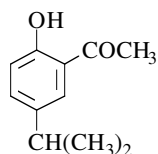
-Obtained by Fries rearrangement of 2-isopropylphenyl acetate with aluminium chloride without solvent at 140°, accompanied by an alkyl group migration (22%) [503].

b.p.<sub>12</sub> 129-130° [503].**1-[2-Hydroxy-5-(1-methylethyl)phenyl]ethanone**

[1634-36-2]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

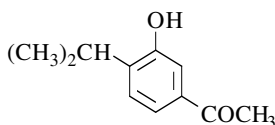
-Preparation by reaction of acetyl chloride on 4-isopropylanisole with aluminium chloride in carbon disulfide at r.t. (48%) [967].  
-Also refer to: [1666].

b.p.<sub>10</sub> 130-132° [967].**1-[3-Hydroxy-4-(1-methylethyl)phenyl]ethanone**

[1634-62-4]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

-Preparation by diazotization of 3-amino-4-isopropylacetophenone, followed by hydrolysis of the diazonium salt obtained (50%) [1069], (26%) [967].

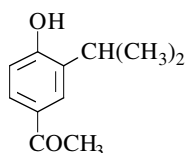
m.p. 100-101° [967], 97-100° [1069].

**1-[4-Hydroxy-3-(1-methylethyl)phenyl]ethanone**

[1632-59-3]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

- Preparation by reaction of acetyl chloride on 2-isopropylphenol with aluminium chloride in boiling carbon disulfide (44%) [1069].
- Preparation by demethylation of 4-methoxy-3-isopropylacetophenone with boiling pyridinium chloride (30%) [967].

-Also obtained (poor yield) by Fries rearrangement of 2-isopropylphenyl acetate with aluminium chloride, without solvent at 104° (14%) [503] or in nitrobenzene at r.t. (13%) [967].

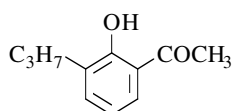
m.p. 143° [967], 140° [503], 139-140° [1069].

**1-(2-Hydroxy-3-propylphenyl)ethanone**

[93915-84-5]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

- Preparation by hydrogenation of 3-allyl-2-hydroxyacetophenone in the presence of 10% Pd/C and sodium hypophosphite,
- \*in dilute ethanol at 20° (92%) [1539];

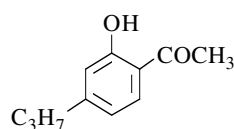
\*in aqueous sodium hydroxide at 50° (88%) [1539].

-Refer to: [851] [852] (Japanese patents).

<sup>1</sup>H NMR [1539].

**1-(2-Hydroxy-4-propylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

- Preparation by reaction of acetic acid with 3-propylphenol in the presence of zinc chloride for 5 h at 180° (reflux) (Nencki reaction) (40%) [434].

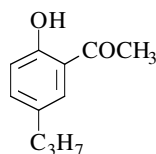
b.p.<sub>0.7</sub> 93° [434], b.p.<sub>16</sub> 128-131° [434].

**1-(2-Hydroxy-5-propylphenyl)ethanone**

[1990-24-5]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

- Preparation by Fries rearrangement of 4-propylphenyl acetate with aluminium chloride [100] [1172] without solvent at 140° [1172].
- Preparation by reaction of acetyl chloride with 4-propylanisole in the presence of aluminium chloride in methylene chloride, first at 0°, then at reflux under nitrogen (86%) [1216].

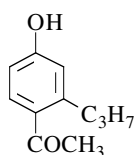
yellow liquid [1216];  
 b.p.<sub>0.25</sub> 80-85° [1172], b.p.<sub>1.2</sub> 98-105° [1216], b.p.<sub>20</sub> 145-147° [100];  
<sup>1</sup>H NMR [1216];  $n_D^{20} = 1.5365$  [1172].

**1-(4-Hydroxy-2-propylphenyl)ethanone**

[104174-27-8]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

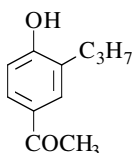
-Obtained by boiling 3-propylphenol with acetic anhydride in the presence of a little sulfuric acid [434].  
 -Also refer to: [126].

b.p.<sub>18</sub> 121-123° [434].**1-(4-Hydroxy-3-propylphenyl)ethanone**

[61270-28-8]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

-Preparation by reaction of acetyl chloride on 2-propylphenol with aluminium chloride in nitrobenzene at r.t. [1513].  
 -Also obtained by catalytic hydrogenation of 3-allyl-4-hydroxyacetophenone in the presence of Pd/C in ethanol

[71] [777] [1211], (90-100%) [71] [1211] or Raney nickel in ethyl acetate (80%) [1156].

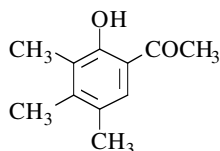
m.p. 90-91° [71], 89-90° [1211], 87° [1513]; b.p.<sub>25</sub> 210° [1513];  
 MS [1156]; pK<sub>a</sub> [1156].

**1-(2-Hydroxy-3,4,5-trimethylphenyl)ethanone**

[58972-39-7]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

-Preparation by Fries rearrangement of 2,3,4-trimethylphenyl acetate with aluminium chloride at 130-140° (good yield) [112].  
 -Preparation by reaction of acetyl chloride on 2,3,4-trimethylphenol with aluminium chloride in carbon disulfide at r.t. (55%) [1808].

-Also obtained from various aryl esters by heating with aluminium chloride between 130 to 150°, the reaction being accompanied by a migration of methyl groups,  
 \*2,3,5-trimethylphenyl acetate [112] [123], (86%) [112];  
 \*2,4,5-trimethylphenyl acetate (major compound) [112];  
 \*2,4,6-trimethylphenyl acetate [103] [112], (major compound) [112].  
 -Also obtained (poor yield) by heating a mixture of 2,4,6-trimethylphenyl acetate and 4-methylphenyl chloroacetate with aluminium chloride (10%) [103].  
 -Also obtained by isomerization of 2-hydroxy-3,4,6-trimethylacetophenone by heating with aluminium chloride [123].

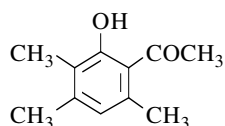
m.p. 43-44° [112], 42° [103] [123]; b.p.<sub>11</sub> 142-144° [112], b.p. 275-276° [112];  
<sup>1</sup>H NMR [1808], IR [1808].

**1-(2-Hydroxy-3,4,6-trimethylphenyl)ethanone**

[163429-79-6]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

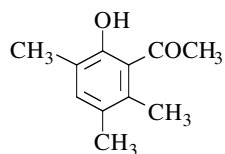
**Syntheses**

-Preparation by Fries rearrangement of 2,3,5-trimethylphenyl acetate (isopseudocumenol acetate) with aluminium chloride [123], at 100° for 1.5 h (85%) [204].  
 -Also refer to: [983].

m.p. 46° [123], 32-34° [204]; <sup>1</sup>H NMR [204], <sup>13</sup>C NMR [204], IR [204].

**1-(2-Hydroxy-3,5,6-trimethylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

-Obtained (by-product) by Fries rearrangement of 2,4,5-trimethylphenyl acetate (pseudocumenol acetate) with aluminium chloride at 130-140° [112].

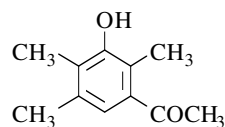
b.p.<sub>11</sub> 145-146° [112].

**1-(3-Hydroxy-2,4,5-trimethylphenyl)ethanone**

[99892-62-3]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

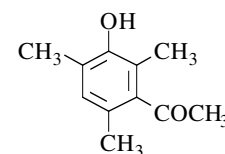
**Synthesis**

-Preparation by rearrangement of 1 $\alpha$ , 5 $\alpha$ , 6 $\alpha$ , 8 $\alpha$ -tetramethyl-2 $\alpha$ -H, 4 $\alpha$ -H -3,9-dioxatricyclo [3.3.1.0<sup>2,4</sup>] nonan-7-one by treatment with sodium ethoxide in ethanol (81%) [615].

m.p. 115° [615]; <sup>1</sup>H NMR [615], IR [615], MS [615].

**1-(3-Hydroxy-2,4,6-trimethylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

-Preparation by reaction of acetyl chloride on 2,4,6-trimethylanisole (mesitol methyl ether) with aluminium chloride in boiling carbon disulfide (20%) [101].

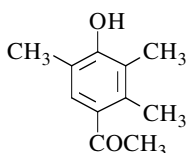
m.p. 81-82° [101].

**1-(4-Hydroxy-2,3,5-trimethylphenyl)ethanone**

[61405-64-9]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

-Preparation by Fries rearrangement of 2,3,6-trimethylphenyl acetate with aluminium chloride at 165-170° for 15 min (94%) [1060].  
 -Also obtained by dehydrogenation of 4-acetyl-2,3,6-trimethyl-2-cyclohexen-1-one at reflux for 30 min in the presence of 5% palladium-barium sulfate [1059], (10%) [1060].

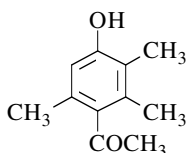
m.p. 132-133° [1059] [1060]; IR [1060], UV [1060].

**1-(4-Hydroxy-2,3,6-trimethylphenyl)ethanone**

[156483-08-8]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Synthesis**

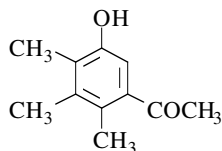
-Refer to: [1631].

**1-(5-Hydroxy-2,3,4-trimethylphenyl)ethanone**

[13667-28-2]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

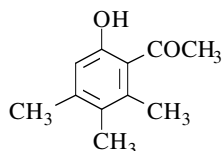
-Preparation from 2,3,4-trimethyl-5-nitroacetophenone *via* reduction with stannous chloride and following diazotization of the resulting 5-amino-2,3,4-trimethylacetophenone (68%) [1805], (53%) [1034].  
 -Also obtained by rearrangement of 3-acetyl-4,4,5-trimethyl-2,5-cyclohexadiene-1-one in 68% sulfuric acid at 40° (29%) [691].

m.p. 168° [1034] [1805]; <sup>1</sup>H NMR [691], IR [691] [1805], MS [691].**1-(6-Hydroxy-2,3,4-trimethylphenyl)ethanone**

[27192-99-0]

C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 178.23

**Syntheses**

-Preparation by Fries rearrangement of 3,4,5-trimethylphenyl acetate with aluminium chloride without solvent at 130° [112] [733], (50%) [733].  
 -Preparation by reaction of acetyl chloride on 3,4,5-trimethylanisole with aluminium chloride in boiling carbon disulfide (45%) [114].

-Also obtained *via* pyrolysis of 1,3,7,8-tetramethyl-2-oxabicyclo[4.2.0]octa-3,7-dien-5-one (2,6-dimethyl-4-pyrone - Butyne-2 - Adduct) in refluxing o-dichlorobenzene [733].

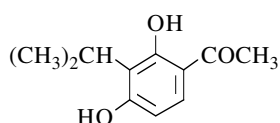
m.p. 83°5-84°5 [114], 83-84° [112], 58-60° [733]; b.p.<sub>13</sub> 163-166° [112];  
<sup>1</sup>H NMR [733], IR [733], UV [733], MS [733].

**1-[2,4-Dihydroxy-3-(1-methylethyl)phenyl]ethanone**

[118604-45-8]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



Synthesis

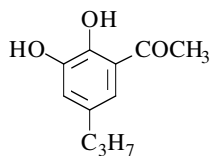
-Preparation by total demethylation of 2,4-dimethoxy-3-iso-propylacetophenone with 48% hydrobromic acid in refluxing acetic acid [1157].

**1-(2,3-Dihydroxy-5-propylphenyl)ethanone**

[86253-71-6]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



Synthesis

-Preparation by reaction of acetic acid with 2-methoxy-4-propylphenol in the presence of boron trifluoride at 150-155° (81%) [1216].

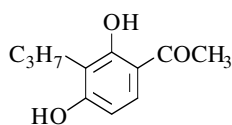
oil [1216].

**1-(2,4-Dihydroxy-3-propylphenyl)ethanone**

[40786-69-4]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



Syntheses

-Preparation by reaction of acetonitrile on 2-propylresorcinol (Hoesch reaction) (86%) [132].  
 -Preparation by catalytic hydrogenation of 3-allyl-2,4-dihydroxyacetophenone using palladium chloride as catalyst in ethanol (quantitative yield) [132] or Raney nickel in ethyl acetate [777].  
 -Preparation by total demethylation of 2,4-dimethoxy-3-propylacetophenone with 48% hydrobromic acid in refluxing acetic acid for 19 h (73%) [1157].  
 -Also refer to: [43] [44] [1372].

**N.B.:** Pr indicates the *propyl* group -C<sub>3</sub>H<sub>7</sub> in Chem. Abstr., **92**, 6368x (1980) and **98**, 54239b (1983), an usual abbreviation. However, in the two references [43] [44], Pr represented the *prenyl* group -CH<sub>2</sub>CH=C(CH<sub>3</sub>)<sub>2</sub>. Therefore they concern the 2,4-dihydroxy-3-prenylacetophenone and not the above mentioned 2,4-dihydroxy-3-propylacetophenone.

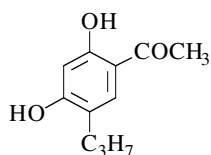
m.p. 127-128° [132].

**1-(2,4-Dihydroxy-5-propylphenyl)ethanone**

[63411-87-0]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Syntheses**

- Preparation by reaction of acetic acid on 4-propylresorcinol with zinc chloride (Nencki reaction) [506] [930].
- Preparation by reaction of acetonitrile on 4-propylresorcinol (Hoesch reaction) (75%) [1277].
- Preparation by Fries rearrangement of 4-propylresorcinol

diacetate in the presence of 4-propylresorcinol with aluminium chloride in nitrobenzene at 50° (quantitative yield) [1514].

-Also refer to: [43] [44].

**N.B.:** Pr indicates the *propyl* group -C<sub>3</sub>H<sub>7</sub> in Chem. Abstr., **92**, 6368x (1980) and **98**, 54239b (1983), an usual abbreviation. However, in the two references [43] [44], Pr represented the *prenyl* group -CH<sub>2</sub>CH=C(CH<sub>3</sub>)<sub>2</sub>. Therefore they concern the 2,4-dihydroxy-5-prenylacetophenone and not the above mentioned 2,4-dihydroxy-5-propylacetophenone.

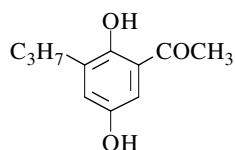
m.p. 110-111° [506], 108-109° [1514], 108° [1277].

**1-(2,5-Dihydroxy-3-propylphenyl)ethanone**

[83812-26-4]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

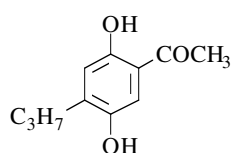
mol.wt. 194.23

**Synthesis**

- Refer to: [742] [1680] (patents).

**1-(2,5-Dihydroxy-4-propylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Synthesis**

- Obtained (by-product) by reaction of acetyl chloride on 2-propylhydroquinone dimethyl ether with aluminium chloride in boiling carbon disulfide (3%) [457].

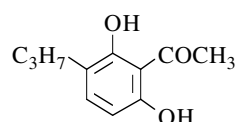
m.p. 85° [457].

**1-(2,6-Dihydroxy-3-propylphenyl)ethanone**

[53542-79-3]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Syntheses**

- Preparation from 2,6-dihydroxyacetophenone according to the method [1532], (64%) [237].
- Also refer to: [92] [93] [94] [95] [191] [1067].

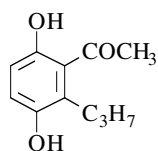
m.p. 84-85° [237].

**1-(3,6-Dihydroxy-2-propylphenyl)ethanone**

[106627-41-2]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Synthesis**

-Preparation by catalytic hydrogenation of 2-allyl-3,6-dihydroxyacetophenone using palladised strontium carbonate catalyst [457] or Raney nickel (60%) [1156] in ethyl acetate.

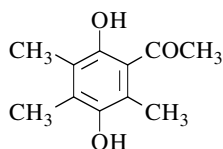
m.p. 88° [457] (monohydrate); MS [1156].

**1-(2,5-Dihydroxy-3,4,6-trimethylphenyl)ethanone**

[64794-45-2]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Syntheses**

-Obtained by oxidation of 2,4,5,7,8-pentamethyl-4*H*-1,3-benzodioxin-6-ol (PBD)\* in aqueous media *via* 2-(1-hydroxyethyl)-3,5,6-trimethylbenzo-1,4-quinone, without or with aldehyde trapping (method A or B, respectively) [1507].

oxidant	method	yield (%)
FeCl <sub>3</sub> .6 H <sub>2</sub> O	A (B)	38 (85)
K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	A (B)	38 (86)
AgNO <sub>3</sub>	A (B)	44 (83)
H <sub>2</sub> O <sub>2</sub>	A (B)	44 (82)
KMnO <sub>4</sub>	A (B)	32 (68)
NMMO**	- (B)	- (81)

**N.B.:**

-PBD\* is a novel 3-oxa-tocopherol-type stabilizer which is obtained as a mixture of two diastereoisomers by condensation of trimethylhydroquinone with acetaldehyde.

-NMMO\*\* = N-methylmorpholine-N-oxide.

-Preparation by Fries rearrangement of 2,3,5-trimethylhydroquinone diacetate,

\*with aluminium chloride at 220° (51%) [1880];

\*with boron trifluoride-acetic acid complex, followed by saponification of the 3-acetoxy-6-hydroxy-2,4,5-trimethylacetophenone obtained [422] [424] [1144], (71%) [424], (65%) [1144].

-Also obtained by hydrolysis of 3-(acetyloxy)-6-hydroxy-2,4,5-trimethylacetophenone with 5% methanolic hydrogen chloride (50%) [1872].

-Also refer to: [1928].

m.p. 152° [1880], 111° [1144], 110-113° [1507], 107-109° [1872], 107-108° [424];

<sup>1</sup>H NMR [424] [1507] [1872], <sup>13</sup>C NMR [1507] [1872], IR [424] [1507],

UV [424] [1880], MS [424].

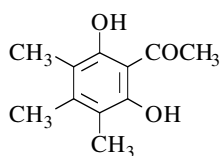


**1-(2,6-Dihydroxy-3,4,5-trimethylphenyl)ethanone**

[66842-24-8]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Syntheses**

- Obtained by Fries rearrangement of trimethylhydroquinone diacetate with aluminium chloride at 220°, *via* a secondary rearrangement of the normal product (I) (50%) [424].
- Also obtained by reaction of aluminium chloride on 5-acetoxy-2-hydroxy-3,4,6-trimethylacetophenone

at 220° (53-55%) [424].

-Also obtained by rearrangement of 2,5-dihydroxy-3,4,6-trimethylacetophenone (I) with aluminium chloride at 220° (29-34%) [424].

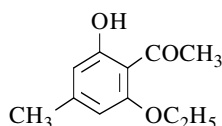
m.p. 136-145° [424]; <sup>1</sup>H NMR [424], IR [424], UV [424], MS [424].

**1-(2-Ethoxy-6-hydroxy-4-methylphenyl)ethanone**

[78274-02-9]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Syntheses**

- Obtained by reaction of sodium ethoxide with 3,5-diacetyl-2,6-dimethyl-4H-pyran-4-one in ethanol at r.t. (20%) [563].
- Also obtained by heating 3-acetyl-2,6-dimethyl-4H-pyran-4-one with sodium ethoxide in ethanol (17%) [564].

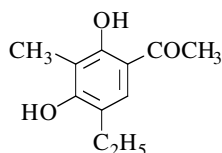
m.p. 95° [563] [564] [1784]; <sup>1</sup>H NMR [563], IR [563], MS [563] [564].

**1-(5-Ethyl-2,4-dihydroxy-3-methylphenyl)ethanone**

[140660-34-0]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

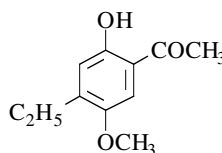
**Synthesis**

- Preparation by reaction of acetic acid on 4-ethyl-1,3-dihydroxy-2-methylbenzene with zinc chloride at 95-100° (Nencki reaction) (24%) [777].

crystalline product [777].

**1-(4-Ethyl-2-hydroxy-5-methoxyphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Syntheses**

- Preparation from 2-ethylhydroquinone dimethyl ether, \*by reaction with acetic acid in the presence of boron trifluoride (55%) [1459];
- \*by reaction with acetyl chloride in the presence of aluminium chloride in boiling ethyl ether (27%) [1461].

-Preparation by partial methylation of 4-ethyl-2,5-hydroxyacetophenone with dimethyl sulfate in the presence of potassium carbonate in boiling acetone (47%) [1461].

-Also obtained (poor yield) by partial demethylation of 4-ethyl-2,5-dimethoxyacetophenone with 6% aqueous hydrobromic acid in acetic acid at r.t. (9%) [1459].

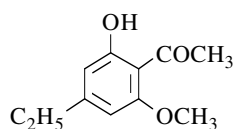
m.p. 60°4-61° [1459], 60° [1461]; UV [1459].

**1-(4-Ethyl-2-hydroxy-6-methoxyphenyl)ethanone**

[128546-82-7]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



Syntheses

-Refer to: [1254] [1255] [1256] [1763] [1765] [1766] (Japanese papers) and [1253].

Isolation from natural sources

-From *Juniperus semiglobosa* Regel (Cupressaceae) [11].

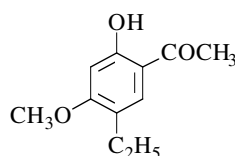
m.p. 85° [11]; <sup>1</sup>H NMR [11], IR [11], UV [11], MS [11].

**1-(5-Ethyl-2-hydroxy-4-methoxyphenyl)ethanone**

[4223-85-2]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



Syntheses

-Preparation by reaction of dimethyl sulfate [930] or methyl iodide [313] on 5-ethyl-2,4-dihydroxyacetophenone with potassium carbonate in refluxing acetone.

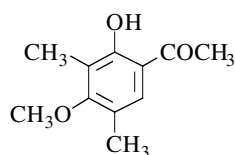
-Preparation by chromic acid degradation of 5-ethyl-6-methoxy-2,3-dimethylbenzofuran (21%) [1521].

m.p. 49-50° [313], 48° [1521]; b.p.<sub>20</sub> 165-167° [1521].

**1-(2-Hydroxy-4-methoxy-3,5-dimethylphenyl)ethanone**

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



Synthesis

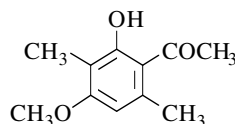
-Preparation by treating 2,4-dihydroxy-3,5-dimethylacetophenone with diazomethane or with dimethyl sulfate and sodium hydroxide [755].

m.p. 35-36° [755]; b.p.<sub>0.6</sub> 90° [755].

**1-(2-Hydroxy-4-methoxy-3,6-dimethylphenyl)ethanone**

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



Synthesis

-Obtained by reaction of methyl iodide with 2,4-dihydroxy-6-methylacetophenone in the presence of potassium hydroxide (15%) [448].

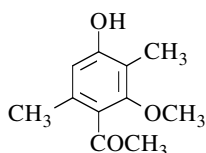
m.p. 90-91° [448].

**1-(4-Hydroxy-2-methoxy-3,6-dimethylphenyl)ethanone**

[97761-88-1]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



## Synthesis

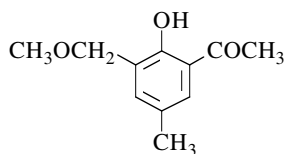
**N.B.:** Mentioned in the Chem. Abstr. **103**, 85031d (1985). However, this compound does not appear in the original paper [1563] which concerns only some ketones derived of phloroglucinol.

**1-[2-Hydroxy-3-(methoxymethyl)-5-methylphenyl]ethanone**

[87165-63-7]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



## Syntheses

-Preparation from 3-chloromethyl-2-hydroxy-5-methylacetophenone (b.p.<sub>0.4</sub> 110-116°) [289] by reaction with methanol in the presence of concentrated hydrochloric acid and iron powder at reflux for 3.5 to 4.5 h (82%) [30], (49%) [289].

-Also refer to: [31].

m.p. 36-38° [30]; b.p.<sub>0.6</sub> 95-103° [289], b.p.<sub>20</sub> 160-165° [30];

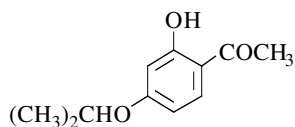
<sup>1</sup>H NMR [30] [289], <sup>13</sup>C NMR [30], IR [30] [289].

**1-[2-Hydroxy-4-(1-methylethoxy)phenyl]ethanone**

[73473-62-8]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



## Synthesis

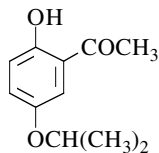
-Refer to: [409] (Chinese reference) and [1770] (Japanese patent).

**1-[2-Hydroxy-5-(1-methylethoxy)phenyl]ethanone**

[152810-05-4]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23



## Syntheses

-Preparation by reaction of 2-bromopropene with quinacetophenone in the presence of sodium iodide and potassium carbonate in DMF at 60° for 24 h (51%) [856].

-Also refer to: [855] [1666].

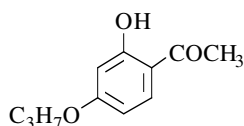
oil [856]; <sup>1</sup>H NMR [856].

**1-(2-Hydroxy-4-propoxyphenyl)ethanone**

[55329-63-0]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Syntheses**

-Preparation by reaction of propyl iodide [313] [364] [578] or propyl bromide [578] on resacetophenone,  
 \*with potassium hydroxide in boiling ethanol [364] [578];  
 \*with potassium carbonate in boiling acetone [313].

-Also refer to: [43] [44].

**N.B.:** Pr indicates the *propyl* group -C<sub>3</sub>H<sub>7</sub> in Chem. Abstr., **92**, 6368x (1980) and **98**, 54239b (1983), an usual abbreviation. However, in the two references [43] [44], Pr represented the *prenyl* group -CH<sub>2</sub>CH=C(CH<sub>3</sub>)<sub>2</sub>. Therefore they concern the 2-hydroxy-4-prenyloxyacetophenone and not the above mentioned 2-hydroxy-4-propyloxyacetophenone.

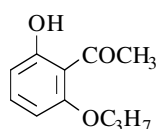
m.p. 25° [578]; b.p.<sub>3-4</sub> 136° [364].

**1-(2-Hydroxy-6-propoxyphenyl)ethanone**

[14718-38-8]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 194.23

**Synthesis**

-Preparation by reaction of propyl iodide on 2,6-dihydroxyacetophenone with potassium carbonate in refluxing acetone (66%) [1567].

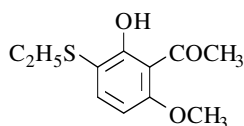
m.p. 70-71° [1567].

**1-[3-(Ethylthio)-2-hydroxy-6-methoxyphenyl]ethanone**

[126405-82-1]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>S

mol.wt. 226.30

**Synthesis**

-Preparation by adding 2-hydroxy-3-iodo-6-methoxyacetophenone and cuprous oxide to a solution of sodium ethyl sulfhydrylate, previously prepared from ethanethiol and sodium hydride in DMF [1873].

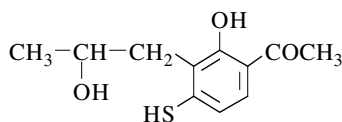
m.p. 57° [1873]; <sup>1</sup>H NMR [1873], IR [1873].

**1-[2-Hydroxy-3-(2-hydroxypropyl)-4-mercaptophenyl]ethanone**

[167211-59-8]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>S

mol.wt. 226.30

**Synthesis**

-Preparation in six steps from 3-allyl-2,4-dihydroxyacetophenone [1367] (Japanese patent).

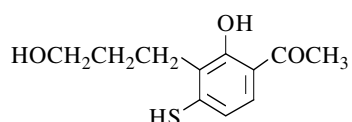
**1-[2-Hydroxy-3-(3-hydroxypropyl)-4-mercaptophenyl]ethanone**

[167211-71-4]

C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>S

mol.wt. 226.30

Synthesis



-Refer to: [1367] (Japanese patent).

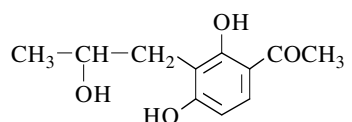
**1-[2,4-Dihydroxy-3-(2-hydroxypropyl)phenyl]ethanone**

[167211-56-5]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

Synthesis



-Refer to: [1367] (Japanese patent).

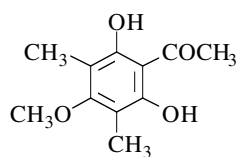
**1-(2,6-Dihydroxy-4-methoxy-3,5-dimethylphenyl)ethanone** (*Mallophenone*)

[129399-54-8]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

Syntheses



-Obtained by degradation of 5-hydroxy-7-methoxy-6,8-dimethylchromone (Leptorumol monomethyl ether) with 2 N potassium hydroxide (30%) [645].  
 -Also refer to: [1322] [1323].

Isolation from natural sources

-From the pericarps of *Mallotus japonicus* Muell. Arg. (Euphorbiaceae) [77].

m.p. 132° [645], 131-132° [77];

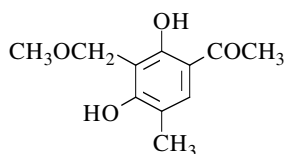
<sup>1</sup>H NMR [77] [645], <sup>13</sup>C NMR [77], IR [77] [645], UV [77] [645] [1322], MS [77].**1-[2,4-Dihydroxy-3-(methoxymethyl)-5-methylphenyl]ethanone**

[333763-54-5]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

Isolation from natural sources

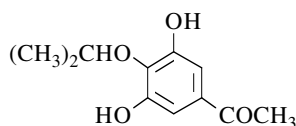
-From the culture filtrate of chilean strain of *Trichoderma pseudokoningii* [90].

**1-[3,5-Dihydroxy-4-(1-methylethoxy)phenyl]ethanone**

[192625-58-4]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Synthesis**

-Preparation by total demethylation of 3',5'-dimethoxy-4'-isopropoxyacetophenone in two steps *via* formation of dimethyl acetal (80%) [1076].

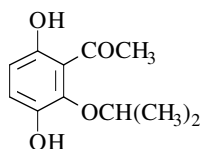
<sup>1</sup>H NMR [1076], MS [1076]; TLC [1076].

**1-[3,6-Dihydroxy-2-(1-methylethoxy)phenyl]ethanone**

[33539-22-9]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Syntheses**

-Easy preparation by reduction of 2-acetyl-3-isopropoxy-1,4-benzoquinone using conventional methods [587].  
-Also obtained (low yield) by reaction of 2-acetyl-1,4-benzoquinone with an excess of isopropanol at r.t., with exclusion of light [587].

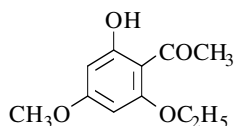
m.p. 90-92° [587]; <sup>1</sup>H NMR [587], IR [587].

**1-(2-Ethoxy-6-hydroxy-4-methoxyphenyl)ethanone**

[76554-79-5]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Syntheses**

-Preparation by reaction of dimethyl sulfate on 6-ethoxy-2,4-dihydroxyacetophenone with potassium carbonate in boiling acetone (81%) [73].  
-Preparation by reaction of diethyl sulfate on 2,6-dihydroxy-4-methoxyacetophenone with potassium carbonate in boiling acetone [73].  
-Preparation by reaction of diazoethane on 2,6-dihydroxy-4-methoxyacetophenone [1675].

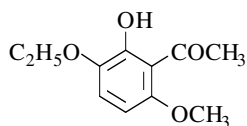
m.p. 134° [73], 133-134° [1675].

**1-(3-Ethoxy-2-hydroxy-6-methoxyphenyl)ethanone**

[126405-76-3]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Synthesis**

-Preparation by adding 2-hydroxy-3-iodo-6-methoxyacetophenone and cuprous iodide to a solution of sodium ethoxide, previously prepared from ethyl alcohol and sodium hydride in DMF [1873].

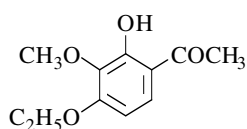
m.p. 70° [1873]; <sup>1</sup>H NMR [1873], IR [1873].

**1-(4-Ethoxy-2-hydroxy-3-methoxyphenyl)ethanone**

[69616-59-7]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Synthesis**

-Preparation by reaction of ethyl iodide with 2,4-dihydroxy-3-methoxyacetophenone in the presence of potassium carbonate in refluxing acetone (64%) [1360].

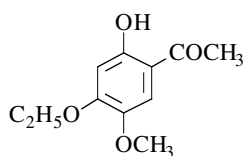
m.p. 76-77° [1360]; <sup>1</sup>H NMR [1360], IR [1360].

**1-(4-Ethoxy-2-hydroxy-5-methoxyphenyl)ethanone**

[75672-62-7]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Synthesis**

-Preparation by reaction of dimethyl sulfate with 4-ethoxy-2,5-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (82%) [212].

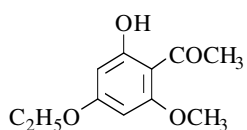
m.p. 94-95° [212].

**1-(4-Ethoxy-2-hydroxy-6-methoxyphenyl)ethanone**

[76554-80-8]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Syntheses**

-Preparation by reaction of diazoethane on 2,4-dihydroxy-6-methoxyacetophenone [1675].

-Also refer to: [639].

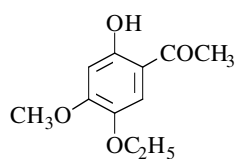
m.p. 56-57° [1675].

**1-(5-Ethoxy-2-hydroxy-4-methoxyphenyl)ethanone**

[75672-59-2]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Synthesis**

-Preparation by reaction of diethyl sulfate with 2,5-dihydroxy-4-methoxyacetophenone in the presence of potassium carbonate in refluxing acetone (71%) [212].

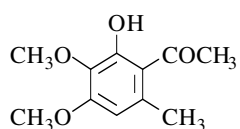
m.p. 101-102° [212].

**1-(2-Hydroxy-3,4-dimethoxy-6-methylphenyl)ethanone**

[63542-37-0]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Syntheses**

-Preparation by reaction of acetyl chloride on 3,4,5-trimethoxytoluene with aluminium chloride,

\*in ethyl ether at r.t. [133] [1449], (50%) [133];

\*in refluxing methylene chloride (67%) [1782].

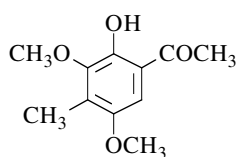
m.p. 94° [1449], 92° [133], 77-78° [1782];  
<sup>1</sup>H NMR [1782], <sup>13</sup>C NMR [1782], IR [1782], MS [1782].

**1-(2-Hydroxy-3,5-dimethoxy-4-methylphenyl)ethanone**

[134255-78-0]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



**Synthesis**

-Obtained by Fries rearrangement of 3-acetoxy-2,6-dimethoxytoluene (oil) with boron trifluoride etherate at 95° for 3 h (63%) [274].

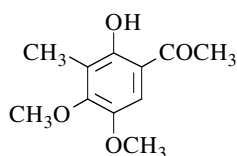
m.p. 73°5-75° [274]; TLC [274];  
<sup>1</sup>H NMR [274], IR [274], MS [274].

**1-(2-Hydroxy-4,5-dimethoxy-3-methylphenyl)ethanone**

[134255-79-1]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



**Synthesis**

-Obtained by selective demethylation of 3-methyl-2,4,5-trimethoxyacetophenone (pale yellow oil) with boron trichloride in methylene chloride at 0° for 80 min (85%) [274].

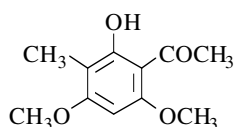
m.p. 86-87° [274]; <sup>1</sup>H NMR [274], MS [274].

**1-(2-Hydroxy-4,6-dimethoxy-3-methylphenyl)ethanone**

[23121-32-6]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



**Syntheses**

-Preparation by reaction of acetonitrile on 3,5-dimethoxy-2-methylphenol (Hoesch reaction) (68%) [469].  
 -Preparation by reaction of methyl iodide, in the presence of potassium carbonate in boiling acetone,

\*on 2,4-dihydroxy-6-methoxy-3-methylacetophenone [1500];

\*on 2,6-dihydroxy-4-methoxy-3-methylacetophenone [470];

\*on phloracetophenone [145] [469] [706] [736] [1297] [1434] [1564] [1735], (37-42%) [706] [1735], (21-28%) [469] [1297] [1564].

-Also obtained (by-product) by reaction of methyl iodide with phloracetophenone in 10% methanolic potassium hydroxide (< 3%) [875].

-Preparation by partial methylation of 2,4,6-trihydroxy-3-methylacetophenone,

\*with diazomethane in ethyl ether-methanol mixture at 0° (good yield) [1564];

\*with dimethyl sulfate in the presence of potassium carbonate in boiling acetone [883] [1297], (71%) [1297];

\*with methyl iodide, in the presence of potassium carbonate in boiling acetone [469] [1297] [1490].

-Preparation by partial demethylation of 2,4,6-trimethoxy-3-methylacetophenone with aluminium chloride in acetonitrile at 30° for 6 h (90%) [962].

-Preparation by reaction of acetyl chloride,

\*with 2,4,6-trimethoxytoluene in the presence of aluminium chloride in ethyl ether at r.t. (51%) [962];

\*with 2-hydroxy-4,6-dimethoxytoluene in the presence of aluminium chloride in nitrobenzene at r.t. [1184] according to [1299].



- Preparation by reaction of acetic anhydride and acetic acid,
- \*on 3,5-dimethoxy-2-methylphenol with boron trifluoride at 20-30° (60%) [494];
- \*on 2,4,6-trimethoxytoluene with boron trifluoride at 20-30° or at 100° [494].
- Also obtained on deacylation of 2,4-diacetyl-3,5-dimethoxy-6-methylphenol acetate with 10% hydrochloric acid in ethanol [494].

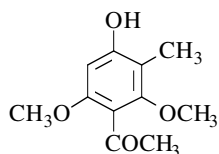
## Isolation from natural sources

- From the leaves and bark of *Acradenia franklinii* (Kippist) (Rutaceae) [145].
- From the stem wood of *Euphorbia quinquecostata* Volk. (Euphorbiaceae) [1209].
- From *Euphorbia portulacoides* (Euphorbiaceae) [1261].

m.p. 145° [494], 144-145° [1564], 144° [1297], 143-144° [469], 143° [145],  
 142-143° [1735], 142° [1490], 141°-143° [962], 141-143° [706],  
 141-142° [383] [470] [1500], 140-141° [875], 130-131° [1209];  
<sup>1</sup>H NMR [883] [1209] [1261], <sup>13</sup>C NMR [736] [1209], IR [145] [1209],  
 UV [145] [1209], MS [1209].

**1-(4-Hydroxy-2,6-dimethoxy-3-methylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



## Synthesis

- Preparation by catalytic hydrogenolysis of 4-(benzyloxy)-2,6-dimethoxy-3-methylacetophenone with Pd/C in acetic acid (quantitative yield) [1883].

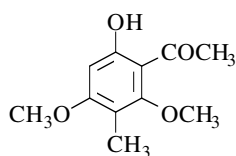
m.p. 121° [1883].

**1-(6-Hydroxy-2,4-dimethoxy-3-methylphenyl)ethanone** (*Bancroftinone*)

[14964-98-8]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



## Syntheses

- Preparation by hydrolysis of 6-(benzyloxy)-2,4-dimethoxy-3-methylacetophenone with 3 N aqueous-methanolic potassium hydroxide at r.t. (75%) [1883].
- Preparation by Fries rearrangement of 3,5-dimethoxy-4-methylphenyl acetate with aluminium chloride in nitrobenzene (75-77%) [224] [1106].
- Preparation by reaction of methyl iodide with 4,6-dihydroxy-2-methoxy-3-methylacetophenone in the presence of potassium carbonate in refluxing acetone (93%) [1186].
- Preparation by reaction of acetyl chloride on 3,5-dimethoxy-4-methylphenol with aluminium chloride in ethyl ether first at 0°, then at r.t. [75] [883] [1454], (40%) [883].

## Isolation from natural sources

- From the leaf oils of *Backhousia bancroftii* F. M. Bailey & Muell. (Myrtaceae) as a major constituent [294].
- The ketone was present to the extent of 35% in clove oil [837].
- Swertisin was isolated from the whole herb of *Swertia japonica* Makino (Gentianaceae). Further, hydrolytic decomposition of its dimethyl ether with aqueous barium hydroxide gave a degradation product, the 3-C-β-D-glucopyranosyl-6-hydroxy-2,4-dimethoxyacetophenone. This one, by treatment with an excess of aqueous periodic acid followed by Clemmensen reduction gave 6-hydroxy-2,4-dimethoxy-3-methylacetophenone [1147].

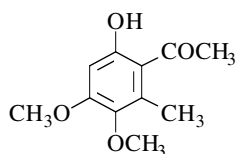
m.p. 44-45° [837], 38-39° [1106], 35° [1883];  
oil [1186]; b.p.<sub>0.2</sub> 110-112° [224], b.p.<sub>2</sub> 120-122° [883], b.p.<sub>1</sub> 128-131° [1106];  
GC [294], GC/MS [294];  
<sup>1</sup>H NMR [75] [294] [837], <sup>13</sup>C NMR [294], IR [837], UV [837], MS [294] [837].

**1-(6-Hydroxy-3,4-dimethoxy-2-methylphenyl)ethanone**

[62615-64-9]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



**Syntheses**

-Obtained by partial methylation of 2,5-dihydroxy-4-methoxy-6-methylacetophenone with dimethyl sulfate in acetone, in the presence of potassium carbonate (20%) [16].  
-Preparation by partial demethylation of 2,4,5-trimethoxy-6-methylacetophenone with boron trichloride in methylene chloride at 0° (85%) [1449].

**Isolation from natural sources**

-By hydrolysis of 4,6,7-trimethoxy-5-methylcoumarin, isolated from *Leonotis nepetaefolia* [1449].

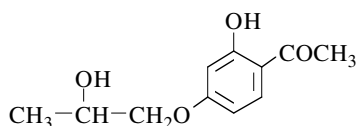
m.p. 77° [1449], 76-77° [16]; <sup>1</sup>H NMR [1449], IR [1449], UV [1449].

**1-[2-Hydroxy-4-(2-hydroxypropoxy)phenyl]ethanone**

[149454-57-9]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



**Synthesis**

-Obtained by reaction of resacetophenone with propylene oxide in the presence of sodium hydroxide in ethanol [185].

**Isolation from natural sources**

-From the aerial parts of *Urolepis hecatantha*, flowers and leaves of *Chromolaena amottiana* (compound 11) [493].

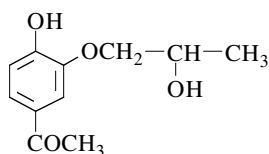
<sup>1</sup>H NMR [493], MS [493].

**1-[4-Hydroxy-3-(2-hydroxypropoxy)phenyl]ethanone**

[63437-94-5]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23



**Synthesis**

-Preparation by hydrogenolysis of 4-(benzyloxy)-3-(2-hydroxypropoxy)acetophenone in ethanol under hydrogen atmosphere in the presence of 5% Pd/C for 45 min (81%) [486].

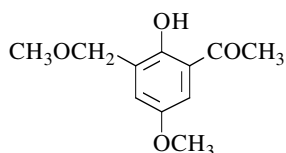
m.p. 143° [486].

**1-[2-Hydroxy-5-methoxy-3-(methoxymethyl)phenyl]ethanone**

[87165-71-7]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 210.23

**Synthesis**

-Preparation from 3-chloromethyl-2-hydroxy-5-methoxyacetophenone (m.p. 71°) by reaction with methanol in the presence of concentrated hydrochloric acid and iron powder at reflux for 3.5 to 4 h (69%) [289].

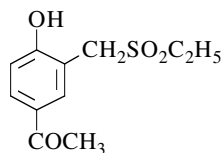
b.p.<sub>0.3</sub> 110-114° [289]; <sup>1</sup>H NMR [289], IR [289].

**1-[3-[(Ethylsulfonyl)methyl]-4-hydroxyphenyl]ethanone**

[56490-62-1]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>S

mol.wt. 242.30

**Synthesis**

-Obtained by reaction of 3'-chloromethyl-4'-hydroxyacetophenone with magnesium ethylsulfinate in refluxing aqueous methanol for 18 h (30%) [935].

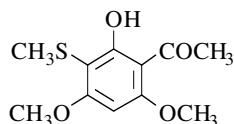
m.p. 137-141° [935].

**1-[2-Hydroxy-4,6-dimethoxy-3-(methylthio)phenyl]ethanone**

[154389-63-6]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>S

mol.wt. 242.30

**Syntheses**

-Preparation by partial demethylation of 2,4,6-trimethoxy-3-methylthioacetophenone with aluminium chloride in acetonitrile for 1 h at 30° (95%) [962].  
-Also obtained by reaction of acetyl chloride with 2,4,6-trimethoxy-1-(methylthio)benzene in the presence of aluminium chloride in ethyl ether at 0° (24%) [962].

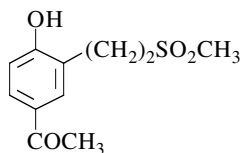
m.p. 143-145° [962].

**1-[4-Hydroxy-3-[2-(methylsulfonyl)ethyl]phenyl]ethanone**

[56490-44-9]

C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>S

mol.wt. 242.30

**Synthesis**

-Obtained by Fries rearrangement of 2-(methylsulfonyl)ethylphenyl acetate (m.p. 80-82°) with aluminium chloride in nitrobenzene, first at r.t. for 1 h, then at 50-60° for 1.5 h (53%) [935].

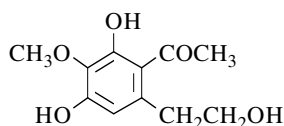
m.p. 176-178° [935].

**1-[2,4-Dihydroxy-6-(2-hydroxyethyl)-3-methoxyphenyl]ethanone**

[165186-29-8]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

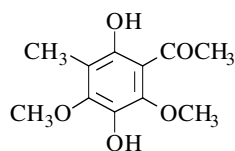
mol.wt. 226.23



Isolation from natural sources

-One of seven metabolites produced by *Ophiosphaerella herpotricha* in liquid culture [1846].**1-(2,5-Dihydroxy-4,6-dimethoxy-3-methylphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



Syntheses

-Preparation by reaction of potassium persulfate on 2-hydroxy-4,6-dimethoxy-3-methylacetophenone in aqueous pyridine solution in the presence of potassium hydroxide [1282] or sodium hydroxide [1434] [1490], (27-35%) [1282] [1490], (10%) [1434].

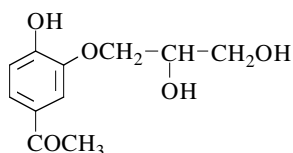
m.p. 122-123° [1490], 121-122° [1434], 119-120° [1282];

<sup>1</sup>H NMR [1434], UV [1490], MS [1434].**1-[3-(2,3-Dihydroxypropoxy)-4-hydroxyphenyl]ethanone**

[70064-44-7]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



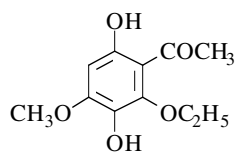
Synthesis

-Preparation by hydrogenolysis of 4-(benzyloxy)-3-(2,3-dihydroxypropoxy)acetophenone in ethanol under hydrogen atmosphere in the presence of 5% Pd/C for 45 min (99%) [486].

m.p. 136° [486].

**1-(2-Ethoxy-3,6-dihydroxy-4-methoxyphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



Synthesis

-Preparation by reaction of potassium persulfate on 2-ethoxy-6-hydroxy-4-methoxyacetophenone in dilute aqueous sodium hydroxide solution at 15-20° (25%) [73].

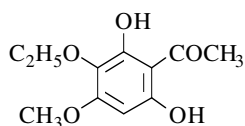
m.p. 145° [73].

**1-(3-Ethoxy-2,6-dihydroxy-4-methoxyphenyl)ethanone**

[105342-70-9]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23

**Synthesis**

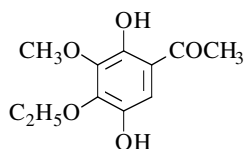
-Obtained (by-product) by reaction of hydrobromic acid with 3-ethoxy-2-hydroxy-4,6-dimethoxyacetophenone in acetic acid at r.t. [198].

m.p. 108°-110° [198];

<sup>1</sup>H NMR [198], IR [198], MS [198].

**1-(4-Ethoxy-2,5-dihydroxy-3-methoxyphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23

**Synthesis**

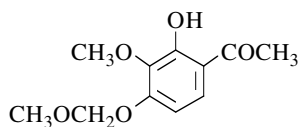
-Preparation from 4-ethoxy-2-hydroxy-3-methoxyacetophenone by persulfate oxidation in 10% aqueous sodium hydroxide (Elbs reaction) [1360].

**1-[2-Hydroxy-3-methoxy-4-(methoxymethoxy)phenyl]ethanone**

[220504-99-4]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23

**Synthesis**

-Preparation in two steps: first, reaction of acetic acid with a mixture (*ca.* 1:1) of 1-O- and 2-O-methylpyrogallol in the presence of zinc chloride at reflux for 6 h (Nencki reaction); then, methoxymethylation of the obtained product (31%) [945].

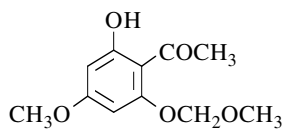
<sup>1</sup>H NMR [945]; MS [945].

**1-[2-Hydroxy-4-methoxy-6-(methoxymethoxy)phenyl]ethanone**

[186693-85-6]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23

**Synthesis**

-Obtained by treatment of 2,6-dihydroxy-4-methoxyacetophenone with methoxymethyl chloride [1946] in the presence of potassium carbonate in refluxing acetone for 2 h (86%) [824].

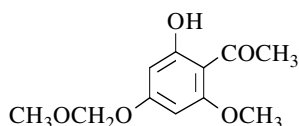
m.p. 59-61° [824]; <sup>1</sup>H NMR [824], IR [824], EIMS [824].

**1-[2-Hydroxy-6-methoxy-4-(methoxymethoxy)phenyl]ethanone**

[404597-93-9]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23

**Synthesis**

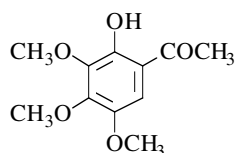
-Obtained by treatment of 2,4-di(methoxymethoxy)-6-methoxyacetophenone with silica gel in mild acetic medium (97%) [553].

**1-(2-Hydroxy-3,4,5-trimethoxyphenyl)ethanone**

[30225-96-8]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23

**Syntheses**

-Preparation by reaction of dimethyl sulfate on 2,5-dihydroxy-3,4-dimethoxyacetophenone with potassium carbonate in refluxing benzene (73%) [135].  
 -Preparation by reaction of acetyl chloride on 1,2,3,4-tetramethoxybenzene with aluminium chloride in refluxing carbon disulfide (70%) [165] [831] [1355] or in boiling ethyl ether [1355] [1357], (76%) [1357].

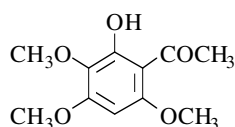
m.p. 88° [165] [1355] [1357], 86° [135] [831]; <sup>1</sup>H NMR [831].

**1-(2-Hydroxy-3,4,6-trimethoxyphenyl)ethanone (*Xanthoxylone*)**

[7507-98-4]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23

**Syntheses**

-Preparation by reaction of diazomethane on 2,4-dihydroxy-3,6-dimethoxyacetophenone in ethyl ether [757] [758].  
 -Preparation by reaction of dimethyl sulfate, \*on 2,6-dihydroxy-3,4-dimethoxyacetophenone disodium salt (95%) [1328];  
 \*on 2,4-dihydroxy-3,6-dimethoxyacetophenone with potassium carbonate in boiling acetone (75%) [1552];  
 \*on 2,3,6-trihydroxy-4-methoxyacetophenone in the presence of potassium carbonate in refluxing acetone [1845];  
 \*on 2,3,4,6-tetrahydroxyacetophenone [166] [1328].  
 -Also obtained by partial methylation of 2,4-dihydroxy-3,6-dimethoxyacetophenone [1379], according to [1552].  
 -Also obtained by Friedel-Crafts acylation of 1,2,3,5-tetramethoxybenzene [1616].  
 -Preparation by reaction of acetyl chloride on 1,2,3,5-tetramethoxybenzene with aluminium chloride, \*in ethyl ether [135] [198] [808] [1263] [1357] [1358] [1452] [1496], (81%) [1357], (64-70%) [135] [1263] [1496], (53%) [198], (35-36%) [361] [1452];  
 \*in carbon disulfide [160] [161] [166] [167] [375] [1358], (51%) [166];  
 \*without solvent at 70° (44%) [1881].  
 -Preparation by reaction of acetic acid with 1,2,3,5-tetramethoxybenzene in the presence of boron trifluoride at 30° (81%) [815].  
 -Also obtained by partial demethylation of 2,3,4,6-tetramethoxyacetophenone in the presence of aluminium chloride [759] [962] in acetonitrile at 30° for 1 h (95%) [962].  
 -Also refer to: [805] [1617] [1687] [1929].

## Isolation from natural sources

- From the New Zealand liverwort, *Plagiochila fasciculata* [1113].
- From *Croton aff. nepetifolius* Bail (Euphorbiaceae) [450].
- From hydrolysis of Wogonin (5,7-dihydroxy-8-methoxyflavone). Wogonin was isolated in small amounts in the roots of *Scutellaria baicalensis* Georgi (Labiatae) [759].
- From the fresh leaves of *Fagara okinawensis* Nakai (Rutaceae) [1263].

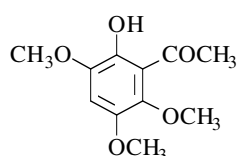
m.p. 125-126° [1328], 113-115° [1452], 113-114° [1552], 113° [1845],  
 112-114° [198], 112-113° [166] [167] [759] [1263] [1357] [1358],  
 111°5-113°5 [361], 111-112° [375], 110-112° [1379], 110-111° [757] [758],  
 109-114° [815], 109°5-111°5 [1496], 109-111° [1881], 105-107° [160] [161] [162],  
 103-105° [135] [801];  
<sup>1</sup>H NMR [198] [361] [450] [757] [758] [1113] [1263] [1379] [1496], <sup>13</sup>C NMR [1379],  
 IR [198] [361] [450] [757] [758] [1113] [1263] [1379] [1496], UV [1113] [1263],  
 MS [450] [1379].

**1-(2-Hydroxy-3,5,6-trimethoxyphenyl)ethanone**

[72424-28-3]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



## Synthesis

-Preparation by partial demethylation of 2,3,5,6-tetra-methoxyacetophenone with aluminium chloride in ethyl ether in an ice bath (55%) [808] or in acetonitrile for 6 h at 45° (25%) [962].

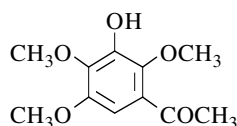
m.p. 62-63°5 [808]; <sup>1</sup>H NMR [808].

**1-(3-Hydroxy-2,4,5-trimethoxyphenyl)ethanone**

[97565-35-0]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



## Isolation from natural sources

-Obtained by alkaline degradation of two octasubstituted flavones with 50% potassium hydroxide in refluxing ethanol under nitrogen atmosphere for 15 h. These flavones were isolated from the aerial parts of *Ageratum houstonianum*

Mill (Asteraceae) (Eupatorieae) [1450].

\*From *agehoustonin C* (3'-hydroxy-5,6,7,8,2',4',5'-heptamethoxyflavone) (m.p. 145°);

\*From *agehoustonin D* (5,3'-dihydroxy-6,7,8,2',4',5'-hexamethoxyflavone) (m.p. 168-169°).

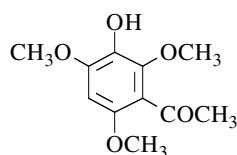
m.p. 98-100° [1450]; <sup>1</sup>H NMR [1450], IR [1450], UV [1450], MS [1450].

**1-(3-Hydroxy-2,4,6-trimethoxyphenyl)ethanone**

[103777-45-3]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



## Syntheses

-Obtained by treatment of polygoacetophenoside with dimethyl sulfate in the presence of potassium carbonate in refluxing acetone for 24 h. Then, the formed oil was hydrolyzed with 10% sulfuric acid on a water bath for 3 h [1929].

-Also obtained (by-product) by reaction of dimethyl sulfate on 3,6-dihydroxy-2,4-dimethoxyacetophenone in aqueous sodium hydroxide solution at r.t. (3%) [1452].

m.p. 128-129° [1929], 113-117° [1452];

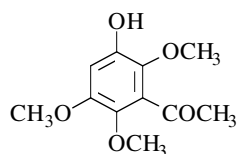
<sup>1</sup>H NMR [1929], <sup>13</sup>C NMR [1929], IR [1929], MS [1929].

### 1-(3-Hydroxy-2,5,6-trimethoxyphenyl)ethanone

[73034-32-9]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



#### Synthesis

-Preparation by hydrolysis of 3-acetoxy-2,5,6-trimethoxyacetophenone with 10% sodium hydroxide in methanol [198] [808].

m.p. 71-72° [198]; b.p.<sub>0.1</sub> 150-160° [198];

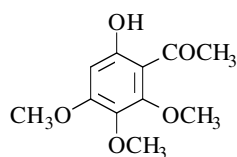
<sup>1</sup>H NMR [198], IR [198].

### 1-(6-Hydroxy-2,3,4-trimethoxyphenyl)ethanone

[22248-14-2]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



#### Syntheses

-Preparation by Fries rearrangement of antiarol acetate (3,4,5-trimethoxyphenyl acetate) with aluminium chloride in nitrobenzene at r.t. (54%) [1354], (45%) [1452].

-Preparation by reaction of antiarol (3,4,5-trimethoxyphenol) with boron trifluoride-acetic acid complex at 28-30° (50%) [1146].

-Also obtained by reaction of acetyl chloride,

\*on antiarol benzyl ether with aluminium chloride in ethyl ether, followed by subsequent debenzoylation of the keto compound obtained (22%) [1354];

\*on 1,2,3,5-tetramethoxybenzene with aluminium chloride in carbon disulfide at r.t. (9%) [162].

-Also obtained by reaction of dimethyl sulfate,

\*on 3,6-dihydroxy-2,4-dimethoxyacetophenone,

-with potassium carbonate in refluxing benzene [135] [1354] [1452], (15-18%) [135] [1452] or in refluxing acetone-benzene mixture [808] [1055] [1551], (70%) [1551], (36%) [1055];

-with aqueous sodium hydroxide solution at r.t. (52%) [1452].

\*on 2,3,4,6-tetrahydroxyacetophenone [1328];

\*on 2,6-dihydroxy-3,4-dimethoxyacetophenone disodium salt, followed by acidification (< 5%) [1328].

-Also obtained by alkaline degradation of 3',4',5,6,7-pentamethoxyflavone with potassium hydroxide in refluxing aqueous ethanol [73].

-Also refer to: [1187] [1311].

#### Isolation from natural sources

-From 5,6,7-trimethoxyflavone by alkaline hydrolysis in refluxing 50% methanolic potassium hydroxide. The 5,6,7-trimethoxyflavone is one of major constituents of the leaves of *Zeyhera tuberculosa* Bur. ex. Verlot (Bignoniaceae) [1055].

yellow oil [73] [1055] [1551];

m.p. 164-165° [1328], 105-107° [162], 41-42° [1354], 32° [1146], 30°5-31°5 [1452].

There is a discrepancy between the different melting points indicated in literature.



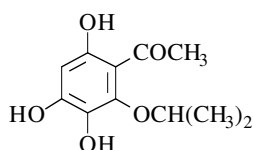
b.p.<sub>0.35</sub> 121-122° [1452], b.p.<sub>1</sub> 140° [1146], b.p.<sub>20</sub> 180-185° [1354], b.p.<sub>14</sub> 182-185° [1452],  
b.p.<sub>27</sub> 184-186° [135];  
<sup>1</sup>H NMR [1055], <sup>13</sup>C NMR [1396], IR [1055], UV [1055], MS [1055].

**1-[3,4,6-Trihydroxy-2-(1-methylethoxy)phenyl]ethanone**

[60840-21-3]

C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 226.23



**Synthesis**

-Preparation by catalytic hydrogenolysis of 3,4,6-tris-(benzyloxy)-2-isopropoxyacetophenone in the presence of 5% Pd/C in ethanol at r.t. (94%) [757] [758].

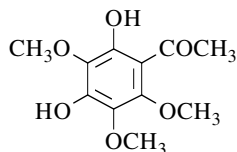
m.p. 137° [757] [758];

<sup>1</sup>H NMR [757] [758], IR [757] [758], MS [757] [758].

**1-(2,4-Dihydroxy-3,5,6-trimethoxyphenyl)ethanone**

C<sub>11</sub>H<sub>14</sub>O<sub>6</sub>

mol.wt. 242.23



**Synthesis**

-Obtained by hydrolysis of 1-(2,4-diacetoxy-3,5,6-trimethoxyphenyl)ethanone (SM) with aqueous 10% sodium hydroxide at r.t. for 10-15 min. SM was obtained by Friedel-Crafts acylation of 2,3,5,6-tetramethoxyphenyl acetate (m.p. 97-98°) with acetic anhydride/acetic acid in

the presence of excess boron trifluoride at 50-60° for 5 h (65%, m.p. 82-84°) [797].

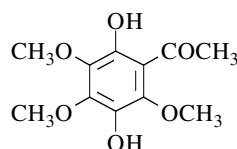
**N.B.:** This ketone was not obtained by Friedel-Crafts reaction of 2,3,5,6-tetramethoxyphenol, and its acetate or benzyl ether with acetyl chloride and aluminium chloride in ethyl ether [797] [802].

**1-(2,5-Dihydroxy-3,4,6-trimethoxyphenyl)ethanone**

[55742-65-9]

C<sub>11</sub>H<sub>14</sub>O<sub>6</sub>

mol.wt. 242.23



**Syntheses**

-Obtained by persulfate oxidation of 2-hydroxy-3,4,6-trimethoxyacetophenone (Elbs reaction) [1617], (33%) [1616], (29%) [135], (9%) [1609].

-Also obtained by reduction of 2-acetyl-3,5,6-trimethoxy-1,4-benzoquinone with zinc dust in acetic anhydride, followed by hydrolysis of the acetic ester formed with dilute sulfuric acid [1328].

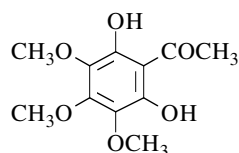
-Also refer to: [795] [796] [800] [1465].

m.p. 174-176° [1328], 116-117° [135], 115-117° [1616] [1617].

One of the reported melting points is obviously wrong.

**1-(2,6-Dihydroxy-3,4,5-trimethoxyphenyl)ethanone**C<sub>11</sub>H<sub>14</sub>O<sub>6</sub>

mol.wt. 242.23

**Synthesis**

-Obtained by acylation of pentamethoxybenzene with acetyl chloride in the presence of aluminium chloride in ethyl ether, first for 14 h at r.t., then for 2 h at reflux (17%) [1695].

m.p. 86-88° [1695];

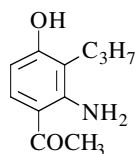
<sup>1</sup>H NMR [1695], IR [1695], UV [1695].

**1-(2-Amino-4-hydroxy-3-propylphenyl)ethanone**

[87472-78-4]

C<sub>11</sub>H<sub>15</sub>NO<sub>2</sub>

mol.wt. 193.25

**Synthesis**

-Preparation by hydrogenation of 3-allyl-2-amino-4-hydroxyacetophenone in the presence of 5% Pd/C in ethanol (quantitative yield) [297].

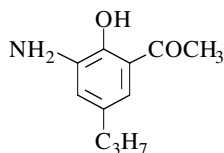
viscous oil [297]; <sup>1</sup>H NMR [297].

**1-(3-Amino-2-hydroxy-5-propylphenyl)ethanone**

[70978-22-2]

C<sub>11</sub>H<sub>15</sub>NO<sub>2</sub>

mol.wt. 193.25

**Synthesis**

-Preparation by catalytic hydrogenation of 2-hydroxy-3-nitro-5-propylacetophenone in the presence of 5% Pd/C in ethanol at 25° [620] [1463], (77%) [620].

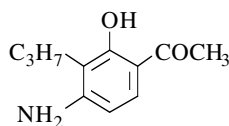
m.p. 43-45° [1463], 42-43° [620].

**1-(4-Amino-2-hydroxy-3-propylphenyl)ethanone**

[75452-54-9]

C<sub>11</sub>H<sub>15</sub>NO<sub>2</sub>

mol.wt. 193.25

**Synthesis**

-Preparation by hydrolysis of 4-acetamido-2-hydroxy-3-propylacetophenone with 6 N hydrochloric acid in refluxing ethanol (95%) [297].

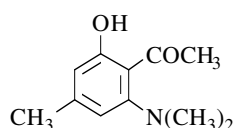
yellow oil [297]; b.p.<sub>0.15</sub> 120-122° [297]; <sup>1</sup>H NMR [297].

**1-[2-(Dimethylamino)-6-hydroxy-4-methylphenyl]ethanone**

[97066-06-3]

C<sub>11</sub>H<sub>15</sub>NO<sub>2</sub>

mol.wt. 193.25

**Synthesis**

-Preparation by reaction of potassium hydroxide with 2-acetyl-3-dimethylamino-5-hydroxy-5-methyl-2-cyclohexenone in ethanol at 40° (41%) [562].

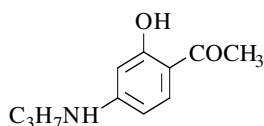
yellow oil [562]; m.p. -5° [562];  
<sup>1</sup>H NMR [562], IR [562], UV [562], MS [562].

**1-[2-Hydroxy-4-(propylamino)phenyl]ethanone**

[118684-26-7]

C<sub>11</sub>H<sub>15</sub>NO<sub>2</sub>

mol.wt. 193.25

**Synthesis**

-A solution of 4-amino-2-hydroxyacetophenone and propionaldehyde in methanol was stored over 3 Å molecular sieves for 3 days. The solution of "2-hydroxy-4-propyliminoacetophenone" so obtained was then treated with hydrogen in the presence of 10% Pd/C (50%) [297].

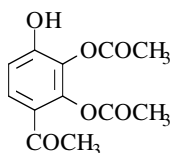
m.p. 73-75° [297]; <sup>1</sup>H NMR [297].

**1-[2,3-Bis(acetyloxy)-4-hydroxyphenyl]ethanone**

[144152-31-8]

C<sub>12</sub>H<sub>12</sub>O<sub>6</sub>

mol.wt. 252.22

**Synthesis**

-Obtained by enzymatic deacylation of 2,3,4-triacetoxyacetophenone with porcine pancreas lipase in tetrahydrofuran at 42-45° (55%) [1381] [1383].

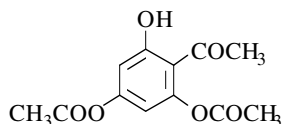
pale yellow viscous oil [1383]; <sup>1</sup>H NMR [1383].

**1-[2,4-Bis(acetyloxy)-6-hydroxyphenyl]ethanone**

[17820-33-6]

C<sub>12</sub>H<sub>12</sub>O<sub>6</sub>

mol.wt. 252.22

**Syntheses**

-Obtained (by-product) by reaction of acetic anhydride on phloracetophenone with pyridine at r.t. (7%) [5].  
 -Also obtained by photo-Fries rearrangement of 1,3,5-triacetoxybenzene in methanol (15%) [1614].

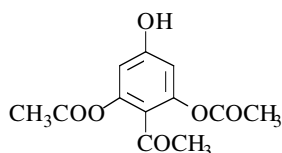
m.p. 86-87° [311], 79-80° [1614];  
<sup>1</sup>H NMR [311] [1614], <sup>13</sup>C NMR [5], IR [1614].

**1-[2,6-Bis(acetyloxy)-4-hydroxyphenyl]ethanone**

[17820-32-5]

C<sub>12</sub>H<sub>12</sub>O<sub>6</sub>

mol.wt. 252.22

**Syntheses**

- Preparation by reaction of acetic anhydride with phloracetophenone between 110 to 165° (40%) [311].
- Also obtained by enzymatic deacylation of 2,4,6-triacetoxyacetophenone with porcine pancreatic lipase in tetrahydrofuran at 42-45° (78%) [1381] [1382] [1383].

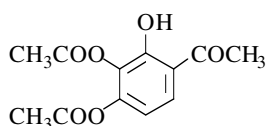
m.p. 154-155° [311], 112° [1383]. One of the reported melting points is obviously wrong.  
<sup>1</sup>H NMR [311] [1383].

**1-[3,4-Bis(acetyloxy)-2-hydroxyphenyl]ethanone**

[27865-58-3]

C<sub>12</sub>H<sub>12</sub>O<sub>6</sub>

mol.wt. 252.22

**Syntheses**

- Obtained by UV light irradiation of pyrogallol triacetate in methanol (15%) [1614].
- Also obtained by partial Fries rearrangement of pyrogallol triacetate with zinc chloride at 130-135° [770].
- Also obtained by reaction of acetic anhydride on gallacetophenone with pyridine [1637].
- Also refer to: [1264].

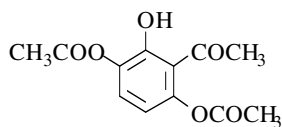
m.p. 217-219° [770], 110-112° [1614], 78-81° [1637];  
<sup>1</sup>H NMR [1614], IR [1614].

**1-[3,6-Bis(acetyloxy)-2-hydroxyphenyl]ethanone**

[104654-33-3]

C<sub>12</sub>H<sub>12</sub>O<sub>6</sub>

mol.wt. 252.22

**Synthesis**

- Obtained by photo-Fries rearrangement of 1,2,4-triacetoxybenzene in methanol (15%) [1614].

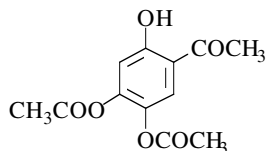
m.p. 116-118° [1614]; <sup>1</sup>H NMR [1614], IR [1614].

**1-[4,5-Bis(acetyloxy)-2-hydroxyphenyl]ethanone**

[42059-51-8]

C<sub>12</sub>H<sub>12</sub>O<sub>6</sub>

mol.wt. 252.22

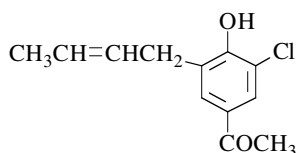
**Syntheses**

- Obtained by partial Fries rearrangement of 1,2,4-triacetoxybenzene with zinc chloride in acetic acid at 140° (21%) [159] [168], (8%) [1335].
- Preparation by reaction of acetic anhydride with 2,4,5-trihydroxyacetophenone in the presence of pyridine at 35° (52%) [1335].

m.p. 165-166° [159] [168], 100-102° [1335]; <sup>1</sup>H NMR [1335], IR [1335].

**1-[3-(2-Butenyl)-5-chloro-4-hydroxyphenyl]ethanone**C<sub>12</sub>H<sub>13</sub>ClO<sub>2</sub>

mol.wt. 224.69

**Synthesis**

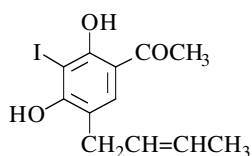
-Obtained by heating 4-(2-butenyloxy)-3-chloroacetophenone for 3 h under nitrogen atmosphere (Claisen rearrangement) [950].

**1-[5-(2-Butenyl)-2,4-dihydroxy-3-iodophenyl]ethanone**

[91664-19-6]

C<sub>12</sub>H<sub>13</sub>IO<sub>3</sub>

mol.wt. 332.14

**Synthesis**

-Preparation by condensation of 2,4-dihydroxy-3-iodoacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (75%) [19].

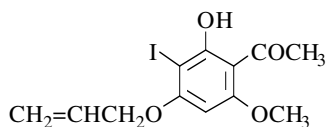
m.p. 100-101° [19]; <sup>1</sup>H NMR [19].

**1-[2-Hydroxy-3-iodo-6-methoxy-4-(2-propenyloxy)phenyl]ethanone**

[74047-33-9]

C<sub>12</sub>H<sub>13</sub>IO<sub>4</sub>

mol.wt. 348.14

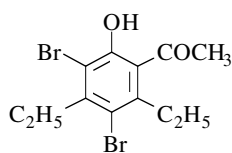
**Synthesis**

-Preparation by reaction of allyl bromide with 2,4-dihydroxy-3-iodo-6-methoxyacetophenone in the presence of potassium carbonate in refluxing acetone (58%) [15].

m.p. 162-164° [15]; <sup>1</sup>H NMR [15].

**1-(3,5-Dibromo-2,4-diethyl-6-hydroxyphenyl)ethanone**C<sub>12</sub>H<sub>14</sub>Br<sub>2</sub>O<sub>2</sub>

mol.wt. 350.05

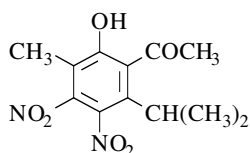
**Synthesis**

-Preparation by reaction of potassium bromate and bromide on 2,4-diethyl-6-hydroxyacetophenone in solution of acetic acid-carbon tetrachloride mixture (quantitative yield) [123].

m.p. 81° [123].

**1-[2-Hydroxy-3-methyl-6-(1-methylethyl)-4,5-dinitrophenyl]ethanone**C<sub>12</sub>H<sub>14</sub>N<sub>2</sub>O<sub>6</sub>

mol.wt. 282.26

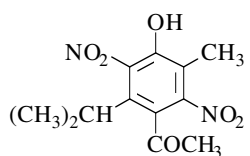
**Synthesis**

-Preparation by reaction of nitric acid (d = 1.4) on 2-hydroxy-3-methyl-5-nitro-6-isopropylacetophenone in acetic acid, between -5° and 0° (53%) [903].

m.p. 119° [903].

**1-[4-Hydroxy-3-methyl-6-(1-methylethyl)-2,5-dinitrophenyl]ethanone**C<sub>12</sub>H<sub>14</sub>N<sub>2</sub>O<sub>6</sub>

mol.wt. 282.26

**Synthesis**

-Preparation by reaction of nitric acid (d = 1.4) on 4-hydroxy-5-methyl-3-nitro-2-isopropylacetophenone in acetic acid (59%) [902].

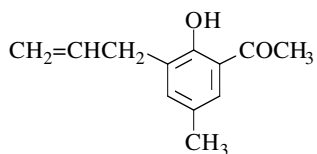
m.p. 55° [902].

**1-[2-Hydroxy-5-methyl-3-(2-propenyl)phenyl]ethanone**

[108293-73-8]

C<sub>12</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 190.24

**Synthesis**

-Preparation by thermal Claisen rearrangement of 2-(allyloxy)-5-methylacetophenone without solvent at 190° (95%) [527] or at 260-270° (84%) [1747].

yellow oil [527];

b.p.<sub>0.15</sub> 94-96° [527], b.p.<sub>5</sub> 103-105° [1747];

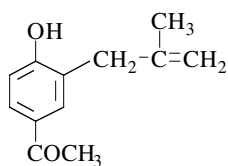
<sup>1</sup>H NMR [527], <sup>13</sup>C NMR [527], IR [527], MS [527].

**1-[4-Hydroxy-3-(2-methyl-2-propenyl)phenyl]ethanone**

[57899-03-3]

C<sub>12</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 190.24

**Synthesis**

-Preparation by thermal Claisen rearrangement of 4-(β-methallyloxy)acetophenone in boiling N,N-dimethylaniline [333].

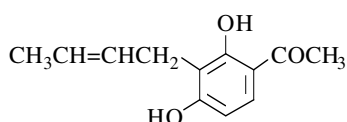
m.p. 86° [333]; b.p.<sub>16</sub> 196° [333].

**1-[3-(2-Butenyl)-2,4-dihydroxyphenyl]ethanone**

[91664-16-3]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Synthesis

-Preparation by condensation of resacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (38%) [19].

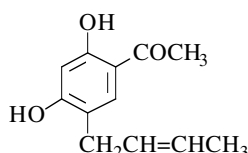
m.p. 164-165° [19]; <sup>1</sup>H NMR [19].

**1-[5-(2-Butenyl)-2,4-dihydroxyphenyl]ethanone**

[91664-17-4]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Syntheses

-Preparation by condensation of resacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (42%) [19].

-Also obtained from 5-(2-butenyl)-2,4-dihydroxy-3-iodoacetophenone by heating with zinc dust and concentrated hydrochloric acid in refluxing ethanol (80%) [19].

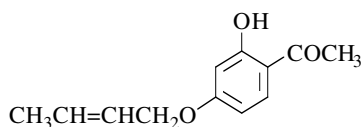
m.p. 103-104° [19]; <sup>1</sup>H NMR [19], IR [19].

**1-[4-(2-Butenyloxy)-2-hydroxyphenyl]ethanone**

[79557-72-5]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Synthesis

-Preparation by reaction of 3-chloro-1-butene with resacetophenone in the presence of potassium carbonate and sodium iodide in refluxing butanone (44%) [1372].

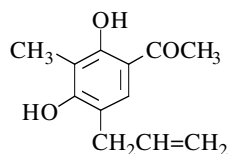
oil [1372]; b.p.<sub>0.1</sub> 162-175° [1372].

**1-[2,4-Dihydroxy-3-methyl-5-(2-propenyl)phenyl]ethanone**

[77869-01-3]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Synthesis

-Preparation by thermal Claisen rearrangement of 4-(allyloxy)-2-hydroxy-3-methylacetophenone in boiling N,N-dimethylaniline [1393].

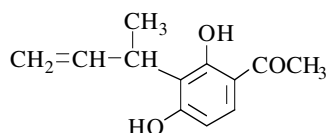
m.p. 139° [1393]; IR [1393].

**1-[2,4-Dihydroxy-3-(1-methyl-2-propenyl)phenyl]ethanone**

[79557-73-6]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Syntheses

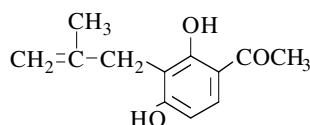
-Preparation by thermal Claisen rearrangement of 4-(2-butenyloxy)-2-hydroxyacetophenone without solvent at 180-190° under nitrogen (40%) [1372].  
 -Also obtained (by-product) by condensation of resacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (3%) [19].

m.p. 147-149° [19], 146-147° [1372]; <sup>1</sup>H NMR [19].**1-[2,4-Dihydroxy-3-(2-methyl-2-propenyl)phenyl]ethanone**

[118683-89-9]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Synthesis

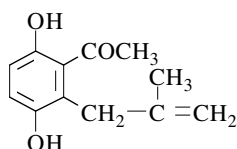
-Preparation by thermal Claisen rearrangement of 2-hydroxy-4-(2-methylprop-2-enoxy)acetophenone without solvent at 210° (24%) [297].

white solid [297]; <sup>1</sup>H NMR [297].**1-[3,6-Dihydroxy-2-(2-methyl-2-propenyl)phenyl]ethanone**

[127870-07-9]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Synthesis

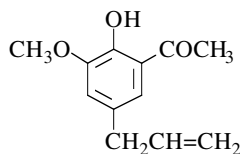
-Obtained by thermal reaction of 2-acetyl-1,4-benzoquinone (1 mol) with (2-methylallyl)trimethylstannane (2 mol) in benzene or acetonitrile under argon atmosphere (77%) [1171].

m.p. 78-80° [1171]; <sup>1</sup>H NMR [1171], MS [1171].**1-[2-Hydroxy-3-methoxy-5-(2-propenyl)phenyl]ethanone**

[23343-04-6]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24



## Synthesis

-Preparation by thermal Claisen rearrangement of 2-(allyloxy)-3-methoxyacetophenone [1212] without solvent at 210° [1417], (77%) [1417], (38%) [1212].

m.p. 43-44° [1417], 42-43° [1212];  
<sup>1</sup>H NMR [1212], IR [1212], UV [1212].

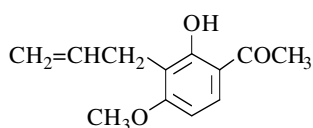


**1-[2-Hydroxy-4-methoxy-3-(2-propenyl)phenyl]ethanone**

[117156-86-2]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Syntheses**

-Preparation by thermal Claisen rearrangement of 2'-(allyloxy)-4'-methoxyacetophenone in boiling N,N-dimethylaniline (80%) [61].  
 -Preparation by reaction of dimethyl sulfate on 3-allyl-resacetophenone in 10% aqueous potassium hydroxide at 30° [132].

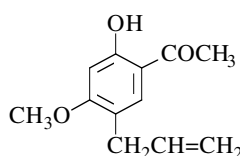
m.p. 61° [132], 59° [61]; <sup>1</sup>H NMR [61], IR [61], UV [61].

**1-[2-Hydroxy-4-methoxy-5-(2-propenyl)phenyl]ethanone**

[117713-79-8]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Synthesis**

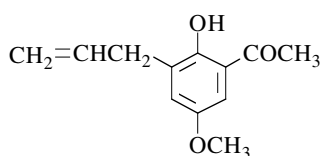
-Preparation by reaction of methyl bromide on 5-allyl-2,4-dihydroxyacetophenone with potassium carbonate and potassium iodide (41%) [256] [257].

**1-[2-Hydroxy-5-methoxy-3-(2-propenyl)phenyl]ethanone**

[186956-47-8]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Synthesis**

-Obtained by Claisen rearrangement of 2-(allyloxy)-5-methoxyacetophenone in refluxing N,N-diethylaniline at 220° for 4 h [1476].

colourless oil [1476]; b.p.<sub>0.1</sub> 145° [1476];

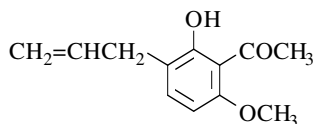
<sup>1</sup>H NMR [1476], IR [1476].

**1-[2-Hydroxy-6-methoxy-3-(2-propenyl)phenyl]ethanone**

[17488-68-5]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Syntheses**

-Preparation by reaction of dimethyl sulfate on 3-allyl-2,6-dihydroxyacetophenone with potassium carbonate in benzene in a water bath (89%) [1648].

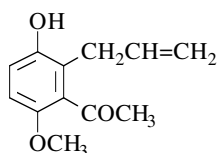
-Also obtained by thermal Claisen rearrangement of 2-(allyloxy)-6-methoxyacetophenone at 215-220°, in a sealed tube (35%) [1648].

b.p.<sub>2</sub> 122-124° [1648], b.p.<sub>3</sub> 127° [1648]; d<sup>20</sup> = 1.0283 [1648];

n<sub>D</sub><sup>20</sup> = 1.5602 and 1.5598 [1648].

**1-[3-Hydroxy-6-methoxy-2-(2-propenyl)phenyl]ethanone**C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Synthesis**

-Preparation by thermal Claisen rearrangement of 5-(allyloxy)-2-methoxyacetophenone at 230° (74%) [131].

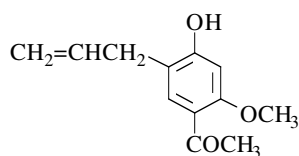
m.p. 104° [131].

**1-[4-Hydroxy-2-methoxy-5-(2-propenyl)phenyl]ethanone**

[117705-59-6]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Synthesis**

-Preparation by Claisen rearrangement of 4-(allyloxy)-2-methoxyacetophenone at 210-215° (60%) [132], (24%) [256] [257] [777].

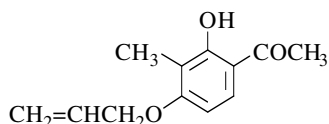
m.p. 136° [132], < 25° [777]; <sup>1</sup>H NMR [256] [257].

**1-[2-Hydroxy-3-methyl-4-(2-propenyloxy)phenyl]ethanone**

[77036-77-2]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Synthesis**

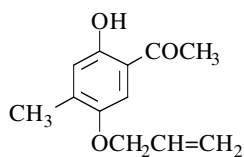
-Preparation by reaction of allyl bromide on 2,4-dihydroxy-3-methylacetophenone with potassium carbonate in refluxing acetone [523].

**1-[2-Hydroxy-4-methyl-5-(2-propenyloxy)phenyl]ethanone**

[76267-82-8]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Synthesis**

-Preparation by reaction of allyl bromide with 2,5-dihydroxy-4-methylacetophenone in the presence of potassium carbonate in refluxing acetone [1392].

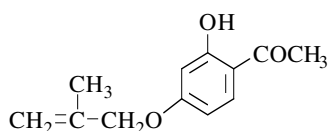
greenish yellow liquid [1392].

**1-[2-Hydroxy-4-[(2-methyl-2-propenyl)oxy]phenyl]ethanone**

[118683-88-8]

C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 206.24

**Synthesis**

-Preparation by reaction of 3-chloro-2-methylpropene with resacetophenone in the presence of potassium carbonate in refluxing acetone (75%) [297].

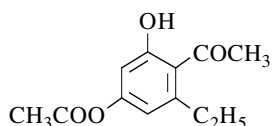
white solid [297]; <sup>1</sup>H NMR [297].

**1-[4-(Acetyloxy)-2-ethyl-6-hydroxyphenyl]ethanone**

[57600-88-1]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

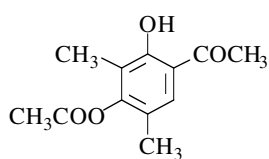
mol.wt. 222.24

**Synthesis**

-Preparation by treatment of a mixture of alkylated resorcinols with acetic anhydride and acetic acid in the presence of zinc chloride at 140-145°, followed by suitable separation [936].

**1-[4-(Acetyloxy)-2-hydroxy-3,5-dimethylphenyl]ethanone**C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

**Synthesis**

-Preparation by reaction of acetic anhydride with 2,4-dihydroxy-3,5-dimethylacetophenone in the presence of pyridine [755].

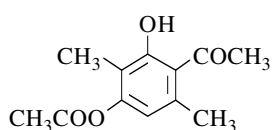
m.p. 95-96° [755].

**1-[4-(Acetyloxy)-2-hydroxy-3,6-dimethylphenyl]ethanone**

[57600-89-2]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

**Synthesis**

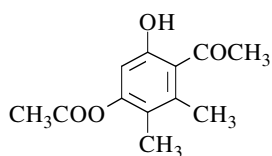
-Preparation by treatment of a mixture of alkylated resorcinols with acetic anhydride and acetic acid in the presence of zinc chloride at 140-145°, followed by suitable separation [936].

**1-[4-(Acetyloxy)-6-hydroxy-2,3-dimethylphenyl]ethanone**

[57600-90-5]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

**Synthesis**

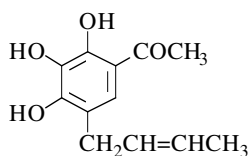
-Preparation by treatment of a mixture of alkylated resorcinols with acetic anhydride and acetic acid in the presence of zinc chloride at 140-145°, followed by suitable separation [936].

**1-[5-(2-Butenyl)-2,3,4-trihydroxyphenyl]ethanone**

[91664-14-1]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

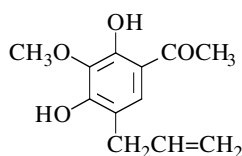
**Synthesis**

-Preparation by condensation of gallacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (60%) [19].

m.p. 93-94° [19]; <sup>1</sup>H NMR [19].

**1-[2,4-Dihydroxy-3-methoxy-5-(2-propenyl)phenyl]ethanone**C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

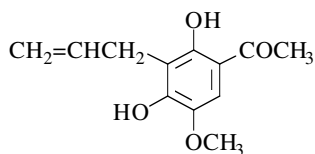
**Synthesis**

-Preparation by heating 4-(allyloxy)-2-hydroxy-3-methoxyacetophenone at 220° under reduced pressure (Claisen rearrangement) (70%) [972].

m.p. 94° [972].

**1-[2,4-Dihydroxy-5-methoxy-3-(2-propenyl)phenyl]ethanone**C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

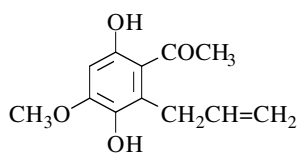
**Synthesis**

-Preparation by thermal Claisen rearrangement of 4-(allyloxy)-2-hydroxy-5-methoxyacetophenone without solvent at 180° (85%) [60].

m.p. 118° [60].

**1-[3,6-Dihydroxy-4-methoxy-2-(2-propenyl)phenyl]ethanone**C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

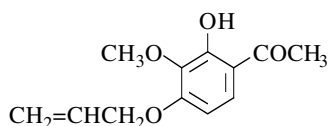
**Synthesis**

-Preparation by heating 5-(allyloxy)-2-hydroxy-4-methoxyacetophenone in glycerol at 200° (Claisen rearrangement) (81%) [498].

m.p. 114° [498].

**1-[2-Hydroxy-3-methoxy-4-(2-propenyloxy)phenyl]ethanone**C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24



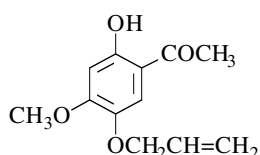
## Syntheses

-Preparation by reaction of allyl bromide on 2,4-dihydroxy-3-methoxyacetophenone with potassium carbonate in boiling acetone (70%) [972].  
 -Preparation by reaction of dimethyl sulfate on 4-(allyloxy)-2,3-dihydroxyacetophenone with potassium carbonate in boiling acetone (80%) [972].

m.p. 63-64° [972].

**1-[2-Hydroxy-4-methoxy-5-(2-propenyloxy)phenyl]ethanone**C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24



## Synthesis

-Preparation by reaction of allyl bromide on 2,5-dihydroxy-4-methoxyacetophenone with potassium carbonate in boiling acetone (82%) [498].

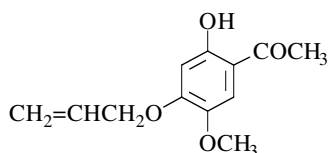
m.p. 80° [498].

**1-[2-Hydroxy-5-methoxy-4-(2-propenyloxy)phenyl]ethanone**

[91497-16-4]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24



## Syntheses

-Preparation by partial methylation of 4-(allyloxy)-2,5-dihydroxyacetophenone with dimethyl sulfate in the presence of potassium carbonate in refluxing acetone (90%) [82].  
 -Preparation by reaction of allyl bromide with 2,4-dihydroxy-5-methoxyacetophenone in the presence of potassium carbonate in boiling acetone (60%) [60].

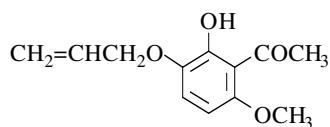
m.p. 50-51° [82], 50° [60].

**1-[2-Hydroxy-6-methoxy-3-(2-propenyloxy)phenyl]ethanone**

[126405-78-5]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24



## Synthesis

-Preparation by adding 2-hydroxy-3-iodo-6-methoxyacetophenone and cuprous iodide to a solution of sodium allyloxide, previously prepared from allyl alcohol and sodium hydride in DMF (45%) [1873].

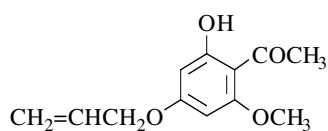
oil [1873]; <sup>1</sup>H NMR [1873], IR [1873].

**1-[2-Hydroxy-6-methoxy-4-(2-propenyloxy)phenyl]ethanone**

[74047-37-3]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

**Syntheses**

-Preparation by reaction of allyl bromide with 2,4-dihydroxy-6-methoxyacetophenone in the presence of potassium carbonate in refluxing acetone (61%) [18].  
 -Also refer to: [1624].

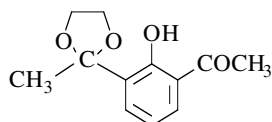
m.p. 74-76° [18]; <sup>1</sup>H NMR [18].

**1-[2-Hydroxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone**

[103867-84-1]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

**Syntheses**

-Preparation by UV light irradiation of ethylene acetal of 2-acetoxyacetophenone in hexane,  
 \*with potassium carbonate (76%) [659];  
 \*without potassium carbonate (10%) [658] [659].

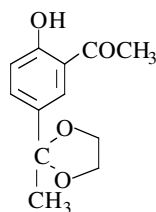
oil [658]; <sup>1</sup>H NMR [658], IR [658], UV [658].

**1-[2-Hydroxy-5-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone**

[103867-87-4]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

**Syntheses**

-Preparation by UV light irradiation of ethylene acetal of the 4-acetoxyacetophenone in hexane,  
 \*with potassium carbonate (82%) [659];  
 \*without potassium carbonate (21%) [658] [659].

m.p. 56-57° [658];

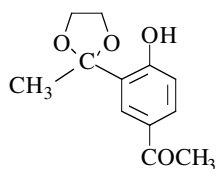
<sup>1</sup>H NMR [658], IR [658], UV [658].

**1-[4-Hydroxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone**

[103867-88-5]

C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 222.24

**Synthesis**

-Obtained (by-product) by UV light irradiation of ethylene acetal of 2-acetoxyacetophenone in hexane, with or without potassium carbonate (8-9%) [658] [659].

m.p. 78-80° [658];

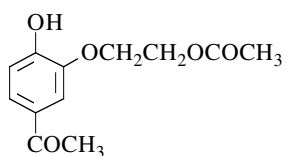
<sup>1</sup>H NMR [658], IR [658], UV [658].

**1-[3-[2-(Acetyloxy)ethoxy]-4-hydroxyphenyl]ethanone**

[63437-82-1]

C<sub>12</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 238.24

**Syntheses**

-Preparation by Fries rearrangement of 2-(2-acetoxyethoxy)phenyl acetate (m.p. 142-146°) with aluminium chloride in nitrobenzene for 48 h at 20° (55%) [486].  
 -Also refer to: [485].

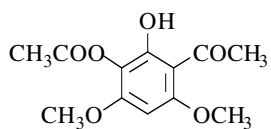
m.p. 103-104° [486].

**1-[3-(Acetyloxy)-2-hydroxy-4,6-dimethoxyphenyl]ethanone**

[21919-65-3]

C<sub>12</sub>H<sub>14</sub>O<sub>6</sub>

mol.wt. 254.24

**Syntheses**

-Preparation by reaction of acetic anhydride with 2,3-dihydroxy-4,6-dimethoxyacetophenone in the presence of sodium acetate at 60° (80%) [1303].

-Preparation by reaction of aluminium chloride with 3-acetoxy-2,4,6-trimethoxyacetophenone in nitrobenzene at 100° [1303] [1309], (52%) [1303].

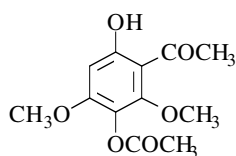
m.p. 180° [1303].

**1-[3-(Acetyloxy)-6-hydroxy-2,4-dimethoxyphenyl]ethanone**

[21919-63-1]

C<sub>12</sub>H<sub>14</sub>O<sub>6</sub>

mol.wt. 254.24

**Syntheses**

-Preparation by reaction of acetic anhydride with 3,6-dihydroxy-2,4-dimethoxyacetophenone in the presence of sodium acetate at 60° [1303] [1309], (80%) [1303].

-Preparation by Fries rearrangement of 2,6-dimethoxyhydroquinone diacetate with aluminium chloride at 120-125° (80%) [1055].

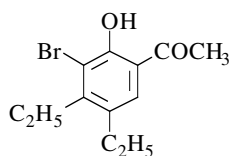
**Isolation from natural sources**

-From *Euphorbia portulacoides* (Euphorbiaceae) [231].

m.p. 112° [1303], 109-110° [1055];

<sup>1</sup>H NMR [1055], IR [1055], UV [1055], MS [1055].**1-(3-Bromo-4,5-diethyl-2-hydroxyphenyl)ethanone**C<sub>12</sub>H<sub>15</sub>BrO<sub>2</sub>

mol.wt. 271.15

**Synthesis**

-Preparation by reaction of potassium bromate and bromide on 4,5-diethyl-2-hydroxyacetophenone (quantitative yield) [123].

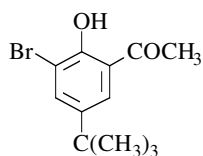
m.p. 59° [123].

**1-[3-Bromo-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone**

[105340-27-0]

C<sub>12</sub>H<sub>15</sub>BrO<sub>2</sub>

mol.wt. 271.15

**Synthesis**

-Preparation by Fries rearrangement of 2-bromo-4-tert-butyl-phenyl acetate with aluminium chloride without solvent at 110° (54%) [1797].

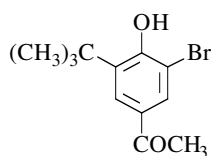
b.p.<sub>3</sub> 142° [1797].

**1-[3-Bromo-5-(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone**

[153356-10-6]

C<sub>12</sub>H<sub>15</sub>BrO<sub>2</sub>

mol.wt. 271.15

**Synthesis**

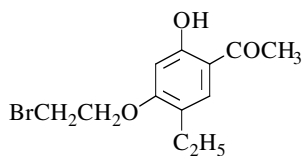
-Refer to: [1916] (Japanese patent).

**1-[4-(2-Bromoethoxy)-5-ethyl-2-hydroxyphenyl]ethanone**

[117706-54-4]

C<sub>12</sub>H<sub>15</sub>BrO<sub>3</sub>

mol.wt. 287.15

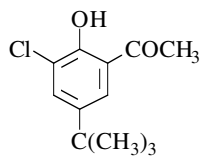
**Synthesis**

-Preparation by reaction of 2-bromoethyl bromide on 5-ethyl-2,4-dihydroxyacetophenone with potassium carbonate and potassium iodide at reflux (43%) [256] [257].

m.p. 58-59° [256] [257]; <sup>1</sup>H NMR [256] [257].

**1-[3-Chloro-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone**C<sub>12</sub>H<sub>15</sub>ClO<sub>2</sub>

mol.wt. 226.70

**Synthesis**

-Preparation by Fries rearrangement of 4-tert-butyl-2-chloro-phenyl acetate with aluminium chloride at 110-130° (82-85%) [1785] [1801].

b.p.<sub>33</sub> 142° [1801].

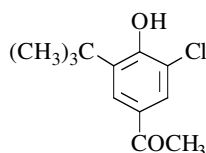


**1-[3-Chloro-5-(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone**

[153356-01-5]

C<sub>12</sub>H<sub>15</sub>ClO<sub>2</sub>

mol.wt. 226.70

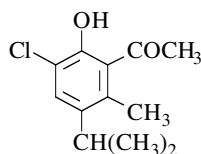


Synthesis

-Refer to: [1916] (Japanese patent).

**1-[3-Chloro-2-hydroxy-6-methyl-5-(1-methylethyl)phenyl]ethanone**C<sub>12</sub>H<sub>15</sub>ClO<sub>2</sub>

mol.wt. 226.70

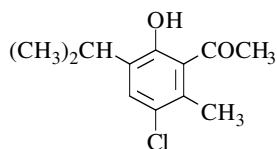


Synthesis

-Preparation by reaction of acetyl chloride on 2-chloro-5-methyl-4-isopropylanisole with aluminium chloride in carbon disulfide at r.t. (35%) [1526].

colourless oil [1526]; b.p.<sub>12</sub> 142° [1526].**1-[3-Chloro-6-hydroxy-2-methyl-5-(1-methylethyl)phenyl]ethanone**C<sub>12</sub>H<sub>15</sub>ClO<sub>2</sub>

mol.wt. 226.70



Syntheses

-Preparation by Fries rearrangement of 4-chloro-5-methyl-2-isopropylphenyl acetate with aluminium chloride at 155° [991].

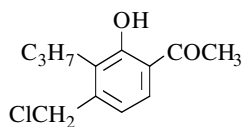
-Also obtained by reaction of acetyl chloride on 4-chloro-5-methyl-2-isopropylanisole with aluminium chloride in carbon disulfide at r.t. (17%) [1524].

b.p.<sub>3</sub> 127-135° [991], b.p.<sub>21</sub> 151-152° [1524].**1-[4-(Chloromethyl)-2-hydroxy-3-propylphenyl]ethanone**

[97582-36-0]

C<sub>12</sub>H<sub>15</sub>ClO<sub>2</sub>

mol.wt. 226.70



Syntheses

-Preparation by reaction of ethyl chloroformate with 4-(dimethylaminomethyl)-2-hydroxy-3-propylacetophenone in toluene (68-82%) [529] [530].

-Also refer to: [1173] [1174].

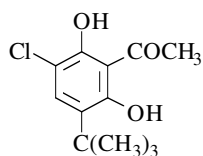
m.p. 55-57° [530]; b.p.<sub>0.2</sub> 105-125° [529]; <sup>1</sup>H NMR [529], IR [529].

**1-[3-Chloro-5-(1,1-dimethylethyl)-2,6-dihydroxyphenyl]ethanone**

[120034-10-8]

C<sub>12</sub>H<sub>15</sub>ClO<sub>3</sub>

mol.wt. 242.70

**Synthesis**

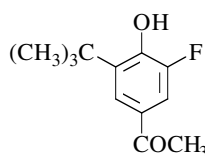
-Preparation by reaction of tert-butyl chloride with 3-chloro-2,6-dihydroxyacetophenone in the presence of sulfuric acid [93] [1067].

**1-[3-(1,1-Dimethylethyl)-5-fluoro-4-hydroxyphenyl]ethanone**

[153356-03-7]

C<sub>12</sub>H<sub>15</sub>FO<sub>2</sub>

mol.wt. 210.25

**Synthesis**

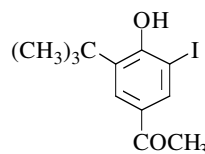
-Refer to: [1916] (Japanese patent).

**1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-iodophenyl]ethanone**

[153356-02-6]

C<sub>12</sub>H<sub>15</sub>IO<sub>2</sub>

mol.wt. 318.15

**Synthesis**

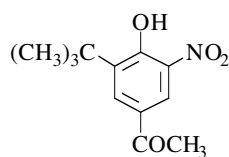
-Refer to: [1916] (Japanese patent).

**1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-nitrophenyl]ethanone**

[153356-04-8]

C<sub>12</sub>H<sub>15</sub>NO<sub>4</sub>

mol.wt. 237.26

**Synthesis**

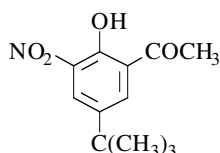
-Refer to: [1916] (Japanese patent).

**1-[5-(1,1-Dimethylethyl)-2-hydroxy-3-nitrophenyl]ethanone**

[100245-06-5]

C<sub>12</sub>H<sub>15</sub>NO<sub>4</sub>

mol.wt. 237.26

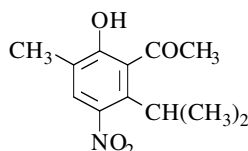
**Synthesis**

-Obtained (poor yield) by nitration of 5-tert-butyl-2-hydroxyacetophenone at -20° using standard reagents (2%) [620].

m.p. 80-81° [620].

**1-[2-Hydroxy-3-methyl-6-(1-methylethyl)-5-nitrophenyl]ethanone**C<sub>12</sub>H<sub>15</sub>NO<sub>4</sub>

mol.wt. 237.26

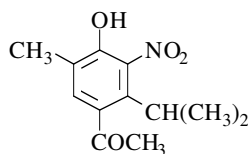
**Synthesis**

-Preparation by reaction of nitric acid (d = 1.4) on 2-hydroxy-3-methyl-6-isopropylacetophenone in acetic acid between -5° and 0° (67%) [903].

m.p. 151° [903].

**1-[4-Hydroxy-5-methyl-2-(1-methylethyl)-3-nitrophenyl]ethanone**C<sub>12</sub>H<sub>15</sub>NO<sub>4</sub>

mol.wt. 237.26

**Synthesis**

-Preparation by reaction of nitric acid (d = 1.4) on 4-hydroxy-5-methyl-2-isopropylacetophenone in acetic acid at -5° (69%) [902].

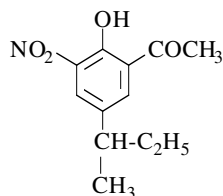
m.p. 157° [902].

**1-[2-Hydroxy-5-(1-methylpropyl)-3-nitrophenyl]ethanone**

[84942-36-9]

C<sub>12</sub>H<sub>15</sub>NO<sub>4</sub>

mol.wt. 237.26

**Synthesis**

-Preparation by reaction of 100% nitric acid on 5-sec-butyl-2-hydroxyacetophenone in acetic acid at r.t. (89%) [318].

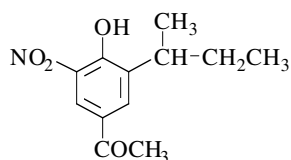
b.p.<sub>0.05</sub> 137-139° [318].

**1-[4-Hydroxy-3-(1-methylpropyl)-5-nitrophenyl]ethanone**

[150313-75-0]

C<sub>12</sub>H<sub>15</sub>NO<sub>4</sub>

mol.wt. 237.26



Synthesis

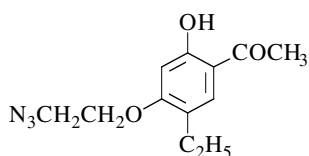
-Refer to: [1243].

**1-[4-(2-Azidoethoxy)-5-ethyl-2-hydroxyphenyl]ethanone**

[117706-27-1]

C<sub>12</sub>H<sub>15</sub>N<sub>3</sub>O<sub>3</sub>

mol.wt. 249.27



Synthesis

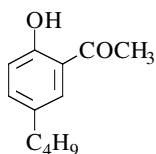
-Preparation by reaction of sodium azide with 4-(2-bromoethoxy)-5-ethyl-2-hydroxyacetophenone in N,N-dimethylformamide at r.t. [256] [257].

<sup>1</sup>H NMR [256] [257], MS [256] [257].**1-(5-Butyl-2-hydroxyphenyl)ethanone**

[50743-14-1]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26



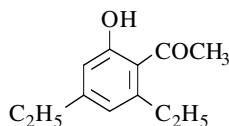
Syntheses

-Preparation by Fries rearrangement of p-butylphenyl acetate with aluminium chloride at 130° (80%) [1335].

-Preparation by reaction of acetyl chloride on 4-butylphenol with aluminium chloride in ethylene dichloride at 110-120° (63%) [1033].

oil [1335]; b.p.<sub>1.5</sub> 105-109° [1335], b.p.<sub>4</sub> 119-123° [1033].**1-(2,4-Diethyl-6-hydroxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26



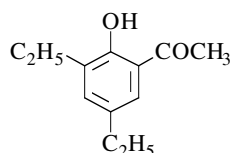
Synthesis

-Preparation by Fries rearrangement of 3,5-diethylphenyl acetate with aluminium chloride [102], between 120° and 150° (quantitative yield) [123].

b.p.<sub>12</sub> 140° [102].

**1-(3,5-Diethyl-2-hydroxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

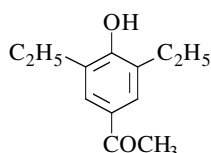
**Synthesis**

-Preparation by Fries rearrangement of 2,4-diethylphenyl acetate with aluminium chloride (67%) [102].

b.p.<sub>12</sub> 138-140° [102].

**1-(3,5-Diethyl-4-hydroxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

-Preparation by Fries rearrangement of 2,6-diethylphenyl acetate with aluminium chloride (60%) [102].

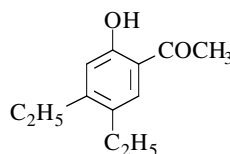
m.p. 92-92°5 [102].

**1-(4,5-Diethyl-2-hydroxyphenyl)ethanone**

[56394-40-2]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation by Fries rearrangement of 3,4-diethylphenyl acetate with aluminium chloride without solvent at 120-150° (90 to 100%) [123] [970].

-Also obtained by isomerization of 2,4-diethyl-6-hydroxyacetophenone by heating with aluminium chloride without solvent between 140-180° (quantitative yield) [123].

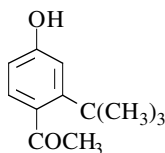
b.p.<sub>0.75</sub> 134-137° [970].

**1-[2-(1,1-Dimethylethyl)-4-hydroxyphenyl]ethanone**

[155982-91-5]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation from 4-hydroxyacetophenone by reaction,  
\*with isobutylene in the presence of sulfuric acid in autoclave at 65° [1279];

\*with tert-butyl chloride in the presence of aluminium chloride [1279].

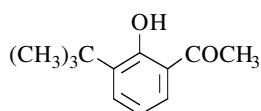
crystalline compound [1279].

**1-[3-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone**

[24242-55-5]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Obtained by UV light irradiation of 2-tert-butylphenyl acetate in benzene (26%) [1188] [1189].  
 -Also obtained (by-product) by reaction of acetyl chloride on bromomagnesium 2-tert-butylphenolate in toluene at r.t. (< 3%) [1549].

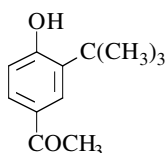
pale yellow oil [1188] [1189] [1549]; b.p.<sub>s</sub> 87° [1189];  
<sup>1</sup>H NMR [1189] [1549], IR [1189] [1549], MS [1549].

**1-[3-(1,1-Dimethylethyl)-4-hydroxyphenyl]ethanone**

[16928-01-1]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Obtained by UV light irradiation of,  
 \*3,5-di-tert-butyl-4-hydroxyacetophenone in cyclohexane solution (photochemical partial dealkylation) (> 95%) [1188] [1189];

\*2-tert-butylphenyl acetate in benzene solution (photo-Fries rearrangement) (24%) [1188] [1189].

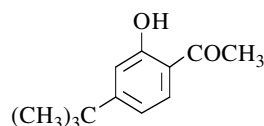
m.p. 175-176° [1188] [1189]; <sup>1</sup>H NMR [1188] [1189], IR [1189].

**1-[4-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone**

[113027-08-0]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Obtained by Fries rearrangement of 3-tert-butylphenyl acetate,  
 \*in the presence of hafnium triflate in 12 M lithium perchlorate in nitromethane at 50° (60%) [1002];

\*in the presence of aluminium chloride without solvent at 145° (68%) [1634].

-Also obtained by Friedel-Crafts acylation of 3-tert-butylphenol with acetyl chloride in the presence of hafnium triflate in 12 M lithium perchlorate in nitromethane (76%) [1002].

-Also obtained by acylation of 3-tert-butylphenol with acetic acid in the presence of hafnium triflate in 12 M lithium perchlorate in nitromethane at 50° (66%) [1003].

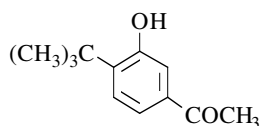
-Also refer to: [1310] (Japanese patent).

**1-[4-(1,1-Dimethylethyl)-3-hydroxyphenyl]ethanone**

[18606-87-6]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

-Preparation by diazotization of 3-amino-4-tert-butylacetophenone, followed by hydrolysis of the diazonium salt obtained [1223].

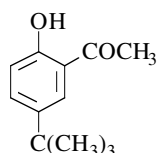
m.p. 127° [1223].

**1-[5-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone**

[57373-81-6]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation by reaction of acetyl chloride on 4-tert-butyl-anisole with aluminium chloride,  
 \*in methylene chloride, first at 0°, then at r.t. (55%) [863];  
 \*in ethylene dichloride, followed by demethylation of the acylanisole obtained with 4% hydrobromic acid in refluxing acetic acid (47-52%) [1906].

-Also obtained by Friedel-Crafts acylation of 4-tert-butylphenol with acetic anhydride in nitrobenzene in the presence of aluminium chloride at 60° (30%) [653].

-Preparation by Fries rearrangement of 4-tert-butylphenyl acetate with aluminium chloride [789] [1583] [1842] [1906],

\*without solvent at 120° (57%) [1583];

\*in 1,2,3-trichloropropane at 120° (60%) [1842] or in boiling nitroethane (22%) [789].

-Preparation by Fries rearrangement of 4-tert-butylphenyl acetate in methylene chloride in the presence of zirconium chloride at r.t. for 48 h (52%). The same reaction performed in a simple ultrasound cleaning bath at r.t. for 10 h leads to 78% yield [748].

-Also obtained *via* an intermolecular photo-Fries rearrangement, by irradiation of a solution of pinacolone and 4-tert-butylphenol in benzene for 5 h (42%) [898].

-Also obtained by reaction of aluminium chloride on 4-(1,1,3,3-tetramethylbutyl)phenyl acetate at 120°, in 1,2,3-trichloropropane (60%) [1842] or in 1,1,2,2-tetrachloroethane (36%) [1842].

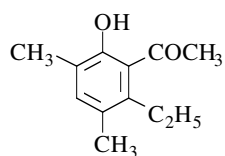
m.p. 26° [653];

b.p.<sub>2</sub> 105-106° [789], b.p.<sub>5</sub> 122-123° [789], b.p.<sub>12</sub> 130° [1583];

<sup>1</sup>H NMR [863], IR [863].

**1-(2-Ethyl-6-hydroxy-3,5-dimethylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

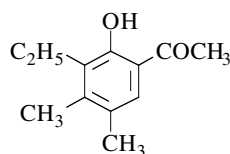
mol.wt. 192.26

**Synthesis**

-Obtained (by-product) by Fries rearrangement of 5-ethyl-2,4-dimethylphenyl acetate with aluminium chloride at 130-140° [102].

**1-(3-Ethyl-2-hydroxy-4,5-dimethylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

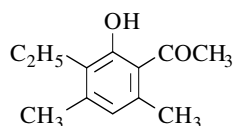
-Obtained (by-product) by heating some esters with aluminium chloride. There is simultaneously displacement and rearrangement of alkyl groups during the Fries reaction from 2-ethyl-4,6-dimethylphenyl acetate or from 2-ethyl-4,5-dimethylphenyl acetate [102].

**1-(3-Ethyl-2-hydroxy-4,6-dimethylphenyl)ethanone**

[69051-59-8]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

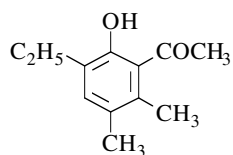
mol.wt. 192.26

**Synthesis**

-Preparation by Fries rearrangement of 2-ethyl-3,5-dimethylphenyl acetate [255].

**1-(3-Ethyl-2-hydroxy-5,6-dimethylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

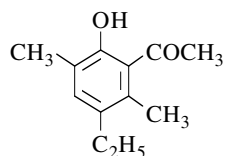
**Syntheses**

-Preparation by reaction of acetyl chloride on 2-ethyl-4,5-dimethylanisole with aluminium chloride in boiling carbon disulfide (50%) [102].  
 -Preparation by heating 2-ethyl-4,5-dimethylphenyl acetate with aluminium chloride (major product) [102].

b.p.<sub>11</sub> 143-145° [102], b.p.<sub>12</sub> 145-147° [102].

**1-(3-Ethyl-6-hydroxy-2,5-dimethylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

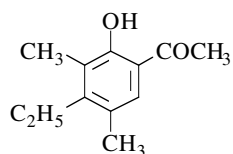
**Synthesis**

-Obtained by Fries rearrangement of 4-ethyl-2,5-dimethylphenyl acetate with aluminium chloride at 130° for 30 min (57%) [1527].

pale yellow oil [1527]; b.p.<sub>16</sub> 156-158° [1527];  
 $n_D^{22} = 1.5410$  [1527]; IR [1527].

**1-(4-Ethyl-2-hydroxy-3,5-dimethylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Obtained by heating some esters\* with aluminium chloride. There is simultaneously displacement and rearrangement of alkyl groups during the Fries reaction,  
 \*2-ethyl-4,6-dimethylphenyl acetate (major product) [102];  
 \*4-ethyl-2,5-dimethylphenyl acetate (75%) [101];

\*4-ethyl-2,6-dimethylphenyl acetate (by-product) [102];

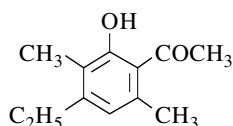
\*5-ethyl-2,4-dimethylphenyl acetate (major product) [102].

m.p. 52-53° [102];  
 b.p.<sub>12</sub> 145-147° [102], b.p.<sub>12</sub> 146-152° [101], b.p.<sub>11</sub> 153-155° [102].



**1-(4-Ethyl-2-hydroxy-3,6-dimethylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

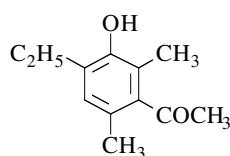
**Synthesis**

-Obtained by oxidation of 6-ethyl-2,3,4,7-tetramethyl-benzofuran with chromium trioxide in acetic acid at 50° for 30 min, followed by saponification of the resulting keto ester with potassium hydroxide in boiling aqueous ethanol for 2 h (40%) [1527].

b.p.<sub>20</sub> 165-167° [1527];  $n_D^{22} = 1.562$  [1527]; IR [1527].

**1-(4-Ethyl-3-hydroxy-2,6-dimethylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

-Obtained by reaction of acetyl chloride on 6-ethyl-2,4-dimethylanisole with aluminium chloride in boiling carbon disulfide [102].

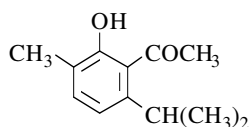
b.p.<sub>15</sub> 178-182° [102].

**1-[2-Hydroxy-3-methyl-6-(1-methylethyl)phenyl]ethanone**

[162853-19-2]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation by Fries rearrangement of carvacryl acetate, \*without solvent at 120°, with aluminium chloride (80-86%) [1584] [1585], with titanium tetrachloride (86%) [1585], with stannic chloride (80%) [1585] or with zinc chloride (60%) [1585];

\*with aluminium chloride in nitrobenzene at 60° (67%) [1584], in toluene or xylene at 100° (58-61%) [1584].

-Preparation by reaction of acetyl chloride on carvacrol with aluminium chloride,

\*in nitrobenzene at r.t. (49%) [903];

\*in nitrobenzene in the presence of phosphorous oxychloride and magnesium chloride at r.t. (17%) [903].

-Also obtained by UV irradiation of a carvacryl acetate solution in methanol/water (2:1) at 254 nm at r.t. under nitrogen atmosphere (51%) [1703].

viscous oil [1703]; m.p. 100-101° [903];

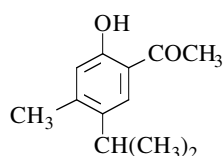
<sup>1</sup>H NMR [1703], <sup>13</sup>C NMR [1703], IR [1703], MS [1703].

**1-[2-Hydroxy-4-methyl-5-(1-methylethyl)phenyl]ethanone**

[52774-08-0]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation by Fries rearrangement of 3-methyl-4-isopropylphenyl acetate, with titanium tetrachloride in nitromethane at 20° (95%) [1162] or with aluminium chloride at 125° (11%) [1525] [1526].

-Preparation by reaction of acetic anhydride on 3-methyl-

4-isopropylphenol (p-thymol) with 70% perchloric acid at 125-135° (32%) [548].

**N.B.:** All the results of references [548] [1525] [1526] were erroneous. Only the Fries rearrangement using titanium tetrachloride leads to the expected ketone and with a good yield [1162]. The <sup>1</sup>H NMR spectra confirms the above structure [1162]. In addition, the reported melting point (29°) [1162] is in good agreement with those generally measured for o-hydroxyketones (below 80°) compared to those of p-hydroxyketones which are considerably higher (usually 120-200°).

m.p. 122°5 [1525] [1526], 110-115° [548], 29° [1162];

b.p.<sub>17</sub> 153° [1162], b.p.<sub>15</sub> 188-192° [1526];

<sup>1</sup>H NMR [1162], (Sadtler: standard n° 52738 M);

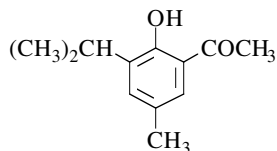
IR [1162] [1526], (Sadtler: standard n° 79797 K); UV [1162], MS [1162].

**1-[2-Hydroxy-5-methyl-3-(1-methylethyl)phenyl]ethanone**

[35158-31-7]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

-Preparation by reaction of ethyl acetoacetate with 2,5-dimethyl-2-hexenal in the presence of pyridine and piperidine as catalysts in refluxing benzene [940] [941] [942].

yellow oil [940] [941] [942]; b.p.<sub>1-2</sub> 70-80° [940] [941] [942];

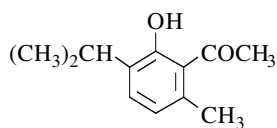
IR [940] [941] [942], UV [940] [941] [942], MS [940] [941] [942].

**1-[2-Hydroxy-6-methyl-3-(1-methylethyl)phenyl]ethanone**

[105337-34-6]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation by reaction of acetic acid on thymol with aluminium chloride at reflux (80%) [1699].

-Preparation by Fries rearrangement of thymyl acetate, \*without solvent at 120° with titanium tetrachloride

(90%) [1585], with aluminium chloride (84-86%) [1584] [1585], with stannic chloride (84%) [1585] or with zinc chloride (62%) [1585];

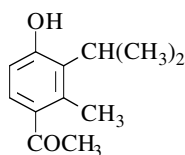
\*with aluminium chloride in nitrobenzene (68%) [1584], in toluene or xylene (59-60%) [1584]. -Also obtained by photo-Fries rearrangement of thymyl acetate in dilute methanol under nitrogen atmosphere at r.t. (48%) [1703].

viscous oil [1703]; b.p.<sub>12</sub> 119° [1699];

<sup>1</sup>H NMR [1703], <sup>13</sup>C NMR [1703], IR [1703], MS [1703].

**1-[4-Hydroxy-2-methyl-3-(1-methylethyl)phenyl]ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

- Preparation by demethylation of 4-methoxy-2-methyl-3-isopropylacetophenone with boiling pyridinium chloride (33%) [967].
- Also obtained by Fries rearrangement of 3-methyl-2-isopropylphenyl acetate with aluminium chloride in nitrobenzene at r.t. (10%) [967].

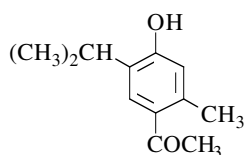
m.p. 128° [967].

**1-[4-hydroxy-2-methyl-5-(1-methylethyl)phenyl]ethanone**

[37847-35-1]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

- Preparation by reaction of acetyl chloride on thymol, with aluminium chloride, in nitrobenzene [187] [188] [459] [1218] [1219] [1513], (97-100%) [187] [188] [459], (75%) [1512] or with zinc chloride [579] [580].
- Preparation by Fries rearrangement of thymyl acetate in nitrobenzene,
  - \*with aluminium chloride, at 40-47° (87-95%) [648] [675] [1462] [1512] [1725], (65-75%) [1727], (51-55%) [676] or at 20-25° (80-87%) [1512] [1585];
  - \*at 25°, with titanium tetrachloride (88%), stannic chloride (78%) or zinc chloride (58%) [1585].
- Preparation from 4-methoxy-2-methyl-5-isopropylacetophenone by demethylation with pyridinium chloride at reflux (73-75%) [1517] [1520] [1524].
- Also obtained (by-product) by reaction of aluminium chloride on p-thymyl acetate without solvent at 140° (15%) [1523].
- Also obtained by UV light irradiation of thymyl acetate in methanol at 25° (41%) [1389].
- Also obtained (by-product) by reaction of acetyl chloride on 5-methyl-2-isopropylanisole with aluminium chloride in carbon disulfide at r.t. (6%) [1520].
- Also obtained by irradiation of thymyl acetate in methanol at 254 nm under nitrogen atmosphere at r.t. (24%) [1703].

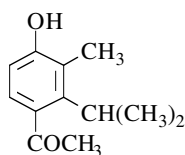
m.p. 152-154° [1703], 135° [1389], 125° [459] [675] [676] [1512] [1513] [1517] [1520], 122°5-125° [648] [1725], 122°5 [1523], 122° [1462]. There is a discrepancy between the different melting points indicated in literature.  
 b.p.<sub>18</sub> 204-207° [1517], b.p.<sub>0.8</sub> 204-207° [1520]; <sup>1</sup>H NMR [1389] [1462] [1703], <sup>13</sup>C NMR [1703], IR [1389] [1462] [1703], MS [1462] [1703].

**1-[4-Hydroxy-3-methyl-2-(1-methylethyl)phenyl]ethanone**

[61405-65-0]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

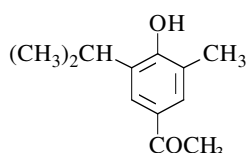
- Refer to: [1239] (Japanese patent).

**1-[4-Hydroxy-3-methyl-5-(1-methylethyl)phenyl]ethanone**

[713-23-5]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

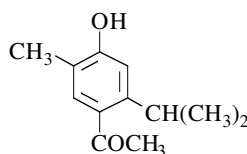
-Refer to: [1781] (Japanese patent).

**1-[4-Hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone**

[37847-37-3]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation by reaction of acetyl chloride on carvacrol with aluminium chloride in nitrobenzene,  
 \*at r.t. [459] [899] [900] [902] [967], (71%) [459], (52%) [900] and (31-39%) [899] [902];  
 \*at 50° (80-90%) [1508].

-Preparation by Fries rearrangement of 2-methyl-5-isopropylphenyl acetate in nitrobenzene at r.t.,

\*with aluminium chloride (84-90%) [1512] [1585], (20%) [902];

\*with stannic chloride or titanium tetrachloride (86%) [1585];

\*with zinc chloride (58%) [1585].

-Preparation by reaction of pyridinium chloride on 4-methoxy-5-methyl-2-isopropylacetophenone [967].

-Also obtained by irradiation of carvacryl acetate in methanol at 254 nm under nitrogen atmosphere at r.t. (15%) [1703].

m.p. 127° [902], 120° [1508] [1512], 101° [459] [899], 86-88° [1703].

There is a discrepancy between the different melting points indicated in literature.

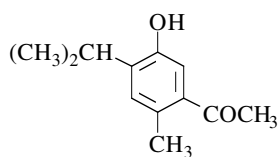
<sup>1</sup>H NMR [1703], <sup>13</sup>C NMR [1703], IR [1703], MS [1703].

**1-[5-Hydroxy-2-methyl-4-(1-methylethyl)phenyl]ethanone**

[126570-37-4]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

-Preparation by reaction of acetyl chloride with isothymol methyl ether in the presence of aluminium chloride in nitrobenzene at r.t. [1462].

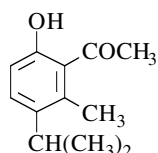
m.p. 106-107° [1462]; <sup>1</sup>H NMR [1462], IR [1462].

**1-[6-Hydroxy-2-methyl-3-(1-methylethyl)phenyl]ethanone**

[105337-35-7]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

-Preparation by reaction of aluminium chloride on 3-tert-butyl-2-hydroxy-6-methyl-5-isopropylacetophenone in nitromethane at 20° (84%) [1162].

-Claimed to be prepared,

\*by Fries rearrangement of 3-methyl-4-isopropylphenyl acetate with aluminium chloride, without solvent at 90°

(85%) [1523] or at 125° (43%) [1526] and in nitrobenzene at 90° (> 50%) [1523];

\*by reaction of acetyl chloride on 3-methyl-4-isopropylanisole with aluminium chloride in boiling carbon disulfide (41%) [1525];

\*by reaction of acetyl chloride on 3-methyl-4-isopropylphenetole with aluminium chloride in carbon disulfide at r.t. (37%) [1526];

\*by heating 6-methoxy-2-methyl-3-isopropylacetophenone with pyridinium chloride at reflux [1525].

**N.B.:** All the results of references [1523] [1525] [1526] were erroneous. Only the first route was correct. The <sup>1</sup>H NMR spectra confirms the above structure [1162].

m.p. 70° [1162]; amber-coloured liquid [1525] [1526];

b.p.<sub>14</sub> 150° [1526], b.p.<sub>19</sub> 153-154° [1525];  $n_D^{20} = 1.5410$  [1525] [1526];

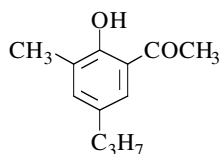
<sup>1</sup>H NMR [1162], (Sadtlar: standard n° 52739 M);

IR [1162] [1526], (Sadtlar: standard n° 79798 K);

UV [1162], MS [1162].

**1-(2-Hydroxy-3-methyl-5-propylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Syntheses**

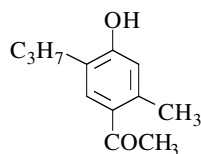
-Preparation by Fries rearrangement of 2-methyl-4-propylphenyl acetate with aluminium chloride without solvent at 100-110° [100].

-Also obtained by reaction of aluminium chloride on 2-ethyl-6-methyl-4-propylphenyl acetate, with elimination of ethyl group (8%) [100].

b.p.<sub>12</sub> 136° [100].

**1-(4-Hydroxy-2-methyl-5-propylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

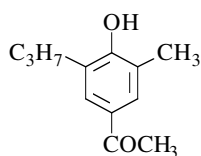
**Synthesis**

-Preparation by Fries rearrangement of 5-methyl-2-propylphenyl acetate with aluminium chloride in nitrobenzene at 20° (83%) [1512].

m.p. 113° [1512]; b.p.<sub>18</sub> 194° [1512].

**1-(4-Hydroxy-3-methyl-5-propylphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

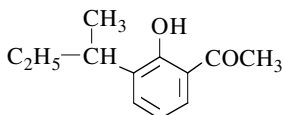
**Syntheses**

- Preparation by Fries rearrangement of 2-methyl-6-propylphenyl acetate with aluminium chloride without solvent at 130-140° [100].
- Also obtained by reaction of aluminium chloride on 4-ethyl-2-methyl-6-propylphenyl acetate, with elimination of ethyl group (12%) [100].

m.p. 101° [100].

**1-[2-Hydroxy-3-(1-methylpropyl)phenyl]ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

- Obtained (poor yield) by reaction of acetyl chloride with a suspension of aluminium o-sec-butylphenoxide in benzene in the presence of aluminium chloride, first at r.t. for 12 h, then on a water bath for 2 h (11%) [1018].

m.p. 121° [1018].

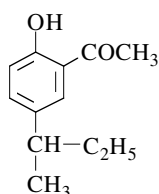
**N.B.:** This o-hydroxyketone should be liquid. The authors probably intended to write b.p.<sub>3</sub> 121° instead of m.p. 121°. This b.p. would be in agreement with those of the other homologous o-hydroxyketones, that have been prepared by the authors [1018].

**1-[2-Hydroxy-5-(1-methylpropyl)phenyl]ethanone**

[84942-39-2]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

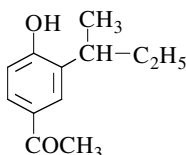
mol.wt. 192.26

**Syntheses**

- Preparation by reaction of acetyl chloride with a suspension of aluminium p-sec-butylphenoxide in benzene in the presence of aluminium chloride, first at r.t. for 12 h, then on a water bath for 2 h (75%) [1018].
- Preparation by Fries rearrangement of 4-sec-butylphenyl acetate with aluminium chloride at 120° (84%) [318].

b.p.<sub>0.15</sub> 86-87° [318], b.p.<sub>3</sub> 115-119° [1018].**1-[4-Hydroxy-3-(1-methylpropyl)phenyl]ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

- Obtained (poor yield) by reaction of acetyl chloride with a suspension of aluminium o-sec-butylphenoxide in benzene in the presence of aluminium chloride, first at r.t. for 12 h, then on a water bath for 2 h (8%) [1018].

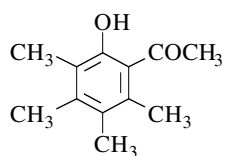
m.p. 123° [1018].

**1-(2-Hydroxy-3,4,5,6-tetramethylphenyl)ethanone**

[118078-21-0]

C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 192.26

**Synthesis**

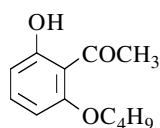
-Preparation by acetylation of 2,3,4,5-tetramethylphenol [1927] according to [1891].

**1-(2-Butoxy-6-hydroxyphenyl)ethanone**

[63438-68-6]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Obtained by reaction of n-butyl iodide with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (40%) [237].

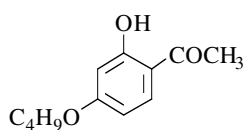
m.p. 59-60° [237].

**1-(4-Butoxy-2-hydroxyphenyl)ethanone**

[57221-60-0]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Preparation by reaction of butyl iodide on resacetophenone with potassium hydroxide in boiling ethanol [364] [578], (14%) [364].

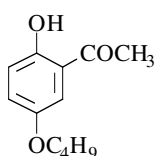
m.p. 43° [364], 42° [578].

**1-(5-Butoxy-2-hydroxyphenyl)ethanone**

[152810-06-5]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

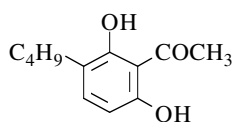
-Refer to: [1666].

**1-(3-Butyl-2,6-dihydroxyphenyl)ethanone**

[63411-82-5]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Preparation from 2,6-dihydroxyacetophenone according to the method [1532], (70%) [237].

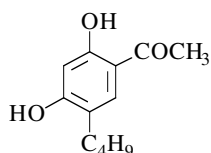
m.p. 72-73° [237].

**1-(5-Butyl-2,4-dihydroxyphenyl)ethanone**

[81468-73-7]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26



## Syntheses

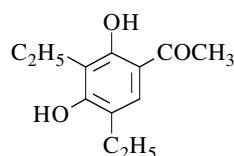
- Preparation by reaction of acetonitrile on 4-n-butyl-resorcinol (Hoesch reaction) (80%) [1277].
- Preparation from 5-n-butyl-2,4-dimethoxyacetophenone by demethylation with boron tribromide in methylene chloride at r.t. (64%) [256] [257] [777].

-Preparation by reaction of acetic acid on 4-n-butylresorcinol with zinc chloride (Nencki reaction) [506] [930].

m.p. 95-96° [1277], 95° [506].

**1-(3,5-Diethyl-2,4-dihydroxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26



## Synthesis

- Obtained by reaction of acetic acid with 2,4-diethyl-resorcinol in the presence of zinc chloride at 140° for 15 min (Nencki reaction) [1095].

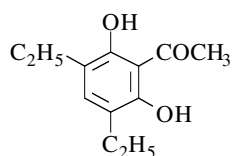
m.p. 115° [1095].

**1-(3,5-Diethyl-2,6-dihydroxyphenyl)ethanone**

[37467-65-5]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26



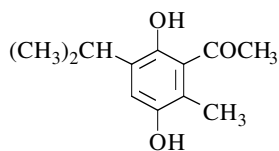
## Synthesis

- Preparation by reaction of acetic anhydride with 4,6-diethyl-resorcinol in the presence of boron trifluoride-acetic acid complex for 2 h at 100° [343].

m.p. 76-77° [343].

**1-[2,5-Dihydroxy-6-methyl-3-(1-methylethyl)phenyl]ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26



## Synthesis

- Obtained by reaction of acetyl chloride on 2-methyl-5-isopropylhydroquinone dimethyl ether with aluminium chloride in carbon disulfide at 35-40° (6%) [1524].

b.p.<sub>17</sub> 148-149° [1524].

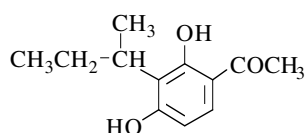


**1-[2,4-Dihydroxy-3-(1-methylpropyl)phenyl]ethanone**

[79557-74-7]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Preparation by hydrogenation of 2,4-dihydroxy-3-(1-methyl-2-propenyl)acetophenone in ethanol using 5% Pd/C as catalyst [1372].

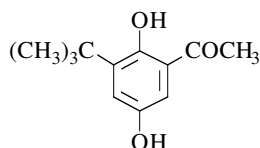
m.p. 174-175° [1372].

**1-[3-(1,1-Dimethylethyl)-2,5-dihydroxyphenyl]ethanone**

[35205-23-3]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Obtained (trace) by reaction of di-tert-butyl diperoxyoxalate with tert-butyl-1,4-benzoquinone in acetaldehyde; the solution was kept in the dark at r.t. (< 1%) [300].

m.p. 141-142° [300];

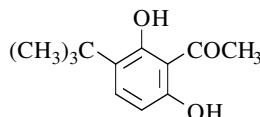
<sup>1</sup>H NMR [300], IR [300], UV [300].

**1-[3-(1,1-Dimethylethyl)-2,6-dihydroxyphenyl]ethanone**

[91124-33-3]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Preparation by reaction of 2,6-dihydroxyacetophenone with tert-butanol in the presence of concentrated sulfuric acid in benzene at 55° in a sealed tube [1940].

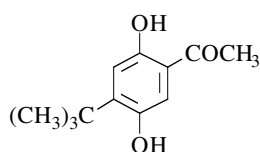
m.p. 183-186° [1940]; <sup>1</sup>H NMR [1940].

**1-[4-(1,1-Dimethylethyl)-2,5-dihydroxyphenyl]ethanone**

[35205-24-4]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Syntheses**

-Preparation by reaction of acetic acid with 2-tert-butylhydroquinone in the presence of boron trifluoride at 80-90° (65%) [1293].

-Preparation by demethylation of 4-tert-butyl-2,5-dimethoxyacetophenone with boron tribromide in methylene chloride at r.t. (58%) [22].

-Also obtained (trace) by reaction of di-tert-butyl diperoxyoxalate with tert-butyl-1,4-benzoquinone in acetaldehyde; the solution was kept in the dark at r.t. (< 1%) [300].

-Also refer to: [634] [1928].

m.p. 195-196° [300], 193°-195° [22];

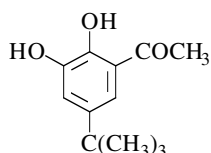
<sup>1</sup>H NMR [22] [300], IR [22] [300], UV [300], MS [22].

**1-[5-(1,1-Dimethylethyl)-2,3-dihydroxyphenyl]ethanone**

[84296-64-0]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Syntheses**

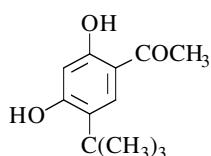
-Obtained by irradiation of a benzene solution of 4-tert-butyl-o-benzoquinone in the presence of a large excess of acetaldehyde (20%) [1758].  
 -Also obtained by treatment of a benzene solution of 4-tert-butyl-o-benzoquinone and acetaldehyde in the presence of di-tert-butyl diperoxyoxalate at 38° (26%) [1758].

m.p. 82-83° [1758]; <sup>1</sup>H NMR [1758], IR [1758].**1-[5-(1,1-Dimethylethyl)-2,4-dihydroxyphenyl]ethanone**

[140660-31-7]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Preparation by reaction of tert-butyl alcohol with resacetophenone in the presence of zinc chloride at 95° (53%) [777].

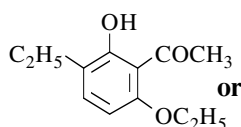
oil [777].

**1-(6-Ethoxy-3-ethyl-2-hydroxyphenyl)ethanone**

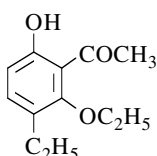
or

**1-(2-Ethoxy-3-ethyl-6-hydroxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26



or

**Syntheses**

-Obtained by partial ethylation of 2-acetyl-4-ethylresorcinol with diethyl sulfate in refluxing 2 N sodium hydroxide for 30 min [1097].  
 -Also obtained by ethylation of 2-acetyl-resorcinol [1097].

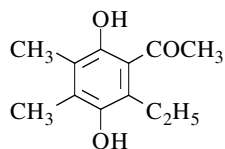
m.p. 84° [1097].

**1-(2-Ethyl-3,6-dihydroxy-4,5-dimethylphenyl)ethanone**

[396639-83-1]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

-Obtained by diethylcadmium alkylation of 5-acetyl-2,3-dimethylbenzoquinone (71%) [68].

m.p. 76° [68];

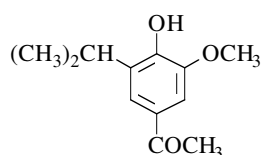
<sup>1</sup>H NMR [68], <sup>13</sup>C NMR [68].

**1-[4-Hydroxy-3-methoxy-5-(1-methylethyl)phenyl]ethanone**

[133393-99-4]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis**

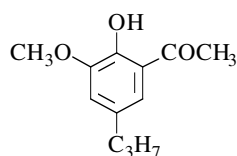
-Preparation from guaiacol by acetylation and isopropylation [1826].

**1-(2-Hydroxy-3-methoxy-5-propylphenyl)ethanone**

[23343-03-5]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Syntheses**

-Preparation by partial demethylation of 2,3-dimethoxy-5-propylacetophenone with aluminium chloride in refluxing methylene chloride (67%) [1216].  
 -Preparation by catalytic hydrogenation of 5-allyl-2-hydroxy-3-methoxyacetophenone [1212] [1417] in the presence of 5% palladium on barium sulfate (97%) [1417].

m.p. 18-19° [1417], 17-19° [1212]; b.p.<sub>0.2</sub> 105-120° [1216];

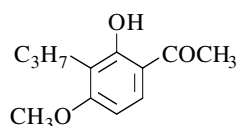
<sup>1</sup>H NMR [1212] [1216], IR [1212], UV [1212].

**1-(2-Hydroxy-4-methoxy-3-propylphenyl)ethanone**

[72018-33-8]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Synthesis not yet described**

-Refer to: [43] [44].

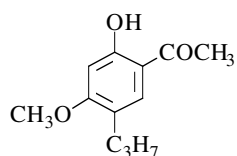
**N.B.:** Pr indicates the *propyl* group -C<sub>3</sub>H<sub>7</sub> in Chem. Abstr., **92**, 6368x (1980) and **98**, 54239b (1983), an usual abbreviation. However, in the two references [43] [44], Pr represented the *prenyl* group -CH<sub>2</sub>CH=C(CH<sub>3</sub>)<sub>2</sub>. Therefore they concern the 2-hydroxy-4-methoxy-3-prenylacetophenone and not the above mentioned 2-hydroxy-4-methoxy-3-propylacetophenone.

**1-(2-Hydroxy-4-methoxy-5-propylphenyl)ethanone**

[72018-35-0]

C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 208.26

**Syntheses**

-Preparation by reaction of dimethyl sulfate on 2,4-dihydroxy-5-propylacetophenone with calcinated potassium carbonate in refluxing acetone [930].  
 -Also refer to: [43] [44].

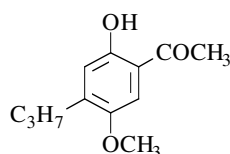
**N.B.:** Pr indicates the *propyl* group -C<sub>3</sub>H<sub>7</sub> in Chem. Abstr., **92**, 6368x (1980) and **98**, 54239b (1983), an usual

abbreviation. However, in the two references [43] [44], Pr represented the *prenyl* group -  $\text{CH}_2\text{CH}=\text{C}(\text{CH}_3)_2$ . Therefore they concern the 2-hydroxy-4-methoxy-5-prenylacetophenone and not the above mentioned 2-hydroxy-4-methoxy-3-propylacetophenone.

**1-(2-Hydroxy-5-methoxy-4-propylphenyl)ethanone**

$\text{C}_{12}\text{H}_{16}\text{O}_3$

mol.wt. 208.26



**Synthesis**

-Preparation by reaction of acetyl chloride on 2-propyl-hydroquinone dimethyl ether with aluminium chloride in boiling carbon disulfide (69%) [457].

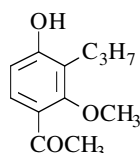
b.p.<sub>1</sub> 150-155° [457].

**1-(4-Hydroxy-2-methoxy-3-propylphenyl)ethanone**

[151027-43-9]

$\text{C}_{12}\text{H}_{16}\text{O}_3$

mol.wt. 208.26



**Synthesis**

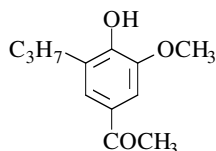
-Refer to: [52] [53].

**1-(4-Hydroxy-3-methoxy-5-propylphenyl)ethanone**

[54514-40-8]

$\text{C}_{12}\text{H}_{16}\text{O}_3$

mol.wt. 208.26



**Synthesis**

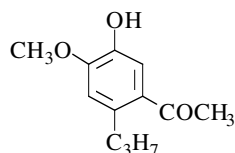
-Refer to: [960] [1783].

**1-(5-Hydroxy-4-methoxy-2-propylphenyl)ethanone**

[23343-08-0]

$\text{C}_{12}\text{H}_{16}\text{O}_3$

mol.wt. 208.26



**Syntheses**

-Preparation by Fries rearrangement of dihydroeugenol acetate with aluminium chloride in nitrobenzene at 5° (13%) [1212].  
-Also refer to: [848].

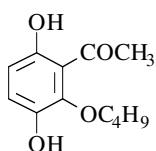
m.p. 68° [1212]; b.p.<sub>1</sub> 138° [1212]; <sup>1</sup>H NMR [1212], IR [1212], UV [1212].

**1-(2-Butoxy-3,6-dihydroxyphenyl)ethanone**

[33539-23-0]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Syntheses**

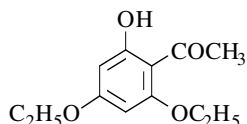
- Easy preparation by reduction of 2-acetyl-3-butoxy-1,4-benzoquinone using conventional methods [587].
- Also obtained in low yield by reaction of 2-acetyl-1,4-benzoquinone with an excess of butanol at r.t., with exclusion of light [587].

m.p. 62°5-63°5 [587]; <sup>1</sup>H NMR [587], IR [587].**1-(2,4-Diethoxy-6-hydroxyphenyl)ethanone**

[26207-59-0]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Syntheses**

- Obtained from phloracetophenone triethyl ether by heating with aluminium chloride [1013].
- Also obtained by reaction of acetonitrile on phloroglucinol diethyl ether (Hoesch reaction) (18%) [494].
- Also obtained by reaction of ethyl iodide [1516] [1550] or diethyl sulfate [964] on phloracetophenone with potassium carbonate in refluxing acetone (18%) [1516].

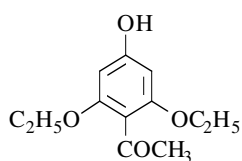
**Isolation from natural sources**

- By treatment of Sotetsuflavone pentaethyl ether with a methanolic barium hydroxide suspension [964]. Sotetsuflavone was extracted of the plants of Coniferae and allied orders.
- By reaction of Kayaflavone triethyl ether with barium hydroxide octahydrate in refluxing methanol (55%) [966]. Kayaflavone was isolated from dried leaves of *Torreya nucifera*.

m.p. 86-87° [1516], 85° [494] [1013], 83-84° [964], 81-83° [966].

**1-(2,6-Diethoxy-4-hydroxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Synthesis**

- Preparation by reaction of acetonitrile on phloroglucinol diethyl ether (Hoesch reaction) (29%) [494].

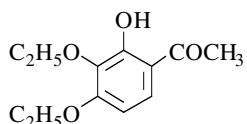
m.p. 186-187° [494].

**1-(3,4-Diethoxy-2-hydroxyphenyl)ethanone**

[6342-86-5]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Syntheses**

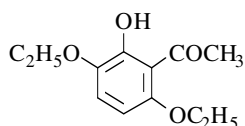
- Refer to: [211] [888] [1599].

**1-(3,6-Diethoxy-2-hydroxyphenyl)ethanone**

[88771-47-5]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Synthesis**

-Preparation by hydrogenolysis procedure on 2-(benzyloxy)-3,6-diethoxyacetophenone with 10% Pd/C as catalyst, and ethanol as solvent at 40° (99%) [502].

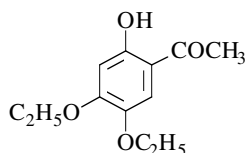
m.p. 64° [502]; <sup>1</sup>H NMR [502], IR [502].

**1-(4,5-Diethoxy-2-hydroxyphenyl)ethanone**

[80938-23-4]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Syntheses**

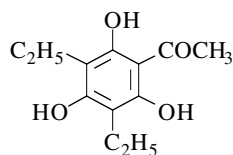
-Refer to: [211] [888].

**1-(3,5-Diethyl-2,4,6-trihydroxyphenyl)ethanone**

[19687-48-0]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Syntheses**

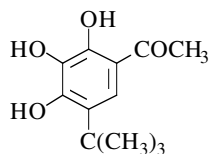
-Preparation by reaction of acetyl chloride with 2,4-diethyl-phloroglucinol in the presence of aluminium chloride in nitrobenzene (28%) [428].

-Preparation by reaction of acetonitrile on 2,4-diethyl-phloroglucinol (Hoesch reaction) (39%) [1618].

m.p. 106-109° [428], 102-105° [1618];  
<sup>1</sup>H NMR [428], UV [428] [1618], MS [428].

**1-[5-(1,1-Dimethylethyl)-2,3,4-trihydroxyphenyl]ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

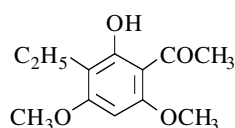
**Synthesis**

-Preparation by reaction of tert-butyl chloride with gallacetophenone in the presence of ferric chloride in acetic acid and heating on a steam bath (52%) [347].

m.p. 174° [347]; UV [347].

**1-(3-Ethyl-2-hydroxy-4,6-dimethoxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

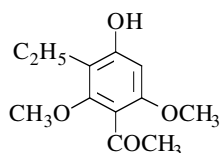
**Synthesis**

-Preparation by reaction of acetonitrile on 2-ethyl-3,5-dimethoxyphenol (Hoesch reaction) [495] [706], (55%) [706].

m.p. 111° [495], 66-68° [706].

**1-(3-Ethyl-4-hydroxy-2,6-dimethoxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Synthesis**

-Obtained (poor yield) by reaction of acetonitrile on 2-ethyl-3,5-dimethoxyphenol (Hoesch reaction) (7%) [706].

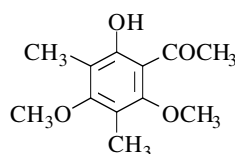
m.p. 184-186° [706].

**1-(2-Hydroxy-4,6-dimethoxy-3,5-dimethylphenyl)ethanone**

[21722-31-6]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Syntheses**

-Preparation by adding of an ethereal solution of diazomethane to a methanolic solution of phloracetophenone (25%) [645]; this compound was obtained from 3,5-dimethylphloracetophenone or from 2,6-dihydroxy-4-methoxy-3,5-dimethylacetophenone in the same conditions [645].

-Also obtained (by-product) from phloracetophenone by reaction with methyl iodide in the presence of potassium carbonate in refluxing acetone (6%) [1735].

**Isolation from natural sources**

-By chromatography of *Melaleuca cajuputi* oil; this oil was obtained from the leaves of *Melaleuca cajuputi* Powell (Myrtaceae) (10%) [1118].

crystalline compound [1118]; m.p. 51-52° [1735], 51° [645];

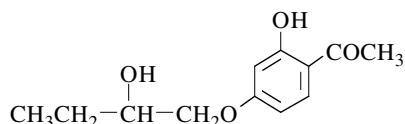
<sup>1</sup>H NMR [645] [1118], IR [645] [1118], UV [645] [1118], MS [1118].

**1-[2-Hydroxy-4-(2-hydroxybutoxy)phenyl]ethanone**

[149454-53-5]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

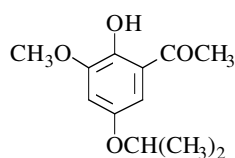
mol.wt. 224.26

**Synthesis**

-Obtained by reaction of resacetophenone with 1,2-butylene oxide in the presence of sodium hydroxide in ethanol [185].

**1-[2-Hydroxy-3-methoxy-5-(1-methylethoxy)phenyl]ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Synthesis**

-Preparation by partial alkylation of 2,5-dihydroxy-3-methoxyacetophenone with isopropyl sulfate in alkaline medium (41%) [1643].

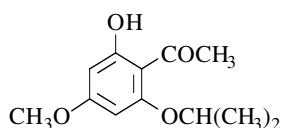
m.p. 70-72° [1643].

**1-[2-Hydroxy-4-methoxy-6-(1-methylethoxy)phenyl]ethanone**

[76554-78-4]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Syntheses**

-Preparation by partial demethylation of 2,4-dimethoxy-6-isopropoxyacetophenone with aluminium bromide in acetonitrile at 0° (95%) [962].  
-Also refer to: [639].

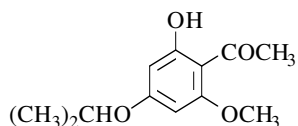
m.p. 65-66° [962].

**1-[2-Hydroxy-6-methoxy-4-(1-methylethoxy)phenyl]ethanone**

[119136-15-1]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Synthesis**

-Preparation by action of 2-bromopropane with 2,4-dihydroxy-6-methoxyacetophenone in the presence of potassium carbonate in DMF for 2 h at 100-110° (87%) [841].

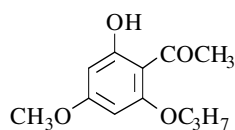
m.p. 71-72° [841]; <sup>1</sup>H NMR [841], IR [841], MS [841].

**1-(2-Hydroxy-4-methoxy-6-propoxyphenyl)ethanone**

[76554-77-3]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Synthesis**

-Refer to: [639].

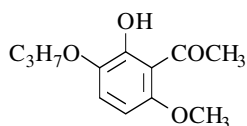


**1-(2-Hydroxy-6-methoxy-3-propoxyphenyl)ethanone**

[126405-77-4]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 224.26

**Synthesis**

-Preparation by adding 2-hydroxy-3-iodo-6-methoxy-acetophenone and cuprous iodide to a solution of sodium propoxide, previously prepared from propyl alcohol and sodium hydride in DMF [1873].

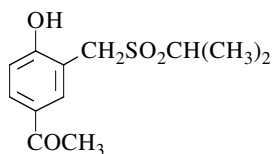
m.p. 90° [1873]; <sup>1</sup>H NMR [1873], IR [1873].

**1-[4-Hydroxy-3-[(1-methylethyl)sulfonyl]methyl]phenyl]ethanone**

[56490-64-3]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>S

mol.wt. 256.32

**Synthesis**

-Obtained by reaction of 3-chloromethyl-4-hydroxy-acetophenone with magnesium isopropylsulfinate in refluxing dilute methanol for 18 h (83%) [935].

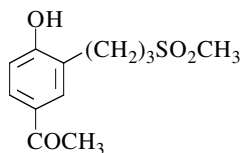
m.p. 96°5-100° [935].

**1-[4-Hydroxy-3-[3-(methylsulfonyl)propyl]phenyl]ethanone**

[56490-61-0]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>S

mol.wt. 256.32

**Synthesis**

-Obtained by Fries rearrangement of 2-(methylsulfonyl-propyl)phenyl acetate with aluminium chloride in nitrobenzene, first at r.t. for 1 h, then at 50-60° for 1.5 h (48%) [935].

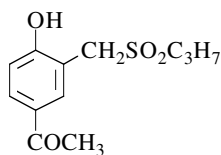
m.p. 140-141° [935].

**1-[4-Hydroxy-3-[(propylsulfonyl)methyl]phenyl]ethanone**

[56490-63-2]

C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>S

mol.wt. 256.32

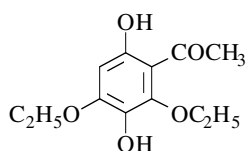
**Synthesis**

-Obtained by reaction of 3-chloromethyl-4-hydroxy-acetophenone with magnesium propylsulfinate in refluxing aqueous methanol for 18 h (36%) [935].

m.p. 73°5-76° [935].

**1-(2,4-Diethoxy-3,6-dihydroxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26

**Synthesis**

-Preparation from 2,4-diethoxy-6-hydroxyacetophenone by persulfate oxidation [73] [1516] [1550], (Elbs reaction) (21%) [1516].

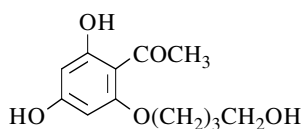
m.p. 130-131° [1516].

**1-[2,4-Dihydroxy-6-(4-hydroxybutoxy)phenyl]ethanone**

[121379-45-1]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26

**Isolation from natural sources**

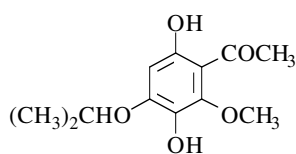
-From the bulbs of *Dioscorea bulbifera* [715].

**1-[3,6-Dihydroxy-2-methoxy-4-(1-methylethoxy)phenyl]ethanone**

[119136-16-2]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26

**Synthesis**

-Preparation from 4-(allyloxy)-2-hydroxy-6-methoxyacetophenone by persulfate oxidation (Elbs reaction) (20%) [841].

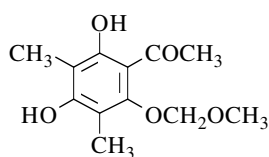
oil [841]; <sup>1</sup>H NMR [841], IR [841], MS [841].

**1-[2,4-Dihydroxy-6-(methoxymethoxy)-3,5-dimethylphenyl]ethanone**

[175465-97-1]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26

**Synthesis**

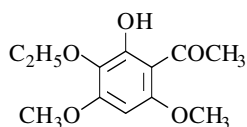
-Refer to: [1736] (Japanese patent).

**1-(3-Ethoxy-2-hydroxy-4,6-dimethoxyphenyl)ethanone**

[89880-47-7]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26

**Synthesis**

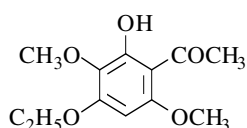
-Obtained (by-product) by reaction of acetyl chloride with 1,2,3,5-tetramethoxybenzene in the presence of aluminium chloride in ethyl ether (9-12%) [198] [1496].

m.p. 74-75° [198], 71°5-72°5 [1496];  
<sup>1</sup>H NMR [198] [1496], IR [198] [1496], MS [198].

**1-(4-Ethoxy-2-hydroxy-3,6-dimethoxyphenyl)ethanone**

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26



**Synthesis**

-Preparation by Friedel-Crafts acylation of 1,3-diethoxy-2,5-dimethoxybenzene with acetyl chloride in the presence of aluminium chloride in ether (81%) [801].

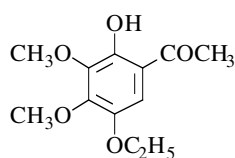
m.p. 106-107° [801].

**1-(5-Ethoxy-2-hydroxy-3,4-dimethoxyphenyl)ethanone**

[69616-62-2]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26



**Synthesis**

-Preparation by reaction of ethyl iodide with 2,5-dihydroxy-3,4-dimethoxyacetophenone in the presence of potassium carbonate in refluxing acetone (57%) [1360].

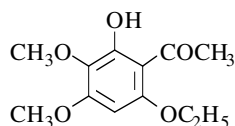
oil [1360]; b.p.<sub>0.1</sub> 120° [1360];

<sup>1</sup>H NMR [1360], IR [1360].

**1-(6-Ethoxy-2-hydroxy-3,4-dimethoxyphenyl)ethanone**

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26



**Synthesis**

-Preparation by reaction of acetyl chloride on antiarol ethyl ether with aluminium chloride [760].

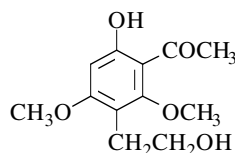
m.p. 97-98° [760].

**1-[6-Hydroxy-3-(2-hydroxyethyl)-2,4-dimethoxyphenyl]ethanone**

[34288-73-8]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26



**Synthesis**

-Obtained from 6-(2'-hydroxyethyl)-5,7-dimethoxy-2-methylchromanone by degradation with potassium hydroxide in refluxing ethanol under nitrogen (32%) [1214].

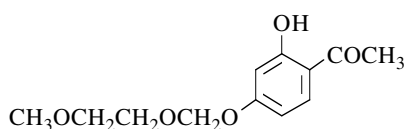
m.p. 133-134° [1214]; <sup>1</sup>H NMR [1214], UV [1214].

**1-[2-Hydroxy-4-[(2-methoxyethoxy)methoxy]phenyl]ethanone**

[123253-31-6]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26

**Syntheses**

-Preparation by reaction of 2-methoxyethoxymethyl chloride with resacetophenone, \*in the presence of N,N-diisopropylethylamine, in DMF at 0° for 1.5 h (83%) [1338] or in methylene chloride at r.t. for 20 h (48%) [70]

\*in the presence of potassium carbonate in acetone for 20 h at 20° (65-70%) [1720];

\*also obtained in two steps: first, by adding sodium hydride (11 mmol) to a solution of resacetophenone (10 mmol) in DMF during 15-30 min at 20°; then, addition of methoxyethoxymethyl chloride (10 mmol) to the mixture between 0 to 5° (80-85%) [1720].

pasty solid [70]; TLC [1720];

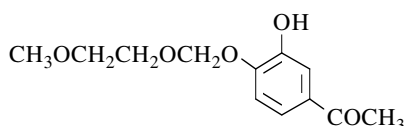
<sup>1</sup>H NMR [70] [1338] [1720], <sup>13</sup>C NMR [1338] [1720], IR [70] [1720], MS [1338] [1720].

**1-[3-Hydroxy-4-[(2-methoxyethoxy)methoxy]phenyl]ethanone**

[101140-09-4]

C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 240.26

**Synthesis**

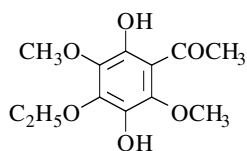
-Preparation by action of sodium methoxide with the crude 3-(benzoyloxy)-4-(2-methoxyethoxy)methoxyacetophenone (SM) in THF at r.t. in a nitrogen atmosphere for 30 min (92%).

SM was previously prepared from 3-(benzoyloxy)-4-hydroxyacetophenone by etherification with 2-methoxyethoxymethyl chloride in the presence of N,N-diisopropylethylamine in methylene chloride at r.t. [1700].

colourless oil [1700]; <sup>1</sup>H NMR [1700], IR [1700], MS [1700].

**1-(4-Ethoxy-2,5-dihydroxy-3,6-dimethoxyphenyl)ethanone**C<sub>12</sub>H<sub>16</sub>O<sub>6</sub>

mol.wt. 256.26

**Synthesis**

-Preparation from 2-hydroxy-4-ethoxy-3,6-dimethoxyacetophenone by persulfate oxidation (Elbs reaction) (31%) [801].

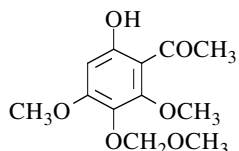
m.p. 73-74° [801].

**1-[6-Hydroxy-2,4-dimethoxy-3-(methoxymethoxy)phenyl]ethanone**

[104481-00-7]

C<sub>12</sub>H<sub>16</sub>O<sub>6</sub>

mol.wt. 256.26

**Synthesis**

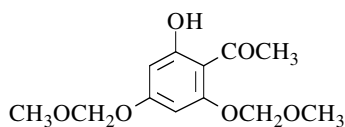
-Obtained from 3,6-dihydroxy-2,4-dimethoxyacetophenone by methoxymethylation with chloromethyl methyl ether in the presence of diisopropylamine in methylene chloride [798] [806].

**1-[2-Hydroxy-4,6-bis(methoxymethoxy)phenyl]ethanone**

[65490-09-7]

C<sub>12</sub>H<sub>16</sub>O<sub>6</sub>

mol.wt. 256.26

**Syntheses**

-Obtained by reaction of methoxymethyl chloride with phloracetophenone in the presence of potassium carbonate,

\*in acetone at r.t. for 2.5 h (47%) [1395];

\*in refluxing acetone for 15 min (43%) [1620] or for 1 h (60%) [553].

-Also refer to: [404] [405] [722] [772] [1089] [1952] [1954].

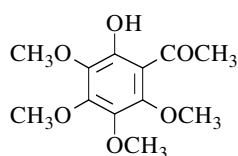
m.p. 52° [1620], 45-46° [1395]; <sup>1</sup>H NMR [1395] [1620], IR [1395] [1620], UV [1620].

**1-(2-Hydroxy-3,4,5,6-tetramethoxyphenyl)ethanone**

[3162-28-5]

C<sub>12</sub>H<sub>16</sub>O<sub>6</sub>

mol.wt. 256.26

**Syntheses**

-Obtained by partial demethylation of 2,3,4,5,6-penta-methoxyacetophenone (**I**),

\*with boron trifluoride etherate in acetic acid at 80°. (**I**) was obtained by metallation of pentamethoxybenzene, followed by treatment of the intermediate aryllithium compound with acetic anhydride at r.t. (85% yield) [1561];

\*with aluminium chloride in ethyl ether at r.t. for 3 h (21%) [1609];

\*with aluminium chloride in acetonitrile for 6 h at 30° (75%) [962].

-Also obtained by acylation of pentamethoxybenzene with acetyl chloride in the presence of aluminium chloride in ethyl ether [135] [1356] [1357] [1695], (25-34%) [135] [1357] or first for 14 h at r.t., then for 2 h at reflux (14%) [1695].

-Also obtained by adding a methanolic solution of 2,5-dihydroxy-3,4,6-trimethoxyacetophenone to an ethereal solution of diazomethane and keeping the mixture overnight in a refrigerator [1616] [1617], (80%) [1616].

-Also refer to: [207] [209] [213] [1246] [1380] [1769].

**Isolation from natural sources**

-By alkaline degradation of two substituted flavones with potassium hydroxide in boiling aqueous ethanol for 17-20 h under nitrogen,

a)-From *Lucidin dimethyl ether* (5,6,7,8-tetramethoxy-3',4'-methylenedioxyflavone) (m.p. 171-172°) (SM) (60% yield) [1072]. SM was obtained from two origins:

-Isolation from ground root of *Lindera lucida* (Lauraceae);

-Also prepared by methylation of *Lucidin* (5,7-dihydroxy-6,8-dimethoxy-3',4'-methylenedioxyflavone) (m.p. 255-257°), itself isolated from ground root of *Lindera lucida*.

b)-From 5,6,7,8-tetramethoxyflavone (m.p. 112-113°) (SM), [86], (53% yield) [1072]. SM was also isolated from the above mentioned plant.

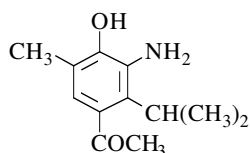
yellow oil [1356] [1695], light orange oil [1072], oil [1561], liquid [1616] [1617];

b.p.<sub>2</sub> 115° [1616] [1617], b.p.<sub>0.2</sub> 130° [1072], b.p.<sub>14</sub> 183° [135], b.p.<sub>15</sub> 183° [1356];

<sup>1</sup>H NMR [86] [1695], IR [86] [1695], UV [86] [1072] [1695].

**1-[3-Amino-4-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone**C<sub>12</sub>H<sub>17</sub>NO<sub>2</sub>

mol.wt. 207.27

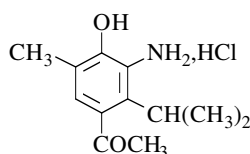
**Syntheses**

-Preparation by reduction of 4-hydroxy-5-methyl-3-nitro-2-isopropylacetophenone,  
 \*with sodium hydrosulfite in aqueous sodium hydroxide solution at 80-90° (92%) [902];  
 \*with tin in dilute hydrochloric acid (46%) [902].

m.p. 100° [902].

**1-[3-Amino-4-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone (Hydrochloride)**C<sub>12</sub>H<sub>17</sub>NO<sub>2</sub>, HCl

mol.wt. 243.73

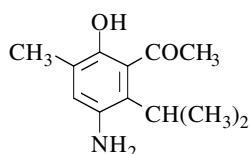
**Synthesis**

-Preparation by reaction of hydrochloric acid on 3-amino-4-hydroxy-5-methyl-2-isopropylacetophenone in ethyl ether [902].

m.p. 199-200° (d) [902].

**1-[3-Amino-6-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone**C<sub>12</sub>H<sub>17</sub>NO<sub>2</sub>

mol.wt. 207.27

**Syntheses**

-Preparation by reduction of 2-hydroxy-3-methyl-5-nitro-6-isopropylacetophenone,  
 \*with sodium hydrosulfite in aqueous sodium hydroxide solution (87%) [903];  
 \*with tin in dilute hydrochloric acid (50%) [903].

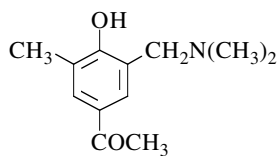
m.p. 117° [903].

**1-[3-[(Dimethylamino)methyl]-4-hydroxy-5-methylphenyl]ethanone**

[82506-14-7]

C<sub>12</sub>H<sub>17</sub>NO<sub>2</sub>

mol.wt. 207.27

**Synthesis**

-Preparation by aminomethylation of 4-hydroxy-3-methylacetophenone with dimethylamine and formalin in water at 35-40° for 4 h (64%) [1040].

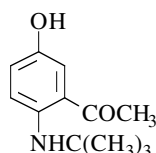
m.p. 44° [1040]; <sup>1</sup>H NMR [1040], IR [1040].

**1-[2-[(1,1-Dimethylethyl)amino]-5-hydroxyphenyl]ethanone**

[63609-62-1]

C<sub>12</sub>H<sub>17</sub>NO<sub>2</sub>

mol.wt. 207.27

**Synthesis**

-Obtained by UV irradiation of a solution of 3-methyl-N-tert-butylanthranilium perchlorate (SM) in 10% aqueous acetonitrile (64%) [55]. SM was prepared according to [725].

yellow oil [55]; TLC [55];

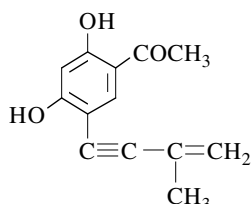
<sup>1</sup>H NMR [55], <sup>13</sup>C NMR [55], IR [55], MS [55].

**1-[2,4-Dihydroxy-5-(3-methyl-3-buten-1-ynyl)phenyl]ethanone**

[193333-25-4]

C<sub>13</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 216.24

**Synthesis**

-Obtained (by-product) by reaction of boron tribromide (4 equiv.) with 2,4-bis(benzyloxy)-5-(3-hydroxy-3-methylbutynyl)acetophenone in methylene chloride for 5 min at 0° (14%) [1825].

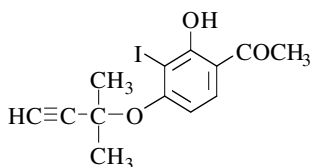
m.p. 110-112° [1825]; <sup>1</sup>H NMR [1825].

**1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-3-iodophenyl]ethanone**

[82538-73-6]

C<sub>13</sub>H<sub>13</sub>IO<sub>3</sub>

mol.wt. 344.15

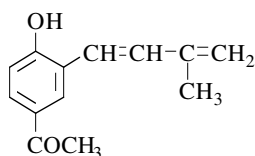
**Synthesis**

-Preparation by reaction of 3-chloro-3-methylbut-1-yne with 2,4-dihydroxy-3-iodoacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (65%) [15].

m.p. 100-101° [15]; <sup>1</sup>H NMR [15].

**1-[4-Hydroxy-3-(3-methyl-1,3-butadienyl)phenyl]ethanone**C<sub>13</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 202.10

**Isolation from natural sources**

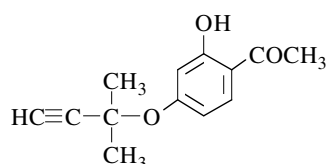
-From the roots of *Helianthella uniflora* (Heliantheae) [242].

m.p. 137-138° [242];

<sup>1</sup>H NMR [242], IR [242], UV [242], MS [242].

**1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxyphenyl]ethanone**C<sub>13</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 218.25

**Synthesis**

-Obtained by treatment of resacetophenone with 3-chloro-3-methylbutyne in DMF in the presence of potassium carbonate and potassium iodide for 12 h at 75° (29%) [245].

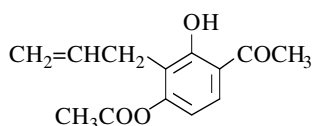
m.p. 62° [245]; <sup>1</sup>H NMR [245], IR [245].

**1-[4-(Acetyloxy)-2-hydroxy-3-(2-propenyl)phenyl]ethanone**

[149810-10-6]

C<sub>13</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 234.25

**Synthesis**

-Preparation by reaction of acetyl chloride with 3-allyl-2,4-dihydroxyacetophenone in the presence of triethylamine in methylene chloride for 1 h at 0° and at 10° for 30 min (62%) [1265].

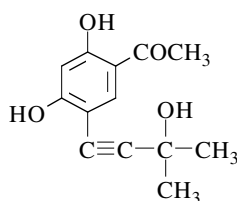
m.p. 56-57° [1265]; <sup>1</sup>H NMR [1265], <sup>13</sup>C NMR [1265], IR [1265].

**1-[2,4-Dihydroxy-5-(3-hydroxy-3-methyl-1-butyryl)phenyl]ethanone**

[193333-24-3]

C<sub>13</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 234.25

**Synthesis**

-Obtained (by-product) by reaction of boron tribromide (4 equiv.) with 2,4-bis(benzyloxy)-5-(3-hydroxy-3-methylbutyryl)acetophenone in methylene chloride for 5 min at 0° (18%) [1825].

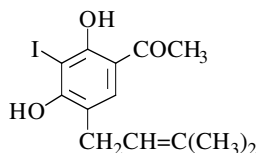
m.p. 148-150° [1825]; <sup>1</sup>H NMR [1825].

**1-[2,4-Dihydroxy-3-iodo-5-(3-methyl-2-butenyl)phenyl]ethanone**

[82538-74-7]

C<sub>13</sub>H<sub>15</sub>IO<sub>3</sub>

mol.wt. 346.16

**Synthesis**

-Obtained by reaction of 2-methylbut-3-en-2-ol with 2,4-dihydroxy-3-iodoacetophenone in the presence of boron trifluoride etherate in dioxane at 35-40° (15%) [15].

m.p. 135-137° [15]; <sup>1</sup>H NMR [15].

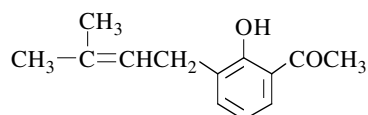


**1-[2-Hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[310402-63-2]

C<sub>13</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 204.27



Synthesis

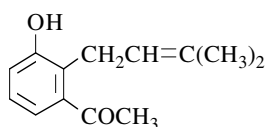
-Refer to: [1325] (compound 76).

**1-[3-Hydroxy-2-(3-methyl-2-butenyl)phenyl]ethanone**

[154520-54-4]

C<sub>13</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 204.27



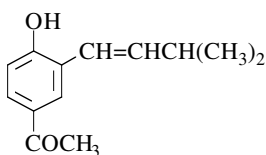
Isolation from natural sources

-From the aerial parts of *Helichrysum stoechas* (L.) grown in Libya [568].**1-[4-Hydroxy-3-(3-methyl-1-butenyl)phenyl]ethanone**

[35816-89-8]

C<sub>13</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 204.27



Synthesis

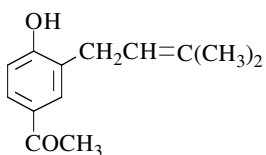
-Preparation by migration of a C=C double bond in 4-hydroxy-3-(2-isopentenyl)acetophenone by treatment with potassium hydroxide in triethylene glycol (Triglykol) at 150° (70%) [241] (allylic/propenylic rearrangement).

b.p.<sub>1</sub> 120° [241]; <sup>1</sup>H NMR [241].**1-[4-Hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[26932-05-8]

C<sub>13</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 204.27



Syntheses

-Obtained by reaction of 2-methyl-3-buten-2-ol with 4-hydroxyacetophenone in the presence of boron trifluoride etherate [128] [246], (15%) [128].

-Preparation by thermal Claisen rearrangement of 4-(2,2-dimethylallyloxy)acetophenone in diethylaniline at 165° (79%) [241].

Isolation from natural sources

-From the aerial parts of *Ophryosporus chilca* (Compositae, tribe Eupatorieae) [251].-From the roots of *Flourensia cernua* DC (Compositae) [244].-From *Artemis campestris* silbsp. glutinosa (Compositae) [489].-From *Senecio phyllolleptus* Cuatr., *Senecio viridis* Phil. and *Senecio nutans* sch. Bip. (Asteraceae) native of northern Chile [1260].-From *Senecio nutans* sch. Bip. [556].-From the aerial parts of *Stevia hyssopifolia* Phil. var. *hyssopifolia* [1942].-From the aerial parts of *Baccharis santelicens* Phil. (Compositae, tribe Cistereae, subtribe Baccharidinae) [242].

- From sliced yacon tubers after inoculation with the bacterium *Pseudomonas cichorii* and incubation at 20° for three days, then extraction with acetone. Yacon (*Polymnia sonchifolia*) (Compositae) is cultivated in South America and has recently been introduced into Japan [1749].
- From the aerial parts of *Helichrysum italicum* (Compositae) (major compound) [1807].
- From the aerial parts of *Helichrysum stoechas* (Compositae) [657], (trace amounts) [1807].
- From the aerial parts of *Werneria poposa* [1429].
- From the roots of *Helianthella uniflora* (Compositae) [242] [264].
- From the leaves of *Ageratina altissima* (L) K & K (Compositae) [249].
- Also refer to: [1324].

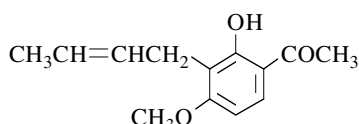
Amorphous [1749]; TLC [251];  
 m.p. 94-95° [128], 93-94° [241] [242], 92-93° [657], 90-91° [1260], 90° [489];  
<sup>1</sup>H NMR [128] [242] [489] [657] [1260] [1429] [1749] [1807],  
<sup>13</sup>C NMR [1260] [1429] [1749] [1807], IR [128] [242] [489] [657] [1260] [1749] [1807],  
 UV [128] [242] [489] [657] [1749] [1807],  
 MS [242] [489] [657] [1260] [1429] [1749] [1807].

### 1-[3-(2-Butenyl)-2-hydroxy-4-methoxyphenyl]ethanone

[91664-24-3]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



#### Synthesis

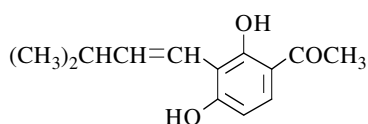
**N.B.:** In the paper [19], the formula of the compound **13** displayed page 131, which is the formula of the titled compound C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>, is incomplete and erroneous. It actually deals with another compound C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>, the 1-[3-(2-butenyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, which is described in the experimental part. This is detailed just below the formula, page 131.

### 1-[2,4-Dihydroxy-3-(3-methyl-1-butenyl)phenyl]ethanone

[80190-95-0]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



#### Syntheses

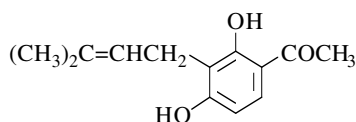
- Obtained by reaction of 2-methylbut-3-en-2-ol with resacetophenone in the presence of boron trifluoride etherate [915] according to the method [884].
- Also refer to: [1091] (Chinese paper).

### 1-[2,4-Dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone

[19825-40-2]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



#### Syntheses

- Preparation by reaction of prenyl bromide on resacetophenone with potassium hydroxide solution at r.t. [175] [882] [1056], (21-25%) [175] [882].
- Preparation by reaction of 2-methylbut-3-en-2-ol with resacetophenone in the presence of boron trifluoride etherate in dioxane at r.t. [43] [865] [884], (33%) [865], (13%) [884].
- Isoprenylation of resacetophenone with prenyl bromide by photochemical method in the presence of benzoyl peroxide in dry benzene for 8 h (40%) [175].
- Preparation from 6-acetyl-3-phenylthio-2,2-dimethylchroman-5-ol,

- \*by reaction with potassium naphthalenide in tetrahydrofuran at r.t. (59%) [1252] or by reaction with lithium naphthalenide in tetrahydrofuran at -32° for 30 min (38%) [1252];
- \*by electrolysis using a mercury cathode, and acetonitrile-tetraethylammonium bromide electrolyte (49%) [1252].
- Also obtained by reaction of potassium naphthalenide with 6-acetyl-2,2-dimethyl-3-phenyl-sulfonylchroman-5-ol in tetrahydrofuran at r.t. (25%) [1252].

Isolation from natural sources

- By cleavage of isobavachin with alkali. The isobavachin is a flavonoid compound obtained from *Psoralea Corylifolia* Linn. [206].

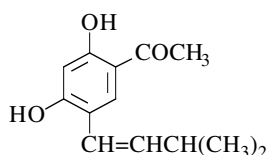
m.p. 162° [1056], 157-158° [882], 155-156° [206] [884], 149-151° [1252], 148° [865];  
<sup>1</sup>H NMR [43] [44] [206] [865] [1056] [1252], IR [206] [865] [882] [1056], UV [43] [882], MS [1252].

### 1-[2,4-Dihydroxy-5-(3-methyl-1-butenyl)phenyl]ethanone

[41347-54-0]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



Synthesis

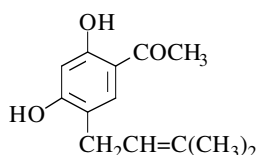
- Obtained by reaction of 2-methylbut-3-en-2-ol with resacetophenone in the presence of boron trifluoride etherate [915] according to the method [884].

### 1-[2,4-Dihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone

[28437-37-8]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



Syntheses

- Preparation by reaction of 2-methylbut-3-en-2-ol with resacetophenone in the presence of boron trifluoride etherate [43] [865] [884], (20-29%) [241] [884].
- Preparation from 2,4-dihydroxy-3-iodo-5-prenyl-acetophenone by elimination of iodine with zinc dust and concentrated hydrochloric acid in refluxing ethanol (79%) [15].
- Preparation by reaction of prenyl bromide with resacetophenone in potassium hydroxide solution at r.t. [1056].

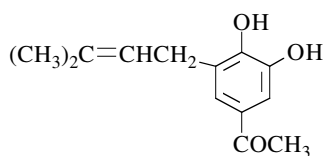
m.p. 146° [1056], 144-145° [15] [884]; <sup>1</sup>H NMR [43] [44] [1056], IR [1056], UV [43].

### 1-[3,4-Dihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone

[186966-70-1]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



Synthesis

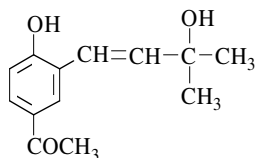
- Obtained (poor yield) by rearrangement of 4-(dimethyl-allyloxy)-3-hydroxyacetophenone in the presence of montmorillonite KSF (< 10%) [1814].

**1-[4-Hydroxy-3-(3-hydroxy-3-methyl-1-butenyl)phenyl]ethanone**

[35816-94-5]

[26931-61-3] (*E*)C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



Isolation from natural sources

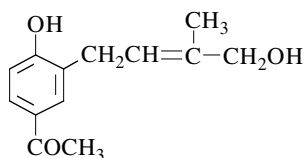
- From the aerial parts of *Ophryosporus floribundus* (Compositae, tribe Eupatorieae) [1941].
- From the leaves and the roots of *Ageratina altissima* (L.) K. et R. (Compositae) [249].
- From the roots of *Helianthella uniflora* (tribe Heliantheae) [242].

<sup>1</sup>H NMR [242], IR [242], UV [242], MS [242].**1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone**

[68034-24-2]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



Isolation from natural sources

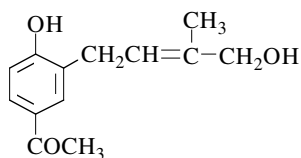
- From the aerial parts of *Artemisia campestris*, L., subsp. glutinosa (Gay ex Besser), Batt (Compositae) [491].

**1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*E*)**

[73869-86-0]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



Synthesis

- Obtained by alkaline hydrolysis of 3-[4-acetoxyisopent-2(*E*)-enyl]-4-hydroxyacetophenone (SM) (viscous oil) with 10% potassium hydroxide in methanol (quantitative yield) [492]. SM was isolated from the *Artemisia campestris* L., subsp. glutinosa (Gay ex Besser), Batt.

Isolation from natural sources

- From the aerial parts of *Artemisia campestris* L., subsp. glutinosa (Gay ex Besser), Batt (Compositae), (1.1%) [488], (11.2%) [489].
- From *Artemisia monosperma* [1].

m.p. 84-85° [488];

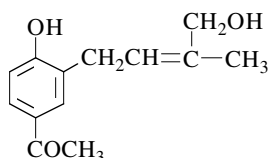
<sup>1</sup>H NMR [488] [489], IR [488], UV [488], MS [488] [489].

**1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (Z)**

[123614-13-1]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27

**Synthesis**

-Obtained by alkaline hydrolysis of 3-[4-acetoxyisopent-2(Z)-enyl]-4-hydroxyacetophenone (SM) (viscous oil) with 10% potassium hydroxide in methanol (quantitative yield) [492]. SM was isolated from the *Artemisia campestris* L., subsp. *glutinosa* (Gay ex Besser), Batt.

**Isolation from natural sources**

-From the aerial parts of *Artemisia campestris* L., subsp. *glutinosa* (Gay ex Besser), Batt (Compositae) [491], (44.8%) [489].  
 -From *Artemisia monosperma* [1].

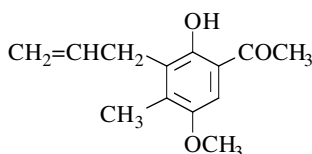
viscid oil [489]; <sup>1</sup>H NMR [489], IR [489], UV [489], MS [489].

**1-[2-Hydroxy-5-methoxy-4-methyl-3-(2-propenyl)phenyl]ethanone**

[43037-66-7]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27

**Synthesis**

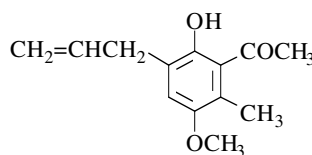
-Preparation by thermal Claisen rearrangement of 2-(allyloxy)-5-methoxy-4-methylacetophenone in N,N-dimethylaniline at 170° (42%) [581].

**1-[2-Hydroxy-5-methoxy-6-methyl-3-(2-propenyl)phenyl]ethanone**

[43037-68-9]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27

**Synthesis**

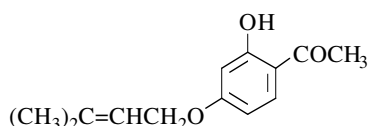
-Obtained by thermal Claisen rearrangement of 2-(allyloxy)-5-methoxy-4-methylacetophenone in N,N-dimethylaniline at 170°, with a [1,5] shift of the aromatic acetyl substituent (22%) [581].

**1-[2-Hydroxy-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone**

[24672-83-1]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27

**Syntheses**

-Preparation by reaction of prenyl bromide on resacetophenone [1619],  
 \*in the presence of potassium carbonate in refluxing acetone [43] [175] [882] [1390], (69%) [882], (40%) [175];

\*in the presence of potassium hydroxide in methanol, at 0° (14%) or at r.t. (4%) [882];

\*by photochemical method in the presence of benzoyl peroxide in dry benzene for 8 h (10%) [175].

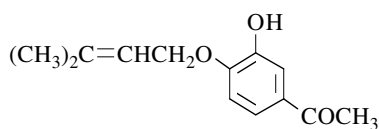
m.p. 46-47° [882]; <sup>1</sup>H NMR [43] [44] [882], IR [882], UV [43] [882].

**1-[3-Hydroxy-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone**

[186966-69-8]

C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 220.27



**Synthesis**

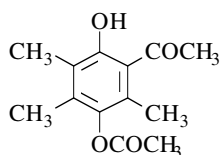
-Preparation by reaction of 3,3-dimethylallyl chloride (2.5 equiv.) with 4-acetylcathecol in the presence of sodium carbonate and catalytic amounts of TBAI in DMF at r.t. (73%) [1814].

**1-[3-(Acetyloxy)-6-hydroxy-2,4,5-trimethylphenyl]ethanone**

[66901-79-9]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27



**Syntheses**

-Preparation by reaction of boron trifluoride-acetic acid complex,  
\*with trimethylhydroquinone [424] [1144], (90%) [424];  
\*with trimethylhydroquinone diacetate in ethylene dichloride via a Fries rearrangement (99%) [1872].  
-Also refer to: [1928].

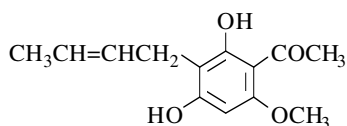
m.p. 75° [1144]; <sup>13</sup>C NMR [1872].

**1-[3-(2-Butenyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone**

[91664-22-1]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27



**Synthesis**

-Preparation by condensation of 2,4-dihydroxy-6-methoxyacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (37%) [19].

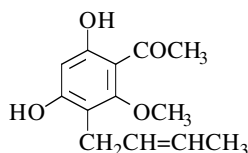
m.p. 134-135° [19]; <sup>1</sup>H NMR [19].

**1-[3-(2-Butenyl)-4,6-dihydroxy-2-methoxyphenyl]ethanone**

[91664-23-2]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27



**Synthesis**

-Preparation by condensation of 2,4-dihydroxy-6-methoxyacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (41%) [19].

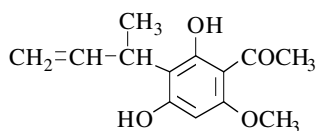
m.p. 128-129° [19]; <sup>1</sup>H NMR [19].

**1-[2,4-Dihydroxy-6-methoxy-3-(1-methyl-2-propenyl)phenyl]ethanone**

[91664-20-9]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Synthesis**

-Obtained, or else its isomer (see below), (by-product) by condensation of 2,4-dihydroxy-6-methoxyacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (7%) [19].

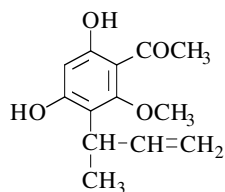
m.p. 130-140° [19]; <sup>1</sup>H NMR [19].

**1-[4,6-Dihydroxy-2-methoxy-3-(1-methyl-2-propenyl)phenyl]ethanone**

[91664-21-0]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Synthesis**

-Obtained, or else its isomer (see above), (by-product) by condensation of 2,4-dihydroxy-6-methoxyacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (7%) [19].

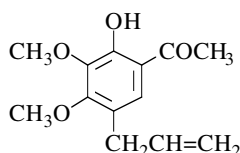
m.p. 130-140° [19]; <sup>1</sup>H NMR [19].

**1-[2-Hydroxy-3,4-dimethoxy-5-(2-propenyl)phenyl]ethanone**

[75254-93-2]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Synthesis**

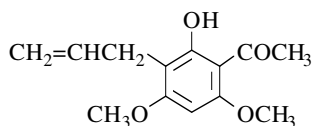
-Preparation by thermal Claisen rearrangement of 2-(allyloxy)-3,4-dimethoxyacetophenone without solvent at 190-200° [351].

**1-[2-Hydroxy-4,6-dimethoxy-3-(2-propenyl)phenyl]ethanone**

[35109-98-9]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Synthesis**

-Preparation by thermal Claisen rearrangement of 2-(allyloxy)-4,6-dimethoxyacetophenone in refluxing N,N-dimethylaniline (90%) [866].

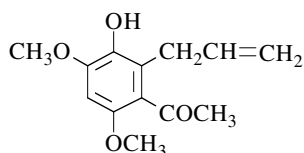
m.p. 85-87° [866]; <sup>1</sup>H NMR [866], IR [866].

**1-[3-Hydroxy-4,6-dimethoxy-2-(2-propenyl)phenyl]ethanone**

[100612-87-1]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Syntheses**

- Preparation by thermal Claisen rearrangement of 5-(allyloxy)-2,4-dimethoxyacetophenone, \*in boiling quinoline (65%) [498];
- \*in glycerol at 200° (87%) [498];
- \*by pyrolysis at 160° for 2 h under nitrogen [699].
- Preparation by reaction of methyl iodide on 2-allyl-3,6-dihydroxy-4-methoxyacetophenone with potassium carbonate in acetone (41%) [498].

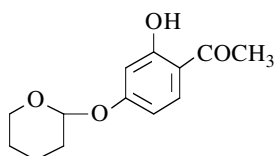
m.p. 110° [498].

**1-[2-Hydroxy-4-[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone**

[111841-07-7]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Syntheses**

- Obtained by reaction of 2,3-dihydropyran with resacetophenone in the presence of concentrated hydrochloric acid (some drops) at r.t. overnight (33%) [671]. In later runs, p-toluenesulfonic acid was used as catalyst.
- Also refer to: [1348].

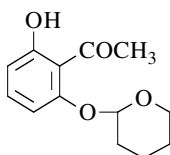
m.p. 76-78° [671].

**1-[2-Hydroxy-6-[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone**

[63854-17-1]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Syntheses**

- Obtained by reaction of 2,3-dihydropyran with 2,6-dihydroxyacetophenone in the presence of p-toluenesulfonic acid in dioxane at r.t. for 3 h (64%) [1233] or for 20 h (69%) [5].
- Also refer to: [1348].

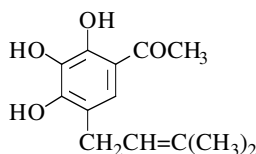
pale yellow crystals [1233];

<sup>1</sup>H NMR [5] [1233], <sup>13</sup>C NMR [5] [1233], MS [1233].**1-[2,3,4-Trihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone**

[35817-18-6]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27

**Synthesis**

- Obtained by reaction of 2-methyl-3-buten-2-ol with gallacetophenone in the presence of boron trifluoride etherate in dioxane [128] [241] at 50-60° (21%) [128].

m.p. 74-75° [128]; <sup>1</sup>H NMR [128], IR [128], UV [128].

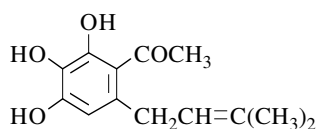


**1-[2,3,4-Trihydroxy-6-(3-methyl-2-butenyl)phenyl]ethanone**

[149876-26-6]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27



## Synthesis

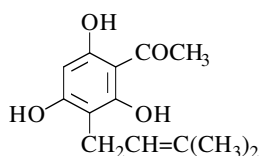
**N.B.:** The titled ketone is mentioned in Chem. Abstr. Vol. **119**, 1993-FORMULA INDEX, p. 1525F under the reference 172870a. However, the original publication [522] obtained from this reference doesn't include the expected ketone. This publication [522] concerns only an isomeric ketone, the 1-[2,3,4-trihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone [35817-18-6] already described [1166], p. 240.

**1-[2,4,6-Trihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[27364-71-2]

C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 236.27



## Syntheses

-Preparation from 2,4-dihydroxy-6-methoxy-5-isopentenylacetophenone (*Acronylin*) by demethylation with aluminium chloride in refluxing benzene [230].  
 -Also obtained by reaction of 2-methylbut-3-en-2-ol with phloracetophenone in the presence of boron trifluoride etherate in dioxane at 20° (10%) [426].  
 -Also obtained by reaction of prenyl bromide with phloracetophenone in solution of methanol in the presence of potassium hydroxide (26%) [1489] or sodium methoxide at r.t. (5%) [1491].

m.p. 182° [230], 172° [1489] [1491], 171-173° [426], 169-171° [350];

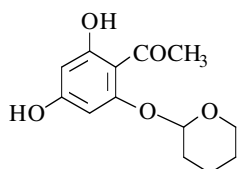
<sup>1</sup>H NMR [230] [350], UV [426].

**1-[2,4-Dihydroxy-6-[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone**

[136257-86-8]

C<sub>13</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 252.27



## Syntheses

-Preparation by reaction of 3,4-dihydro-2H-pyran, \*on phloracetophenone with p-toluenesulfonic acid in dioxane at r.t. (10%) [5];  
 \*on 4-acetoxy-2,6-dihydroxyacetophenone with p-toluenesulfonic acid in dioxane (32-49%) [5].

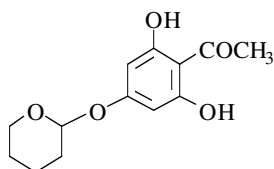
white solid [5]; <sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[2,6-Dihydroxy-4-[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone**

[136257-85-7]

C<sub>13</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 252.27



## Syntheses

-Obtained by reaction of 3,4-dihydro-2H-pyran, \*on phloracetophenone with p-toluenesulfonic acid in dioxane at r.t. (20%) [5];  
 \*on 4-acetoxy-2,6-dihydroxyacetophenone with p-toluene sulfonic acid in dioxane (8-11%) [5].

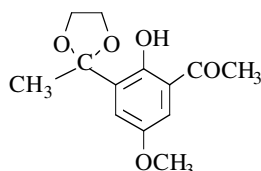
white solid [5]; <sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[2-Hydroxy-5-methoxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone**

[103867-85-2]

C<sub>13</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 252.27

**Synthesis**

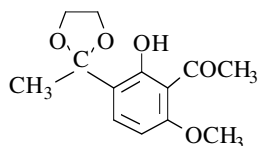
-Preparation by UV light irradiation of ethylene acetal of 2-acetoxy-5-methoxyacetophenone with potassium carbonate in hexane (85%) [659].

**1-[2-Hydroxy-6-methoxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone**

[103867-86-3]

C<sub>13</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 252.27

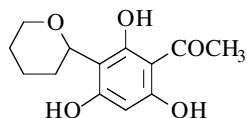
**Synthesis**

-Preparation by UV light irradiation of ethylene acetal of 2-acetoxy-4-methoxyacetophenone with potassium carbonate in hexane (52%) [659].

m.p. 120-123° [659]; <sup>1</sup>H NMR [659], IR [659].

**1-[2,4,6-Trihydroxy-3-(tetrahydro-2H-pyran-2-yl)phenyl]ethanone**C<sub>13</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 252.27

**Synthesis**

-Obtained by reaction of 3,4-dihydro-2H-pyran on phloracetophenone with p-toluenesulfonic acid in dioxane at r.t. (21%) [5].

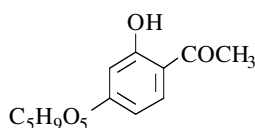
<sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[2-Hydroxy-4-(β-D-xylopyranosyloxy)phenyl]ethanone**

[54918-29-5]

C<sub>13</sub>H<sub>16</sub>O<sub>7</sub>

mol.wt. 284.14

**Synthesis**

-Preparation by reaction of sodium on 2',4'-dihydroxyacetophenone-4'-β-tri-O-acetyl-D-xylopyranoside in methanol (66%) [1480].

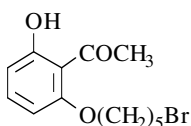
m.p. 204-205° [1480]; (α)<sub>D</sub><sup>17</sup> = -70° (0.4%, THF) [1480].

**1-[2-[(5-Bromopentyl)oxy]-6-hydroxyphenyl]ethanone**

[28862-10-4]

C<sub>13</sub>H<sub>17</sub>BrO<sub>3</sub>

mol.wt. 301.18

**Synthesis**

-Preparation by reaction of 1,5-dibromopentane with 2,6-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone [71].

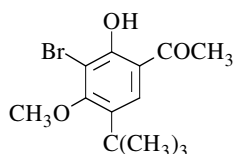
m.p. 35-36° [71].

**1-[3-Bromo-5-(1,1-dimethylethyl)-2-hydroxy-4-methoxyphenyl]ethanone**

[127371-47-5]

C<sub>13</sub>H<sub>17</sub>BrO<sub>3</sub>

mol.wt. 301.18

**Synthesis**

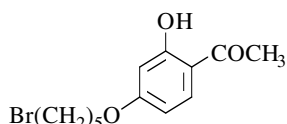
-Refer to: [1576] (patent).

**1-[4-[(5-Bromopentyl)oxy]-2-hydroxyphenyl]ethanone**

[40785-72-6]

C<sub>13</sub>H<sub>17</sub>BrO<sub>3</sub>

mol.wt. 301.18

**Synthesis**

-Preparation by reaction of 1,5-dibromopentane with resacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (34%) [71].

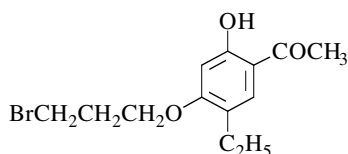
m.p. 64-66° [71].

**1-[4-(3-Bromopropoxy)-5-ethyl-2-hydroxyphenyl]ethanone**

[117706-55-5]

C<sub>13</sub>H<sub>17</sub>BrO<sub>3</sub>

mol.wt. 301.18

**Synthesis**

-Preparation by reaction of 3-bromopropyl bromide on 5-ethyl-2,4-dihydroxyacetophenone with potassium carbonate and potassium iodide, at reflux (80%) [256] [257].

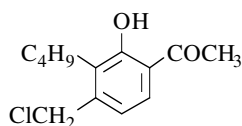
m.p. 126-127° [256] [257]; <sup>1</sup>H NMR [256] [257].

**1-[3-Butyl-4-(chloromethyl)-2-hydroxyphenyl]ethanone**

[107223-43-8]

C<sub>13</sub>H<sub>17</sub>ClO<sub>2</sub>

mol.wt. 240.73

**Synthesis**

-Preparation by reaction of ethyl chloroformate with 3-n-butyl-4-(dimethylaminomethyl)-2-hydroxyacetophenone in toluene (78%) [530].

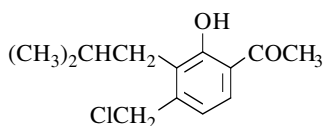
m.p. 42-44° [530].

**1-[4-(Chloromethyl)-2-hydroxy-3-(2-methylpropyl)phenyl]ethanone**

[97582-41-7]

C<sub>13</sub>H<sub>17</sub>ClO<sub>2</sub>

mol.wt. 240.73

**Synthesis**

-Preparation by reaction of ethyl chloroformate with 3-isobutyl-4-(dimethylaminomethyl)-2-hydroxyacetophenone in toluene [529] [530], (42%) [530].

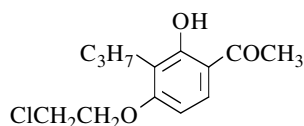
oil [530]; <sup>1</sup>H NMR [529], IR [529].

**1-[4-(2-Chloroethoxy)-2-hydroxy-3-propylphenyl]ethanone**

[104074-07-9]

C<sub>13</sub>H<sub>17</sub>ClO<sub>3</sub>

mol.wt. 256.73

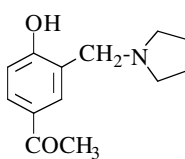
**Synthesis**

-Preparation by action of 2-chloroethyl p-toluenesulfonate with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in boiling acetone for 16 h (36%) [1035].

m.p. 72-73°5 [1035]; <sup>1</sup>H NMR [1035].

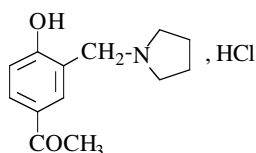
**1-[4-Hydroxy-3-(1-pyrrolidinylmethyl)phenyl]ethanone**C<sub>13</sub>H<sub>17</sub>NO<sub>2</sub>

mol.wt. 219.28

**Synthesis**

-Preparation by reaction of 4-hydroxyacetophenone with formaldehyde and pyrrolidine in 75% ethanol at r.t. (60%) [669] (Mannich reaction).

m.p. 97-98° [669].

**1-[4-Hydroxy-3-(1-pyrrolidinylmethyl)phenyl]ethanone (Hydrochloride)**C<sub>13</sub>H<sub>17</sub>NO<sub>2</sub>, HCl mol.wt. 255.74

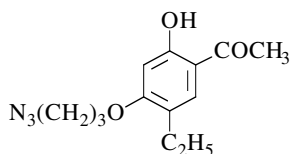
## Synthesis

-Preparation from 4-hydroxy-3-(1-pyrrolidinylmethyl)-acetophenone [669].

m.p. 202-203° [669].

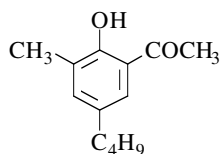
**1-[4-(3-Azidopropoxy)-5-ethyl-2-hydroxyphenyl]ethanone**

[117706-26-0]

C<sub>13</sub>H<sub>17</sub>N<sub>3</sub>O<sub>3</sub> mol.wt. 263.30

## Synthesis

-Preparation by reaction of sodium azide with 4-(3-bromopropoxy)-5-ethyl-2-hydroxyacetophenone in DMF at r.t. [256] [257].

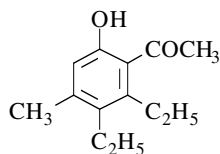
<sup>1</sup>H NMR [256] [257], MS [256] [257].**1-(5-Butyl-2-hydroxy-3-methylphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub> mol.wt. 206.28

## Synthesis

-Preparation by Fries rearrangement of 4-butyl-2-methylphenyl acetate with aluminium chloride without solvent at 100-110° (64%) [100].

b.p.<sub>12</sub> 152-154° [100].**1-(2,3-Diethyl-6-hydroxy-4-methylphenyl)ethanone**

[27193-00-6]

C<sub>13</sub>H<sub>18</sub>O<sub>2</sub> mol.wt. 206.28

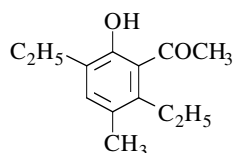
## Synthesis

-Obtained *via* pyrolysis of 7,8-diethyl-1,3-dimethyl-2-oxabicyclo [4.2.0] octa-3,7-dien-5-one (2,6-dimethyl-4-pyrone - Hexyne-3 - Adduct) in refluxing o-dichlorobenzene [733].

IR [733], UV [733], MS [733].

**1-(2,5-Diethyl-6-hydroxy-3-methylphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

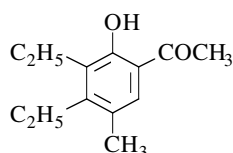
mol.wt. 206.28

**Synthesis**

-Obtained (small amounts) by Fries rearrangement of 2,5-diethyl-4-methylphenyl acetate with aluminium chloride without solvent at 130° [101].

**1-(3,4-Diethyl-2-hydroxy-5-methylphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

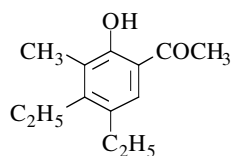
**Syntheses**

-Obtained by heating some esters\* with aluminium chloride. There is simultaneously displacement and rearrangement of alkyl groups during the Fries reaction,  
 \*2,4-diethyl-5-methylphenyl acetate (65%) [102];  
 \*2,5-diethyl-4-methylphenyl acetate (at 130°) (60%) [101];  
 \*2,6-diethyl-4-methylphenyl acetate (60%) [102].

b.p.<sub>12</sub> 136-137° [102], b.p.<sub>11</sub> 143-145° [102], b.p.<sub>15</sub> 154-162° [101].

**1-(4,5-Diethyl-2-hydroxy-3-methylphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

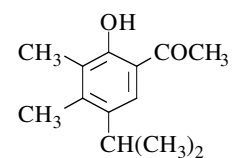
**Synthesis**

-Obtained by heating 2,4-diethyl-6-methylphenyl acetate with aluminium chloride at high temperature. In this reaction, a migration of an ethyl group occurs [102].

m.p. 50-51° [102].

**1-[3,4-Dimethyl-2-hydroxy-5-(1-methylethyl)phenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

**Synthesis**

-Preparation by Fries rearrangement of 2,3-dimethyl-4-isopropylphenyl acetate with aluminium chloride at 140-150° (37%) [1523].

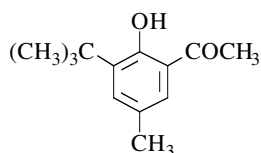
m.p. 132° [1523]; b.p.<sub>22</sub> 176-180° [1523].

**1-[3-(1,1-Dimethylethyl)-2-hydroxy-5-methylphenyl]ethanone**

[14813-18-4]

C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

**Syntheses**

- Preparation by Fries rearrangement of 2-tert-butyl-4-methylphenyl acetate in the presence of aluminium chloride in cyclohexane at < 105° (47%) [412].
- The reaction of acetyl chloride with a pentane solution of [AlCH<sub>3</sub>(dbmp)<sub>2</sub>] leads to acylation of one of the (dbmp)

ligands and affords [AlCH<sub>3</sub>(dbmp)(bhmap)]. Hydrolysis of this aluminium complex with a saturated aqueous solution of ammonium chloride gives the ketone attempted (65%) [1440].

**N.B.:** Hdbmp = 2,6-di-tert-butyl-4-methylphenol and Hbhmap = 3-tert-butyl-2-hydroxy-5-methylacetophenone.

-Also obtained by reaction of p-tert-butyl alcohol with 2-hydroxy-5-methylacetophenone in concentrated sulfuric acid at r.t. for 24 h (49%) [1049].

-Also refer to: [1431].

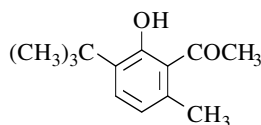
m.p. 97-98° [412], 58° [1440]. One of the reported melting points is obviously wrong.

X-ray crystallography [1440]; GC/MS [1049];

<sup>1</sup>H NMR [1049] [1440], <sup>13</sup>C NMR [1440], IR [1440], MS [1440].

**1-[3-(1,1-Dimethylethyl)-2-hydroxy-6-methylphenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

**Synthesis**

- Claimed to be prepared by Fries rearrangement of 2-tert-butyl-5-methylphenyl acetate with aluminium chloride, without solvent, at 110° (76%) [1800].

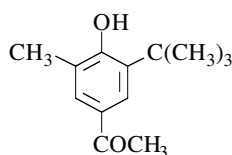
b.p. 92° [1800].

**1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-methylphenyl]ethanone**

[18606-50-3]

C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

**Syntheses**

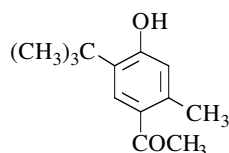
- Preparation by reaction of acetyl chloride or acetic anhydride with 2-tert-butyl-6-methylphenol in the presence of aluminium chloride, and saponification of keto ester obtained [1223].

-Also obtained (poor yield) by oxidation of 2-tert-butyl-4-ethyl-6-methylphenol. The oxidation was carried out by bubbling air at 80-100° into a solution of 2-tert-butyl-4-ethyl-6-methylphenol in cumene containing cobalt phthalate and cumene hydroperoxide as initiator (4%) [780].

m.p. 126° [780], 123-125° [1223].

**1-[5-(1,1-Dimethylethyl)-4-hydroxy-2-methylphenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

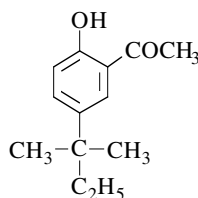
**Synthesis**

-Preparation by Fries rearrangement of 2-tert-butyl-5-methylphenyl acetate with aluminium chloride in nitrobenzene at 25° (22%) [1800].

m.p. 124° [1800].

**1-[5-(1,1-Dimethylpropyl)-2-hydroxyphenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

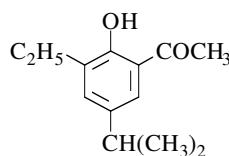
**Synthesis**

-Preparation by Fries rearrangement of 4-tert-pentylphenyl acetate with aluminium chloride at 120° (57%) [1583].

b.p.<sub>12</sub> 165° [1583].

**1-[3-Ethyl-2-hydroxy-5-(1-methylethyl)phenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

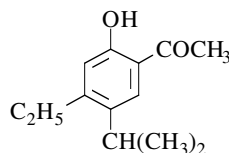
**Synthesis**

-Preparation by chromic acid degradation of 7-ethyl-2,3-dimethyl-5-isopropylbenzofuran (44%) [967].

b.p.<sub>10</sub> 139-140° [967].

**1-[4-Ethyl-2-hydroxy-5-(1-methylethyl)phenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

**Synthesis**

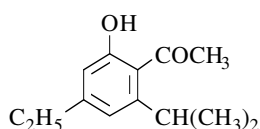
-Preparation by chromic acid degradation of 6-ethyl-2,3-dimethyl-5-isopropylbenzofuran (44%) [967].

b.p.<sub>11</sub> 152-153° [967].



**1-[4-Ethyl-2-hydroxy-6-(1-methylethyl)phenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

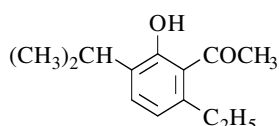
**Synthesis**

-Preparation by chromic acid degradation of 6-ethyl-2,3-dimethyl-4-isopropylbenzofuran (60%) [967].

m.p. 113° [967]; b.p.<sub>14</sub> 167-168° [967].

**1-[6-Ethyl-2-hydroxy-3-(1-methylethyl)phenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

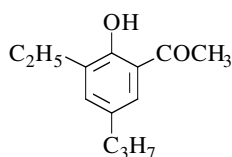
**Synthesis**

-Preparation by chromic acid degradation of 4-ethyl-2,3-dimethyl-7-isopropylbenzofuran (60%) [967].

b.p.<sub>11</sub> 145° [967].

**1-(3-Ethyl-2-hydroxy-5-propylphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

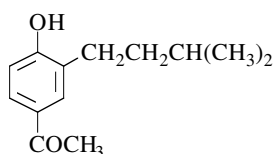
**Synthesis**

-Preparation by Fries rearrangement of 2-ethyl-4-propylphenyl acetate with aluminium chloride [100].

b.p.<sub>18</sub> 140-141° [100].

**1-[4-Hydroxy-3-(3-methylbutyl)phenyl]ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

**Synthesis**

-Preparation by Fries rearrangement of 2-isopentylphenyl acetate [264] [500].

Isolation from natural sources

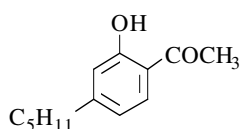
-Also obtained by catalytic hydrogenation of Tremetone in the presence of Pd/C. Tremetone has been isolated from the "*White Snakeroot*" plant (*Eupatorium urticaefolium*) [264] [500].

**1-(2-Hydroxy-4-pentylphenyl)ethanone**

[60441-58-9]

C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

**Syntheses**

-Preparation by Fries rearrangement of 3-pentylphenyl acetate with aluminium chloride at 130° (50%) [81].

-Also obtained by demethylation of a mixture of 2-methoxy-4-pentylacetophenone and 4-methoxy-2-pentylaceto-

phenone (**I**) with boron tribromide in methylene chloride at 0° and separation of isomers by chromatography (21%). The mixture of anisoles (**I**) was obtained by reaction of acetic anhydride with 3-pentylanisole in the presence of aluminium chloride in refluxing carbon disulfide [533].

oil [81] [533]; b.p.<sub>0.5</sub> 130° [533]; <sup>1</sup>H NMR [81] [533].

#### 1-(2-Hydroxy-5-pentylphenyl)ethanone

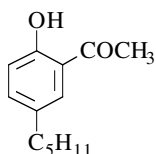
C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

##### Synthesis

-Preparation by reaction of acetic acid on 4-pentylphenol with boron trifluoride at 140-150° (87%) [79].

b.p.<sub>7</sub> 145-148° [79]; n<sub>D</sub><sup>25</sup> = 1.5249 [79].



#### 1-(4-Hydroxy-2-pentylphenyl)ethanone

[60441-59-0]

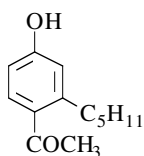
C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 206.28

##### Synthesis

-Preparation by demethylation of a mixture of 2-methoxy-4-pentylacetophenone and 4-methoxy-2-pentylacetophenone (**I**) with boron tribromide in methylene chloride at 0° and separation of isomers by chromatography (46%). The mixture of anisoles (**I**) was obtained by reaction of acetic anhydride with 3-pentylanisole in the presence of aluminium chloride in refluxing carbon disulfide [533].

m.p. 58-59° [533]; <sup>1</sup>H NMR [533].



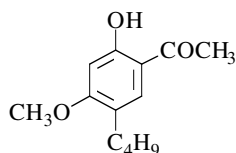
#### 1-(5-Butyl-2-hydroxy-4-methoxyphenyl)ethanone

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

##### Synthesis

-Preparation by reaction of dimethyl sulfate on 5-butyl-2,4-dihydroxyacetophenone with potassium carbonate in boiling acetone [930].



#### 1-(3,5-Diethyl-2-hydroxy-6-methoxyphenyl)ethanone

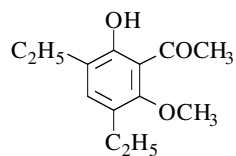
[37467-70-2]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

##### Synthesis

-Preparation by reaction of methyl iodide with 3,5-diethyl-2,6-dihydroxyacetophenone in the presence of potassium carbonate in boiling acetone (46%) [343].



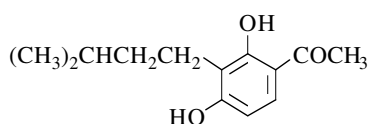
oil [343]; MS [343].

**1-[2,4-Dihydroxy-3-(3-methylbutyl)phenyl]ethanone**

[50773-37-0]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Synthesis**

-Preparation by catalytic hydrogenation of 3-(dimethylallyl)-2,4-dihydroxyacetophenone with platinum oxide as a catalyst in ethanol [1056].

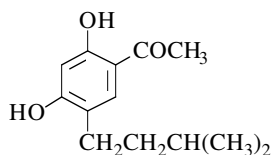
m.p. 115° [1056]; <sup>1</sup>H NMR [1056], IR [1056].

**1-[2,4-Dihydroxy-5-(3-methylbutyl)phenyl]ethanone**

[56146-52-2]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Syntheses**

-Obtained by Fries rearrangement of 4-isoamylresorcinol diacetate with aluminium chloride in nitrobenzene at 50-55° [264] [500], (11%) [500].

Isolation from natural sources

-Also obtained by hydrogenolysis of 6-hydroxytremetone in the presence of 10% Pd/C in ethanol at r.t. [264] [500], (62%) [500]. The 6-hydroxytremetone has been isolated from the *Eupatorium urticaefolium* Reichard (Compositae) (white snakeroot).

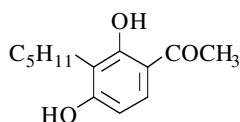
m.p. 93-95° [500], 92°5-94° [264]; IR [500].

**1-(2,4-Dihydroxy-3-pentylphenyl)ethanone**

[111224-14-7]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Synthesis**

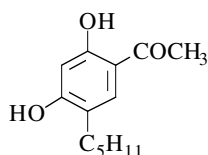
-Refer to: [1158].

**1-(2,4-Dihydroxy-5-pentylphenyl)ethanone**

[97304-17-1]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Syntheses**

-Preparation by reaction of acetonitrile on 4-n-amylresorcinol (Hoesch reaction) (76%) [1277].

-Preparation from 2,4-dimethoxy-5-pentylacetophenone by demethylation with boron tribromide in methylene chloride at r.t. (53%) [256] [257].

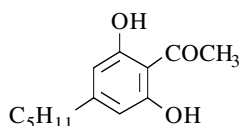
m.p. 110-111° [1277].

**1-(2,6-Dihydroxy-4-pentylphenyl)ethanone**

[67895-11-8]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Synthesis**

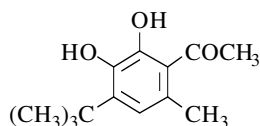
-Preparation by metallation of olivetol tetrahydropyranyl ether with n-butyllithium in tetrahydrofuran under nitrogen, followed by adding cuprous bromide in this solution. The condensation of 2,6-dihydroxy-4-pentylphenylcopper tetrahydropyranyl ether so obtained with acetyl chloride, connected with elimination of protective group under mild conditions gave the expected compound (80%) [1123].

**1-[4-(1,1-Dimethylethyl)-2,3-dihydroxy-6-methylphenyl]ethanone**

[84297-01-8]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Synthesis**

-Obtained by UV irradiation of a benzene solution of 3-tert-butyl-5-methyl-o-benzoquinone in the presence of a large excess of acetaldehyde (12%) [1758].

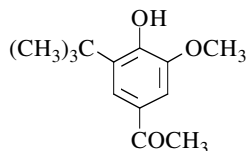
m.p. 72-73° [1758]; <sup>1</sup>H NMR [1758], IR [1758].

**1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-methoxyphenyl]ethanone**

[153356-09-3]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Syntheses**

-Obtained by partial methylation of 3,4-dihydroxy-5-tert-butylacetophenone with diazomethane [1190].

-Also refer to: [1916].

**N.B.:** (*Catechol O-methyltransferase test*).

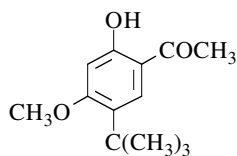
-Also obtained from 3,4-dihydroxy-5-tert-butylacetophenone in propylene glycol by incubation for 2 h at 37° with 0.5 M phosphate buffer (pH = 7.9), 0.5 M magnesium chloride, S-adenosylmethionine and catechol O-methyltransferase (enzyme). This enzyme solution was prepared from the blood of an adult male rat [1190].

**1-[5-(1,1-Dimethylethyl)-2-hydroxy-4-methoxyphenyl]ethanone**

[127371-46-4]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28

**Synthesis**

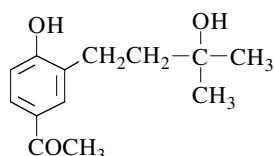
-Refer to: [1576] (patent).

**1-[4-Hydroxy-3-(3-hydroxy-3-methylbutyl)phenyl]ethanone**

[81944-40-3]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28



Isolation from natural sources

- From *Senecio* species of the North of Chile (*Senecio phylloleptus* Cuatr., *Senecio viridis* Phil., *Senecio nutans* Sch. Bip.) [1260].
- From the aerial parts of *Werneria poposa* [1429].
- Also refer to: [1704].

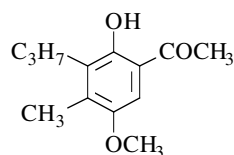
m.p. 100-101° [1260]; <sup>1</sup>H NMR [1260] [1429],  
<sup>13</sup>C NMR [1260] [1429], IR [1260], MS [1260] [1429].

**1-(2-Hydroxy-5-methoxy-4-methyl-3-propylphenyl)ethanone**

[43037-71-4]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28



Synthesis

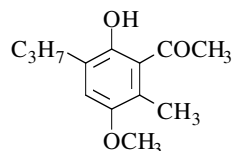
- Preparation by catalytic hydrogenation of 3-allyl-2-hydroxy-5-methoxy-4-methylacetophenone, previously obtained by thermal Claisen rearrangement of 2-(allyloxy)-5-methoxy-4-methylacetophenone in N,N-dimethylaniline at 170° (42%) [581].

**1-(2-Hydroxy-5-methoxy-6-methyl-3-propylphenyl)ethanone**

[43037-72-5]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28



Synthesis

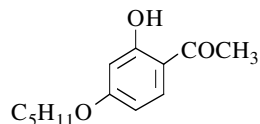
- Preparation by catalytic hydrogenation of 3-allyl-2-hydroxy-5-methoxy-6-methylacetophenone, previously obtained by thermal Claisen rearrangement of 2-(allyloxy)-5-methoxy-4-methylacetophenone — *via* a [1,5] sigmatropic rearrangement — in N,N-dimethylaniline at 170° (22%) [581].

**1-[2-Hydroxy-4-(pentyloxy)phenyl]ethanone**

[101002-29-3]

C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 222.28



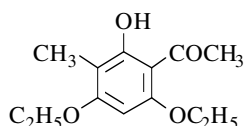
Syntheses

- Preparation by partial alkylation of resacetophenone with pentyl bromide in the presence of potassium carbonate in refluxing acetone for 20 h [183].
- Also refer to: [1771].

m.p. 36° [183].

**1-(4,6-Diethoxy-2-hydroxy-3-methylphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 238.28

**Synthesis**

-Preparation by reaction of ethyl iodide or diethyl sulfate on 2,4,6-trihydroxy-3-methylacetophenone with potassium carbonate in boiling acetone (77%) [1883].

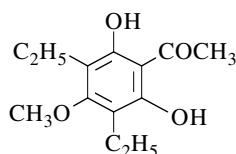
m.p. 147° [1883].

**1-(3,5-Diethyl-2,6-dihydroxy-4-methoxyphenyl)ethanone**

[175785-86-1]

C<sub>13</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 238.28

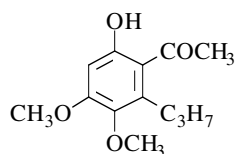
**Synthesis**

-Refer to: [1737] (Japanese patent).

**N.B.:** di-Na salt [175785-89-4] [1737].

**1-(3,4-Dimethoxy-6-hydroxy-2-propylphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 238.28

**Syntheses**

-Preparation by catalytic hydrogenation of 6-(benzyloxy)-3,4-dimethoxy-2-propenylacetophenone in the presence of Pd/C in methanol [498].

-Also obtained by addition of 6-(benzyloxy)-3,4-dimethoxy-2-propenylacetophenone in ethyl ether to calcium in liquid

ammonia, and addition of ammonium chloride before evaporation of solvents [498].

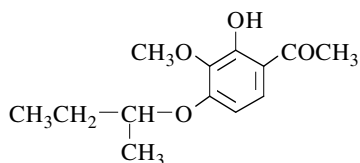
yellow oil [498]; b.p.<sub>0.2</sub> 160° [498]; UV [498].

**1-[2-Hydroxy-3-methoxy-4-(1-methylpropoxy)phenyl]ethanone**

[94245-10-0]

C<sub>13</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 238.28

**Synthesis**

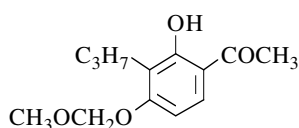
-Refer to: [1796] (Indian patent).

**1-[2-Hydroxy-4-(methoxymethoxy)-3-propylphenyl]ethanone**

[200355-19-7]

C<sub>13</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 238.28

**Synthesis**

-Preparation by treatment of 2,4-dihydroxy-3-propylacetophenone according to the procedure [1395], (83%) [1394].

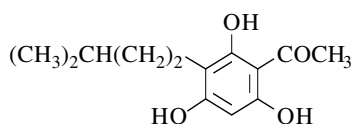
b.p.<sub>1</sub> 152-154° [1394]; <sup>1</sup>H NMR [1394], IR [1394].

**1-[2,4,6-Trihydroxy-3-(3-methylbutyl)phenyl]ethanone**

[39652-85-2]

C<sub>13</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 238.28

**Syntheses**

-Preparation by reaction of acetonitrile on 2-isoamylphloroglucinol (Hoesch reaction) (93%) [1677].

-Preparation by reaction of 2-isoamylphloroglucinol with boron trifluoride-acetic acid complex at 28-30° (70%) [1146].

-Preparation by catalytic hydrogenolysis of 2-acetyl-4,4-bis-(3-methylbut-2-enyl)cyclohexane-1,3,5-trione at r.t. and pressure in the presence of 10% Pd/C in ethanol (93%) [426].

-Preparation by catalytic hydrogenation of 2',4',6'-trihydroxy-3'-(3-methylbut-2-enyl)acetophenone [426].

-Also obtained by catalytic hydrogenation of 7-acetyl-4,6-dihydroxy-2-isopropenylcoumaran in the presence of platinum oxide (Adams catalyst) in methanol (72%) [1322].

-Also obtained by catalytic hydrogenation of 9-acetyl-2,5-dihydro-3-methyl-1-benzoxepin-6,8-diol in ethyl acetate in the presence of Adams catalyst (25%) [1908].

-Also obtained (by-product) by reaction of isoamyl iodide with phloracetophenone in the presence of sodium methoxide in methanol (6%) [1491].

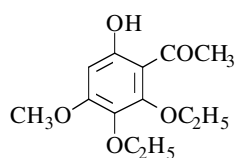
m.p. 190-192° [1908], 190° [1146], 188° [1491] [1677], 185° [1322],

184-185° [426], 183-184° [1611], 130-131° (compound **VIII**) [350]. One of the reported melting points is obviously wrong.

b.p.<sub>0.01</sub> 190° [1677]; <sup>1</sup>H NMR [350] [1908], IR [1908], UV [426].

**1-(2,3-Diethoxy-6-hydroxy-4-methoxyphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28

**Synthesis**

-Preparation by reaction of diethyl sulfate on 2-ethoxy-3,6-dihydroxy-4-methoxyacetophenone with potassium carbonate in boiling acetone [73].

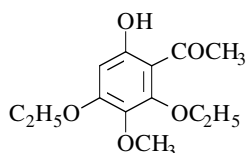
oil [73].

**1-(2,4-Diethoxy-6-hydroxy-3-methoxyphenyl)ethanone**

[18086-01-6]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28

**Syntheses**

-Preparation by reaction of dimethyl sulfate on 2,4-diethoxy-3,6-dihydroxyacetophenone with potassium carbonate in refluxing acetone [73] [1516] [1550], (47%) [1516].

-The same ketone was also obtained by alkaline degradation of 4',5,7-triethoxy-3',6-dimethoxyflavone with potassium hydroxide in refluxing dilute ethanol [73].

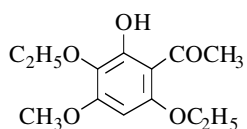
oil [73] [1516].

**1-(3,6-Diethoxy-2-hydroxy-4-methoxyphenyl)ethanone**

[105342-72-1]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28

**Syntheses**

-Preparation from 1,4-diethoxy-2,6-dimethoxybenzene by reaction,

\*with acetyl chloride in the presence of aluminium chloride in ethyl ether cooled in an ice bath (89%) [1467];

\*with acetic acid in the presence of boron trifluoride for 5 h at 80° (50%) [198].

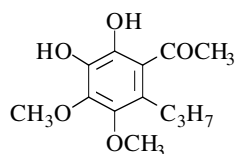
m.p. 104-105° [1467], 101-103° [198].

**1-(2,3-Dihydroxy-4,5-dimethoxy-6-propylphenyl)ethanone**

[76576-61-9]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28

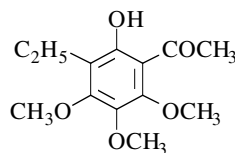
**Synthesis**

-Preparation by treatment of acetyldihydrodillapiol with boron trifluoride (almost quantitative yield) [1806].

m.p. 110° [1806];

<sup>1</sup>H NMR [1806], IR [1806], MS [1806].**1-(3-Ethyl-2-hydroxy-4,5,6-trimethoxyphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28

**Synthesis**

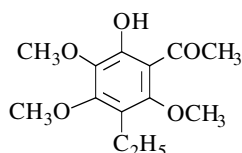
-Preparation by Fries rearrangement of 2-ethyl-3,4,5-trimethoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (25%) [1452].

b.p.<sub>0.15</sub> 98-102° [1452];  $n_D^{25} = 1.5293$  [1452].



**1-(3-Ethyl-6-hydroxy-2,4,5-trimethoxyphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28



## Syntheses

- Preparation by Fries rearrangement of 4-ethyl-2,3,5-trimethoxyphenyl acetate with aluminium chloride in nitrobenzene at r.t. (51%) [1452].
- Preparation by reaction of acetyl chloride on 1-ethyl-2,3,4,6-tetramethoxybenzene with aluminium chloride in

ethyl ether between -20 to -15°, followed by standing overnight at r.t. (46%) [1452].

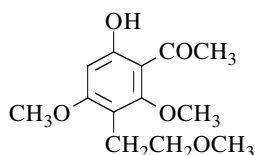
clear, orange coloured oil [1452]; b.p.<sub>0.3</sub> 117-118°5 [1452];  $n_D^{25}$  = 1.5421 [1452].

**1-[6-Hydroxy-2,4-dimethoxy-3-(2-methoxyethyl)phenyl]ethanone**

[34288-74-9]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28



## Synthesis

- Obtained by reaction of methyl iodide with 2-hydroxy-4,6-dimethoxy-5-(2-hydroxyethyl)acetophenone (m.p. 133-134°) in chloroform in the presence of silver oxide at r.t. overnight (25%) [1214].

m.p. 94-94°5 [1214];

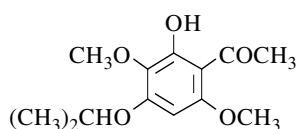
<sup>1</sup>H NMR [1214], UV [1214].

**1-[2-Hydroxy-3,6-dimethoxy-4-(1-methylethoxy)phenyl]ethanone**

[93344-52-6]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28



## Syntheses

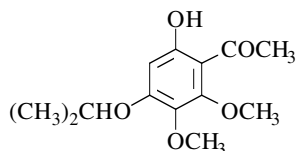
- Refer to: [846] (compound 11) and [1767] (Japanese paper).

**1-[6-Hydroxy-2,3-dimethoxy-4-(1-methylethoxy)phenyl]ethanone**

[119136-17-3]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28



## Synthesis

- Preparation by reaction of dimethyl sulfate with 2,5-dihydroxy-4-isopropoxy-6-methoxyacetophenone in the presence of potassium carbonate in refluxing acetone (82%) [841].

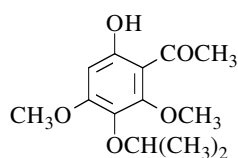
colourless oil [841]; <sup>1</sup>H NMR [841], IR [841], MS [841].

**1-[6-Hydroxy-2,4-dimethoxy-3-(1-methylethoxy)phenyl]ethanone**

[96501-84-7]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28

**Synthesis**

-Obtained by partial isopropylation of 2,5-dihydroxy-4,6-dimethoxyacetophenone with isopropyl bromide, according to [845], (compound 27) (44%) [842].

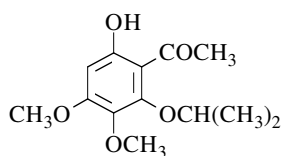
brown oil [842]; <sup>1</sup>H NMR [842].

**1-[6-Hydroxy-3,4-dimethoxy-2-(1-methylethoxy)phenyl]ethanone**

[188927-29-9]

C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 254.28

**Synthesis**

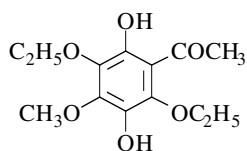
-Preparation by treatment of 3,4,6-trimethoxy-2-isopropoxyacetophenone (m.p. 69-71°) with aluminium bromide in acetonitrile at 0° for 10-15 min (80%) [804].

**N.B.:** The partial demethylation realized with aluminium bromide-sodium iodide system at 0° for 10 min gave a 94% yield.

m.p. 65-67° [804].

**1-(3,6-Diethoxy-2,5-dihydroxy-4-methoxyphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>6</sub>

mol.wt. 270.28

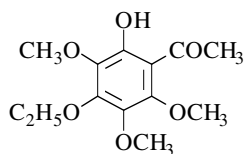
**Synthesis**

-Preparation from 3,6-diethoxy-2-hydroxy-4-methoxyacetophenone by persulfate oxidation (Elbs reaction) (33%) [1467].

m.p. 131-132° [1467].

**1-(4-Ethoxy-2-hydroxy-3,5,6-trimethoxyphenyl)ethanone**C<sub>13</sub>H<sub>18</sub>O<sub>6</sub>

mol.wt. 270.28

**Synthesis**

-Preparation by Friedel-Crafts acylation of 1-ethoxy-2,3,5,6-tetramethoxybenzene with acetyl chloride in the presence of aluminium chloride (46%) [801].

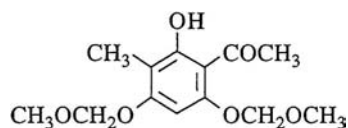
b.p.<sub>0.1</sub> 117-119° [801].

**1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3-methylphenyl]ethanone**

[106929-57-1]

C<sub>13</sub>H<sub>18</sub>O<sub>6</sub>

mol.wt. 270.28

**Synthesis**

-Preparation by reaction of chloromethyl methyl ether with 2,4,6-trihydroxy-3-methylacetophenone in cooled acetone in the presence of potassium carbonate for 1 h (34%) [1228].

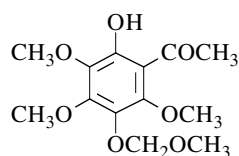
m.p. 77-78° [1228]; <sup>1</sup>H NMR [1228].

**1-[2-Hydroxy-3,4,6-trimethoxy-5-(methoxymethoxy)phenyl]ethanone**

[173217-34-0]

C<sub>13</sub>H<sub>18</sub>O<sub>7</sub>

mol.wt. 286.28

**Synthesis**

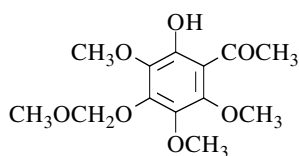
-Preparation by reaction of chloromethyl methyl ether with 2,5-dihydroxy-3,4,6-trimethoxyacetophenone in methylene chloride in the presence of N,N-diisopropylethylamine at r.t. for 3-4 h [795].

**1-[2-Hydroxy-3,5,6-trimethoxy-4-(methoxymethoxy)phenyl]ethanone**

[176662-07-0]

C<sub>13</sub>H<sub>18</sub>O<sub>7</sub>

mol.wt. 286.28

**Synthesis**

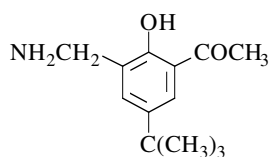
-Obtained by stirring a solution of 2,4-dihydroxy-3,5,6-trimethoxyacetophenone, N,N-diisopropylethylamine and chloromethyl methyl ether in methylene chloride at 5° for 40-50 min [797].

**1-[3-(Aminomethyl)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone**

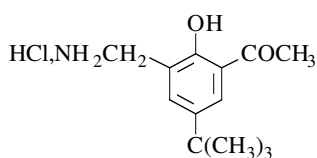
[75060-91-2]

C<sub>13</sub>H<sub>19</sub>NO<sub>2</sub>

mol.wt. 221.30

**Synthesis**

-Refer to: [1636].

**1-[3-(Aminomethyl)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone (Hydrochloride)**C<sub>13</sub>H<sub>19</sub>NO<sub>2</sub>, HCl mol.wt. 268.77**Synthesis**

-Preparation by hydrolysis of 2-acetyl-4-tert-butyl-6-(N-chloroacetylaminomethyl)phenol with concentrated hydrochloric acid in refluxing ethanol (89%) [863].

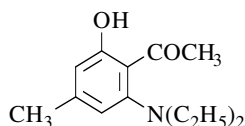
m.p. 191-193° [863].

**1-[2-(Diethylamino)-6-hydroxy-4-methylphenyl]ethanone**

[97066-07-4]

C<sub>13</sub>H<sub>19</sub>NO<sub>2</sub>

mol.wt. 221.30

**Synthesis**

-Preparation by reaction of potassium hydroxide with 2-acetyl-3-diethylamino-5-hydroxy-5-methyl-2-cyclohexenone in ethanol at 40° (75%) [562].

yellow oil [562];

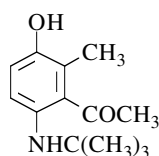
<sup>1</sup>H NMR [562], IR [562], UV [562], MS [562].

**1-[6-[(1,1-Dimethylethyl)amino]-3-hydroxy-2-methylphenyl]ethanone**

[158013-69-5]

C<sub>13</sub>H<sub>19</sub>NO<sub>2</sub>

mol.wt. 221.30

**Synthesis**

-Obtained from N-tert-butyl-2-acetyl-4-methyl quinol imine by refluxing overnight in trifluoroethanol (TFE) (quantitative yield) [1497].

red oil [1497]; <sup>1</sup>H NMR [1497],

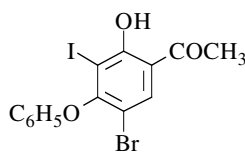
<sup>13</sup>C NMR [1497], IR [1497], MS [1497].

**1-(5-Bromo-2-hydroxy-3-iodo-4-phenoxyphenyl)ethanone**

[145489-48-1]

C<sub>14</sub>H<sub>10</sub>BrIO<sub>3</sub>

mol.wt. 433.04

**Synthesis**

-Preparation by hypervalent iodine oxidation of 5-bromo-resacetophenone with iodosobenzene diacetate in the presence of potassium hydroxide in methanol *via* the rearrangement of iodonium ylide previously formed (35%) [1441].

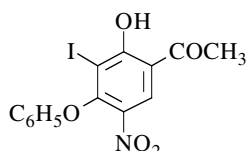
m.p. 160-161° [1441]; <sup>1</sup>H NMR [1441], MS [1441].

**1-(2-Hydroxy-3-iodo-5-nitro-4-phenoxyphenyl)ethanone**

[145489-93-6]

C<sub>14</sub>H<sub>10</sub>INO<sub>5</sub>

mol.wt. 399.14

**Syntheses**

-Preparation by hypervalent iodine oxidation of 5-nitro-resacetophenone with iodosobenzene diacetate in the presence of potassium hydroxide in methanol *via* the rearrangement of iodonium ylide previously formed (77%) [1441].

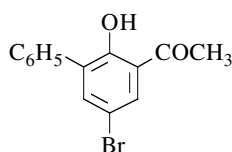
-Preparation by thermal rearrangement of 4-acetyl-3-hydroxy-6-nitro-2-phenyliodonio-phenolate (SM) in refluxing acetonitrile for 30 min (47%) [1681]. SM was obtained by reaction of iodosobenzene diacetate with 5-nitroresacetophenone in methanol in the presence of potassium hydroxide at 0° for 30 min (45%, m.p. 145-147°).

m.p. 190-191° [1441], 180-185° [1681];

<sup>1</sup>H NMR [1441] [1681], IR [1441] [1681], MS [1681].

**1-(5-Bromo-2-hydroxy[1,1'-biphenyl]-3-yl)ethanone**C<sub>14</sub>H<sub>11</sub>BrO<sub>2</sub>

mol.wt. 291.14

**Synthesis**

-Preparation by treatment of 1-(2-hydroxy[1,1'-biphenyl]-3-yl)ethanone in acetic acid with NBS at 85° for 2 h (quantitative yield) [1848].

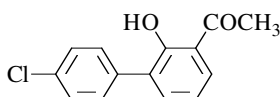
<sup>1</sup>H NMR [1848].

**1-(4'-Chloro-2-hydroxy[1,1'-biphenyl]-3-yl)ethanone**

[77893-89-1]

C<sub>14</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 246.69

**Synthesis**

-Obtained by Fries rearrangement of 2-acetoxy-4'-chlorobiphenyl with aluminium chloride at 150° for 30 min (26%) [1762].

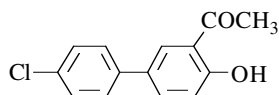
m.p. 76-78° [1762].

**1-(4'-Chloro-4-hydroxy[1,1'-biphenyl]-3-yl)ethanone**

[86608-89-1]

C<sub>14</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 246.69

**Synthesis**

**N.B.:** It must be pointed out that in the referenced paper [835], the described product [(chloro-4 phenyl)-5 hydroxy-2 phenyl]-1 ethanone is not consistent with the mentioned starting material, (chloro-4 phenoxy)-4 phenol.

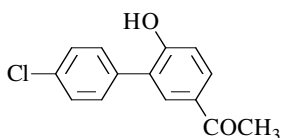
In such a case, the obtained product should be the 1-[5-(4-chlorophenoxy)-2-hydroxyphenyl]-ethanone. One of the authors of this paper, Daniel Humbert, has confirmed this typing mistake [833].

**1-(4'-Chloro-6-hydroxy[1,1'-biphenyl]-3-yl)ethanone**

[77893-88-0]

C<sub>14</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 246.69

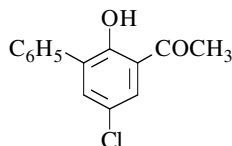
**Synthesis**

-Preparation by Fries rearrangement of 2-acetoxy-4'-chloro-biphenyl with aluminium chloride at 150° for 30 min (60%) [1762].

m.p. 165°5-167°5 [1762].

**1-(5-Chloro-2-hydroxy[1,1'-biphenyl]-3-yl)ethanone**C<sub>14</sub>H<sub>11</sub>ClO<sub>2</sub>

mol.wt. 246.69

**Synthesis**

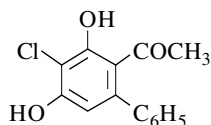
-Obtained by treatment of 1-(2-hydroxy[1,1'-biphenyl]-3-yl)ethanone in DMF solution with NCS at r.t. overnight (96%) (crude product) [1848].

**1-(4-Chloro-3,5-dihydroxy[1,1'-biphenyl]-2-yl)ethanone**

[76538-42-6]

C<sub>14</sub>H<sub>11</sub>ClO<sub>3</sub>

mol.wt. 262.69

**Synthesis**

-Preparation by adding lithium chloride to a solution of 3-acetoxy-6-acetyl-2,6-dichloro-5-phenyl-2-cyclohexenone in DMF and heating for 2 h at 100° (83%) [1756].

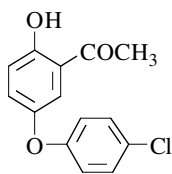
m.p. 111-112° [1756]; <sup>1</sup>H NMR [1756], IR [1756], MS [1756].

**1-[5-(4-Chlorophenoxy)-2-hydroxyphenyl]ethanone**

[73051-30-6]

C<sub>14</sub>H<sub>11</sub>ClO<sub>3</sub>

mol.wt. 262.69

**Syntheses**

-Preparation by acetylation of 4-phenoxyphenol with, \*39.7% (w/w) boron trifluoride in acetic acid at 75° for 24 h (71%) [835]; \*35-37% boron trifluoride in acetic acid at 90° for 3 days (quantitative yield) [833].  
-Also refer to: [834].

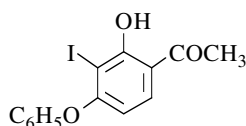
m.p. 88° [834] [835].

**1-(2-Hydroxy-3-iodo-4-phenoxyphenyl)ethanone**

[144691-35-0]

C<sub>14</sub>H<sub>11</sub>IO<sub>3</sub>

mol.wt. 354.14

**Syntheses**

- Preparation by thermal rearrangement of 4-acetyl-3-hydroxy-2-phenyliodonio-phenolate (SM) in refluxing acetonitrile for 30 min (70%). SM was obtained by reaction of iodosobenzene diacetate with resacetophenone in methanol in the presence of potassium hydroxide at 0° for 30 min (40%, m.p. 81-85°) [1681].
- Preparation by reaction of resacetophenone with iodosobenzene diacetate in refluxing methanol (55%) [1139].
- Preparation by hypervalent iodine oxidation of resacetophenone with iodosobenzene diacetate in the presence of potassium hydroxide in methanol *via* the rearrangement of iodonium ylide previously formed (20%) [1441].

m.p. 116-118° [1441], 101-103° [1139], 72° [1681]. There is a discrepancy between the different melting points indicated in literature.

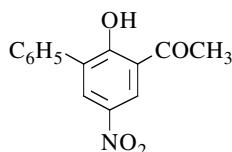
<sup>1</sup>H NMR [1139] [1441] [1681], IR [1139], MS [1681].

**1-(2-Hydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone**

[360791-69-1]

C<sub>14</sub>H<sub>11</sub>NO<sub>4</sub>

mol.wt. 257.25

**Synthesis**

- Obtained by treatment of 3-bromo-2-hydroxy-5-nitro-acetophenone and phenylboronic acid mixture in THF with tetrakis(triphenylphosphine)palladium (0) and 10% aqueous sodium carbonate. The mixture was heated at 80° for 3 h. Then, 10% Pd/C catalyst was added and heating continued for 1.5 h (70%) (compound 32) [1848].

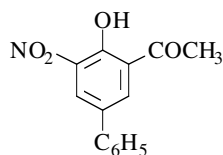
<sup>1</sup>H NMR [1848], <sup>13</sup>C NMR [1848].

**1-(4-Hydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone**

[84942-37-0]

C<sub>14</sub>H<sub>11</sub>NO<sub>4</sub>

mol.wt. 257.25

**Synthesis**

- Preparation by reaction of 100% nitric acid with 3-acetyl-4-hydroxybiphenyl in acetic acid at r.t. (90%) [318].

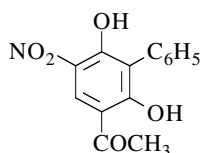
m.p. 113-114° [318].

**1-(2,6-Dihydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone**

[160246-79-7]

C<sub>14</sub>H<sub>11</sub>NO<sub>5</sub>

mol.wt. 273.25

**Syntheses**

-Obtained by irradiation of 4-acetyl-3-hydroxy-6-nitro-2-phenyliodonio-phenolate (1 mmol),  
 \*in benzene suspension (65%) [1681];  
 \*in the presence of cyclohexene (3-5 mmol) in methylene chloride/acetonitrile solution (1:1) for 4 h (20-30%) [1681].

**N.B.:** The irradiations were performed with a 250 watt low pressure Hg lamp.

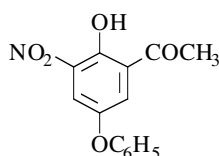
m.p. 160-161° [1681]; <sup>1</sup>H NMR [1681], IR [1681], MS [1681].

**1-(2-Hydroxy-3-nitro-5-phenoxyphenyl)ethanone**

[84942-38-1]

C<sub>14</sub>H<sub>11</sub>NO<sub>5</sub>

mol.wt. 273.25

**Synthesis**

-Preparation by reaction of 100% nitric acid with 2-hydroxy-5-phenoxyacetophenone in acetic acid at r.t. (73%) [318].

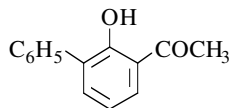
m.p. 126-127° [318].

**1-(2-Hydroxy[1,1'-biphenyl]-3-yl)ethanone**

[21424-82-8]

C<sub>14</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 212.25

**Syntheses**

-Preparation by Fries rearrangement of 2-acetoxybiphenyl with aluminium chloride,  
 \*without solvent between 130 to 160° [108] [746] [1181] [1182];  
 \*in boiling o-dichlorobenzene for 30 min (15%) [859].

-Also obtained by UV light irradiation (254 nm) of 2-acetoxybiphenyl in benzene (11%) [999].

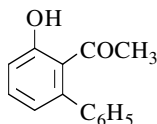
m.p. 60-61° [108], 56°1-57°3 [859]; b.p.<sub>14</sub> 194-196° [108]; GC-MS [859];  
<sup>1</sup>H NMR [859], IR [859].

**1-(3-Hydroxy[1,1'-biphenyl]-2-yl)ethanone**

[136819-93-7]

C<sub>14</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 212.25

**Synthesis**

-Obtained by adding potassium fluoride to a solution of 1-phenyl-2-octene-1,5,7-trione in dry toluene and the whole refluxed overnight (32%) [1755].

colourless oil [1755];  
<sup>1</sup>H NMR [1755], IR [1755], MS [1755].

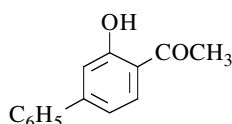


**1-(3-Hydroxy[1,1'-biphenyl]-4-yl)ethanone**

[32101-38-5]

C<sub>14</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 212.25

**Syntheses**

- Preparation by reaction of acetyl chloride with 3-methoxybiphenyl in the presence of aluminium chloride in refluxing methylene chloride for 11 h (50%) [281].
- Preparation by aromatization of 2-acetyl-3-chloro-5-phenyl-2-cyclohexenone in the presence of Pd/C in refluxing cyclohexene for 4 h (70%) [32].
- Preparation by dehydrogenation of 6-acetyl-3-phenyl-2-cyclohexen-1-one with refluxing 16% bromine solution in acetic acid [1059].
- Also refer to: [1166].

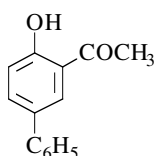
m.p. 91° [1059], 90°5-91°5 [281], 90-90°5 [32].

**1-(4-Hydroxy[1,1'-biphenyl]-3-yl)ethanone**

[14031-80-2]

C<sub>14</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 212.25

**Syntheses**

- Preparation by Fries rearrangement of 4-acetoxybiphenyl, \*with aluminium chloride without solvent at 120-140° [318] [595] [1280], (48%) [318] or in tetrachloroethane at 140° [381] [820] [1181] [1182], (46%) [820]; \*with titanium tetrachloride in nitrobenzene at r.t. (6%) [1891].
- Also obtained by photo-Fries rearrangement of 4-acetoxybiphenyl with 254 nm light in benzene (61%) [999].
- Also obtained — *via* an intermolecular photo-Fries rearrangement — by irradiation of a solution of pinacolone and p-phenylphenol in benzene for 5 h (42%) [898].
- Preparation by catalytic hydrogenation of 2-(benzyloxy)-5-phenylacetophenone in the presence of 10% Pd/C in 95% ethanol at r.t. under 35 psi for 2 h (84%) [1891].
- Preparation by adding an ethereal solution of methyl lithium to a solution of 5-phenylsalicylic acid in 1,2-dimethoxyethane under nitrogen and maintained at 10-12° (85%) [1891].
- Preparation by reaction of acetic acid with 4-hydroxybiphenyl in the presence of boron trifluoride-acetic acid complex (good yield) [1181] [1182].
- Also refer to: [392] [393] [394] [821].

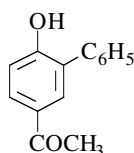
m.p. 61°5-62° [381], 61-62° [318] [595], 60-61° [1891], 59-61° [820]; IR [1891].

**1-(6-Hydroxy[1,1'-biphenyl]-3-yl)ethanone**

[20281-51-0]

C<sub>14</sub>H<sub>12</sub>O<sub>2</sub>

mol.wt. 212.25

**Syntheses**

- Preparation by Fries rearrangement of 2-acetoxybiphenyl with aluminium chloride, \*without solvent between 130 to 160° [108] [746] [747], (60-62%) [108] [746]; \*in nitrobenzene (58%) [1869] according to [1512]; \*in boiling o-dichlorobenzene for 30 min (80%) [859].
- Also obtained by UV light irradiation (254 nm) of 2-acetoxybiphenyl in benzene (6%) [999].

-Preparation by direct condensation of 2-hydroxybiphenyl with acetic acid in the presence of boron trifluoride [331].  
 -Also refer to: [1870].

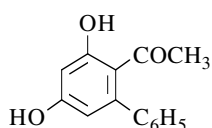
m.p. 184°1-184°4 [859], 177° [1869], 173° [331], 172-173° [108], 167-168°5 [746];  
<sup>1</sup>H NMR [859], IR [859]; GC-MS [859].

### 1-(3,5-Dihydroxy[1,1'-biphenyl]-2-yl)ethanone

[54439-83-7]

C<sub>14</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 228.25



#### Synthesis

-Obtained (by-product) from 3-methyl-3'-phenyl-5,5'-diisoxazoly-methane by performing hydrogenolysis and subsequent hydrolysis with hydrochloric acid (12%) [97].

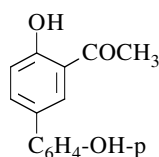
m.p. 139° [97]; <sup>1</sup>H NMR [97], MS [97].

### 1-(4,4'-Dihydroxy[1,1'-biphenyl]-3-yl)ethanone

[52189-90-9]

C<sub>14</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 228.25



#### Syntheses

-Preparation by Fries rearrangement,  
 \*of 4-acetoxy-4'-hydroxybiphenyl with aluminium chloride without solvent for 6 h at 168-170° (57%) [299];  
 \*of 4,4'-diacetoxybiphenyl with aluminium chloride in tetrachloroethane for 6 h at 160° (34%) [299].  
 -Also obtained by irradiation of 4,4'-diphenoquinone [bi(cyclohexa-2,5-dienylidene)-4,4'-dione] in acetaldehyde for 2 days (28%) [299].

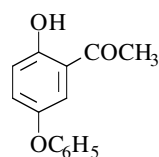
m.p. 193° [299]; <sup>1</sup>H NMR [299], IR [299], MS [299].

### 1-(2-Hydroxy-5-phenoxyphenyl)ethanone

[56926-34-2]

C<sub>14</sub>H<sub>12</sub>O<sub>3</sub>

mol.wt. 228.25



#### Syntheses

-Preparation by Fries rearrangement of 4-acetoxydiphenyl oxide in the presence of aluminium chloride at 120° (90%) [318].  
 -Preparation by catalytic hydrogenolysis of 2-(benzyloxy)-5-phenoxyacetophenone at r.t. at 35 psi in the presence of 10% Pd/C in ethanol (85%) [1891].

-Preparation by adding an ethereal solution of methylolithium to a solution of 5-phenoxybenzoic acid in 1,2-dimethoxyethane (79%) [1891].

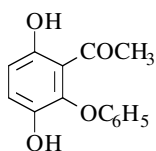
m.p. 160-161° [318], 71-73° [1891].  
 One of the reported melting points is obviously wrong.  
<sup>1</sup>H NMR [1891].

**1-(3,6-Dihydroxy-2-phenoxyphenyl)ethanone**

[52095-10-0]

C<sub>14</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 244.25

**Synthesis**

-Preparation by reaction of phenol on 2-acetylquinone with pyridine in benzene (40%) [586].

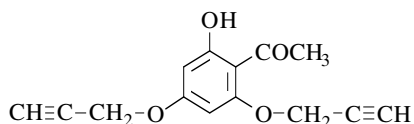
m.p. 68-70° [586]; <sup>1</sup>H NMR [586], IR [586].

**1-[2-Hydroxy-4,6-bis(2-propynyloxy)phenyl]ethanone**

[53771-23-6]

C<sub>14</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 244.25

**Synthesis**

-Obtained by reaction of 2-propynyl bromide with phloracetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone in an atmosphere of nitrogen (12%) [427].

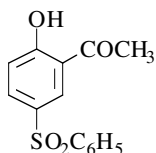
m.p. 111° [427]; IR [427], UV [427].

**1-[2-Hydroxy-5-(phenylsulfonyl)phenyl]ethanone**

[146575-61-3]

C<sub>14</sub>H<sub>12</sub>O<sub>4</sub>S

mol.wt. 276.31

**Synthesis**

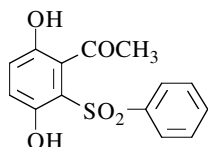
-Preparation by Fries rearrangement of 4-phenylsulfonyl-phenyl acetate with aluminium chloride at 190° (52%) [1919] [1920].

**1-[3,6-Dihydroxy-2-(phenylsulfonyl)phenyl]ethanone**

[145746-54-9]

C<sub>14</sub>H<sub>12</sub>O<sub>5</sub>S

mol.wt. 292.31

**Synthesis**

-Preparation by shaking an aqueous solution of sodium benzenesulfinate with a solution of 2-acetyl-1,4-benzoquinone and trifluoroacetic acid in methylene chloride for 4 h at r.t. (68%) [301].

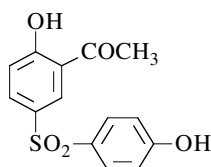
m.p. 182-183° [301]; <sup>1</sup>H NMR [301], IR [301], MS [301].

**1-[2-Hydroxy-5-[(4-hydroxyphenyl)sulfonyl]phenyl]ethanone**

[147816-50-0]

C<sub>14</sub>H<sub>12</sub>O<sub>5</sub>S

mol.wt. 292.31

**Syntheses**

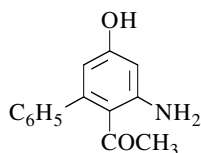
- Obtained by treatment of bisphenol-S diacetate (4,4'-diacetoxydiphenyl sulfone) with aluminium chloride (10 mol) at 160° (23%) [1684].
- Also obtained by UV light irradiation (254 nm) of bisphenol-S diacetate in acetonitrile for 5.5 h (18%) [1684].

**1-(3-Amino-5-hydroxy[1,1'-biphenyl]-2-yl)ethanone**

[54439-91-7]

C<sub>14</sub>H<sub>13</sub>NO<sub>2</sub>

mol.wt. 227.26

**Synthesis**

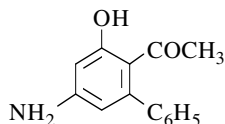
- Preparation from 5-methyl-3'-phenyl-3,5'-diisoxazolyl-methane by performing hydrogenolysis and subsequent hydrolysis with hydrochloric acid (major product) [97].

m.p. 192° [97]; <sup>1</sup>H NMR [97], MS [97].**1-(5-Amino-3-hydroxy[1,1'-biphenyl]-2-yl)ethanone**

[54439-90-6]

C<sub>14</sub>H<sub>13</sub>NO<sub>2</sub>

mol.wt. 227.26

**Synthesis**

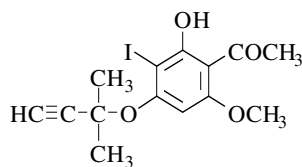
- Obtained (by-product) from 3'-methyl-5-phenyl-3,5'-diisoxazolyl-methane by performing hydrogenolysis and subsequent hydrolysis with hydrochloric acid (4%) [97].

m.p. 118° [97]; <sup>1</sup>H NMR [97], MS [97].**1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-3-iodo-6-methoxyphenyl]ethanone**

[82538-75-8]

C<sub>14</sub>H<sub>15</sub>IO<sub>4</sub>

mol.wt. 374.17

**Synthesis**

- Preparation by reaction of 3-chloro-3-methylbut-1-yne with 2,4-dihydroxy-3-iodo-6-methoxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (56%) [15].

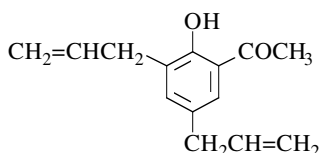
m.p. 110-111° [15]; <sup>1</sup>H NMR [15].

**1-[2-Hydroxy-3,5-bis(2-propenyl)phenyl]ethanone**

[35158-35-1]

C<sub>14</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 216.28

**Syntheses**

- Preparation by thermal Claisen rearrangement of 3-allyl-2-(allyloxy)acetophenone in N,N-diethylaniline for 4 h at 220° (93%) [343].
- Preparation by reaction of ethyl acetoacetate with 2-allyl-2,6-heptadienal in the presence of pyridine and piperidine as catalysts, in benzene at 60-70° (33%). The 2-allyl-

2,6-heptadienal was obtained by self condensation of 4-pentenol in the presence of 15% potassium hydroxide solution [940] [941] [942].

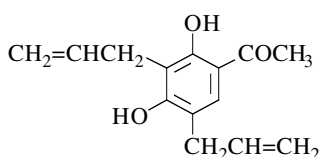
oil [343] [940] [941] [942];  
 b.p.<sub>1-2</sub> 90-95° [940] [941] [942], b.p.<sub>1-2</sub> 100-120° [343];  
 IR [940] [941] [942], UV [940] [941] [942].

**1-[2,4-Dihydroxy-3,5-bis(2-propenyl)phenyl]ethanone**

[40815-80-3]

C<sub>14</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 232.28

**Syntheses**

- Preparation by thermal Claisen rearrangement, \*of 3-allyl-4-(allyloxy)-2-hydroxyacetophenone without solvent at 210° (20%) [132];
- \*of 3'-acetyl-4',6'-bis(allyloxy)acetophenone in refluxing N,N-dimethylaniline (33%) [61] or in refluxing phenyl ether (11%) [61];

\*of 5'-acetyl-2',4'-bis(allyloxy)-3'-bromoacetophenone in refluxing N,N-dimethylaniline (16%) [61];  
 \*of 3'-acetyl-2',4'-bis(allyloxy)acetophenone in refluxing N,N-dimethylaniline (18%) [61];  
 \*of 2',4'-bis(allyloxy)acetophenone in refluxing N,N-dimethylaniline (40%) [61].

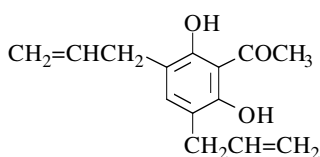
m.p. 90° [61], 89-90° [132]; <sup>1</sup>H NMR [61], IR [61], UV [61], MS [61].

**1-[2,6-Dihydroxy-3,5-bis(2-propenyl)phenyl]ethanone**

[37467-66-6]

C<sub>14</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 232.28

**Syntheses**

- Preparation by thermal Claisen rearrangement of, \*2',6'-bis(allyloxy)acetophenone in refluxing N,N-dimethylaniline (45%) [1251] or in N,N-diethylaniline for 4 h at 220° [343];
- \*3'-acetyl-4',6'-bis(allyloxy)acetophenone in refluxing N,N-dimethylaniline or in phenyl ether (6-7%) [61];

\*3'-acetyl-2',4'-bis(allyloxy)acetophenone in refluxing N,N-dimethylaniline (6%) [61].

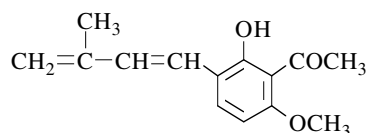
m.p. 57°5-58°5 [1251], 55-56° [343]; b.p.<sub>0.03</sub> 150° [1251];  
<sup>1</sup>H NMR [61], IR [61], UV [61], MS [61].

**1-[2-Hydroxy-6-methoxy-3-(3-methyl-1,3-butadienyl)phenyl]ethanone (Z)**

[141215-43-2]

C<sub>14</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 232.28

**Synthesis**

-Preparation by reaction of methylmagnesium iodide with 8-acetyl-7-methoxycoumarin in refluxing tetrahydrofuran during 1 h under nitrogen atmosphere (40%) [557].

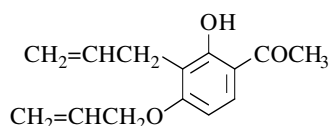
m.p. 112° [557]; <sup>1</sup>H NMR [557], IR [557], UV [557], MS [557].

**1-[2-Hydroxy-3-(2-propenyl)-4-(2-propenyloxy)phenyl]ethanone**

[40903-02-4]

C<sub>14</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 232.28

**Synthesis**

-Preparation by reaction of allyl bromide with 3-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (62%) [132].

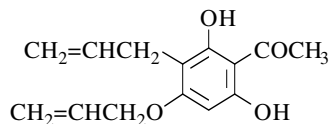
m.p. 34°5 [132].

**1-[2,6-Dihydroxy-3-(2-propenyl)-4-(2-propenyloxy)phenyl]ethanone**

[53771-28-1]

C<sub>14</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 248.28

**Synthesis**

-Preparation by thermal Claisen rearrangement of 2,4-bis-(allyloxy)-6-hydroxyacetophenone in N-methylpiperazine at reflux in an atmosphere of nitrogen (53%) [427] or without solvent in a sealed vial at 130° (33%) [427].

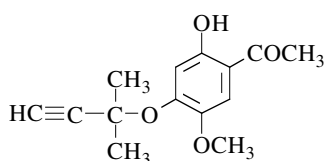
m.p. 102-103°5 [427]; UV [427].

**1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-5-methoxyphenyl]ethanone**

[70662-40-7]

C<sub>14</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 248.28

**Synthesis**

-Obtained by treatment of 2,4-dihydroxy-5-methoxyacetophenone with 3-chloro-3-methyl-1-butyne in the presence of potassium carbonate and potassium iodide in DMF for 40 h at 80-85° (15%) [881].

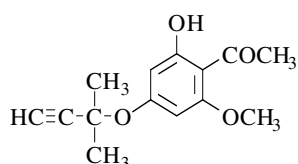
yellow oil [881]; TLC [881]; <sup>1</sup>H NMR [881], UV [881].

**1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-6-methoxyphenyl]ethanone**

[31273-60-6]

C<sub>14</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 248.28

**Synthesis**

-Preparation by reaction of 2-methyl-2-chlorobut-3-yne on 2,4-dihydroxy-6-methoxyacetophenone with potassium carbonate and potassium iodide in refluxing acetone (80%) [127].

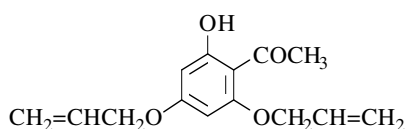
m.p. 107-108° [127].

**1-[2-Hydroxy-4,6-bis(2-propenyloxy)phenyl]ethanone**

[53771-27-0]

C<sub>14</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 248.28

**Synthesis**

-Obtained by reaction of allyl bromide with phloracetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (10%) [427].

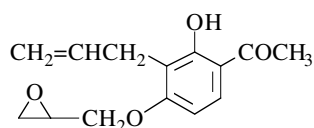
m.p. 62°5 [427]; UV [427].

**1-[2-Hydroxy-4-(oxiranylmethoxy)-3-(2-propenyl)phenyl]ethanone**

[40785-92-0]

C<sub>14</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 248.28

**Synthesis**

-Preparation by reaction of epichlorohydrin with 3-allyl-2,4-dihydroxyacetophenone in the presence of potassium hydroxide in refluxing ethanol [71].

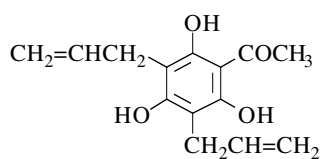
m.p. 67°5-68°5 [71].

**1-[2,4,6-Trihydroxy-3,5-bis(2-propenyl)phenyl]ethanone**

[53771-29-2]

C<sub>14</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 248.28

**Synthesis**

-Preparation by thermal Claisen rearrangement of 2,4-bis(allyloxy)-6-hydroxyacetophenone in N,N-diethylaniline at reflux (215°) under nitrogen (87%) [427].

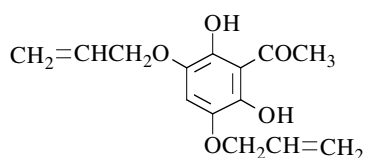
m.p. 67-68° [427]; UV [427].

**1-[2,6-Dihydroxy-3,5-bis(2-propenyloxy)phenyl]ethanone**

[73331-27-8]

C<sub>14</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 264.28



## Synthesis

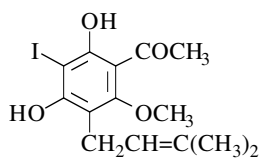
**N.B.:** In the paper [1251], the formula of the compound **59** displayed page 180, which is the formula of the titled compound C<sub>14</sub>H<sub>16</sub>O<sub>5</sub>, does not fit at all with the one of the actually prepared compound. The Claisen rearrangement of 2,6-bis(allyloxy)acetophenone **58** leads to the formation of 3,5-diallyl-2,6-dihydroxyacetophenone C<sub>14</sub>H<sub>16</sub>O<sub>3</sub>, page 183.

**1-[2,4-Dihydroxy-3-iodo-6-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone**

[82538-76-9]

C<sub>14</sub>H<sub>17</sub>IO<sub>4</sub>

mol.wt. 376.19



## Synthesis

-Obtained by reaction of 2-methylbut-3-en-2-ol with 2,4-dihydroxy-3-iodo-6-methoxyacetophenone in the presence of boron trifluoride etherate in dioxane at 35-40° (11%) [15].

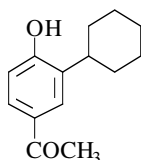
m.p. 136-137° [15]; <sup>1</sup>H NMR [15].

**1-(3-Cyclohexyl-4-hydroxyphenyl)ethanone**

[23299-00-5]

C<sub>14</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 218.30



## Synthesis

-Preparation by Fries rearrangement of 2-cyclohexylphenyl acetate with aluminium chloride in nitrobenzene at 85° [195] [1069], (55%) [1069].

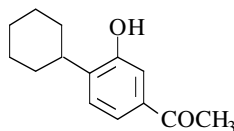
m.p. 148-149° [195], 147-148° [1069].

**1-(4-Cyclohexyl-3-hydroxyphenyl)ethanone**

[73898-21-2]

C<sub>14</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 218.30



## Synthesis

-Preparation by diazotization of 3-amino-4-cyclohexylacetophenone, followed by hydrolysis of diazonium salt obtained (48%) [1069].

m.p. 171° (Sadtler), 165-167° [1069];

<sup>1</sup>H NMR, (Sadtler: standard n° 44602 M); IR, (Sadtler: standard n° 71630 K).

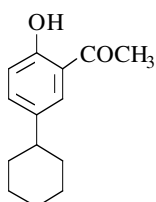


**1-(5-Cyclohexyl-2-hydroxyphenyl)ethanone**

[55168-33-7]

C<sub>14</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 218.30

**Syntheses**

- Preparation by reaction of acetic acid with p-cyclohexylphenol in the presence of boron trifluoride at 75° for 24 h (91%) [835].
- Preparation by Fries rearrangement of p-cyclohexylphenyl acetate with aluminium chloride without solvent at 140° [1335] or at 170° [129], (47%) [1335].

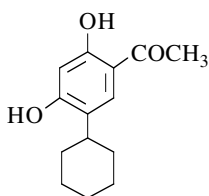
colourless oil [129] [1335]; m.p. < 50° [835];  
<sup>1</sup>H NMR [1335].

**1-(5-Cyclohexyl-2,4-dihydroxyphenyl)ethanone**

[159977-36-3]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30

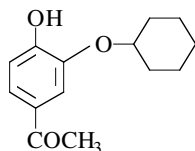
**Synthesis**

- Preparation by reaction of acetic acid with 4-cyclohexyl-resorcinol in the presence of boron trifluoride etherate at 105-108° for 15 min, followed by hydrolysis of the obtained boron difluoride chelate (m.p. 207-208°) with boiling aqueous ethanol for 15-20 min (89%) [1375].

m.p. 145-146° [1375]; IR [1375], UV [1375].

**1-[3-(Cyclohexyloxy)-4-hydroxyphenyl]ethanone**C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30

**Syntheses**

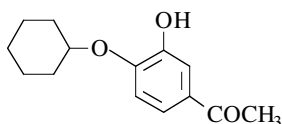
- Preparation by catalytic hydrogenolysis of 4-(benzyloxy)-3-cyclohexyloxyacetophenone in the presence of Pd/C in ethanol at r.t. (82%) [1210].
- Also obtained (poor yield) by reaction of cyclohexyl bromide with 3,4-dihydroxyacetophenone in the presence of

sodium hydroxide in a refluxing mixture of ethanol and methanol (2%) [1210].

m.p. 88° [1210].

**1-[4-(Cyclohexyloxy)-3-hydroxyphenyl]ethanone**C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30

**Synthesis**

- Obtained (poor yield) by reaction of cyclohexyl bromide with 3,4-dihydroxyacetophenone in the presence of sodium hydroxide in a refluxing mixture of ethanol and methanol (8%) [1210].

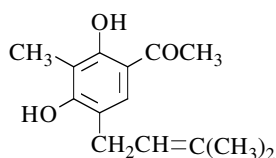
m.p. 103° [1210].

**1-[2,4-Dihydroxy-3-methyl-5-(3-methyl-2-butenyl)phenyl]ethanone**

[74727-08-5]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30

**Synthesis**

-Obtained by prenylation of 2,4-dihydroxy-3-methylacetophenone with 2-methyl-3-buten-2-ol in dioxane in the presence of boron trifluoride etherate for 1 h at r.t. (41%) [1607].

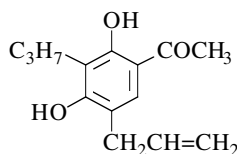
m.p. 117-118° [1607]; TLC [1607];  
<sup>1</sup>H NMR [1607], IR [1607].

**1-[2,4-Dihydroxy-5-(2-propenyl)-3-propylphenyl]ethanone**

[99370-48-6]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30

**Synthesis**

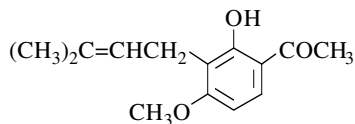
-Preparation by thermal Claisen rearrangement of 4-(allyloxy)-2-hydroxy-3-propylacetophenone without solvent at 210° (79%) [777].

**1-[2-Hydroxy-4-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[52601-06-6]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30

**Synthesis**

-Preparation by reaction of 2-methylbut-3-en-2-ol with 2-hydroxy-4-methoxyacetophenone in the presence of boron trifluoride etherate [43].

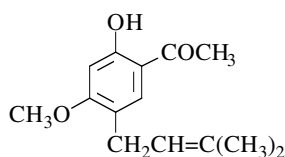
<sup>1</sup>H NMR [43] [44], UV [43].

**1-[2-Hydroxy-4-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone**

[28448-83-1]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30

**Syntheses**

-Preparation by reaction of dimethyl sulfate with 2,4-dihydroxy-5-prenylacetophenone in the presence of potassium carbonate in refluxing acetone (89%) [884].

-Preparation by reaction of 2-methylbut-3-en-2-ol with 2-hydroxy-4-methoxyacetophenone in the presence of boron trifluoride etherate [43].

**Isolation from natural sources**

-By treatment of bavachinin with 50% potassium hydroxide aqueous solution at 180-200° (80%). The bavachinin is a flavonoid compound obtained from *Psoralea Corylifolia* Linn. [206].

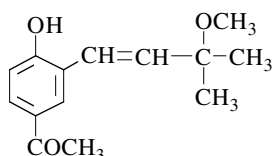
oil [206] [884]; <sup>1</sup>H NMR [43] [44] [206], IR [206], UV [43] [206].

**1-[4-Hydroxy-3-(3-methoxy-3-methyl-1-butenyl)phenyl]ethanone (*E*)**

[26931-60-2]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30



Isolation from natural sources

-From the roots of *Helianthella uniflora* (tribe Heliantheae) [242].

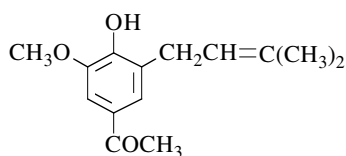
m.p. 124° [242];

<sup>1</sup>H NMR [242], IR [242], UV [242], MS [242].**1-[4-Hydroxy-3-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone**

[73869-90-6]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30



Synthesis

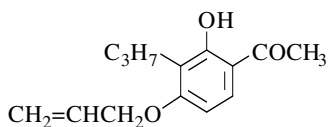
-Obtained by Claisen rearrangement of 3-methoxy-4-(3-methyl-2-butenyloxy)acetophenone (m.p. 41°) in diethylaniline for 5 h at 170° (85%) [245].

m.p. 65° [245]; <sup>1</sup>H NMR [245], IR [245].**1-[2-Hydroxy-4-(2-propenyloxy)-3-propylphenyl]ethanone**

[99370-47-5]

C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 234.30



Synthesis

-Preparation by reaction of allyl bromide with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (78%) [777].

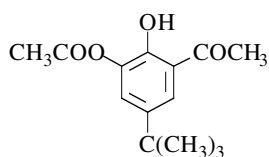
crystalline compound [777].

**1-[3-(Acetyloxy)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone**

[84297-04-1]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29



Syntheses

-Obtained by treatment of a benzene solution of 5-tert-butyl-2,3-dihydroxyacetophenone and acetaldehyde in the presence of di-tert-butyl diperoxyoxalate at 38° (25%) [1758].

-Also obtained by treatment of a benzene solution of 4-tert-butyl-o-benzoquinone and acetaldehyde in the presence of di-tert-butyl diperoxyoxalate at 38° (6%) [1758].

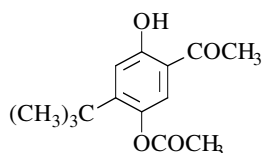
pale yellow oil [1758]; <sup>1</sup>H NMR [1758], IR [1758].

**1-[5-(Acetyloxy)-4-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone**

[107188-26-1]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29

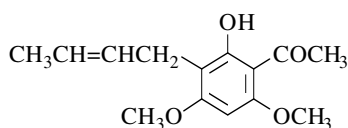
**Synthesis**

-Preparation by reaction of acetic anhydride with 2-tert-butylhydroquinone in the presence of boron trifluoride-acetic acid complex between 60 to 90° [1928].

m.p. 86°5-87°5 [1928].

**1-[3-(2-Butenyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone**C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29

**Synthesis**

-Preparation by condensation of 2-hydroxy-4,6-dimethoxyacetophenone with 1,3-butadiene in the presence of 85% orthophosphoric acid in xylene at 30-35° (80%) [19].

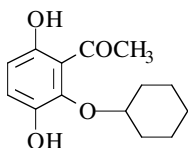
m.p. 101-103° [19]; <sup>1</sup>H NMR [19].

**1-[2-(Cyclohexyloxy)-3,6-dihydroxyphenyl]ethanone**

[33537-80-3]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29

**Syntheses**

-Easy preparation by reduction of 2-acetyl-3-cyclohexyloxy-1,4-benzoquinone using conventional methods [587].  
-Also obtained (low yield) by reaction of 2-acetyl-1,4-benzoquinone with an excess of cyclohexanol at r.t., with exclusion of light [587].

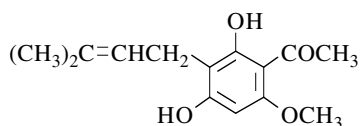
m.p. 75-76°5 [587]; <sup>1</sup>H NMR [587], IR [587].

**1-[2,4-Dihydroxy-6-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[30403-01-1]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29

**Synthesis**

-Preparation by reaction of prenyl bromide with 2,4-dihydroxy-6-methoxyacetophenone in the presence of methanolic potassium hydroxide (major product) [876], (27%) [877].

**Isolation from natural sources**

-From the rhizomes of *Remirea maritima* Aubl. (Cyperaceae) [38] [876].

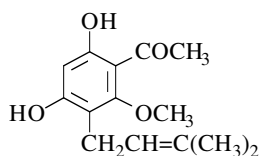
m.p. 173°5-174° [38], 173-174° [876], 170-171° [877]; TLC [877];  
<sup>1</sup>H NMR [876] [877], UV [876] [877].

**1-[4,6-Dihydroxy-2-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone** (*Acronylin*)

[27364-64-3]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29



## Syntheses

- Preparation by prenylation of 2,4-dihydroxy-6-methoxyacetophenone with 2-methyl-3-buten-2-ol in the presence of boron trifluoride etherate [876].
- Preparation by dehalogenation of 2,4-dihydroxy-3-iodo-6-methoxy-5-prenylacetophenone in the presence of zinc dust and concentrated hydrochloric acid in refluxing ethanol (75%) [15].

## Isolation from natural sources

-From the bark of *Acronychia laurifolia* BL (Rutaceae) [230].

m.p. 128-129° [38] [230], 127-128° [876];

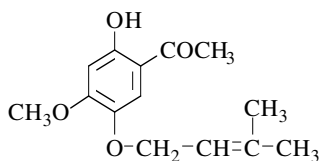
<sup>1</sup>H NMR [230] [876], IR [230], UV [230] [876], MS [230].

**1-[2-Hydroxy-4-methoxy-5-[(3-methyl-2-butenyl)oxy]phenyl]ethanone**

[142608-87-5]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29



## Synthesis

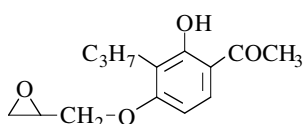
- Preparation by prenylation of 2,5-dihydroxy-4-methoxyacetophenone [1764].

**1-[2-Hydroxy-4-(oxiranylmethoxy)-3-propylphenyl]ethanone**

[57161-85-0]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29



## Syntheses

- Preparation by reaction of epichlorohydrin with 2,4-dihydroxy-3-propylacetophenone in the presence of,
  - \*potassium hydroxide in refluxing ethanol (64%) [71];
  - \*potassium carbonate in boiling 2-butanol for 10 h (62%) [1035].

m.p. 54-55° [71], 52-56° [1035]; b.p.<sub>0.5</sub> 170-175° [71]; GLC [1035];

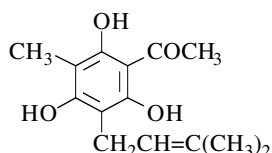
<sup>1</sup>H NMR [1035].

**1-[2,4,6-Trihydroxy-3-methyl-5-(3-methyl-2-butenyl)phenyl]ethanone**

[55380-58-0]

C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 250.29

**Synthesis**

-Obtained by reaction of 2-methylbut-3-en-2-ol with methylphloracetophenone in the presence of boron trifluoride etherate in dioxane (16%) [428].

m.p. 115-117° [350] [428], 114-116° [1611];

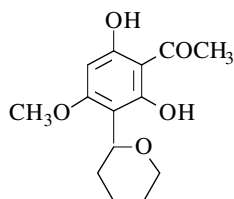
<sup>1</sup>H NMR [350] [428], UV [428], MS [428].

**1-[2,6-Dihydroxy-4-methoxy-3-(tetrahydro-2H-pyran-2-yl)phenyl]ethanone**

[136258-10-1]

C<sub>14</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 266.29

**Synthesis**

-Preparation by reaction of 3,4-dihydro-2H-pyran on 2,6-dihydroxy-4-methoxyacetophenone with p-toluene-sulfonic acid in dioxane, first at 0°, then at r.t. (29%) [5].

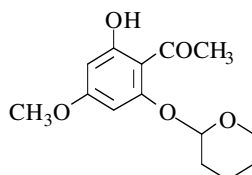
m.p. 71-76° [5]; <sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[2-Hydroxy-4-methoxy-6-[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone**

[136258-09-8]

C<sub>14</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 266.29

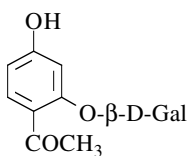
**Synthesis**

-Preparation by reaction of 3,4-dihydro-2H-pyran on 2,6-dihydroxy-4-methoxyacetophenone with p-toluene-sulfonic acid in dioxane, first at 0°, then at r.t. (29%) [5].

m.p. 88-92° [5]; <sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[2-(β-D-Galactopyranosyloxy)-4-hydroxyphenyl]ethanone**C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Synthesis**

-Preparation from 2-(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyloxy)-4-hydroxyacetophenone by boiling in 0.2 N methanolic sodium methoxide solution for 3 min (45%) [1861].

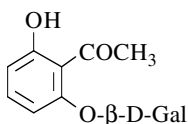
m.p. 114-115° [1861]; monohydrate [1861]; (α)<sub>D</sub><sup>20</sup> = -73° (c = 1 in water) [1861].

**1-[2-( $\beta$ -D-Galactopyranosyloxy)-6-hydroxyphenyl]ethanone**

[88087-04-1]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Synthesis**

-Obtained by deprotection of 2-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-glucopyranosyloxy)-6-hydroxyacetophenone with 0.5 N methanolic sodium methoxide at r.t. overnight (20%) [1008].

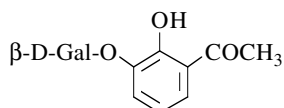
m.p. 226-229° [1008];  $(\alpha)_D^{20} = -4.8$  (c = 1.67 in pyridine) [1008]; <sup>1</sup>H NMR [1008].

**1-[3-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone**

[88086-97-9]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Synthesis**

-Obtained from 3-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyloxy)-2-hydroxyacetophenone by treatment with 0.1 N methanolic sodium methoxide for 3 h at r.t. [1008].

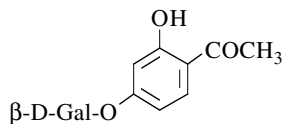
m.p. 179-181° [1008]; dihydrate [1008];  
 $(\alpha)_D^{20} = -7.0$  (c = 1 in pyridine) [1008]; <sup>1</sup>H NMR [1008].

**1-[4-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone**

[54918-26-2]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Syntheses**

-Obtained from 4-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyloxy)-2-hydroxyacetophenone by treatment with methanolic sodium methoxide at r.t. [1008] [1480], (87% (monohydrate) [1480] or in boiling methanol for 3 min [1861].

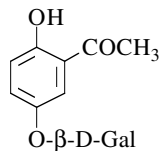
m.p. 207° [1008], 205-207° [1861], 198° [1480];  
 $(\alpha)_D^{18} = -62.0$  (c = 2.3 in pyridine) [1480];  $(\alpha)_D^{22} = -68.3$  (c = 1 in water) (monohydrate) [1861];  $(\alpha)_D^{22} = -73.0$  (c = 1 in water) (anhydrous) [1861].

**1-[5-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone**

[88086-99-1]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Synthesis**

-Obtained from 5-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyloxy)-2-hydroxyacetophenone by treatment with 0.1 N methanolic sodium hydroxide solution for 2 h (22%) [1008].

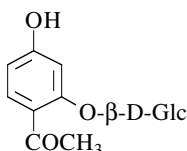
m.p. 209-211° [1008]; <sup>1</sup>H NMR [1008].

**1-[2-(β-D-Glucopyranosyloxy)-4-hydroxyphenyl]ethanone** (*Cynanoneside B*; *Bungeiside B*)

[149561-88-6]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Synthesis**

-Preparation from 2-(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyloxy)-4-hydroxyacetophenone by boiling in 0.2 N methanolic sodium methoxide solution for 3 min (65%) [1860].

**Isolation from natural sources**

-From the roots of *Cynanchum bungei* DECNE (Asclepiadaceae) [1088].  
 -From the roots of *Cynanchum taiwanianum* (Asclepiadaceae) [1102].

Amorphous white powder [1088], Amorphous solid [1102];

m.p. 178-180° [1860];

(α)<sub>D</sub><sup>20</sup> = -88°5 (c = 1 in water) [1860], (α)<sub>D</sub><sup>20</sup> = -11°0 (c = 1 in ethanol) [1102],

(α)<sub>D</sub> = -17°3 (c = 0.7 in methanol) [1088]; TLC [1860];

<sup>1</sup>H NMR [1088] [1102], <sup>13</sup>C NMR [1088] [1102], IR [1102], UV [1102],

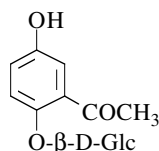
MS [1088] [1102].

**1-[2-(β-D-Glucopyranosyloxy)-5-hydroxyphenyl]ethanone** (*Bungeiside A*)

[149475-52-5]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Isolation from natural sources**

-From the roots of *Cynanchum bungei* DECNE (Asclepiadaceae) [1088].

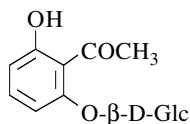
white amorphous powder [1088];

(α)<sub>D</sub> = -40°6 (c = 5 in methanol) [1088];

<sup>1</sup>H NMR [1088], <sup>13</sup>C NMR [1088], IR [1088], MS [1088].

**1-[2-(β-D-Glucopyranosyloxy)-6-hydroxyphenyl]ethanone**C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Synthesis**

-Refer to: [1817].

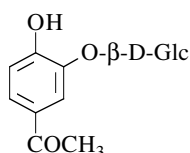


**1-[3-( $\beta$ -D-Glucopyranosyloxy)-4-hydroxyphenyl]ethanone**

[55483-00-6]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Synthesis**

-Preparation by bubbling dry ammonia into an ice cooled solution of 3-(tetra-O-acetyl- $\beta$ -D-glucopyranosyloxy)-4-hydroxyacetophenone in methanol for 40 min. Then, the solution was set aside at r.t. for 15 h (72%) [1700].

**Isolation from natural sources**

- From the leaves of *Picea pungens* Engelm. (Colorado spruce) [1315] [1316].
- From the leaves of *Picea pungens* Engelm. var. *glauca* Beiss. [1742].
- From shoots of *Picea abies* [1021].
- From white spruce of *Picea glauca* (Moench) Voss [1742].
- From galls and shoots of *Picea glauca* (Pinaceae) [1022].

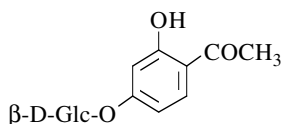
m.p. 198-199° [1315], 190-195° [1700], 190-191° [1742];  
 $(\alpha)_D^{25} = -96.8$  (c = 0.53 in water) [1315],  $(\alpha)_D = -88.9$  (c = 0.53 in water) [1700],  
 $(\alpha)_D^{30} = -85.47$  (c = 1.17 in water) [1742]; GC [1021], GC/MS [1021] [1022];  
<sup>1</sup>H NMR [948] [1700], IR [1700], MS [1700].

**1-[4-( $\beta$ -D-Glucopyranosyloxy)-2-hydroxyphenyl]ethanone**

[54918-24-0]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Syntheses**

-Preparation by deacetylation of 4-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-glucopyranosyloxy)-2-hydroxyacetophenone,  
 \*with sodium methoxide in methanol (92%) [1478],  
 (70-80%) [549], (60-70%) [1860];

- \*with barium hydroxide in aqueous solution for 16 h (84%) [1201].
- Also refer to: [1241] [1480].

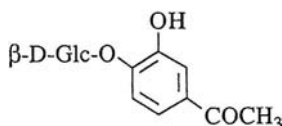
m.p. 201-202° [1201] [1860], 198-200° [1478];  
 $(\alpha)_D^{20} = -86.9$  (c = 50 in acetone) [1478]; TLC [1860].

**1-[4-( $\beta$ -D-Glucopyranosyloxy)-3-hydroxyphenyl]ethanone (*Cynanoneside A*)**

[17063-43-3]

C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>

mol.wt. 314.29

**Isolation from natural sources**

- From the shoots of *Picea abies* [1021].
- From the roots of *Cynanchum taiwanianum* (Asclepiadaceae) [1102].
- From galls and shoots of *Picea glauca* (Pinaceae) [1022].

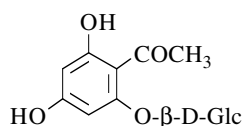
Amorphous solid [1102];  $(\alpha)_D^{20} = -5.0$  (c = 1 in ethanol) [1102];  
 GC [1021]; GC/MS [1021] [1022];  
<sup>1</sup>H NMR [1102], <sup>13</sup>C NMR [1102], IR [1102], UV [1102], MS [1102].

**1-[2-(β-D-Glucopyranosyloxy)-4,6-dihydroxyphenyl]ethanone**

[26089-54-3]

C<sub>14</sub>H<sub>18</sub>O<sub>9</sub>

mol.wt. 330.29



Isolation from natural sources

-From the aerial parts of *Artemisia stolonifera* (Compositae) [1075].

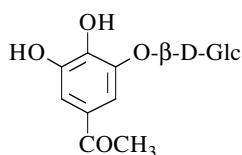
m.p. 201-203° [1075];

<sup>1</sup>H NMR [1075], <sup>13</sup>C NMR [1075], IR [1075], UV [1075].**1-[3-(β-D-Glucopyranosyloxy)-4,5-dihydroxyphenyl]ethanone**

[448949-59-5]

C<sub>14</sub>H<sub>18</sub>O<sub>9</sub>

mol.wt. 330.29



Isolation from natural sources

-From dried root of *Polygonum cuspidatum* SIEB. et ZUCC. (Polygonaceae) [1901].

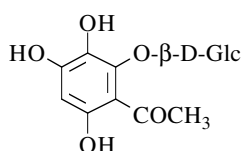
-Also refer to: [1075].

**1-[2-(β-D-Glucopyranosyloxy)-3,4,6-trihydroxyphenyl]ethanone (Lalioside)**

[116964-03-5]

C<sub>14</sub>H<sub>18</sub>O<sub>10</sub>

mol.wt. 346.29



Isolation from natural sources

-From *Lawsonia inermis* [1752].

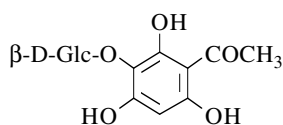
spectroscopic data [1752].

**1-[3-(β-D-Glucopyranosyloxy)-2,4,6-trihydroxyphenyl]ethanone (Polygoacetophenoside)**

[110906-84-8]

C<sub>14</sub>H<sub>18</sub>O<sub>10</sub>

mol.wt. 346.29



Isolation from natural sources

-From the leaves and stems of *Polygonum multiflorum* (Polygonaceae) [1929].

m.p. 214-216° [1929];

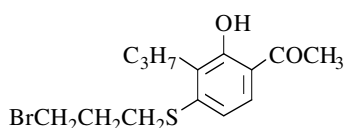
<sup>1</sup>H NMR [1929], <sup>13</sup>C NMR [1929], IR [1929], UV [1929], MS [1929], HRMS [1929].

**1-[4-[(3-Bromopropyl)thio]-2-hydroxy-3-propylphenyl]ethanone**

[125617-43-8]

C<sub>14</sub>H<sub>19</sub>BrO<sub>2</sub>S

mol.wt. 331.27

**Synthesis**

-Preparation by reaction of 1,3-dibromopropane with 2-hydroxy-4-mercapto-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone [1680].

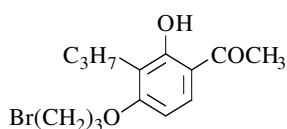
yellow oil [1680].

**1-[4-(3-Bromopropoxy)-2-hydroxy-3-propylphenyl]ethanone**

[40786-20-7]

C<sub>14</sub>H<sub>19</sub>BrO<sub>3</sub>

mol.wt. 315.21

**Synthesis**

-Preparation by reaction of 1,3-dibromopropane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone [71].

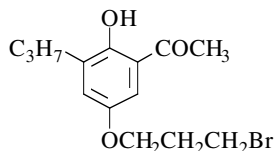
b.p.<sub>0.02</sub> 172-180° [71].

**1-[5-(3-Bromopropoxy)-2-hydroxy-3-propylphenyl]ethanone**

[125617-25-6]

C<sub>14</sub>H<sub>19</sub>BrO<sub>3</sub>

mol.wt. 315.21

**Synthesis**

-Preparation by reaction of 1,3-dibromopropane with 2,5-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone [1680].

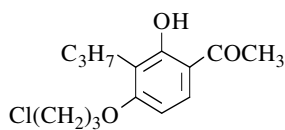
m.p. 69-70° [1680].

**1-[4-(3-Chloropropoxy)-2-hydroxy-3-propylphenyl]ethanone**

[79558-02-4]

C<sub>14</sub>H<sub>19</sub>ClO<sub>3</sub>

mol.wt. 270.76

**Syntheses**

-Preparation by reaction of 1-bromo-3-chloropropane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate in refluxing acetone for 5 h (80%) [314], (67%) [1035].  
-Also refer to: [1371].

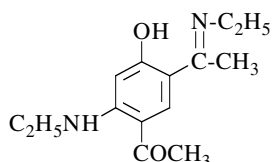
m.p. 39-41° [1035], 37-38° [314]; GLC [1035]; <sup>1</sup>H NMR [1035].

**1-[2-(Ethylamino)-5-[1-(ethylimino)ethyl]-4-hydroxyphenyl]ethanone**

[115349-97-8]

C<sub>14</sub>H<sub>20</sub>N<sub>2</sub>O<sub>2</sub>

mol.wt. 248.33

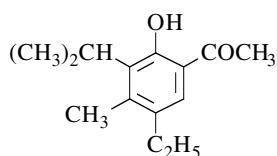
**Synthesis**

-Obtained by heating a mixture of 4,6-diacetylresorcinol, aqueous ethylamine and concentrated hydrochloric acid as catalyst, in an autoclave from 8 to 72 h [65].

m.p. 153-154° [65]; <sup>1</sup>H NMR [65], MS [65].

**1-[5-Ethyl-2-hydroxy-4-methyl-3-(1-methylethyl)phenyl]ethanone**C<sub>14</sub>H<sub>20</sub>O<sub>2</sub>

mol.wt. 220.31

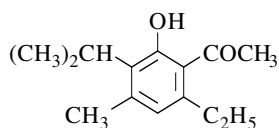
**Synthesis**

-Preparation by chromic degradation of 5-ethyl-2,3,6-trimethyl-7-isopropylbenzofuran (52%) [967].

b.p.<sub>16</sub> 164-167° [967].

**1-[6-Ethyl-2-hydroxy-4-methyl-3-(1-methylethyl)phenyl]ethanone**C<sub>14</sub>H<sub>20</sub>O<sub>2</sub>

mol.wt. 220.31

**Synthesis**

-Preparation by chromic degradation of 4-ethyl-2,3,6-trimethyl-7-isopropylbenzofuran (46%) [967].

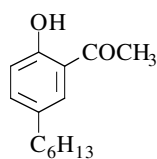
b.p.<sub>18</sub> 165-166° [967].

**1-(5-Hexyl-2-hydroxyphenyl)ethanone**

[55168-32-6]

C<sub>14</sub>H<sub>20</sub>O<sub>2</sub>

mol.wt. 220.31

**Synthesis**

-Preparation by Fries rearrangement of p-n-hexylphenyl acetate with aluminium chloride without solvent (15%) [1335].

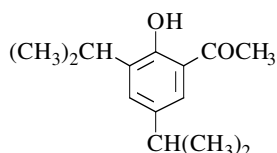
yellow oil [1335]; b.p.<sub>0.7</sub> 110° [1335]; MS [1335].

**1-[2-Hydroxy-3,5-bis(1-methylethyl)phenyl]ethanone**

[35158-23-7]

C<sub>14</sub>H<sub>20</sub>O<sub>2</sub>

mol.wt. 220.31

**Synthesis**

-Preparation by reaction of ethyl acetoacetate with 5-methyl-2-isopropyl-2-hexenal in the presence of pyridine and piperidine as catalysts in refluxing benzene (40%). The 5-methyl-2-isopropyl-2-hexenal was obtained by self-condensation of isovaleraldehyde in the presence of 15% potassium hydroxide solution [940] [941] [942].

m.p. 37° [940] [941] [942]; b.p.<sub>0.05-0.10</sub> 70-80° [940] [941] [942];

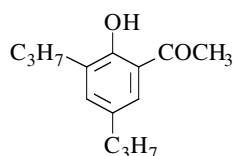
<sup>1</sup>H NMR [940] [941] [942], IR [940] [941] [942], UV [940] [941] [942].

**1-(2-Hydroxy-3,5-dipropylphenyl)ethanone**

[35198-96-0]

C<sub>14</sub>H<sub>20</sub>O<sub>2</sub>

mol.wt. 220.31

**Synthesis**

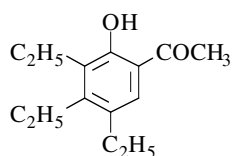
-Preparation by reaction of ethyl acetoacetate with 2-n-propyl-2-heptenal in the presence of pyridine and piperidine as catalysts in refluxing benzene (42%). The 2-n-propyl-2-heptenal was obtained by self-condensation of n-valeraldehyde in the presence of 15% potassium hydroxide solution [940] [941] [942].

liquid [940] [941] [942]; b.p.<sub>0.075</sub> 80-90° [940] [941] [942];

<sup>1</sup>H NMR [940] [941] [942], IR [940] [941] [942], UV [940] [941] [942].

**1-(3,4,5-Triethyl-2-hydroxyphenyl)ethanone**C<sub>14</sub>H<sub>20</sub>O<sub>2</sub>

mol.wt. 220.31

**Synthesis**

-Preparation by Fries rearrangement of 2,4,6-triethylphenyl acetate with aluminium chloride *via* a migration of two ethyl groups (65%) [102].

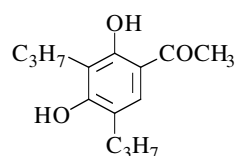
b.p.<sub>12</sub> 153-155° [102].

**1-(2,4-Dihydroxy-3,5-dipropylphenyl)ethanone**

[72018-36-1]

C<sub>14</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 236.31

**Syntheses**

-Preparation by hydrogenation of 2,4-dihydroxy-3,5-dipropenylacetophenone in ethanol using 10% PdO/C as catalyst (98%) [1372].

-Also refer to: [43] [44].

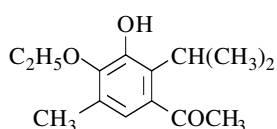
**N.B.:** Pr indicates the *propyl* group -C<sub>3</sub>H<sub>7</sub> in Chem. Abstr., **92**, 6368x (1980) and **98**, 54239b (1983), as usual abbreviation. However, in the two references [43] [44], Pr represented the *prenyl* group -CH<sub>2</sub>CH=C(CH<sub>3</sub>)<sub>2</sub>. Therefore they concern the 2,4-dihydroxy-3,5-diprenylacetophenone and not the above mentioned 2,4-dihydroxy-3,5-dipropylacetophenone.

m.p. 98-99° [1372].

**1-[4-Ethoxy-3-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone**

C<sub>14</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 236.31



Synthesis

-Preparation by diazotization of 3-amino-4-ethoxy-5-methyl-2-isopropylacetophenone, followed by hydrolysis of the diazonium salt obtained (44%) [902].

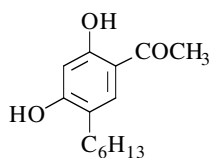
m.p. 88° [902].

**1-(5-Hexyl-2,4-dihydroxyphenyl)ethanone**

[63411-88-1]

C<sub>14</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 236.31



Syntheses

-Preparation by reaction of acetonitrile on 4-n-hexyl-resorcinol (Hoesch reaction) (84%) [1277].

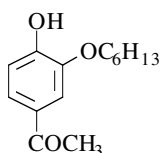
-Preparation from 5-hexyl-2,4-dimethoxyacetophenone by demethylation with boron tribromide in methylene chloride at r.t. (70%) [256] [257].

m.p. 86-87° [1277].

**1-[3-(Hexyloxy)-4-hydroxyphenyl]ethanone**

C<sub>14</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 236.31



Synthesis

-Preparation from 4-(benzyloxy)-3-hexyloxyacetophenone by catalytic debenzoylation on Pd/C (89%) [1211].

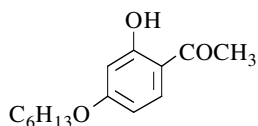
m.p. 48° [1211].

**1-[4-(Hexyloxy)-2-hydroxyphenyl]ethanone**

[143286-85-5]

C<sub>14</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 236.31



Synthesis

-Preparation by partial alkylation of resacetophenone with hexyl bromide in the presence of potassium carbonate in refluxing acetone for 20 h [183].

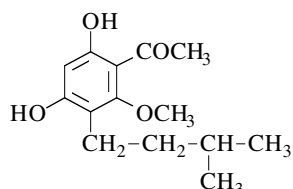
m.p. 22° [183].

**1-[4,6-Dihydroxy-2-methoxy-3-(3-methylbutyl)phenyl]ethanone**

[14764-76-2]

C<sub>14</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 252.31

**Synthesis**

-Preparation from acronylin (4,6-dihydroxy-2-methoxy-3-isopentenylacetophenone) by catalytic reduction with Pd/C as catalyst in ethyl acetate [230].

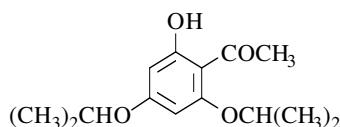
m.p. 143° [230]; <sup>1</sup>H NMR [230].

**1-[2-Hydroxy-4,6-bis(1-methylethoxy)phenyl]ethanone**

[93344-48-0]

C<sub>14</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 252.31

**Synthesis**

-Preparation by reaction of 2-bromopropane with phloracetophenone in the presence of potassium carbonate in DMF at reflux (67%) [841].

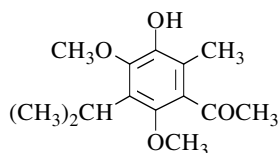
dark red oil [841]; <sup>1</sup>H NMR [841], IR [841], MS [841].

**1-[3-Hydroxy-4,6-dimethoxy-2-methyl-5-(1-methylethyl)phenyl]ethanone**

[159848-01-8]

C<sub>14</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 252.31

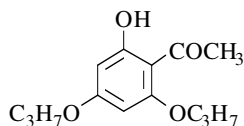
**Synthesis**

-Obtained by reaction of 3-chloroperbenzoic acid with 2,4-dimethoxy-6-methyl-3-isopropylacetophenone in refluxing ethylene dichloride for 48 h (34%) [1859].

m.p. 98-100° [1859]; <sup>1</sup>H NMR [1859].

**1-[2-Hydroxy-4,6-bis(propyloxy)phenyl]ethanone**C<sub>14</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 252.31

**Synthesis**

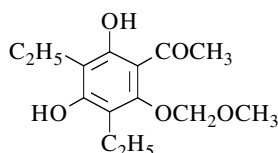
-Preparation by catalytic hydrogenation of 2-hydroxy-4,6-bis(2-propynyloxy)acetophenone in the presence of 10% Pd/C in methanol [427].

**1-[3,5-Diethyl-2,4-dihydroxy-6-(methoxymethoxy)phenyl]ethanone**

[175785-90-7]

C<sub>14</sub>H<sub>20</sub>O<sub>5</sub>

mol.wt. 268.31



Synthesis

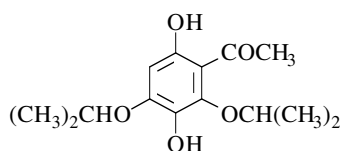
-Refer to: [1737] (Japanese patent).

**1-[3,6-Dihydroxy-2,4-bis(1-methylethoxy)phenyl]ethanone**

[93344-49-1]

C<sub>14</sub>H<sub>20</sub>O<sub>5</sub>

mol.wt. 268.31



Synthesis

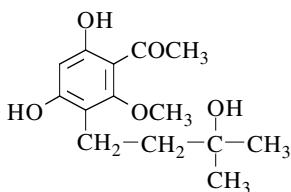
-Preparation from 2-hydroxy-4,6-diisopropoxyacetophenone by persulfate oxidation (Elbs reaction) (12%) [841].

oil [841]; <sup>1</sup>H NMR [841], IR [841], MS [841].**1-[4,6-Dihydroxy-3-(3-hydroxy-3-methylbutyl)-2-methoxyphenyl]ethanone**

[153399-41-8]

C<sub>14</sub>H<sub>20</sub>O<sub>5</sub>

mol.wt. 268.31



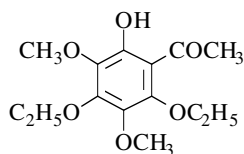
Synthesis

-Obtained by catalytic hydrogenation of 4,6-bis(benzyloxy)-3-(3-hydroxy-3-methylbutynyl)-2-methylacetophenone in methanol in the presence of Pd/C at 20° [1824].

m.p. 156-158° [1824];

<sup>1</sup>H NMR [1824].**1-(2,4-Diethoxy-6-hydroxy-3,5-dimethoxyphenyl)ethanone**C<sub>14</sub>H<sub>20</sub>O<sub>6</sub>

mol.wt. 284.31



Synthesis

-Preparation by Friedel-Crafts acylation of 1,3-diethoxy-2,4,5-trimethoxybenzene with acetyl chloride in the presence of aluminium chloride (60%) [801].

b.p.<sub>0.2</sub> 119-121° [801].

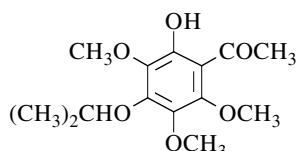


**1-[2-Hydroxy-3,5,6-trimethoxy-4-(1-methylethoxy)phenyl]ethanone**

[56002-87-0]

C<sub>14</sub>H<sub>20</sub>O<sub>6</sub>

mol.wt. 284.31

**Synthesis**

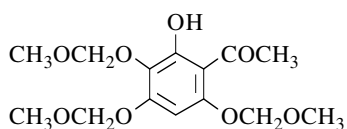
-Obtained (poor yield) by Friedel-Crafts acylation of 3-isopropoxy-2,4,5-trimethoxyphenol with acetyl chloride in ethyl ether in the presence of aluminium chloride (9%) [802].

<sup>1</sup>H NMR [802].**1-[2-Hydroxy-3,4,6-tris(methoxymethoxy)phenyl]ethanone**

[53000-17-2]

C<sub>14</sub>H<sub>20</sub>O<sub>8</sub>

mol.wt. 316.31

**Synthesis**

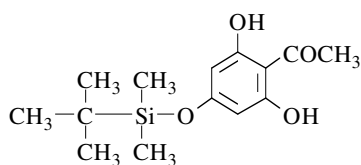
-Obtained by reaction of chloromethyl methyl ether with 2,3,4,6-tetrahydroxyacetophenone in ethanol in the presence of sodium ethoxide under nitrogen, first at 0°, then at 40° (13%) [1341].

yellow oil [1341]; <sup>1</sup>H NMR [1341], IR [1341].**1-[4-[(1,1-Dimethylethyl)dimethylsilyl]oxy]-2,6-dihydroxyphenyl]ethanone**

[139140-13-9]

C<sub>14</sub>H<sub>22</sub>O<sub>4</sub>Si

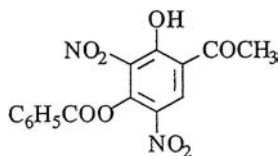
mol.wt. 282.41

**Synthesis**

-Obtained by sonication of 2',4',6'-(tri-tert-butyl-dimethylsilyloxy)acetophenone in solution of methanol and carbon tetrachloride (1:1) at 50-55° for 12 h (85%) [487].

Colourless oil [487]; <sup>1</sup>H NMR [487], <sup>13</sup>C NMR [487], IR [487], MS [487].**1-[4-(Benzoyloxy)-2-hydroxy-3,5-dinitrophenyl]ethanone**C<sub>15</sub>H<sub>10</sub>N<sub>2</sub>O<sub>8</sub>

mol.wt. 346.25

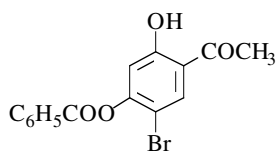
**Synthesis**

-Preparation (by-product) by reaction of concentrated nitric acid on 4-(benzoyloxy)-2-hydroxyacetophenone in acetic acid at r.t. [870].

m.p. 171-172° [870].

**1-[4-(Benzoyloxy)-5-bromo-2-hydroxyphenyl]ethanone**C<sub>15</sub>H<sub>11</sub>BrO<sub>4</sub>

mol.wt. 335.15



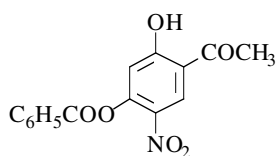
## Synthesis

-Preparation by bromination of 4-(benzoyloxy)-2-hydroxyacetophenone [515] [870].

m.p. 176° [515], 175-177° [870].

**1-[4-(Benzoyloxy)-2-hydroxy-5-nitrophenyl]ethanone**C<sub>15</sub>H<sub>11</sub>NO<sub>6</sub>

mol.wt. 301.26



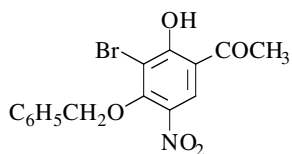
## Synthesis

-Preparation by reaction of concentrated nitric acid on 4-(benzoyloxy)-2-hydroxyacetophenone in acetic acid at r.t. [870].

m.p. 125-126° [870].

**1-[3-Bromo-2-hydroxy-5-nitro-4-(phenylmethoxy)phenyl]ethanone**C<sub>15</sub>H<sub>12</sub>BrNO<sub>5</sub>

mol.wt. 366.17



## Synthesis

-Preparation by bromination of 4-(benzoyloxy)-2-hydroxy-5-nitroacetophenone in chloroform solution in the presence of iron wire [870].

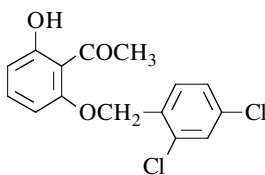
m.p. 150-151° [870].

**1-[2-[(2,4-Dichlorophenyl)methoxy]-6-hydroxyphenyl]ethanone**

[63411-86-9]

C<sub>15</sub>H<sub>12</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 311.16



## Synthesis

-Obtained by reaction of 2,4-dichlorobenzyl chloride with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (62%) [237].

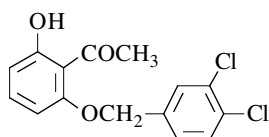
m.p. 126-127° [237].

**1-[2-[(3,4-Dichlorophenyl)methoxy]-6-hydroxyphenyl]ethanone**

[63411-85-8]

C<sub>15</sub>H<sub>12</sub>Cl<sub>2</sub>O<sub>3</sub>

mol.wt. 311.16

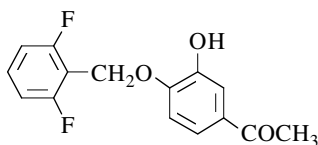
**Synthesis**

-Obtained by reaction of 3,4-dichlorobenzyl bromide or chloride with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (52%) [237].

m.p. 175-176° [237].

**1-[4-(2,6-Difluorophenyl)methoxy-3-hydroxyphenyl]ethanone**C<sub>15</sub>H<sub>12</sub>F<sub>2</sub>O<sub>3</sub>

mol.wt. 278.26

**Synthesis**

-Obtained by stirring a mixture of 3,4-dihydroxyacetophenone, lithium carbonate and  $\alpha$ -bromo-2,6-difluorotoluene in DMF for 2 days at r.t. (38%) [701].

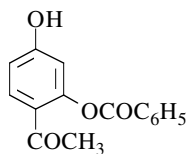
solid [701]; <sup>1</sup>H NMR [701].

**1-[2-(Benzoyloxy)-4-hydroxyphenyl]ethanone**

[144406-93-9]

C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 256.26

**Synthesis**

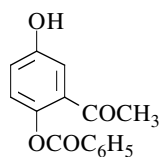
-Obtained by conventional acylation of resacetophenone with benzoyl chloride [1330].

**1-[2-(Benzoyloxy)-5-hydroxyphenyl]ethanone**

[88087-03-0]

C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 256.26

**Synthesis**

-Preparation by hydrogenolysis of 5-(benzyloxy)-2-(benzyloxy)acetophenone in ethyl acetate using 10% Pd/C as catalyst, at r.t. for 5 h (78%) [1008].

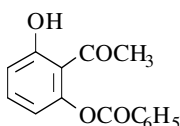
m.p. 168-169° [1008]; <sup>1</sup>H NMR [1008].

**1-[2-(Benzoyloxy)-6-hydroxyphenyl]ethanone**

[50634-01-0]

C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 256.26

**Synthesis**

-Preparation by reaction of benzoyl chloride on 2,6-dihydroxyacetophenone in aqueous sodium hydroxide solution (60%) [763].

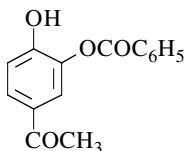
m.p. 99-100° [763].

**1-[3-(Benzoyloxy)-4-hydroxyphenyl]ethanone**

[101140-07-2]

C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 256.26

**Synthesis**

-Preparation by reaction of benzoyl chloride with 3,4-dihydroxyacetophenone in the presence of pyridine, first at 0° for 5 min, then at r.t. for 24 h under nitrogen atmosphere (77%) [1700].

m.p. 143-156° [1700]. This gap of 13° appears in the publication.

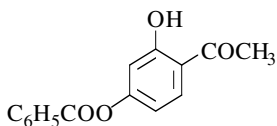
<sup>1</sup>H NMR [1700], IR [1700], MS [1700].

**1-[4-(Benzoyloxy)-2-hydroxyphenyl]ethanone**

[109311-05-9]

C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 256.26

**Syntheses**

-Preparation by reaction of benzoyl chloride on resacetophenone [137] [515] [874] [982],  
\*with aqueous sodium hydroxide (68%) [137];  
\*with aqueous potassium hydroxide [982];

\*with potassium carbonate in toluene by heating on a steam bath (52%) [137];

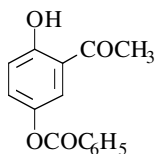
\*with aluminium chloride in nitrobenzene by heating in a water bath (21%) [515].

-Also refer to: [816].

m.p. 110° [515], 107-108° [874], 106-107° [137], 105-106° [982].

**1-[5-(Benzoyloxy)-2-hydroxyphenyl]ethanone**C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>

mol.wt. 256.26

**Synthesis**

-Obtained by reaction of aluminium chloride on 4-(benzoyloxy)phenyl acetate without solvent between 125° and 155° (13%) [46].

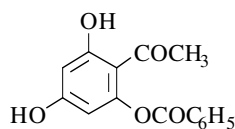
m.p. 77-78° [46].

**1-[2-(Benzoyloxy)-4,6-dihydroxyphenyl]ethanone**

[83332-29-0]

C<sub>15</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 272.26

**Synthesis**

-Obtained by reaction of benzoyl chloride on phloracetophenone with 2% aqueous potassium hydroxide solution at 0° (6%) [352] or with dilute aqueous sodium hydroxide solution [1673].

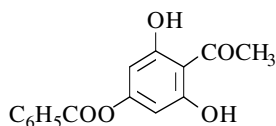
m.p. 186° [352], 177-178° [1673].

**1-[4-(Benzoyloxy)-2,6-dihydroxyphenyl]ethanone**

[130471-75-9]

C<sub>15</sub>H<sub>12</sub>O<sub>5</sub>

mol.wt. 272.26

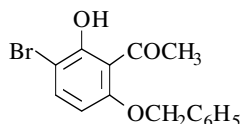
**Synthesis**

-Obtained by reaction of benzoyl chloride on phloracetophenone with 2% aqueous potassium hydroxide solution at 0° (19%) [352].

m.p. 210-211° [352].

**1-[3-Bromo-2-hydroxy-6-(phenylmethoxy)phenyl]ethanone**C<sub>15</sub>H<sub>13</sub>BrO<sub>3</sub>

mol.wt. 321.17

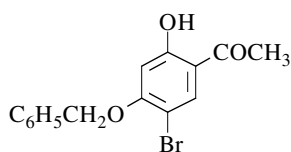
**Synthesis**

-Preparation by reaction of bromine on 2-(benzyloxy)-6-hydroxyacetophenone in methylene chloride (84%) [1873] or in acetic acid at r.t. (58%) [1213].

m.p. 125-126° [1213], 124° [1873]; IR [1873].

**1-[5-Bromo-2-hydroxy-4-(phenylmethoxy)phenyl]ethanone**C<sub>15</sub>H<sub>13</sub>BrO<sub>3</sub>

mol.wt. 321.17

**Syntheses**

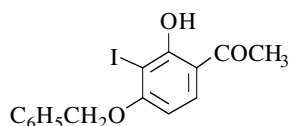
-Obtained from 3,3'-diacetyl-4,4'-dihydroxy-6,6'-dibenzyl-oxydiphenyl thioether by treatment with bromine in the presence of a crystal of iodine in boiling acetic acid for 8 h then at r.t. overnight [871].

-Also obtained by bromination of 4-(benzyloxy)-2-hydroxyacetophenone with bromine in carbon disulfide in the presence of a trace of iodine [534].

m.p. 154-155° [534] [871].

**1-[2-Hydroxy-3-iodo-4-(phenylmethoxy)phenyl]ethanone**C<sub>15</sub>H<sub>13</sub>IO<sub>3</sub>

mol.wt. 368.17

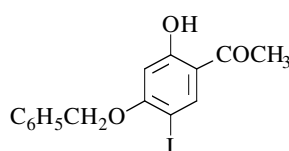
**Synthesis**

-Preparation by iodination of 4-(benzyloxy)-2-hydroxyacetophenone [928].

m.p. 165° [928].

**1-[2-Hydroxy-5-iodo-4-(phenylmethoxy)phenyl]ethanone**C<sub>15</sub>H<sub>13</sub>IO<sub>3</sub>

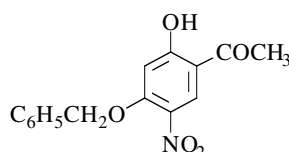
mol.wt. 368.17

**Synthesis**

-Obtained (by-product) during the rearrangement of 2-(benzyloxy)-4-(benzyloxy)-3-iodoacetophenone to give 7-(benzyloxy)-8-iodoflavone [928].

**1-[2-Hydroxy-5-nitro-4-(phenylmethoxy)phenyl]ethanone**C<sub>15</sub>H<sub>13</sub>NO<sub>5</sub>

mol.wt. 287.27

**Synthesis**

-Preparation by nitration of 4-(benzyloxy)-2-hydroxyacetophenone in acetic acid at r.t. [870].

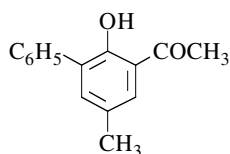
m.p. 140-141° [870].

**1-(2-Hydroxy-5-methyl[1,1'-biphenyl]-3-yl)ethanone**

[360791-68-0]

C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 226.27

**Synthesis**

-Obtained by successively adding an aqueous solution of sodium bicarbonate (6 mmol), then tetrakis(triphenylphosphine)palladium (0) (0.1 mmol) to a solution of 3-bromo-2-hydroxy-5-methylacetophenone (2 mmol) and phenylboronic acid (2 mmol) in ethylene glycol dimethyl ether (DME). After, the reaction mixture was refluxed for 10 min and then heated at 75° overnight (71%) (compound 26) [1848].

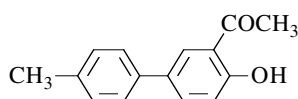
yellow solid [1848]; <sup>1</sup>H NMR [1848], MS [1848].

**1-(4-Hydroxy-4'-methyl[1,1'-biphenyl]-3-yl)ethanone**

[229007-00-5]

C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 226.27

**Synthesis**

-Obtained by Fries rearrangement of 4'-methyl-4-biphenyl acetate (1 mol) with aluminium chloride (1.1 mol) in refluxing o-dichlorobenzene for 3 h (67%) [1910].

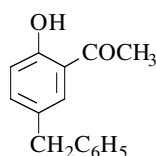
m.p. 82°-83° [1910]; <sup>1</sup>H NMR [1910], IR [1910], GC-MS [1910].

**1-[2-Hydroxy-5-(phenylmethyl)phenyl]ethanone**

[61300-15-0]

C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 226.27

**Synthesis**

-Preparation by Fries rearrangement of 4-hydroxydiphenylmethane acetate with aluminium chloride in chlorobenzene at 130° [71] [1896], (85%) [1896].

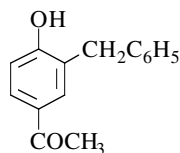
m.p. 56° [1896], 55-56° [71].

**1-[4-Hydroxy-3-(phenylmethyl)phenyl]ethanone**

[95102-24-2]

C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>

mol.wt. 226.27

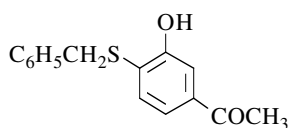
**Syntheses**

-Preparation by Fries rearrangement of 2-hydroxydiphenylmethane acetate in the presence of aluminium chloride in nitrobenzene at 50-60° (70%) [1896].  
-Also refer to: [949] [1545].

m.p. 137-138° [1896].

**1-[3-Hydroxy-4-(phenylmethyl)thiophenyl]ethanone**C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>S

mol.wt. 258.34

**Synthesis**

-Obtained by reaction of benzyl bromide with 3-hydroxy-4-mercaptoacetophenone (SM) in the presence of potassium carbonate in refluxing acetone for 2 h (20%). SM was prepared by demethylation of 3-methoxy-4-mercaptoacetophenone with boron tribromide in methylene chloride for 2 h at -78° [701].

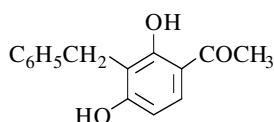
<sup>1</sup>H NMR [701].

**1-[2,4-Dihydroxy-3-(phenylmethyl)phenyl]ethanone**

[67088-16-8]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Syntheses**

- Preparation by reaction of boron tribromide with 3-benzyl-2,4-dimethoxyacetophenone in methylene chloride, first at -50°, then at r.t. (90%) [297].
- Preparation by reaction of concentrated hydrochloric acid with 3-benzyl-4-(benzyloxy)-2-hydroxyacetophenone in refluxing acetic acid (69%) [1274].
- Also obtained by reacting 4-(benzyloxy)-2-hydroxyacetophenone with trifluoroacetic acid at r.t. for 70 h (17%) [878].
- Also obtained by reaction of benzyl alcohol with resacetophenone in the presence of boron trifluoride etherate and dioxane at 60-70° (16%) [878].
- Also obtained by reaction of acetonitrile on 2-benzylresorcinol (Hoesch reaction) (11%) [1274].
- Also obtained by reaction of benzyl bromide with resacetophenone in the presence of methanolic potassium hydroxide at r.t. (18%) [885].
- Also obtained by catalytic reduction of 2',4'-dihydroxy-3'-[phenyl-(1-piperidyl)methyl]-acetophenone in the presence of Pd/C [937] [939], (68%) [939]. An alternative route of reduction consisted in heating the starting material and Pd/C in tetralin between 140 and 150° for 8 h (57%) [939]. The starting material was obtained by treatment of resacetophenone in ethanol or benzene with benzylidene-bis-piperidine.
- Also refer to: [938].

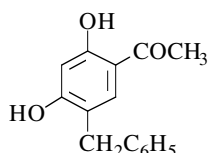
m.p. 207-208° [937] [939], 196-198° [885], 195-197° [1274], 195-196° [878];

<sup>1</sup>H NMR [297] [878] [939], IR [878] [939], UV [878].**1-[2,4-Dihydroxy-5-(phenylmethyl)phenyl]ethanone**

[93898-99-8]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Syntheses**

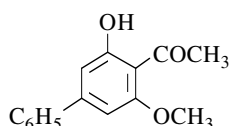
- Preparation by Fries rearrangement of 4-benzylresorcinol diacetate with aluminium chloride in the presence of 4-benzylresorcinol in nitrobenzene at 50° (85%) [1896].
- Also obtained by reacting 2-hydroxy-4-(benzyloxy)acetophenone with trifluoroacetic acid at r.t. for 70 h (29%) [878].
- Also obtained by reaction of benzyl alcohol with resacetophenone in the presence of boron trifluoride etherate and dioxane at 60-70° (24%) [878].
- Also obtained (poor yield) by reaction of benzyl bromide with resacetophenone in the presence of methanolic potassium hydroxide at r.t. (< 2%) [885].

m.p. 149° [1896], 140-142° [885], 140-141° [878]; <sup>1</sup>H NMR [878], IR [878], UV [878].**1-(3-Hydroxy-5-methoxy[1,1'-biphenyl]-4-yl)ethanone**

[32101-40-9]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Synthesis**

- Preparation by dehydrogenation of 2-acetyl-3-methoxy-5-phenyl-2-cyclohexenone in the presence of Pd black powder in refluxing cyclohexene for 6 h (70%) [32].

m.p. 96-97° [32]; IR [32], UV [32].

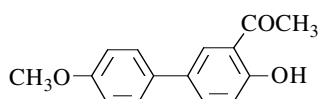


**1-(4-Hydroxy-4'-methoxy[1,1'-biphenyl]-3-yl)ethanone**

[114412-47-4]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Synthesis**

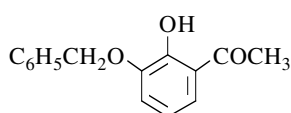
-Obtained by Fries rearrangement of 4-acetoxy-4'-methoxydiphenyl with aluminium chloride in tetrachloroethane at 140° for 30 min [771].

**1-[2-Hydroxy-3-(phenylmethoxy)phenyl]ethanone**

[30992-64-4]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Synthesis**

-Preparation by reaction of benzyl chloride with 2,3-dihydroxyacetophenone in the presence of potassium iodide and potassium carbonate in refluxing acetone for 4 h (43%) [776] or for 18 h (40%) [1427].

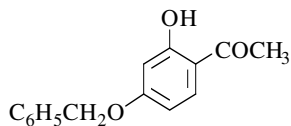
m.p. 55-56° [1427]; b.p.<sub>0.05</sub> 122-130° [776]; <sup>1</sup>H NMR [1427], IR [1427].

**1-[2-Hydroxy-4-(phenylmethoxy)phenyl]ethanone**

[29682-12-0]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Syntheses**

-Preparation by reaction of resacetophenone, with benzyl chloride, \*in the presence of potassium carbonate in refluxing acetone [183] [1068], (85%) [314], (50-52%) [8] [712] [943].

**N.B.:** The butanone can also be used instead of acetone [314]. The addition of potassium iodide improved yields [1068].

\*in the presence of potassium carbonate in DMF at 150-153° (62%) [1821];

\*in the presence of potassium carbonate and potassium iodide in refluxing acetone for 4 h [776] or for 18 h (67%) [1427];

\*in the presence of potassium hydroxide in refluxing methanol [1274].

-with benzyl bromide,

\*in the presence of potassium carbonate in a methyl ethyl ketone and DMSO mixture (53%) [1664];

\*in the presence of methanolic potassium hydroxide at r.t. (10%) [885].

-Also obtained by hydrolysis of 2-(acetyloxy)-4-(benzyloxy)acetophenone (m.p. 111-112°) with 10% aqueous sodium hydroxide in boiling methanol for 5 min (76%) [927].

-Also obtained (trace) by heating 4-acetyloxy-2-hydroxyacetophenone with benzyl chloride (< 1%) [25].

-Also refer to: [417] [607] [1133] [1135] [1311] [1557] [1615] [1663] [1840].

m.p. 111° [712], 110° [878], 109-110° [885], 106-107° [1274], 105-106° [776], 104-104°5 [927], 104-105° [314], 103-105° [183], 103-104° [8], 102-103° [25], 101-102° [1427], 94-95° [1821];

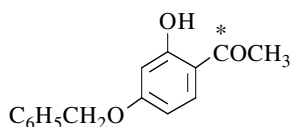
<sup>1</sup>H NMR [25] [1427] [1821], <sup>13</sup>C NMR [1396], UV [25] [927].

**1-[2-Hydroxy-4-(phenylmethoxy)phenyl]ethanone-1-<sup>14</sup>C**

[71815-42-4]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 244.27

**Syntheses**

-Preparation by reaction of benzyl chloride with [carbonyl-<sup>14</sup>C]resacetophenone in the presence of potassium carbonate and potassium iodide in DMF at 80° for 2 h [518], (69%) [519] or at 50-55° for 1 h (63%) [116].

m.p. 105°-106° [116], 103-105° [519];

sp. act. 6.09x10<sup>7</sup> dpm/mM [519]; 0.316 mCi/mM [518].

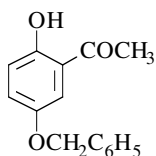
sp. act. 6.09x10<sup>7</sup> dpm/mM [519]; 0.316 mCi/mM [518].

**1-[2-Hydroxy-5-(phenylmethoxy)phenyl]ethanone**

[30992-63-3]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Syntheses**

-Preparation by reaction of benzyl chloride with quinacetophenone [130] [302] [943] in refluxing acetone in the presence of potassium carbonate,

\*with potassium iodide (85%) [302], (71%) [776], (55%) [1427];

\*without potassium iodide (31%) [130].

m.p. 100-102° [302], 69-70° [130] [776], 67-68° [1427]. One of the reported melting points is obviously wrong.

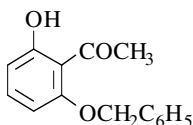
<sup>1</sup>H NMR [302] [1427], IR [302], MS [302].

**1-[2-Hydroxy-6-(phenylmethoxy)phenyl]ethanone**

[4047-24-9]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Syntheses**

-Preparation by reaction of benzyl chloride with 2,6-dihydroxyacetophenone,

\*in the presence of potassium carbonate in refluxing acetone [140] [1077], (58%) [140];

\*in the presence of potassium carbonate and potassium iodide in refluxing acetone for 18 h (40%) [1427];

\*in the presence of 15% aqueous sodium hydroxide, by heating in a water bath (67%) [1610].

-Preparation by reaction of benzyl bromide with 2,6-dihydroxyacetophenone monosodium salt (SM) in DMSO at r.t. for 1 h (76%). SM was prepared by reaction of sodium hydride (1 mol) with 2,6-dihydroxyacetophenone (1 mol) in DMSO at r.t. for 10 min [1815].

-Preparation by reaction of benzyl bromide with 2,6-dihydroxyacetophenone,

\*in the presence of potassium carbonate in refluxing acetone (60%) [1873];

\*in the presence of potassium carbonate and potassium iodide in refluxing acetone (about 80°) for 12 h (72%) [1423].

monohydrate [1423];

m.p. 110-111° [1423], 109-110° [140] [916] [1815], 109° [1873], 108-109° [1427]

106-109° [1077], 106-107° [1610];

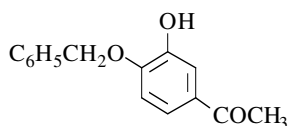
<sup>1</sup>H NMR [1423] [1427] [1815], <sup>13</sup>C NMR [1423], MS [1423].

**1-[3-Hydroxy-4-(phenylmethoxy)phenyl]ethanone**

[21092-94-4]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Syntheses**

-Preparation by reaction of benzyl chloride with 3,4-dihydroxyacetophenone in the presence of potassium hydroxide in a refluxing mixture of ethanol, methanol and water (53%) [1210].  
 -Also refer to: [1702].

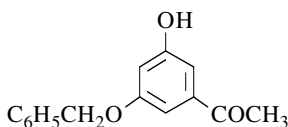
m.p. 118° [1210].

**1-[3-Hydroxy-5-(phenylmethoxy)phenyl]ethanone**

[81732-54-9]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Synthesis**

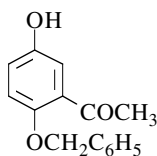
-Preparation by partial catalytic hydrogenolysis of 3,5-bis(benzyloxy)acetophenone in acetone in the presence of Pd/C (48%) [222].

m.p. 126-128° [222]; <sup>1</sup>H NMR [222].**1-[5-Hydroxy-2-(phenylmethoxy)phenyl]ethanone**

[83069-04-9]

C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>

mol.wt. 242.27

**Synthesis**

-Preparation by hydrolysis of 5-acetoxy-2-(benzyloxy)acetophenone (m.p. 111-112°) with 5% sodium hydroxide in boiling aqueous methanol (69%) [927].

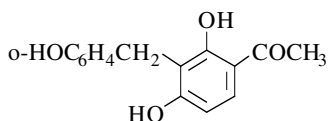
m.p. 117° [927]; UV [927].

**1-[2,4-Dihydroxy-3-[(2-hydroxyphenyl)methyl]phenyl]ethanone**

[103633-38-1]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Synthesis**

-Preparation by catalytic hydrogenolysis of 3-(o-benzyloxybenzyl)-2,4-dihydroxyacetophenone at r.t. in the presence of 10% Pd/C in ethyl acetate (67%) [873].

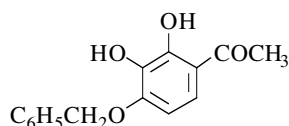
m.p. 204-205° [873]; <sup>1</sup>H NMR [873], IR [873], UV [873].

**1-[2,3-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone**

[69114-99-4]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Synthesis**

-Preparation by reaction of benzyl chloride on gallacetophenone with sodium bicarbonate and sodium iodide in refluxing acetone-ethanol mixture (33-37%) [972] [1571].

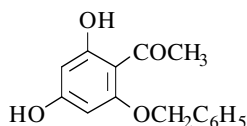
m.p. 137-138° [972], 133-133°5 [1571]; <sup>1</sup>H NMR [1571].

**1-[2,4-Dihydroxy-6-(phenylmethoxy)phenyl]ethanone**

[39548-86-2]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Syntheses**

-Preparation from 2-(benzyloxy)-4,6-dihydroxyacetophenone ditosilate (SM) by hydrolysis with 5% sodium hydroxide in ethanol (72%). The starting ketone (SM) was prepared by a two-step procedure from phloracetophenone [10].

-Also obtained (poor yield) by reaction of benzyl chloride on phloracetophenone with potassium carbonate in refluxing acetone (4%) [880].

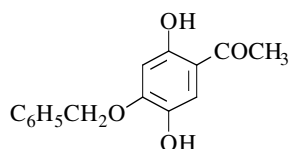
m.p. 239-240° [880], 233°5 [10]; <sup>1</sup>H NMR [880], UV [880].

**1-[2,5-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone**

[34176-17-5]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Syntheses**

-Preparation by reaction of benzyl halide with 2,4,5-trihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (62%) [1900].

-Preparation from 4-(benzyloxy)-2-hydroxyacetophenone by persulfate oxidation (Elbs reaction) (25%) [8] [703] [1068].

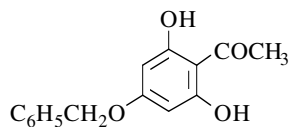
m.p. 160-162° [1068], 159-160° [8], 157-159° [1900].

**1-[2,6-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone**

[35028-02-5]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Syntheses**

-Preparation from 2,4-diacetyl-5-(benzyloxy)resorcinol by selective deacetylation by refluxing in 1 N sodium hydroxide for 1 h [342].

-Also obtained by reaction of benzyl chloride on phloracetophenone with potassium carbonate in refluxing acetone (13%) [1281].

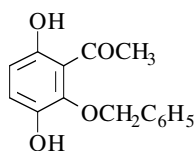
m.p. 188-189° (compound VIII) [1281],  
139-140° (compound II, R=H; R'=PhCH<sub>2</sub>-) [342]; <sup>1</sup>H NMR [342].

**1-[3,6-Dihydroxy-2-(phenylmethoxy)phenyl]ethanone**

[33537-81-4]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Syntheses**

- Preparation from 2-(benzyloxy)-6-hydroxyacetophenone by persulfate oxidation (Elbs reaction) (49%) [140].
- Easy preparation by reduction of 2-acetyl-3-(benzyloxy)-1,4-benzoquinone using conventional methods [587].
- Also obtained in low yield by reaction of 2-acetyl-1,4-benzo-

quinone with an excess of benzyl alcohol at r.t., with exclusion of light [587].

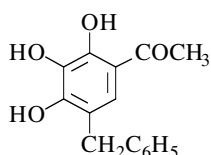
m.p. 94° [140], 87°5-89° [587]; <sup>1</sup>H NMR [587], IR [587].

**1-[2,3,4-Trihydroxy-5-(phenylmethyl)phenyl]ethanone**

[105485-44-7]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

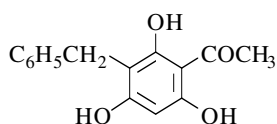
**Syntheses**

- Preparation by reaction of benzyl alcohol with gallacetophenone in the presence of boron trifluoride etherate in dioxane at 60-70° (49%) [885].
- Preparation by Claisen rearrangement of 3,4-bis-(benzyloxy)-2-hydroxyacetophenone in the presence of trifluoroacetic acid at r.t. (54%) [885].

m.p. 127-128° [885]; <sup>1</sup>H NMR [885], IR [885], UV [885].

**1-[2,4,6-Trihydroxy-3-(phenylmethyl)phenyl]ethanone**C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Syntheses**

- Obtained (poor yield) by reaction of a benzyl halogenide with phloracetophenone in the presence of sodium methoxide in methanol at r.t. (8%) [1491].
- Also obtained from 3-benzyl-4,6-bis(benzyloxy)-2-hydroxyacetophenone by hydrogenolysis in the presence of 5% Pd/C in ethanol [406].

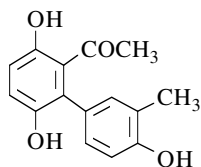
m.p. 208° [1491], 207-208° [406]; IR [406], UV [406].

**1-(3,4',6-Trihydroxy-3'-methyl[1,1'-biphenyl]-2-yl)ethanone**

[32541-10-9]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 258.27

**Synthesis**

- Obtained by catalytic reduction of 2-acetyl-3-(4-hydroxy-3-methylphenyl)-1,4-benzoquinone (SM). SM was obtained by condensation of o-cresol with 2-acetyl-1,4-benzoquinone in ethyl ether in the presence of trifluoroacetic acid at 0° (12%) [1054].

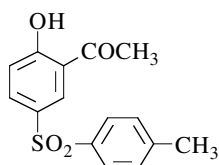
m.p. 194° [1054].

**1-[2-Hydroxy-5-[(4-methylphenyl)sulfonyl]phenyl]ethanone**

[147816-51-1]

C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>S

mol.wt. 290.34

**Syntheses**

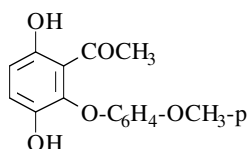
-Preparation by Fries rearrangement of 4-(p-tolylsulfonyl)-phenyl acetate with aluminium chloride (5 mol) at 160° for 1 h (58%) [1684].  
 -Also obtained by photo-Fries rearrangement of the same ester in acetonitrile (26%) or (40%) based on consumed starting material [1684].

m.p. 206-208° [1684]; <sup>1</sup>H NMR [1684], UV [1684].**1-[3,6-Dihydroxy-2-(4-methoxyphenoxy)phenyl]ethanone**

[52095-11-1]

C<sub>15</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 274.27

**Synthesis**

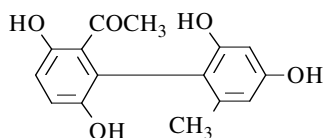
-Preparation by reaction of hydroquinone monomethyl ether on 2-acetylquinone with pyridine in benzene (43%) [586].

m.p. 74-77° [586]; <sup>1</sup>H NMR [586], IR [586].**1-(2',3,4',6'-Tetrahydroxy-6'-methyl[1,1'-biphenyl]-2-yl)ethanone**

[32546-66-0]

C<sub>15</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 274.27

**Synthesis**

-Obtained by condensation of 2-acetyl-1,4-benzoquinone with orcinol in an acetic acid/ethyl ether solution at r.t. for 1 h (50%) [1054].

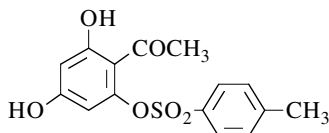
m.p. 185° [1054]; IR [1054].

**1-[2,4-Dihydroxy-6-[[4-(4-methylphenyl)sulfonyl]oxy]phenyl]ethanone**

[225088-72-2]

C<sub>15</sub>H<sub>14</sub>O<sub>6</sub>S

mol.wt. 322.05

**Synthesis**

-Preparation by hydrogenolysis of 2-toluenesulfonyloxy-4,6-bis(benzyloxy)acetophenone (m.p. 122-123°) in methanol with hydrogen in the presence of 10% Pd/C at r.t. for 20 h (94%) [825].

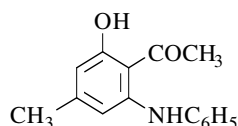
m.p. 150-152° [825]; <sup>1</sup>H NMR [825], IR [825], MS [825].

**1-[2-Hydroxy-4-methyl-6-(phenylamino)phenyl]ethanone**

[97066-04-1]

C<sub>15</sub>H<sub>15</sub>NO<sub>2</sub>

mol.wt. 241.29

**Synthesis**

-Obtained by reaction of aniline with 2-acetyl-3-dimethyl-amino-5-hydroxy-5-methyl-2-cyclohexenone in refluxing ethanol (17%) [562].

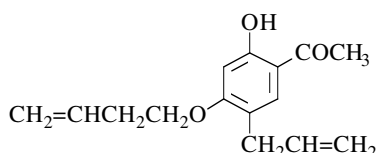
m.p. 115-117° [562]; <sup>1</sup>H NMR [562], IR [562], UV [562], MS [562].

**1-[4-(3-Butenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117690-53-6]

C<sub>15</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 246.31

**Synthesis**

-Preparation by reaction of 3-butenyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide at reflux (26%) [256] [257].

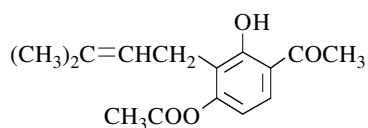
m.p. < 25° [256] [257].

**1-[4-(Acetyloxy)-2-hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[95604-05-0]

C<sub>15</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 262.31

**Synthesis**

-Preparation by acetylation of 3-prenylresacetophenone with acetic anhydride in the presence of boric acid, first under reflux for 5 min, then at r.t. for 24 h (60%) [1847].

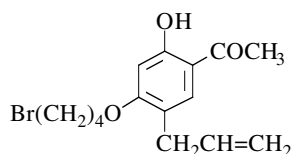
m.p. 66° [1847]; <sup>1</sup>H NMR [1847].

**1-[4-(4-Bromobutoxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117706-42-0]

C<sub>15</sub>H<sub>19</sub>BrO<sub>3</sub>

mol.wt. 327.22

**Synthesis**

-Preparation by reaction of 4-bromobutyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide at reflux (56%) [256] [257].

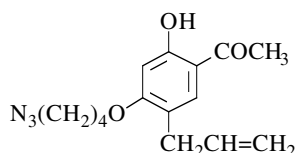
m.p. < 25° [256] [257].

**1-[4-(4-Azidobutoxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[140660-37-3]

C<sub>15</sub>H<sub>19</sub>N<sub>3</sub>O<sub>3</sub>

mol.wt. 289.33

**Synthesis**

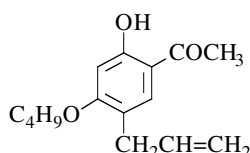
-Preparation by reaction of sodium azide on 5-allyl-4-(4-bromobutoxy)-2-hydroxyacetophenone in DMF at r.t. [257] [777].

**1-[4-Butoxy-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117690-48-9]

C<sub>15</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 248.32

**Synthesis**

-Preparation by reaction of n-butyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (60%) [256] [257] [777].

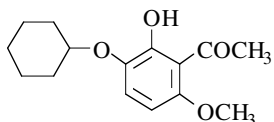
oil [256] [257] [777].

**1-[3-(Cyclohexyloxy)-2-hydroxy-6-methoxyphenyl]ethanone**

[126405-80-9]

C<sub>15</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 264.32

**Synthesis**

-Preparation by adding 2-hydroxy-3-iodo-6-methoxyacetophenone and cuprous iodide to a solution of sodium cyclohexanolate, previously prepared from cyclohexanol and sodium hydride in DMF [1873].

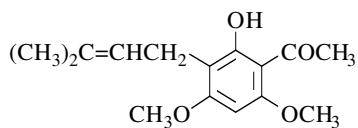
oil [1873]; <sup>1</sup>H NMR [1873], IR [1873].

**1-[2-Hydroxy-4,6-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[33523-62-5]

C<sub>15</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 264.32

**Synthesis**

-Obtained by partial methylation of 2,4-dihydroxy-6-methoxy-3-prenylacetophenone [876].

m.p. 113-114° [876].

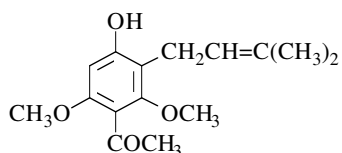


**1-[4-Hydroxy-2,6-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone**

[18780-96-6]

C<sub>15</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 264.32

**Syntheses**

-Preparation:  $\gamma,\gamma$ -dimethylallyl bromide was added to the lithium salt of 4-acetyl-3,5-dimethoxyphenol, which is easily prepared in benzene by reaction with butyl lithium (6%) [353].

-Preparation by thermal Claisen rearrangement of 4-( $\gamma,\gamma$ -dimethylallyloxy)-2,6-dimethoxyacetophenone

in refluxing diethylaniline [786] [787], (> 90%) [786].

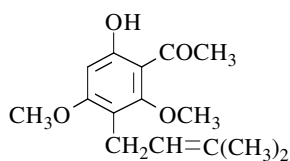
m.p. 66-68° [353]; <sup>1</sup>H NMR [353], UV [353], MS [353].

**1-[6-Hydroxy-2,4-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone***(Acronylin methyl ether).*

[4683-33-4]

C<sub>15</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 264.32

**Synthesis**

-Obtained by reaction of dimethyl sulfate with 4,6-dihydroxy-2-methoxy-3-prenylacetophenone (m.p. 127-128°) in the presence of potassium carbonate in refluxing acetone for 3 h (38%) [877].

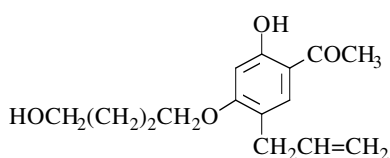
m.p. 78-79° [877]; TLC [877].

**1-[2-Hydroxy-4-(4-hydroxybutoxy)-5-(2-propenyl)phenyl]ethanone**

[117690-52-5]

C<sub>15</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 264.32

**Synthesis**

-Obtained by reaction of 4-hydroxybutyl bromide on 5-allyl-2,4-dihydroxyacetophenone with potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (5-12%) [256] [257] [777].

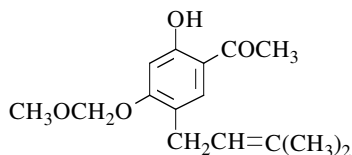
m.p. 117-119° [256] [257] [777].

**1-[2-Hydroxy-4-(methoxymethoxy)-5-(3-methyl-2-butenyl)phenyl]ethanone**

[99217-72-8]

C<sub>15</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 264.32

**Synthesis**

-Preparation by treatment of 2,4-dihydroxy-5-prenylacetophenone with methoxymethyl chloride in the presence of potassium carbonate in acetone [1179], (good yield) [1713].

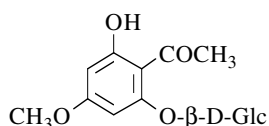
<sup>1</sup>H NMR [1179], IR [1179], UV [1179].

**1-[2-(β-D-Glucopyranosyloxy)-6-hydroxy-4-methoxyphenyl]ethanone**

[24587-97-1]

C<sub>15</sub>H<sub>20</sub>O<sub>9</sub>

mol.wt. 344.32



Isolation from natural sources

-From the leaves of *Ribes alpinum* L. (alpine currant) (Grossulariaceae) [685].

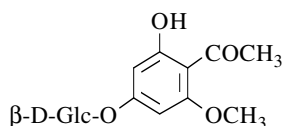
spectral data [853]; TLC [685].

**1-[4-(β-D-Glucopyranosyloxy)-2-hydroxy-6-methoxyphenyl]ethanone (Annphenone)**

[61775-18-6]

C<sub>15</sub>H<sub>20</sub>O<sub>9</sub>

mol.wt. 344.32



Synthesis

-Preparation by reaction, first, of a saturated aqueous barium hydroxide solution on 2-hydroxy-6-methoxy-4-(tetraacetyl-β-D-glucoside)acetophenone, and then carbon dioxide (38%) [1945].

Isolation from natural sources

- From the aerial parts of *Artemisia iwayomogi* (Compositae) [977].
- From the aerial parts of *Artemisia sacrorum* [1947] and from *Artemisia sacrorum* Ledeb. (Compositae) [1007].
- From the aerial parts of *Artemisia stolonifera* (Max.) Kom (Compositae) [1075].
- From the rhizomes of *Rhodiola linearifolia* Boriss. [1556].
- From the aerial parts of *Artemisia annua* [1645].
- From the leaves of *Monochaetum multiflorum* (Melastomataceae) [854].

m.p. 215° [1945], 185-188° [1007], 160-162° [1645], 156-158° [977] [1075];

(α)<sub>D</sub><sup>20</sup> = -56°4 (pyridine) [1945];<sup>1</sup>H NMR [977] [1007] [1075] [1645], <sup>13</sup>C NMR [977] [1007] [1075] [1645],

IR [977] [1007] [1075] [1645], UV [977] [1075] [1645],

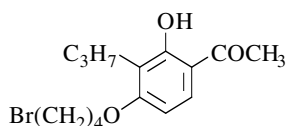
MS [977] [1007], EIMS [1645].

**1-[4-(4-Bromobutoxy)-2-hydroxy-3-propylphenyl]ethanone**

[92518-06-4]

C<sub>15</sub>H<sub>21</sub>BrO<sub>3</sub>

mol.wt. 329.23



Synthesis

-Preparation by reaction of 1,4-dibromobutane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (78%) [1156].

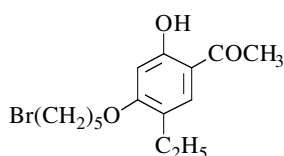
b.p.<sub>0.25</sub> 180° [1156].

**1-[4-[(5-Bromopentyl)oxy]-5-ethyl-2-hydroxyphenyl]ethanone**

[117690-80-9]

C<sub>15</sub>H<sub>21</sub>BrO<sub>3</sub>

mol.wt. 329.23

**Synthesis**

-Preparation by reaction of 5-bromopentyl bromide with 2,4-dihydroxy-5-ethylacetophenone in the presence of potassium carbonate and potassium iodide at reflux (60%) [256] [257].

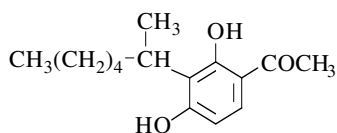
m.p. 60-62° [256] [257]; <sup>1</sup>H NMR [256] [257].

**1-[2,4-Dihydroxy-3-(1-methylhexyl)phenyl]ethanone**

[79557-94-1]

C<sub>15</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 250.34

**Synthesis**

-Preparation by hydrogenation of 2,4-dihydroxy-3-(1-methyl-2-hexenyl)acetophenone in ethanol using 10% PdO/C as catalyst (54%) [1372].

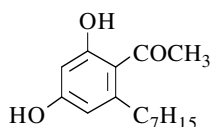
m.p. 78-81° [1372].

**1-(2-Heptyl-4,6-dihydroxyphenyl)ethanone**

[83375-18-2]

C<sub>15</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 250.34

**Syntheses**

-Preparation by reaction of acetonitrile with 5-heptylresorcinol according to Hoesch reaction (57%) [986].  
-Also refer to: [987].

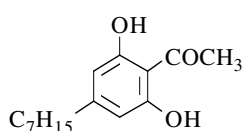
m.p. 61-62° [986]; <sup>1</sup>H NMR [986].

**1-(4-Heptyl-2,6-dihydroxyphenyl)ethanone**

[83375-19-3]

C<sub>15</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 250.34

**Synthesis**

-Obtained (poor yield) by reaction of acetonitrile with 5-heptylresorcinol according to Hoesch reaction (5%) [986].

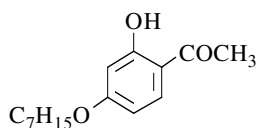
m.p. 46-47° [986]; <sup>1</sup>H NMR [986].

**1-[4-(Heptyloxy)-2-hydroxyphenyl]ethanone**

[219696-56-7]

C<sub>15</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 250.34

**Synthesis**

-Preparation by reaction of 1-heptanol with resacetophenone using polymer-bound triphenylphosphine\* and diethyl azodicarboxylate (DEAD) in methylene chloride at 25° for 5 h (72%) [1827].

\*Polystyryl-diphenylphosphine-2% divinylbenzene.

**N.B.:** The polymer-bound triphenylphosphines — commercially available — are easily removed by filtration from the reaction products.

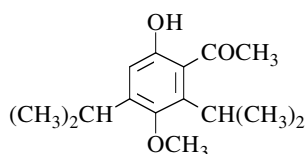
oil [1827].

**1-[6-Hydroxy-3-methoxy-2,4-bis(1-methylethyl)phenyl]ethanone**

[188903-79-9]

C<sub>15</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 250.34



**Synthesis**

-Refer to: [889].

**N.B.:** this compound, that has never been prepared, is however mistakenly mentioned in Chem. Abstr., **126**, 277303r (1997). However, it is not mentioned in the original paper [889]. In this paper, the compound is

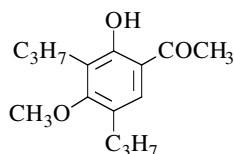
the 2-hydroxy-4,6-diisopropoxy-5-methoxyacetophenone, a ketone already obtained by [842].

**1-(2-Hydroxy-4-methoxy-3,5-dipropylphenyl)ethanone**

[72018-37-2]

C<sub>15</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 250.34



**Synthesis not yet described**

-Refer to: [43] [44].

**N.B.:** Pr indicates the *propyl* group -C<sub>3</sub>H<sub>7</sub> in Chem. Abstr., **92**, 6368x (1980) and **98**, 54239b (1983), an usual abbreviation. However, in the two references [43] [44], Pr represented the *prenyl* group -CH<sub>2</sub>CH=C(CH<sub>3</sub>)<sub>2</sub>.

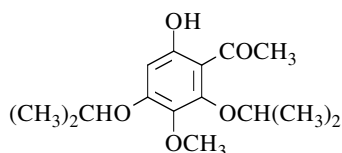
Therefore they concern the 2-hydroxy-4-methoxy-3,5-diprenylacetophenone and not the above mentioned 2-hydroxy-4-methoxy-3,5-dipropylacetophenone.

**1-[6-Hydroxy-3-methoxy-2,4-bis(1-methylethoxy)phenyl]ethanone**

[93344-50-4]

C<sub>15</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 282.34



**Syntheses**

-Obtained by partial methylation of 2,5-dihydroxy-4,6-diisopropoxyacetophenone (m.p. 37°) according to [845], (67%) (compound 14) [842].

-Also refer to: [846] [847].

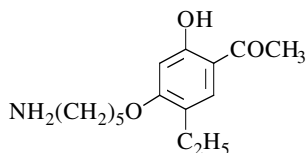
pale yellow oil [842]; <sup>1</sup>H NMR [842].

**1-[4-[(5-Aminopentyl)oxy]-5-ethyl-2-hydroxyphenyl]ethanone**

[117705-90-5]

C<sub>15</sub>H<sub>23</sub>NO<sub>3</sub>

mol.wt. 265.35



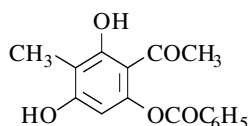
**Synthesis**

-Preparation by hydrogenation of 5-(4-acetyl-2-ethyl-5-hydroxyphenoxy)pentane nitrile in the presence of 10% Pd/C in acetic acid (> 98%) [256] [257].

m.p. 75-76° [256] [257]; <sup>1</sup>H NMR [256] [257].

**1-[6-(Benzoyloxy)-2,4-dihydroxy-3-methylphenyl]ethanone**C<sub>16</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 286.28

**Synthesis**

-Obtained by reaction of benzoyl chloride on 2,4,6-trihydroxy-3-methylacetophenone with 2% sodium hydroxide solution at 0° (13%) [1883].

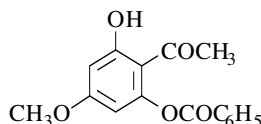
m.p. 189° [1883].

**1-[2-(Benzoyloxy)-6-hydroxy-4-methoxyphenyl]ethanone**

[49602-08-6]

C<sub>16</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 286.28

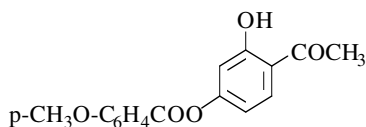
**Synthesis**

-Preparation by reaction of benzoyl chloride with 2,6-dihydroxy-4-methoxyacetophenone in the presence of 1.5 N sodium hydroxide at r.t. [762].

oil [762].

**1-[2-Hydroxy-4-(4-methoxybenzoyloxy)phenyl]ethanone**C<sub>16</sub>H<sub>14</sub>O<sub>5</sub>

mol.wt. 286.28

**Synthesis**

-Preparation by reaction of p-anisoyl chloride on resacetophenone with potassium carbonate in toluene (70%) [137] or in aqueous sodium hydroxide solution (the best way) [137].

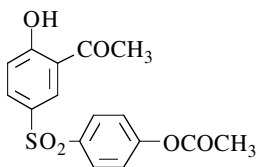
m.p. 151° [137].

**1-[5-[[4-(Acetyloxy)phenyl]sulfonyl]-2-hydroxyphenyl]ethanone**

[147816-49-7]

C<sub>16</sub>H<sub>14</sub>O<sub>6</sub>S

mol.wt. 334.35

**Syntheses**

-Obtained by UV light irradiation (254 nm) of 0.02 M bisacetate of bisphenol-S in acetonitrile for 3.5 h (20%) [1684].

-Also obtained by Fries rearrangement of bisacetate of bisphenol-S with aluminium chloride (3 equiv.) at 160° (17%) [1684].

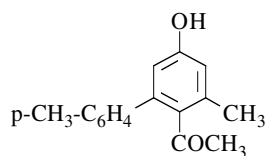
m.p. 166°6 [1684]; <sup>1</sup>H NMR [1684], UV [1684].

**1-(5-Hydroxy-3,4'-dimethyl[1,1'-biphenyl]-2-yl)ethanone**

[108909-47-3]

C<sub>16</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 240.30

**Syntheses**

-Obtained by aromatization of 4-acetyl-3-methyl-5-(4-methylphenyl)-2-cyclohexen-1-one (m.p. 130°) with bromine in chloroform (60%) or by heating at 170° for 3 h [731].

-Also obtained by deacylation of 1,1'-(3-hydroxy-4',5-dimethyl[1,1'-biphenyl]-2,6-diyl)bis-ethanone (m.p. 165°) with sodium hydroxide in refluxing dilute ethanol for 3 h (60%) [731].  
-Also refer to: [730].

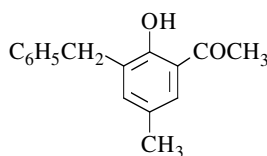
m.p. 180° [731]; IR [731].

**1-[2-Hydroxy-5-methyl-3-(phenylmethyl)phenyl]ethanone**

[350981-92-9]

C<sub>16</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 240.30

**Synthesis**

-Obtained from 3-acetyl-2-hydroxy-5-methylbenzyl O,O-dimethylphosphorothionothiolate (m.p. 99°5) on treatment with aluminium chloride in refluxing benzene for 5-10 min (93%) [695].

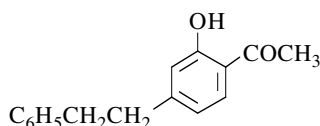
m.p. 84° [695]; <sup>1</sup>H NMR [695], IR [695], MS [695].

**1-[2-Hydroxy-4-(2-phenylethyl)phenyl]ethanone**

[122379-44-6]

C<sub>16</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 240.30

**Synthesis**

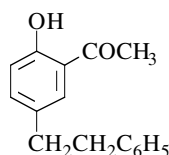
-Refer to: [636].

**1-[2-Hydroxy-5-(2-phenylethyl)phenyl]ethanone**

[136608-20-3]

C<sub>16</sub>H<sub>16</sub>O<sub>2</sub>

mol.wt. 240.30

**Syntheses**

-Preparation by Fries rearrangement of 4-acetoxy-diphenylmethane with aluminium chloride in boiling chlorobenzene (70%) [1896].

-Also refer to: [857].

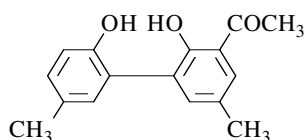
m.p. 52° [1896]; b.p.<sub>18</sub> 250° [1896].

**1-(2,2'-Dihydroxy-5,5'-dimethyl[1,1'-biphenyl]-3-yl)ethanone**

[24046-00-2]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Syntheses**

-Obtained by Fries rearrangement of 2,2'-diacetoxy-5,5'-dimethylbiphenyl with aluminium chloride in nitrobenzene at 120° for 2 h (53%) [1816].  
 -Also refer to: [1750].

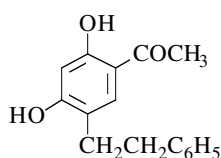
m.p. 129-130° [1816]; TLC [1816];  
<sup>1</sup>H NMR [1750] [1816], IR [1750] [1816].

**1-[2,4-Dihydroxy-5-(2-phenylethyl)phenyl]ethanone**

[60640-95-1]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Syntheses**

-Preparation by Fries rearrangement of 2,4-dihydroxydiphenylethane diacetate with aluminium chloride in the presence of 2,4-dihydroxydiphenylethane in nitrobenzene at 50° [1893].  
 -Also refer to: [754].

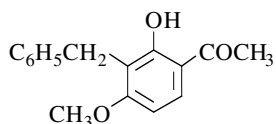
m.p. 136° [1893].

**1-[2-Hydroxy-4-methoxy-3-(phenylmethyl)phenyl]ethanone**

[95832-45-4]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Synthesis**

-Preparation by partial methylation of 3-benzyl-2,4-dihydroxyacetophenone with dimethyl sulfate in the presence of potassium carbonate in refluxing acetone (87%) [878].

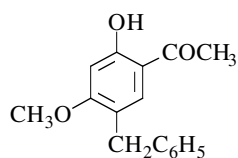
m.p. 119-120° [878]; <sup>1</sup>H NMR [878].

**1-[2-Hydroxy-4-methoxy-5-(phenylmethyl)phenyl]ethanone**

[93434-27-6]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Synthesis**

-Preparation by partial methylation of 5-benzyl-2,4-dihydroxyacetophenone with dimethyl sulfate in the presence of potassium carbonate in refluxing acetone (82%) [878].

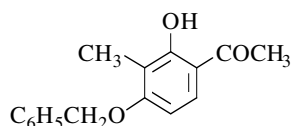
m.p. 95-96° [878]; <sup>1</sup>H NMR [878].

**1-[2-Hydroxy-3-methyl-4-(phenylmethoxy)phenyl]ethanone**

[73640-74-1]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Syntheses**

-Preparation by reaction of benzyl chloride on 2,4-dihydroxy-3-methylacetophenone with potassium carbonate and potassium iodide in refluxing acetone (81%) [1470].  
-Also refer to: [1264] [1927].

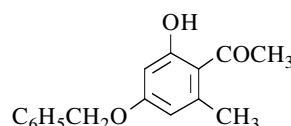
m.p. 87-88° [1470]; <sup>1</sup>H NMR [1470], IR [1470], MS [1470].

**1-[2-Hydroxy-6-methyl-4-(phenylmethoxy)phenyl]ethanone**

[72545-51-8]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Synthesis**

-Preparation by partial benzylation of 2,4-dihydroxy-6-methylacetophenone [12].

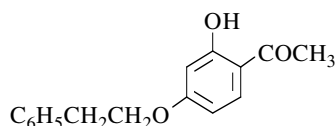
m.p. 83-84° [12].

**1-[2-Hydroxy-4-(2-phenylethoxy)phenyl]ethanone**

[63359-84-2]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Synthesis**

-Obtained by reaction of 1-bromo-2-phenylethane with resacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h (45%) [314].

**N.B.:** the 1-chloro derivative and butanone can also be used instead of the mentioned starting materials.

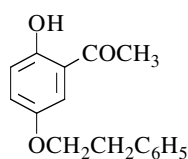
m.p. 69° [314].

**1-[2-Hydroxy-5-(2-phenylethoxy)phenyl]ethanone**

[63359-85-3]

C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 256.30

**Synthesis**

-Obtained by reaction of 1-bromo-2-phenylethane with quinacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h (21%) [314].

**N.B.:** the 1-chloro derivative and the butanone can also be used instead of the mentioned starting materials.

m.p. 36° [314].

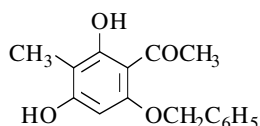


**1-[2,4-Dihydroxy-3-methyl-6-(phenylmethoxy)phenyl]ethanone**

[39548-93-1]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Synthesis**

-Obtained by reaction of benzyl chloride on the 2,4,6-tri-hydroxy-3-methylacetophenone with potassium carbonate in boiling acetone (20%) [880], (< 2%) [1186].

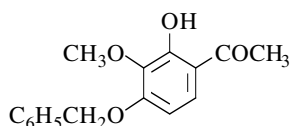
m.p. 212° [1186], 187-188° [880]. One of the reported melting points is obviously wrong.  
<sup>1</sup>H NMR [880], UV [880].

**1-[2-Hydroxy-3-methoxy-4-(phenylmethoxy)phenyl]ethanone**

[52249-85-1]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Synthesis**

-Preparation by reaction of dimethyl sulfate on 4-(benzyloxy)-2,3-dihydroxyacetophenone with potassium carbonate in refluxing acetone [589] [972] [1571], (82%) [972].

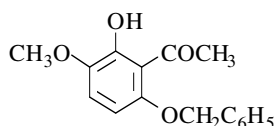
m.p. 146° [972], 143-145° [1571]; <sup>1</sup>H NMR [1571].

**1-[2-Hydroxy-3-methoxy-6-(phenylmethoxy)phenyl]ethanone**

[126405-75-2]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Synthesis**

-Preparation by adding 6-(benzyloxy)-2-hydroxy-3-iodoacetophenone and cuprous iodide to a solution of sodium methoxide, previously prepared from methyl alcohol and sodium hydride in DMF [1873].

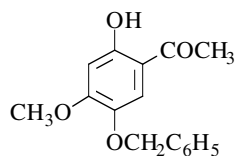
m.p. 103° [1873]; IR [1873].

**1-[2-Hydroxy-4-methoxy-5-(phenylmethoxy)phenyl]ethanone**

[52249-88-4]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Synthesis**

-Preparation by reaction of benzyl bromide on 2,5-dihydroxy-4-methoxyacetophenone with potassium carbonate in boiling acetone (67%) [498].

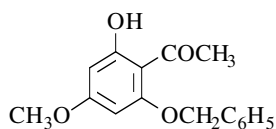
m.p. 151° [498].

**1-[2-Hydroxy-4-methoxy-6-(phenylmethoxy)phenyl]ethanone**

[10299-59-9]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Syntheses**

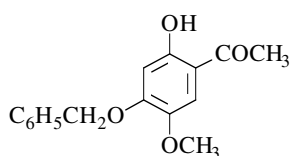
-Preparation by reaction of dimethyl sulfate on 2-(benzyloxy)-4,6-dihydroxyacetophenone with potassium carbonate in refluxing acetone (95%) [880], (85%) [10].  
 -Preparation by reaction of benzyl bromide with phloracetophenone 4-methyl ether in the presence of potassium carbonate in acetone at r.t. under nitrogen (82%) [311].

m.p. 120-121° [880], 110-113° [10], 110-111° [311]; <sup>1</sup>H NMR [311].**1-[2-Hydroxy-5-methoxy-4-(phenylmethoxy)phenyl]ethanone**

[34176-18-6]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Synthesis**

-Preparation by reaction of dimethyl sulfate on 4-(benzyloxy)-2,5-dihydroxyacetophenone with potassium carbonate in refluxing acetone [8] [60] [1068], (85-86%) [8] [60].

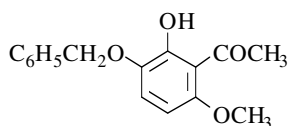
m.p. 130° [60], 128-129° [8], 126° [1068].

**1-[2-Hydroxy-6-methoxy-3-(phenylmethoxy)phenyl]ethanone**

[126405-79-6]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Synthesis**

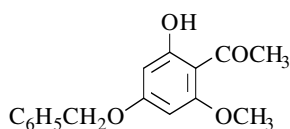
-Preparation by adding 2-hydroxy-3-iodo-6-methoxyacetophenone and cuprous iodide to a solution of sodium benzyolate, previously prepared from benzyl alcohol and sodium hydride in DMF [1873].

oil [1873]; <sup>1</sup>H NMR [1873], IR [1873].**1-[2-Hydroxy-6-methoxy-4-(phenylmethoxy)phenyl]ethanone**

[39548-89-5]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Syntheses**

-Preparation by reaction of benzyl chloride on 2,4-dihydroxy-6-methoxyacetophenone with potassium carbonate in boiling acetone [710] [880] [1281], (55%) [880].  
 -Preparation by reaction of dimethyl sulfate on 4-(benzyloxy)-2,6-dihydroxyacetophenone with potassium carbonate in refluxing acetone (73%) [1281].

m.p. 90-91° [880], 73-74° [1281], 72° [710]. A melting points is obviously wrong.

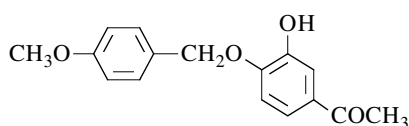
<sup>1</sup>H NMR [880], UV [880]; TLC [379].

**1-[3-Hydroxy-4-(4-methoxybenzyloxy)phenyl]ethanone**

[187966-38-7]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Syntheses**

-Preparation by reaction of p-methoxybenzyl bromide with the sodium salt of 3,4-dihydroxyacetophenone (SM) in DMF at r.t. for 24 h (75%). SM was obtained by adding a solution of 3,4-dihydroxyacetophenone in

DMF to a suspension of sodium hydride (2 mol) in the same solvent [566].  
-Also refer to: [567].

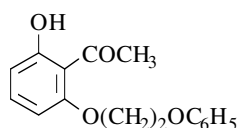
crystals [566] (m.p. not mentioned); <sup>1</sup>H NMR [566].

**1-[2-Hydroxy-6-(2-phenoxyethoxy)phenyl]ethanone**

[61270-14-2]

C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>

mol.wt. 272.30

**Synthesis**

-Preparation by reaction of 2-bromoethoxybenzene with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (34%) [71].

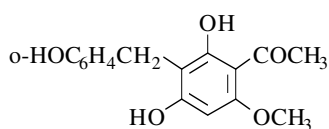
m.p. 79-80° [71].

**1-[2,4-Dihydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxyphenyl]ethanone**

[102056-82-6]

C<sub>16</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 288.30

**Syntheses**

-Preparation by catalytic hydrogenolysis of 3-(o-benzyloxybenzyl)-2,4-dihydroxy-6-methoxyacetophenone at r.t. and atmospheric pressure in the presence of 10% Pd/C in ethyl acetate (66%) [873].

-Preparation from the 2',4'-dihydroxy-3'-[(2-hydroxyphenyl)-(1-piperidino)methyl]-6'-methoxyacetophenone, the piperidine moiety was removed by catalytic hydrogenation using 10% Pd/C as catalyst (50-60%) [1140].

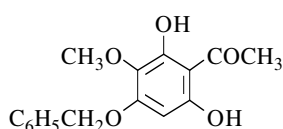
m.p. 184-185° [873]; <sup>1</sup>H NMR [873], IR [873], UV [873].

**1-[2,6-Dihydroxy-3-methoxy-4-(phenylmethoxy)phenyl]ethanone**

[204590-48-7]

C<sub>16</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 288.30

**Synthesis**

-Preparation by hydrolysis of 4-benzyloxy-6-hydroxy-3-methoxy-2-tosyloxyacetophenone with potassium carbonate in refluxing methanol for 2 h (94%) [803].

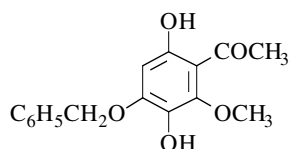
m.p. 149-150° [803].

**1-[3,6-Dihydroxy-2-methoxy-4-(phenylmethoxy)phenyl]ethanone**

[25892-94-8]

C<sub>16</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 288.30



## Syntheses

-Obtained from 4-(benzyloxy)-2-hydroxy-6-methoxyacetophenone by persulfate oxidation (Elbs reaction) [588], (23%) [1281].  
 -Also refer to: [716] [1453].

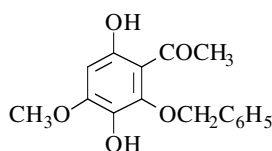
m.p. 161-162° [1281], 109-110° [588]. One of the reported melting points is obviously wrong. <sup>1</sup>H NMR [588].

**1-[3,6-Dihydroxy-4-methoxy-2-(phenylmethoxy)phenyl]ethanone**

[41997-38-0]

C<sub>16</sub>H<sub>16</sub>O<sub>5</sub>

mol.wt. 288.30



## Synthesis

-Obtained from 6-(benzyloxy)-2-hydroxy-4-methoxyacetophenone by persulfate oxidation (Elbs reaction) (17%) [10].

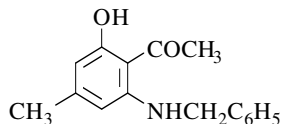
m.p. 119-120° [10]; TLC [379].

**1-[2-Hydroxy-4-methyl-6-[(phenylmethyl)amino]phenyl]ethanone**

[97066-16-5]

C<sub>16</sub>H<sub>17</sub>NO<sub>2</sub>

mol.wt. 255.32



## Synthesis

-Preparation by reaction of potassium hydroxide with 2-acetyl-3-benzylamino-5-hydroxy-5-methyl-2-cyclohexene-1-one in ethanol at 40° (73%) [562].

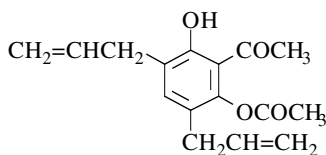
m.p. 160° [562]; <sup>1</sup>H NMR [562], IR [562], UV [562], MS [562].

**1-[2-(Acetyloxy)-6-hydroxy-3,5-di-2-propenylphenyl]ethanone**

[117156-76-0]

C<sub>16</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 274.32



## Synthesis

-Obtained (by-product) by thermal rearrangement of 3-acetyl-4,6-bis(allyloxy)acetophenone in refluxing diphenyl ether (3%) [61].

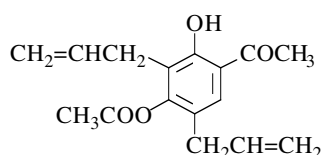
<sup>1</sup>H NMR [61], IR [61].

**1-[4-(Acetyloxy)-2-hydroxy-3,5-di-2-propenylphenyl]ethanone**

[106987-29-5]

C<sub>16</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 274.32

**Synthesis**

-Obtained (by-product) by thermal Claisen rearrangement of 3-acetyl-4,6-bis(allyloxy)acetophenone or of 3-acetyl-2,4-bis(allyloxy)acetophenone in refluxing N,N-dimethylaniline (5-6%) [61].

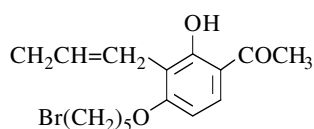
pale greenish yellow oil [61]; <sup>1</sup>H NMR [61], IR [61], UV [61], MS [61].

**1-[4-[(5-Bromopentyl)oxy]-2-hydroxy-3-(2-propenyl)phenyl]ethanone**

[61270-23-3]

C<sub>16</sub>H<sub>21</sub>BrO<sub>3</sub>

mol.wt. 341.24

**Synthesis**

-Preparation by reaction of 1,5-dibromopentane with 3-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone [71].

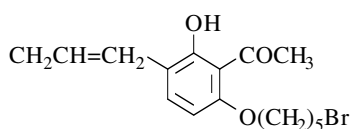
oil [71].

**1-[6-[(5-Bromopentyl)oxy]-2-hydroxy-3-(2-propenyl)phenyl]ethanone**

[61270-18-6]

C<sub>16</sub>H<sub>21</sub>BrO<sub>3</sub>

mol.wt. 341.24

**Synthesis**

-Preparation by reaction of 1,5-dibromopentane with 3-allyl-2,6-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone [71].

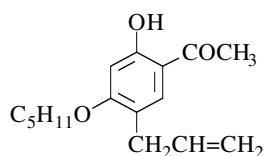
b.p.<sub>0.1</sub> 180-200° [71].

**1-[2-Hydroxy-4-(pentyloxy)-5-(2-propenyl)phenyl]ethanone**

[117690-49-0]

C<sub>16</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 262.35

**Synthesis**

-Preparation by reaction of n-pentyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (43-44%) [256] [257] [777].

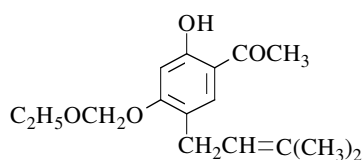
oil [256] [257] [777].

**1-[4-(Ethoxymethoxy)-2-hydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone**

[175546-56-2]

C<sub>16</sub>H<sub>22</sub>O<sub>4</sub>

mol.wt. 278.35

**Synthesis**

-Preparation by reaction of ethoxymethyl chloride with 2,4-dihydroxy-5-(3-methyl-2-butenyl)acetophenone in acetone for 10 min at 30° (66%) [1378].

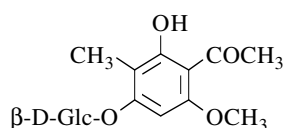
<sup>1</sup>H NMR [1378].

**1-[4-(β-D-Glucopyranosyloxy)-2-hydroxy-6-methoxy-3-methylphenyl]ethanone**

[145194-40-7]

C<sub>16</sub>H<sub>22</sub>O<sub>9</sub>

mol.wt. 358.35

**Isolation from natural sources**

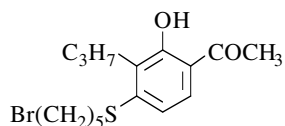
-From the roots of *Euphorbia ebracteolata* Hayata (Euphorbiaceae) [1950].

**1-[4-[(5-Bromopentyl)thio]-2-hydroxy-3-propylphenyl]ethanone**

[125617-44-9]

C<sub>16</sub>H<sub>23</sub>BrO<sub>2</sub>S

mol.wt. 359.33

**Synthesis**

-Preparation by reaction of 1,5-dibromopentane with 2-hydroxy-4-mercapto-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone [1680].

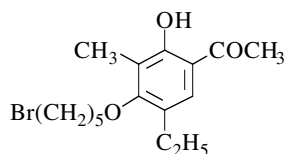
pale yellow oil [1680].

**1-[4-[(5-Bromopentyl)oxy]-5-ethyl-2-hydroxy-3-methylphenyl]ethanone**

[140660-35-1]

C<sub>16</sub>H<sub>23</sub>BrO<sub>3</sub>

mol.wt. 343.26

**Synthesis**

-Preparation by reaction of 1,5-dibromopentane with 5-ethyl-2,4-dihydroxy-3-methylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (76%) [777].

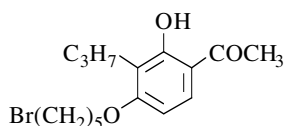
oil [777].

**1-[4-[(5-Bromopentyl)oxy]-2-hydroxy-3-propylphenyl]ethanone**

[99453-85-7]

C<sub>16</sub>H<sub>23</sub>BrO<sub>3</sub>

mol.wt. 343.26

**Synthesis**

-Preparation by reaction of 1,5-dibromopentane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone [71] [1156], (22%) [1156].

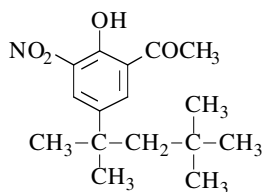
b.p.<sub>0.02</sub> 172-180° [71]; MS [1156].

**1-[2-Hydroxy-3-nitro-5-(1,1,3,3-tetramethylbutyl)phenyl]ethanone**

[30299-56-0]

C<sub>16</sub>H<sub>23</sub>NO<sub>4</sub>

mol.wt. 293.36

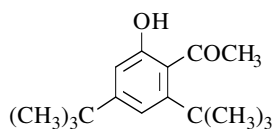
**Synthesis**

-Preparation by reaction of 65% nitric acid with 2-hydroxy-5-tert-octylacetophenone in acetic acid, first at 0°, then at 20° [1386].

m.p. 86°5 [1386]; IR [1386], UV [1386].

**1-[2,4-Bis(1,1-dimethylethyl)-6-hydroxyphenyl]ethanone**C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 248.37

**Synthesis**

-Obtained by UV light irradiation of 3,5-di-tert-butylphenyl acetate in benzene at r.t. (photo-Fries rearrangement) [597].

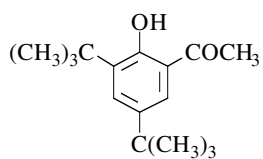
m.p. 198°5 [597].

**1-[3,5-Bis(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone**

[37456-29-4]

C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 248.37

**Syntheses**

-Preparation by reaction of methylmagnesium iodide on 3,5-di-tert-butyl-2-hydroxybenzonitrile in ethyl ether, first at 0° and then at r.t. (58%) [1331].

-Also obtained by reaction of sec-butyllithium on 2-bromo-4,6-di-tert-butylphenyl acetate in ethyl ether at -95° and -78°,

followed by hydrolysis of mixture with saturated ammonium chloride (metal-promoted Fries rearrangement) (43-52%) [1234].

-Preparation by reaction of acetic anhydride with 2,4-di-tert-butylphenol in the presence of boron trifluoride-acetic acid complex at 100° [343].

m.p. 45-46° [343], 43-44°5 [1331]; b.p.<sub>0.45</sub> 100° [343];

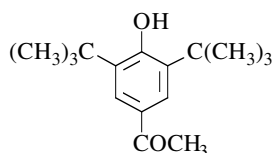
<sup>1</sup>H NMR [1331], IR [1331].

**1-[3,5-Bis(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone**

[14035-33-7]

C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 248.37

**Syntheses**

- Preparation by reaction of acetic acid on 2,6-di-tert-butylphenol with trifluoroacetic anhydride at r.t. [1027] [1190] [1332] [1333], (78-87%) [1190] [1333].
- Preparation by reaction of acetic anhydride on 2,6-di-tert-butylphenol with sulfodifluoroacetic acid in acetic acid at 20° (81%) [654] or with boron trifluoride etherate at 5° (30%) [705].
- Preparation by reaction of acetyl chloride on 2,6-di-tert-butylphenol with aluminium chloride at -10° (95%) [1436] and at 0° (70%) [430].
- Also obtained by reaction of potassium ferricyanide on 2,6-di-tert-butyl-4-(1-methoxyethyl)-phenol with aqueous sodium hydroxide in benzene (20%) [430].
- Also obtained (poor yield) by bubbling air into a cumene solution of 2,6-di-tert-butyl-4-ethylphenol in the presence of cumene hydroperoxide and cobalt phthalate between 80-100° (2%) [780].

m.p. 150-151° [705] [1190], 148° [780], 147-148° [430] [1332] [1333],  
146-147° [1436], 141-143° [654];

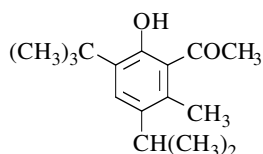
<sup>1</sup>H NMR [705] [1333], <sup>13</sup>C NMR [705], IR [705], MS [1030].

**1-[3-(1,1-Dimethylethyl)-2-hydroxy-6-methyl-5-(1-methylethyl)phenyl]ethanone**

[129375-13-9]

C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 248.37

**Synthesis**

- Preparation by Fries rearrangement of 2-tert-butyl-5-methyl-4-isopropylphenyl acetate with titanium tetrachloride in chlorobenzene at 100° (23%) [1162].

m.p. 44° [1162];

<sup>1</sup>H NMR [1162], (Sadtler: standard n° 52742 M);

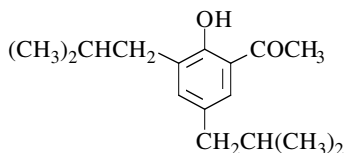
IR [1162], (Sadtler: standard n° 79801 K); UV [1162], MS [1162].

**1-[2-Hydroxy-3,5-bis(2-methylpropyl)phenyl]ethanone**

[35158-27-1]

C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 248.37

**Synthesis**

- Preparation by reaction of ethyl acetoacetate with 2-isobutyl-6-methyl-2-heptenal in the presence of pyridine and piperidine as catalysts in refluxing benzene (29%). The 2-isobutyl-6-methyl-2-heptenal was obtained by self-condensation of isocaproaldehyde in the presence of 15% potassium hydroxide solution (Aldol condensation) [940] [941] [942].

b.p.<sub>1-2</sub> 116-118° [940] [941] [942];

IR [940] [941] [942], UV [940] [941] [942], MS [940] [941] [942].

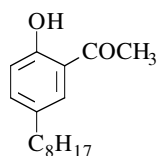


**1-(2-Hydroxy-5-octylphenyl)ethanone**

[74604-19-6]

C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 248.37

**Synthesis**

-Preparation by reaction of acetyl chloride on 4-octylphenol with aluminium chloride in ethylene dichloride at 110-120° (58%) [1033].

b.p. 168-170° [1033].

**1-[2-Hydroxy-5-(1,1,3,3-tetramethylbutyl)phenyl]ethanone**

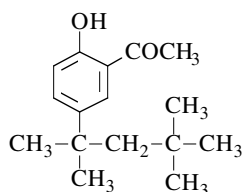
[57373-80-5]

C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 248.37

and

[30299-53-7] (2'-Hydroxy-5'-(1,1,3,3-tetramethylbutyl)acetophenone)

**Syntheses**

-Obtained by Fries rearrangement of 4-(1,1,3,3-tetramethylbutyl)phenyl acetate also called 4-tert-octylphenyl acetate with aluminium chloride [1842] [1906], in 1,2,3-trichloropropane or in tetrachloroethane at 120° under nitrogen (71-77%) [1842]; (high yield) [1906].

-Preparation by demethylation of 2-methoxy-5-tert-octylacetophenone with 4% hydrobromic acid in refluxing

acetic acid (47-52%) [1906].

-Preparation by UV light irradiation of 4-tert-octylphenyl acetate in benzene or in ethanol solution (37%) (photo-Fries rearrangement) [1386].

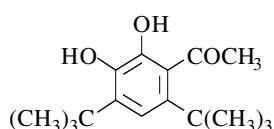
<sup>1</sup>H NMR [1386], IR [1386], UV [1386].

**1-[4,6-Bis(1,1-dimethylethyl)-2,3-dihydroxyphenyl]ethanone**

[84296-99-1]

C<sub>16</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 264.37

**Synthesis**

-Obtained by irradiation of a benzene solution of 3,5-di-tert-butyl-o-benzoquinone in the presence of a large excess of acetaldehyde (6%) [1758].

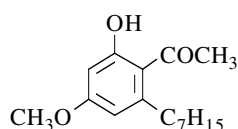
m.p. 169-170° [1758]; <sup>1</sup>H NMR [1758], IR [1758].

**1-(2-Heptyl-6-hydroxy-4-methoxyphenyl)ethanone**

[4670-13-7]

C<sub>16</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 264.37

**Synthesis**

-Preparation by partial methylation of 2,4-dihydroxy-6-heptylacetophenone in acetone with dimethyl sulfate in the presence of 10% sodium hydroxide at 45° for 4 h (70%) [986].

## Isolation from natural sources

-Obtained by alkaline degradation of various *siphulin* derivatives\* with potassium hydroxide in refluxing methanol [307]. The siphulin (an homoflavone) 7-hydroxy-5-heptyl-2-[3',5'-dihydroxy-2-carboxybenzyl]chroman-4-one (m.p. 180°) [308] is a constituent of the North Scandinavian lichen *siphula ceratites* (Wahlenberg) Fr.

\*siphulin methyl ester trimethyl ether [308], decarboxysiphulin trimethyl ether or a lactol.

oil [307] [986], liquid compound [308];

b.p.<sub>0.01</sub> 110° [308], b.p.<sub>0.01</sub> 120° [307];  $n_D^{18} = 1.5372$  [307],  $n_D^{19} = 1.5339$  [308];

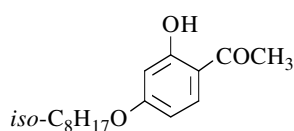
<sup>1</sup>H NMR [307] [986], IR [307] [308], UV [307] [308].

**1-[2-Hydroxy-4-(isooctyloxy)phenyl]ethanone**

[127313-67-1]

C<sub>16</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 264.37



Synthesis

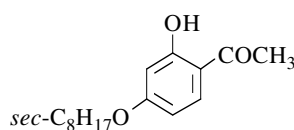
-Refer to: [1932] (Chinese paper).

**1-[2-Hydroxy-4-(sec-octyloxy)phenyl]ethanone**

[127313-63-7]

C<sub>16</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 264.37



Synthesis

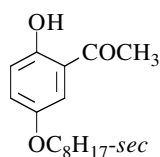
-Refer to: [1932] (Chinese paper).

**1-[2-Hydroxy-5-(sec-octyloxy)phenyl]ethanone**

[127313-62-6]

C<sub>16</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 264.37



Synthesis

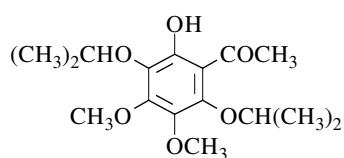
-Refer to: [1932] (Chinese paper).

**1-[2-Hydroxy-4,5-dimethoxy-3,6-bis(1-methylethoxy)phenyl]ethanone**

[169130-25-0]

C<sub>16</sub>H<sub>24</sub>O<sub>6</sub>

mol.wt. 312.36

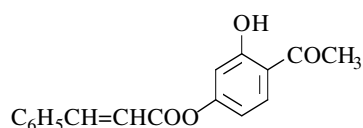


Synthesis

-Preparation by smooth demethylation of 2,5-diisopropoxy-3,4,6-trimethoxyacetophenone with aluminium bromide in acetonitrile (high yield) [796].

**1-[4-(Cinnamoyloxy)-2-hydroxyphenyl]ethanone**C<sub>17</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 282.30

**Synthesis**

-Obtained by reaction of cinnamoyl chloride on resacetophenone with potassium carbonate in toluene (17%) [137].

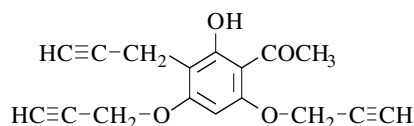
m.p. 131° [137].

**1-[2-Hydroxy-3-(2-propynyl)-4,6-bis(2-propynyloxy)phenyl]ethanone**

[53771-25-8]

C<sub>17</sub>H<sub>14</sub>O<sub>4</sub>

mol.wt. 282.30

**Synthesis**

-Obtained (poor yield) by reaction of 2-propynyl bromide with phloracetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (4%) [427].

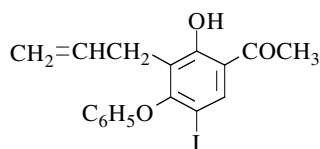
m.p. 150-151° [427]; IR [427], UV [427].

**1-[2-Hydroxy-5-iodo-4-phenoxy-3-(2-propenyl)phenyl]ethanone**

[144691-36-1]

C<sub>17</sub>H<sub>15</sub>IO<sub>3</sub>

mol.wt. 394.21

**Synthesis**

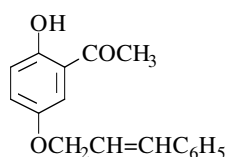
-Obtained by reaction of iodosobenzene diacetate (DAIB) with 3-allyl-2,4-dihydroxyacetophenone in refluxing methanol (38%) [1143].

m.p. 160° [1143]; <sup>1</sup>H NMR [1143], IR [1143].**1-[2-Hydroxy-5-[(3-phenyl-2-propenyl)oxy]phenyl]ethanone**

[79950-56-4]

C<sub>17</sub>H<sub>16</sub>O<sub>3</sub>

mol.wt. 268.31

**Synthesis**

-Preparation by reaction of cinnamyl bromide with quinacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone under nitrogen (90%) [303].

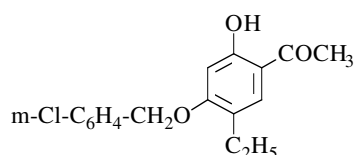
m.p. 105-107° [303]; <sup>1</sup>H NMR [303], IR [303], MS [303].

**1-[4-[(3-Chlorophenyl)methoxy]-5-ethyl-2-hydroxyphenyl]ethanone**

[117706-49-7]

C<sub>17</sub>H<sub>17</sub>ClO<sub>3</sub>

mol.wt. 304.77

**Synthesis**

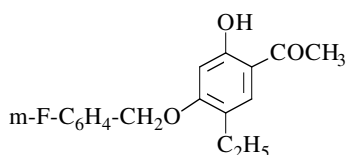
-Preparation by reaction of 3-chlorobenzyl bromide with 5-ethyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide (47%) [256] [257].

**1-[5-Ethyl-4-[(3-fluorophenyl)methoxy]-2-hydroxyphenyl]ethanone**

[117706-48-6]

C<sub>17</sub>H<sub>17</sub>FO<sub>3</sub>

mol.wt. 288.32

**Synthesis**

-Preparation by reaction of 3-fluorobenzyl bromide with 5-ethyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide (18%) [256] [257].

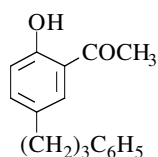
m.p. 104-105° [256] [257].

**1-[2-Hydroxy-5-(3-phenylpropyl)phenyl]ethanone**

[61270-17-5]

C<sub>17</sub>H<sub>18</sub>O<sub>2</sub>

mol.wt. 254.33

**Syntheses**

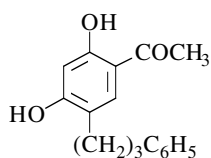
-Preparation by Fries rearrangement of 4'-acetoxy-1,3-diphenylpropane with aluminium chloride in boiling chlorobenzene [1896].

-Preparation by reaction of acetic anhydride with 4-(3-phenylpropyl)phenol in the presence of boron trifluoride-acetic acid complex at 100° [71].

oil [71]; b.p.<sub>18.5</sub> 232° [1896]; <sup>1</sup>H NMR [71], MS [71].

**1-[2,4-Dihydroxy-5-(3-phenylpropyl)phenyl]ethanone**C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 270.33

**Synthesis**

-Preparation by Fries rearrangement of 2',4'-diacetoxy-1,3-diphenylpropane with aluminium chloride in the presence of 2',4'-dihydroxy-1,3-diphenylpropane in nitrobenzene at 50° [1896].

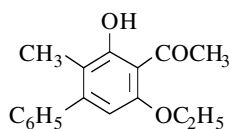
m.p. 106° [1896].

**1-(5-Ethoxy-3-hydroxy-2-methyl[1,1'-biphenyl]-4-yl)ethanone**

[138151-67-4]

C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 270.33

**Synthesis**

-Preparation by heating at 100° for 18 h a dioxane solution of 4-chloro-2-methyl-3-phenyl-2-cyclobutenone and 4-ethoxy-4-(tri-n-butylstannyl)-3-buten-2-one (I) with Pd(benzonitrile)<sub>2</sub>Cl<sub>2</sub> and tris(2-furyl)phosphine (50%).

The compound (I) was obtained by adding a tetrahydrofuran solution of tetrabutylammonium cyanide (Bu<sub>4</sub>NCN) to a tetrahydrofuran solution of 3-ethoxy-2-cyclobutenone and n-(C<sub>4</sub>H<sub>9</sub>)<sub>3</sub>SnSi(CH<sub>3</sub>)<sub>3</sub> cooled to -22° and then the mixture was warmed at r.t. [1032].

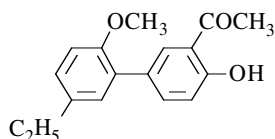
m.p. 78-80° [1032]; <sup>1</sup>H NMR [1032], <sup>13</sup>C NMR [1032], IR [1032].

**1-(5'-Ethyl-4-hydroxy-2'-methoxy[1,1'-biphenyl]-3-yl)ethanone**

[131845-25-5]

C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 270.33

**Synthesis**

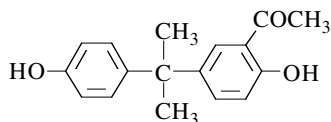
-Refer to: [1768].

**1-[2-Hydroxy-5-[1-(4-hydroxyphenyl)-1-methylethyl]phenyl]ethanone**

[104676-26-8]

C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 270.33

**Synthesis**

-Obtained by Fries rearrangement of 2,2-bis(acetoxyphenyl)propane (bisphenol-A diacetate) (1 mol) with titanium tetrachloride (4 mol) in nitrobenzene, first for 24 h at r.t., then for 6 h at 55° (23%) [1339].

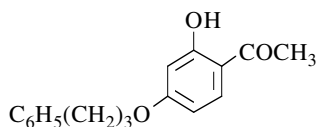
m.p. 139-140° [1339]; <sup>1</sup>H NMR [1339], <sup>13</sup>C NMR [1339], IR [1339].

**1-[2-Hydroxy-4-(3-phenylpropoxy)phenyl]ethanone**

[63359-86-4]

C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 270.33

**Syntheses**

-Obtained by reaction of 1-bromo-3-phenylpropane with resacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h. The 1-chloro derivative and butanone can also be used instead of the mentioned starting materials (83%) [314].

-Also refer to: [312].

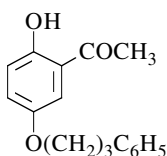
m.p. 75-77° [314].

**1-[2-Hydroxy-5-(3-phenylpropoxy)phenyl]ethanone**

[63359-87-5]

C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 270.33

**Syntheses**

-Obtained by reaction of 1-bromo-3-phenylpropane with quinacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h. The 1-chloro derivative and butanone can also be used instead of the mentioned starting material and solvent (54%) [314].  
 -Also refer to: [312].

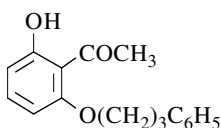
m.p. 34-35° [314].

**1-[2-Hydroxy-6-(3-phenylpropoxy)phenyl]ethanone**

[69079-93-2]

C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 270.33

**Synthesis**

-Obtained by reaction of 1-bromo-3-phenylpropane with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h. The 1-chloro derivative and butanone can also be used instead of the mentioned starting material and solvent (75%) [314].

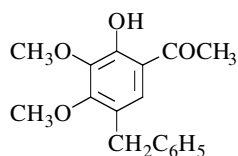
m.p. 95-96° [314].

**1-[2-Hydroxy-3,4-dimethoxy-5-(phenylmethyl)phenyl]ethanone**

[105485-57-2]

C<sub>17</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 286.33

**Synthesis**

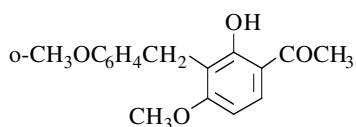
-Preparation by reaction of dimethyl sulfate with 5-benzyl-2,3,4-trihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (68%) [885].

m.p. 42-43° [885]; <sup>1</sup>H NMR [885], IR [885], UV [885].**1-[2-Hydroxy-4-methoxy-3-[(2-methoxyphenyl)methyl]phenyl]ethanone**

[103633-39-2]

C<sub>17</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 286.33

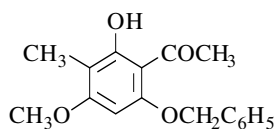
**Synthesis**

-Obtained by reaction of dimethyl sulfate with 2,4-dihydroxy-3-(o-hydroxybenzyl)acetophenone in the presence of potassium carbonate in refluxing acetone (9%) [873].

oil [873]; <sup>1</sup>H NMR [873].

**1-[2-Hydroxy-4-methoxy-3-methyl-6-(phenylmethoxy)phenyl]ethanone**C<sub>17</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 286.33

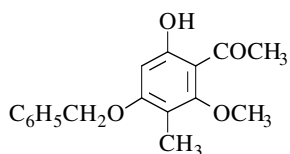
**Synthesis**

-Preparation by reaction of methyl iodide with 6-(benzyloxy)-2,4-dihydroxy-3-methylacetophenone in the presence of potassium carbonate in refluxing acetone (88%) [1186].

m.p. 127° [1186].

**1-[6-Hydroxy-2-methoxy-3-methyl-4-(phenylmethoxy)phenyl]ethanone**C<sub>17</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 286.33

**Syntheses**

-Preparation by reaction of benzyl bromide on 4,6-dihydroxy-2-methoxy-3-methylacetophenone with potassium carbonate in boiling acetone (48%) [1883].  
 -Preparation by partial catalytic hydrogenolysis of 4,6-bis-(benzyloxy)-2-methoxy-3-methylacetophenone with

PdCl<sub>2</sub>/C in methanol (86%) [1883] or by reaction of 10% ethanolic hydrochloric acid on the same starting material in refluxing dioxane (42%) [1186].

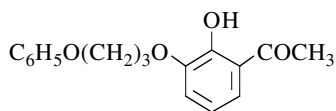
m.p. 105° [1883], 103° [1186].

**1-[2-Hydroxy-3-(3-phenoxypropoxy)phenyl]ethanone**

[69079-92-1]

C<sub>17</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 286.33

**Synthesis**

-Obtained by reaction of 1-bromo-3-phenoxypropane with 2,3-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h. The 1-chloro derivative and butanone can also be used instead of the mentioned starting material and solvent (32%) [314].

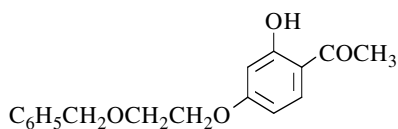
m.p. 56-57° [314].

**1-[2-Hydroxy-4-[2-(phenylmethoxy)ethoxy]phenyl]ethanone**

[307520-94-1]

C<sub>17</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 286.33

**Synthesis**

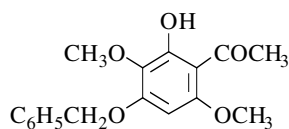
-Refer to: [1840] (compound 1d).

**1-[2-Hydroxy-3,6-dimethoxy-4-(phenylmethoxy)phenyl]ethanone**

[3162-52-5]

C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33

**Syntheses**

-Preparation by reaction of benzyl chloride with 2,4-dihydroxy-3,6-dimethoxyacetophenone in the presence of potassium carbonate [671] [1452] or potassium carbonate and potassium iodide [215] in refluxing acetone (72%) [671], (63%) [215], (53%) [1452].

The same reaction using benzyl bromide instead of benzyl chloride led to an inseparable mixture (68%) of 2-benzyl- and 4-benzyl ethers (m.p. 105-107°) [664].

-Preparation by reaction of acetyl chloride on 2,5-dimethoxyresorcinol dibenzyl ether with aluminium chloride in benzene at 0° (35%) [671].

-Obtained (by-product) by reaction of acetonitrile with 2,6-bis(benzyloxy)-1,4-dimethoxybenzene (Hoesch reaction) [1452].

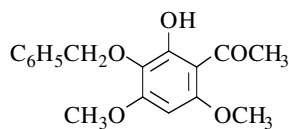
m.p. 113-115° [215], 111-111°5 [1452], 109°5-110° [671].

**1-[2-Hydroxy-4,6-dimethoxy-3-(phenylmethoxy)phenyl]ethanone**

[54299-57-9]

C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33

**Syntheses**

-Preparation by reaction of benzyl chloride with 2,3-dihydroxy-4,6-dimethoxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (56%) [215].

-Preparation from 2,3-bis(benzyloxy)-4,6-dimethoxyacetophenone. The 2-benzyloxy group was selectively split with concentrated hydrochloric acid in acetic acid at r.t. (80%) [799].

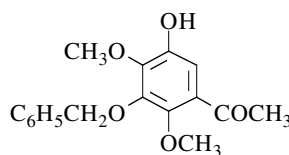
m.p. 95-97° [799], 90-92° [215].

**1-[5-Hydroxy-2,4-dimethoxy-3-(phenylmethoxy)phenyl]ethanone**

[65039-99-8]

C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33

**Synthesis**

-Obtained [1864] according to the procedure [1696].

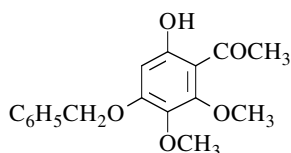


**1-[6-Hydroxy-2,3-dimethoxy-4-(phenylmethoxy)phenyl]ethanone**

[25892-95-9]

C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33

**Syntheses**

-Obtained by partial methylation of 4-(benzyloxy)-3,6-dihydroxy-2-methoxyacetophenone [23] [215] [588] [778] [804] [807] [1862] [1863], with dimethyl sulfate in the presence of potassium carbonate in refluxing acetone [1453], for 5 h (57%) [716].  
 -Also refer to: [1865] [1918].

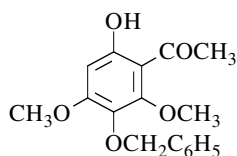
m.p. 86-87° [716], 84-85° [588]; IR [716].

**1-[6-Hydroxy-2,4-dimethoxy-3-(phenylmethoxy)phenyl]ethanone**

[52249-87-3]

C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33

**Syntheses**

-Preparation by reaction of benzyl chloride with 3,6-dihydroxy-2,4-dimethoxyacetophenone,  
 \*in the presence of potassium carbonate and sodium iodide in refluxing acetone for 10 h, then at r.t. for 6 h [1536] [1863], (57%) [1696];  
 \*in the presence of potassium carbonate in DMF [843].  
 -Also refer to: [208] [210] [590] [1005] [1136] [1864].

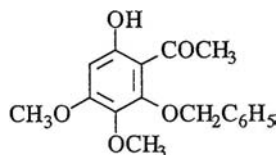
oil [1696] [843]; <sup>1</sup>H NMR [843].

**1-[6-Hydroxy-3,4-dimethoxy-2-(phenylmethoxy)phenyl]ethanone**

[41997-39-1]

C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33

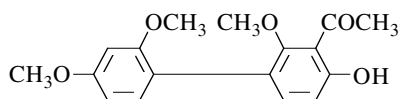
**Synthesis**

-Preparation by reaction of dimethyl sulfate on 6-(benzyloxy)-2,5-dihydroxy-4-methoxyacetophenone with potassium carbonate in refluxing acetone (57%) [10].

m.p. 87-89° [10].

**1-(4-Hydroxy-2,2',4'-trimethoxy[1,1'-biphenyl]-3-yl)ethanone**C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33

**Syntheses**

-Obtained by alkaline degradation of 2-(2,4-dimethoxyphenyl)-1,9-di-O-methylhemiergo-flavinone (C<sub>25</sub>H<sub>24</sub>O<sub>9</sub>) with 10% sodium hydroxide on a steam bath for 1.75 h [72].

-Also obtained by alkaline degradation of 6-(2,4-dimethoxyphenyl)-5-methoxy-2-methylchromone (m.p. 141-142°) with 25%(w/v) aqueous sodium hydroxide during 2 h on a steam bath (72%) [794].

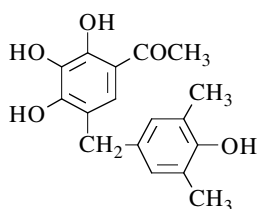
m.p. 94° [72], 93° [794]; IR [794].

**1-[2,3,4-Trihydroxy-5-[(4-hydroxy-3,5-dimethylphenyl)methyl]phenyl]ethanone**

[142045-74-7]

C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>

mol.wt. 302.33



Synthesis

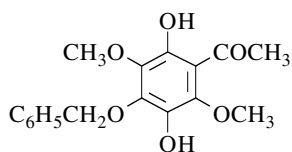
-Refer to: [1834] (Japanese patent).

**1-[2,5-Dihydroxy-3,6-dimethoxy-4-(phenylmethoxy)phenyl]ethanone**

[3162-50-3]

C<sub>17</sub>H<sub>18</sub>O<sub>6</sub>

mol.wt. 318.33



Syntheses

-Obtained by oxidation of 4-(benzyloxy)-2-hydroxy-3,6-dimethoxyacetophenone with potassium persulfate (Elbs reaction), (46%) [1072], (14%) [592].  
-Also refer to: [591] [593] [1071] [1793].

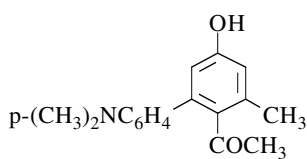
m.p. 60-62° [592], 59-61° [1072];  
IR [1072]; TLC [592].

**1-[4'-(Dimethylamino)-5-hydroxy-3-methyl[1,1'-biphenyl]-2-yl]ethanone**

[108909-48-4]

C<sub>17</sub>H<sub>19</sub>NO<sub>2</sub>

mol.wt. 269.34



Syntheses

-Obtained by aromatization of 4-acetyl-5-[4-(dimethylamino)phenyl]-3-methyl-2-cyclohexen-1-one (m.p. 162°) with bromine in chloroform (70%) or by heating at 170° for 3 h [731].

-Also obtained by deacylation of 1,1'-[4'-(dimethylamino)-3-hydroxy-5-methyl[1,1'-biphenyl]-2,6-diyl]bis-ethanone (m.p. 153°) with sodium hydroxide in refluxing dilute ethanol for 3 h (70%) [731].  
-Also refer to: [730].

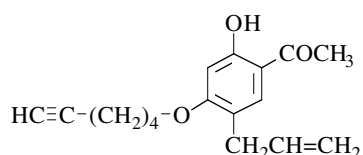
m.p. 192° [731].

**1-[4-(5-Hexynyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117706-50-0]

C<sub>17</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 272.34

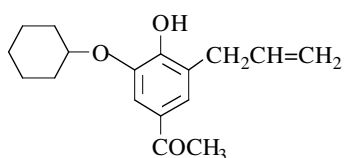
**Synthesis**

-Preparation by reaction of 6-bromo-1-hexyne with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (15-20%) [256] [257] [777].

oil [777]; m.p. < 25° [256] [257]; <sup>1</sup>H NMR [256] [257].

**1-[3-(Cyclohexyloxy)-4-hydroxy-5-(2-propenyl)phenyl]ethanone**C<sub>17</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 274.36

**Synthesis**

-Preparation by thermal Claisen rearrangement of 4-(allyloxy)-3-cyclohexyloxyacetophenone in boiling N,N-diethylaniline (69%) [1211].

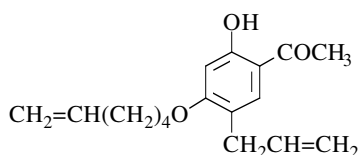
m.p. 58° [1211]; b.p.<sub>0.6</sub> 170-180° [1211].

**1-[4-(5-Hexenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117690-54-7]

C<sub>17</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 274.36

**Synthesis**

-Preparation by reaction of 6-bromo-1-hexene with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (30%) [256] [257] [777].

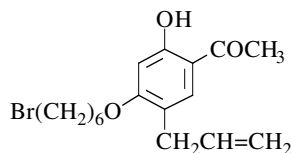
oil [777]; m.p. < 25° [256] [257].

**1-[4-[(6-Bromohexyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117706-41-9]

C<sub>17</sub>H<sub>23</sub>BrO<sub>3</sub>

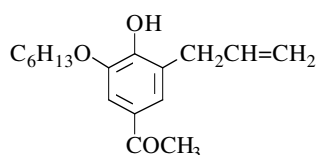
mol.wt. 355.27

**Synthesis**

-Preparation by reaction of 1,6-dibromohexane with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide at reflux (42%) [256] [257].

**1-[3-(Hexyloxy)-4-hydroxy-5-(2-propenyl)phenyl]ethanone**C<sub>17</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 276.38



## Synthesis

-Preparation by thermal Claisen rearrangement of 4-(allyloxy)-3-(hexyloxy)acetophenone without solvent at 200° (47%) [1211].

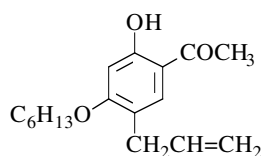
m.p. 83° [1211]; b.p.<sub>0.9</sub> 175-180° [1211].

**1-[4-(Hexyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117690-47-8]

C<sub>17</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 276.38



## Synthesis

-Preparation by reaction of hexyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (85%) [777], (36%) [256] [257].

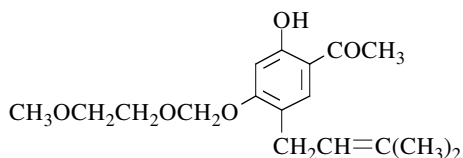
m.p. 42-44° [256] [257] [777].

**1-[2-Hydroxy-4-[(2-methoxyethoxy)methoxy]-5-(3-methyl-2-butenyl)phenyl]ethanone**

[181047-51-8]

C<sub>17</sub>H<sub>24</sub>O<sub>5</sub>

mol.wt. 308.37



## Synthesis

-Preparation by treatment of 4-(2-methoxyethoxymethoxy)-2-(3,3-dimethylallyloxy)acetophenone in refluxing N,N-diethylaniline at 220° for 4 h under argon atmosphere (77%) (Claisen rearrangement) [1338].

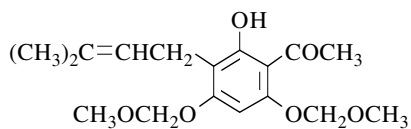
<sup>1</sup>H NMR [1338], <sup>13</sup>C NMR [1338], MS [1338].

**1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3-(3-methyl-2-butenyl)phenyl]ethanone**

[84092-45-5]

C<sub>17</sub>H<sub>24</sub>O<sub>6</sub>

mol.wt. 324.37



## Syntheses

-Obtained by reaction of prenyl bromide with 2-hydroxy-4,6-di-(methoxymethoxy)acetophenone in methanolic potassium hydroxide solution, first at 0°, then at r.t. for 24 h (74%) [1620].

-Also refer to: [310].

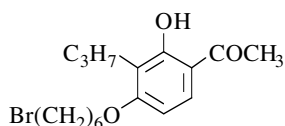
liquid [1620]; <sup>1</sup>H NMR [1620], IR [1620], UV [1620].

**1-[4-[(6-Bromohexyl)oxy]-2-hydroxy-3-propylphenyl]ethanone**

[92518-46-2]

C<sub>17</sub>H<sub>25</sub>BrO<sub>3</sub>

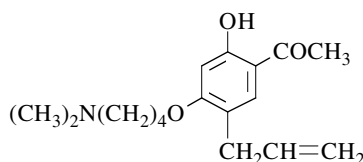
mol.wt. 357.29

**Synthesis**

-Preparation by reaction of 1,6-dibromohexane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (37%) [1156].

**1-[4-[4-(Dimethylamino)butoxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone**C<sub>17</sub>H<sub>25</sub>NO<sub>3</sub>

mol.wt. 291.39

**Synthesis**

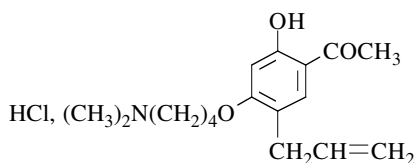
-Preparation by reaction of dimethylamine with 5-allyl-4-(4-bromobutoxy)-2-hydroxyacetophenone during 16 h [777].

**1-[4-[4-(Dimethylamino)butoxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone (Hydrochloride)**

[117706-32-8]

C<sub>17</sub>H<sub>25</sub>NO<sub>3</sub>, HCl

mol.wt. 327.85

**Synthesis**

-Obtained by reaction of hydrogen chloride with the corresponding base in ethanol, then adding ethyl ether to the mixture [777].

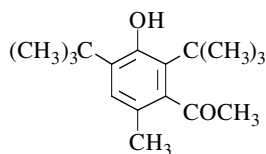
m.p. 88-90° [777].

**1-[2,4-Bis(1,1-dimethylethyl)-3-hydroxy-6-methylphenyl]ethanone**

[175438-44-5]

C<sub>17</sub>H<sub>26</sub>O<sub>2</sub>

mol.wt. 262.39

**Synthesis**

-Refer to: Chem. Abstr., **124**, 260501q (1995).

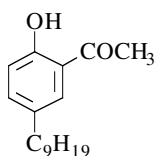
**N.B.:** this ketone is erroneously referenced in the Chemical Abstracts (Vol. **124**, 1996, Formula Index, 2675F). The compound actually obtained by reaction between acetic anhydride and 2,6-di-tert-butyl-6-methylphenol in the presence of various Metal Bis(trifluoromethylsulfonyl)-amides such as a titanium and ytterbium bistriflylamides in methylene chloride or acetonitrile at r.t. is the phenolic ester, i.e. the 2,6-di-tert-butyl-6-methylphenyl acetate (90-99%), which has been unambiguously characterized [1232] (personal communication from professor Koichi MIKAMI).

**1-(2-Hydroxy-5-nonylphenyl)ethanone**

[115851-77-9]

C<sub>17</sub>H<sub>26</sub>O<sub>2</sub>

mol.wt. 262.39

**Synthesis**

-Preparation by reaction of acetyl chloride on 4-nonylphenol with aluminium chloride in ethylene dichloride at 110-120° (63%) [1033].

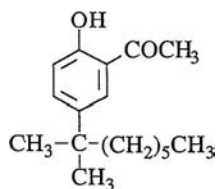
b.p. 178-182° [1033].

**1-(2-Hydroxy-5-tert-nonylphenyl)ethanone**

[57375-45-8]

C<sub>17</sub>H<sub>26</sub>O<sub>2</sub>

mol.wt. 262.39

**Synthesis**

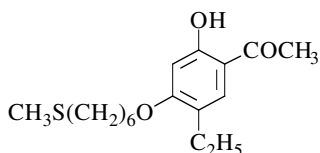
-Preparation by Fries rearrangement of 4-tert-nonylphenyl acetate with aluminium chloride under nitrogen in tetrachloroethane or in tetrachloroethylene at 120-125° (77-79%) [1842] or in refluxing chlorobenzene (46%) [1842].

**1-[5-Ethyl-2-hydroxy-4-[[6-(methylthio)hexyl]oxy]phenyl]ethanone**

[117706-37-3]

C<sub>17</sub>H<sub>26</sub>O<sub>3</sub>S

mol.wt. 310.46

**Synthesis**

-Preparation by adding a DMF solution of 4-(6-bromohexyloxy)-5-ethyl-2-hydroxy acetophenone to a DMF solution of methanethiol previously treated with sodium hydride (78%) [256] [257] [777].

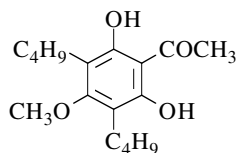
m.p. 52-53° [256] [257], 47-48° [777]; <sup>1</sup>H NMR [256] [257] [777], MS [777].

**1-(3,5-Dibutyl-2,6-dihydroxy-4-methoxyphenyl)ethanone**

[175785-88-3]

C<sub>17</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 294.39

**Synthesis**

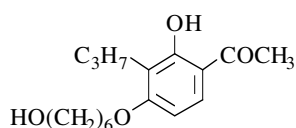
-Refer to: [1737] (Japanese patent).

**1-[2-Hydroxy-4-[(6-hydroxyhexyl)oxy]-3-propylphenyl]ethanone**

[106627-20-7]

C<sub>17</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 294.39

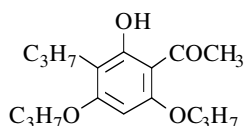
**Synthesis**

-Preparation by reaction of 6-chlorohexanol with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate in refluxing methyl ethyl ketone (20%) [1156].

oily solid [1156]; MS [1156].

**1-[2-Hydroxy-3-propyl-4,6-bis(propyloxy)phenyl]ethanone**C<sub>17</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 294.39

**Synthesis**

-Preparation by catalytic hydrogenation of 2-hydroxy-3-(2-propynyl)-4,6-bis(2-propynyloxy)acetophenone in the presence of 10% Pd/C in ethanol (77%) [427].

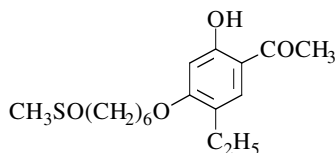
m.p. 78-80° [427].

**1-[5-Ethyl-2-hydroxy-4-[[6-(methylsulfinyl)hexyl]oxy]phenyl]ethanone**

[117706-38-4]

C<sub>17</sub>H<sub>26</sub>O<sub>4</sub>S

mol.wt. 326.46

**Synthesis**

-Obtained (by-product) by reaction of m-chloroperbenzoic acid on 2-hydroxy-4-[6-(methylthio)hexyloxy]-5-ethylacetophenone in methylene chloride, first at 0°, then at r.t. (17%) [256] [257] [777].

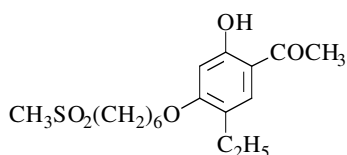
m.p. 87-90° [256] [257], 87-89° [777].

**1-[5-Ethyl-2-hydroxy-4-[[6-(methylsulfonyl)hexyl]oxy]phenyl]ethanone**

[117690-76-3]

C<sub>17</sub>H<sub>26</sub>O<sub>5</sub>S

mol.wt. 342.46

**Synthesis**

-Preparation by reaction of m-chloroperbenzoic acid on 5-ethyl-2-hydroxy-4-[6-(methylthio)hexyloxy]acetophenone in methylene chloride, first at 0°, then at r.t. (70-76%) [256] [257] [777].

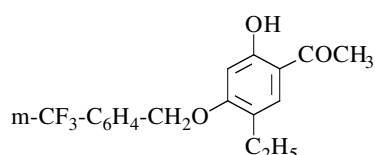
m.p. 124-126° [256] [257] [777].

**1-[5-Ethyl-2-hydroxy-4-[[3-(trifluoromethyl)phenyl]methoxy]phenyl]ethanone**

[117706-51-1]

C<sub>18</sub>H<sub>17</sub>F<sub>3</sub>O<sub>3</sub>

mol.wt. 338.33

**Synthesis**

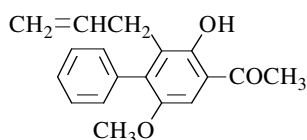
-Preparation by reaction of 3-(trifluoromethyl)benzyl bromide with 5-ethyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide (11%) [256] [257].

**1-[3-Hydroxy-6-methoxy-2-(2-propenyl)[1,1'-biphenyl]-4-yl]ethanone**

[43037-65-6]

C<sub>18</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 282.34

**Synthesis**

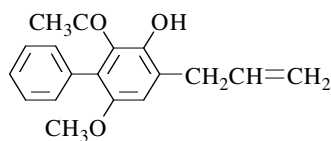
-Obtained by thermal Claisen rearrangement of 1-[2-methoxy-5-(2-propenyloxy)[1,1'-biphenyl]-4-yl]ethanone in N,N-dimethylaniline at 170° (52%) [581].

**1-[3-Hydroxy-6-methoxy-4-(2-propenyl)[1,1'-biphenyl]-2-yl]ethanone**

[43037-67-8]

C<sub>18</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 282.34

**Synthesis**

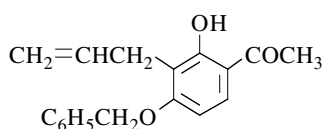
-Obtained by thermal Claisen rearrangement of 1-[2-methoxy-5-(2-propenyloxy)[1,1'-biphenyl]-4-yl]ethanone in N,N-dimethylaniline at 170° (33%) [581]. The formation of this ketone is rationalised as involving a [1,5] acetyl shift.

**1-[2-Hydroxy-4-(phenylmethoxy)-3-(2-propenyl)phenyl]ethanone**

[137170-49-1]

C<sub>18</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 282.34

**Syntheses**

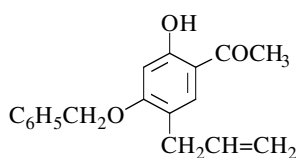
-Refer to: [423] [1367] (patents).

**1-[2-Hydroxy-4-(phenylmethoxy)-5-(2-propenyl)phenyl]ethanone**

[117690-55-8]

C<sub>18</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 282.34

**Synthesis**

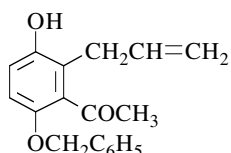
-Preparation by reaction of benzyl bromide on 5-allyl-2,4-dihydroxyacetophenone with potassium carbonate and potassium iodide (60%) [256] [257].

m.p. 86° [256] [257].



**1-[3-Hydroxy-6-(phenylmethoxy)-2-(2-propenyl)phenyl]ethanone**C<sub>18</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 282.34

**Synthesis**

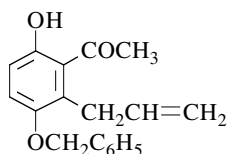
-Obtained (by-product) by reaction of benzyl bromide with 2-allyl-3,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone for 5.5 h under nitrogen atmosphere (3%) [699].

**1-[6-Hydroxy-3-(phenylmethoxy)-2-(2-propenyl)phenyl]ethanone**

[263138-72-3]

C<sub>18</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 282.34

**Synthesis**

-Obtained by reaction of benzyl bromide with 2-allyl-3,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone for 5.5 h under nitrogen atmosphere (54%) [699].

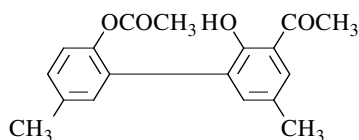
m.p. 92-93° [699]; <sup>1</sup>H NMR [699], <sup>13</sup>C NMR [699], IR [699], MS [699].

**1-(2'-Acetoxy-2-hydroxy-5,5'-dimethyl[1,1'-biphenyl]-3-yl)ethanone**

[24046-01-3]

C<sub>18</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 298.34

**Synthesis**

-Obtained by stirring a solution of 1-(2,2'-dihydroxy-5,5'-dimethyl[1,1'-biphenyl]-3-yl)ethanone in pyridine with freshly fused sodium acetate for 1 h (95%) [1816].

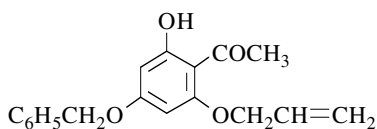
pale yellow oil [1816]; b.p.<sub>10</sub><sup>-5</sup> 120° [1816].

**1-[2-Hydroxy-4-(phenylmethoxy)-6-(2-propenyloxy)phenyl]ethanone**

[76609-36-4]

C<sub>18</sub>H<sub>18</sub>O<sub>4</sub>

mol.wt. 298.34

**Synthesis**

-Obtained by partial benzylation of 6-(allyloxy)-2,4-dihydroxyacetophenone [13].

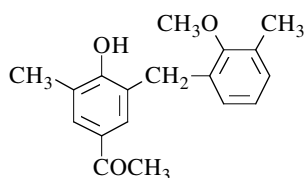
m.p. 64-65° [13].

**1-[4-Hydroxy-3-[(2-methoxy-3-methylphenyl)methyl]-5-methylphenyl]ethanone**

[38778-41-5]

C<sub>18</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 284.36

**Synthesis**

-Preparation by Fries rearrangement of 2-acetoxy-2'-methoxy-3,3'-dimethyldiphenylmethane with aluminium chloride in nitrobenzene at 40° for 3 h (50%) [1327].

m.p. 124-125° [1327];

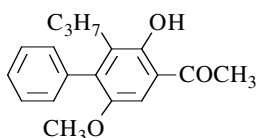
<sup>1</sup>H NMR [1327], IR [1327], UV [1327].

**1-(3-Hydroxy-6-methoxy-2-propyl[1,1'-biphenyl]-4-yl)ethanone**

[43037-69-0]

C<sub>18</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 284.36

**Synthesis**

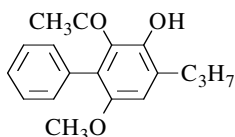
-Obtained by catalytic hydrogenation of 1-[3-hydroxy-6-methoxy-2-(2-propenyl)[1,1'-biphenyl]-4-yl]ethanone or by thermal Fries rearrangement of 3-(acetyloxy)-6-methoxy-2-propyl [1,1'-biphenyl] with aluminium chloride [581].

**1-(3-Hydroxy-6-methoxy-4-propyl[1,1'-biphenyl]-2-yl)ethanone**

[43037-70-3]

C<sub>18</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 284.36

**Synthesis**

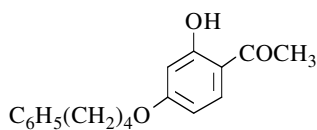
-Obtained by catalytic hydrogenation of 1-[3-hydroxy-6-methoxy-4-(2-propenyl)[1,1'-biphenyl]-2-yl]ethanone or by thermal Fries rearrangement of 5-(acetyloxy)-2-methoxy-4-propyl[1,1'-biphenyl] with aluminium chloride [581].

**1-[2-Hydroxy-4-(4-phenylbutoxy)phenyl]ethanone**

[63359-88-6]

C<sub>18</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 284.36

**Synthesis**

-Obtained by reaction of 1-bromo-4-phenylbutane with resacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h. The 1-chloro derivative and the butanone can also be used instead of the mentioned starting material and solvent (59%) [314].

-Also refer to: [312].

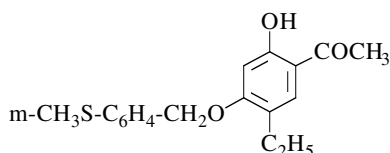
m.p. 55° [314].

**1-[5-Ethyl-2-hydroxy-4-[[3-(methylthio)phenyl]methoxy]phenyl]ethanone**

[117706-52-2]

C<sub>18</sub>H<sub>20</sub>O<sub>3</sub>S

mol.wt. 316.42

**Synthesis**

-Preparation by reaction of 3-methylmercapto-benzyl bromide with 2,4-dihydroxy-5-ethyl-acetophenone in the presence of potassium carbonate and potassium iodide (18%) [256] [257].

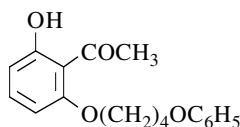
m.p. 89° [256] [257]; <sup>1</sup>H NMR [256] [257].

**1-[2-Hydroxy-6-(4-phenoxybutoxy)phenyl]ethanone**

[69079-91-0]

C<sub>18</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 300.35

**Synthesis**

-Obtained by reaction of 1-bromo-4-phenoxybutane with 2,6-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone for 24 h (91%). The 1-chloro derivative and butanone can also be used instead of the mentioned starting material and solvent [314].

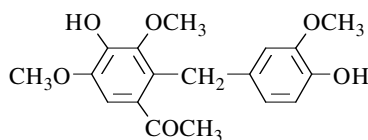
m.p. 81° [314].

**1-[4-Hydroxy-2-[(4-hydroxy-3-methoxyphenyl)methyl]-3,5-dimethoxyphenyl]ethanone**

[147904-71-0]

C<sub>18</sub>H<sub>20</sub>O<sub>6</sub>

mol.wt. 332.35

**Synthesis**

-Obtained by alkaline CuO oxidation of lignin (compound Vm2Sn) named 2-vanillylacetosyringone [689].

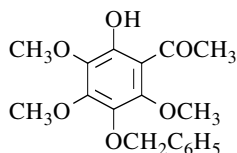
GC [689], GC-MS [689].

**1-[2-Hydroxy-3,4,6-trimethoxy-5-(phenylmethoxy)phenyl]ethanone**

[76844-54-7]

C<sub>18</sub>H<sub>20</sub>O<sub>6</sub>

mol.wt. 332.35

**Syntheses**

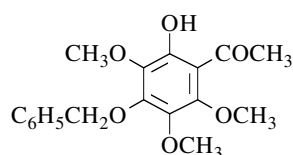
-Preparation by [796] according to [800] (Japanese paper).  
-Also obtained by benzylation of 2,5-dihydroxy-3,4,6-trimethoxyacetophenone with benzyl chloride [1465].

**1-[2-Hydroxy-3,5,6-trimethoxy-4-(phenylmethoxy)phenyl]ethanone**

[3162-49-0]

C<sub>18</sub>H<sub>20</sub>O<sub>6</sub>

mol.wt. 332.35

**Syntheses**

-Preparation by partial methylation of 4-benzyloxy-2,5-dihydroxy-3,6-dimethoxyacetophenone with dimethyl sulfate in the presence of potassium carbonate in petroleum ether (b.p. 40-60°) (70%) [1072].  
 -Also refer to: [584] [1073].

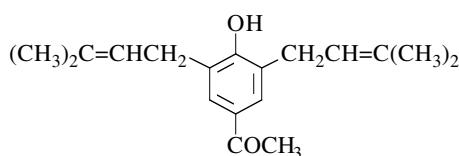
m.p. 35-36° [1072]; IR [1072], UV [1072].

**1-[4-Hydroxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone**

[41607-43-6]

C<sub>18</sub>H<sub>24</sub>O<sub>2</sub>

mol.wt. 272.39

**Synthesis**

-Preparation by thermal Claisen rearrangement of 3-(3,3-dimethylallyl)-4-(3,3-dimethylallyloxy)acetophenone in N,N-diethylaniline at 170-175° (84%) [246].

**Isolation from natural sources**

-From the roots of several *Gerbera* species (Tribus *Arctotideae*, Fam. *Compositae*): *Gerbera asplenifolia* (1.5%) [252], *Gerbera crocea* (1%) [252] and as a trace in *Gerbera cordata* Less. (0.008%) [243].

-From the roots of several *Ageratina* species (Compositae): *Ageratina aschenbornia* (0.017%) [249] and *Ageratina altissima* (0.005%) [249].

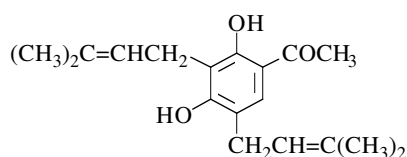
m.p. 93°6 [252], 92°3 [246]; <sup>1</sup>H NMR [252], IR [252], UV [252].

**1-[2,4-Dihydroxy-3,5-bis-(3-methyl-2-butenyl)phenyl]ethanone**

[24672-82-0]

C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 288.39

**Syntheses**

-Obtained (poor yield) by reaction of 2-methylbut-3-en-2-ol on resacetophenone with boron trifluoride etherate [43] [884] in dioxane at r.t. (6%) [884].

-Also obtained [1056] (poor yield) [882] by reaction of prenyl bromide with resacetophenone in potassium hydroxide solution at r.t. (3%) [882].

m.p. 117° [1056], 109-114° [882], 109-110° [884];

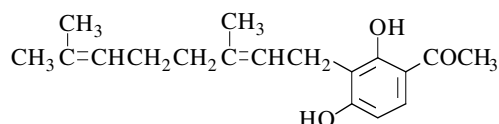
<sup>1</sup>H NMR [43] [44] [882] [1056], IR [882] [1056], UV [43] [882].

**1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone**

[88661-97-6]

C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 288.39

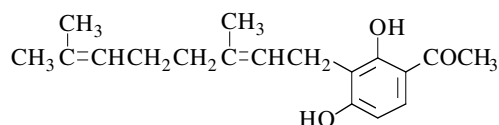
**Synthesis**

-Preparation by condensation of resacetophenone with 3,7-dimethyl-3-hydroxy-1,6-octadiene in the presence of boron trifluoride etherate in dioxane at r.t. (compound **14**) [865].

<sup>1</sup>H NMR [865], IR [865].

**1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone**[18296-19-0] (*Z*)C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 288.39

[20212-67-3] (*E*)**Syntheses**

-Preparation by alkylation of 2,4-dihydroxyacetophenone lithium salt with geranyl bromide in refluxing benzene (23%) [354] (no specification).

-Also obtained by treatment of 6-acetyl-2-methyl-2-(4-methylpent-3-enyl)-3-phenylthiochroman-5-ol with potassium naphthalenide in tetrahydrofuran at -78°; then, the mixture was allowed to warm to -30° (48%) (2*E*, 6*Z*) [1252].

m.p. 120-121° [354]; <sup>1</sup>H NMR [354], UV [354] (compound **XX**); (no specification) (*E* isomer?).

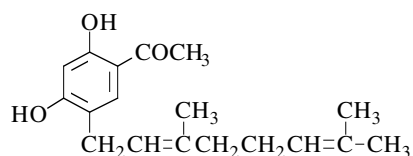
m.p. 93-96° [1252]; <sup>1</sup>H NMR [1252], MS [1252] (compound **29**); (as a 1:1 mixture of *E* and *Z* isomers by <sup>13</sup>C NMR) [1252].

**1-[5-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone**

[146954-92-9]

C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 288.39

**Synthesis**

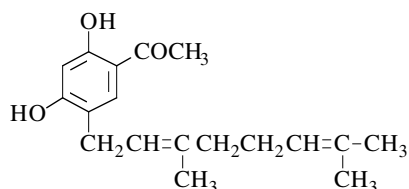
-Preparation by condensation of resacetophenone with 3,7-dimethyl-3-hydroxy-1,6-octadiene in the presence of boron trifluoride etherate in dioxane at r.t. (compound **15**) [865].

**1-[5-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone (*E*)**

[20212-68-4]

C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 288.39



## Synthesis

-Obtained (poor yield) by alkylation of 2,4-dihydroxyacetophenone lithium salt with geranyl bromide in benzene (< 2%) [354].

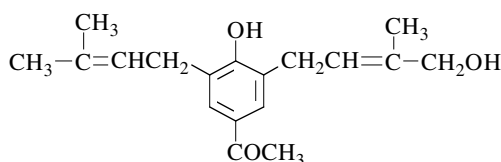
m.p. 88° [354];  
<sup>1</sup>H NMR [354], UV [354].

**1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)-5-(3-methyl-2-butenyl)phenyl]ethanone (*E*)**

[81053-02-3]

C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 288.39



## Isolation from natural sources

-From the aerial parts of *Artemisia campestris* L. subsp. *glutinosa* (Gay ex Besser) Batt. (Compositae) (1.8%) [489].

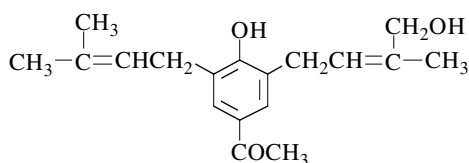
m.p. 83° [489]; <sup>1</sup>H NMR [489], IR [489], UV [489], MS [489].

**1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)-5-(3-methyl-2-butenyl)phenyl]ethanone (*Z*)**

[77370-28-6]

C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 288.39



## Isolation from natural sources

-From *Artemisia campestris* L. ssp. *glutinosa* (Gay ex Besser) Batt, \*compound (7) (12%) (from the aerial parts) [489];  
 \*compound (2) [488].

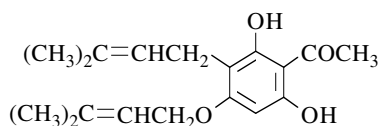
m.p. 109-110° [488]; <sup>1</sup>H NMR [488] [489], IR [488], UV [488], MS [488] [489].

**1-[2,6-Dihydroxy-3-(3-methyl-2-butenyl)-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone**

[158499-98-0]

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39



## Synthesis

-Obtained by reaction of 4,6-dihydroxy-3-prenyl-2-tosyloxyacetophenone with prenyl bromide in the presence of potassium carbonate in acetone at 20° for 2 h, followed by hydrolysis of the resulting 6-hydroxy-3-prenyl-4-prenyloxy-2-tosyloxyacetophenone with 30% potassium hydroxide in refluxing ethanol under nitrogen atmosphere for 1 h [1823].

## Isolation from natural sources

-From the fruit of *Evodia merrillii* [1823].

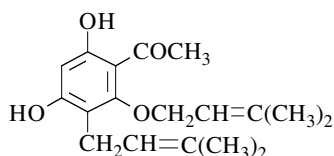
m.p. 108-110° [1823]; <sup>1</sup>H NMR [1823], IR [1823].

**1-[4,6-Dihydroxy-3-(3-methyl-2-butenyl)-2-[(3-methyl-2-butenyl)oxy]phenyl]ethanone**

[153399-38-3]

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39



## Syntheses

-Obtained by hydrolysis of 4',6'-bis(benzoyloxy)-2'-(3-methyl-2-butenyloxy)-3'-(3-methyl-2-butenyl)-acetophenone with dilute sodium hydroxide under nitrogen atmosphere at 50° [1824].  
-Also refer to: [1823].

## Isolation from natural sources

-From the root bark of *Euodia lunu-ankenda* (Rutaceae) [1045].

m.p. 73-75° [1045], 71-72° [1824]; TLC [1045];  
<sup>1</sup>H NMR [1045] [1824], IR [1045] [1824], UV [1045],  
MS [1045], HRMS [1045].

**N.B.:** The synthetic works [1824] [1823] have suggested that the prenylphenol of natural products isolated by [1045] had an incorrectly assigned structure. This compound [1045] is identical with 1-[2,6-dihydroxy-3-(3-methyl-2-butenyl)-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone [158499-98-0].

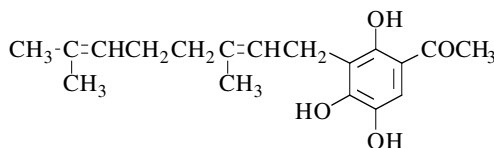
**1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4,5-trihydroxyphenyl]ethanone**

[18296-18-9] (*Z*)

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39

[20212-66-2] (*E*)



## Syntheses

-Preparation by reaction of geraniol of 2,4,5-trihydroxyacetophenone in refluxing decalin [354] (no specification).  
-Also obtained by reaction of potassium naphthalenide with 6-acetyl-2-methyl-

2-(4-methylpent-3-enyl)-3-phenylthiochroman-5,8-diol in tetrahydrofuran at r.t. (11%) (*E*, *Z*) [1252].

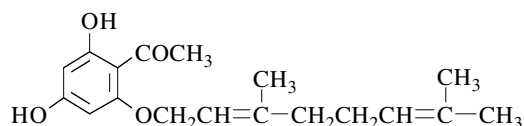
m.p. 127-130° [354]; UV [354]; (compound **XVIII**);  
(no specification) (*E* isomer ?).  
unstable oil [1252]; <sup>1</sup>H NMR [1252], MS [1252]; (compound **30**);  
(as a 1:1 mixture of *E* and *Z* isomers by <sup>13</sup>C NMR) [1252].

**1-[2-[(3,7-Dimethyl-2,6-octadienyl)oxy]-4,6-dihydroxyphenyl]ethanone (*E*)**

[142905-39-3]

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39



Isolation from natural sources

-From the fruit of *Evodia Merrillii* Kanehira & Sasaki ex Kanehira (Rutaceae) [408].

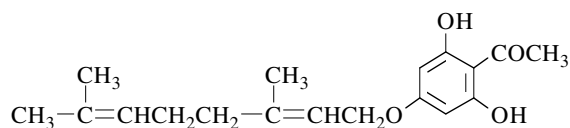
m.p. 147-150° [408]; column chromatography [408];  
<sup>1</sup>H NMR [408], <sup>13</sup>C NMR [408], IR [408], UV [408], MS [408].

**1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-2,6-dihydroxyphenyl]ethanone (*E*)**

[142905-40-6]

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39



Synthesis

-Obtained by hydrolysis of  
 2-toluenesulfonyloxy-  
 6-hydroxy-4-(1'-geranyloxy)-  
 acetophenone with 30%

potassium hydroxide in refluxing ethanol for 1.5 h (75%) [825].

Isolation from natural sources

-From the fruit of *Evodia Merrillii* Kanehira & Sasaki ex Kanehira (Rutaceae) [408].

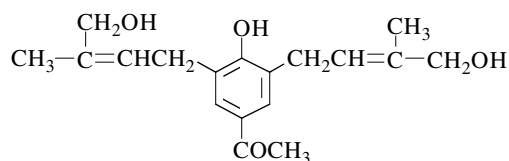
waxy substance [408]; m.p. 147-148° [825];  
<sup>1</sup>H NMR [408] [825], <sup>13</sup>C NMR [408], IR [408] [825], UV [408],  
 MS [408], EIMS [825], HREIMS [825];  
 column chromatography [408].

**1-[4-Hydroxy-3,5-bis(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*E,Z*)**

[81053-03-4]

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39



Isolation from natural sources

-From the aerial parts of *Artemisia campestris* L. subsp. *glutinosa* (Gay ex Besser) Batt. (Compositae) (2%) [489].

m.p. 97° [489]; <sup>1</sup>H NMR [489], IR [489], UV [489], MS [489].

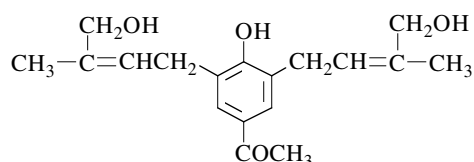


**1-[4-Hydroxy-3,5-bis(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (Z,Z)**

[77370-30-0]

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39



Isolation from natural sources

-From *Artemisia camprstris* L. ssp. glutinosa (Gay ex Besser) Batt, \*compound (10) (0.6%) (from the aerial parts) [489];  
\*compound (3) (12%) [488].

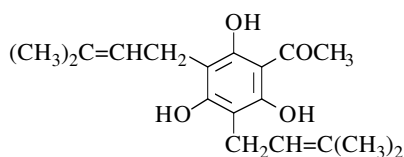
m.p. 120° [488]; <sup>1</sup>H NMR [488] [489], IR [488], UV [488], MS [488] [489].

**1-[2,4,6-Trihydroxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone**

[35458-19-6]

C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>

mol.wt. 304.39



Syntheses

-Preparation by reaction of 2-methylbut-3-en-2-ol with phloracetophenone in the presence of boron trifluoride etherate in dioxane at 20° [426] [1611], (21%) [426] or at 50° [428].  
-Also obtained by reaction of prenyl bromide

with phloracetophenone in the presence of potassium hydroxide in 80% aqueous methanol (15%) [1489].

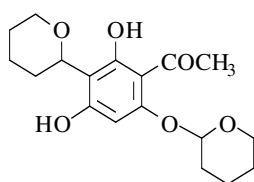
m.p. 78-79° [426] [428] [1489] [1611], 68-72° [350]; b.p.<sub>1</sub> 135-140° [1489];  
<sup>1</sup>H NMR [350]; UV [426] [1489].

**1-[2,4-Dihydroxy-3-(tetrahydro-2H-pyran-2-yl)-6-[(tetrahydro-2H-pyran-2-yl)-oxy]phenyl]ethanone**

[136257-83-5]

C<sub>18</sub>H<sub>24</sub>O<sub>6</sub>

mol.wt. 336.38



Synthesis

-Obtained (by-product) by reaction of 3,4-dihydro-2H-pyran on phloracetophenone with p-toluenesulfonic acid in dioxane at r.t. (8%) [5].

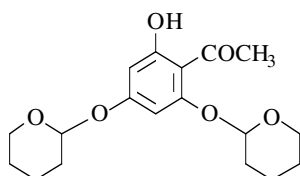
m.p. 118-121° [5]; <sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[2-Hydroxy-4,6-bis[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone**

[130600-90-7]

C<sub>18</sub>H<sub>24</sub>O<sub>6</sub>

mol.wt. 336.38

**Synthesis**

-Obtained (by-product) by reaction of 3,4-dihydro-2H-pyran on phloroacetophenone with p-toluenesulfonic acid in dioxane at r.t. (7%) [5].

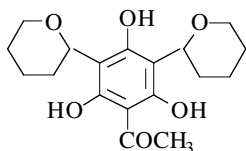
<sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[2,4,6-Trihydroxy-3,5-bis(tetrahydro-2H-pyran-2-yl)phenyl]ethanone**

[136257-82-4]

C<sub>18</sub>H<sub>24</sub>O<sub>6</sub>

mol.wt. 336.38

**Synthesis**

-Obtained (by-product) by reaction of 3,4-dihydro-2H-pyran on phloroacetophenone with p-toluenesulfonic acid in dioxane at r.t. (1%) [5].

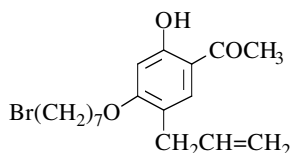
<sup>1</sup>H NMR [5], <sup>13</sup>C NMR [5].

**1-[4-[(7-Bromoheptyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117706-40-8]

C<sub>18</sub>H<sub>25</sub>BrO<sub>3</sub>

mol.wt. 369.30

**Synthesis**

-Preparation by reaction of 1,7-dibromoheptane with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (70%) [256] [257] [777].

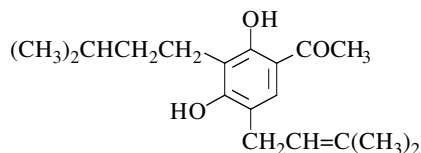
oil [256] [257] [777].

**1-[2,4-Dihydroxy-5-(3-methyl-2-butenyl)-3-(3-methylbutyl)phenyl]ethanone**

[50773-38-1]

C<sub>18</sub>H<sub>26</sub>O<sub>3</sub>

mol.wt. 290.40

**Synthesis**

-Preparation by reaction of prenyl bromide with 2,4-dihydroxy-3-isopentylacetophenone in aqueous potassium hydroxide solution at r.t. [1056].

m.p. 113°5 [1056];

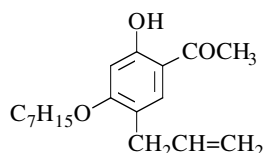
<sup>1</sup>H NMR [1056], IR [1056].

**1-[4-(Heptyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117706-56-6]

C<sub>18</sub>H<sub>26</sub>O<sub>3</sub>

mol.wt. 290.40

**Synthesis**

-Preparation by reaction of heptyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing methyl ethyl ketone (77%) [777], (40%) [256] [257].

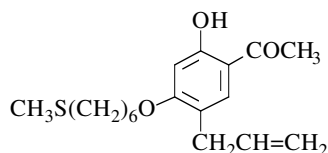
oil [256] [257] [777].

**1-[2-Hydroxy-4-[[6-(methylthio)hexyl]oxy]-5-(2-propenyl)phenyl]ethanone**

[117706-34-0]

C<sub>18</sub>H<sub>26</sub>O<sub>3</sub>S

mol.wt. 322.47

**Synthesis**

-Preparation by adding a DMF solution of 5-allyl-4-(6-bromohexyloxy)-2-hydroxyacetophenone to a DMF solution of methanethiol previously treated with sodium hydride (54%) [256] [257].

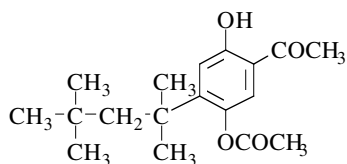
m.p. 42° [256] [257].

**1-[5-(Acetyloxy)-2-hydroxy-4-(1,1,3,3-tetramethylbutyl)phenyl]ethanone**

[107188-54-5]

C<sub>18</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 306.40

**Synthesis**

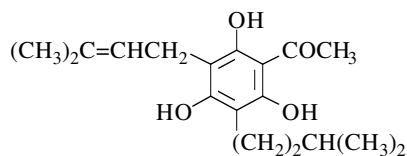
-Refer to: [1928].

**1-[2,4,6-Trihydroxy-3-(3-methyl-2-butenyl)-5-(3-methylbutyl)phenyl]ethanone**

[57744-70-4]

C<sub>18</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 306.40

**Synthesis**

-Obtained by reaction of 2-methyl-3-buten-2-ol with isopentylphloroacetophenone in the presence of boron trifluoride etherate in dioxane at 20° (13%) [1611].

m.p. 92°5-93°5 [350], 92-93°5 [1611];

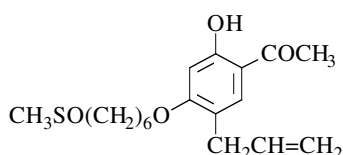
<sup>1</sup>H NMR [350].

**1-[2-Hydroxy-4-[[6-(methylsulfinyl)hexyl]oxy]-5-(2-propenyl)phenyl]ethanone**

[117706-35-1]

C<sub>18</sub>H<sub>26</sub>O<sub>4</sub>S

mol.wt. 338.47

**Synthesis**

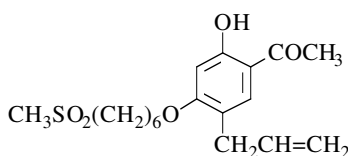
-Obtained (by-product) by reaction of m-chloroperbenzoic acid with 5-allyl-2-hydroxy-4-[6-(methylthio)hexyloxy]acetophenone in methylene chloride, first at 0°, then at r.t. (9%) [256] [257].

**1-[2-Hydroxy-4-[[6-(methylsulfonyl)hexyl]oxy]-5-(2-propenyl)phenyl]ethanone**

[117706-36-2]

C<sub>18</sub>H<sub>26</sub>O<sub>5</sub>S

mol.wt. 354.47

**Synthesis**

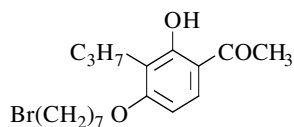
-Obtained by reaction of m-chloroperbenzoic acid with 5-allyl-2-hydroxy-4-[6-(methylthio)hexyloxy]acetophenone in methylene chloride, first at 0°, then at r.t. (20%) [256] [257].

**1-[4-[(7-Bromoheptyl)oxy]-2-hydroxy-3-propylphenyl]ethanone**

[106627-33-2]

C<sub>18</sub>H<sub>27</sub>BrO<sub>3</sub>

mol.wt. 371.31

**Synthesis**

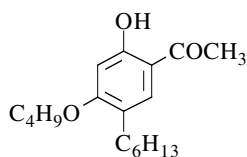
-Preparation by reaction of 1,7-dibromoheptane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (21%) [1156].

**1-(4-Butoxy-5-hexyl-2-hydroxyphenyl)ethanone**

[101002-31-7]

C<sub>18</sub>H<sub>28</sub>O<sub>3</sub>

mol.wt. 292.42

**Synthesis**

-Obtained by partial alkylation of 2,4-dihydroxy-5-hexylacetophenone with butyl bromide in the presence of potassium carbonate in refluxing acetone for 20 h [183].

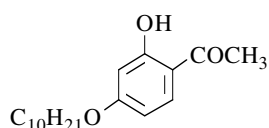
m.p. 37° [183].

**1-[4-(Decyloxy)-2-hydroxyphenyl]ethanone**

[143286-86-6]

C<sub>18</sub>H<sub>28</sub>O<sub>3</sub>

mol.wt. 292.42

**Syntheses**

-Preparation by partial alkylation of resacetophenone with decyl bromide in the presence of potassium carbonate in refluxing acetone for 20 h [183].  
 -Also refer to: [1733].

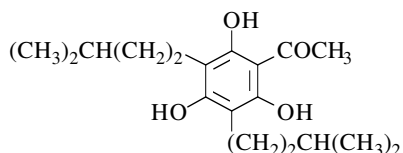
m.p. 35° [183] [1733].

**1-[2,4,6-Trihydroxy-3,5-bis(3-methylbutyl)phenyl]ethanone**

[55380-57-9]

C<sub>18</sub>H<sub>28</sub>O<sub>4</sub>

mol.wt. 308.42

**Synthesis**

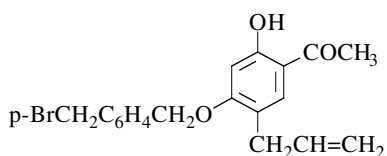
-Preparation by catalytic hydrogenation of deoxyacetohumulone [2,4,6-trihydroxy-3,5-(dimethylallyl)acetophenone] in the presence of 10% Pd/C in ethanol [428].

<sup>1</sup>H NMR [428], UV [428], MS [428].**1-[4-[[4-(Bromomethyl)phenyl]methoxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117706-46-4]

C<sub>19</sub>H<sub>19</sub>BrO<sub>3</sub>

mol.wt. 375.26

**Synthesis**

-Preparation by reaction of 4-(bromomethyl)benzyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide (18%) [256] [257].

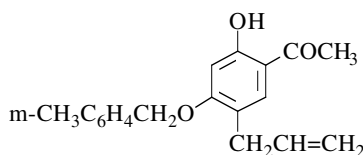
oil [256] [257].

**1-[2-Hydroxy-4-[(3-methylphenyl)methoxy]-5-(2-propenyl)phenyl]ethanone**

[117706-45-3]

C<sub>19</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 296.37

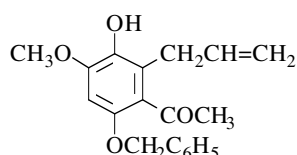
**Synthesis**

-Preparation by reaction of 3-methylbenzyl bromide on 5-allyl-2,4-dihydroxyacetophenone with potassium carbonate and potassium iodide (50%) [256] [257].

m.p. 87-88° [256] [257].

**1-[3-Hydroxy-4-methoxy-6-(phenylmethoxy)-2-(2-propenyl)phenyl]ethanone**C<sub>19</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 312.37

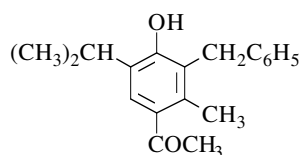
**Synthesis**

-Preparation by thermal Claisen rearrangement of 3-(allyloxy)-6-(benzyloxy)-4-methoxyacetophenone in boiling carbitol (diethylene glycol monoethyl ether) (89%) [498].

m.p. 116° [498].

**1-[4-Hydroxy-2-methyl-5-(1-methylethyl)-3-(phenylmethyl)phenyl]ethanone**C<sub>19</sub>H<sub>22</sub>O<sub>2</sub>

mol.wt. 282.38

**Synthesis**

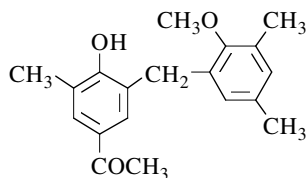
-Obtained (poor yield) by reaction of benzyl chloride with 4-hydroxy-2-methyl-5-isopropylacetophenone in the presence of zinc chloride in boiling chloroform (4%) [1522].

m.p. 88° [1522]; b.p.<sub>14</sub> 243-245° [1522].**1-[4-Hydroxy-3-[(2-methoxy-3,5-dimethylphenyl)methyl]-5-methylphenyl]ethanone**

[38778-48-2]

C<sub>19</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 298.38

**Synthesis**

-Obtained by Fries rearrangement of 2-acetoxy-2'-methoxy-3,3',5-trimethyldiphenylmethane with aluminium chloride in nitrobenzene at 55° for 3 h (23%) [1327].

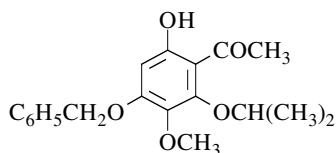
m.p. 128° [1327];

<sup>1</sup>H NMR [1327], IR [1327], UV [1327].**1-[6-Hydroxy-3-methoxy-2-(1-methylethoxy)-4-(phenylmethoxy)phenyl]ethanone**

[188927-31-3]

C<sub>19</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 330.38

**Synthesis**

-Preparation by treatment of 4-(benzyloxy)-3,6-dimethoxy-2-isopropoxyacetophenone (m.p. 74-75°) with aluminium bromide in acetonitrile at 0° for 10-15 min (75%) [804].

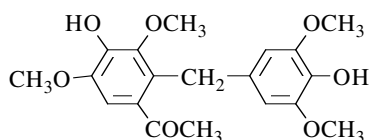
m.p. 69-70° [804].

**1-[4-Hydroxy-2-[(4-hydroxy-3,5-dimethoxyphenyl)methyl]-3,5-dimethoxyphenyl]-ethanone**

[147904-74-3]

C<sub>19</sub>H<sub>22</sub>O<sub>7</sub>

mol.wt. 362.38

**Synthesis**

-Obtained by upon alkaline CuO oxidation of lignin (compound Sm2Sn) named 2-syringylaceto-syringone [689].

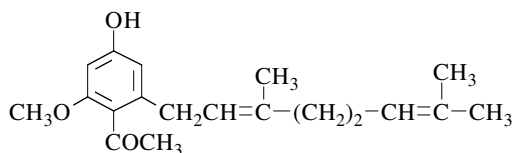
GC [689], GC-MS [689].

**1-[2-(3,7-Dimethyl-2,6-octadienyl)-4-hydroxy-6-methoxyphenyl]ethanone**

[121379-44-0]

C<sub>19</sub>H<sub>26</sub>O<sub>3</sub>

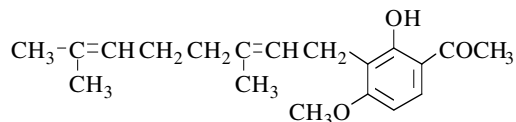
mol.wt. 302.41

**Isolation from natural sources**

-From the bulbs of *Dioscorea bulbifera* [715].

**1-[2-Hydroxy-4-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (E)**C<sub>19</sub>H<sub>26</sub>O<sub>3</sub>

mol.wt. 302.41

**Synthesis**

-Preparation by reaction of dimethyl sulfate on 3-geranyl-2,4-dihydroxyacetophenone with potassium carbonate in refluxing acetone [354].

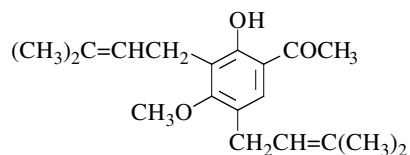
<sup>1</sup>H NMR [354]; UV [354].

**1-[2-Hydroxy-4-methoxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone**

[50773-40-5]

C<sub>19</sub>H<sub>26</sub>O<sub>3</sub>

mol.wt. 302.41

**Syntheses**

-Preparation by reaction of 2-methylbut-3-en-2-ol with 2-hydroxy-4-methoxyacetophenone in the presence of boron trifluoride etherate [43].

-Preparation by reaction of dimethyl sulfate with 2,4-dihydroxy-3,5-(dimethylallyl)acetophenone

in the presence of potassium carbonate in refluxing acetone [1056].

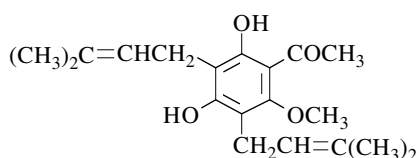
<sup>1</sup>H NMR [43] [44] [1056], UV [43].

**1-[2,4-Dihydroxy-6-methoxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone**

[123999-38-2]

C<sub>19</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 318.41



Isolation from natural sources

-From *Euodia lunu-ankenda* root bark (Rutaceae) [1045].-From *Acronychia pedunculata* root bark (Rutaceae) [1044].

yellow oil [1044] [1045];

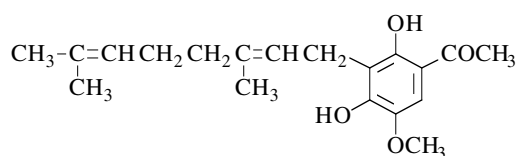
TLC [1044]; HPLC [1045];

<sup>1</sup>H NMR [1044], IR [1044], HRMS [1044], MS [1044].**1-[2,4-Dihydroxy-5-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (E)**

[20212-64-0]

C<sub>19</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 318.41



Synthesis

-Obtained by alkylation of 2,4-dihydroxy-5-methoxyacetophenone lithium salt with geranyl bromide in benzene (7%) [353] [354].

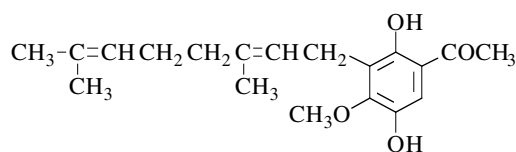
Isolation from natural sources

-Also obtained on barium hydroxide degradation of homoflemingins, a chalcone isolated from the seed pods of *Flemingia rhodocarpa* Baker (Leguminosae) [353] [354].m.p. 107° [354]; <sup>1</sup>H NMR [354], UV [354], MS [354].**1-[2,5-Dihydroxy-4-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (E)**

[20180-88-5]

C<sub>19</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 318.41



Synthesis

-Obtained by Elbs persulfate oxidation of 3-geranyl-2-hydroxy-4-methoxyacetophenone (10%) [354].

m.p. 69-70° [354]; <sup>1</sup>H NMR [354], UV [354].

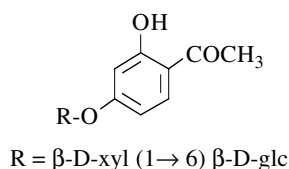


**1-[2-Hydroxy-4-[(6-O- $\beta$ -D-xylopyranosyl- $\beta$ -D-glucopyranosyl)oxy]phenyl]ethanone**  
(*Bungeiside D*)

[149475-54-7]

C<sub>19</sub>H<sub>26</sub>O<sub>12</sub>

mol.wt. 446.41



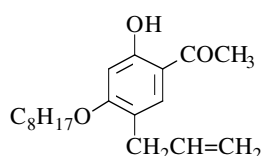
Isolation from natural sources

-From the roots of *Cynanchum bungei* DECNE (Asclepiadaceae) [1088].colourless needles [1088]; m.p. 238-240° [1088];  
( $\alpha$ )<sub>D</sub> = -68°3 (c = 0.5, methanol) [1088]; MS [1088],  
<sup>1</sup>H NMR [1088], <sup>13</sup>C NMR [1088], IR [1088].**1-[2-Hydroxy-4-(octyloxy)-5-(2-propenyl)phenyl]ethanone**

[117690-46-7]

C<sub>19</sub>H<sub>28</sub>O<sub>3</sub>

mol.wt. 304.43



Synthesis

-Preparation by reaction of n-octyl bromide with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide (21%) [256] [257].

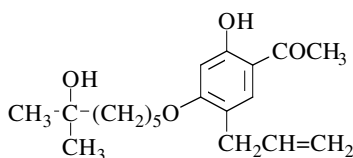
oil [256] [257].

**1-[2-Hydroxy-4-[(6-hydroxy-6-methylheptyl)oxy]-5-(2-propenyl)phenyl]ethanone**

[117706-02-2]

C<sub>19</sub>H<sub>28</sub>O<sub>4</sub>

mol.wt. 320.43



Synthesis

-Obtained by reaction of 7-(4-acetyl-2-allyl-5-hydroxyphenoxy)heptanoyl chloride on methyl lithium in ether at -98°; the reaction mixture was allowed to warm up to -50° and then poured into dilute hydrochloric acid (8%) [777].

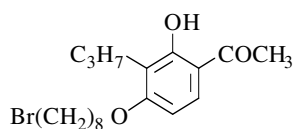
oil [777].

**1-[4-[(8-Bromooctyl)oxy]-2-hydroxy-3-propylphenyl]ethanone**

[106627-34-3]

C<sub>19</sub>H<sub>29</sub>BrO<sub>3</sub>

mol.wt. 343.26



Synthesis

-Preparation by reaction of 1,8-dibromooctane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (63%) [1156].

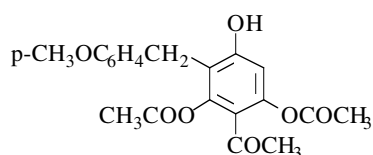
pale green oil [1156]; <sup>1</sup>H NMR [1156].

**1-[2,6-Bis(acetyloxy)-4-hydroxy-3-[(4-methoxyphenyl)methyl]phenyl]ethanone**

[145747-40-6]

C<sub>20</sub>H<sub>20</sub>O<sub>7</sub>

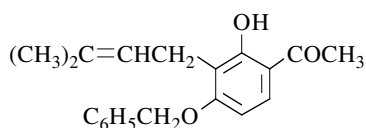
mol.wt. 372.37

**Synthesis**

-Obtained by enzymatic hydrolysis of 2,4,6-tri-acetoxy-3-(4-methoxy)benzylacetophenone in the presence of porcine pancreas lipase in tetrahydrofuran at 42-45° (65%) [1381].

**1-[2-Hydroxy-3-(3-methyl-2-butenyl)-4-(phenylmethoxy)phenyl]ethanone**C<sub>20</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 310.39

**Synthesis**

-Obtained by reaction of benzyl bromide with 3-prenylresacetophenone in the presence of potassium carbonate in refluxing acetone for 8 h (64%) [1719].

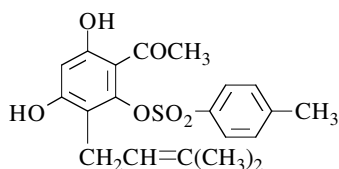
m.p. 70-71° [1719]; <sup>1</sup>H NMR [1719], IR [1719].

**1-[4,6-Dihydroxy-3-(3-methyl-2-butenyl)-2-[[4-(methylphenyl)sulfonyl]oxy]phenyl]ethanone**

[158499-95-7]

C<sub>20</sub>H<sub>22</sub>O<sub>6</sub>S

mol.wt. 390.46

**Synthesis**

-Obtained by hydrolysis of 4,6-bis(benzoyloxy)-3-prenyl-2-(tosyloxy)acetophenone with aqueous methanolic sodium hydroxide solution under nitrogen at 50° [1823].

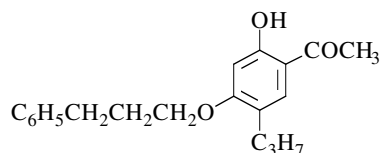
paste [1823].

**1-[2-Hydroxy-4-(3-phenylpropoxy)-5-propylphenyl]ethanone**

[117706-47-5]

C<sub>20</sub>H<sub>24</sub>O<sub>3</sub>

mol.wt. 312.41

**Synthesis**

-Preparation by reaction of 3-phenylpropyl bromide on 2,4-dihydroxy-5-propylacetophenone with potassium carbonate and potassium iodide (26%) [256] [257].

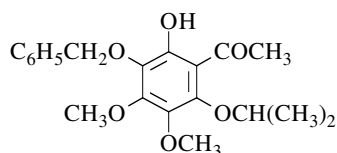
m.p. 60° [256] [257].

**1-[2-Hydroxy-4,5-dimethoxy-6-(1-methylethoxy)-3-(phenylmethoxy)phenyl]ethanone**

[169130-27-2]

C<sub>20</sub>H<sub>24</sub>O<sub>6</sub>

mol.wt. 360.41

**Synthesis**

-Obtained by selective demethylation of 3-benzyloxy-6-isopropoxy-2,4,5-trimethoxyacetophenone with aluminium bromide in acetonitrile, first at 0° for 15 min, then at 50-60° for 15-20 min after dilution with *ca* 3% hydrochloric acid (68%) [796].

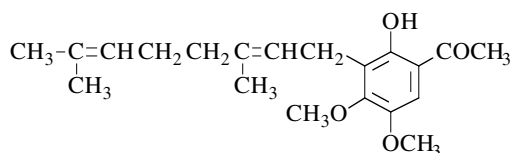
m.p. 76-77° [796]; <sup>1</sup>H NMR [796].

**1-[2-Hydroxy-4,5-dimethoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (E)**

[20212-65-1]

C<sub>20</sub>H<sub>28</sub>O<sub>4</sub>

mol.wt. 332.44

**Synthesis**

-Preparation by methylation of 3-geranyl-2,4-dihydroxy-5-methoxyacetophenone or of 3-geranyl-2,4,5-trihydroxyacetophenone with diazomethane [354].

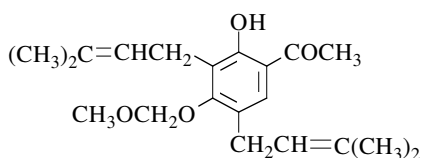
oil [354]; <sup>1</sup>H NMR [354], IR [354], UV [354].

**1-[2-Hydroxy-4-(methoxymethoxy)-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone**

[217442-59-6]

C<sub>20</sub>H<sub>28</sub>O<sub>4</sub>

mol.wt. 332.44

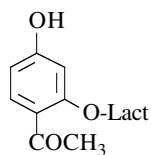
**Synthesis**

-Obtained by reaction of chloromethyl methyl ether with 3,5-diprenylresacetophenone in acetone in the presence of potassium carbonate [1713] at r.t. for 3 h (83%) [709].

m.p. 67-68° [709]; <sup>1</sup>H NMR [709].

**1-[2-[(4-O-β-D-Galactopyranosyl)-β-D-glucopyranosyl]oxy]-4-hydroxyphenyl]ethanone**C<sub>20</sub>H<sub>28</sub>O<sub>13</sub>

mol.wt. 476.41



Lact = β-D-Lactosid rest

**Synthesis**

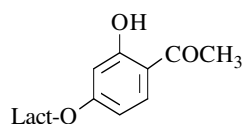
-Preparation by reaction of 0.2 M sodium methoxide with 4-acetylresacetophenone-2-heptaacetyl-β-D-lactosid in boiling methanol for 3 min (40%) [1861].

monohydrate [1861]; m.p. 165-168° [1861];

(α)<sub>D</sub><sup>21</sup> = -45° (c = 1, water) [1861].

**1-[4-[(4-O-β-D-Galactopyranosyl)-β-D-glucopyranosyl]oxy]-2-hydroxyphenyl]ethanone**C<sub>20</sub>H<sub>28</sub>O<sub>13</sub>

mol.wt. 476.43



Lact = β-D-Lactosid rest

**Synthesis**

-Preparation by reaction of 0.2 M sodium methoxide with resacetophenone-4-heptaacetyl-β-D-lactosid in boiling methanol for 3 min (50%) [1861].

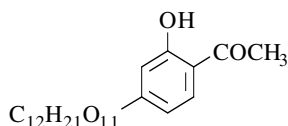
m.p. 255-258° [1861]; (α)<sub>D</sub><sup>21</sup> = -62°6 (c = 1, water) [1861].

**1-[4-[(4-O-β-D-Glucopyranosyl)-β-D-glucopyranosyl]oxy]-2-hydroxyphenyl]ethanone**

[54918-30-8]

C<sub>20</sub>H<sub>28</sub>O<sub>13</sub>

mol.wt. 476.43

C<sub>12</sub>H<sub>21</sub>O<sub>11</sub>**Synthesis**

-Preparation by reaction of sodium on 2',4'-dihydroxy-acetophenone-4-β-hepta-O-acetyl-D-cellobioside in methanol (67%) [1480].

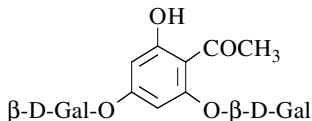
m.p. 212° [1480]; (α)<sub>D</sub><sup>17</sup> = -60° (pyridine) [1480].

**1-[2,4-Bis-(β-D-galactopyranosyloxy)-6-hydroxyphenyl]ethanone**

[88087-01-8]

C<sub>20</sub>H<sub>28</sub>O<sub>14</sub>

mol.wt. 492.43



β-D-Gal-O-

O-β-D-Gal

**Synthesis**

-Preparation by deacetylation of phloracetophenone 2,4-di-O-(2,3,4,6-tetra-O-acetyl)-β-D-galactopyranoside with 0.1 N methanolic sodium methoxide (87%) [1008].

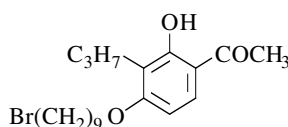
m.p. 183-185° [1008]; <sup>1</sup>H NMR [1008].

**1-[4-[(9-Bromononyl)oxy]-2-hydroxy-3-propylphenyl]ethanone**

[79557-82-7]

C<sub>20</sub>H<sub>31</sub>BrO<sub>3</sub>

mol.wt. 399.37

Br(CH<sub>2</sub>)<sub>9</sub>O-**Synthesis**

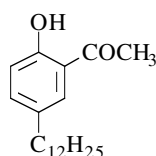
-Preparation by reaction of 1,9-dibromononane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (63%) [1156].

**1-(5-Dodecyl-2-hydroxyphenyl)ethanone**

[84744-37-6]

C<sub>20</sub>H<sub>32</sub>O<sub>2</sub>

mol.wt. 304.47

C<sub>12</sub>H<sub>25</sub>**Synthesis**

-Preparation by reaction of acetyl chloride on 4-dodecylphenol with aluminium chloride in ethylene dichloride at 110-120° (46%) [1033].

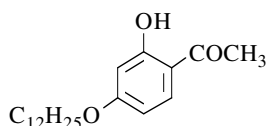
b.p.<sub>4</sub> 198-203° [1033].

**1-[4-(Dodecyloxy)-2-hydroxyphenyl]ethanone**

[52122-72-2]

C<sub>20</sub>H<sub>32</sub>O<sub>3</sub>

mol.wt. 318.37

**Syntheses**

-Preparation by partial alkylation of resacetophenone with dodecyl bromide in the presence of potassium carbonate in refluxing acetone for 20 h [183].  
 -Also refer to: [1733].

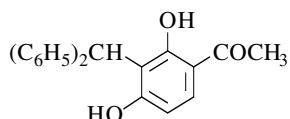
m.p. 51° [183] [1733].

**1-[3-(Diphenylmethyl)-2,4-dihydroxyphenyl]ethanone**

[107114-32-9]

C<sub>21</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 318.37

**Synthesis**

-Obtained by reaction of resacetophenone with diphenylcarbinol in the presence of boron trifluoride etherate in dioxane at r.t. (21%) [887].

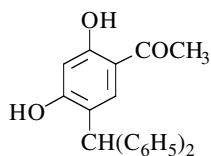
m.p. 203-204° [887];

<sup>1</sup>H NMR [887], IR [887], UV [887].**1-[5-(Diphenylmethyl)-2,4-dihydroxyphenyl]ethanone**

[107114-35-2]

C<sub>21</sub>H<sub>18</sub>O<sub>3</sub>

mol.wt. 318.37

**Synthesis**

-Preparation by reaction of resacetophenone with diphenylcarbinol in the presence of boron trifluoride etherate in dioxane at r.t. (39%) [887].

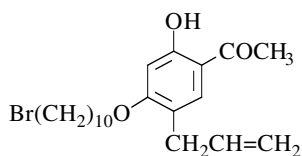
m.p. 179-180° [887];

<sup>1</sup>H NMR [887], IR [887], UV [887].**1-[4-[(10-Bromodecyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone**

[117706-39-5]

C<sub>21</sub>H<sub>31</sub>BrO<sub>3</sub>

mol.wt. 411.38

**Synthesis**

-Preparation by reaction of 1,10-dibromodecane with 5-allyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide (18%) [256] [257].

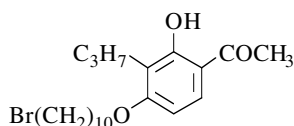
m.p. < 25° [256] [257]; <sup>1</sup>H NMR [256] [257].

**1-[4-[(10-Bromodecyl)oxy]-2-hydroxy-3-propylphenyl]ethanone**

[106627-35-4]

C<sub>21</sub>H<sub>33</sub>BrO<sub>3</sub>

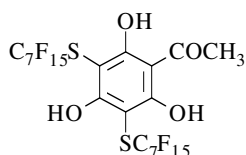
mol.wt. 413.40

**Synthesis**

-Preparation by reaction of 1,10-dibromodecane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (60%) [1156].

**1-[2,4,6-Trihydroxy-3,5-bis[(pentadecafluoroheptyl)thio]phenyl]ethanone**C<sub>22</sub>H<sub>6</sub>F<sub>30</sub>O<sub>4</sub>S<sub>2</sub>

mol.wt. 968.37

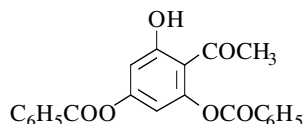
**Synthesis**

-Preparation by reaction of perfluoroheptanesulfonyl chloride with phloracetophenone in chloroform in the presence of a slight excess of pyridine and a little quantity of iron powder, first at -40°, then at 60° for 3 h (39%) [456].

m.p. 106-108° [456]; <sup>1</sup>H NMR [456], IR [456].

**1-[2,4-Bis(benzoyloxy)-6-hydroxyphenyl]ethanone**C<sub>22</sub>H<sub>16</sub>O<sub>6</sub>

mol.wt. 376.37

**Synthesis**

-Preparation by reaction of benzoyl chloride on phloracetophenone in dilute aqueous sodium hydroxide [1673].

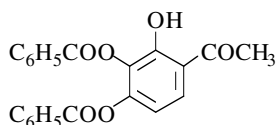
m.p. 109-110° [1673].

**1-[3,4-Bis(benzoyloxy)-2-hydroxyphenyl]ethanone**

[27865-59-4]

C<sub>22</sub>H<sub>16</sub>O<sub>6</sub>

mol.wt. 367.37

**Synthesis**

-Preparation by partial esterification of gallacetophenone with benzoyl chloride in pyridine at 100° (21%) [1053].

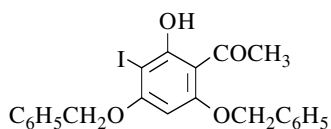
m.p. 108-109° [1053]; <sup>1</sup>H NMR [1053], IR [1053].

**1-[2-Hydroxy-3-iodo-4,6-bis(phenylmethoxy)phenyl]ethanone**

[95165-66-5]

C<sub>22</sub>H<sub>19</sub>IO<sub>4</sub>

mol.wt. 474.29

**Syntheses**

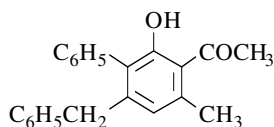
-Obtained by reaction of 2-hydroxy-4,6-bis(benzyloxy)-acetophenone with iodine in the presence of silver trifluoroacetate in chloroform at r.t. (83%) [1824].  
-Also refer to: [1823].

m.p. 204-206° [1824]; <sup>1</sup>H NMR [1824].**1-[2-Hydroxy-6-methyl-3-phenyl-4-(phenylmethyl)phenyl]ethanone**

[64648-09-5]

C<sub>22</sub>H<sub>20</sub>O<sub>2</sub>

mol.wt. 316.40

**Synthesis**

-Obtained by a potassium fluoride catalyzed self-condensation of 1-phenyl-2,4-pentanedione in DMF solution [414] [1753], (52%) [414]; also refer to: "ERRATUM" [415].

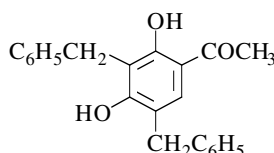
m.p. 124° [414] [415];

<sup>1</sup>H NMR [414] [415] [1753], <sup>13</sup>C NMR [414] [415], IR [414] [415], MS [414] [415].**1-[2,4-Dihydroxy-3,5-bis(phenylmethyl)phenyl]ethanone**

[95832-44-3]

C<sub>22</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 332.40

**Syntheses**

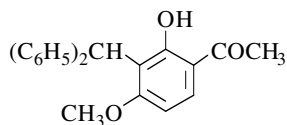
-Obtained by reaction of benzyl alcohol with resacetophenone in the presence of boron trifluoride etherate and dioxane at 60-70° (9%) [878].  
-Also obtained (poor yield) by reaction of benzyl bromide with resacetophenone in the presence of potassium hydroxide in methanol at r.t. (< 2%) [885].

m.p. 159-160° [885], 157-158° [878]; <sup>1</sup>H NMR [878], IR [878], UV [878].**1-[3-(Diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone**

[107114-34-1]

C<sub>22</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 332.40

**Synthesis**

-Preparation by partial methylation of 3-(diphenylmethyl)resacetophenone with dimethyl sulfate in the presence of potassium carbonate in refluxing acetone (90%) [887].

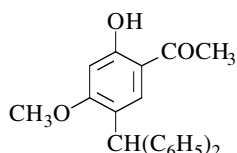
m.p. 161-162° [887]; <sup>1</sup>H NMR [887].

**1-[5-(Diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone**

[107114-37-4]

C<sub>22</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 332.40

**Synthesis**

-Preparation by partial methylation of 5-(diphenylmethyl)resacetophenone with dimethyl sulfate in the presence of potassium carbonate in refluxing acetone (90%) [887].

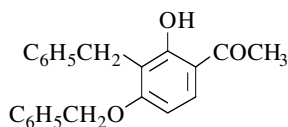
m.p. 145-146° [887]; <sup>1</sup>H NMR [887].

**1-[2-Hydroxy-4-(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone**

[105485-45-8]

C<sub>22</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 332.40

**Synthesis**

-Obtained by reaction of benzyl chloride [1274] or benzyl bromide [885] with resacetophenone in the presence of potassium hydroxide in refluxing methanol (10%) [1274], (< 1%) [885].

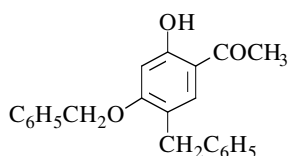
m.p. 120-121° [1274], 118-120° [885]; <sup>1</sup>H NMR [885], IR [885], UV [885].

**1-[2-Hydroxy-4-(phenylmethoxy)-5-(phenylmethyl)phenyl]ethanone**

[105485-48-1]

C<sub>22</sub>H<sub>20</sub>O<sub>3</sub>

mol.wt. 332.40

**Synthesis**

-Preparation by reaction of benzyl chloride with 5-benzyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone [885].

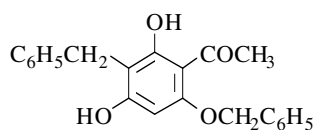
m.p. 100-102° [885]; <sup>1</sup>H NMR [885], UV [885].

**1-[2,4-Dihydroxy-6-(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone**

[39548-85-1]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Synthesis**

-Obtained (poor yield) by reaction of benzyl chloride with phloracetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (6%) [880].

m.p. 166-167° [880]; UV [880].

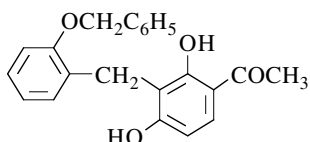


**1-[2,4-Dihydroxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone**

[103633-36-9]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Syntheses**

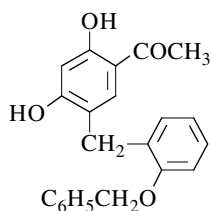
-Obtained by reaction of o-benzyloxybenzyl alcohol with resacetophenone in dioxane in the presence of boron trifluoride etherate at 60-70° for 3 h (10%) [873].  
 -Also obtained by reaction of o-benzyloxybenzyl bromide with resacetophenone in methanol in the presence of potassium hydroxide at r.t. for 24 h (14%) [873].

m.p. 155-156° [873]; <sup>1</sup>H NMR [873], IR [873], UV [873].**1-[2,4-Dihydroxy-5-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone**

[103633-37-0]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Syntheses**

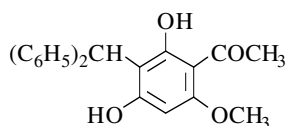
-Obtained by reaction of o-benzyloxybenzyl alcohol with resacetophenone in dioxane in the presence of boron trifluoride etherate at 60-70° for 3 h (18%) [873].  
 -Also obtained by reaction of o-benzyloxybenzyl bromide with resacetophenone in methanol in the presence of potassium hydroxide at r.t. for 24 h (7%) [873].

m.p. 127-128° [873]; <sup>1</sup>H NMR [873], IR [873], UV [873].**1-[3-(Diphenylmethyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone**

[101161-94-8]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Synthesis**

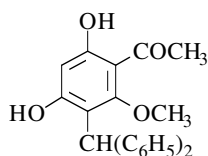
-Obtained by reaction of diphenylcarbinol with 2,4-dihydroxy-6-methoxyacetophenone in the presence of boron trifluoride etherate in dioxane at r.t. (15%) [879].

m.p. 150-151° [879]; <sup>1</sup>H NMR [879], IR [879], UV [879].**1-[3-(Diphenylmethyl)-4,6-dihydroxy-2-methoxyphenyl]ethanone**

[101161-95-9]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Synthesis**

-Obtained by reaction of diphenylcarbinol with 2,4-dihydroxy-6-methoxyacetophenone in the presence of boron trifluoride etherate in dioxane at r.t. (20%) [879].

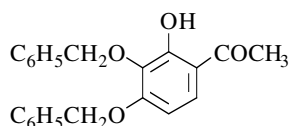
m.p. 148-149° [879]; <sup>1</sup>H NMR [879], IR [879], UV [879].

**1-[2-Hydroxy-3,4-bis(phenylmethoxy)phenyl]ethanone**

[2652-27-9]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Syntheses**

-Obtained by reaction of benzyl chloride with gallacetophenone in the presence of sodium bicarbonate and sodium iodide in refluxing mixture of acetone and ethanol [589] [972] [1053], (48%) [1053], (< 2%) [972].  
 -Also refer to: [973].

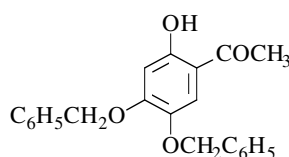
m.p. 114-115° [1053], 113-114° [972]; <sup>1</sup>H NMR [1053], IR [1053].

**1-[2-Hydroxy-4,5-bis(phenylmethoxy)phenyl]ethanone**

[7298-39-7]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Syntheses**

-Preparation by reaction of benzyl halide with 2,4,5-trihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (69%) [1900].  
 -Preparation by reaction of benzyl chloride with 5-acetoxy-2,4-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (52%) [703].

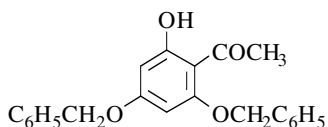
m.p. 96-97° [703], 94-95° [1900]; <sup>1</sup>H NMR [703], IR [703].

**1-[2-Hydroxy-4,6-bis(phenylmethoxy)phenyl]ethanone**

[18065-05-9]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40

**Synthesis**

-Preparation by reaction of benzyl chloride on phloracetophenone with potassium carbonate in refluxing acetone (29%) [1281], (20%) [880], in DMF at 100° (54%) [841] and at 150-153° (26%) [1820] or in HMPA at 90-93° (80%) [1822].

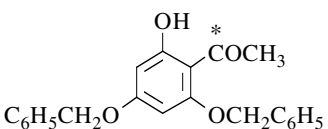
m.p. 119-120° [841], 101-102° [880], 100-102° [1822], 98-100° [1281], 96-98° [1820]. One of the reported melting points is obviously wrong.  
<sup>1</sup>H NMR [841], IR [841], UV [880], MS [841].

**1-[2-Hydroxy-4,6-bis(phenylmethoxy)phenyl]ethanone-1-<sup>13</sup>C**

[332900-03-5]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 349.40

**Syntheses**

-Preparation by selective deprotection of tri-O-benzyl-phloracetophenone labelled at the carbonyl group with titanium tetrachloride in methylene chloride for 160 min at 0° (80%) [1314].  
 -Also refer to: [961] [1313].

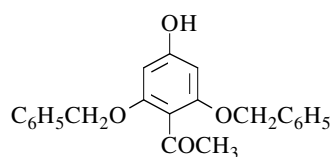
m.p. 104° [1314], 103° [961];  
<sup>1</sup>H NMR [1314], <sup>13</sup>C NMR [1314], IR [1314], UV [1314], MS [1314].

**1-[4-Hydroxy-2,6-bis(phenylmethoxy)phenyl]ethanone**

[76799-38-7]

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40



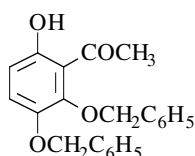
Synthesis

-Refer to: [1046] (compound 7) (45%).

**1-[6-Hydroxy-2,3-bis(phenylmethoxy)phenyl]ethanone**

C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 348.40



Synthesis

-Preparation by reaction of benzyl chloride on 2-(benzyloxy)-3,6-dihydroxyacetophenone with potassium carbonate in refluxing acetone (10%) [130].

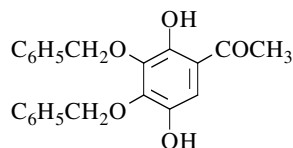
m.p. 57°5 [130].

**1-[2,5-Dihydroxy-3,4-bis(phenylmethoxy)phenyl]ethanone**

[151148-87-9]

C<sub>22</sub>H<sub>20</sub>O<sub>5</sub>

mol.wt. 364.40



Synthesis

-Obtained by persulfate oxidation of 3,4-bis(benzyloxy)-2-hydroxyacetophenone (Elbs reaction) (10%) [886].

m.p. 121° [886];

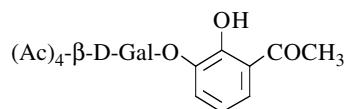
<sup>1</sup>H NMR [886], UV [886]; TLC [886].

**1-[2-Hydroxy-3-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone**

[88086-96-8]

C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>

mol.wt. 482.44



Syntheses

-Obtained by reaction of acetobromo-α-D-galactose with 2,3-dihydroxyacetophenone, \*in the presence of silver carbonate in quinoline at r.t., according to the Koenigs-Knorr method [1008];

\*in the presence of 10% aqueous potassium hydroxide in acetone at r.t. for 24 h, according to the Fischer method (14%) [1008].

m.p. 152-153° [1008]; (α)<sub>D</sub><sup>20</sup> = -47° (c = 1 in chloroform) [1008];

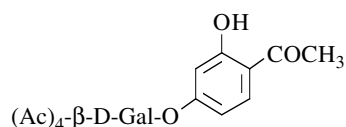
<sup>1</sup>H NMR [1008].

**1-[2-Hydroxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone**

[54918-27-3]

C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>

mol.wt. 482.44

**Syntheses**

-Preparation by reaction of acetobromo- $\alpha$ -D-galactose (m.p. 79-81°) with resacetophenone, \*in the presence of silver oxide in quinoline at r.t. for 2 h (30%) [1861];

\*in the presence of 10% aqueous potassium hydroxide in acetone at r.t. for 24 h (12%) [1008].

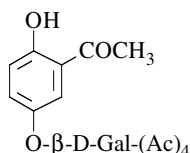
m.p. 115-117° [1861], 115° [1008]; ( $\alpha$ )<sub>D</sub><sup>22</sup> = -2°6 (c = 4 in chloroform) [1861].

**1-[2-Hydroxy-5-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone**

[88086-98-0]

C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>

mol.wt. 482.44

**Syntheses**

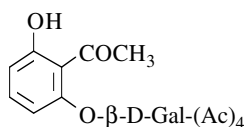
-Preparation by reaction of acetobromo- $\alpha$ -D-galactose, \*with 2-benzoyloxy-5-hydroxyacetophenone in the presence of silver carbonate in dry quinoline at r.t. for 3 h according to the Koenigs-Knorr method (quantitative yield) [1008]; \*with quinacetophenone in the presence of 10% aqueous

sodium hydroxide in acetone at r.t. for 24 h according to the Fischer method (14%) [1008].

m.p. 69-73° [1008]; <sup>1</sup>H NMR [1008].

**1-[2-Hydroxy-6-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone**C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>

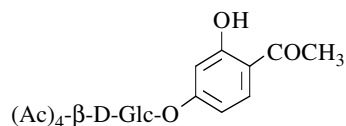
mol.wt. 482.44

**Synthesis**

-Preparation by reaction of acetobromo- $\alpha$ -D-galactose with 2,6-dihydroxyacetophenone in the presence of silver carbonate in quinoline at r.t. for 3 h [1008], according to Koenigs-Knorr method [1004].

**1-[2-Hydroxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone**C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>

mol.wt. 482.44

**Syntheses**

-Obtained by reaction of acetobromo- $\alpha$ -D-glucose with resacetophenone, \*in acetone in the presence of 10% sodium hydroxide at r.t. for 4 days (30%) [1478];

\*in acetone in the presence of aqueous potassium hydroxide solution at r.t. for 24-40 h (20-45%) [549];

\*in quinoline in the presence of silver oxide during 15 min (11%) [1201].

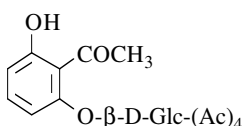
m.p. 131-132° [1201], 130-131° [1478];  $(\alpha)_D^{20} = -29^\circ 7$  (in acetone) [1478].

**1-[2-Hydroxy-6-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone**

[23141-00-6]

C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>

mol.wt. 482.44



Syntheses

-Preparation by glycosation of 2,6-dihydroxyacetophenone with acetobromo- $\alpha$ -D-glucose, \*in the presence of cadmium carbonate in refluxing toluene for 20 h, with removal of generated water (71%) [1818],

according to Dick's method [524];

\*in the presence of benzytributylammonium chloride and potassium carbonate in chloroform at r.t. for 24 h (93%) [792];

\*in the presence of potassium hydroxide in aqueous acetone (38%) [1818], (32%) [525].

m.p. 201-203° [525], 200°5-201°5 [1818], 197-200° [792];

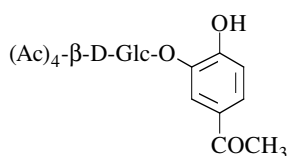
<sup>1</sup>H NMR [792] [1818], IR [792] [1818], MS [1818], FAB-MS [792].

**1-[4-Hydroxy-3-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone**  
(*Tetraacetylpingenin*)

[101140-11-8]

C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>

mol.wt. 482.44



Synthesis

-Preparation by treatment of 3-(β-tetraacetylglucopyranosyl-oxy)-4-(2-methoxyethoxy)methoxyacetophenone (SM) with zinc bromide in methylene chloride at r.t. under nitrogen atmosphere (76%). SM was obtained by action of acetobromo- $\alpha$ -D-glucose with 3-hydroxy-4-(2-methoxy-

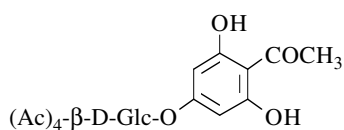
ethoxy)-methoxyacetophenone in the presence of silver oxide in dry quinoline at r.t. under nitrogen atmosphere [1700].

m.p. 106-112° [1700]; <sup>1</sup>H NMR [1700], IR [1700], MS [1700].

**1-[2,6-Dihydroxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone**

C<sub>22</sub>H<sub>26</sub>O<sub>13</sub>

mol.wt. 498.42



Synthesis

-Obtained by reaction of acetobromo- $\alpha$ -D-glucose with phloracetophenone in the presence of 2.25 N aqueous sodium hydroxide in acetone at 0° (9-12%) [1943].

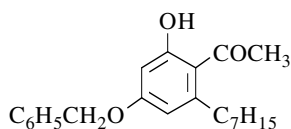
m.p. 215-216° [1943];  $(\alpha)_D^{20} = -52^\circ 7$  (pyridine) [1943].

**1-[2-Heptyl-6-hydroxy-4-(phenylmethoxy)phenyl]ethanone**

[96864-14-1]

C<sub>22</sub>H<sub>28</sub>O<sub>3</sub>

mol.wt. 340.46

**Synthesis**

-Preparation by reaction of benzyl bromide with 2,4-dihydroxy-6-heptylacetophenone in the presence of potassium carbonate in refluxing acetone for 1.5 h (42%) [987].

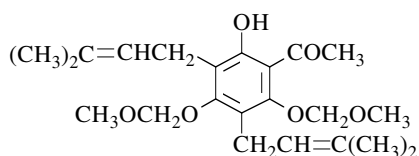
m.p. 45° [987]; <sup>1</sup>H NMR [987], MS [987].

**1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone**

[131303-37-2]

C<sub>22</sub>H<sub>32</sub>O<sub>6</sub>

mol.wt. 392.49

**Syntheses**

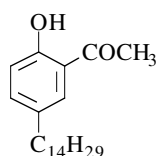
-Obtained by reaction of methoxymethyl chloride with 3,5-diprenyl-2,4,6-trihydroxyacetophenone (57%) [1953].  
-Also refer to: [1948] [1949] [1952].

**1-(2-Hydroxy-5-tetradecylphenyl)ethanone**

[118469-76-4]

C<sub>22</sub>H<sub>36</sub>O<sub>2</sub>

mol.wt. 332.53

**Synthesis**

-Preparation by Fries rearrangement of 4-tetradecylphenyl acetate with aluminium chloride without solvent at 120° (94%) [1890].

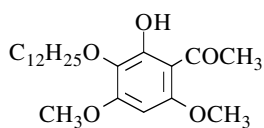
m.p. 39-40° [1890]; <sup>1</sup>H NMR [1890], IR [1890].

**1-[3-(Dodecyloxy)-2-hydroxy-4,6-dimethoxyphenyl]ethanone**

[103777-47-5]

C<sub>22</sub>H<sub>36</sub>O<sub>5</sub>

mol.wt. 380.52

**Synthesis**

-Preparation by partial demethylation of 3-(dodecyloxy)-2,4,6-trimethoxyacetophenone (SM) with aluminium chloride in acetonitrile at 60° for 1.5 h (83%). SM was obtained by alkylation of 3-hydroxy-2,4,6-trimethoxyacetophenone with dodecyl iodide in the presence of potassium carbonate in refluxing acetone for 12 h [807].

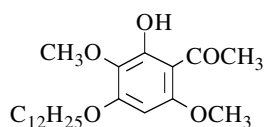
m.p. 53-54° [807].

**1-[4-(Dodecyloxy)-2-hydroxy-3,6-dimethoxyphenyl]ethanone**

[103777-44-2]

C<sub>22</sub>H<sub>36</sub>O<sub>5</sub>

mol.wt. 380.52

**Synthesis**

-Preparation by partial alkylation of 4,6-dihydroxy-2,5-dimethoxyacetophenone with dodecyl iodide (92%) [807].

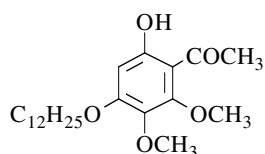
m.p. 55-56° [807].

**1-[4-(Dodecyloxy)-6-hydroxy-2,3-dimethoxyphenyl]ethanone**

[103777-43-1]

C<sub>22</sub>H<sub>36</sub>O<sub>5</sub>

mol.wt. 380.52

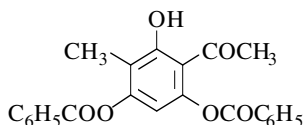
**Synthesis**

-Preparation by partial alkylation of 4,6-dihydroxy-2,3-dimethoxyacetophenone with dodecyl iodide [807].

oil [807].

**1-[4,6-Bis(benzoyloxy)-2-hydroxy-3-methylphenyl]ethanone**C<sub>23</sub>H<sub>18</sub>O<sub>6</sub>

mol.wt. 390.39

**Synthesis**

-Obtained by reaction of benzoyl chloride on 2,4,6-trihydroxy-3-methylacetophenone with 2% sodium hydroxide solution at 0° (9-12%) [1883].

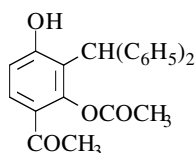
m.p. 149° [1883].

**1-[2-(Acetyloxy)-3-(diphenylmethyl)-4-hydroxyphenyl]ethanone**

[145747-37-1]

C<sub>23</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 360.41

**Synthesis**

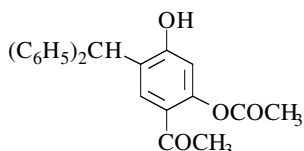
-Obtained by enzymatic hydrolysis of 2,4-diacetoxy-3-(diphenylmethyl)acetophenone in the presence of porcine pancreas lipase in tetrahydrofuran at 42-45° (70%) [1381].

**1-[2-(Acetyloxy)-5-(diphenylmethyl)-4-hydroxyphenyl]ethanone**

[145747-38-2]

C<sub>23</sub>H<sub>20</sub>O<sub>4</sub>

mol.wt. 360.41

**Synthesis**

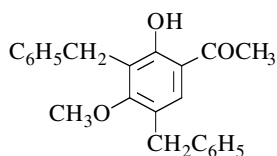
-Obtained by enzymatic hydrolysis of 2,4-diacetoxy-5-(diphenylmethyl)acetophenone in the presence of porcine pancreas lipase in tetrahydrofuran at 42-45° (68%) [1381].

**1-[2-Hydroxy-4-methoxy-3,5-bis(phenylmethyl)phenyl]ethanone**

[95832-46-5]

C<sub>23</sub>H<sub>22</sub>O<sub>3</sub>

mol.wt. 346.43

**Synthesis**

-Preparation by reaction of dimethyl sulfate with 3,5-dibenzyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (90%) [887].

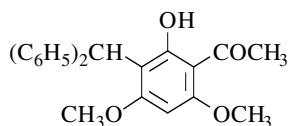
oil [887]; <sup>1</sup>H NMR [887].

**1-[3-(Diphenylmethyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone**

[101161-96-0]

C<sub>23</sub>H<sub>22</sub>O<sub>4</sub>

mol.wt. 362.42

**Synthesis**

-Preparation by reaction of dimethyl sulfate with 2,4-dihydroxy-6-methoxy-3-(diphenylmethyl)acetophenone in the presence of potassium carbonate in refluxing acetone (82%) [879].

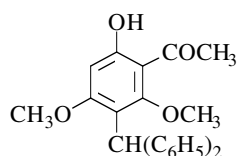
m.p. 173-174° [879]; <sup>1</sup>H NMR [879], UV [879].

**1-[3-(Diphenylmethyl)-6-hydroxy-2,4-dimethoxyphenyl]ethanone**

[101161-97-1]

C<sub>23</sub>H<sub>22</sub>O<sub>4</sub>

mol.wt. 362.42

**Synthesis**

-Preparation by reaction of dimethyl sulfate with 2,4-dihydroxy-6-methoxy-5-(diphenylmethyl)acetophenone in the presence of potassium carbonate in refluxing acetone (69%) [879].

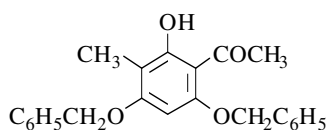
m.p. 167-168° [879]; <sup>1</sup>H NMR [879], UV [879].

**1-[2-Hydroxy-3-methyl-4,6-bis(phenylmethoxy)phenyl]ethanone**

[39548-92-0]

C<sub>23</sub>H<sub>22</sub>O<sub>4</sub>

mol.wt. 362.42

**Syntheses**

-Preparation by reaction of benzyl chloride on 3-methylphloracetophenone with potassium carbonate in refluxing acetone (27-31%) [1186] [1883], (18%) [880].  
-Also refer to: [1184].

m.p. 145° [218] [880] [1883], 142° [1186].

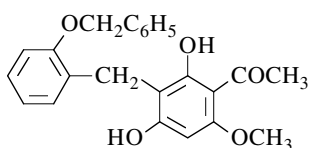


**1-[2,4-Dihydroxy-6-methoxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone**

[103633-31-4]

C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

**Syntheses**

-Obtained by reaction of o-(benzyloxy)benzyl bromide with 2,4-dihydroxy-6-methoxyacetophenone in the presence of potassium hydroxide in methanol at r.t. for 24 h (18%) [873].

-Also obtained by reaction of o-(benzyloxy)benzyl alcohol with 2,4-dihydroxy-6-methoxyacetophenone in the presence of boron trifluoride etherate in dioxane (7%) [873].

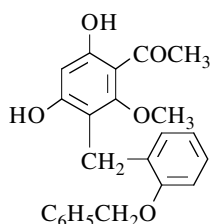
m.p. 152-153° [873]; TLC [873];

<sup>1</sup>H NMR [873], IR [873], UV [873].**1-[4,6-Dihydroxy-2-methoxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone**

[103633-32-5]

C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

**Syntheses**

-Obtained by reaction of o-(benzyloxy)benzyl alcohol with 2,4-dihydroxy-6-methoxyacetophenone in the presence of boron trifluoride etherate in dioxane at 60-70° for 3 h (< 15%) [873].

-Also obtained by reaction of o-(benzyloxy)benzyl bromide with 2,4-dihydroxy-6-methoxyacetophenone in the presence of potassium hydroxide in methanol at r.t. for 24 h (7%) [873].

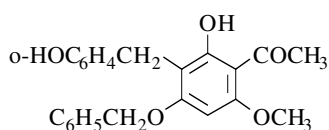
m.p. 145-146° [873]; TLC [873]; <sup>1</sup>H NMR [873], IR [873], UV [873].**1-[2-Hydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxy-4-(phenylmethoxy)-phenyl]ethanone**

1-[2,4-Dihydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxyphenyl]ethanone, monoether with benzenemethanol

[102056-83-7]

C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

**Synthesis**

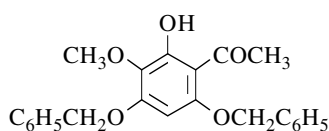
-Obtained by reaction of benzyl chloride with 2',4'-dihydroxy-3'-(2-hydroxybenzyl)-6'-methoxyacetophenone in the presence of potassium carbonate in refluxing acetone (10%) [1140].

**1-[2-Hydroxy-3-methoxy-4,6-bis(phenylmethoxy)phenyl]ethanone**

[24126-73-6]

C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

**Syntheses**

-Preparation by selective cleavage of 2-benzyloxy group of 2,4,6-tris(benzyloxy)-3-methoxyacetophenone (SM) with concentrated hydrochloric acid in acetic acid at r.t. for 50 min (82%). SM (oily material) was obtained by reaction of benzyl chloride with 4-benzyloxy-2,6-dihydroxy-3-methoxyacetophenone in the presence of potassium carbonate in DMF at 150-160° for 10 min [803].

-Also obtained by partial benzylation of 3-methoxy-2,4,6-trihydroxyacetophenone [809], with benzyl chloride in the presence of potassium carbonate in refluxing acetone for 16 h (6%) [642].

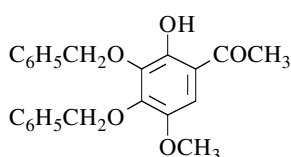
m.p. 140-141° [642] [809], 137-138° [803]; <sup>1</sup>H NMR [809]; UV [642] [809].

**1-[2-Hydroxy-5-methoxy-3,4-bis(phenylmethoxy)phenyl]ethanone**

[158148-88-0]

C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

**Synthesis**

-Preparation by reaction of dimethyl sulfate with 3,4-bis(benzyloxy)-2,5-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone for 8 h (79%) [886].

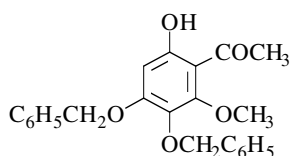
m.p. 131° [886]; TLC [886];  
<sup>1</sup>H NMR [886], IR [886], UV [886].

**1-[6-Hydroxy-2-methoxy-3,4-bis(phenylmethoxy)phenyl]ethanone**

[73239-53-9]

C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

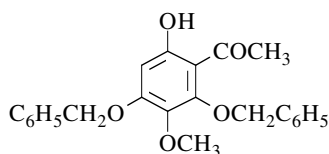
**Synthesis not yet described**

-Refer to: [379].

TLC [379].

**1-[6-Hydroxy-3-methoxy-2,4-bis(phenylmethoxy)phenyl]ethanone**C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

**Syntheses**

-Obtained by partial benzylation of 3-methoxy-2,4,6-trihydroxyacetophenone [809], with benzyl chloride in the presence of potassium carbonate in refluxing acetone for 16 h (31%) [642].

-Also refer to: [643] [804].

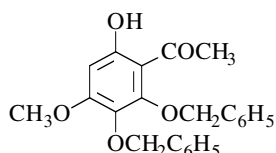
oil [642]; m.p. 70-71° [809]; <sup>1</sup>H NMR [809].

**1-[6-Hydroxy-4-methoxy-2,3-bis(phenylmethoxy)phenyl]ethanone**

[54299-56-8]

C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>

mol.wt. 378.42

**Synthesis**

-Preparation by reaction of benzyl chloride with 6-(benzyloxy)-2,5-dihydroxy-4-methoxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (71%) [215].

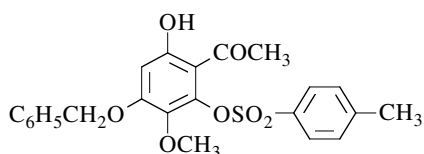
m.p. 95-97° [215].

**1-[6-Hydroxy-3-methoxy-2-[(4-methylphenyl)sulfonyl]oxy]-4-(phenylmethoxy)phenyl]-ethanone**

[188927-30-2]

C<sub>23</sub>H<sub>22</sub>O<sub>7</sub>S

mol.wt. 442.49

**Synthesis**

-Preparation by treatment of 4-(benzyloxy)-3,6-dimethoxy-2-(tosyloxy)acetophenone (m.p. 106-108°) with aluminium bromide in acetonitrile at 0° for 1 h (quantitative yield) [804].

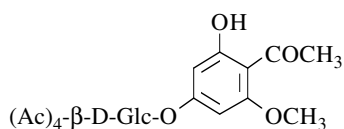
m.p. 94-95° [804].

**1-[2-Hydroxy-6-methoxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]-ethanone**

[139545-92-9]

C<sub>23</sub>H<sub>28</sub>O<sub>13</sub>

mol.wt. 512.47

**Syntheses**

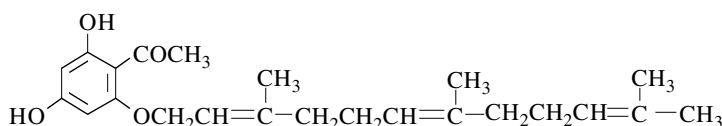
-Obtained by treatment of 2,4-dihydroxy-6-methoxyacetophenone with acetobromo-α-D-glucose, \*in acetone in the presence of 10% aqueous sodium hydroxide at r.t. for 4.5 h (48%) [1007]; \*in quinoline or in acetone in the presence of silver oxide at r.t. for 20 min (22 and 30% yields, respectively) [1944].

m.p. 169-171° [1007], 168° [1944]; (α)<sub>D</sub><sup>25</sup> = -39°7 to -42°3 (pyridine) [1944];<sup>1</sup>H NMR [1007], IR [1007], MS [1007]; TLC [1007].**1-[2,4-Dihydroxy-6-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone (E,E)**

[200129-18-6]

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50

**Synthesis**

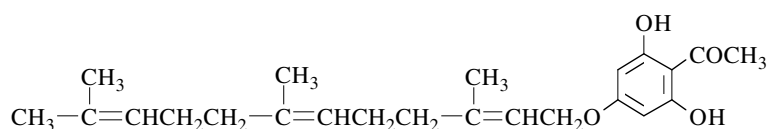
-Refer to: [823] (Chinese paper).

**1-[2,6-Dihydroxy-4-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone**

[156499-52-4]

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50



Isolation from natural sources

-From the aerial parts of *Boronia Ramosa* (Rutaceae) [24].

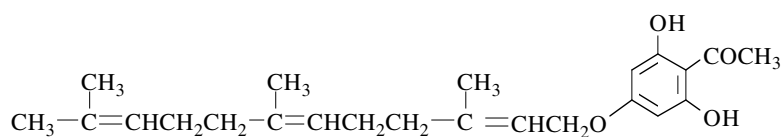
gum [24];

<sup>1</sup>H NMR [24], <sup>13</sup>C NMR [24], IR [24], UV [24], MS [24].**1-[2,6-Dihydroxy-4-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone (E,E)**

[183143-91-1]

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50



Syntheses

-Preparation by hydrolysis of 2-p-toluenesulfonyloxy-6-hydroxy-4-(1'-farnesyloxy)acetophenone with 30% potassium hydroxide in refluxing ethanol for 1.5 h (89%) [825].

-Obtained (poor yield) by reaction of farnesyl bromide with phloracetophenone in the presence of potassium carbonate in refluxing acetone for 4 h (7%) [822] [823].

Isolation from natural sources

-From the aerial parts of *Boronia ramosa* in Australian genus *Boronia* (Rutaceae) [24] [823].

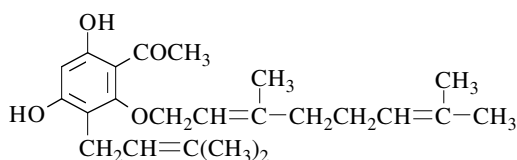
white gum [24] [825];

<sup>1</sup>H NMR [24] [825], <sup>13</sup>C NMR [24], IR [24] [825], UV [24], EIMS [24] [825].**1-[2-[(3,7-Dimethyl-2,6-octadienyl)oxy]-4,6-dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone (E)**

[126259-76-5]

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50



## Synthesis

-Obtained by hydrolysis of 4',6'-bis (benzoyloxy)-2'-geranyloxy-3'-prenylacetophenone with dilute sodium hydroxide under nitrogen atmosphere at 50° (good yield) [1824].

Isolation from natural sources

-From the *Euodia Lunu-Ankenda* root bark (Rutaceae) [1045].

**N.B.:** The synthetic works [1823] [1824] have suggested that the natural product ketone isolated by [1045] had an incorrectly assigned structure. This compound [1045] will be identical with 1-[4-[(3,7-dimethyl-2,6-octadienyl)oxy]-2,6-dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone [142905-38-2].

m.p. 88-90° [1045], 71-73° [1824]. One of the reported melting points is obviously wrong.

<sup>1</sup>H NMR [1045] [1824], IR [1045][1824], UV [1045], MS [1045],

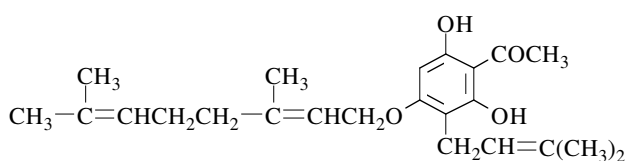
HRMS [1045]; TLC [1045];

**1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-2,6-dihydroxy-3-(3-methyl-2-butenyl)phenyl]-ethanone (*E*)**

[142905-38-2]

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50



## Synthesis

-Obtained via a nine-step synthesis from the 4',6'-bis(benzyloxy)-2'-hydroxyacetophenone [1823].

Isolation from natural sources

-From the fruit of *Evodia Merrillii* Kanehira & Sasaki ex Kanehira (Rutaceae) [408] [1099].

m.p. 98-101° [408] [1099], 98-100° [1823]; column chromatography [408];

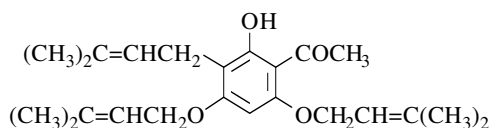
<sup>1</sup>H NMR [408] [1099] [1823], <sup>13</sup>C NMR [408],

IR [408] [1099] [1823], UV [408], MS [408].

**1-[2-Hydroxy-3-(3-methyl-2-butenyl)-4,6-bis[(3-methyl-2-butenyl)oxy]phenyl]ethanone**

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50



## Synthesis

-Obtained (poor yield) by reaction of prenyl bromide with phloroacetophenone in the presence of aqueous potassium hydroxide solution (3%) [1489].

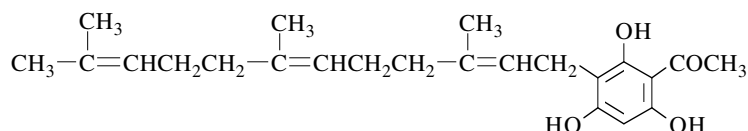
b.p.<sub>0.2</sub> 135-150° [1489].

**1-[2,4,6-Trihydroxy-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]ethanone**

[156499-51-3]

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50



Isolation from natural sources

-From the aerial parts of *Boronia Ramosa* (Rutaceae) [24].

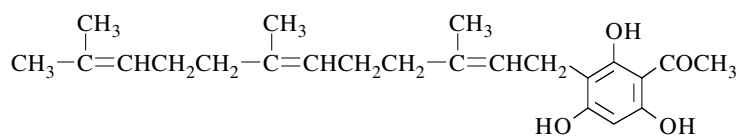
m.p. 112-115° [24];

<sup>1</sup>H NMR [24], <sup>13</sup>C NMR [24], IR [24], UV [24], MS [24].**1-[2,4,6-Trihydroxy-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]ethanone (E,E)**

[183143-90-0]

C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>

mol.wt. 372.50



Synthesis

-Obtained by reaction of farnesyl bromide with phloracetophenone in the presence of potassium carbonate in refluxing acetone for 4 h (52%) [822] [823].

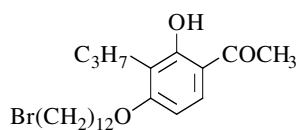
Isolation from natural sources

-From the aerial parts of *Boronia ramosa* in Australia [823].**1-[4-[(12-Bromododecyl)oxy]-2-hydroxy-3-propylphenyl]ethanone**

[106627-36-5]

C<sub>23</sub>H<sub>37</sub>BrO<sub>3</sub>

mol.wt. 441.45



Synthesis

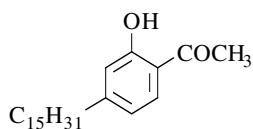
-Preparation by reaction of 1,12-dibromododecane with 2,4-dihydroxy-3-propylacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (45%) [1156].

**1-(2-Hydroxy-4-pentadecylphenyl)ethanone**

[52122-69-7]

C<sub>23</sub>H<sub>38</sub>O<sub>2</sub>

mol.wt. 346.55

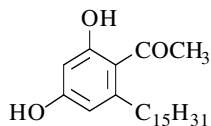
**Synthesis**

-Preparation by Fries rearrangement of 3-pentadecylphenyl acetate with aluminium chloride without solvent at 140-150° [550].

m.p. 50° [550]; b.p.<sub>2</sub> 212-214° [550].

**1-(2,4-Dihydroxy-6-pentadecylphenyl)ethanone**C<sub>23</sub>H<sub>38</sub>O<sub>3</sub>

mol.wt. 362.55

**Synthesis**

-Preparation by reaction of acetic acid on 5-pentadecyl-resorcinol with boron trifluoride and hydrofluoric acid in xylene at 50-60° (75%) [332].

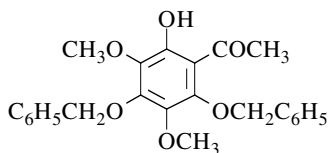
m.p. 63° [332].

**1-[2-Hydroxy-3,5-dimethoxy-4,6-bis(phenylmethoxy)phenyl]ethanone**

[3162-54-7]

C<sub>24</sub>H<sub>24</sub>O<sub>6</sub>

mol.wt. 408.45

**Synthesis**

-Obtained by alkaline degradation of *Lucidin dibenzyl ether* by refluxing with 10% aqueous ethanolic potassium hydroxide under nitrogen atmosphere for 17 h [1072].

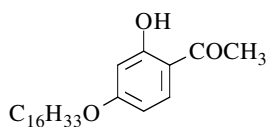
b.p.<sub>0.2</sub> 160-180° [1072]; m.p. 86-87° [1072].

**1-[4-(Hexadecyloxy)-2-hydroxyphenyl]ethanone**

[143286-87-7]

C<sub>24</sub>H<sub>40</sub>O<sub>3</sub>

mol.wt. 376.58

**Synthesis**

-Preparation by partial alkylation of resacetophenone with hexadecyl bromide in the presence of potassium carbonate in refluxing acetone for 20 h [183].

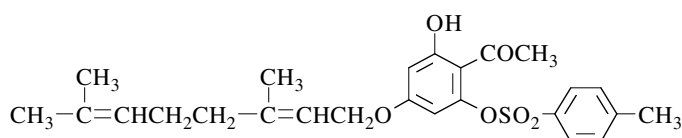
m.p. 56° [183].

**1-[4-[(2*E*)-3,7-Dimethyl-2,6-octadienyl]oxy]-2-hydroxy-6-[[4-(4-methylphenyl)sulfonyl]oxy]phenyl]ethanone**

[225088-73-3]

C<sub>25</sub>H<sub>30</sub>O<sub>6</sub>S

mol.wt. 458.58



**Synthesis**

-Preparation by treatment of 2-toluenesulfonyl-oxy-4,6-dihydroxy-acetophenone with geranyl bromide

in acetone in the presence of potassium carbonate at r.t. for 2 h (84%) [825].

colourless gum [825];

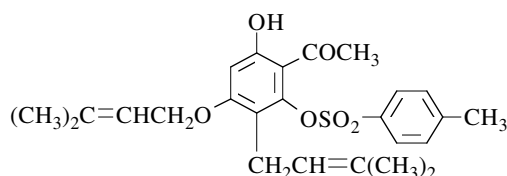
<sup>1</sup>H NMR [825], IR [825], EIMS [825], HREIMS [825].

**1-[6-Hydroxy-3-(3-methyl-2-butenyl)-4-[(3-methyl-2-butenyl)oxy]-2-[[4-(4-methylphenyl)sulfonyl]oxy]phenyl]ethanone**

[158499-97-9]

C<sub>25</sub>H<sub>30</sub>O<sub>6</sub>S

mol.wt. 458.58



**Synthesis**

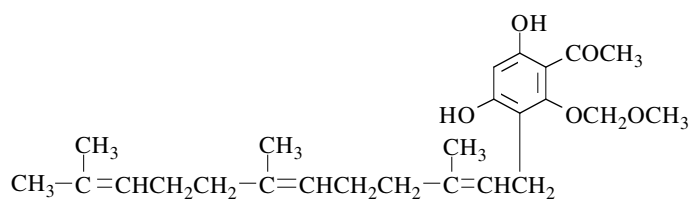
-Obtained by reaction of prenyl bromide with 4',6'-dihydroxy-3'-prenyl-2'-tosyloxyacetophenone in the presence of potassium carbonate in acetone at 20° for 2 h [1823].

<sup>1</sup>H NMR [1823].

**1-[4,6-Dihydroxy-3-(methoxymethoxy)-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]ethanone**

C<sub>25</sub>H<sub>36</sub>O<sub>5</sub>

mol.wt. 416.56



**Synthesis**

-Obtained by reaction of chloromethyl methyl ether with 3-farnesyl-2,4,6-trihydroxyacetophenone in the presence

of potassium carbonate in refluxing acetone for 5 h (82%) [822].

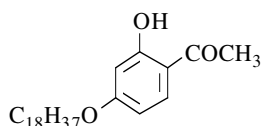


**1-[2-Hydroxy-4-(octadecyloxy)phenyl]ethanone**

[99283-88-2]

C<sub>26</sub>H<sub>44</sub>O<sub>3</sub>

mol.wt. 404.63

**Syntheses**

-Preparation by partial alkylation of resacetophenone with octadecyl bromide in the presence of potassium carbonate in refluxing acetone for 20 h [183].  
 -Also refer to: [1733].

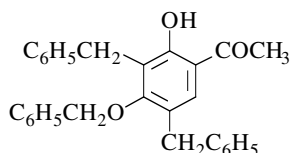
m.p. 61° [183] [1733]; GC [1732].

**1-[2-Hydroxy-4-(phenylmethoxy)-3,5-bis(phenylmethyl)phenyl]ethanone**

[105485-47-0]

C<sub>29</sub>H<sub>26</sub>O<sub>3</sub>

mol.wt. 422.52

**Synthesis**

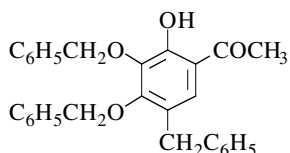
-Obtained by reaction of benzyl chloride with 3,5-dibenzyl-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone [885].

m.p. 87-89° [885]; <sup>1</sup>H NMR [885], IR [885], UV [885].**1-[2-Hydroxy-3,4-bis(phenylmethoxy)-5-(phenylmethyl)phenyl]ethanone**

[105485-46-9]

C<sub>29</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 438.52

**Synthesis**

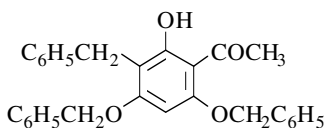
-Preparation by reaction of benzyl chloride with 5-benzyl-2,3,4-trihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone (64%) [885].

m.p. 56-58° [885]; <sup>1</sup>H NMR [885], IR [885], UV [885].**1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone**

[18065-06-0]

C<sub>29</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 438.52

**Synthesis**

-Obtained by reaction of benzyl chloride with phloracetophenone in the presence of potassium carbonate in DMF at 150-153° (31%) [1820] or in refluxing acetone [406] [880], (2%) [880].

m.p. 123-124° [406] [880], 111-112° [1820];

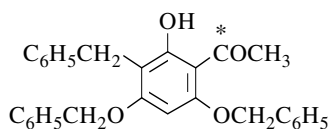
<sup>1</sup>H NMR [880], IR [406], UV [406] [880].

**1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone-1-<sup>13</sup>C**

[357409-15-5]

C<sub>29</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 439.52

**Syntheses**

-Obtained (by-product) by selective deprotection of tri-O-benzylphloroacetophenone labelled at the carbonyl group with titanium tetrachloride in methylene chloride for 160 min at 0° (7%) [1314].  
 -Also refer to: [1313].

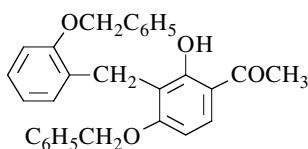
m.p. 117° [1314];

<sup>1</sup>H NMR [1314], <sup>13</sup>C NMR [1314], IR [1314], UV [1314], MS [1314].**1-[2-Hydroxy-4-(phenylmethoxy)-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone**

[103633-40-5]

C<sub>29</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 438.52

**Synthesis**

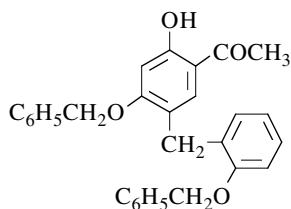
-Preparation by reaction of benzyl chloride with 3-(o-benzyloxybenzyl)-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone for 6 h (73%) [873].

m.p. 135-136° [873]; TLC [873]; <sup>1</sup>H NMR [873], IR [873], UV [873].**1-[2-Hydroxy-4-(phenylmethoxy)-5-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone**

[103633-43-8]

C<sub>29</sub>H<sub>26</sub>O<sub>4</sub>

mol.wt. 438.52

**Synthesis**

-Preparation by reaction of benzyl chloride with 5-(o-benzyl-oxybenzyl)-2,4-dihydroxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone for 6 h (75%) [873].

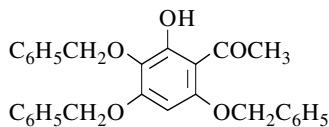
m.p. 113-114° [873]; TLC [873];

<sup>1</sup>H NMR [873], IR [873], UV [873].**1-[2-Hydroxy-3,4,6-tris(phenylmethoxy)phenyl]ethanone**

[60840-18-8]

C<sub>29</sub>H<sub>26</sub>O<sub>5</sub>

mol.wt. 454.52

**Synthesis**

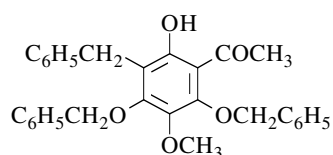
-Preparation from 2,3,4,6-tetrakis(benzyloxy)acetophenone on refluxing with 90% aqueous acetic acid (91%) [756], (78%) [757] [758]. There is a selective hydrolysis of the 2-(benzyloxy) group [756].

m.p. 141-142° [757] [758];

<sup>1</sup>H NMR [756] [757] [758], IR [756] [757] [758], MS [756].

**1-[2-Hydroxy-5-methoxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone**C<sub>30</sub>H<sub>28</sub>O<sub>5</sub>

mol.wt. 468.55

**Synthesis**

-Obtained (by-product) by partial benzylation of 3-methoxy-2,4,6-trihydroxyacetophenone [809].

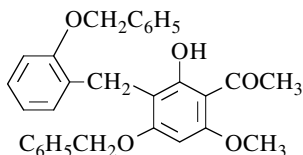
oil [809]; <sup>1</sup>H NMR [809].

**1-[2-Hydroxy-6-methoxy-4-(phenylmethoxy)-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone**

[102104-05-2]

C<sub>30</sub>H<sub>28</sub>O<sub>5</sub>

mol.wt. 468.55

**Synthesis**

-Preparation by reaction of benzyl chloride with 3-(o-benzyloxybenzyl)-2,4-dihydroxy-6-methoxyacetophenone in the presence of potassium carbonate and potassium iodide in refluxing acetone for 6 h (73%) [873].

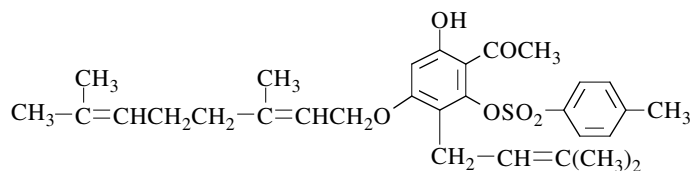
m.p. 167-168° [873]; TLC [873];  
<sup>1</sup>H NMR [873], IR [873], UV [873].

**1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-6-hydroxy-3-(3-methyl-2-butenyl)-2-[(4-methylphenyl)sulfonyl]oxy]phenyl]ethanone (*E*)**

[158499-96-8]

C<sub>30</sub>H<sub>38</sub>O<sub>6</sub>S

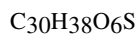
mol.wt. 526.69

**Synthesis**

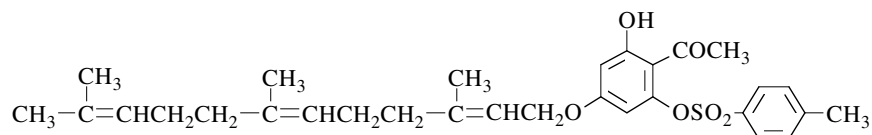
-Obtained by reaction of geranyl bromide with 4',6'-dihydroxy-3'-prenyl-2'-tosyloxyacetophenone in the presence of potassium carbonate in acetone at 20° for 2 h [1823].

<sup>1</sup>H NMR [1823].

[225088-74-4]



mol.wt. 526.69

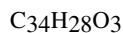


## Synthesis

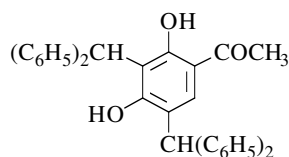
colourless gum [825];

<sup>1</sup>H NMR [825], IR [825], EIMS [825].

[107114-29-4]



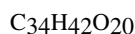
mol.wt. 484.59



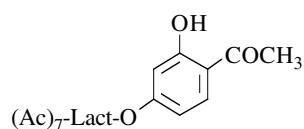
## Synthesis

-Obtained by reaction of resacetophenone with diphenylcarbinol in the presence of boron trifluoride etherate in dioxane at r.t. (14%) [887].

m.p. 144-145° [887];

<sup>1</sup>H NMR [887], IR [887], UV [887].

mol.wt. 770.70



## Synthesis

-Preparation by reaction of  $\alpha$ -acetobromolactose with resacetophenone in the presence of silver oxide in quinoline at r.t. for 2 h (40%) [1861].

(Ac)<sub>7</sub>-Lact = heptaacetylactosid rest

m.p. 195-197° [1861];

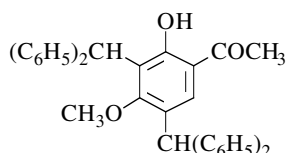
$$(\alpha)_D^{21} = -32.3 \text{ (c = 2 in chloroform) [1861].}$$

**1-[3,5-Bis(diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone**

[107114-31-8]

C<sub>35</sub>H<sub>30</sub>O<sub>3</sub>

mol.wt. 498.62



## Synthesis

-Preparation by reaction of dimethyl sulfate with 3,5-bis-(diphenylmethyl)-2,4-dihydroxyacetophenone in the presence of potassium carbonate in refluxing acetone (81%) [887].

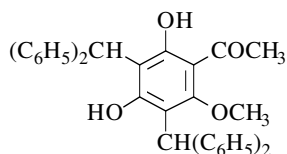
m.p. 152-153° [887]; <sup>1</sup>H NMR [887].

**1-[3,5-Bis(diphenylmethyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone**

[101161-93-7]

C<sub>35</sub>H<sub>30</sub>O<sub>4</sub>

mol.wt. 514.62



## Synthesis

-Obtained (poor yield) by reaction of diphenylcarbinol with 2,4-dihydroxy-6-methoxyacetophenone in dioxane at r.t. in the presence of boron trifluoride etherate (7%) [879].

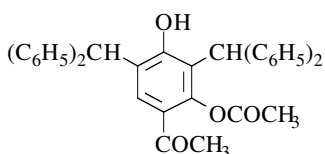
m.p. 122-123° [879]; <sup>1</sup>H NMR [879], IR [879], UV [879].

**1-[2-(Acetyloxy)-3,5-bis(diphenylmethyl)-4-hydroxyphenyl]ethanone**

[145747-39-3]

C<sub>36</sub>H<sub>30</sub>O<sub>4</sub>

mol.wt. 526.63



## Synthesis

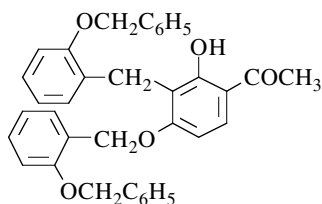
-Obtained by partial deacylation of 2,4-diacetoxy-3,5-bis-(diphenylmethyl)acetophenone by porcine pancreatic lipase in tetrahydrofuran at 42-45° (63%) [1381] [1382].

**1-[2-Hydroxy-4-[[2-(phenylmethoxy)phenyl]methoxy]-3-[[2-(phenylmethoxy)phenyl]-methyl]phenyl]ethanone**

[103633-46-1]

C<sub>36</sub>H<sub>32</sub>O<sub>5</sub>

mol.wt. 544.65



## Synthesis

-Obtained (poor yield) by reaction of o-benzyloxy-benzyl bromide with resacetophenone in methanol in the presence of potassium hydroxide at r.t. for 24 h (< 2%) [873].

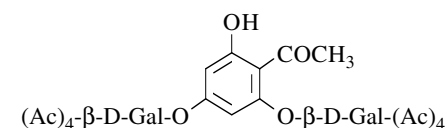
m.p. 135-136° [873]; TLC [873];  
<sup>1</sup>H NMR [873], IR [873], UV [873].

**1-[2-Hydroxy-4,6-bis[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone**

[88087-00-7]

C<sub>36</sub>H<sub>44</sub>O<sub>22</sub>

mol.wt. 828.73

**Synthesis**

-Obtained by reaction of 2,3,4,6-tetra-O-acetyl-α-D-galactopyranosyl bromide with phloracetophenone in the presence of 30% aqueous sodium hydroxide in acetone (17%) [1008], according to Zemlen's procedure [1943].

m.p. 184-186° [1008]; <sup>1</sup>H NMR [1008].

**1-[2-Hydroxy-4,6-dimethoxy-3-[2,3,4,6-tetrakis-O-(phenylmethyl)-β-D-glucopyranosyl]-phenyl]ethanone**

[115130-46-6]

C<sub>44</sub>H<sub>46</sub>O<sub>9</sub>

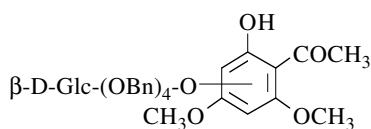
mol.wt. 718.84

**and****1-[6-Hydroxy-2,4-dimethoxy-3-[2,3,4,6-tetrakis-O-(phenylmethyl)-β-D-glucopyranosyl]-phenyl]ethanone**

[169566-54-5]

C<sub>44</sub>H<sub>46</sub>O<sub>9</sub>

mol.wt. 718.84

**Synthesis**

-Obtained (*via* O → C glycoside rearrangement) by adding boron trifluoride etherate to a mixture of 2-hydroxy-4,6-dimethoxyacetophenone, 2,3,4,6-tetra-O-benzyl-α-D-glucopyranosyl fluoride (R) and powdered molecular sieves 4 Å in methylene chloride and stirring at -78° for 2 h under an argon atmosphere; after the disappearance of R on TLC, the reaction temperature was raised from -78° to r.t. and the mixture stirred for 45 min (92%) [1046].

**N.B.:** The 3-isomer was obtained by selective glycosylation of 2-hydroxy-4,6-dimethoxyacetophenone with O-(2,3,4,6-tetra-O-benzyl-α-D-glucopyranosyl)trichloroacetimidate and trimethylsilyl triflate as promoter in methylene chloride first at -25°, then heating up to r.t. [407] [1132].

<sup>1</sup>H NMR [1046], IR [1046], MS [1046].

**1-[2-Hydroxy-4-methoxy-6-(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone**

[169566-44-3]

C<sub>50</sub>H<sub>50</sub>O<sub>9</sub>

mol.wt. 794.94

and

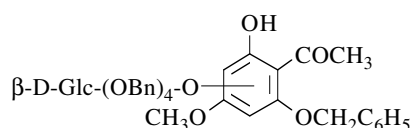
**1-[6-Hydroxy-4-methoxy-2-(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone**

[169566-55-6]

C<sub>50</sub>H<sub>50</sub>O<sub>9</sub>

mol.wt. 794.94

Synthesis



-Obtained (*via* O  $\rightarrow$  C glycoside rearrangement) by adding boron trifluoride etherate to a mixture of 2-(benzyloxy)-6-hydroxy-4-methoxy-acetophenone, 2,3,4,6-tetra-O-benzyl- $\alpha$ -D-glucopyranosyl fluoride (R) and powdered molecular sieves 4 Å in methylene chloride and stirring at -78° for 2 h under an argon atmosphere; after the disappearance of (R) on TLC, the reaction temperature was raised from -78° to r.t. and the mixture stirred for 45 min (78%) [1046].

<sup>1</sup>H NMR [1046], IR [1046], MS [1046].

**1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone**

[169566-46-5]

C<sub>56</sub>H<sub>54</sub>O<sub>9</sub>

mol.wt. 871.04

and

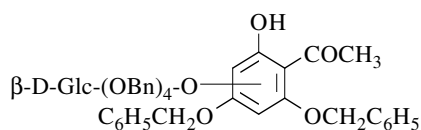
**1-[6-Hydroxy-2,4-bis(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone**

[169566-56-7]

C<sub>56</sub>H<sub>54</sub>O<sub>9</sub>

mol.wt. 871.04

Synthesis



-Obtained (*via* O  $\rightarrow$  C glycoside rearrangement) by adding boron trifluoride etherate to a mixture of 2-acetylphloroglucinol 3,5-bis-(benzyl ether), 2,3,4,6-tetra-O-benzyl- $\alpha$ -D-glucopyranosyl fluoride (R) and powdered molecular sieves 4 Å in methylene chloride and stirring at -20° for 2 h under an argon atmosphere; after the disappearance of (R) on TLC, the reaction temperature was raised from -20° to r.t. and the mixture stirred for 45 min (92%) [1046].

colourless syrup [1046]; <sup>1</sup>H NMR [1046], IR [1046], MS [1046].

## REFERENCES

- 1 Abdel-Mogib, M.; Dawidar, A. M.; Metwally, M. A. and Abou-Elzahab, M.: *Phytochemistry*, **29** (8), 2728-2729 (1990).
- 2 Acton, J. P.; Donnelly, D. J. and Donnelly, J. A.: *Monatsh. Chem.*, **113** (1), 73-79 (1982).
- 3 Adachi, H.; Tanaka, K.; Yamaguchi, M.; Miyahara, O.; Koguchi, M.; Kawana, T.; Takahashi, A. and Yamada, S.: *PCT Int. Appl. WO 97 41,116* (1997); *Chem. Abstr.*, **127**, 346389h (1997).
- 4 Adam, W. and Schulz, M. H.: *Chem. Ber.*, **125**, 2455-2461 (1992).
- 5 Adams, C. J. and Main, L.: *Tetrahedron*, **47** (27), 4959-4978 (1991).
- 6 Adams, R. and Mecorney, J. W.: *J. Am. Chem. Soc.*, **67**, 798-802 (1945).
- 7 Adams, R.: *J. Am. Chem. Soc.*, **41**, 247-270 (1919).
- 8 Adityachandhury, N.; Kirtaniya, C. L. and Mukherjee, B.: *Tetrahedron*, **27** (11), 2111-2117 (1971).
- 9 Afzal, M.; Davies, J. S. and Hassal, C. H.: *J. Chem. Soc. C*, 1721-1727 (1969).
- 10 Agarwal, S. C.; Bhaskar, A. and Seshadri, T. R.: *Indian J. Chem.*, **11** (1), 9-12 (1973).
- 11 Agarwal, S. G.; Thappa, R. K. and Dhar, K. L.: *Fitoterapia*, **67** (2), 178-179 (1996); *Chem. Abstr.*, **125**, 123407v (1996).
- 12 Ahluwalia, V. K.; Dhingra, S. and Kapur, K.: *Indian J. Chem., Sect. B*, **18B** (1), 79-80 (1979).
- 13 Ahluwalia, V. K.; Gupta, R. and Rani, N.: *Indian J. Chem., Sect. B*, **19B** (9), 814-815 (1980).
- 14 Ahluwalia, V. K.; Kumar, D. and Gupta, Y. K.: *Indian J. Chem., Sect. B*, **17B** (5), 433-437 (1979).
- 15 Ahluwalia, V. K.; Prakash, C. and Gupta, R.: *Tetrahedron*, **38** (5), 609-611 (1982).
- 16 Ahluwalia, V. K.; Prakash, C. and Rani, N.: *Indian J. Chem., Sect. B*, **16B** (5), 436-437 (1978).
- 17 Ahluwalia, V. K.; Prakash, C. and Singh, R. P.: *Aust. J. Chem.*, **32** (6), 1361-1367 (1979).
- 18 Ahluwalia, V. K.; Prakash, C. and Singh, R. P.: *Tetrahedron*, **35** (17), 2081-2085 (1979).
- 19 Ahluwalia, V. K.; Singh, M. and Singh, R. P.: *Synth. Commun.*, **14** (2), 127-137 (1984).
- 20 Ahmad, F. B. H. and Bruce, J. M.: *Res. J. Chem. Environ.*, **3** (4), 9-10 (1999); *Chem. Abstr.*, **133**, 30552p (2000).
- 21 Ahmad, F. B. H. and Bruce, J. M.: *Synth. Commun.*, **26** (7), 1263-1271 (1996).
- 22 Ahmad, F. B. H.: *Pertanika*, **10** (3), 315-319 (1987); *Chem. Abstr.*, **110**, 23454e (1989).
- 23 Ahmad, S.; Wagner, H. and Razaq, S.: *Tetrahedron*, **34** (10), 1593-1594 (1978).
- 24 Ahsan, M.; Gray, A. I.; Waterman, P. G. and Armstrong, J. A.: *J. Nat. Prod.*, **57** (5), 673-676 (1994).
- 25 Ahuja, M.; Bandyopadhyay, M. and Seshadri, T. R.: *Indian J. Chem.*, **12** (1), 26-28 (1974).
- 26 Aichaoui, H.; Lesieur, I. and Henichart, J. P.: *Synthesis*, (8), 679-680 (1990).
- 27 Aitken, R. A.; Bibby, M. C.; Bielefeldt, F.; Double, J. A.; Laws, A. L.; Mathieu, A. L.; Ritchie, R. B. and Wilson, D. W. J.: *Arch. Pharm. Pharm. Med. Chem.*, **331**, 405-411 (1998).
- 28 Aitken, R. A.; Bibby, M. C.; Cooper, P. A.; Double, J. A.; Laws, A. L.; Ritchie, R. B. and Wilson, D. W. J.: *Arch. Pharm. Pharm. Med. Chem.*, **333**, 181-188 (2000).
- 29 Aitken, R. A.; Bibby, M. C.; Double, J. A.; Laws, A. L.; Ritchie, R. B. and Wilson, D. W. J.: *Arch. Pharm. Pharm. Med. Chem.*, **330**, 215-224 (1997).
- 30 Aitken, R. A.; Bibby, M. C.; Double, J. A.; Phillips, R. M. and Sharma, S. K.: *Arch. Pharm. (Weinheim, Ger.)*, **329** (11), 489-497 (1996).
- 31 Aitken, R. A.; Bibby, M. C.; Double, J. A.; Phillips, R. M. and Sharma, S. K.: *Bioorg. Med. Chem. Lett.*, **4** (19), 2313-2326 (1994).
- 32 Akhrem, A. A.; Moiseenkova, A. M. and Lakhvich, F. A.: *Izv. Akad. Nauk SSSR, Ser. Khim.*, **11**, 2625-2627 (1970).
- 33 Akiba, M.; Kosugi, Y. and Takada, T.: *Hokusokan Kagaku Toronkai Koen Yoshishu*, **5th**, 54-58 (1975); *Chem. Abstr.*, **84**, 164669k (1976).



- 34 Al-Ani, H. A. M. and Dewick, P. M.: J. Chem. Soc., Perkin Trans. 1, (12), 2831-2838 (1984).
- 35 Al-Ka'bi, Ja'far; Farooqi, Jameel A.; Gore, P. H.; Nassar, Ahmed M. G.; Saad, Esmat F.; Short, E. L. and Waters, David N.: J. Chem. Soc., Perkin Trans. 2, (6), 943-949 (1988).
- 36 Al-Ka'bi, Ja'far; Gore, P. H.; Moonga, Baljit; Al-Shiebani, Ikbai S.; Shibaldain Nazar L. and Kamounah, Fadhil S.: J. Chem. Res., Synop., (7), 246-247 (1986); Miniprint, 2201-2226 (1986).
- 37 Allan, D. and London, J. D.: J. Chem. Soc., 821-825 (1949).
- 38 Allan, R. D.; Wells, R. J. and MacLeod, J. K.: Tetrahedron Lett., (45), 3945-3946 (1970).
- 39 Allen, J.; Bertin, J.; Frost, J. and Vassal, T.: Fr. Demande FR 2,672,286 (1992); Chem. Abstr., **118**, 59592c (1993).
- 40 Allport, D. C. and Bu'Lock, J. D.: J. Chem. Soc., 654-662 (1960).
- 41 Alvarado, S. I.; Marc, P. A.; Dahlke, B. J. and Reilly, E. M.: Eur. Pat. Appl. EP 694,257 (1996); Chem. Abstr., **124**, 168273u (1996).
- 42 Alvaro, M.; Garcia, H.; Iborra, S.; Miranda, M. A. and Primo, J.: Tetrahedron, **43** (1), 143-148 (1987).
- 43 Alves de Lima, R. and Delle Monache, G.: Rend. Accad. Naz. 40 [Quaranta], **3**, 181-191 (1978).
- 44 Alves de Lima, R.; Delle Monache, G. and Botta, B.: Rev. Latinoam. Quim., **13** (2), 61-64 (1982).
- 45 Amin, G. C. and Shah, N. M.: J. Indian Chem. Soc., **25** (8), 377-384 (1948).
- 46 Amin, G. C. and Shah, N. M.: J. Indian Chem. Soc., **27** (10), 531-534 (1950).
- 47 Amin, G. C. and Shah, N. M.: J. Indian Chem. Soc., **29** (5), 351-356 (1952).
- 48 Amin, G. C.; Chaughuley, A. S. U. and Jadhav, G. V.: J. Indian Chem. Soc., **36** (9), 617-621 (1959).
- 49 Amin, G. C.; Chaughuley, A. S. U. and Jadhav, G. V.: J. Indian Chem. Soc., **36** (12), 833-837 (1959).
- 50 Amin, G. C.; Shah, N. M.; Schreiber, R. S. and Prichard, W. W.: Org. Synth., **28**, 42-43 (1948); Coll. vol. **3**, 280-281 (1965).
- 51 Amstutz, E. D.: J. Am. Chem. Soc., **71**, 3836-3837 (1949).
- 52 Anderskewitz, R.; Schromm, K.; Renth, E. O.; Himmelsbach, F.; Birke, F. and Fuegner, A.: Ger. Offen. DE 4,203,201 (1993); Chem. Abstr., **119**, 270812c (1993).
- 53 Anderskewitz, R.; Schromm, K.; Renth, E. O.; Himmelsbach, F.; Birke, F. and Fuegner, A.: PCT Int. Appl. WO 93 16,036 (1993); Chem. Abstr., **120**, 77038x (1994).
- 54 Anderson, B. F.; Briggs, L. H.; Cebalo, T. and Trotman, M. A.: J. Chem. Soc., 1026-1029 (1964).
- 55 Anderson, G. B.; Yang, L. L. N. and Falvey, D. E.: J. Am. Chem. Soc., **115** (16), 7254-7262 (1993).
- 56 Anderson, J. A.: Can. J. Res., **7**, 285-292 (1932).
- 57 Anderson, J. C. and Reese, C. B.: J. Chem. Soc., 1781-1784 (1963).
- 58 Anderson, J. C. and Reese, C. B.: Proc. Chem. Soc., London, 217 (1960).
- 59 Anderson, J. C. and Reese, C. B.: Tetrahedron Lett., (1) 1-4 (1962).
- 60 Aneja, R.; Khanna, R. N. and Seshadri, T. R.: J. Chem. Soc., 163-168 (1963).
- 61 Anjaneyulu, A. S. R. and Mallavadhani, U. V.: J. Chem. Soc., Perkin Trans. 1, (3), 623-628 (1988).
- 62 Anjaneyulu, A. S. R.; Mallavadhani, U. V.; Venkateswarlu, Y. and Prasad, A. V. R.: Indian J. Chem., Sect. B, **26B**, 823-826 (1987).
- 63 Ankiwala, M. D.: J. Indian Chem. Soc., **67** (10), 848-849 (1990).
- 64 Anon: Res. Discl., **191**, 112-113 (1980); Chem. Abstr., **93**, 85075w (1980).
- 65 Anon: Res. Discl., **276**, 223 (1987); Chem. Abstr., **109**, 54378s (1988).
- 66 Anschütz, R. and Scholl, M. E.: Justus Liebigs Ann. Chem., **379**, 333-350 (1911).
- 67 Ansell, M. F.; Nash, B. W. and Wilson, D. A.: J. Chem. Soc., 3028-3036 (1963).
- 68 Aponick, A.; Buzdygon, R. S.; Tomko, Jr., R. J.; Fazal, A. N.; Shughart, E. L.; McMaster, D. M.; Myers, M. C.; Pitcock, Jr., W. H. and Wigal, C. T.: J. Org. Chem., **67** (1), 242-244 (2002).
- 69 Appel, H.; Baker, W.; Hagenbach, H. and Robinson, R.: J. Chem. Soc., 738-744 (1937).

- 70 Appendino, G.; Tagliapietra, S.; Cravotto, G. and Nano, G. M.: *Gazz. Chim. Ital.*, **119** (7), 385-388 (1989).
- 71 Appleton, R. A.; Bantick, J. R.; Chamberlain, T. R.; Hardern, D. N.; Lee, T. B. and Pratt, A. D.: *J. Med. Chem.*, **20** (3), 371-379 (1977).
- 72 APSimon, J. W.; Corran, J. A.; Creasey, N. G.; Marlow, W.; Whalley, W. B. and Sim, K. Y.: *J. Chem. Soc.*, 4144-4156 (1965).
- 73 APSimon, J. W.; Haynes, N. B.; Sim, K. Y. and Whalley, W. B.: *J. Chem. Soc.*, 3780-3782 (1963).
- 74 Aptula, A. O.; Netzeva, T. I.; Valkova, I. V.; Cronin, M. T. D.; Schultz, T. W.; Kühne, R. and Schüürmann, G.: *Quant. Struct.-Act. Relat.*, **21** (1), 11-22 (2002); *Chem. Abstr.*, **137**, 104945d (2002).
- 75 Aqil, M.; Rahman, W.; Hasaka, N.; Okigawa, M. and Kawano, N.: *J. Chem. Soc., Perkin Trans. 1*, (5), 1389-1392 (1981).
- 76 Arad, D.; Elias, Y.; Elhanany, O.; Shokhen, M. and Puzis, L.: *PCT Int. Appl. WO* 97 47,270 (1997); *Chem. Abstr.*, **128**, 84381x (1998).
- 77 Arisawa, M.; Fujita, A.; Hayashi, T.; Hayashi, K.; Ochiai, H. and Morita, N.: *Chem. Pharm. Bull.*, **38** (6), 1624-1626 (1990).
- 78 Arisawa, M.; Fujita, A.; Suzuki, R.; Hayashi, T.; Morita, N.; Kawano, N. and Koshimura, S.: *J. Nat. Prod.*, **48** (3), 455-459 (1985).
- 79 Armstrong, E. C.; Bent, R. L.; Loria, A.; Thirtle, J. R. and Weissberger, A.: *J. Am. Chem. Soc.*, **82**, 1928-1935 (1960).
- 80 Arnold, R. T. and McCool, J. C.: *J. Am. Chem. Soc.*, **64**, 1315-1317 (1942).
- 81 Arnoldi, A.; Bonsignori, A.; Melloni, P.; Merlini, L.; Quadri, M. L.; Rossi, A. C. and Valsecchi, M.: *J. Med. Chem.*, **33** (10), 2865-2869 (1990).
- 82 Arora, U.: *Indian J. Chem., Sect. B*, **23B** (4), 373-374 (1984).
- 83 Arshad, M.; Devlin, J. P.; Ollis, W. D. and Wheeler, R. E.: *Chem. Commun.*, (3), 154-155 (1968).
- 84 Asahina, Y. and Yanagita, M.: *Ber. Dtsch. Chem. Ges.*, **71**, 2260-2269 (1938).
- 85 Asahina, Y.; Shinoda, J. and Inubuse, M.: *J. Pharm. Soc. Jpn.*, **550**, 1007-1019 (1927).
- 86 Asakawa, Y.: *Bull. Chem. Soc. Jpn.*, **44** (10), 2761-2766 (1971).
- 87 Asakawa, Y.: *Rev. Latinoam. Quim.*, **14** (3-4), 109-114 (1984); *Chem. Abstr.*, **101**, 3891f (1984).
- 88 Asams, R. and Mecorney, J. W.: *J. Am. Chem. Soc.*, **67**, 798-802 (1945).
- 89 Aslam, M.; Vicari, R.; Dammel, R.; Dossel, K. F.; Lingnan, J.; Ray, W. B. and Davenport, K. G.: *Eur. Pat. Appl. EP* 353,339 (1990); *Chem. Abstr.*, **113**, 153277x (1990).
- 90 Astudillo, L.; Schmeda-Hirschmann, G.; Soto, R.; Sandoval, C.; Afonso, C.; Gonzalez, M. S. and Kijjoa, A.: *World J. Microbiol. Biotechnol.*, **16** (6), 585-587 (2000); *Chem. Abstr.*, **134**, 277686h (2001).
- 91 Atkinson, J. G.; Guindon, Y. and Lau, C. K.: *Eur. Pat. Appl. EP* 146,243 (1985); *Chem. Abstr.*, **103**, 215151f (1985).
- 92 Atkinson, J. G.; Guindon, Y. and Lau, C. K.: *Eur. Pat. Appl. EP* 200,443 (1986); *Chem. Abstr.*, **106**, 102081b (1987).
- 93 Atkinson, J. G.; Guindon, Y. and Lau, C. K.: *U.S. Patent* 4,663,347 (1987).
- 94 Augstein, J.; Cairns, H. and Rogers, N. H.: *Brit. 1,447,480* (1976); *Chem. Abstr.*, **86**, 72660p (1977).
- 95 Augstein, J.; Cairns, H. and Rogers, N. H.: *Ger. Offen. 2,361,490* (1974); *Chem. Abstr.*, **81**, 120633c (1974).
- 96 Auricchio, S. and Ricca, A.: *Gazz. Chim. Ital.*, **103** (1-2), 37-45 (1973).
- 97 Auricchio, S.; Morrocchi, S. and Ricca, A.: *Tetrahedron Lett.*, (33), 2793-2796 (1974).
- 98 Auwers, K. v. and Betteridge, F. H.: *Z. Phys. Chem., Stoechiom. Verwandtschaftsl.*, **32**, 39-45 (1900).
- 99 Auwers, K. v. and Borsche, E.: *Ber. Dtsch. Chem. Ges.*, **48**, 1698-1717 (1915).
- 100 Auwers, K. v. and Janssen, E.: *Justus Liebigs Ann. Chem.*, **483**, 44-65 (1930).
- 101 Auwers, K. v. and Mauss, W.: *Ber. Dtsch. Chem. Ges.*, **61**, 1495-1507 (1928).
- 102 Auwers, K. v. and Mauss, W.: *Justus Liebigs Ann. Chem.*, **460**, 240-277 (1928).
- 103 Auwers, K. v. and Mauss, W.: *Justus Liebigs Ann. Chem.*, **464**, 293-311 (1928).
- 104 Auwers, K. v. and Müller K.: *Justus Liebigs Ann. Chem.*, **364**, 147-182 (1909).

- 105 Auwers, K. v. and Pohl, P.: *Justus Liebigs Ann. Chem.*, **405**, 243-294 (1914).  
106 Auwers, K. v. and Rietz, E.: *Ber. Dtsch. Chem. Ges.*, **40**, 3514-3521 (1907).  
107 Auwers, K. v. and Wittig, G.: *Ber. Dtsch. Chem. Ges.*, **57**, 1270-1275 (1924).  
108 Auwers, K. v. and Wittig, G.: *J. Prakt. Chem.*, **108**, 99-112 (1924).  
109 Auwers, K. v.: *Ber. Dtsch. Chem. Ges.*, **48**, 90-93 (1915).  
110 Auwers, K. v.: *Justus Liebigs Ann. Chem.*, **408**, 212-254 (1915).  
111 Auwers, K. v.; Borsche, E. and Weller, R.: *Ber. Dtsch. Chem. Ges.*, **54**, 1291-1316 (1921).  
112 Auwers, K. v.; Bundesman, H. and Wieners, F.: *Justus Liebigs Ann. Chem.*, **447**, 162-196 (1926).  
113 Auwers, K. v.; Lechner, M. and Bundesmann, H.: *Ber. Dtsch. Chem. Ges.*, **58**, 36-51 (1925).  
114 Auwers, K. v.; Mürbe, E.; Saurwein, K.; Deines, G. and Schornstein, J.: *Fortsch. Chem., Phys., Phys. Chem.*, **18** (2), 37-77 (1924).  
115 Awad, W. I.; El-Newehy, M. F. and Selim, S. F.: *J. Org. Chem.*, **23**, 1783-1784 (1958).  
116 Ayabe, S. and Furuya, T.: *J. Chem. Soc., Perkin Trans. 1*, (11), 2725-2734 (1982).  
117 Ayras, P. and Widen, C. J.: *Org. Magn. Reson.*, **11** (11), 551-554 (1987).  
118 Ayub, Ali S.: *Pak. J. Sci. Ind. Res.*, **22** (1-2), 38-39 (1979).  
119 B. Ramesh, Babu: *Indian IN* 171,970 (1993); *Chem. Abstr.*, **121**, 35018f (1994).  
120 Babin, P.; Benneteau, B.; Dunogues, J. and Rajarison, F.: *Fr. Demande* FR 2,668,484 (1992); *Chem. Abstr.*, **118**, 59417z (1993).  
121 Bachelet, J. P.; Cavier, R.; Lemoine, J.; Rigother, M. C.; Gayral, P. and Royer, R.: *Eur. J. Med. Chem.*, **14** (4), 321-324 (1979).  
122 Backstrom, R.; Honkanen, E.; Pippuri, A.; Kairisalo, P.; Pystynen, J.; Heinola, K.; Nissinen, E.; Linden, I. B.; Mannisto, P. T.; Kaakkola, S. and Pohto, P.: *J. Med. Chem.*, **32** (4), 841-846 (1989).  
123 Baddeley, G.: *J. Chem. Soc.*, 273-274 (1943).  
124 Badhwar, I. C. and Venkataraman, K.: *Org. Synth., Coll. Vol.*, **2**, 304-305 (1959).  
125 Bagade, M. B. and Ghiya, B. J.: *Indian J. Chem., Sect. B*, **30B** (1), 71-74 (1991).  
126 Bagley, S. W.; Broten, T. P.; Chakravarty, P. K.; Dhanoa, D. S.; Fitch, K. J.; Greenlee, W. J.; Kevin, N. J.; Kieczkowski, G. R.; Matthews, J. M. et al.: *PCT Int. Appl. WO* 96 04,905 (1996); *Chem. Abstr.*, **125**, 58490a (1996).  
127 Bajwa, B. S.; Lal, P. and Seshadri, T. R.: *Indian J. Chem.*, **9**, 17-19 (1971).  
128 Bajwa, B. S.; Lal, P. and Seshadri, T. R.: *Indian J. Chem.*, **9**, 1322-1325 (1971).  
129 Baker, S. R.; Ross, W. J. and Jamieson, W. B.: *Ger. Offen*, 2,936,730 (1980); *Chem. Abstr.*, **94**, 15550u (1981).  
130 Baker, W. and Flemons, G. F.: *J. Chem. Soc.*, 2138-2143 (1948).  
131 Baker, W. and Lothian, O. M.: *J. Chem. Soc.*, 274-281 (1936).  
132 Baker, W. and Lothian, O. M.: *J. Chem. Soc.*, 628-633 (1935).  
133 Baker, W. and Raistrick, H.: *J. Chem. Soc.*, 670-672 (1941).  
134 Baker, W. and Smith, A. R.: *J. Chem. Soc.*, 346-348 (1936).  
135 Baker, W.: *J. Chem. Soc.*, 662-670 (1941).  
136 Baker, W.: *J. Chem. Soc.*, 956-961 (1939).  
137 Baker, W.: *J. Chem. Soc.*, 1381-1389 (1933).  
138 Baker, W.: *J. Chem. Soc.*, 1684-1692 (1934).  
139 Baker, W.: *J. Chem. Soc.*, 1953-1954 (1934).  
140 Baker, W.; Brown, N. C. and Scott, J. A.: *J. Chem. Soc.*, 1922-1927 (1939).  
141 Baker, W.; Jukes, E. H. T. and Subrahmanyam, C. A.: *J. Chem. Soc.*, 1681-1684 (1934).  
142 Baker, W.; McOmie, J. F. W. and Miles, D.: *J. Chem. Soc.*, 820-822 (1953).  
143 Balaban, A. T.; Frangopol, P. T.; Katritzky, A. R. and Nenitzescu, C. D.: *J. Chem. Soc.*, 3889-3895 (1962).  
144 Baldwin, J. E. and Lusch, M. J.: *Tetrahedron*, **38** (19), 2939-2947 (1982).  
145 Baldwin, M. E.; Bick, I. R. C.; Komzak, A. A. and Price, J. R.: *Tetrahedron*, **16** (1/4), 206-211 (1961).  
146 Ballio, A. and Almirante, L.: *Ann. Chim. (Rome)*, **41**, 421-424 (1951).  
147 Ballio, A. and Almirante, L.: *Ric. Sci.*, **20**, 829-830 (1950).  
148 Ballio, A. and Almirante, L.: *Ric. Sci.*, **21**, 85-86 (1951).  
149 Ballio, A.: *Gazz. Chim. Ital.*, **79**, 924-929 (1949).

- 150 Baltzly, R. and Phillips, A. P.: J. Am. Chem. Soc., **70**, 4191-4193 (1948).  
151 Baltzly, R.; Ide, W. S. and Phillips, A. P.: J. Am. Chem. Soc., **77**, 2522-2533 (1955).  
152 Banerji, K. D. and Poddar, Dayanand: J. Indian Chem. Soc., **56** (1), 62-65 (1979).  
153 Banerji, K. D.; Kumar, K.; Saha, G. C. and Mazumdar, A. K. D.: J. Indian Chem. Soc., **62** (7), 531-533 (1985).  
154 Banks, C. K. and Hamilton, C. S.: J. Am. Chem. Soc., **61**, 357-360 (1939).  
155 Barch, W. E.: J. Am. Chem. Soc., **57**, 2330 (1935).  
156 Bargellini, G. and Aureli, S.: Atti R. Accad. Naz. Lincei, **20** (2), 118-124 (1911).  
157 Bargellini, G. and Aureli, S.: Gazz. Chim. Ital., **41**, 590-603 (1911).  
158 Bargellini, G. and Avrutin, G.: Gazz. Chim. Ital., **40**, 342-347 (1910).  
159 Bargellini, G. and Avrutin, G.: Gazz. Chim. Ital., **40**, 347-353 (1910).  
160 Bargellini, G. and Bini, L.: Atti R. Accad. Naz. Lincei, **19** (2), 595-600 (1910).  
161 Bargellini, G. and Bini, L.: Chem. Zentralbl., **1**, 392-393 (1911).  
162 Bargellini, G. and Bini, L.: Gazz. Chim. Ital., **41**, 8-20 (1911).  
163 Bargellini, G. and Bini, L.: Gazz. Chim. Ital., **49**, 47-63 (1919).  
164 Bargellini, G. and Marini-Bettolo, G. B.: Gazz. Chim. Ital., **70**, 170-178 (1940).  
165 Bargellini, G. and Oliverio, A.: Ber. Dtsch. Chem. Ges., **75**, 2083-2089 (1942).  
166 Bargellini, G. and Zoras, S. M.: Gazz. Chim. Ital., **64**, 192-202 (1934).  
167 Bargellini, G.: Atti X<sup>e</sup> Congr. Inter. Chim., **3**, 32 (1939); Chem. Abstr., **34**, 1018<sup>1</sup> (1940).  
168 Bargellini, G.: Gazz. Chim. Ital., **43**, 164-175 (1913).  
169 Bargellini, G.: Gazz. Chim. Ital., **46**, 249-255 (1916).  
170 Barker, G. and Ellis, G. P.: J. Chem. Soc. C, **16**, 2230-2233 (1970).  
171 Barnes, R. A.; Aguiar, L. S. and Da Costa, R. L.: An. Acad. Bras. Cienc., **52** (3), 515-520 (1980); Chem. Abstr., **94**, 174522c (1981).  
172 Barot, Vijay M. and Naik, H. B.: Asian J. Chem., **7** (3), 669-671 (1995); Chem. Abstr., **123**, 339968k (1995).  
173 Bartlett, P. D. and Trachtenberg, E. N.: J. Am. Chem. Soc., **80**, 5808-5812 (1958).  
174 Barton, D. H.; Donnelly, D. M. X.; Finet, J. P. and Guiry, P. J.: Tetrahedron Lett., **31** (51), 7449-7452 (1990).  
175 Barua, Putul; Barua, Nabin C. and Sharma, Ram P.: Chem. Ind. (London), **8**, 303-305 (1984).  
176 Bates, M. A.; Sammes, P. G. and Thomson, G. A.: J. Chem. Soc., Perkin Trans. 1, (11), 3037-3045 (1988).  
177 Baxendale, I. R.; Lee, A.-L. and Ley, S. V.: J. Chem. Soc., Perkin Trans. 1, (16), 1850-1857 (2002).  
178 Baxendale, I. R.; Lee, A.-L. and Ley, S. V.: Synlett, (3), 516-518 (2002).  
179 Bazyl, I. T.; Skryabina, Z. E. and Saloutin, V. I.: Zh. Org. Khim., **32** (1), 148-149 (1996).  
180 Beddoes, R. L.; Bruce, J. M.; Finch, H.; Heelam, L. M. J.; Hunt, I. D. and Mills, O. S.: J. Chem. Soc., Perkin Trans. 1, (10), 2670-2676 (1981).  
181 Beeley, L. J.; Thompson, M.; Dean, D. K.; Kotecha, N. R.; Berge, J. M. and Ward, R. W.: PCT Int. Appl. WO 96 04,233 (1996); Chem. Abstr., **125**, 58092x (1996).  
182 Begasse, B. and Le Corre, M.: Tetrahedron, **36** (23), 3409-3412 (1980).  
183 Beger, J.; Binte, H. J.; Brunne, L. and Neumann, R.: J. Prakt. Chem./ Chem.-Ztg., **334** (3), 269-277 (1992).  
184 Beger, J.; Neumann, R.; Vogel, T.; Luecke, L.; Kaestner, G.; Runge, H. J.; Schewe, T.; Schewe, C.; Ludwig, P. and Slapke, J.: Ger. (East) DD 297,155 (1992); Chem. Abstr., **116**, 214145p (1992).  
185 Beger, J.; Poeschmann, C.; Grupe, R.; Ziska, T.; Faust, G. and Laban, G.: Ger. Offen. DE 4,136,778 (1993); Chem. Abstr., **119**, 138878z (1993).  
186 Bégué, J. B. and Fétizon, M.: Bull. Soc. Chim. Fr., 781-787 (1969).  
187 Behn, R.: DRP 95901 (1897); Chem. Zentralbl., **69**, 1223 (1898).  
188 Behn, R.: Frdl., **5**, 143-144 (1901).  
189 Behn, R.: Inaugural dissertation, Rostock, Germany (1897).  
190 Beirne, J. J.; Coyle, A. M. and Donnelly, J. A.: Tetrahedron, **26** (15), 3809 (1970).  
191 Belanger, P. C.; Scheigetz, J. and Rokach, J.: Eur. Pat. Appl. EP 165,810 (1985); Chem. Abstr., **105**, 6403s (1986).

- 192 Belanger, P. C.; Lau, C. K.; Williams, H. W. R.; Dufresne, C. and Scheigetz, J.: *Can. J. Chem.*, **66** (6), 1479-1482 (1988).
- 193 Bellino, A. and Venturella, P.: *Ann. Chim. (Rome)*, **48**, 111-124 (1958).
- 194 Belton, J. G.; Nowlan, N. V. and Wheeler, T. S.: *Sci. Proc. R. Dublin Soc.*, **25**, 19-32 (1949).
- 195 Bencze, W. L.: German Patent, 1,946,084 (1970); *Chem. Abstr.*, **73**, 25136u (1970).
- 196 Benington, F.; Morin, R. D. and Clark, Jr., L. C.: *J. Org. Chem.*, **20**, 102-108 (1955).
- 197 Bennetau, B.; Rajarison, F.; Dunogues, J. and Babin, P.: *Tetrahedron*, **50** (4), 1179- 1188 (1994).
- 198 Bennett, G. J. and Lee, H. H.: *J. Chem. Soc., Perkin Trans. 1*, (4), 633-638 (1986).
- 199 Bergel, F.; Morrison, A. C.; Moss, A. R. and Rinderknecht, H.: *J. Chem. Soc.*, 415- 421 (1944).
- 200 Beri, R. M.; Gakhar, K. L. and Rao, P. S.: *Proc. Indian Acad. Sci.*, **33A**, 88-91 (1951).
- 201 Berlin, A. Ya.; Sherlin, S. M. and Serebrennikova, T. A.: *Zh. Obshch. Khim.*, **19**, 759- 768 (1949).
- 202 Bernauer, Karl; Borgulya, Janos; Bruderer, Hans; Da Prada, Mose and Zurcher, Gerhard: *Pat. Specif. (Aust.) AU 603,788* (1990); *Chem. Abstr.*, **115**, 49134d (1991).
- 203 Berthelot, P.; Vaccher, C.; Flouquet, N.; Viana, M. N.; Savel, J. and Debaert, M.: *Ann. Pharm. Fr.*, **49** (1), 31-39 (1991).
- 204 Bertrand, F.; Basketter, D. A.; Roberts, D. W. and Lepoittevin, J.-P.: *Chem. Res. Toxicol.*, **10** (3), 335-343 (1997); *Chem. Abstr.*, **126**, 140668u (1997).
- 205 Bhalerao, U. T.; Raju, B. China and Neelakantan, Parvathi: *Synth. Commun.*, **25** (10), 1433-1439 (1995).
- 206 Bhalla, V. K.; Nayak, U. Ramdas and Dev, Sukh: *Tetrahedron Lett.*, (20), 2401-2406 (1968).
- 207 Bhardwaj, D. K.; Bansal, M. C.; Rohatgi, S. and Kumar, S.: *Proc. Indian Natl. Sci. Acad., Part A*, **56** (4), 379-382 (1990); *Chem. Abstr.*, **114**, 121806y (1991).
- 208 Bhardwaj, D. K.; Bisht, M. S.; Gupta, A. K. and Kohli, R. M.: *Proc. Indian Natl. Sci. Acad., Part A*, **48** (3), 253-256 (1982).
- 209 Bhardwaj, D. K.; Chand, G.; Jain, A.; Srivastava, N. and Sharma, A. K.: *Indian J. Chem., Sect. B*, **25B** (11), 1163-1164 (1986).
- 210 Bhardwaj, D. K.; Chand, G.; Jain, R. K. and Munjal, A.: *Indian J. Chem., Sect. B*, **21B** (11), 1041-1042 (1982).
- 211 Bhardwaj, D. K.; Gupta, A. K.; Jain, R. K. and Sharma, G. C.: *J. Nat. Prod.*, **44** (6), 662-663 (1981).
- 212 Bhardwaj, D. K.; Mehta, C. K. and Sharma, G. C.: *Proc. Indian Natl. Sci. Acad., Part A*, **46** (1), 48-52 (1980); *Chem. Abstr.*, **94**, 1990a (1981).
- 213 Bhardwaj, D. K.; Rohatgi, S.; Kumar, S. and Rani, A.: *Proc. Indian Natl. Sci. Acad., Part A*, **56** (2), 161-163 (1990); *Chem. Abstr.*, **114**, 23595j (1991).
- 214 Bhargava, P. M. and Sen, A. B.: *J. Sci. Food Agr.*, **1**, 178-182 (1950).
- 215 Bhaskar, A. and Seshadri, T. R.: *Indian J. Chem.*, **12** (6), 557-560 (1974).
- 216 Bhavsar, M. D. and Desai, V. B.: *Man-Made Text. India*, **31** (12), 529-535, 556 (1988).
- 217 Bhawsar, S. B.; Shinde, D. B.; Mane, D. V.; Thore, S. N.; Gajare, A. S. and Shingare, M. S.: *Polym. J. Chem.* **70** (6), 809-812 (1996).
- 218 Bhrara, S. C.: Ph. D. Thesis, Dehli University, India (1964).
- 219 Bhrara, S. C.; Goel, R. N.; Jain, A. C. and Seshadri, T. R.: *Indian J. Chem.*, **2**, 399- 401 (1964).
- 220 Biginelli, P.: *Gazz. Chim. Ital.*, **24**, 437-444 (1984).
- 221 Bingham, S. J. and Tyman, J. H. P.: *Chem. Commun. (Cambridge)*, (11), 925-926 (2000).
- 222 Binh, Vu; Mezey-Vandor, G. and Nogradi, M.: *Liebigs Ann. Chem.*, **4**, 734-741 (1984).
- 223 Birch, A. J. and Hextall, P.: *Aust. J. Chem.*, **8** (2), 263-266 (1955).
- 224 Birch, H. R. and Robertson, A.: *J. Chem. Soc.*, 306-309 (1938).
- 225 Bird, Thomas Geoffrey Colerick and Ple, Patrick: *Eur. Pat. Appl. EP 555,068* (1993); *Chem. Abstr.*, **122**, 187392g (1995).
- 226 Birnbaum, L. S. and Powell, G.: *J. Org. Chem.*, **4**, 139-141 (1939).
- 227 Birsa, M. L.: *An. Stiint. Univ. "Al. I. Cuza" Iasi, Chim.*, **6**, 57-64 (1998); *Chem. Abstr.*, **132**, 207785z (2000).

- 228 Birsă, M. L.: An. Stiint. Univ. "Al. I. Cuza" Iasi, Chim., **7** (2), 341-347 (1999); Chem. Abstr., **134**, 100787r (2001).
- 229 Birsă, M. L.: An. Stiint. Univ. "Al. I. Cuza" Iasi, Chim., **7** (2), 349-354 (1999); Chem. Abstr., **134**, 100788s (2001).
- 230 Biswas, G. K. and Chatterjee, A.: Chem. Ind. (London), 654-655 (1970).
- 231 Bittner, M.; Silva, M.; Aqueveque, P. and Jakupovic, J.: Bol. Soc. Quim. Peru, **62** (2), 66-71 (1996); Chem. Abstr., **125**, 322997n (1996).
- 232 Blatt, A. H.: "Organic Reactions", Wiley, New-York, 1942, Vol. 1, Chapter 11, pp. 342-369.
- 233 Blom, A. and Tambor, J.: Ber. Dtsch. Chem. Ges., **38**, 3589-3592 (1905).
- 234 Blum, G.; Gazit, A. and Levitzki, A.: Biochemistry, **39** (51), 15705-15712 (2000).
- 235 Blum, M. S.; Jones, T. H.; Snelling, R. R.; Overal, W. L.; Fales, H. M. and Highet, R. J.: Biochem. Syst. Ecol., **10** (1), 91-94 (1982).
- 236 Blumstein, J. and Kostanecki, S.: Ber. Dtsch. Chem. Ges., **33**, 1478-1483 (1900).
- 237 Bobik, A.; Holder, G. M. and Ryan, A. J.: J. Med. Chem., **20** (9), 1194-1199 (1977).
- 238 Bobik, A.; Holder, G. M.; Ryan, A. J. and Wiebe, L. I.: Xenobiotica, **5** (2), 65-72 (1975).
- 239 Boeger, M. and Drabek, J.: Ger. Offen. 2,411,809 (1974); Chem. Abstr., **82**, 3964w (1975).
- 240 Boehme, W. R. and Scharpf, W. G.: J. Org. Chem., **26**, 1692-1695 (1961).
- 241 Bohlmann, F. and Bühlmann, U.: Chem. Ber., **105**, 863-873 (1972).
- 242 Bohlmann, F. and Grenz, M.: Chem. Ber., **103**, 90-96 (1970).
- 243 Bohlmann, F. and Grenz, M.: Chem. Ber., **108**, 26-30 (1975).
- 244 Bohlmann, F. and Grenz, M.: Chem. Ber., **110**, 295-300 (1977).
- 245 Bohlmann, F. and Stöhr, F. M.: Liebigs Ann. Chem., (2), 185-191 (1980).
- 246 Bohlmann, F. and Vorwerk, E.: Chem. Ber., **113**, 261-266 (1980).
- 247 Bohlmann, F. and Wienhold, C.: Chem. Ber., **112** (7), 2394-2401 (1979).
- 248 Bohlmann, F.; Grenz, M.; Zdero, C.; Jakupovic, J.; King, R. M. and Robinson, H.: Phytochemistry, **24** (6), 1392-1393 (1985).
- 249 Bohlmann, F.; Mahanta, P. K.; Suwita, A.; Suwita, A.; Natu, A. A.; Zdero, C.; Dorner, W.; Ehlers, D. and Grenz, M.: Phytochemistry, **16** (12), 1973-1981 (1977).
- 250 Bohlmann, F.; Niedballa, U. and Schulz, J.: Chem. Ber., **102** (3), 864-871 (1969).
- 251 Bohlmann, F.; Wallmeyer, M.; King, R. M. and Robinson, H.: Phytochemistry, **23** (7), 1513-1514 (1984).
- 252 Bohlmann, F.; Zdero, C. and Franke, H.: Chem. Ber., **106**, 382-387 (1973).
- 253 Boileau, J.; Konrat, J. P. and Pascal, H.: Fr. 1,452,911 (1966); Chem. Abstr., **66**, 104812v (1967).
- 254 Boit, H. G.: Beilstein's Handbuch Der Organischen Chemie, Springer-Verlag Ed., **8**, 2098 (1971).
- 255 Bollag, W.; Ruegg, R. and Ryser, G.: U.S. 4,105,681 (1978); Chem. Abstr., **90**, 71919a (1979).
- 256 Bollinger, N. G.; Goodson, T., Jr. and Herron, D. K.: Eur. Pat. Appl. EP 276,065 (1988); Chem. Abstr., **109**, 230544d (1988).
- 257 Bollinger, N. G.; Goodson, T., Jr. and Herron, D. K.: U.S. US 4,945,099 (1990); Chem. Abstr., **114**, 42277y (1991).
- 258 Bolognese, A.; Chioccare, F. and Scherillo, G.: Phytochemistry, **13** (9), 1989-1990 (1974).
- 259 Bolognese, A.; Piscitelli, C. and Scherillo, G.: J. Org. Chem., **48** (21), 3649-3652 (1983).
- 260 Bolos, J.; Gubert, S.; Anglada, L.; Planas, J. M.; Burgarolas, C.; Castello, J. M.; Sacristan, A. and Ortiz, J. A.: J. Med. Chem., **39** (15), 2962-2970 (1996).
- 261 Bolos, J.; Loscertales, T.; Nieto, J.; Sacristan, A. and Ortiz, J. A.: J. Heterocycl. Chem., **37** (5), 1203-1208 (2000).
- 262 Bombardelli, E.; Gabetta, B. and Magistretti, M. J.: Eur. Pat. Appl. EP 122,053 (1984); Chem. Abstr., **102**, 131808s (1985).
- 263 Bonneau, I.; Gubelmann, M.; Nonn, A. and Rochin, C.: Fr. Demande FR 2,655,335 (1991); Chem. Abstr., **116**, 58941n (1992).
- 264 Bonner, W. A.; DeGraw, J. I.; Bowen, D. M. and Shah, V. R.: Tetrahedron Lett., (12), 417-420 (1961).
- 265 Bonsall, C. and Hill, J.: J. Chem. Soc. C, 1836-1839 (1967).

- 266 Bonte, J. P.; Lesieur, D.; Lespagnol, C.; Cazin, J. C. and Cazin, M.: *Eur. J. Med. Chem.*, **9** (5), 497-500 (1974).
- 267 Boote, V. A.; Bruce, J. M.; Clarke, J. A.; Pritchard, A. P. and Speak, R. J.: *Rapid Commun. Mass Spectrom.*, **11** (7), 749-752 (1997); *Chem. Abstr.*, **127**, 17308v (1997).
- 268 Booth, B. L. and Noori, G. F. M.: *J. Chem. Soc., Perkin Trans. 1*, (12), 2894-2900 (1980).
- 269 Borchardt, R. T. and Bhatia, P.: *J. Med. Chem.*, **25** (3), 263-271 (1982).
- 270 Borders, C. L. Jr.; Perez, Dianne M.; Lafferty, Mark W.; Kondow, Alexander J.; Brahm, Jesper; Fenderson, Mary B.; Brelsford, Gregy L. and Pett, Virginia B.: *Bioorg. Chem.*, **17** (1), 96-107 (1989).
- 271 Borgulya, J.; Bruderer, H.; Bernauer, K.; Zuercher, G. and Da Prada, M.: *Helv. Chim. Acta*, **72** (5), 952-968 (1989).
- 272 Borsche, W.: *Ber. Dtsch. Chem. Ges.*, **50**, 1339-1355 (1917).
- 273 Borthakur, R. C.; Goswami, A.; Goswami, M.; Borthakur, N.; Rastogi, R. C. and Bhattacharya, P. R.: *Indian J. Chem., Sect. B*, **25B** (6), 668-671 (1986).
- 274 Botha, M. E.; Giles, R. G. F.; Moorhoff, C. M.; Engelhardt, L. M.; White, A. H.; Jardine, A. and Yorke, S. C.: *J. Chem. Soc., Perkin Trans. 1*, (1), 89-95 (1991).
- 275 Bottu S. A.: *Fr. 2,244,458* (1975); *Chem. Abstr.*, **83**, 178802q (1975).
- 276 Bowen, J. G.; Hockley, M. H. and Housley, J. R.: *Faming Zhuanli Shenqing Gongkai Shuomingshu CN A,053,921* (1991); *Chem. Abstr.*, **116**, 194304j (1992).
- 277 Bowen, J. G.; Hockley, M. H.; Housley, J. R.; Hunneyball, I. M.; Titman, R. B. and Webber, D. G.: *Eur. Pat. Appl. EP 354,693* (1990); *Chem. Abstr.*, **113**, 97601j (1990).
- 278 Boykin, D. W.: *J. Mol. Struct.*, **295** (1-3), 39-45 (1993); *Chem. Abstr.*, **119**, 180275a (1993).
- 279 Bradley, W. and Robinson, R.: *J. Chem. Soc.*, 1541-1569 (1928).
- 280 Bradshaw, J. S.; Loveridge, E. L. and White, L.: *J. Org. Chem.*, **33**, 4127-4132 (1968).
- 281 Bradsher, C. K.; Brown, F. C. and Porter, H. K.: *J. Am. Chem. Soc.*, **76**, 2357-2362 (1954).
- 282 Brand, K. and Collischonn, H.: *J. Prakt. Chem.*, **103**, 329-351 (1922).
- 283 Braude, M. B.; Aranovitch, G. I.; Shvedova, V. I. and Bekhli, A. F.: *Khim. Farm. Zh.*, **9** (4), 57-59 (1975); *Chem. Abstr.*, **83**, 27806t (1975).
- 284 Braude, M. B.; Ermakov, A. I.; Koroleva, T. I. and Bekhli, A. F.: *Zh. Org. Khim.*, **9** (9), 1910-1914 (1973).
- 285 Braude, M. B.; Polovinchik, R. L.; Vorob'eva, Z. G.; Bolotina, L. A.; Shvedova, V. I. and Bekhli, A. F.: *Khim. Farm. Zh.*, **5** (10), 41-42 (1971); *Chem. Abstr.*, **76**, 33985x (1972).
- 286 Bredereck, H.; Lehmann, G.; Fritzsche, E. and Schönfeld, C.: *Angew. Chem.*, **52** (26), 445-446 (1939).
- 287 Bredereck, H.; Lehmann, G.; Schönfeld, C. and Fritzsche, E.: *Ber. Dtsch. Chem. Ges.*, **72**, 1414-1429 (1939).
- 288 Brewster, C. M. and Harris, J. C.: *J. Am. Chem. Soc.*, **52**, 4866-4872 (1930).
- 289 Briet, P.; Berthelon, J. J. and Collonges, F.: *Eur. Pat. Appl. EP 80,419* (1983); *Chem. Abstr.*, **99**, 122305t (1983).
- 290 Briggs, L. H. and Locker, R. H.: *J. Chem. Soc.*, 2157-2164 (1949).
- 291 Briggs, L. H. and Locker, R. H.: *J. Chem. Soc.*, 3131-3136 (1951).
- 292 Britton, W. E. and Steelink, C.: *Tetrahedron Lett.*, (33), 2873-2876 (1974).
- 293 Brophy, J. J.; Cavill, G. W. K. and Duke, R. K.: *Insect Biochem.*, **13** (5), 503-505 (1983).
- 294 Brophy, J. J.; Goldsack, R. J.; Fookes, C. J. R. and Forster, P. I.: *J. Essent. Oil Res.*, **7** (3), 237-254 (1995); *Chem. Abstr.*, **123**, 107769t (1995).
- 295 Brossi, A.; Gurien, H.; Rachlin, A. I. and Teitel, S.: *J. Org. Chem.*, **32**, 1269-1270 (1967).
- 296 Brown, F. C.: *J. Am. Chem. Soc.*, **68**, 872-873 (1946).
- 297 Brown, F. J.; Bernstein, P. R.; Cronk, L. A.; Dosset, D. L.; Hebbel, K. C.; Maduskuie, T. P., Jr.; Shapiro, H. S.; Vacek, E. P.; Yee, Ying K.; Willard, A. K.; Krell, R. D. and Snyder, D. W.: *J. Med. Chem.*, **32** (4), 807-826 (1989).
- 298 Browne, M. F. and Shriner, R. L.: *J. Org. Chem.*, **22**, 1320-1322 (1957).
- 299 Bruce, J. M. and Chaudhry, A.-u.-h.: *J. Chem. Soc., Perkin Trans. 1*, (2), 295-297 (1974).
- 300 Bruce, J. M. and Chaudhry, A.-u.-h.: *J. Chem. Soc., Perkin Trans. 1*, (3), 372-379 (1972).
- 301 Bruce, J. M. and Lloyd-Williams, P.: *J. Chem. Soc., Perkin Trans. 1*, (21), 2877-2884 (1992).

- 302 Bruce, J. M. and Roshan-Ali, Y.: J. Chem. Res., Synop., (7), 193, 2564-2572 (1981).  
303 Bruce, J. M. and Roshan-Ali, Y.: J. Chem. Soc., Perkin Trans. 1, (10), 2677-2679 (1981).  
304 Bruce, J. M.: J. Chem. Soc., 360-365 (1960).  
305 Bruckhausen, F. v.; Oberembt, H. and Feldhaus, A.: Justus Liebigs Ann. Chem., **507**, 144-159 (1933).  
306 Brüll, J. and Friedlaender, P.: Ber. Dtsch. Chem. Ges., **30**, 297-302 (1897).  
307 Bruun, T.: Acta Chem. Scand., **19** (7), 1677-1693 (1965).  
308 Bruun, T.: Tetrahedron Lett., (4), 1-4 (1960).  
309 Bryan, J. D.; Goldberg, A. A. and Wragg, A. H.: J. Chem. Soc., 1279-1281 (1960).  
310 Bu, Xian Yong; Xiao, Li and Li, Yu Lin: Chin. Chem. Lett., **7** (1), 11-12 (1996).  
311 Büchi, G.; Foulkes, D. M.; Kurono, M.; Mitchell, G. F. and Schneider, R. S.: J. Am. Chem. Soc., **89**, 6745-6753 (1967).  
312 Buckle, D. R. and Smith, H.: U.S. 4,200,577 (1980); Chem. Abstr., **93**, 186172f (1980).  
313 Buckle, D. R.; Cantello, B. C. C.; Smith, H. and Spicer, B. A.: J. Med. Chem., **18** (4), 391-394 (1975).  
314 Buckle, D. R.; Outred, D. J.; Ross, J. W.; Smith, H.; Smith, R. J.; Spicer, B. A. and Gasson, B. C.: J. Med. Chem., **22** (2), 158-168 (1979).  
315 Buckman, S. J.; Fenyves, J. G. E.; Flanagan, K. J.; Pera, J. D. and Pulido, M. L.: US 3,933,472 (1976); Chem. Abstr., **84**, 106378d (1976).  
316 Buckman, S. J.; Pera, J. D. and Mercer, G. D.: Ger. Offen. 2,051,921 (1971); Chem. Abstr., **75**, 37361t (1971).  
317 Bülow, C. and Wagner, H.: Ber. Dtsch. Chem. Ges., **34**, 1782-1804 (1901).  
318 Burdeska, K.: Synthesis, (11), 940-942 (1982).  
319 Burke, J. M.; Scannell, R. T. and Stevenson, R.: Phytochemistry, **25** (5), 1248-1249 (1986).  
320 Businelli, M.: Farm. Sci. e tec. (Pavia), **5**, 522-527 (1950); Chem. Abstr., **45**, 3819f (1951).  
321 Butenandt, A.: Angew. Chem., **69** (1/2), 16-23 (1957).  
322 Butenandt, A.; Biekert, E. and Beckmann, R.: Justus Liebigs Ann. Chem., **607**, 207-215 (1957).  
323 Butenandt, A.; Biekert, E. and Linzen, B.: Z. Physiol. Chem., **312**, 227-236 (1958).  
324 Butenandt, A.; Biekert, E.; Däuble, M. and Köhrmann, K. H.: Chem. Ber., **92**, 2172-2181 (1959).  
325 Butenandt, A.; Biekert, E.; Kübler, H. and Linzen, B.: Z. Physiol. Chem., **319**, 238-256 (1960).  
326 Butenandt, A.; Hallmann, G. and Beckmann, R.: Chem. Ber., **90**, 1120-1124 (1957).  
327 Butenandt, A.; Schiedt, U. and Biekert, E.: Justus Liebigs Ann. Chem., **586**, 229-239 (1954).  
328 Butenandt, A.; Schiedt, U. and Biekert, E.: Justus Liebigs Ann. Chem., **588**, 106-116 (1954).  
329 Butenandt, A.; Schiedt, U.; Biekert, E. and Cromartie, R. Jan T.: Justus Liebigs Ann. Chem., **590**, 75-90 (1955).  
330 Buu-Hoï, N. P. and Lavit, D.: J. Chem. Soc., 18-20 (1955).  
331 Buu-Hoï, N. P. and Seailles, J., Jr.: J. Org. Chem., **20**, 606-609 (1955).  
332 Buu-Hoï, N. P. and Xuong, N. D.: J. Org. Chem., **26**, 2401-2402 (1961).  
333 Buu-Hoï, N. P.; Jacquignon, P. and Dufour, M.: Bull. Soc. Chim. Fr., 23-27 (1964).  
334 Buu-Hoï, N. P.; Lavit, D. and Xuong, N. D.: J. Org. Chem., **19**, 1617-1621 (1954).  
335 Buu-Hoï, N. P.; Xuong, N. D. and Lavit, D.: J. Chem. Soc., 1034-1038 (1954).  
336 Buu-Hoï, N. P.; Xuong, N. D. and Lavit, D.: J. Org. Chem., **18**, 910-915 (1953).  
337 Buu-Hoï, N. P.: J. Org. Chem., **18**, 1723-1729 (1953).  
338 Bycroft, B. W.; Knight, J. A. and Roberts, J. C.: J. Chem. Soc., 5148-5151 (1963).  
339 Cai, Mengshen and Wang, Lan-Ming: Huaxue Xuebao, **48** (12), 1191-1198 (1990); Chem. Abstr., **114**, 142922y (1991).  
340 Cai, Mengshen; Bian, Zhaoqun; Qiao, Liang and Wang, Dong: Huaxue Xuebao, **49** (6), 593-599 (1991); Chem. Abstr., **115**, 232635g (1991).  
341 Cairns, H. and Johnson, P. B.: Ger. Offen. 1,954,266 (1970); Chem. Abstr., **73**, 25303w (1970).  
342 Cairns, H.: Tetrahedron, **28** (2), 359-361 (1972).



- 343 Cairns, H.; Chambers, A. and Lee, T. B.: Ger. Offen. 2,142,526 (1972); Chem. Abstr., **77**,  
34338w (1972).
- 344 Campaigne, E.; Kim, Chung S. and Smith, Homer A., Jr.: Proc. Indiana Acad. Sci., **92**,  
145-151 (1982) (Pub. **1983**).
- 345 Campbell, N. and Thomson, A.: Proc. R. Soc. Edinburgh, Sect. A, Math. Phys. Sci., **68** (3),  
245-256 (1970).
- 346 Campbell, T. W. and Coppinger, G. M.: J. Am. Chem. Soc., **73**, 1849-1850 (1951).
- 347 Campbell, T. W. and Coppinger, G. M.: J. Am. Chem. Soc., **73**, 2708-2712 (1951).
- 348 Campbell, T. W. and Coppinger, G. M.: US Patent 2,686,123 (1954); Chem. Abstr., **49**,  
4203h (1955).
- 349 Campin, D. N.: Appita, **34** (3), 205-210 (1980).
- 350 Cann, M. R. and Shannon, P. V. R.: Chem. Ind. (London), **19**, 779-780 (1982).
- 351 Cannon, J. R.; Ghisaberti, E. L. and Lojanapiwatna, Vitchu: J. Sci. Soc. Thailand, **6** (1), 59-  
62 (1980); Chem. Abstr., **93**, 185878d (1980).
- 352 Canter, F. W.; Curd, F. H. and Robertson, A.: J. Chem. Soc., 1245-1255 (1931).
- 353 Cardillo, G.; Cricchio, R. and Merlini, L.: Tetrahedron, **24** (13), 4825-4831 (1968).
- 354 Cardillo, G.; Merlini, L. and Mondelli, R.: Tetrahedron, **24** (1), 497-510 (1968).
- 355 Carlini, R.; Higgs, K.; Taylor, N. and Rodrigo, R.: Can. J. Chem., **75** (6), 805-816 (1997).
- 356 Carter, S. D. and Wallace, T. W.: Synthesis, (12), 1000-1002 (1983).
- 357 Cascaval, A.: Rom. RO 91,541 (1987); Chem. Abstr., **108**, 74985v (1988).
- 358 Casini, G.; Ferappi, M. and Giardina, D.: Ann. Chim. (Rome), **62**, 814-824 (1972).
- 359 Catch, J. R.; Elliott, D. F.; Hey, D. H. and Jones, E. R. H.: J. Chem. Soc., 552-555 (1949).
- 360 Cavallini, G.; Massarani, E.; Mauri, L.; Nardi, D.; Pacchiano, F. and Mantegazza, P.: Boll.  
Chim. Farm., **103** (1), 48-64 (1964).
- 361 Cavell, B. D. and MacMillan, J.: J. Chem. Soc. C, 310-313 (1967).
- 362 Cechinel-Filho, V.; Vaz, Z. R.; Zunino, L.; Calixto, J. B. and Yunes, R. A.: Eur. J. Med.  
Chem., **31** (10), 833-839 (1996).
- 363 Celli, A. M.; Lampariello, L. R.; Chimichi, S.; Nesi, R. and Scotton, M.: Can. J. Chem., **60**  
(11), 1327-1332 (1982).
- 364 Chabrier, P.; Najer, H.; Giudicelli, R. and Joannic-Voisinet, E.: Bull. Soc. Chim. Fr., 1488-  
1491 (1958).
- 365 Chadha, T. C. and Venkataraman, K.: J. Chem. Soc., 1073-1076 (1933).
- 366 Chakravarti, D. and Chakravarti, N.: J. Indian Chem. Soc., **16**, 144-150 (1939).
- 367 Chakravarti, D. and Majumdar, B.: J. Indian Chem. Soc., **16**, 151-159 (1939).
- 368 Chandrasekhar: Ph. D. Bombay University (1944).
- 369 Chang, C. T. and Chen, F. C.: J. Chem. Soc., 3155-3156 (1961).
- 370 Chang, C. T. and Chen, F. C.: J. Chin. Chem. Soc. (Taipei), **7**, 69-73 (1960); Chem. Abstr.,  
**55**, 3504c (1961).
- 371 Chang, C. T.: Formosan. Sci., **16** (4), 127-132 (1962); Chem. Abstr., **59**, 3869e (1963).
- 372 Chang, C. T.; Chen, F. C.; Chen, T. S.; Hsu, K. K.; Ueng, T. and Hung, M.: J. Chem. Soc.,  
3414-3417 (1961).
- 373 Chang, C. T.; Chen, T. S. and Chen, F. C.: J. Org. Chem., **26**, 3142-3143 (1961).
- 374 Chang, C. T.; Young, M. F. and Chen, F. C.: Formosan Sci., **16**, 29-30 (1962); Chem.  
Abstr., **59**, 2759a (1963).
- 375 Chapman, E.; Perkin, A. G. and Robinson, R.: J. Chem. Soc., 3015-3041 (1927).
- 376 Charton, M.: J. Org. Chem., **28**, 3121-3124 (1963).
- 377 Chaughuley, A. S. U. and Amin, G. C.: Sci. Cult., **19**, 614 (1954).
- 378 Chawla, H. M. and Mittal, R. S.: Curr. Sci., **52** (24), 1189-1190 (1983).
- 379 Chawla, H. M.; Gambhir, I. and Kathuria, L.: J. Chromatogr., **188** (1), 289-291 (1980).
- 380 Chawla, H. M.; Mittal, R. S. and Johny, C. J.: Indian J. Chem., Sect. B, **26B** (10), 992- 993  
(1987).
- 381 Cheetham, K. H. and Hey, D. H.: J. Chem. Soc., 770-772 (1937).
- 382 Chen, C. Y.; Lin, E. C.; Ueng, T. and Chen, F. C.: Formosan Sci., **12**, 144-148 (1958).
- 383 Chen, F. C. and Chang, C. T.: J. Chem. Soc., 146-150 (1958).
- 384 Chen, F. C. and Chang, C. T.: J. Chin. Chem. Soc. (Taipei), **1**, 156-158 (1954); Chem.  
Abstr., **49**, 13932g (1955).

- 385 Chen, F. C. and Chang, K. T.: J. Taiwan Pharm. Assoc., **4**, 38-41 (1952); Chem. Abstr., **49**, 3175i (1955).
- 386 Chen, F. C. and Tsai, T. H.: J. Taiwan Pharm. Assoc., **4**, 42-44 (1952); Chem. Abstr., **49**, 5374g (1955).
- 387 Chen, F. C.; Chang, C. T. and Chen, T. S.: Formosan Sci., **12**, 151-154 (1958).
- 388 Chen, F. C.; Chang, C. T. and Chen, T. S.: J. Org. Chem., **27**, 85-87 (1962).
- 389 Chen, F. C.; Chang, C. T.; Chen, C. Y.; Hung, M. and Lin, Y. C.: J. Org. Chem., **27**, 310-312 (1962).
- 390 Chen, F. C.; Chang, C. T.; Shi, T. T. and Li, T.: J. Chin. Chem. Soc. (Taipei), **1**, 159-162 (1954).
- 391 Chen, J. and Li, Y.: Xiamen Daxue Xuebao, Ziran Kexueban, **32** (2), 249-251 (1993).
- 392 Cheng, H. M.; Eto, M.; Kuwatsuka, S.; Oshima, Y. and Kado, M.: Chung Kuo Nung Yeh Hua Hsueh Hui Chih, (Spec. Issue), 38-47 (1968); Chem. Abstr., **71**, 110171e (1969).
- 393 Cheng, H. M.; Eto, M.; Nakamura, K.; Kuwatsuka, S.; Oshima, Y. and Kado, M.: Agric. Biol. Chem., **32** (9), 1162-1174 (1968); Chem. Abstr., **69**, 93942w (1968).
- 394 Cheng, H. M.; Eto, M.; Taniguchi, E.; Kuwatsuka, S.; Oshima, Y. and Kado, M.: Bochu Kagaku, **34** (4), 176-182 (1969); Chem. Abstr., **72**, 131405v (1970).
- 395 Cheng, P. L.; Fournari, P. and Tirouflet, J.: Bull. Soc. Chim. Fr., 2248-2251 (1963).
- 396 Cherry, P. C.; Pipe, A. J.; Kitchin, J.; Borthwick, A. D.; Coles, R. J. and Burn, D.: U.S. US 4,769,367 (1988); Chem. Abstr., **110**, 212803d (1989).
- 397 Chhaya, G. S., Trivedi, P. L. and Jadhav, G. V.: J. Univ. Bombay, Sci., **26** (5), 22-27 (1958); Chem. Abstr., **53**, 14038 (1959).
- 398 Chiba, K. and Tada, M.: J. Chem. Soc., Chem. Commun., (21), 2485-2486 (1994).
- 399 Chien, S. L. and Yin, L. Y.: J. Chin. Chem. Soc. (Peking), **7**, 40-45 (1939); Chem. Abstr., **34**, 1979<sup>9</sup> (1940).
- 400 Chien, S. L.; Chung, H. P. and Tai, H. C.: J. Chin. Chem. Soc. (Peking), **4**, 361-369 (1936); Chem. Abstr., **31**, 1155<sup>9</sup> (1937).
- 401 Chiji, H.; Aiba, T. and Izawa, M.: Agric. Biol. Chem., **42** (1), 159-165 (1978).
- 402 Chin, Masao; Sato, Shunji; Hosaka, Kunio and Mihashi, Hiroshi: Jpn. Kokai Tokkyo Koho JP 01 13,019 [89 13,019] (1989); Chem. Abstr., **111**, 214230j (1989).
- 403 Ching-Te Chang: Hua Hsueh, (1), 15-18 (1967); Chem. Abstr., **67**, 90612m (1967).
- 404 Choi, Yoon-Jung; Shim, Pil-Jong; Ko, Kyung-Soo and Kim, Hee-Doo: Heterocycles, **43** (6), 1223-1228 (1996).
- 405 Choi, Yoon-Jung; Shim, Pil-Jong; Ko, Kyung-Soo and Kim, Hee-Doo: Yakhak Hoechi, **41** (4), 14-17 (1997); Chem. Abstr., **126**, 263950n (1997).
- 406 Chopin, J. and Roux, B.: C. R. Acad. Sci., **257** (1), 176-178 (1963).
- 407 Chopin, J.; Bouillant, M. L. and Besson, E.: The Flavonoids, Advances in Research (J. B. Harborne, T. J. Mabry, Eds.) Chapman and Hall, (1982), p. 449-504.
- 408 Chou, C. J.; Lin, L. C.; Chen, K. T. and Chen, C. F.: J. Nat. Prod., **55** (6), 795-799 (1992).
- 409 Chou, Chyuan and Sheu, Shuenn Jyi: Hua Hsueh, **41** (2), 61-71 (1983); Chem. Abstr., **101**, 210670y (1984).
- 410 Choudhari, S. R.; Goswami, D. D. and Thakar, K. A.: J. Indian Chem. Soc., **55** (4), 401-404 (1978).
- 411 Christian, C. M. and Amin, G. C.: J. Indian Chem. Soc., **35** (2), 111-114 (1958).
- 412 Cicchetti, O. and Moggi, G.: Chim. Ind. (Milan), **48** (9), 952-954 (1966).
- 413 Cizmarikova, R. and Misikova, E.: Czech. CS 276,922 (1992); Chem. Abstr., **120**, 269843c (1994).
- 414 Clark, J. H. and Miller, J. M.: J. Chem. Soc., Perkin Trans. 1, (18), 2063-2069 (1977).
- 415 Clark, J. H. and Miller, J. M.: Tetrahedron Lett., (2), 139-140 (1977).
- 416 Clark-Lewis, J. W. and Jemison, R. W.: Aust. J. Chem., **20**, 149-156 (1967).
- 417 Clark-Lewis, J. W. and Williams, L. R.: Aust. J. Chem., **20**, 2151-2167 (1967).
- 418 Claus, A. and Huth, M.: J. Prakt. Chem., **53**, 39-42 (1896).
- 419 Claus, A.: Ger. Offen, 96,659 (1897).
- 420 Clemmensen, E.: Ber. Dtsch. Chem. Ges., **47**, 51-63 (1914).
- 421 Coates, W. J. and Flynn, S. T.: Can. Pat. Appl. CA 2,027,169 (1991); Chem. Abstr., **115**, 135931t (1991).

- 422 Cohen, N.; Blount, J. F.; Lopresti, R. J. and Trullinger, D. P.: *J. Org. Chem.*, **44** (12), 4005-4007 (1979).
- 423 Cohen, N.; Daniewski, A. R.; Lee, F. Kwo-Chen and Yagaloff, K. A.: *PCT Int. Appl. WO* 95 15,956 (1995); *Chem. Abstr.*, **123**, 339414b (1995).
- 424 Cohen, N.; Lopresti, R. J. and Williams, T. H.: *J. Org. Chem.*, **43** (19), 3723-3726 (1978).
- 425 Colella, D. F. and Kaiser, C.: *Ger. Offen.* 2,227,022 (1972); *Chem. Abstr.*, **79**, 126069d (1973).
- 426 Collins, E. and Shannon, P. V. R.: *J. Chem. Soc., Perkin Trans. 1*, (4), 419-424 (1973).
- 427 Collins, E. and Shannon, P. V. R.: *J. Chem. Soc., Perkin Trans. 1*, (8), 944-952 (1974).
- 428 Collins, E.; John, G. D. and Shannon, P. V. R.: *J. Chem. Soc., Perkin Trans. 1*, (2), 96-101 (1975).
- 429 Coltman, C. C. W.; Eyley, S. C. and Raphael, R. A.: *Synthesis*, (2), 150-152 (1984).
- 430 Cook, C. D. and Gilmour, N. D.: *J. Org. Chem.*, **25**, 1429-1431 (1960).
- 431 Corse, J. and Ingraham, L. L.: *J. Org. Chem.*, **16**, 1345-1348 (1951).
- 432 Corson, B. B.; Heintzelman, W. J.; Schwartzman, J. H.; Tiefenthal, H. E.; Lokken, R. J.; Nickels, J. E.; Atwood, G. R. and Pavlik, F. J.: *J. Org. Chem.*, **23**, 544-549 (1958).
- 433 Coulthard, C. E.; Marshall, J. and Pyman, F. L.: *J. Chem. Soc.*, 280-291 (1930).
- 434 Cousin, S. G. and Lions, F.: *J. Proc. R. Soc. N. S. W.*, **70**, 413-427 (1936).
- 435 Coutts, S. J. and Wallace, T. W.: *Tetrahedron*, **50** (40), 11755-11780 (1994).
- 436 Coutts, S. J. and Kallmerten, J.: *Tetrahedron Lett.*, **31** (30), 4305-4308 (1990).
- 437 Covello, M. and Piscopo, E.: *Farmaco, Ed. Sci.*, **19**, 675-687 (1964).
- 438 Covello, M.; De Simone, F. and Dini, A.: *Rend. Accad. Sci. Fis. Mat., Naples*, **35**, 298-308 (1968).
- 439 Covello, M.; Dini, A. and De Simone, F.: *Rend. Accad. Sci. Fis. Mat., Naples* **36**, 67-71 (1969).
- 440 Covello, M.; Dini, A. and Piscopo, E.: *Rend. Accad. Sci. Fis. Mat., Naples*, **37**, 56-62 (1970).
- 441 Covello, M.; Piscopo, E. and Abignente, E.: *Ann. Chim. (Rome)*, **50**, 1651-1665 (1960).
- 442 Covello, M.; Piscopo, E. and Abignente, E.: *Ann. Chim. (Rome)*, **52**, 911-922 (1962).
- 443 Covello, M.; Piscopo, E. and Abignente, E.: *Ann. Chim. (Rome)*, **50**, 383-396 (1960).
- 444 Covello, M.; Piscopo, E. and Pepe, G.: *Gazz. Chim. Ital.*, **88**, 101-112 (1958).
- 445 Cox, B. and Waigh, R. D.: *Synthesis*, (9), 709-710 (1989).
- 446 Cox, E.: *J. Am. Chem. Soc.*, **52**, 352-358 (1930).
- 447 Cram, D. J. and Cranz, F. W.: *J. Am. Chem. Soc.*, **72**, 595-600 (1950).
- 448 Cram, D. J.: *J. Am. Chem. Soc.*, **70**, 4240-4243 (1948).
- 449 Cramer, F. and Elschmig, G. H.: *Chem. Ber.*, **89**, 1-2 (1956).
- 450 Craveiro, A. A.; Andrade, C. H. S.; Matos, F. J. A.; Alencar, J. W. and Dantas, T. N. C.: *J. Nat Prod.*, **43** (6), 756-757 (1980).
- 451 Crawford, L. W.; Eaton, E. O. and Pepper, J. M.: *Can. J. Chem.*, **34** (11), 1562-1566 (1956).
- 452 Cremer, S. E. and Tarbell, D. S.: *J. Org. Chem.*, **26**, 3653-3657 (1961).
- 453 Crépieux, M. P.: *Bull. Soc. Chim. Fr.*, 151-161 (1891).
- 454 Cresp, T. M.; Sargent, M. V.; Elix, J. A. and Murphy, D. P. H.: *J. Chem. Soc., Perkin Trans. 1*, (4), 340-345 (1973).
- 455 Cristiano, M. L. S.; Johnstone, R. A. and Pratt, M. J.: *Acta Crystallogr., Sect. C: Cryst. Struct. Commun.*, **C51** (12), 2581-2583 (1995).
- 456 Croft, T. S.: *Phosphorous Sulfur*, **2** (1-2-3), 129-132 (1976); *Chem. Abstr.*, **89**, 6062f (1978).
- 457 Cruickshank, J. H. and Robinson, R.: *J. Chem. Soc.*, 2064-2071 (1938).
- 458 Cullinane, N. M. and Edwards, B. F. R.: *J. Appl. Chem.*, **9**, 133-136 (1959).
- 459 Cullinane, N. M. and Edwards, B. F. R.: *J. Chem. Soc.*, 434-438 (1958).
- 460 Cullinane, N. M. and Edwards, B. F. R.: *J. Chem. Soc.*, 1311-1312 (1958).
- 461 Cullinane, N. M. and Edwards, B. F. R.: *J. Chem. Soc.*, 2926-2929 (1958).
- 462 Cullinane, N. M. and Edwards, B. F. R.: *J. Chem. Soc.*, 3016-3019 (1957).
- 463 Cullinane, N. M.; Edwards, B. F. R. and Bailey-Wood, V. V.: *Recl. Trav. Chim. Pays-Bas*, **79**, 1174-1180 (1960).
- 464 Cullinane, N. M.; Evans, A. G. and Lloyd, E. T.: *J. Chem. Soc.*, 2222-2231 (1956).

- 465 Cullinane, N. M.; Lloyd, E. T. and Tudball, J. K.: J. Chem. Soc., 3894-3895 (1954).  
466 Cullinane, N. M.; Woolhouse, R. A. and Edwards, B. F. R.: J. Chem. Soc., 3842-3845 (1961).  
467 Cummins, B.; Donnelly, D. M. X.; Eades, J. F.; Fletcher, H. F.; Cinneide, F. O.; Philbin, E. M. and Swirski, J.: Tetrahedron, **19** (4), 499-512 (1963).  
468 Cundy, C. S.; Higgins, R.; Kibby, S. A. M.; Lowe, B. M. and Paton, R. M.: Tetrahedron Lett., **30** (17), 2281-2284 (1989).  
469 Curd, F. H. and Robertson, A.: J. Chem. Soc., 437-444 (1933).  
470 Curd, F. H. and Robertson, A.: J. Chem. Soc., 1173-1179 (1933).  
471 Cushman, M.; Zhu, H.; Geahlen, R. L. and Kraker, A. J.: J. Med. Chem., **37** (20), 3353-3362 (1994).  
472 d'Ans, J. and Zimmer, H.: Chem. Ber., **85**, 585-590 (1952).  
473 Da Re, P. and Cimattoribus, L.: J. Org. Chem., **26**, 3650-3653 (1961).  
474 Da Re, P.: Farmaco, Ed. Sci., **11**, 662-669 (1956).  
475 Dahse, W.: Ber. Dtsch. Chem. Ges., **41**, 1619-1625 (1908).  
476 Dalvi, V. J. and Jadhav, G. V.: J. Indian Chem. Soc., **34** (4), 324-326 (1957).  
477 Dandegaonker, S. H. and Revankar, G. R.: Monatsh. Chem., **96**, 450-460 (1965).  
478 Dandegaonker, S. H. and Shet, S. G.: Monatsh. Chem., **96**, 1214-1223 (1965).  
479 Dandegaonker, S. H.: J. Indian Chem. Soc., **46** (2), 148-152 (1969).  
480 Dann, O. and Mylius, G.: Justus Liebigs Ann. Chem., **587**, 1-15 (1954).  
481 Dave, K. G.; Telang, S. A. and Venkataraman, K.: J. Sci. Ind. Res., **19B**, 470-476 (1960).  
482 Davenport, K. G. and Hilton, C. B.: US 4,560,789 (1985); Chem. Abstr., **104**, 148552t (1986).  
483 David, E. and Kostanecki, S. v.: Ber. Dtsch. Chem. Ges., **36**, 125-129 (1903).  
484 Dawane, B. S. and Vibhute, Y. B.: J. Indian Chem. Soc., **77** (6), 299 (2000).  
485 De Antoni, J.; Eche, R. and Potherat, J. J.: Ger. Offen. 2,647,866 (1975); Chem. Abstr., **87**, 134495v (1977).  
486 De Antoni, J.; Eche, R.; Guillemot, A.; Bruzzi, J.; Bourillet, F.; Potherat, J. J. and Lamoril, I.: Eur. J. Med. Chem.-Chim. Ther., **13** (6), 545-552 (1978).  
487 De Groot, A. H.; Dommissie, R. A. and Lemiere, G. L.: Tetrahedron, **56** (11), 1541-1549 (2000).  
488 De Pascual, T. J.; Bellido, I. S.; Gonzalez, M. S.; Muriel, M. R. and Hernandez, J. M.: Phytochemistry, **19** (12), 2781-2782 (1980).  
489 De Pascual, T. J.; Bellido, I. S.; Gonzalez, M. S.; Muriel, M. R. and Hernandez, J. M.: Phytochemistry, **20** (10), 2417-2420 (1981).  
490 De Pascual, T. J.; Galinanes, B.; Diaz, F. and Grande, M.: An. Quim., **75** (12), 1000-1001 (1979).  
491 De Pascual, T. J.; Gonzalez, M. S.; Muriel, M. R. and Bellido, I. S.: Phytochemistry, **22** (11), 2587-2589 (1983).  
492 De Pascual, T. J.; Gonzalez, M. S.; Muriel, M. R. and Bellido, I. S.: Phytochemistry, **23** (8), 1819-1821 (1984).  
493 de Gutierrez, A. N.; Catalan, C. A. N.; Diaz, J. G. and Herz, W.: Phytochemistry, **39** (4), 795-800 (1995).  
494 Dean, F. M. and Robertson, A.: J. Chem. Soc., 1241-1249 (1953).  
495 Dean, F. M.; Evans, E. and Robertson, A.: J. Chem. Soc., 4565-4572 (1954).  
496 Dean, F. M.; Goodchild, J.; Houghton, L. E.; Martin, J. A.; Morton, R. B.; Parton, B.; Price, A. W. and Nongyow Somvichien: Tetrahedron Lett., (35), 4153-4159 (1966).  
497 Dean, F. M.; Halewood, P.; Mongkolsuk, S.; Robertson, A. and Whalley, W. B.: J. Chem. Soc., 1250-1261 (1953).  
498 Dean, F. M.; Randell, D. R. and Winfield, G.: J. Chem. Soc., 1071-1077 (1959).  
499 Dean, R. E.; Midgley, A.; White, E. N. and McNeil, D.: J. Chem. Soc., 2773-2779 (1961).  
500 DeGraw, J. I., Jr. and Bonner, W. A.: J. Org. Chem., **27**, 3917-3919 (1962).  
501 Delalande S. A.: Belg. 884,602 (1981); Chem. Abstr., **95**, 62259m (1981).  
502 Delalande S. A.: Belg. BE 895,464 (1983); Chem. Abstr., **100**, 85390h (1984).  
503 Demerseman, P.; Lechartier, J. P.; Cheutin, A.; Reynaud, R.; Royer, R.; Rumpf, P. and Desvoye, M. L.: Bull. Soc. Chim. Fr., 1700-1705 (1962).

- 504 Denny, W. A.; Baguley, B. C.; Arwell, G. J. and Rewcastle, G. W.: Eur. Pat. 278,176 (1988); Chem. Abstr., **110**, 8048 (1989).
- 505 Desai, B. M. and Desai, P. R.: J. Indian Chem. Soc., **37** (9), 550-552 (1960).
- 506 Desai, B. M. and Desai, R. D.: J. Sci. Ind. Res., **13B** (4), 249-252 (1954).
- 507 Desai, R. D. and Ekhlal, M.: Proc. Indian Acad. Sci., **8A**, 194-201 (1938).
- 508 Desai, R. D. and Ekhlal, M.: Proc. Indian Acad. Sci., **8A**, 567-577 (1938).
- 509 Desai, R. D. and Hamid, S. A.: Proc. Indian Acad. Sci., **6A**, 287-290 (1937).
- 510 Desai, R. D. and Mavani, C. K.: Curr. Sci., **10**, 524 (1941).
- 511 Desai, R. D. and Mavani, C. K.: J. Sci. Ind. Res., **12B**, 236-239 (1953).
- 512 Desai, R. D. and Mavani, C. K.: Proc. Indian Acad. Sci., **15A**, 11-15 (1942).
- 513 Desai, R. D. and Mavani, C. K.: Proc. Indian Acad. Sci., **25A**, 353-358 (1947).
- 514 Desai, R. D. and Mavani, C. K.: Proc. Indian Acad. Sci., **29A**, 269-273 (1949).
- 515 Desai, R. D. and Vakil, V. M.: Proc. Indian Acad. Sci., **12A**, 391-398 (1940).
- 516 Desai, R. D.; Trivedi, J. J. and Trivedi, J. P.: J. Sci. Ind. Res., **13B**, 328-330 (1954).
- 517 Deshpande, G. D.: Ph. D. Thesis, Marathwada University, India, (1972).
- 518 Dewick, P. M. and Martin, M.: Phytochemistry, **18** (4), 597-602 (1979).
- 519 Dewick, P. M. and Ward, D.: Phytochemistry, **17**, 1751-1754 (1978).
- 520 Dhami, K. S. and Stothers, J. B.: Can. J. Chem., **43**, 479-497 (1965).
- 521 Dhar, D. N. and Singhal, D. V.: Indian J. Appl. Chem., **34** (1), 23-26 (1971).
- 522 Dhar, M. L. and Magazine, N.: Proc. Natl. Acad. Sci., India, Sect. A, **62** (2), 153-156 (1992).
- 523 Dholakia, V. N. and Trivedi, K. N.: J. Indian Chem. Soc., **47** (11), 1058-1062 (1970).
- 524 Dick, W. E., Jr.: Carbohydr. Res., **70**, 313-318 (1979).
- 525 Diedrich, D. F.: J. Med. Pharm. Med., **5**, 1054-1062 (1962).
- 526 Diehl, H.; Liggett, L. M.; Harrison, G. C.; Hach, C. C. and Curtis, R.: Iowa State Coll. J. Sci., **22**, 91-109 (1947).
- 527 Dijkstra, P. J.; den Hertog, Jr., H. J.; van Steen, B. J.; Zijlstra, S.; Skowronska-Ptasinska, M.; Reinhoudt, D. N.; van Eerden, J. and Harkema, S.: J. Org. Chem., **52**, 2433-2442 (1987).
- 528 Dijkstra, P. J.; van Steen, B. J.; Hams, B. H. M.; den Hertog, H. J. and Reinhoudt, D. N.: Tetrahedron Lett., **27** (27), 3183-3186 (1986).
- 529 Dillar, R. D.: Eur. Pat. Appl. EP 132,366 (1985); Chem. Abstr., **103**, 141966b (1985).
- 530 Dillard, R. D.; Carr, F. P.; McCullough, D.; Haisch, K. D.; Rinkema, L. E. and Fleisch, J. H.: J. Med. Chem., **30** (5), 911-918 (1987).
- 531 Dimmel, D. R. and Schuller, L. F.: J. Wood Chem. Technol., **6** (4), 535-564 (1986); Chem. Abstr., **106**, 139963s (1987).
- 532 Distillers & Co.: GB 951,435 (1959); Chem. Abstr., **60**, 15778 (1964).
- 533 Djura, P. and Sargent, M. V.: Aust. J. Chem., **29** (5), 1069-1077 (1976).
- 534 Dodwadmath, R. P.: J. Univ. Bombay, **9**, Pt. 3, 172-179 (1940); Chem. Abstr., **35**, 6959<sup>6</sup> (1941).
- 535 Dohrn, M. and Diedrich, P.: USP 2,116,104 (1938); Chem. Abstr., **32**, 5160<sup>7</sup> (1938).
- 536 Dong, Yunfa and Ding, Yunmei: Zhiwu Ziyuan Yu Huanjing, **1** (2), 1-3 (1992); Chem. Abstr., **118**, 56152y (1993).
- 537 Donnelly, D. M. X.; Molloy, D. J.; Reilly, J. P. and Finet, J.-P.: J. Chem. Soc., Perkin Trans. 1, (20), 2531-2534 (1995).
- 538 Donnelly, J. A. and Doran, H. J.: Tetrahedron, **31** (15), 1791-1794 (1975).
- 539 Donnelly, J. A. and Doran, H. J.: Tetrahedron, **31** (13/14), 1565-1569 (1975).
- 540 Donnelly, J. A. and Murphy, J. J.: J. Chem. Soc. C, 2596-2598 (1970).
- 541 Donnelly, J. A. and Policky, F.: Chem. Ind. (London), 1338 (1965).
- 542 Donnelly, J. A.: Tetrahedron Lett., (19), 1-3 (1959).
- 543 Donnelly, J. A.: Tetrahedron, **29** (17), 2585-2588 (1973).
- 544 Donnelly, J. A.; Acton, J. P.; Donnelly, D. J. and Philbin, E. M.: Proc. R. Ir. Acad., Sect. B, **83B** (1-16), 49-56 (1983); Chem. Abstr., **100**, 103118g (1984).
- 545 Doppler, T.; Hansen, H. J. and Schmid, H.: Helv. Chim. Acta, **55** (5), 1730-1736 (1972).
- 546 Doppler, T.; Schmid, H. and Hansen, H. J.: Helv. Chim. Acta, **62** (1), 271-303 (1979).
- 547 Doppler, T.; Schmid, H. and Hansen, H. J.: Helv. Chim. Acta, **62** (1), 314-325 (1979).

- 548 Dorofeenko, G. N. and Tkachenko, V. V.: *Khim. Geterotsikl. Soedin.*, **2**, 176-180 (1974); *Chem. Abstr.*, **81**, 13347r (1974).
- 549 Dorsch, W.; Müller, A.; Christoffel, V.; Stuppner, H.; Antus, S.; Gottsegen, A. and Wagner, H.: *Phytomedicine*, **1** (1), 47-54 (1994).
- 550 Downey, P. M. and Zerbe, R. O.: US 2,670,382 (1954); *Chem. Abstr.*, **49**, 4020b (1955).
- 551 Drake, N. L.; Ansporn, H. D. and Mozingo, R.: *Org. Synth., Coll. Vol. 3*, 761-762 (1960).
- 552 Du Crocq, H.; Lonsberg, R. J. J. C. and Salemink, C. A.: *Recl. Trav. Chim. Pays-Bas*, **93** (5), 139-142 (1974).
- 553 Du, Z. T. and Li, S. B.: *Chin. Chem. Lett.*, **12** (11), 957-958 (2001).
- 554 Duncanson, L. A.; Grove, J. F.; MacMillan, J. and Mulholland, T. P. C.: *J. Chem. Soc.*, 3555-3564 (1957).
- 555 Dunstan, Wyndham R. and Henry, T. A.: *J. Chem. Soc. Trans.*, **75**, 66-71 (1899).
- 556 Dupre, S.; Grenz, M.; Jakupovic, J.; Bohlmann, F. and Niemeyer, H. M.: *Phytochemistry*, **30** (4), 1211-1220 (1991).
- 557 Dutta, L. N.; Sinha, N. C. and Sarkar, A. K.: *Indian J. Chem., Sect. B*, **30B** (12), 1112-1115 (1991).
- 558 Dzierzgowski, S.: *Zh. Russ. Fiz. Khim. O-va*, **1**, 154-163 (1893).
- 559 Eckstein, Z.; Alster, K. and Domanska, H.: *Przem. Chem.*, **58** (10), 533-536 (1979).
- 560 Edkins, R. P. and Linnell, W. H.: *Q. J. Pharm. Pharmacol.*, **9**, 75-109 (1936).
- 561 Edwards, Jr., J. D., McGuire, S. E. and Higuete, C.: *J. Org. Chem.*, **29**, 3029-3032 (1964).
- 562 Eiden, F. and Patzelt, G.: *Arch. Pharm. (Weinheim, Ger.)*, **318** (4), 328-340 (1985).
- 563 Eiden, F. and Teupe, E. G.: *Arch. Pharm. (Weinheim, Ger.)*, **314** (3), 223-227 (1981).
- 564 Eiden, F.; Patzelt, G. and Buchborn, H.: *Arch. Pharm. (Weinheim, Ger.)*, **322** (10), 589-592 (1989).
- 565 Einhorn, A. and Hollandt, F.: *Justus Liebigs Ann. Chem.*, **301**, 95-117 (1898).
- 566 El Hajji, H.; Dangles, O.; Figueiredo, P. and Brouillard, R.: *Helv. Chim. Acta*, **80** (2), 398-413 (1997).
- 567 El Hajji, H.; Dangles, O.; Statona, A. and Brouillard, R.: *Polyphenols Actual.*, **15**, 7-10 (1996); *Chem. Abstr.*, **126**, 212302v (1997).
- 568 El-Dahmy, Sameeh I.: *Zagazig J. Pharm. Sci.*, **2** (1), 73-80 (1993); *Chem. Abstr.*, **120**, 265829e (1994).
- 569 Ellis, Gwynn P. and Hudson, Henrietta V.: *J. Chem. Res., Synop.*, (12), 372-373 (1985).
- 570 Eneback, C.: *Acta Chem. Scand.*, **11** (5), 895-897 (1957).
- 571 Enomoto, M.; Nagano, H.; Haga, T.; Morita, K. and Sato, M.: *Jpn. Kokai Tokkyo Koho JP 01,52,755* [89 52,755] (1989); *Chem. Abstr.*, **111**, 194588b (1989).
- 572 Enomoto, M.; Nagano, H.; Haga, T.; Morita, K. and Sato, M.: *Jpn. Kokai Tokkyo Koho JP 07,145,112* [95,145,112] (1995); *Chem. Abstr.*, **124**, 29406b (1996).
- 573 Enomoto, M.; Nagano, H.; Haga, T.; Morita, K. and Sato, M.: *Jpn. Kokai Tokkyo Koho JP 63,267,779* [88,267,779] (1988); *Chem. Abstr.*, **110**, 231324q (1989).
- 574 Enomoto, M.; Nagano, H.; Haga, T.; Morita, K. and Sato, M.: *Jpn. Kokai Tokkyo Koho JP 63,275,580* [88,275,580] (1988); *Chem. Abstr.*, **110**, 168104a (1989).
- 575 Escobar, C. A.; Kluge, M. and Sicker, D.: *J. Heterocycl. Chem.*, **34** (5), 1407-1414 (1997).
- 576 Eto, M.: *Organophosphorous pesticides: Organic and biological chemistry*, CRC Press, Ohio (USA), (1974), p. 27.
- 577 Evstigneeva, R. P.; Rzhiznikov, V. M. and Preobrazhenskii, N. A.: *Zh. Obshch. Khim.*, **31**, 1534-1537 (1961).
- 578 Eykman, J. F.; Bergema, F. and Henrard, I. T.: *Chem. Zentralbl.*, **76** (1), 814-817 (1905).
- 579 Eykman, J. F.: *Chem. Weekbl.*, **31**, 453-461 (1904).
- 580 Eykman, J. F.: *Chem. Zentralbl.*, **1**, 1597 (1904).
- 581 Falshaw, C. P.; Lane, S. A. and Ollis, W. D.: *J. Chem. Soc., Chem. Commun.*, (14), 491-492 (1973).
- 582 Faltis, F.; Holzinger, L.; Ita, P. and Schwarz, R.: *Ber. Dtsch. Chem. Ges.*, **74**, 79-97 (1941).
- 583 Fan, P.; Guo, Z. and Zhang, J.: *Tianran Chanwu Yanjiu Yu Kaifa*, **8** (2), 40-45 (1996); *Chem. Abstr.*, **126**, 57468h (1997).
- 584 Fang, N.; Leidig, M.; Mabry, T. J. and Muneazu, I.: *Phytochemistry*, **24** (12), 3029-3034 (1985).
- 585 Fargher, R. G. and Perkin, Jr., W. H.: *J. Chem. Soc.*, **119**, 1724-1744 (1921).

- 586 Farina, F. and Valderrama, J.: *An. Quim.*, **70** (3), 258-261 (1974).  
587 Farina, F. and Valderrama, J.: *Synthesis*, (6), 315-316 (1971).  
588 Farkas, L. and Strelisky, J.: *Tetrahedron Lett.*, (2), 187-190 (1970).  
589 Farkas, L. and Wolfner, A.: *Acta Chim. Acad. Sci. Hung.*, **88** (2), 173-177 (1976).  
590 Farkas, L.; Gottsegen, A.; Nogradi, M. and Antus, S.: *J. Chem. Soc., Perkin Trans. 1*, (2), 305-312 (1974).  
591 Farkas, L.; Nogradi, M. and Zubovics, Z.: *Acta Chim. Acad. Sci. Hung.*, **52** (3), 301-304 (1967).  
592 Farkas, L.; Nogradi, M.; Sudarsanam, V. and Herz, W.: *J. Org. Chem.*, **31**, 3228-3232 (1966).  
593 Farkas, L.; Nogradi, M.; Sudarsanam, V. and Herz, W.: *Tetrahedron*, **23** (9), 3557-3561 (1967).  
594 Feuerstein, W. and Kostanecki, S. v.: *Ber. Dtsch. Chem. Ges.*, **31**, 710-719 (1898).  
595 Fieser, L. F. and Bradsher, C. K.: *J. Am. Chem. Soc.*, **58**, 1738-1741 (1936).  
596 Finlayson, H. H.: *J. Chem. Soc.*, 2763-2767 (1926).  
597 Finnegan, R. A. and Knutson, D.: *Chem. Ind. (London)*, 1837-1838 (1965).  
598 Finnemore, H.: *J. Chem. Soc., Trans.* **93**, 1513-1519 (1908).  
599 Finnemore, H.: *J. Chem. Soc., Trans.* **93**, 1520-1524 (1908).  
600 Firouzabadi, N.; Iranpoor, N. and Zolfigol, M. A.: *Synth. Commun.*, **27** (19), 3301-3311 (1997).  
601 Fischer, A.; Greig, C. C. and Roederer, R.: *Can. J. Chem.*, **53** (11), 1570-1578 (1975).  
602 Fischer, A.; Leary, G. J.; Topsom, R. D. and Vaughan, J.: *J. Chem. Soc.*, 686-687 (1967).  
603 Fischer, A.; Leary, G. J.; Topsom, R. D. and Vaughan, J.: *J. Chem. Soc.*, 782-785 (1966).  
604 Fischer, A.; Leary, G. J.; Topsom, R. D. and Vaughan, J.: *J. Chem. Soc.*, 846-851 (1967).  
605 Fischer, E. and Speier, A.: *Ber. Dtsch. Chem. Ges.*, **28**, 3252-3258 (1895).  
606 Fischer, E.: *Ber. Dtsch. Chem. Ges.*, **42**, 1015-1022 (1909).  
607 Fischer, R.; Braeunlich, G.; Mohrs, K. H.; Hanko, R.; Butler-Ransohoff, J. E.; Es-sayed, M.; Sturton, G.; Tudhope, S.; Abram, T. and McDonald-Gilson, W. J.: *Eur. Pat. Appl. EP 623,207* (1994); *Chem. Abstr.*, **122**, 160466x (1995).  
608 Fisons Ltd.: *Neth. Appl.* 74 07,648 (1974); *Chem. Abstr.*, **83**, 9792f (1975).  
609 Fisons Pharmaceuticals Ltd.: *Fr.* 1,559,722 (1969); *Chem. Abstr.*, **72**, 43452c (1970).  
610 Fisons Pharmaceuticals Ltd.: *Neth. Appl.* 6,603,997 (1966); *Chem. Abstr.*, **67**, 100002d (1967).  
611 Fitzmaurice, C. and Lee, T. B.: *Brit.* 1,144,906 (1969); *Chem. Abstr.*, **71**, 91309n (1969).  
612 Fitzmaurice, C.; Cairns, H.; Hazard, R. and King, J.: *Brit.* 1,093,673 (1967); *Chem. Abstr.*, **68**, 114437g (1968).  
613 Flammang, M. and Wermuth, C. G.: *Bull. Soc. Chim. Fr.*, 4927-4928 (1968).  
614 Foguet, R.; Bolos, J.; Sacristan, A. and Ortiz, J. A.: *PCT Int. Appl. WO 95 25,733* (1995); *Chem. Abstr.*, **124**, 117096f (1996).  
615 Föhlisch, B. and Herrscher, O.: *Tetrahedron*, **41** (10), 1979-1983 (1985).  
616 Folke, J. and Guerra, M.: *Chemosphere*, **24** (4), 371-381 (1992); *Chem. Abstr.*, **116**, 241221s (1992).  
617 Folke, J. and Lindgaard-Joergensen, P.: *Toxicol. Environ. Chem.*, **10** (1), 1-24 (1985); *Chem. Abstr.*, **103**, 92411f (1985).  
618 Folke, J.; Sven. Papperstidn., **87** (15), R133-R144 (1984); *Chem. Abstr.*, **102**, 80618v (1985).  
619 Folli, U.; Iarossi, D. and Taddei, F.: *J. Chem. Soc., Perkin Trans. 2*, (6), 848-853 (1973).  
620 Ford, R. E.; Knowles, P.; Lunt, E.; Marshall, S. M.; Penrose, A. J.; Ramsden, C. A.; Summers, A. J. H.; Walker, J. L. and Wright, D. E.: *J. Med. Chem.*, **29** (4), 538-549 (1986).  
621 Ford, R. E.; Knowles, P.; Lunt, E.; Marshall, S. M. and Summers, A. J. H.: *Ger. Offen.* 2,749,518 (1978); *Chem. Abstr.*, **89**, 109509m (1978).  
622 Forsen, S.; Nilsson, M. and Wachtmeister, C. A.: *Acta Chem. Scand.*, **16** (3), 583-590 (1962).  
623 Forsskahl, I.; Popoff, T. and Theander, O.: *Carbohydr. Res.*, **48** (1), 13-21 (1976).  
624 Forstner, H. J. L.; Flagan, R. C. and Seinfeld, J. H.: *Environ. Sci. Technol.*, **31** (5), 1345-1358 (1997); *Chem. Abstr.*, **126**, 215869w (1997).

- 625 Franklin, C. S.; Morris, D. S. and Smith, S. D.: *J. Chem. Soc.*, 1683-1686 (1954).  
626 Freudenberg, K. and Maitland, P.: *Justus Liebigs Ann. Chem.*, **510**, 193-205 (1934).  
627 Freudenberg, K. and Orthner, L.: *Ber. Dtsch. Chem. Ges.*, **55**, 1748-1751 (1922).  
628 Friedl, W.: *US Pat.* 2,898,374 (1959); *Chem. Abstr.*, **54**, 17330f (1960).  
629 Friedlaender, P. and Neudörfer, J.: *Ber. Dtsch. Chem. Ges.*, **30**, 1077-1083 (1897).  
630 Friedlaender, P. and Schnell, L. C.: *Ber. Dtsch. Chem. Ges.*, **30**, 2150-2155 (1897).  
631 Friedlaender, P.: *DRP* 105240 (1898).  
632 Fries, K. and Pfaffendorf, W.: *Ber. Dtsch. Chem. Ges.*, **43**, 212-219 (1910).  
633 Frye, A. H.; Wallis, E. S. and Dougherty, G.: *J. Org. Chem.*, **14**, 397-404 (1949).  
634 Fuji Photo Film Co., Ltd.: *Jpn. Kokai Tokkyo Koho* 81 12,642 (Cl. G03C7/00) (1981); *Chem. Abstr.*, **95**, 106338t (1981).  
635 Fujii, T.; Yoshifuji, S. and Ohba, M.: *Chem. Pharm. Bull.*, **26** (10), 3218-3222 (1978).  
636 Fujimori, S.; Yamazaki, S.; Sugano, M.; Kawamura, M.; Ninomiya, K.; Tobbe, A. and Nitta, I.: *Eur. Pat. Appl. EP* 306,411 (1989); *Chem. Abstr.*, **111**, 194788s (1989).  
637 Fujimoto, Y.; Ukita, T.; Miyagawa, H.; Tsurushima, T.; Irie, H.; Nishimura, K. and Ueno, T.: *Biosci., Biotechnol., Biochem.*, **58** (9), 1627-1631 (1994).  
638 Fujio, M.; Mishima, M.; Tsuno, Y.; Yukawa, Y. and Takai, Y.: *Bull. Chem. Soc. Jpn.*, **48** (7), 2127-2133 (1975).  
639 Fujiu, M.; Suhara, Y. and Ishitsuka, H.: *Eur. Pat. Appl.* 13,960 (1980); *Chem. Abstr.*, **94**, 83777y (1981).  
640 Fukui, K. and Matsumoto, T.: *Bull. Chem. Soc. Jpn.*, **36** (7), 806-809 (1963).  
641 Fukui, K. and Nakayama, M.: *Bull. Chem. Soc. Jpn.*, **37** (3), 300-302 (1964).  
642 Fukui, K.; Nakayama, M. and Horie, T.: *Bull. Chem. Soc. Jpn.*, **42** (8), 2327-2330 (1969).  
643 Fukui, K.; Nakayama, M. and Horie, T.: *Experientia*, **25**, 355-356 (1969).  
644 Fukui, Y. and Kawano, N.: *J. Am. Chem. Soc.*, **81**, 6331 (1959).  
645 Fukushima, S.; Noro, T.; Saiki, Y.; Ueno, A. and Akahori, Y.: *Yakugaku Zasshi*, **88** (9), 1135-1142 (1968); *Chem. Abstr.*, **70**, 35079e (1969).  
646 Furka, A. and Szell, T.: *Acta Univ. Szeged., Acta Phys. Chem.*, **6** (1-4), 116-121 (1960).  
647 Furka, A. and Szell, T.: *Acta Univ. Szeged., Acta Phys. Chem.*, **6** (1-4), 122-125 (1960).  
648 Furka, A. and Szell, T.: *J. Chem. Soc.*, 2312-2321 (1960).  
649 Furlanetto, Richard W. and Kaiser, E. T.: *J. Am. Chem. Soc.*, **95**, 6786-6792 (1973).  
650 Fuson, R. C.; Lewis, P. H. and Du Puis, R. N.: *J. Am. Chem. Soc.*, **54**, 1114-1120 (1932).  
651 Fuson, R. C.; McKeever, C. H.; Rabjohn, N. and Gray, H. W.: *J. Am. Chem. Soc.*, **65**, 1028-1029 (1943).  
652 Gabetta, B. and Giorgi, R.: *Eur. Pat. Appl. EP* 390,496 (1990); *Chem. Abstr.*, **114**, 81404g (1991).  
653 Gabriel, G.; Pickles, R. and Tyman, J. H. P.: *J. Chem. Res., Synop.*, (11), 348-349, 2713-2719 (1989).  
654 Gandelsman, L. Z.; Nazaretian, V. P.; Chomenko, L. A. and Iagoupolskii, L. M.: *Ukr. Khim. Zh. (Russ. Ed.)*, **52** (4), 405-406 (1986); *Chem. Abstr.*, **106**, 175885b (1987).  
655 Gandhi, P. and Tiwari, R. D.: *Curr. Sci.*, **47** (16), 576-577 (1978).  
656 Gandhi, P. and Tiwari, R. D.: *J. Indian Chem. Soc.*, **52** (11), 1111-1112 (1975).  
657 Garcia de Quesada, T.; Rodriguez, B. and Valverde, S.: *Phytochemistry*, **11** (1), 446-449 (1972).  
658 Garcia, H.; Martinez-Utrilla, R. and Miranda, M. A.: *Tetrahedron*, **41** (15), 3131-3134 (1985).  
659 Garcia, H.; Miranda, M. A. and Primo, J.: *J. Chem. Res., Synop.*, (3), 100-101 (1986).  
660 Garcia, H.; Primo, J. and Miranda, M. A.: *Synthesis*, (9), 901-902 (1985).  
661 Gardner, D.; Grove, J. F. and Ismay, D.: *J. Chem. Soc.*, 1817-1819 (1954).  
662 Gardner, P. D.: *J. Am. Chem. Soc.*, **77**, 4674-4675 (1955).  
663 Gardner, P. D.; Horton, W. J. and Pincock, R. E.: *J. Am. Chem. Soc.*, **78**, 2541-2543 (1956).  
664 Gardner, T. S.; Wenis, E. and Lee, J.: *J. Org. Chem.*, **15**, 841-849 (1950).  
665 Gatenbeck, S. and Brunsberg, U.: *Acta Chem. Scand.*, **20** (9), 2334-2338 (1966).  
666 Gattermann, L.; Lockhart, A. E. and Weinlig, C.: *Ber. Dtsch. Chem. Ges.*, **29**, 3034-3037 (1896).



- 667 Gaur, V. B.; Shah, V. H. and Parikh, A. R.: *Indian J. Heterocycl. Chem.*, **1** (3), 141-146 (1991).
- 668 Gaur, V. B.; Shah, V. H. and Parikh, A. R.: *J. Inst. Chem. (India)*, **63** (5), 171-173 (1991).
- 669 Gautier, J. A.; Miocque, M. and Dang Quoc Quan: *C. R. Acad. Sci.*, **258**, 3731-3734 (1964).
- 670 Geissman, T. A. and Mojé, W.: *J. Am. Chem. Soc.*, **73**, 5765-5768 (1951).
- 671 Geissman, T. A.: *J. Am. Chem. Soc.*, **73**, 3514-3515 (1951).
- 672 Georgarakis, E. and Schmid, H.: *Helv. Chim. Acta*, **62** (1), 234-270 (1979).
- 673 Georgarakis, M.; Doppler, T.; Märky, M.; Hansen, H. J. and Schmid, H.: *Helv. Chim. Acta*, **54** (8), 2916-2920 (1971).
- 674 Gerecs, A. and Windholz, M.: *Acta Chim. Acad. Sci. Hung.*, **8**, 295-302 (1955).
- 675 Gerecs, A.; Szell, T. and Windholz, M.: *Acta Chim. Acad. Sci. Hung.*, **3**, 459-467 (1953).
- 676 Gerecs, A.; Windholz, M. and Sipos, Gy.: *Acta Chim. Acad. Sci. Hung.*, **4**, 123-127 (1954).
- 677 Geresh, S.; Levy, O.; Markovits, Y. and Shani, A.: *Tetrahedron*, **31** (22), 2803-2807 (1975).
- 678 Gevorgyan, G. A.; Gabrielyan, S. A.; Apoyan, N. A.; Podol'skaya, L. P.; Sukasyan, R. S.; Sarkisyan, A. S.; Azlivyan, A. S.; Akopyan, A. V. and Mndzhoyan, O. L.: *Khim. Farm. Zh.*, **23** (12), 1478-1480 (1989); *Chem. Abstr.*, **112**, 172258n (1990).
- 679 Gevorgyan, G. A.; Gabrielyan, S. A.; Vlasenko, E. V.; Durgaryan, L. K. and Mndzhoyan, O. L.: *Khim. Farm. Zh.*, **21** (4), 419-425 (1987); *Chem. Abstr.*, **107**, 127109a (1987).
- 680 Ghate, R. V.; Sarlashkar, V. D. and Ingle, T. R.: *J. Indian Chem. Soc.*, **50** (9), 598-599 (1973).
- 681 Gibson, C. S. and Levin, B.: *J. Chem. Soc.*, 2388-2407 (1931).
- 682 Giovannini, E.; Rosales, J. and de Souza, B.: *Helv. Chim. Acta*, **54** (7), 2111-2113 (1971).
- 683 Givens, E. N.; Venuto, P. B. and Alexakos, L. G.: *J. Chem. Eng. Data*, **14** (3), 392-396 (1969).
- 684 Gjertsen, F. B.; Solheim, E. and Scheline, R. R.: *Xenobiotica*, **18** (2), 225-234 (1988).
- 685 Gluchoff-Fiasson, K.; Fenet, B.; Leclerc, J.-C.; Reynaud, J.; Lussignol, M. and Jay, M.: *Chem. Pharm. Bull.*, **49** (6), 768-770 (2001).
- 686 Gnagy, B. H.: *J. Am. Chem. Soc.*, **45**, 805-808 (1923).
- 687 Go, Yakushu; Ro, Gyokuka; Shü, Hotoku and Yana, Gyoten: *Jpn. Kokai Tokkyo Koho JP 06 41,140 [94 41,140]* (1994); *Chem. Abstr.*, **121**, 35332d (1994).
- 688 Goering, H. L. and Jacobson, R. R.: *J. Am. Chem. Soc.*, **80**, 3277-3285 (1958).
- 689 Goni, M. A. and Hedges, J. I.: *Geochim. Cosmochim. Acta*, **56** (11), 4025-4043 (1992); *Chem. Abstr.*, **118**, 258334v (1993).
- 690 Gonzalez, A. G.; Barrera, J. B. and Yanes, H. C.: *Heterocycles*, **34** (7), 1311-1315 (1992).
- 691 Goodyear, G. and Waring, A. J.: *J. Chem. Soc., Perkin Trans. 2*, (1), 103-107 (1990).
- 692 Gören, N. and Tahtasakal, E.: *Phytochemistry*, **36** (5), 1281-1282 (1994).
- 693 Goris, A. and Canal, H.: *C. R. Acad. Sci.*, **200**, 1990-1992 (1935).
- 694 Goswami, A. K.; Borthakur, N.; Rastogi, R. C. and Bhattacharya, P. R.: *Indian J. Chem., Sect. B*, **23B** (9), 904-906 (1984).
- 695 Goswami, A.: *J. Chem. Res., Synop.*, (12), 554-555 (2000).
- 696 Goto, H.; Shimada, Y.; Akechi, Y.; Kohta, K.; Hattori, M. and Terasawa, K.: *Planta Med.*, **62** (5), 436-439 (1996).
- 697 Gotoda, S.; Takahashi, N.; Nakagawa, H.; Murakami, M.; Takechi, T.; Komura, T. and Uchida, T.: *Pestic. Sci.*, **52** (4), 309-320 (1998); *Chem. Abstr.*, **128**, 318299f (1998).
- 698 Gowan, J. E.; MacGiolla Riogh, S. P.; MacMahon, G. J.; O'Cleirigh, S.; Philbin, E. M. and Wheeler, T. S.: *Tetrahedron*, **2** (1/2), 116-121 (1958).
- 699 Green, I. R.; De Koning, C. B. and Hugo, V. I.: *S. Afr. J. Chem.*, **52** (4), 112-119 (1999); *Chem. Abstr.*, **132**, 264994r (2000).
- 700 Green, I. R.; Hugo, V. I.; Oosthuisen, F. J.; van Eeden, N. and Giles, R. G. F.: *S. Afr. J. Chem.*, **48** (1/2), 15-22 (1995); *Chem. Abstr.*, **124**, 260773e (1996).
- 701 Greenspan, P. D.; Fujimoto, R. A.; Marshall, P. J.; Raychandhuri, A.; Lipson, K. E.; Zhou, H.; Doti, R. A.; Coppa, D. E.; Zhu, L.; Pelletier, R.; Uziel-Fusi, S.; Jackson, R. H.; Chin, M. H.; Kotyuk, B. L. and Fitt, J. J.: *J. Med. Chem.*, **42**, 164-172 (1999).
- 702 Gregor, G.: *Monatsh. Chem.*, **15**, 437-445 (1894).
- 703 Gregson, M.; Ollis, W. D.; Redman, B. T.; Sutherland, I. O.; Dietrichs, H. H. and Gottlieb, O. R.: *Phytochemistry*, **17** (8), 1395-1400 (1978).

- 704 Grollier, J. F.: Eur. Pat. Appl. EP 498,707 (1992); Chem. Abstr., **118**, 45445v (1993).  
705 Grosso, P. and Vogl, O.: J. Macromol. Sci., Chem., **A 23** (9), 1041-1056 (1986).  
706 Gruber, W. and Traub, F.: Monatsh. Chem., **77**, 414-430 (1947).  
707 Gu, Shangxiang; Jing, Huanwang; Wu, Jigui and Liang, Yongmin: Synth. Commun., **27** (16), 2793-2797 (1997).  
708 Guillen, M. D. and Ibargoitia, M. L.: J. Agric. Food Chem., **46** (4), 1276-1285 (1998); Chem. Abstr., **128**, 243078x (1998).  
709 Gulacsi, K.; Litkei, G.; Antus, S. and Gunda, T. E.: Tetrahedron, **54** (45), 13867-13876 (1998).  
710 Gulati, K. C. and Venkataraman, K.: J. Chem. Soc., 267-269 (1936).  
711 Gulati, K. C. and Venkataraman, K.: J. Chem. Soc., 2376-2381 (1931).  
712 Gulati, K. C.; Seth, S. R. and Venkataraman, K.: J. Chem. Soc., 1765-1767 (1934).  
713 Gulati, K. C.; Seth, S. R. and Venkataraman, K.: Org. Synth., Coll. Vol. II (9th) 522-523 (1959).  
714 Guo, Libing; Liang, Jin ji and Yang, Qiwen: Zhongguo Zhongyao Zazhi, **21** (8), 484-485 (1996); Chem. Abstr., **126**, 242697v (1997).  
715 Gupta, D. and Singh, J.: Phytochemistry, **28** (3), 947-949 (1989).  
716 Gupta, H. C.; Ayengar, K. N. N. and Rangaswami, S.: Indian J. Chem., **12** (9), 914-915 (1974).  
717 Gurav, V. M. and Ingle, D. B.: Indian J. Chem. Sect. B, **25B** (2), 225-226 (1986).  
718 Gurav, V. M. and Ingle, D. B.: Indian J. Chem. Sect. B, **25B** (8), 868-869 (1986).  
719 Gurav, V. M. and Jagwani, U. K.: Marathwada Univ. J. Sci., Nat. Sci., **14** (7), 5-8 (1975); Chem. Abstr., **89**, 108503t (1978).  
720 Guthrie, R. W.; Heathers, G. P.; Higgins, A. J.; Kachensky, D. F.; Kierstead, R. W.; LeMahieu, R. A.; Mullin, J. G., Jr. and Tilley, J. W.: Eur. Pat. Appl. EP 512,352 (1992); Chem. Abstr., **118**, 147306t (1993).  
721 Gutzke, M. E.; Fox, D. W.; Cieresecko, L. S. and Wender, S. H.: J. Org. Chem., **22**, 1271-1272 (1957).  
722 Guz, N. R. and Stermitz, F. R.: J. Nat. Prod., **63** (8), 1140-1145 (2000).  
723 Guzman-Lopez, E.; Rosas, N. and Walls, F.: Bol. Inst. Quim. Univ. Nac. Auton. Mex., **22**, 125-151 (1970).  
724 Hageman, H. J.: Tetrahedron, **25** (24), 6015-6024 (1969).  
725 Haley, N. F.: J. Org. Chem., **42**, 3929-3933 (1977).  
726 Hall, J. B.; Sprecker, M. A.; Shuster, E. J.; Schmitt, F. L. and Vinals, J. F.: U.S. 4,115,431 (1978); Chem. Abstr., **90**, 71930x (1979).  
727 Hamada, Y.; Ando, S. and Sakata, T.: Jpn. Kokai Tokkyo Koho JP 61 186,342 [86 186,342] (1986); Chem. Abstr., **106**, 32574p (1987).  
728 Hamada, Y.; Koike, H. and Yorifuji, T.: Jpn. Kokai Tokkyo Koho JP 62 45, 549 [87 45,549] (1987); Chem. Abstr., **107**, 115364s (1987).  
729 Hamado, M. and Kurosawa, K.: Bull. Chem. Soc. Jpn., **53** (9), 2630-2633 (1980).  
730 Hamed, A. A.; Salem, M. A. I.; Hataba, A. M. and Attia, I. A.: Egypt. J. Chem., **29** (4), 485-493 (1986) (Pub. **1987**); Chem. Abstr., **111**, 194658z (1989).  
731 Hamed, A. A.; Salem, M. A. I.; Hataba, A. M. and Attia, I. A.: Pol. J. Chem., **59** (10-12), 1161-1166 (1986); Chem. Abstr., **107**, 39251k (1987).  
732 Hanaya, K.; Ozawa, K. and Muramatsu, T.: Nippon Kagaku Kaishi, **11**, 1643-1649 (1986); Chem. Abstr., **107**, 198010x (1987).  
733 Hanifin, J. W. and Cohen, E.: J. Org. Chem., **36** (7), 910-912 (1971).  
734 Hansen, P. E. and Bolvig, S.: Magn. Reson. Chem., **35** (8), 520-528 (1997).  
735 Hansen, P. E.: Magn. Reson. Chem., **24**, 903-910 (1986).  
736 Hansen, P. E.: Magn. Reson. Chem., **31** (1), 23-37 (1993).  
737 Hansen, P. E.; Bolvig, S.; Buvari-Barcza, A. and Lycka, A.: Acta Chem. Scand., **51** (8), 881-888 (1997).  
738 Hansen, P. E.; Christoffersen, M. and Bolvig, S.: Magn. Reson. Chem., **31**, 893-902 (1993).  
739 Hansen, P. E.; Ibsen, S. N.; Kristensen, T. and Bolvig, S.: Magn. Reson. Chem., **32** (7), 399-408 (1994).

- 740 Hapiot, P.; Neta, P.; Pinson, J.; Rolando, C. and Schneider, S.: *New J. Chem.*, **17** (3), 211-224 (1993).
- 741 Harada, H.; Ohsugi, E.; Yonetani, Y. and Shinosaki, T.: *Eur. Pat. Appl. EP 415,566* (1991); *Chem. Abstr.*, **115**, 71398q (1991).
- 742 Hardern, D. N.; Lee, T. B. and Bantick, J. R.: *Eur. Pat. Appl. EP 56,172* (1982); *Chem. Abstr.*, **97**, 215762p (1982).
- 743 Harper, D. B. and Wain, R. L.: *Ann. Appl. Biol.*, **64**, 395-407 (1969).
- 744 Harper, D. B. and Wain, R. L.: *Ann. Appl. Biol.*, **67**, 395-408 (1971).
- 745 Harries, C. and Haarmann, R.: *Ber. Dtsch. Chem. Ges.*, **48**, 32-41 (1915).
- 746 Harris, S. and Pierce, J. S.: *J. Am. Chem. Soc.*, **62**, 2223-2225 (1940).
- 747 Harris, S. E. and Christiansen, W. G.: *J. Am. Pharm. Assoc.*, **23**, 530-536 (1934).
- 748 Harrowven, D. C. and Dainty, R. F.: *Tetrahedron Lett.*, **37** (42), 7659-7660 (1996).
- 749 Hart, M. C. and Woodruff, E. H.: *J. Am. Chem. Soc.*, **58**, 1957-1959 (1936).
- 750 Hartman, W. W. and Roll, L. J.: *Org. Synth., Coll. Vol. 2*, 304-305 (1959).
- 751 Hartmann, C. and Gattermann, L.: *Ber. Dtsch. Chem. Ges.*, **25**, 3531-3534 (1892).
- 752 Hartmann, G. and Nienhaus, F.: *Phytopathol. Z.*, **81**, 97-113 (1974).
- 753 Hashimoto, S. and Wakatsuka, H.: *Jpn. Kokai Tokkyo Koho JP 05, 279,305* [93,279,305] (1993); *Chem. Abstr.*, **120**, 163700p (1994).
- 754 Hashimoto, T.; Kawarada, A. and Tamura, S.: *U.S. 3,971,651* (1976); *Chem. Abstr.*, **85**, 155074f (1976).
- 755 Hassall, C. H. and Todd, A. R.: *J. Chem. Soc.*, 611-613 (1947).
- 756 Hatakeda, K.; Asano, T.; Ito, S. and Saito, N.: *Japan Kokai 76 95,033* (1976); *Chem. Abstr.*, **85**, 192376b (1976).
- 757 Hatakeda, K.; Saito, N.; Ito, S. and Asano, T.: *Bull. Chem. Soc. Jpn.*, **50** (6), 1649-1650 (1977).
- 758 Hatakeda, K.; Saito, N.; Ito, S. and Asano, T.: *Tohoku Kogyo Gijitsu Shikensho Hokoku*, **9**, 1-3 (1978); *Chem. Abstr.*, **89**, 42680q (1978).
- 759 Hattori, S.: *Acta Phytochim.*, **5**, 99-116 (1930).
- 760 Hattori, S.: *Acta Phytochim.*, **5**, 219-237 (1931).
- 761 Hauteville, M. and Chadenson, M.: *Bull. Soc. Chim. Fr.*, 1780 (1973).
- 762 Hauteville, M.; Chadenson, M. and Chopin, J.: *Bull. Soc. Chim. Fr.*, 1781-1784 (1973).
- 763 Hauteville, M.; Chadenson, M. and Chopin, J.: *Bull. Soc. Chim. Fr.*, 1784-1788 (1973).
- 764 Hauteville, M.; Chopin, J.; Geiger, H. and Schuler, L.: *Tetrahedron*, **37** (2), 377-381 (1981).
- 765 Hay, R. W. and Williams, P. P.: *J. Chem. Soc.*, 2270-2272 (1964).
- 766 Healey, M. and Robinson, R.: *J. Chem. Soc.*, 1625-1631 (1934).
- 767 Hecht, J. K.; Flynn, J. J., Jr. and Boer, F. P.: *J. Org. Chem.*, **34** (11), 3645-3648 (1969).
- 768 Heikel, Armas: *Suom. Kemistil. B*, **8B**, 33-34 (1935); *Chem. Abstr.*, **30**, 438<sup>2</sup> (1936).
- 769 Heller, G.: *Ber. Dtsch. Chem. Ges.*, **45**, 418-427 (1912).
- 770 Heller, G.: *Ber. Dtsch. Chem. Ges.*, **45**, 2389-2392 (1912).
- 771 Heller, H. G.; Oliver, S. N.; Whittall, J. and Tomlinson, I.: *Eur. Pat. Appl. EP 246,114* (1987); *Chem. Abstr.*, **108**, 206269b (1988).
- 772 Hendrix, C.; Roets, E.; Bervoets, V.; Thomas, J.; Pijcke, M.; Busson, R.; Janssen, G. and Hoogmartens, J.: *Arch. Pharm. (Weinheim, Ger.)*, **327** (4), 215-219 (1994).
- 773 Henning, R.; Lattrell, R.; Gerhards, H. J. and Leven, M.: *J. Med. Chem.*, **30** (5), 814-819 (1987).
- 774 Hensel, W. and Hoyer, H.: *Z. Phys. Chem. (Munich)*, **36** (5/6), 387-391 (1963).
- 775 Hercouet, A. and Le Corre, M.: *Tetrahedron*, **37** (16), 2867-2873 (1981).
- 776 Hermodson, M. A.; Barker, W. M. and Link, K. P.: *J. Med. Chem.*, **14** (2), 167-169 (1971).
- 777 Herron, D. K.; Goodson, T.; Bollinger, N. G.; Swanson-Bean, D.; Wright, I. G.; Staten, G. S.; Thompson, A. R.; Froelich, L. L. and Jackson, W. T.: *J. Med. Chem.*, **35** (10), 1818-1928 (1992).
- 778 Herz, W.; Govindan, S. V.; Riess-Maurer, I.; Kreil, B.; Wagner, H.; Farkas, L. and Strelisky, J.: *Phytochemistry*, **19** (4), 669-672 (1980).
- 779 Heslop, R. B. and Robinson, P. L.: *J. Chem. Soc.*, 1271-1273 (1954).
- 780 Hey, M. E. and Waters, V. A.: *J. Chem. Soc.*, 2753-2755 (1955).

- 781 Heywang, R. and Kostanecki, S. v.: Ber. Dtsch. Chem. Ges., **35**, 2887-2891 (1902).  
782 Hinkel, L. E. and Treharne, G. J.: J. Chem. Soc., 866-867 (1945).  
783 Hirashima, H. and Sumimoto, M.: Tappi J., **77** (1), 146-154 (1994); Chem. Abstr., **121**, 207804c (1994).  
784 Hirt, U. H.; Schuster, M. F. H.; French, A. N.; Wiest, O. G. and Wirth, T.: Eur. J. Org. Chem., (8), 1569-1579 (2001).  
785 Hiserodt, R. D.; Ho, Chi-Tang and Rosen, R. T.: ACS Symp. Ser. 660 (spices), 80-97 (1997); Chem. Abstr., **126**, 292614m (1997).  
786 Hlubucek, J.; Ritchie, E. and Taylor, W. C.: Chem. Ind. (London), **49**, 1780-1781 (1969).  
787 Hlubucek, J.; Ritchie, E. and Taylor, W. C.: Tetrahedron Lett., (17), 1369-1370 (1969).  
788 Hoan, N. and Buu-Hoi, N. P.: C. R. Acad. Sci., **224**, 1363-1365 (1947).  
789 Hocking, M. B.: J. Chem. Technol. Biotechnol., **30** (11), 626-641 (1980).  
790 Hoesch, K. and Schulze-Tegel, M.: Ber. Dtsch. Chem. Ges., **48**, 1122-1133 (1915).  
791 Holleman, M. A. F.: Bull. Soc. Chim. Fr., **9**, I-XLV (1911).  
792 Hongu, M.; Saito, K. and Tsujihara, K.: Synth. Commun., **29** (16), 2775-2781 (1999).  
793 Hope, P. and Gray, J.: Brit. 1,470,665 (1977); Chem. Abstr., **87**, 134545m (1977).  
794 Hopper, J. W.; Marlow, W.; Whalley, W. B.; Borthwick, A. D. and Bowden, R.: J. Chem. Soc. C, (21), 3580-3590 (1971).  
795 Horie, T.; Kawamura, Y.; Yamamoto, H. and Yamashita, K.: Chem. Pharm. Bull., **43** (12), 2054-2063 (1995).  
796 Horie, T.; Kawamura, Y.; Yamamoto, H.; Kitou, T. and Yamashita, K.: Phytochemistry, **39** (5), 1201-1210 (1995).  
797 Horie, T.; Kitou, T.; Kawamura, Y. and Yamashita, K.: Bull. Chem. Soc. Jpn., **69** (4), 1033-1041 (1996).  
798 Horie, T.; Kobayashi, T.; Kawamura, Y.; Yoshida, I.; Tominaga, H. and Yamashita, K.: Bull. Chem. Soc. Jpn., **68** (7), 2033-2041 (1995).  
799 Horie, T.; Kourai, H. and Fujita, N.: Bull. Chem. Soc. Jpn., **56** (12), 3773-3780 (1983).  
800 Horie, T.; Kourai, H.; Nakayama, M.; Tsukayama, M. and Masumura, M.: Nippon Kagaku Kaishi, (9), 1397-1403 (1980); Chem. Abstr., **94**, 139564w (1981).  
801 Horie, T.; Masumura, M. and Okumura, S.: Nippon Kagaku Zasshi, **83**, 468-472 (1962); Chem. Abstr., **59**, 1576f (1963).  
802 Horie, T.; Masumura, M.; Kase, K.; Fukui, K. and Nakayama, M.: Nippon Kagaku Kaishi, (12), 2400-2406 (1974); Chem. Abstr., **83**, 9697d (1975).  
803 Horie, T.; Shibata, K.; Yamashita, K.; Fujii, K.; Tsukayama, M. and Ohtsuru, Y.: Chem. Pharm. Bull., **46** (2), 222-230 (1998).  
804 Horie, T.; Shibata, K.; Yamashita, K.; Kawamura, Y. and Tsukayama, M.: Chem. Pharm. Bull., **45** (3), 446-451 (1997).  
805 Horie, T.; Tsukayama, M.; Kawamura, Y. and Yamamoto, S.: Chem. Pharm. Bull., **35** (11), 4465-4472 (1987).  
806 Horie, T.; Tsukayama, M.; Kourai, H.; Nakayama, Y. and Nakayama, M.: Chem. Pharm. Bull., **34** (1), 30-35 (1986).  
807 Horie, T.; Tsukayama, M.; Kourai, H.; Yokoyama, C.; Furukawa, M.; Yoshimoto, T.; Yamamoto, S.; Watanabe-Kohno, S. and Okata, K.: J. Med. Chem., **29** (11), 2256-2262 (1986).  
808 Horie, T.; Tsukayama, M.; Masumura, M.; Nakayama, M. and Hayashi, S.: Bull. Chem. Soc. Jpn., **52** (10), 2950-2952 (1979).  
809 Horie, T.; Tsukayama, M.; Masumura, M.; Nakayama, M.; Hayashi, S. and Fukui, K.: Nippon Kagaku Kaishi, (4), 773-779 (1972); Chem. Abstr., **77**, 61744g (1972).  
810 Horii, Z.; Tsuji, J. and Inoi, T.: Yakugaku Zasshi, **77**, 252-255 (1957); Chem. Abstr., **51**, 8671f (1957).  
811 Horri, Z. and Kinouchi, T.: J. Pharm. Soc. Jpn., **58**, 293-295 (1938).  
812 Horton, W. J. and Robertson, D. E.: J. Org. Chem., **25**, 1016-1020 (1960).  
813 Horton, W. J. and Spence, J. T.: J. Am. Chem. Soc., **80**, 2453-2456 (1958).  
814 Horton, W. J. and Stout, M. G.: J. Org. Chem., **26**, 1221-1223 (1961).  
815 Horton, W. J. and Stout, M. G.: J. Org. Chem., **27**, 830-833 (1962).  
816 Hossain, M. A. and Islam, A.: J. Bangladesh Acad. Sci., **18** (2), 111-116 (1994); Chem. Abstr., **122**, 239265q (1995).

- 817 Howells, H. P. and Little, J. G.: *J. Am. Chem. Soc.*, **54**, 2451-2453 (1932).  
818 Howton, D. R.; Mead, J. F. and Clark, W. G.: *J. Am. Chem. Soc.*, **77**, 2896-2897 (1955).  
819 Hsu, K. K. and Chen, F. C.: T'ai-wan K'o Hsueh, **27** (1-2), 23-26 (1973); *Chem. Abstr.*, **80**, 66597h (1974).  
820 Hsu, K. K. and Wu, T. S.: T'ai-wan K'o Hsueh, **27** (1-2), 19-22 (1973); *Chem. Abstr.*, **80**, 47602g (1974).  
821 Hsu, K. K. and Wu, T. S.: T'ai-wan Yao Hsueh Tsa Chih, **25** (1-2), 49-53 (1973); *Chem. Abstr.*, **84**, 105346e (1976).  
822 Huang, C.-S.; Li, X.-Y.; Li, Y. and Li, Y.-L.: *Chin. Chem. Lett.*, **7** (8), 701-702 (1996).  
823 Huang, C.-S.; Li, X.-Y.; Li, Y. and Li, Y.-L.: *Gaodeng Xuexiao Huaxue Xuebao*, **18** (11), 1804-1808 (1997); *Chem. Abstr.*, **128**, 48379u (1998).  
824 Huang, C.; Da, S.; Li, Y. and Li, Y.: *J. Nat. Prod.*, **60** (3), 277-278 (1997).  
825 Huang, C.; Zhang, Z.; Li, S. and Li, Y.: *J. Chem. Res., Synop.*, (2), 148-149 (1999).  
826 Huang, D.-S. and Ting, S.-H.: *J. Chem. Res., Synop.*, (12), 500-501 (1994).  
827 Huang, F. C.; Campbell, H. F. and Learn, K. S. US 5,082,849 (1992); *Chem. Abstr.*, **116**, 235459j (1992).  
828 Huang, F. C.; Campbell, H. F.; Learn, K. S. and Galemme, R. A., Jr.: US 4,977,162 (1990); *Chem. Abstr.*, **115**, 8594k (1991).  
829 Huber, D.: Thèse de l'Université Louis Pasteur, Strasbourg, France (1988).  
830 Huber, H. and Brunner, K.: *Monatsh. Chem.*, **56**, 322-330 (1930).  
831 Hüe, R.; Jubier, A.; Andrieux, J. and Resplandy, A.: *Bull. Soc. Chim. Fr.*, 3617-3624 (1970).  
832 Huls, R. and Hubert, A.: *Bull. Soc. Chim. Belg.*, **65**, 596-602 (1956).  
833 Humbert, D.: personal communication, February 14, (1997).  
834 Humbert, D.; Clemence, F. and Dagnaux, M.: *Ger. Offen.* 2,917,902 (1979); *Chem. Abstr.*, **92**, 128938d (1980).  
835 Humbert, D.; Dagnaux, M.; Cohen, N. C.; Fournex, R. and Clemence, F.: *Eur. J. Med. Chem.-Chim. Ther.*, **18** (1), 67-78 (1983).  
836 Huneck, S. and Santesson, J.: *Z. Naturforsch., B: Anorg. Chem., Org. Chem., Biochem., Biophys., Biol.*, **24B** (6), 750-756 (1969).  
837 Huneck, S.: *Phytochemistry*, **11** (11), 3311-3312 (1972).  
838 Hunsberger, I. M.: *J. Am. Chem. Soc.*, **72**, 5626-5635 (1950).  
839 Hunsberger, I. M.; Lednicer, D.; Gutowsky, H. S.; Don Bunker, L. and Taussig, P.: *J. Am. Chem. Soc.*, **77**, 2466-2475 (1955).  
840 Hutchins, W. A. and Wheeler, T. S.: *J. Chem. Soc.*, 91-94 (1939).  
841 Ichino, K.; Tanaka, H.; Ito, K.; Tanaka, T. and Mizuno, M.: *J. Nat. Prod.*, **51** (5), 906-914 (1983).  
842 Iinuma, M.; Iwashima, K. and Matsuura, S.: *Chem. Pharm. Bull.*, **32** (12), 4935-4941 (1984).  
843 Iinuma, M.; Matsuura, S. and Tanaka, T.: *Chem. Pharm. Bull.*, **32** (4), 1472-1476 (1984).  
844 Iinuma, M.; Tanaka, T. and Matsuura, S.: *Chem. Pharm. Bull.*, **32** (3), 1006-1010 (1984).  
845 Iinuma, M.; Tanaka, T. and Matsuura, S.: *Chem. Pharm. Bull.*, **32** (9), 3354-3360 (1984).  
846 Iinuma, M.; Tanaka, T. and Mizuno, M.: *Chem. Pharm. Bull.*, **33** (9), 4034-4036 (1985).  
847 Iinuma, M.; Tanaka, T.; Iwashima, K. and Matsuura, S.: *Yakugaku Zasshi*, **104** (6), 691-694 (1984); *Chem. Abstr.*, **101**, 230191w (1984).  
848 Iiyama, K. and Wallis, A. F. A.: *J. Wood Chem. Technol.*, **10** (1), 39-58 (1990); *Chem. Abstr.*, **113**, 134398w (1990).  
849 Ilyas, M.; Parveen, M.; Shafinillah and Khan, M. S.: *J. Indian Chem. Soc.*, **73** (11), 632 (1996).  
850 Imai, Sachihiko: *J. Sci. Hiroshima Univ., Ser. A: Phys. Chem.*, **35** (2), 171-182 (1971); *Chem. Abstr.*, **77**, 61705v (1972).  
851 Inoe, H.; Kurokuzuhara, H.; Ikezawa, I. and Uchida, H.: *Jpn. Kokai Tokkyo Koho JP 04 54,118* [92 54,118] (1992); *Chem. Abstr.*, **117**, 40435m (1992).  
852 Inoe, H.; Kurokuzuhara, H.; Ikezawa, I.; Uchida, H.; Kikuchi, M. and Sugano, K.: *Jpn. Kokai Tokkyo Koho JP 04 54,119* [92 54,119] (1993); *Chem. Abstr.*, **117**, 40436n (1992).  
853 Isawa, J.; Okano, K. and Nakamura, Y.: *Agric. Biol. Chem.*, **36**, 1247-1248 (1972).  
854 Isaza, J. H.; Ito, H. and Yoshida, T.: *Phytochemistry*, **58** (2), 321-327 (2001).

- 855 Ishizuka, N. and Matsumura, Ken-ichi: Annual Report of Shionogi Research Laboratories, **51**, 1-22 (2001).
- 856 Ishizuka, N.; Matsumura, Ken-ichi; Sakai, K.; Fujimoto, M.; Mihara, Shin-ichi and Yamamori, T.: J. Med. Chem., **45** (10), 2041-2055 (2002).
- 857 Isoda, Y.; Fujiwara, H. and Hosogami, T.: Jpn. Kokai Tokkyo Koho JP 03 86,884 [91 86,884] (1991); Chem. Abstr., **115**, 183264z (1991).
- 858 Isoma, C.: Gifu Yakka Daigaku Kiyo, **17**, 147-149 (1967); Chem. Abstr., **70**, 37385a (1969).
- 859 Isota, Y.; Murakami, T.; Ohkubo, N. and Yamamoto, J.: Nippon Kagaku Kaishi, **11** (2), 787-795 (2000).
- 860 Israelstam, S. S. and Stephen, H.: J. S. Afr. Chem. Inst., **26**, 41-48 (1943).
- 861 Isukura Sangyo K. K.: Jpn. Kokai Tokkyo Koho JP 58 21,678 [83 21,678] (1983); Chem. Abstr., **98**, 197878v (1983).
- 862 Itazaki, H.; Hayashi, K.; Matsuura, M.; Yonetani, Y. and Nakamura, M.: Chem. Pharm. Bull., **36** (9), 3404-3431 (1988); Chem. Abstr., **110**, 192740a (1989).
- 863 Itoh, Hiroyuki; Konno, Mitoshi; Tokuhiro, Takao; Iguchi, Sadahiko and Hayashi, Masaki: Brit. UK Pat. Appl. 2,026,480 (1980); Chem. Abstr., **93**, 167893a (1980).
- 864 Ivanova, S. Z.; Medvedeva, S. A. and Tyukavkina, N. A.: Khim. Drev., **1**, 103-108 (1978); Chem. Abstr., **88**, 117788w (1978).
- 865 Iyer, Meera R. and Trivedi, G. K.: J. Nat. Prod., **56** (2), 268-271 (1993).
- 866 Jackson, B.; Locksley, H. D.; Scheinmann, F. and Wolstenholme, W. A.: J. Chem. Soc. C, 3791-3804 (1971).
- 867 Jackson, L. B. and Waring, A. J.: J. Chem. Soc., Perkin Trans. 2, (11), 1893-1898 (1990).
- 868 Jadhav, G. V. and Merchant, J. R.: J. Indian Chem. Soc., **28** (5), 265-267 (1951).
- 869 Jadhav, G. V. and Merchant, J. R.: J. Indian Chem. Soc., **29** (7), 403-404 (1951).
- 870 Jadhav, G. V. and Merchant, J. R.: J. Univ. Bombay, Sci., **19** (5), 35-38 (1951); Chem. Abstr., **46**, 8630e (1952).
- 871 Jadhav, G. V. and Merchant, J. R.: Proc. Indian Acad. Sci., Ser. A, **34A** (3), 152-154 (1951).
- 872 Jaen, J. C.; Wise, L. D.; Heffner, T. G.; Pugsley, T. A. and Meltzer, L. T.: J. Med. Chem., **34** (1), 248-256 (1991).
- 873 Jain, A. C. and Arya, P.: Indian J. Chem., Sect. B, **24B** (10), 1015-1022 (1985).
- 874 Jain, A. C. and Seshadri, T. R.: Proc. Indian Acad. Sci., **40A**, 249-259 (1954).
- 875 Jain, A. C. and Seshadri, T. R.: Proc. Indian Acad. Sci., **42A**, 279-284 (1955).
- 876 Jain, A. C. and Zutshi, M. K.: Tetrahedron Lett., (34), 3179-3182 (1971).
- 877 Jain, A. C. and Zutshi, M. K.: Tetrahedron, **28** (22), 5589-5593 (1972).
- 878 Jain, A. C.; Arya, P. and Nayyar, N. K.: Indian J. Chem., Sect. B, **23B** (11), 1030-1035 (1984).
- 879 Jain, A. C.; Gupta, S. M. and Bambah, P.: Indian J. Chem., Sect. B, **24B** (4), 393-397 (1985).
- 880 Jain, A. C.; Jain, S. M. and Seshadri, T. R.: Indian J. Chem., Sect. B, **10B** (6), 581-584 (1972).
- 881 Jain, A. C.; Khazanchi, R. and Kumar, A.: Bull. Chem. Soc. Jpn., **52** (4), 1203-1204 (1979).
- 882 Jain, A. C.; Lal, P. and Seshadri, T. R.: Indian J. Chem., Sect. B, **7**, 1072-1075 (1969).
- 883 Jain, A. C.; Lal, P. and Seshadri, T. R.: Tetrahedron, **25** (2), 283-286 (1969).
- 884 Jain, A. C.; Lal, P. and Seshadri, T. R.: Tetrahedron, **26** (11), 2631-2635 (1970).
- 885 Jain, A. C.; Nayyar, N. K. and Arya, P.: Indian J. Chem., Sect. B, **25B** (3), 259-263 (1986).
- 886 Jain, A. C.; Singh, P. K. and Bhojak, N.: Indian J. Chem., Sect. B: Org. Chem. Incl. Med. Chem., **33B** (4), 372-374 (1994).
- 887 Jain, A. C.; Tyagi, O. D. and Gupta, A.: Indian J. Chem., Sect. B, **25B** (7), 755-758 (1986).
- 888 Jain, R. K.: Ph. D. Thesis, University of Delhi, India (1978).
- 889 Jain, S. C.; Rajwanshi, V. K.; Kumar, R.; Talwar, S. and Bharadvaja, A.: Synth. Commun., **27** (8), 1405-1414 (1997).
- 890 Janot, M.-M.: Exposé des titres et des travaux scientifiques, 1-55 (1956): reference 10571. (Bibliothèque interuniversitaire de pharmacie, 4 avenue de l'Observatoire, 75270 Paris Cedex 06).

- 891 Jatley, U. K.; Shukla, F.; Singh, J.; Sharma, K. N. and Rastogi, S. N.: J. Inst. Chem. (India), **59** (2), 91-94 (1987); Chem. Abstr., **107**, 206135j (1987).
- 892 Jayne, J. E.: J. Am. Chem. Soc., **75**, 1742-1743 (1953).
- 893 Jefferson, A. and Wangchareontrakul, S.: Aust. J. Chem., **38** (4), 605-614 (1985).
- 894 Jemison, R. W.: Aust. J. Chem., **21** (1), 217-220 (1968).
- 895 Jetley, U. K.; Rehman, F.; Rastogi, S. N.; Lal, K. and Singh, J.: J. Inst. Chem. (India), **64**, 215-217 (1992).
- 896 Jha, B. C. and Amin, G. C.: Tetrahedron, **2** (3/4), 241-245 (1958).
- 897 Jha, H. C.; Zilliken, F.; Offermann, W. and Breitmaier, E.: Can. J. Chem., **59** (15), 2266-2282 (1981).
- 898 Jimenez, M. C.; Leal, P.; Miranda, M. A. and Tormos, R.: J. Chem. Soc., Chem. Commun., (19), 2009-2010 (1995).
- 899 John, H. and Beetz, P.: J. Prakt. Chem., **143**, 253-258 (1935).
- 900 John, H. and Beetz, P.: J. Prakt. Chem., **143**, 342-346 (1935).
- 901 John, H. and Beetz, P.: J. Prakt. Chem., **149**, 164-170 (1937).
- 902 John, H.: J. Prakt. Chem., **137**, 351-364 (1933).
- 903 John, H.: J. Prakt. Chem., **137**, 365-376 (1933).
- 904 John, T. K. and Rao, G. S. K.: Indian J. Chem., Sect. B, **14B**, 805-806 (1976).
- 905 Johnson, J. R. and Bush, M. T.: Org. Synth., Coll. Vol. 2, 522-523 (1959).
- 906 Johnson, T. B. and Lane, F. W.: J. Am. Chem. Soc., **43**, 348-360 (1921).
- 907 Johnson, W. S. and Keller, R. T.: Org. Synth., Coll. Vol. 4, 836-838 (1963).
- 908 Jonas, R.: Bericht von Schimmel & Co., April, 147-153 (1909).
- 909 Jonas, R.: Chem. Zentralbl., **I**, 1566 (1909).
- 910 Jones, E. T. and Robertson, A.: J. Chem. Soc., 1689-1693 (1932).
- 911 Jones, G. H.; Mackenzie, J. B. D.; Robertson, A. and Whalley, W. B.: J. Chem. Soc., 562-569 (1949).
- 912 Jones, K. and Storey, J. M. D.: Tetrahedron Lett., **34** (48), 7797-7798 (1993).
- 913 Jones, T. H.; Blum, M. S. and Fales, H. M.: Synth. Commun., **11** (11), 889-894 (1981).
- 914 Joseph-Nathan, P.; Rogel, Maria A. and Rodriguez, V. M.: Rev. Soc. Quim. Mex., **18** (6), 265-268 (1974); Chem. Abstr., **83**, 8639z (1975).
- 915 Joshi, B. S. and Kamat, V. N.: J. Chem. Soc., Perkin Trans. 1, (9), 907-911 (1973).
- 916 Joshi, B. S. and Rane, D. F.: Tetrahedron Lett., (46), 4579-4581 (1967).
- 917 Joshi, G. G. and Shah, N. M.: J. Indian Chem. Soc., **31**(3), 220-222 (1954).
- 918 Joshi, K. C. and Giri, S.: J. Indian Chem. Soc., **39** (3), 185-187 (1962).
- 919 Joshi, K. C. and Jauhar, A. K.: J. Indian Chem. Soc., **39** (7), 463-468 (1962); Chem. Abstr., **58**, 2397h (1963).
- 920 Joshi, K. C.; Jain, R. and Garg, S.: J. Indian Chem. Soc., **62** (5), 388-390 (1985).
- 921 Joshi, R. C. and Thakar, K. A.: Marathwada Univ. J. Sci., **19** (12, Sect. A), 9-13 (1980); Chem. Abstr., **96**, 181189u (1982).
- 922 Joshi, R. S. and Naik, H. B.: J. Inst. Chem. (India), **52**, 184-186 (1980).
- 923 Joshi, S. S. and Singh, H.: J. Am. Chem. Soc., **76**, 4993-4994 (1954).
- 924 Jucker, E. and Vogel, A.: Helv. Chim. Acta, **46**, 727-741 (1963).
- 925 Julia, M. and Baillargé, M.: Bull. Soc. Chim. Fr., 639-642 (1952).
- 926 Julia, M. and Chastrette, F.: Bull. Soc. Chim. Fr., 2255-2261 (1962).
- 927 Jurd, L. and Rolle, L. A.: J. Am. Chem. Soc., **80**, 5527-5531 (1958).
- 928 Jurd, L.: Chem. Ind. (London), 322-323 (1961).
- 929 Kabalka, G. W.; Wang, L. and Pagni, R. M.: Tetrahedron, **57** (38), 8017-8028 (2001).
- 930 Kachroo, P. L.; Singh, C. and Gupta, Rajive: J. Indian Chem. Soc., **58** (12), 1209-1211 (1981).
- 931 Kad, G. L.; Trehan, I. R.; Kam, J.; Nayyar, S.; Arora, A. and Brar, J. S.: Indian J. Chem., Sect. B: Org. Chem. Incl. Med. Chem., **35B** (7), 734-736 (1996).
- 932 Kaiser, C. and Ross, S. T.: Ger. Offen. 2,313,625 (1973); Chem. Abstr., **80**, 14739m (1974).
- 933 Kaiser, C. and Ross, S. T.: U.S. 3,961,076 (1976); Chem. Abstr., **85**, 108409j (1976).
- 934 Kaiser, C. and Ross, S. T.: U.S. 3,966,770 (1976); Chem. Abstr., **85**, 192698h (1976).
- 935 Kaiser, C.; Schwartz, M. S.; Colella, D. F. and Wardell, J. R., Jr., J. Med. Chem., **18** (7), 674-683 (1975).

- 936 Kalennikov, E. A.; Mardykina, L. M.; Paushkin, Ya. M.; Piller, P. Yu. and Ryatsep, A. Ya.: U.S.S.R. 487,063 (1975); Chem. Abstr., **84**, 16967r (1976).
- 937 Kallay, F. and Janzso, G.: Tetrahedron Lett., (16), 1443-1446 (1978).
- 938 Kallay, F.; Janzso, G.; Egyed, I. and Baitz-Gacs, E.: Flavonoids Bioflavonoids, Proc. Hung. Bioflavonoid Symp., 5th, 1977, 235-246. Edited by Farkas, Lorand; Gabor, Miklos; Kallay, F. Elsevier: Amsterdam, Neth.
- 939 Kallay, F.; Janzso, G.; Egyed, I.; Baitz-Gacs, E. and Tamas, J.: Acta Chim. Acad. Sci. Hung., **100** (1-4), 311-317 (1979).
- 940 Kallianos, A. G.; Warfield, A. H. and Simpson, M. I.: U.S. 3,605,760 (1971); Chem. Abstr., **76**, 1949x (1972).
- 941 Kallianos, A. G.; Warfield, A. H. and Simpson, M. I.: U.S. 3,787,501 (1974); Chem. Abstr., **80**, 82410x (1974).
- 942 Kallianos, A. G.; Warfield, A. H. and Simpson, M. I.: U.S. 3,900,521 (1975); Chem. Abstr., **83**, 205942u (1975).
- 943 Kalluraya, B. and Alphonsus, D. S.: Chim. Acta Turc., **21** (3), 241-246 (1993); Chem. Abstr., **121**, 35214s (1994).
- 944 Kamal, A.; Kazi, N. and Qureshi, A. A.: Pak. J. Sci. Ind. Res., **14** (1-2), 56-62 (1971); Chem. Abstr., **75**, 106382 (1971).
- 945 Kamara, B. I.; Brandt, E. V. and Ferreira, D.: Tetrahedron, **55** (3), 861-868 (1999).
- 946 Kampfer, H.; Koenig, A. v.; Ranz, E.; Rintelen, H. v.; Mayer, D. and Sasse, K.: Ger. Offen. 1,925,998 (1970); Chem. Abstr., **75**, 28234b (1971).
- 947 Kaneniwa, N.: J. Pharm. Soc. Jpn., **75** (7), 785-788 (1955).
- 948 Kanitskaya, L. V.; Medvedeva, S. A.; Ivanova, S. Z.; Kushnarev, D. F.; Ri, Bonhi; Babkin, V. A. and Kalabin, G. A.: Khim. Drev., (6), 3-10 (1987); Chem. Abstr., **108**, 77428b (1988).
- 949 Kanzaki Paper Mfg. Co., Ltd. Sanko Kaihatsu Kagaku Kenkyusho, Jpn. Kokai Tokkyo Koho JP 59,176,093 [84,176,093] (1984); Chem. Abstr., **102**, 103695j (1985).
- 950 Karadovidoff, I. and Chevalier, G.: Ger. Offen. 2,323,005 (1974); Chem. Abstr., **80**, 95717c (1974).
- 951 Kariyone, T. and Sawada, T.: Yakugaku Zasshi, **78**, 1020-1022 (1958); Chem. Abstr., **53**, 3203, 3204 (1959).
- 952 Kariyone, T.; Kawano, N. and Miura, H.: Yakugaku Zasshi, **79**, 1182-1184 (1959); Chem. Abstr., **54**, 3405c (1960).
- 953 Kariyone, T.; Takahashi, M.; Ito, T. and Masutani, K.: Yakugaku Zasshi, **79**, 394-395 (1959); Chem. Abstr., **53**, 14096i (1959).
- 954 Karrer, P. and Hoffmann, O.: Helv. Chim. Acta, **23**, 1126-1131 (1940).
- 955 Kasahara, A.: Nippon Kagaku Zasshi, **79**, 335-338 (1958); Chem. Abstr., **54**, 5635i (1960).
- 956 Kasahara, A.: Nippon Kagaku Zasshi, **79**, 339-343 (1958); Chem. Abstr., **54**, 5636e (1960).
- 957 Katusumata, C. and Seguchi, K.: Nihon Yukagakkaiishi, **45** (9), 857-863 (1996); Chem. Abstr., **125**, 328002f (1996).
- 958 Kauffmann, H. and Beisswenger, A.: Ber. Dtsch. Chem. Ges., **38**, 789-793 (1905).
- 959 Kawai, Tomohiko; Shimizu, Tsunekazu and Chiba, Hisae: J. Pharm. Soc. Jpn., **76**, 660-665 (1956).
- 960 Kawakami, H.: Mokuzai Gakkaishi, **21** (11), 629-634 (1975); Chem. Abstr., **84**, 61522c (1976).
- 961 Kawamoto, H.; Nakatsubo, F. and Murakami, K.: J. Wood Chem. Technol., **9**, 35-52 (1989).
- 962 Kawamura, Y.; Takatsuki, H.; Torii, F. and Horie, T.: Bull. Chem. Soc. Jpn., **67** (2), 511-515 (1994).
- 963 Kawanishi, T. and Asai, H.: Jpn. Kokai Tokkyo Koho JP 03, 215, 462 [91,215,462] (1991); Chem. Abstr., **116**, 41077n (1992).
- 964 Kawano, N. and Yamada, M.: Yakugaku Zasshi, **80**, 1576-1578 (1960); Chem. Abstr., **55**, 10425a (1961).
- 965 Kawano, N.: Chem. Ind. (London), 368-369 (1959).
- 966 Kawano, N.: Chem. Pharm. Bull., **9**, 358-359 (1961).



- 967 Kawase, Y.; Royer, R.; Hubert-Habart, M.; Cheutin, A.; René, L.; Buisson, J. P. and Desvoye, M. L.: *Bull. Soc. Chim. Fr.*, 3131-3140 (1964).
- 968 Kees, K. L.; Musser, J. H.; Chang, J.; Skowronek, M. and Lewis, A. J.: *J. Med. Chem.*, **29** (11), 2329-2334 (1986).
- 969 Kelly, S. M.: *Helv. Chim. Acta*, **72**, 594-607 (1989).
- 970 Kenner, J. and Statham, F. S.: *J. Chem. Soc.*, 299-303 (1935).
- 971 Khan, H. and Zaman, A.: *Tetrahedron*, **30** (16), 2811-2815 (1974).
- 972 Khanna, R. N. and Seshadri, T. R.: *Indian J. Chem.*, **1** (9), 385-387 (1963).
- 973 Khanna, R. N.: Ph. D. Thesis, Delhi University, India (1962).
- 974 Khanna, R. N.; Singh, K. P. and Sharma, J.: *Org. Prep. Proced. Int.*, **24** (6), 687-690 (1992).
- 975 Killelea, J. R. and Lindwall, H. G.: *J. Am. Chem. Soc.*, **70**, 428 (1948).
- 976 Kim, Jae Nyoun and Ryu, Eung K.: *Synth. Commun.*, **26** (1), 67-74 (1996).
- 977 Kim, Soon Shin; Lee, Chung Kyu; Kang, Sam Sik; Jung, Hyun Ah and Choi, Jae Sue: *Arch. Pharmacol. Res.*, **20** (2), 148-154 (1997); *Chem. Abstr.*, **127**, 60573q (1997).
- 978 Kim, Young-Hoi; Kim, Sam-Kon; Kim, Kun-Soo and Lee, Yun-Hwan: *Han'guk Nonghwa Hakhoechi*, **44** (4), 262-268 (2001); *Chem. Abstr.*, **137**, 124699b (2002).
- 979 Kindler, K. and Oelschlager, H.: *Chem. Ber.*, **87**, 194-202 (1954).
- 980 Kindler, K.; Oelschlager, H. and Henrich, P.: *Arch. Pharm. (Weinheim, Ger.)*, **287**, 210-223 (1954).
- 981 Kinoshita, Y.; Ajisawa, Y.; Ikeguchi, S.; Ujiie, S. and Tsutsumi, N.: *Jpn. Kokai Tokkyo Koho JP 63,201,124* [88,201,124] (1988); *Chem. Abstr.*, **110**, 231436c (1989).
- 982 Kirialov, N. P.: *Zh. Obshch. Khim.*, **16**, 1527-1534 (1946).
- 983 Kita, Y.; Okuno, T.; Egi, M.; Iio, K.; Takeda, Y. and Akai, S.: *Synlett*, (12), 1039-1040 (1994).
- 984 Kitagawa, M. and Tanaka, M.: *Eur. Pat. Appl. EP 248,420* (1987); *Chem. Abstr.*, **108**, 94387e (1988).
- 985 Kitagawa, M.; Yamamoto, K.; Katakura, S.; Kanno, H.; Yamada, K.; Nagahara, T. and Tanaka, M.: *Chem. Pharm. Bull.*, **39** (10), 2681-2690 (1991).
- 986 Kjaer, A. and Kjaer, D.: *Acta Chem. Scand., Ser. B*: **B36** (6), 417-419 (1982).
- 987 Kjaer, A. and Kjaer, D.: *Acta Chem. Scand., Ser. B*: **B39** (1), 65-68 (1985).
- 988 Klages, Ber. Dtsch. Chem. Ges., **36**, 3585-3597 (1903).
- 989 Klamann, D.: *Justus Liebigs Ann. Chem.*, **583**, 63-80 (1953).
- 990 Klarmann, E.; Gates, L. W.; Shternov, V. A. and Cox, P. H. Jr.: *J. Am. Chem. Soc.*, **55**, 4657-4662 (1933).
- 991 Klarmann, E.; Shternov, V. A. and Gates, L. W.: *J. Am. Chem. Soc.*, **55**, 2576-2589 (1933).
- 992 Klingel, J.: *Ber. Dtsch. Chem. Ges.*, **18**, 2687-2706 (1885).
- 993 Klinger, H. and Kolvenbach, W.: *Ber. Dtsch. Chem. Ges.*, **31**, 1214-1216 (1898).
- 994 Klinke, P. and Gibian, H.: *Chem. Ber.*, **94**, 26-38 (1961).
- 995 Kloetzel, M. C.; Dayton, R. P. and Abadir, B. Y.: *J. Org. Chem.*, **20**, 38-49 (1955).
- 996 Kluge, M. and Sicker, D.: *J. Nat. Prod.*, **61** (6), 821-822 (1998); *Chem. Abstr.*, **128**, 321492u (1998).
- 997 Knoelker, H. J. and Bauermeister, M.: *Helv. Chim. Acta*, **76** (7), 2500-2514 (1993).
- 998 Knowles, M. B.: *US 2,763,691* (1956); *Chem. Abstr.*, **51**, 8791e (1957).
- 999 Ko, Seung Hye and Chae, Woo Ki: *Bull. Korean Chem. Soc.*, **19** (5), 513-514 (1998).
- 1000 Kobayashi, O.; Mitamura, S. and Kawada, A.: *Jpn. Kokai Tokkyo Koho JP 06,135,884* [94,135,884] (1994); *Chem. Abstr.*, **121**, 179252a (1994).
- 1001 Kobayashi, S. and Karaishi, C.: *Chem. Pharm. Bull.*, **10** (7), 1137-1141 (1962).
- 1002 Kobayashi, S.; Moriwaki, M. and Hachiya, I.: *Tetrahedron Lett.*, **37** (12), 2053-2056 (1996).
- 1003 Kobayashi, S.; Moriwaki, M. and Hachiya, I.: *Tetrahedron Lett.*, **37** (24), 4183-4186 (1996).
- 1004 Koenigs, W. and Knorr, E.: *Ber. Dtsch. Chem. Ges.*, **34**, 957-981 (1901).
- 1005 Kohli, R. M.: Ph. D. Thesis, University of Delhi, India (1981).
- 1006 Kokubun, T.; Harborne, J. B. and Eagles, J.: *Phytochemistry*, **35** (2), 331-333 (1994).

- 1007 Konda, Y.; Funato, N.; Harigaya, Y.; Li, Xi; Zhang, D. and Onda, M.: *J. Heterocycl. Chem.*, **28** (8), 1949-1951 (1991).
- 1008 Konishi, F.; Esaki, S. and Kamiya, S.: *Agric. Biol. Chem.*, **47** (7), 1419-1429 (1983); *Chem. Abstr.*, **100**, 22916p (1984).
- 1009 Koshinaka, E.; Kurata, S.; Yamagishi, K.; Kubo, S. and Kato, H.: *Yakugaku Zasshi*, **98** (9), 1198-1207 (1978).
- 1010 Kostanecki, S. v. and Lampe, V.: *Ber. Dtsch. Chem. Ges.*, **37**, 773-778 (1904).
- 1011 Kostanecki, S. v. and Ludwig, A.: *Ber. Dtsch. Chem. Ges.*, **31**, 2950-2953 (1898).
- 1012 Kostanecki, S. v. and Tambor, J.: *Ber. Dtsch. Chem. Ges.*, **28**, 2302-2309 (1895).
- 1013 Kostanecki, S. v. and Tambor, J.: *Ber. Dtsch. Chem. Ges.*, **32**, 2260-2269 (1899).
- 1014 Kostanecki, S. v.; Levi, R. and Tambor, J.: *Ber. Dtsch. Chem. Ges.*, **32**, 326-332 (1899).
- 1015 Kostka, K. and Ochocki, J.: *Pol. J. Chem.*, **52**, 1815-1818 (1978).
- 1016 Kotali, A.; Glaveri, U.; Pavlidon, E. and Tsoungas, P. G.: *Synthesis*, (12), 1172-1173 (1990).
- 1017 Kouno, I.; Shigematsu, N.; Iwagami, M. and Kawano, N.: *Phytochemistry*, **24** (3), 620-621 (1985).
- 1018 Kouskov, V. K.; Naoumov, I. A. and Bourtseva, T. A.: *Zh. Obshch. Khim.*, **31** (1), 54-59 (1961).
- 1019 Kraemer, J.: *Arch. Pharm. (Weinheim, Ger.)*, **303** (12), 1013-1024 (1970).
- 1020 Krannichfeldt, H.: *Ber. Dtsch. Chem. Ges.*, **46**, 4016-4025 (1913).
- 1021 Kraus, C. A. and Spiteller, G.: *Z. Naturforsch., C: Biosci.*, **52** (5/6), 308-312 (1997).
- 1022 Kraus, C. and Spiteller, G.: *Phytochemistry*, **44** (1), 59-67 (1997) (Pub. **1996**).
- 1023 Krause, G. H. and Hoyer, H.: *Z. Naturforsch., B: Anorg. Chem., Org. Chem., Biochem., Biophys., Biol.*, **27B** (6), 663-674 (1972).
- 1024 Krausz, F. and Martin, R.: *Bull. Soc. Chim. Fr.*, 2192-2197 (1965).
- 1025 Krausz, F. and Martin, R.: *C. R. Acad. Sci.*, **256**, 5594-5595 (1963).
- 1026 Krausz, F.; Martin, R. and Gavard, J. P.: *Bull. Soc. Chim. Fr.*, 640-645 (1966).
- 1027 Kreilick, R. W.: *J. Am. Chem. Soc.*, **88**, 5284-5288 (1966).
- 1028 Krishnamoorthy, V.; Seshadri, T. R. and Krishnaswamy, N. R.: *Indian J. Chem.*, **10** (3), 258-259 (1972).
- 1029 Kroes, B. H.; Van den Berg, A. J. J.; Quarles van Ufford, H. C.; Van Dijk, H. and Labadie, R. P.: *Planta Med.*, **58** (6), 499-504 (1992); *Chem. Abstr.*, **119**, 479p (1993).
- 1030 Krokhin, A. V.; Chizhov, O. S.; Mikheeva, N. N.; Ershov, V. V. and Volod'kin, A. A.: *Izv. Akad. Nauk SSSR, Ser. Khim.*, **12**, 2686-2693 (1976).
- 1031 Krollpfeiffer, F.; Schultze, H.; Schlumbohm, E. and Sommermeyer, E.: *Ber. Dtsch. Chem. Ges.*, **58**, 1654-1676 (1925).
- 1032 Krysan, D. J.; Gurski, A. and Liebeskind, L. S.: *J. Am. Chem. Soc.*, **114**, 1412-1418 (1992).
- 1033 Krzyzanowska, E.; Olszanowski, A. and Juskowiak, M.: *J. Prakt. Chem.*, **331**, 617-630 (1989).
- 1034 Kubota, T. and Tokoroyama, T.: *Tetrahedron Lett.*, (8), 745-748 (1967).
- 1035 Kuchar, M.; Culikova, K.; Panajotovova, V.; Brunova, B.; Jandera, A. and Kmonicek, V.: *Collect. Czech. Chem. Commun.*, **63** (1), 103-114 (1998).
- 1036 Kudav, N. A.; Trivedi, B. K. and Kulkarni, A. B.: *Indian J. Chem. Sect. B*, **12B**, 1045-1049 (1974).
- 1037 Kuhn, R. and Löw, I.: *Ber. Dtsch. Chem. Ges.*, **77**, 202-210 (1944).
- 1038 Kuhn, R. and Staab, H. A.: *Chem. Ber.*, **87**, 266-272 (1954).
- 1039 Kuliev, A. M.; Guseinov, M. S. and Sardarova, S. A.: *Organ. Soedin. Sery.*, Riga **2**, 13-17 (1980); *Chem. Abstr.*, **95**, 42568h (1981).
- 1040 Kuliev, A. M.; Sardarova, S. A. and Agamalieva, M. M.: *Prisadki Smaz. Maslam*, **7**, 3-5 (1981); *Chem. Abstr.*, **97**, 55410s (1982).
- 1041 Kulkarni, S. U. and Thakar, K. A.: *J. Indian Chem. Soc.*, **52** (9), 849-852 (1975).
- 1042 Kumamoto, S.; Somekawa, K.; Uemura, H. and Shimo, T.: *Kenkyu Hokoku - Asahi Garasu Kogyo Gijutsu Shoreikai*, **41**, 185-196 (1982); *Chem. Abstr.*, **99**, 139892e (1983).
- 1043 Kumar, A.; Zhao, M.; Wilson, W. D. and Boykin, D. W.: *Bioorg. Med. Chem. Lett.*, **4** (24), 2913-2918 (1994); *Chem. Abstr.*, **122**, 71375z (1995).

- 1044 Kumar, V.; Karunaratne, V.; Meegalle, M. R. and Sanath, K.: *Phytochemistry*, **28** (4), 1278-1279 (1989).
- 1045 Kumar, V.; Karunaratne, V.; Sanath, M. R.; Meegalle, K. and MacLeod, J. K.: *Phytochemistry*, **29** (1), 243-245 (1990).
- 1046 Kumazawa, T.; Ohki, K.; Ishida, M.; Sato, S.; Onodera, J. and Matsuba, S.: *Bull. Chem. Soc. Jpn.*, **68** (5), 1379-1384 (1995).
- 1047 Kunczell, F.: *Ber. Dtsch. Chem. Ges.*, **34**, 124-129 (1901).
- 1048 Kunczell, F.: *Ber. Dtsch. Pharm. Ges.*, **23**, 472-490 (1913).
- 1049 Kupfer, R.; Dwyer-Nield, L. D.; Malkinson, A. M. and Thompson, J. A.: *Chem. Res. Toxicol.*, **15** (8), 1106-1112 (2002); *Chem. Abstr.*, **137**, 258747z (2002).
- 1050 Kuroiwa, Katsumasa; Katayama, Katsuhiro; Miura, Shunei and Nagasawa, Takeshi: *Jpn. Kokai Tokkyo Koho JP 02,234,052* [90,234,052] (1990); *Chem. Abstr.*, **114**, 159857d (1991).
- 1051 Kurosawa, E.: *Bull. Chem. Soc. Jpn.*, **34**, 300-304 (1961).
- 1052 Kurosawa, E.: *Nippon Kagaku Zasshi*, **78**, 312 (1957); *Chem. Abstr.*, **54**, 374i (1960).
- 1053 Kurosawa, K.: *Bull. Chem. Soc. Jpn.*, **43** (7), 2176-2181 (1970).
- 1054 Kuser, P.; Inderbitzin, M.; Brauchli, J. and Eugster, C. H.: *Helv. Chim. Acta*, **54** (4), 980-995 (1971).
- 1055 Kutney, J. P. and Hansen, H. W.: *Phytochemistry*, **10** (12), 3298-3302 (1971).
- 1056 Kyogoku, K.; Hatayama, K.; Yokomori, S.; Shio, M. and Komaysu, M.: *Chem. Pharm. Bull.*, **21** (6), 1192-1197 (1973).
- 1057 La Face, D.: *Helv. Chim. Acta*, **33**, 249-250 (1950).
- 1058 Labadie, R. P.: *Planta Med.*, **32A**, 42 (1977).
- 1059 Lacey, R. N.: *Brit.* 951,435 (1964); *Chem. Abstr.*, **60**, 15779b (1964).
- 1060 Lacey, R. N.: *J. Chem. Soc.*, 1625-1633 (1960).
- 1061 Laekan, O. O.; Lasekan, W. O. and Idowu, M. A.: *Food Chem.*, **58** (4), 341-344 (1997) (*Pub.* **1996**); *Chem. Abstr.*, **126**, 211312m (1997).
- 1062 Lamberton, J. A.; Geewananda, Y. A.; Gunawardana, P. and Bick, I. R. C.: *J. Nat. Prod.*, **46** (2), 235-247 (1983).
- 1063 Lang, H. J.; Gerlach, U.; Brendel, J.; Englert, H. C.; Gogelein, H.; Hropot, M.; Bohn, H.; Herling, A.; Busch, A. and Greger, R.: *Eur. Pat. Appl.* EP 807,629 (1997); *Chem. Abstr.*, **128**, 34684c (1998).
- 1064 Lange, R. G.: *J. Org. Chem.*, **27**, 2037-2039 (1962).
- 1065 Larock, R. C. and Yum, E. K.: *Tetrahedron*, **52** (8), 2743-2758 (1996).
- 1066 Lau, C. K.; Bélanger, P. C.; Dufresne, C. and Scheigetz, J.: *J. Org. Chem.*, **52** (9), 1670-1673 (1987).
- 1067 Lau, C. K.; Bélanger, P. C.; Scheigetz, J.; Dufresne, C.; Williams, H. W. R.; Maycock, A. L.; Guindon, Y.; Bach, T.; Dallob, A. L.; Denis, D.; Ford-Hutchinson, A. W.; Gale, P. H.; Hopple, S. L.; Letts, L. G.; Luell, S.; McFarlane, C. S.; MacIntyre, E.; Meurer, R.; Miller, D. K.; Piechuta, H.; Riendeau, D.; Rokach, J. and Rouzer, C.: *J. Med. Chem.*, **32** (6), 1190-1197 (1989).
- 1068 Laumas, K. R.; Neelakantan, S. and Seshadri, T. R.: *Proc. Indian Acad. Sci.*, **46A**, 343-348 (1957).
- 1069 Leclerc, G.; Bizec, J. C.; Bieth, N. and Schwartz, J.: *J. Med. Chem.*, **23** (7), 738-744 (1980).
- 1070 Lee, A. S.-Y. and Cheng, C.-L.: *Tetrahedron*, **53** (42), 14255-14262 (1997).
- 1071 Lee, H. H. and Tan, C. H.: *J. Chem. Soc. C*, 1583-1585 (1967).
- 1072 Lee, H. H. and Tan, C. H.: *J. Chem. Soc.*, 2743-2749 (1965).
- 1073 Lee, H. H. and Tan, C. H.: *J. Chem. Soc.*, 6255-6256 (1964).
- 1074 Lee, K.; Dudley, M. W.; Hess, K. M.; Lynn, D. G.; Joerger, R. D. and Binns, A. N.: *Proc. Natl. Acad. Sci. U.S.A.*, **89** (18), 8666-8670 (1992).
- 1075 Lee, Kang Ro; Hong, Seung Woo; Kwak, Jong Hwan; Pyo, Suhkneung and Jee, Ok Pyo: *Arch. Pharmacol. Res.*, **19** (3), 231-234 (1996); *Chem. Abstr.*, **125**, 81936j (1996).
- 1076 Lee, Sungsook; Morimoto, H. and Williams, P. G.: *J. Labelled Compd. Radiopharm.*, **39** (6), 461-470 (1997); *Chem. Abstr.*, **127**, 121541b (1997).
- 1077 Lee, T. T.; Starratt, A. N. and Jevnikar, J. J.: *Phytochemistry*, **21** (3), 517-523 (1982).

- 1078 Leeson, P. D.; Emmett, J. C.; Underwood, A. H. and Ellis, D.: Eur. Pat. Appl. EP 188,351 (1986); Chem. Abstr., **105**, 209386m (1986).
- 1079 Leger, F. and Hibbert, H.: J. Am. Chem. Soc., **60**, 565-567 (1938).
- 1080 Lehr, M.; Klimt, M. and Elfringhoff, A. S.: Bioorg. Med. Chem. Lett., **11** (19), 2569-2572 (2001).
- 1081 Leental, M. and Fleming, J. C.: J. Photogr. Sci., **36** (5), 158-166 (1988); Chem. Abstr., **110**, 125174f (1989).
- 1082 Lemon, H. W.: J. Am. Chem. Soc., **69**, 2998-3000 (1947).
- 1083 Lenz, G. R. and Woo, Chi-Min: J. Heterocycl. Chem., **18**, 691-693 (1981).
- 1084 Leonte, M.; Beschia, M.; Pascaru, E. and Stoica, M.: Stud. Univ. Babès-Bolyai, Chem., **8** (1), 291-296 (1963).
- 1085 Letcher, R. M.: J. Chem. Res., Synop., (12), 380, 2901-2929 (1989).
- 1086 Leuchs, H. and Sperling, R.: Ber. Dtsch. Chem. Ges., **48**, 135-152 (1915).
- 1087 Levai, A. and Tokes, A. L.: Z. Naturforsch., C: Biosci., **37c** (5-6), 540-541 (1982).
- 1088 Li, Jun; Kadota, S.; Kawato, Y.; Hattori, M.; Xu, Guojun and Namba, T.: Chem. Pharm. Bull., **40** (12), 3133-3137 (1992).
- 1089 Li, Yu Lin and Zhao, Lian Yun: Chin. Chem. Lett., **5** (11), 935-938 (1994); Chem. Abstr., **122**, 105470u (1995).
- 1090 Liang, Xiaotian; Chen, Shufeng; Lu, Yuhua and Ge, Dalun: Yaoxue Xuebao, **20** (1), 33-38 (1985); Chem. Abstr., **104**, 5661s (1986).
- 1091 Liang, Xiaotian; Li, Heshui; Qi, Jianxin and Lu, Yuhua: Yao Hsueh Tung Po, **16** (6), 50-51 (1981); Chem. Abstr., **96**, 19917h (1982).
- 1092 Limaye, D. B. and Gangal, D. D.: Rasayanam, **1**, 64-68 (1936); Chem. Abstr., **31**, 2182<sup>3</sup> (1937).
- 1093 Limaye, D. B. and Munje, R. H.: Rasayanam, **1**, 80-86 (1937); Chem. Abstr., **32**, 2096<sup>1</sup> (1938).
- 1094 Limaye, D. B.: Rasayanam, **1**, 1-14 (1936); Chem. Abstr., **31**, 2206<sup>8</sup> (1937).
- 1095 Limaye, D. B.: Rasayanam, **1**, 246-250 (1943); Chem. Abstr., **38**, 4258<sup>4</sup> (1944).
- 1096 Limaye, S. D. and Limaye, D. B.: Rasayanam, **1**, 109-112 (1937); Chem. Abstr., **32**, 2095<sup>8</sup> (1938).
- 1097 Limaye, S. D. and Limaye, D. B.: Rasayanam, **1**, 201-207 (1941); Chem. Abstr., **36**, 1038<sup>7</sup> (1942).
- 1098 Lin, H. C. and Chern, H. M.: Chung-hua Yao Usueh Tsa Chih, **43** (2), 175-177 (1991); Chem. Abstr., **115**, 99062z (1991).
- 1099 Lin, L. C.; Chou, C. J.; Chen, K. T. and Chen, C. F.: J. Nat. Prod., **56** (6), 926-928 (1993).
- 1100 Lin, W. C.; Chuang, W. C. and Shen, S. J.: J. High Resolut. Chromatogr. **19** (9), 530-533 (1996).
- 1101 Lin, X.; Jia, Z. and Lin, Z.: Gaodeng Xuexiao Huaxue Xuebao, **13** (6), 767-769 (1992); Chem. Abstr., **117**, 86816q (1992).
- 1102 Lin, Y.-L.; Lin, T.-C. and Kuo, Y.-H.: J. Nat. Prod., **60** (4), 368-370 (1997).
- 1103 Lindemann, H. and Pickert, W.: Justus Liebigs Ann. Chem., **456**, 275-283 (1927).
- 1104 Lindemann, H. and Romanoff, S.: J. Prakt. Chem., **122**, 214-231 (1929).
- 1105 Lindemann, H.; Könitzer, H. and Romanoff, S.: Justus Liebigs Ann. Chem., **456**, 284-311 (1927).
- 1106 Lindstedt, G. and Misiorny, A.: Acta Chem. Scand., **6**, 1212-1216 (1952).
- 1107 Link, J. T. and Sorensen, B. K.: Tetrahedron Lett., **41** (48), 9213-9217 (2000).
- 1108 Lipinski, C. A.: Eur. Pat. Appl. EP 230,379 (1987); Chem. Abstr., **108**, 75224h (1988).
- 1109 Lohiya, S. B.: Ph. D. Thesis, Nagpur University, India (1983).
- 1110 Loire, J. C. and Thomson, R. H.: J. Chem. Soc., 485-487 (1961).
- 1111 Looker, J. H.; Edman, J. R. and Dappen, J. I.: J. Heterocycl. Chem., **1**, 141-144 (1964).
- 1112 Looker, J. H.; Edman, J. R. and Kingsbury, C. A.: J. Org. Chem., **49**, 645-649 (1984).
- 1113 Lorimer, S. D. and Perry, N. B.: Planta Med., **60** (4), 386-387 (1994).
- 1114 Lou, F.; Li, X.; Ma, Q.; Meng, Y. and Wu, Q.: Zhongguo Yaoke Daxue Xuebao, **20** (3), 167-169 (1989); Chem. Abstr., **111**, 228982t (1989).
- 1115 Lounasmaa, M.; Widén, C. J. and Huhtikangas, A.: Acta Chem. Scand., Ser. B, **28**, 1200-1208 (1974).

- 1116 Lovie, J. C. and Thomson, R. H.: J. Chem. Soc., 485-487 (1961).  
1117 Löwe, W.; Elz, S.; Reiser, H. and Schott, S.: Arch. Pharm. (Weinheim), **327**, 267-269 (1994).  
1118 Lowry, J. B.: Nature (London), **241** (5384), 61-62 (1973).  
1119 Lu, H.: Huaxue Shiji, **15** (4), 254 (1993); Chem. Abstr., **120**, 133957k (1994).  
1120 Luan, L.-Jun; Zeng, S.; Liu, Z.-q. and Fu, X.-c.: Gaodeng Xuexia Huaxue Xuebao **18** (1), 42-45 (1997); Chem. Abstr., **126**, 194849x (1997).  
1121 Ludwinowsky, S. and Tambor, J.: Ber. Dtsch. Chem. Ges., **39**, 4037-4041 (1906).  
1122 Lunts, L. H. C.; Toon, P. and Collin, D. T.: S. African 67 05,591 (1968); Chem. Abstr., **71**, 91066f (1969).  
1123 Luteyn, J. M.; Spronck, H. J. W. and Saleminck, C. A.: Recl. Trav. Chim. Pays-Bas, **97** (7-8), 187-190 (1978).  
1124 Lutskii, A. E.: Molekulyarhaya Spektroskopiya, Leningrad. Gosudarst. Univ. im. A. A. Zhdanova, Sbornik Statei, 190-197 (1960); Chem. Abstr., **56**, 4257a (1962).  
1125 Lutskii, A. E.; Granzhan, V. A. and Semenko, S. V.: Zh. Strukt. Khim, **10** (1), 56-59 (1969); Chem. Abstr., **70**, 101309h (1969).  
1126 Ma, J.; Ji, Y. and Chen, H.: Huaxue Shiji, **13** (3), 191; 152 (1991); Chem. Abstr., **115**, 231796y (1991).  
1127 Machin, P. J.; Hurst, D. N.; Bradshaw, R. M.; Blaber, L. C.; Burden, D. T.; Fryer, A. D.; Melarange, R. A. and Shivdasani, C.: J. Med. Chem., **26** (11), 1570-1576 (1983).  
1128 Maciejewicz, W.; Daniewski, M.; Dzido, T. H. and Bal, K.: Chem. Anal. (Warsaw), **47** (1), 21-30 (2002); Chem. Abstr., **137**, 30134m (2002).  
1129 Mackenzie, J. B. D.; Robertson, A. and Whalley, W. B.: J. Chem. Soc., 2965-2970 (1950).  
1130 Mahal, H. S. and Venkataraman, K.: J. Chem. Soc., 616-617 (1933).  
1131 Mahesh, V. B.; Neelakantan, S. and Seshadri, T. R.: J. Sci. Ind. Res., **15B** (6), 287-292 (1956).  
1132 Mahling, J.-A.; Jung, K.-H. and Schmidt, R. R.: Liebigs Ann. Chem., (3), 461-466 (1995).  
1133 Major, A.; Nogradi, M.; Vermes, B. and Kajtac-Peredy, M.: Liebigs Ann. Chem., **6**, 555-558 (1988).  
1134 Makela, O.; Karjalainen, K. and Potter, M.: Ann. Immunol. (Paris), **130C** (2), 215-223 (1979).  
1135 Malhotra, S.; Sharma, V. K. and Parmar, V. S.: J. Chem. Res., Synop., (6), 179 (1988).  
1136 Malhotra, S.; Sharma, V. K.; Gupta, S. R. and Parmar, V. S.: Indian J. Chem., Sect. B, **26B** (7), 705-706 (1987).  
1137 Malik, M. L. and Grover, S. K.: Indian J. Chem., Sect. B, **14B** (7), 513-515 (1976).  
1138 Malin, G.: Justus Liebigs Ann. Chem., **138**, 76-83 (1866).  
1139 Mallik, U. K. and Mallik, A. K.: Indian J. Chem., Sect. B, **31B** (10), 696-697 (1992).  
1140 Malterud, K. E.; Undheim, J. and Erdal, J. E.: Tetrahedron Lett., **26** (39), 4807-4810 (1985).  
1141 Mamalis, P.; Green, J.; Outred, D. J. and Rix, M.: J. Chem. Soc., 3915-3926 (1962).  
1142 Manaktala, S. K.: Ph. D. Thesis, Delhi University, India (1964).  
1143 Mandal, S. K. and Nag, K.: J. Chem. Soc., Dalton Trans., (11), 2429-2434 (1983).  
1144 Manecke, G. and Bourwiege, G.: Chem. Ber., **95**, 1413-1416 (1962).  
1145 Manecke, G. and Bourwiege, G.: Chem. Ber., **96**, 2013-2015 (1963).  
1146 Mani, R.; Herbert, L. and Manise, D.: J. Tenn. Acad. Sci., **66** (1), 1-8 (1991); Chem. Abstr., **114**, 163805c (1991).  
1147 Manki, K.; Tsuyoshi, T. and Michiko, T.: Chem. Pharm. Bull., **15** (3), 263-269 (1967).  
1148 Mankiwala, S. C.; Naik, H. B. and Thakor, V. M.: J. Inst. Chem., Calcutta, **47**, Pt. 4, 132-134 (1975); Chem. Abstr., **84**, 4591a (1976).  
1149 Manley, P. W.: PCT Int. Appl. WO 94 12,493 (1994); Chem. Abstr., **123**, 55695u (1995).  
1150 Manske, R. H. F. and Ledingham, A. E.: Can. J. Res., **22B**, 115-124 (1944).  
1151 Marathe, M. G. and Athavale, J. M.: J. Indian Chem. Soc., **31** (9), 654-656 (1954).  
1152 Marathe, M. G.: J. Sci. Ind. Res., **20B**, 40-41 (1961).  
1153 Marini-Bettolo, G. B. and Paolini, L.: Ital. 435,779 (1948); Chem. Abstr., **44**, 8375d (1950).  
1154 Marini-Bettolo, G. B.; Ballio, A. and Baroni, G.: Gazz. Chim. Ital., **78**, 301-303 (1948).  
1155 Marlow, W.: Chem. Ind. (London), **51**, 1838 (1969).

- 1156 Marshall, W. S.; Goodson, T.; Cullinan, G. J.; Swanson-Bean, D.; Haisch, K. D.; Rinkema, L. E. and Fleisch, J. H.: *J. Med. Chem.*, **30**, 682-689 (1987).
- 1157 Marshall, W. S.; Sigmund, S. K. and Whitesitt, C. A.: U.S. US 4,777,299 (1988); *Chem. Abstr.*, **110**, 57310v (1989).
- 1158 Marshall, W. S.; Whitesitt, C. A.; Goodson, T.; Roman, C.; Rinkema, L. and Fleisch, J. H.: *Agents Actions*, **21** (3-4), 275-277 (1987); *Chem. Abstr.*, **107**, 211455t (1987).
- 1159 Martin, G. v. and Jagi: *Arch. Pharm. Ber. Dtsch. Pharm. Ges.*, **213**, 334-338 (1878).
- 1160 Martin, R. and Betoux, J. M.: *Chim. Anal. (Paris)*, **50** (2), 65-76 (1968).
- 1161 Martin, R. and Betoux, J. M.: *Chim. Anal. (Paris)*, **50** (9), 464-482 (1968).
- 1162 Martin, R. and Demerseman, P.: *Monatsh. Chem.*, **121**, 227-236 (1990).
- 1163 Martin, R. and Krausz, F.: *C. R. Acad. Sci.*, **258**, 5614-5615 (1964).
- 1164 Martin, R.: *Bull. Soc. Chim. Fr.*, 901-905 (1977).
- 1165 Martin, R.: *Bull. Soc. Chim. Fr.*, 1503-1505 (1968).
- 1166 Martin, R.: *Handbook of Hydroxyacetophenones*, editor Kluwer Academic Publishers, Dordrecht, the Netherlands (1997).
- 1167 Martin, R.: *Thesis Docteur-Ingenieur*, Paris (1964).
- 1168 Martin, R.: Unpublished results.
- 1169 Martin, R.; Gavard, J. P.; Delfly, M.; Demerseman, P. and Tromelin, A.: *Bull. Soc. Chim. Fr.*, 659-662 (1986).
- 1170 Martinez, M. V.; Sanchez, F. A. and Joseph-Nathan, P.: *Phytochemistry*, **26** (9), 2577-2579 (1987).
- 1171 Maruyama, K. and Matano, Y.: *Bull. Chem. Soc. Jpn.*, **62** (12), 3877-3885 (1989).
- 1172 Marwell, E. N.; Richardson, B.; Anderson, R.; Stephenson, J. L. and Crandall, T.: *J. Org. Chem.*, **30**, 1032-1035 (1965).
- 1173 Mase, T.; Hara, H.; Murase, K. and Tomioka, K.: *Jpn. Kokai Tokkyo Koho JP 63,238,074* [88,238,074] (1988); *Chem. Abstr.*, **110**, 114844y (1989).
- 1174 Mase, T.; Murase, K.; Tsuzuki, R.; Tomioka, K. and Hara, H.: *Eur. Pat. Appl. EP 214,732* (1987); *Chem. Abstr.*, **106**, 175944v (1987).
- 1175 Masoud, Mamdouh S.; El-Dessouky, Mohamed A. and Haggag, Sawsan S.: *Spectrosc. Lett.*, **18** (4), 251-266 (1985).
- 1176 Mathur, K. B. L.; Sharma, J. N.; Venkataramanan, K. and Krishnamurty, H. G.: *J. Am. Chem. Soc.*, **79**, 3582-3586 (1957).
- 1177 Matsui, K. and Motoi, M.: *Bull. Chem. Soc. Jpn.*, **46** (2), 565-569 (1973).
- 1178 Matsui, M.; Yamashita, K. and Sugimura, I.: *Japan 69 05, 214* (1969); *Chem. Abstr.*, **71**, 3257r (1969).
- 1179 Matsumoto, J.; Fujimoto, T.; Takino, C.; Saitoh, M.; Hano, Y.; Fukai, T. and Nomura, T.: *Chem. Pharm. Bull.*, **33** (8), 3250-3256 (1985).
- 1180 Matsumoto, Seiichiro; Kobayashi, Hiroshi and Ueno, Keihei: *Bull. Chem. Soc. Jpn.*, **42** (4), 960-968 (1969).
- 1181 Matsumura, H.; Tsuchiya, T. and Imafuku, K.: *Bull. Chem. Soc. Jpn.*, **56** (11), 3519-3520 (1983).
- 1182 Matsumura, H.; Tsuchiya, T.; Takeda, T. and Imafuku, K.: *Bull. Chem. Soc. Jpn.*, **56** (7), 2037-2043 (1983).
- 1183 Matsunaya, Y. and Imafuku, K.: *Bull. Chem. Soc. Jpn.*, **65**, 295-297 (1992).
- 1184 Matsuura, S.: *Pharm. Bull.*, **5**, 195-198 (1957); *Chem. Abstr.*, **52**, 5396c (1958).
- 1185 Matsuura, S.: *Yakugaku Zasshi*, **77**, 298-301 (1957); *Chem. Abstr.*, **51**, 11338a (1957).
- 1186 Matsuura, S.: *Yakugaku Zasshi*, **77**, 302-306 (1957); *Chem. Abstr.*, **51**, 11338d (1957).
- 1187 Matsuura, S.; Kunii, T. and Matsuura, A.: *Chem. Pharm. Bull.*, **21**, 2757-2759 (1973).
- 1188 Matsuura, T. and Kitaura, Y.: *Tetrahedron Lett.*, (34), 3311-3312 (1967).
- 1189 Matsuura, T. and Kitaura, Y.: *Tetrahedron*, **25** (18), 4501-4514 (1969).
- 1190 Matsuura, T.; Nishinaga, A. and Cahnmann, H. J.: *J. Org. Chem.*, **27**, 3620-3628 (1962).
- 1191 Maurer, F. and Grohe, K.: *Ger. Offen DE 3,501,247* (1986); *Chem. Abstr.*, **105**, 225803a (1986).
- 1192 Mauthner, F.: *J. Prakt. Chem.*, **115**, 137-142 (1927).
- 1193 Mauthner, F.: *J. Prakt. Chem.*, **115**, 274-278 (1927).
- 1194 Mauthner, F.: *J. Prakt. Chem.*, **118**, 314-320 (1928).
- 1195 Mauthner, F.: *J. Prakt. Chem.*, **121**, 255-258 (1929).

- 1196 Mauthner, F.: J. Prakt. Chem., **136**, 205-212 (1933).  
1197 Mauthner, F.: J. Prakt. Chem., **136**, 213-216 (1933).  
1198 Mauthner, F.: J. Prakt. Chem., **139**, 290-292 (1934).  
1199 Mauthner, F.: J. Prakt. Chem., **147**, 287-292 (1936/1937).  
1200 Mauthner, F.: J. Prakt. Chem., **149**, 324-327 (1937).  
1201 Mauthner, F.: J. Prakt. Chem., **160**, 33-37 (1942).  
1202 Mauthner, N.: Mat. naturw. Anz. ungar. Akad. Wiss., **50**, 468-476 (1934); Chem. Abstr., **28**, 3392<sup>7</sup> (1934).  
1203 Mauthner, N.: Mat. naturw. Anz. ungar. Akad. Wiss., **50**, 480-482 (1934); Chem. Abstr., **28**, 3392<sup>8</sup> (1934).  
1204 Mazumdar, A. K. D.; Das, S. C.; Rangachari, K.; Saha, G. C. and Banerji, K. D.: J. Indian Chem. Soc., **70** (10), 843-844 (1993).  
1205 Mazumdar, A. K. D.; Karmakar, P. K.; Rahman, M.; Saha, G. C.; Rangachari, K. and Banerji, K. D.: J. Indian Chem. Soc., **69** (4), 207-209 (1992).  
1206 Mazumdar, A. K. D.; Karmakar, P. K.; Rangachari, K.; Banerjee, K. P. and Banerji, K. D.: J. Indian Chem. Soc., **67** (11), 911-913 (1990).  
1207 Mazumdar, A. K. D.; Karmakar, P. K.; Tiwari, S. K.; Banerjee, K. P. and Banerji, K. D.: J. Indian Chem. Soc., **67** (10), 845-847 (1990).  
1208 Mazumdar, A. K. D.; Rahman, M.; Saha, G. C.; Karmakar, P. K. and Banerji, K. D.: J. Indian Chem. Soc., **68** (10), 571-573 (1991).  
1209 Mbawambo, Z. H.; Lee, S. K.; Mshiu, E. N.; Pezzuto, J. M. and Kinghorn, A. D.: J. Nat. Prod., **59** (11), 1051-1055 (1996).  
1210 McCoubrey, A. and Iyengar, N. K.: J. Chem. Soc., 3430-3433 (1951).  
1211 McCoubrey, A.: J. Pharm. Pharmacol., **8**, 648-652 (1956).  
1212 McCredie, R. S.; Ritchie, E. and Taylor, W. C.: Aust. J. Chem., **22** (5), 1011-1032 (1969).  
1213 McCusker, P. E.; Philbin, E. M. and Wheeler, T. S.: J. Chem. Soc., 2374-2381 (1963).  
1214 McGahren, W. J.; Ellestad, G. A.; Morton, G. O. and Kunstmann, M. P.: J. Org. Chem., **37** (10), 1636-1639 (1972).  
1215 McGookin, A.; Robertson, A. and Simpson, T. H.: J. Chem. Soc., 2021-2029 (1951).  
1216 McKittrick, B. A. and Stevenson, R.: J. Chem. Soc., Perkin Trans. 1, (2), 475-482 (1983).  
1217 Mehta, A. M.; Jadhav, G. V. and Shah, R. C.: Proc. Indian Acad. Sci., **29A**, 314-321 (1949).  
1218 Mehta, K. J.; Parekh, K. S. and Parikh, A. R.: J. Inst. Chem. (India), **50** (5), 210-212 (1978).  
1219 Mehta, K. J.; Patel, V. S. and Parikh, A. R.: J. Inst. Chem. (India), **50** (6), 241-242 (1978).  
1220 Meisenheimer, J. and Liang-Han Chou: Justus Liebigs Ann. Chem., **539**, 78-92 (1939).  
1221 Merck and Co., Inc.: Fr. Addn. 95,106 (1970); Chem. Abstr., **78**, 58067d (1973).  
1222 Merck and Co., Inc.: Fr. CAM 0264 (1969); Chem. Abstr., **77**, 5182k (1972).  
1223 Merck, E.; A.-G.: Fr. M 3687 (1965); Chem. Abstr., **68**, 12685u (1968).  
1224 Meshitsuka, G. and Nakano, J.: Mokuzai Gakkaishi, **26** (8), 576-577 (1980); Chem. Abstr., **93**, 206373c (1980).  
1225 Meussdoerffer, J. N. and Niederpruem, H.: Ger. Offen. 2,653,601 (1978); Chem. Abstr., **89**, 129265g (1978).  
1226 Mewshaw, R. E. and Stack, G. P.: U.S. US 5,750,556 (1998); Chem. Abstr., **129**, 12750q (1998).  
1227 Mewshaw, R. E.; Marquis, K. L.; Shi, X.; Mcgaughey, G.; Stack, G. P.; Webb, M. B.; Abou-Gharbia, M.; Wasik, T.; Scerni, R.; Spangler, T.; Brennan, J. A.; Mazandarani, H.; Coupet, J. and Andree, T. H.: Tetrahedron, **54** (25), 7081-7108 (1998).  
1228 Mezey-Vandor, G.; Kajtar-Peredy, M. and Nogradi, M.: Liebigs Ann. Chem., **5**, 447-449 (1987).  
1229 Mezheritskii, V. V. and Dorofeenko, G. N.: Zh. Org. Khim., **5** (3), 515-517 (1969).  
1230 Michael, A. and Palmer, G. M.: Am. Chem. J., **7**, 275-277 (1885).  
1231 Miguel, M. G. and Barroso, J. G.: Phytochemistry, **35** (2), 371-375 (1994).  
1232 Mikami, K.; Kotera, O.; Motoyama, Y.; Sakaguchi, H. and Maruta, M.: Synlett, (2), 171-172 (1996).  
1233 Miles, C. O.; Main, L. and Nicholson, B. K.: Aust. J. Chem., **42** (7), 1103-1113 (1989).  
1234 Miller, J. A.: J. Org. Chem., **52**, 322-323 (1987).

- 1235 Mills, F. D.: *J. Heterocycl. Chem.*, **17** (7), 1597-1600 (1980).  
1236 Minor, J. T. and Vanderwerf, C. A.: *J. Org. Chem.*, **17**, 1425-1430 (1952).  
1237 Miquel, J. F.; Müller, P. and Buu-Hoi, N. P.: *Bull. Soc. Chim. Fr.*, 633-636 (1956).  
1238 Miranda, M. A. and Tormos, R.: *J. Org. Chem.*, **58** (12), 3304-3307 (1993).  
1239 Misato, T.; Ko, K.; Honma, Y.; Konno, K. and Taniyama, E.: *Japan Kokai* 76,110,021 (1976); *Chem. Abstr.*, **86**, 38592h (1977).  
1240 Misra, G. C.; Sharma, S. D. and Joshi, G. C.: *Labdev, Part A*, **6A** (3), 117-120 (1968).  
1241 Miura, H.; Kitamura, Y. and Sugii, M.: *Shoyakugaku Zasshi*, **39** (4), 312-315 (1985); *Chem. Abstr.*, **106**, 5348m (1987).  
1242 Miyazawa, M.; Shimamura, H. and Kameoka, H.: *Nat. Prod. Lett.*, **9** (4), 245-248 (1997).  
1243 Miyoshi, H.; Saitoh, I. and Iwamura, H.: *Biochim. Biophys. Acta*, **1143** (1), 23-28 (1993); *Chem. Abstr.*, **119**, 176027d (1993).  
1244 Miyoshi, M. and Onodera, K.: *Jpn. Kokai Tokkyo Koho JP* 61,248,042 [86,248,042] (1986); *Chem. Abstr.*, **106**, 224414h (1987).  
1245 Miyoshi, S. and Ogawa, K.: *PCT Int. Appl. WO* 97 25,311 (1997); *Chem. Abstr.*, **127**, 161695m (1997).  
1246 Mizuno, M.; Matoba, Y.; Tanaka, T.; Tachibana, H.; Iinuma, M. and Iwamasa, M.: *J. Nat. Prod.*, **50** (4), 751-753 (1987).  
1247 Mizuta, H.; Watanabe, S.; Sakurai, Y.; Nishiyama, K.; Furuta, T.; Kobayashi, Y. and Iwamura, M.: *Bioorg. Med. Chem.*, **10** (3), 675-683 (2002).  
1248 Modi, S. R. and Naik, H. B.: *Orient. J. Chem.*, **10** (1), 85-86 (1994); *Chem. Abstr.*, **122**, 81186c (1995).  
1249 Mody, C. S. and Shah, R. C.: *Proc. Indian Acad. Sci.*, **34A**, 77-87 (1951).  
1250 Moed, H. D.; Van Dijk, J. and Niewind, H.: *Recl. Trav. Chim. Pays-Bas*, **77**, 273-282 (1958).  
1251 Moffett, R. B.: *J. Chem. Eng. Data*, **25** (2), 176-183 (1980).  
1252 Mohamed, Salah E. N.; Thomas, Philip and Whiting, Donald A.: *J. Chem. Soc., Perkin Trans. 1*, **2**, 431-437 (1987).  
1253 Momoda, J.; Imura, S. and Kobayakawa, T.: *U.S. US* 5,693,830 (1997); *Chem. Abstr.*, **128**, 61426b (1998).  
1254 Momoda, J.; Imura, T. and Kobayakawa, T.: *Eur. Pat. Appl. EP* 678,517 (1995); *Chem. Abstr.*, **124**, 145901h (1996).  
1255 Momota, J.; Imura, T. and Kobayakawa, T.: *Jpn. Kokai Tokkyo Koho, JP* 06,199,827 [94,199,827] (1994); *Chem. Abstr.*, **123**, 83206d (1995).  
1256 Momota, J.; Imura, T. and Kobayakawa, T.: *Jpn. Kokai Tokkyo Koho, JP* 07,258,245 [95,258,245] (1995); *Chem. Abstr.*, **124**, 175832d (1996).  
1257 Montanari, P.; Da Re, P. and Valenti, P.: *J. Heterocycl. Chem.*, **25**, 1277 (1988).  
1258 Moore, C. W.: *J. Chem. Soc.*, **95**, 734-751 (1909).  
1259 Morais, A. A.; Braz Fo, R. and Fraiz, S. V., Jr., *Phytochemistry*, **28** (1), 239-242 (1988).  
1260 Morales, G.; Borquez, J. and Loyola, L. A.: *Bol. Soc. Chil. Quim.*, **41** (2), 159-166 (1996); *Chem. Abstr.*, **125**, 110288g (1996).  
1261 Morgenstein, T.; Bittner, M.; Silva, M.; Aqueveque, P. and Jakupovic, J.: *Phytochemistry*, **41** (4), 1149-1153 (1996).  
1262 Morita, N.; Arisawa, M. and Takezaki, T.: *Yakugaku Zasshi*, **87** (8), 1017-1019 (1967); *Chem. Abstr.*, **68**, 19589z (1968).  
1263 Morita, N.; Shimizu, M. and Arisawa, M.: *Yakugaku Zasshi*, **88** (9), 1214-1217 (1968); *Chem. Abstr.*, **70**, 26401b (1969).  
1264 Morris, J.; Wishka, D. G. and Fang, Yue: *J. Org. Chem.*, **57** (24), 6502-6508 (1992).  
1265 Morris, J.; Wishka, D. G.; Lin, A. H.; Humphrey, W. R.; Wiltse, A. L.; Gammill, R. B.; Judge, T. M.; Bisaha, S. N.; Olds, N. L.; Jacob, C. S.; Bergh, C. L.; Cudahy, M. M.; Williams, D. J.; Nishizawa, E. E.; Thomas, E. W.; Gorman, R. R.; Benjamin, C. W. and Shebuski, R. J.: *J. Med. Chem.*, **36** (14), 2026-2032 (1993).  
1266 Morton, R. A. and Stubbs, A. L.: *J. Chem. Soc.*, 1347-1359 (1940).  
1267 Mosettig, E. and Burger, A.: *J. Am. Chem. Soc.*, **52**, 2988-2994 (1930).  
1268 Mottern, H. O.: *J. Am. Chem. Soc.*, **56**, 2107-2108 (1934).  
1269 Moussavi, Z.; Depreux, P.; Lesieur, D.; Cotellet, N.; Sauzieres, J.; Plancke, M. O. and Fruchart, J. C.: *Farmacologia*, **46** (2), 339-355 (1991).



- 1270 Moussavi, Z.; Lesieur, D.; Lespagnol, C.; Sauzies, J. and Olivier, P.: *Eur. J. Med. Chem.*, **24** (1), 55-60 (1989).
- 1271 Mraz, V.: *Sb. Pr. Vyzk. Chem. Využití Uhli, Dehtu Ropy*, **7**, 21-39 (1967); *Chem. Abstr.*, **68**, 95436n (1968).
- 1272 Mukerjee, S. K.; Seshadri, T. R. and Varadarajan, S.: *Proc. Indian Acad. Sci.*, **37A**, 127-144 (1953).
- 1273 Mulchandani, N. B. and Shah, N. M.: *Chem. Ber.*, **93**, 1913-1918 (1960).
- 1274 Mullaji, B. Z. and Shah, R. C.: *Proc. Indian Acad. Sci.*, **34A**, 88-96 (1951).
- 1275 Munavalli, S.: *Chem. Ind. (London)*, **7**, 293-294 (1972).
- 1276 Munavalli, S.; Bhat, G. A. and Viel, C.: *Bull. Soc. Chim. Fr.*, 3311-3318 (1966).
- 1277 Murai, J.: *Sci. Rpts. Saitama Univ.*, **1A**, 129-137 (1954); *Chem. Abstr.*, **50**, 981e (1956).
- 1278 Murata, H.; Ushio, H. and Furutani, A.: *Brit. UK Pat. Appl. GB 2,298,861* (1996); *Chem. Abstr.*, **126**, 46965s (1997).
- 1279 Murphy, M. A.; Kvakovszky, G. and Fritch, J. R.: *PCT Int. Appl. WO 93 15,063* (1993); *Chem. Abstr.*, **121**, 84281v (1994).
- 1280 Murthy, A. K.; Rao, K. S. R. K. and Rao, N. V. S.: *J. Indian Chem. Soc.*, **49** (10), 1025-1028 (1972).
- 1281 Murti, V. V. S.; Seshadri, T. R. and Rao, K. V.: *Proc. Indian Acad. Sci.*, **29A**, 1-8 (1949).
- 1282 Murti, V. V. S.; Seshadri, T. R.; Sundaresan, V. and Venkataramani, B.: *Proc. Indian Acad. Sci.*, **46**, 265-271 (1957).
- 1283 Mutlib, A. E.; Strupczewski, J. T. and Chesson, S. M.: *Drug Metab. Dispos.*, **23** (9), 951-964 (1995); *Chem. Abstr.*, **123**, 305855f (1995).
- 1284 Nadkarni, D. R. and Wheeler, T. S.: *J. Chem. Soc.*, 589-591 (1936).
- 1285 Nagai, W. N.: *Ber. Dtsch. Chem. Ges.*, **24**, 2847-2853 (1891).
- 1286 Naik, A. R. and Jadhav, G. V.: *J. Indian Chem. Soc.*, **25** (4), 171-174 (1948).
- 1287 Naik, G. N.: *J. Sci. Ind. Res.*, **20B**, 339-341 (1961).
- 1288 Naik, R. M. and Sethna S.: *J. Indian Chem. Soc.*, **29** (7), 493-498 (1952).
- 1289 Naik, R. M. and Thakor, V. M.: *Proc. Indian Acad. Sci.*, **37A**, 774-783 (1953).
- 1290 Naik, R. M.: *Ph. D. Thesis, Bombay University, India* (1955).
- 1291 Naik, R. M.; Thakor, V. M. and Shah, R. C.: *Proc. Indian Acad. Sci.*, **37A**, 765-773 (1953).
- 1292 Naik, S. M. and Naik, H. B.: *Orient. J. Chem.*, **41** (1), 167-168 (1998); *Chem. Abstr.*, **129**, 216539n (1998).
- 1293 Naito, H.; Hara, H.; Aono, T.; Sato, K. and Fujita, S.: *Eur. Pat. Appl. EP 76,492* (1983); *Chem. Abstr.*, **99**, 131398c (1983).
- 1294 Nakajima, M. and Takei, S.: *J. Chem. Soc. Jpn.*, **70**, 49-52 (1949).
- 1295 Nakazawa, K. and Isoma, C.: "Yukikagobutsu-goseiho", ed by the Society of Synthetic Organic Chemistry, Japan, Gihodo, Tokyo (1970), Vol. 20, pp. 61-64.
- 1296 Nakazawa, K. and Kusuda, K.: *J. Pharm. Soc. Jpn.*, **75**, 257-260 (1955).
- 1297 Nakazawa, K. and Matsuura, S.: *J. Pharm. Soc. Jpn.*, **73**, 484-486 (1953).
- 1298 Nakazawa, K. and Matsuura, S.: *J. Pharm. Soc. Jpn.*, **74**, 69-72 (1954).
- 1299 Nakazawa, K. and Matsuura, S.: *J. Pharm. Soc. Jpn.*, **75**, 467-469 (1955).
- 1300 Nakazawa, K. and Wada, K.: *Chem. Pharm. Bull.*, **20** (12), 2741-2743 (1972).
- 1301 Nakazawa, K. and Wada, K.: *Chem. Pharm. Bull.*, **22** (6), 1326-1330 (1974).
- 1302 Nakazawa, K.: *Chem. Pharm. Bull.*, **10**, 1032-1038 (1962).
- 1303 Nakazawa, K.: *Chem. Pharm. Bull.*, **16** (12), 2503-2511 (1968).
- 1304 Nakazawa, K.: *J. Pharm. Soc. Jpn.*, **59**, 107-110 (1939).
- 1305 Nakazawa, K.: *J. Pharm. Soc. Jpn.*, **59**, 199-202 (1939).
- 1306 Nakazawa, K.: *J. Pharm. Soc. Jpn.*, **59**, 297-302 (1939).
- 1307 Nakazawa, K.: *J. Pharm. Soc. Jpn.*, **59**, 495-499 (1939).
- 1308 Nakazawa, K.: *J. Pharm. Soc. Jpn.*, **74**, 836-839 (1954).
- 1309 Nakazawa, K.: *Tetrahedron Lett.*, (51), 5223-5225 (1967).
- 1310 Nanba, Ryoichi; Isozaki, Masashi; Endo, Isamu and Yomo, Yoshiyuki: *Jpn. Kokai Tokkyo Koho JP 02,240,037* [90,240,037] (1990); *Chem. Abstr.*, **114**, 121718w (1991).
- 1311 Nath, S.: *Ph. D. Thesis, Kalyani University, India* (1983).
- 1312 Naves, Y. R.: *Helv. Chim. Acta*, **32**, 1351-1353 (1949).
- 1313 Nay, B.; Arnaudinaud, V. and Vercauteren, J.: *C. R. Chimie*, **5**, 577-590 (2002).

- 1314 Nay, B.; Arnaudinaud, V. and Vercauteren, J.: *Eur. J. Org. Chem.*, (12), 2379-2384 (2001).
- 1315 Neish, A. C.: *Can. J. Biochem. Physiol.*, **35**, 161-167 (1957).
- 1316 Neish, A. C.: *Can. J. Bot.*, **36**, 649-662 (1958).
- 1317 Neitzel, E.: *Ber. Dtsch. Chem. Ges.*, **24**, 2863-2868 (1891).
- 1318 Nencki, M. and Schmid, W.: *J. Prakt. Chem.*, **23**, 546-550 (1881).
- 1319 Nencki, M. and Sieber, N.: *J. Prakt. Chem.*, **23**, 147-156 (1881).
- 1320 Nencki, M. and Stoeber, E.: *Ber. Dtsch. Chem. Ges.*, **30**, 1768-1772 (1897).
- 1321 Nencki, M.: *Ber. Dtsch. Chem. Ges.*, **30**, 1766-1768 (1897).
- 1322 Nickl, J.: *Chem. Ber.*, **91**, 553-565 (1958).
- 1323 Nickl, J.: *Dissertat.*, Techn. Hochschule, München, 1955.
- 1324 Nicolaou, K. C.; Pfefferkorn, J. A. and Cao, G.-Q.: *Angew. Chem., Int. Ed.*, **39** (4), 734-739 (2000).
- 1325 Nicolaou, K. C.; Pfefferkorn, J. A.; Roecker, A. J.; Cao, G.-Q.; Barluenga, S. and Mitchell, H. J.: *J. Am. Chem. Soc.*, **122** (41), 9939-9953 (2000).
- 1326 Nicolosi, G.; Piattelli, M. and Sanfilippo, C.: *Tetrahedron*, **49** (15), 3143-3148 (1993).
- 1327 Niemann, W.; Böhmer, V.; Evers, H. and Kämmerer, H.: *Makromol. Chem.*, **158**, 123-134 (1972).
- 1328 Nierenstein, M.: *J. Chem. Soc.*, **111**, 4-11 (1917).
- 1329 Nishina, A.; Kajishima, F.; Matsunaga, M.; Tezuka, H.; Inatomi, H. and Osawa, T.: *Biosci., Biotechnol., Biochem.*, **58** (2), 293-296 (1994); *Chem. Abstr.*, **120**, 215727z (1994).
- 1330 Nishinaga, A.; Ando, H.; Maruyama, K. and Mashino, T.: *Synthesis*, (9), 839-841 (1992).
- 1331 Nishinaga, A.; Iwasaki, H.; Shimizu, T.; Toyoda, Y. and Matsuura, T.: *J. Org. Chem.*, **51**, 2257-2266 (1986).
- 1332 Nishinaga, A.; Shimizu, T. and Matsuura, T.: *Tetrahedron Lett.*, **22** (52), 5293-5296 (1981).
- 1333 Nishinaga, A.; Shimizu, T.; Toyoda, Y.; Matsuura, T. and Hirotsu, K.: *J. Org. Chem.*, **47**, 2278-2285 (1982).
- 1334 Niviere, P.; Tronche, P. and Couquelet, J.: *Bull. Soc. Chim. Fr.*, 3658-3662 (1965).
- 1335 Nohara, A.; Umetani, T. and Sanno, Y.: *Tetrahedron*, **30** (19), 3553-3561 (1974).
- 1336 Nonoyama, N.; Chiba, K.; Hisatome, K.; Suzuki, H. and Shintani, F.: *Tetrahedron Lett.*, **40** (38), 6933-6937 (1999).
- 1337 Norris, R. K. and Sternhell, S.: *Tetrahedron Lett.*, (2), 97-101 (1967).
- 1338 Nougoué-Tchamo, D.; Barron, D. and Mariotte, A. M.: *Nat. Prod. Lett.*, **7** (1), 73-80 (1995); *Chem. Abstr.*, **125**, 195236m (1996).
- 1339 Nowakowska, E.; Daszkiewicz, Z. and Kyzioł, J. B.: *Pol. J. Chem.*, **72**, 1191-1197 (1998).
- 1340 O'Cleirigh, S.: *Ph. D. Thesis (N.U.I.)* (1963).
- 1341 Obara, H.; Onodera, J. and Abe, S.: *Bull. Chem. Soc. Jpn.*, **52** (9), 2596-2599 (1979).
- 1342 Obara, H.; Onodera, J. and Kurihara, Y.: *Bull. Chem. Soc. Jpn.*, **44**, 289 (1971).
- 1343 Obara, H.; Onodera, J.; Kurihara, Y. and Yamamoto, F.: *Bull. Chem. Soc. Jpn.*, **51** (12), 3627-3630 (1978).
- 1344 Obara, H.; Onodera, J.; Tsuchiya, M.; Matsueda, H.; Sato, S. and Matsuba, S.: *Bull. Chem. Soc. Jpn.*, **64** (1), 309-311 (1991).
- 1345 Oelschläger, H.: *Arch. Pharm. (Weinheim, Ger.)*, **288**, 102-113 (1955).
- 1346 Ogata, M.: *Eur. Pat. Appl. EP 66,144* (1982); *Chem. Abstr.*, **98**, 143419c (1983).
- 1347 Ogata, M.; Matsumoto, H.; Takahashi, K.; Shimizu, S.; Kida, S.; Ueda, M.; Kimoto, S. and Haruna, M.: *J. Med. Chem.*, **27** (9), 1142-1149 (1984).
- 1348 Ogata, M.; Tawara, K.; Ueda, M. and Sato, K.: *Eur. Pat. Appl. EP 227,100* (1987); *Chem. Abstr.*, **108**, 6009e (1988).
- 1349 Ogata, Y. and Tabuchi, H.: *Tetrahedron*, **20** (7), 1661-1666 (1964).
- 1350 Ohara, M. and Watanabe, K.: *Angew. Chem., Int. Ed. Engl.*, **14** (12), 820 (1975).
- 1351 Okazaki, K.: *J. Pharm. Soc. Jpn.*, **59**, 190-193 and 547-552 (1939); *Chem. Abstr.*, **34**, 1004<sup>8</sup> (1940).
- 1352 Okogun, J. I.; Enyenihi, V. H. and Ekong, D. E. U.: *Tetrahedron*, **34** (8), 1221-1224 (1978); *Chem. Abstr.*, **89**, 179792x (1978).
- 1353 Okuno, M.; Kameoka, H.; Yamashita, M. and Miyazawa, M.: *Yukagaku*, **42** (1), 44-48 (1993); *Chem. Abstr.*, **118**, 154259h (1993).
- 1354 Oliverio, A. and Bargellini, G.: *Gazz. Chim. Ital.*, **78**, 372-385 (1948).

- 1355 Oliverio, A. and Bargellini, G.: *Gazz. Chim. Ital.*, **78**, 386-396 (1948).  
1356 Oliverio, A. and Casinovi, C.: *Gazz. Chim. Ital.*, **80**, 798-802 (1950).  
1357 Oliverio, A. and Lugli, E.: *Gazz. Chim. Ital.*, **78**, 16-20 (1948).  
1358 Oliverio, A.; Marini-Bettolo, G. B. and Bargellini, G.: *Gazz. Chim. Ital.*, **78**, 363-372 (1948).  
1359 Ollis, W. D.; Arshad, M. and Devlin, J. P.: *J. Chem. Soc. C*, **7**, 1324-1326 (1971).  
1360 Ollis, W. D.; Redman, B. T.; Sutherland, I. O. and Gottlieb, O. R.: *Phytochemistry*, **17** (8), 1379-1381 (1978).  
1361 Omata, A.; Yomogida, K.; Nakamura, S.; Hashimoto, S.; Koba, S.; Furukawa, K. and Noro, S.: *Flavour Fragrance J.*, **5** (1), 19-22 (1990).  
1362 Omer, R. E. and Hamilton, C. S.: *J. Am. Chem. Soc.*, **59**, 642-644 (1937).  
1363 Ono, K. and Imoto, M.: *Bull. Chem. Soc. Jpn.*, **11**, 127-131 (1936).  
1364 Onoda, Takeru and Wada, Keisuke: *Japan Kokai* 76 08,231 (1976); *Chem. Abstr.*, **84**, 164449p (1976).  
1365 Onodera, J.; Machida, Y. and Yada, S.: *Bull. Chem. Soc. Jpn.*, **62** (9), 3034-3035 (1989).  
1366 Onodera, J.; Saito, T. and Obara, H.: *Chem. Lett.*, **11**, 1327-1330 (1979).  
1367 Oohashi, M. and Hori, W.: *Jpn. Kokai Tokkyo Koho JP* 06,100,526 [94,100,526] (1994); *Chem. Abstr.*, **123**, 169347n (1995).  
1368 Orem, W. H.; Lerch, H. E. and Kotra, R. K.: *Geol. Geofiz.*, **34** (10-11), 108-123 (1993); *Chem. Abstr.*, **121**, 209510c (1994).  
1369 Osswald, W. F.; Ziebold, S.; Schütz, W.; Firl, J. and Elstner, E. F.: *Z. Pflanzenkrankh. Pflanzenschutz*, **94** (6), 572-577 (1987).  
1370 Otto, T.: *Ber. Dtsch. Chem. Ges.*, **24**, 2869-2870 (1891).  
1371 Oxford, A. W. and Ellis, F.: *Brit. UK Pat. Appl. GB* 2,058,785 (1981); *Chem. Abstr.*, **96**, 51977p (1982).  
1372 Oxford, A. W. and Ellis, F.: *Eur. Pat. Appl. EP* 28,063 (1981); *Chem. Abstr.*, **96**, 34874k (1982).  
1373 Oxford, A. W.; Mitchell, W. L.; Bradshaw, J.; Clitherow, J. W. and Baxter, I. C.: *Eur. Pat. Appl. EP* 533,266 (1993); *Chem. Abstr.*, **119**, 139268n (1993).  
1374 Pala, G.: *Nature (London)*, **204**, 1190-1191 (1964).  
1375 Panasenka, A. I.; Polyanskaya, N. L. and Starkov, S. P.: *Zh. Obshch. Khim.*, **64** (4), 673-676 (1994).  
1376 Panhekar, D. Y. and Ghiya, B. J.: *Indian J. Heterocycl. Chem.*, **5** (2), 159-160 (1995); *Chem. Abstr.*, **124**, 289328z (1996).  
1377 Parkes, G. D.: *J. Chem. Soc.*, 2143-2146 (1948).  
1378 Parmar, V. S.; Bisht, K. S.; Jain, R.; Singh, S.; Sharma, S. K.; Gupta, S.; Malhotra, S.; Tyagi, O. D.; Vardhan, A.; Pati, H. N.; van den Berghe, D. A. and Vlietinck, A. J.: *Indian J. Chem., Sect. B: Org. Chem. Incl. Med. Chem.*, **35B** (3), 220-232 (1996).  
1379 Parmar, V. S.; Gupta, S.; Sinha, R. and Sharma, S. K.: *Indian J. Chem., Sect. B*, **32B** (2), 244-256 (1993).  
1380 Parmar, V. S.; Jain, R. and Singh, S.: *J. Chem. Res., Synop.*, (9), 278-279 (1987).  
1381 Parmar, V. S.; Khanduri, C. H.; Tyagi, O. D.; Prasad, A. K.; Gupta, Suman; Bisht, K. S.; Pati, H. N. and Sharma, N. K.: *Indian J. Chem., Sect. B*, **31B** (12), 925-929 (1992).  
1382 Parmar, V. S.; Prasad, A. K.; Sharma, N. K.; Bisht, K. S.; Sinha, Rita and Taneja, Poonam: *Pure Appl. Chem.*, **64** (8), 1135-1139 (1992).  
1383 Parmar, V. S.; Prasad, A. K.; Sharma, N. K.; Singh, S. K.; Pati, H. N. and Gupta, S.: *Tetrahedron*, **48** (31), 6495-6498 (1992).  
1384 Parmar, V. S.; Singh, S. and Jain, R.: *Indian J. Chem., Sect. B*, **26B** (2), 166-167 (1987).  
1385 Parmar, V. S.; Singh, S. and Jain, R.: *Indian J. Chem., Sect. B*, **26B** (5), 484-485 (1987).  
1386 Parrish, J. R.: *J. S. Afr. Chem. Inst.*, **23** (3), 129-135 (1970); *Chem. Abstr.*, **74**, 42077p (1971).  
1387 Patel, C. B. and Patel, R. P.: *J. Indian Chem. Soc.*, **52** (4), 312-314 (1975).  
1388 Patel, D. R. and Patel, S. R.: *J. Indian Chem. Soc.*, **45** (8), 703-709 (1968).  
1389 Pathak, V. P. and Khanna, R. N.: *Synthesis*, (11), 882-883 (1981).  
1390 Pathak, V. P.; Saini, T. R. and Khanna, R. N.: *Indian J. Chem., Sect. B*, **23B** (8), 778-779 (1984).

- 1391 Patil, Ghanshyam; Matier, William L. and Mai, Khuong H. X.: Eur. Pat. Appl. EP 273,592 (1990); Chem. Abstr., **113**, 211585j (1990).
- 1392 Patolia, R. J. and Trivedi, K. N.: J. Indian Chem. Soc., **57** (5), 532-535 (1980).
- 1393 Patolia, R. J. and Trivedi, K. N.: J. Indian Chem. Soc., **58** (1), 62-65 (1981).
- 1394 Patonay, T.; Levai, A.; Hegedus, L. and Patonay-Peli, E.: Bull. Soc. Chim. Fr., **134** (7), 653-667 (1997).
- 1395 Patonay, T.; Molnar, D. and Muranyi, Z.: Bull. Soc. Chim. Fr., **132** (2), 233-242 (1995).
- 1396 Patra, A.; Ghosh, G.; Sengupta, P. K. and Nath, S.: Magn. Reson. Chem., **25** (8), 734-736 (1987).
- 1397 Paulsen, A.: Medd. Norsk Farm. Selskap, **22**, 213-217 (1960); Chem. Abstr., **59**, 5557b (1963).
- 1398 Pauly, H. and Lockemann, K.: Ber. Dtsch. Chem. Ges., **48**, 28-32 (1915).
- 1399 Pechmann, H. v. and Duisberg, C.: Ber. Dtsch. Chem. Ges., **16**, 2119-2128 (1883).
- 1400 Pelter, A.; Ward, R. S. and Bass, R. J.: J. Chem. Soc., Perkin Trans. 1, (6), 666-668 (1978).
- 1401 Pelter, A.; Ward, R. S. and Gray, T. I.: J. Chem. Soc., Perkin Trans. 1, (23), 2475-2483 (1976).
- 1402 Penfold, A. R.: J. Proc. R. Soc. N. S. W., **61**, 179-189 (1927).
- 1403 Pepper, J. M. and Hibbert, H.: J. Am. Chem. Soc., **70**, 67-71 (1948).
- 1404 Pera, John D.; Buckman, Stanley J.; Fenyves, Joseph G. E.; Flanagan, Kenneth J. and Pulido, Miguel L.: Fr. Demande 2,174,152 (1973); Chem. Abstr., **80**, 120547g (1974).
- 1405 Perkin, A. G. and Horsfall, L. H.: J. Chem. Soc., **77**, 1314-1324 (1900).
- 1406 Perkin, A. G. and Storey, R. C.: J. Chem. Soc., **243**, 229-244 (1928).
- 1407 Perkin, A. G. and Wilson, C. R.: Chem. Zentralbl., **74**, 89-90 (1903).
- 1408 Perkin, A. G. and Wilson, C. R.: Chem. Zentralbl., **74**, 466 (1903).
- 1409 Perkin, A. G. and Wilson, C. R.: J. Chem. Soc., **83**, 129-144 (1903).
- 1410 Perkin, A. G. and Wilson, C. R.: Proc. Chem. Soc., London, **18**, 215 (1902).
- 1411 Perkin, A. G.: J. Chem. Soc., Trans., **67**, 990-999 (1895).
- 1412 Perkin, W. H. and Weizmann, C.: Chem. Zentralbl., **I**, 406-408 (1907).
- 1413 Perkin, W. H. and Weizmann, C.: J. Chem. Soc., **89**, 1649-1665 (1906).
- 1414 Perkin, W. H.: J. Chem. Soc., 546-549 (1889).
- 1415 Peron, M. G.: J. Pharm. Chim., [7] **3**, 238-241 (1910); Chem. Zentralbl., **I**, 1144 (1911).
- 1416 Persson, M.: Fr. Demande 2,364,920 (1978); Chem. Abstr., **90**, 54977a (1979).
- 1417 Pew, J. C.: J. Am. Chem. Soc., **74**, 2850-2856 (1952).
- 1418 Pfeiffer, P. and Lin, Wang: Angew. Chem., **40**, 983-991 (1927).
- 1419 Pfeiffer, P.: Justus Liebigs Ann. Chem., **383**, 92-155 (1911).
- 1420 Phadke, P. S.; Rao, A. V. R. and Venkataraman, K.: Indian J. Chem., **5** (4), 131-133 (1967).
- 1421 Philion, R. E.: U.S. US 4,695,589 (1987); Chem. Abstr., **109**, 54475w (1988).
- 1422 Pilkington, J. W. and Waring, A. J.: J. Chem. Soc., Perkin Trans. 2, (12), 1349-1359 (1976).
- 1423 Pinto, D. C. G. A.; Silva, A. M. S. and Cavaleiro, J. A. S.: J. Heterocycl. Chem., **37** (6), 1629-1634 (2000).
- 1424 Pirrung, M. C.; Brown, W. L.; Rege, S. and Laughton, P.: J. Am. Chem. Soc., **113** (22), 8561-8562 (1991).
- 1425 Piscopo, E.; Diurno, M. V. and Andreotti, A.: Boll. Soc. Ital. Biol. Sper., **59** (1), 44-50 (1983).
- 1426 Pogosyan, G. M.; Akopyan, L. M. and Matsoyan, S. G.: Zh. Org. Khim., **111**, 1605-1608 (1967).
- 1427 Pohl, L. R.; Haddock, R. Garland, W. A. and Trager, W. F.: J. Med. Chem., **18** (5), 513-519 (1975).
- 1428 Poirier, J.-M. and Votters, C.: Tetrahedron, **45** (5), 1415-1422 (1989).
- 1429 Ponce, M. A. and Gros, E. G.: An. Asoc. Quim. Argent., **79** (5), 197-200 (1991); Chem. Abstr., **117**, 147181c (1992).
- 1430 Pope, F. G.: Proc. Chem. Soc., London, **28**, 331-332 (1912).
- 1431 Popkova, T. N.; Kukhareva, T. S.; Bekker, A. R. and Nifant'ev, E. E.: Zh. Obshch. Khim., **56** (8), 1813-1818 (1986).

- 1432 Popoff, T. and Theander, O.: *Acta Chem. Scand.*, Ser. B, **B30** (5), 397-402 (1976).  
1433 Popoff, T. and Theander, O.: *Carbohydr. Res.*, **22** (1), 135-149 (1972).  
1434 Popoff, T.; Theander, O. and Westerlund, E.: *Acta Chem. Scand.*, Ser. B, **B32** (1), 1-7 (1978).  
1435 Porte, A. L.; Gutowsky, H. S. and Hunsberger, I. M.: *J. Am. Chem. Soc.*, **82**, 5057-5063 (1960).  
1436 Portnykh, N. V.; Volod'kin, A. A. and Ershov, V. V.: *Izv. Akad. Nauk SSSR, Ser. Khim.*, **12**, 2243-2244 (1966).  
1437 Posner, T. v.: *Justus Liebigs Ann. Chem.*, **389**, 1-120 (1912).  
1438 Pouilloux, Y.; Gnep, N. S.; Magnoux, P. and Perot, G.: *J. Mol. Catal.*, **40** (2), 231-233 (1987).  
1439 Pouwels, A. D.; Tom, A.; Eijkel, G. B. and Boon, J. J.: *J. Anal. Appl. Pyrolysis*, **11**, 417-436 (1987); *Chem. Abstr.*, **108**, 183203j (1988).  
1440 Power, M. B.; Bott, S. G.; Bishop, E. J.; Tierce, K. D.; Atwood, J. L. and Barron, A. R.: *J. Chem. Soc., Dalton Trans.*, **2**, 241-247 (1991).  
1441 Prakash, O., Tanwar, M. P.; Goyal, S. and Pahuja, S.: *Tetrahedron Lett.*, **33** (43), 6519-6522 (1992).  
1442 Pratt, D. D. and Robinson, R.: *J. Chem. Soc.*, **123**, 745-758 (1923).  
1443 Prey, V. and Pieh, G.: *Monatsh. Chem.*, **80**, 790-800 (1949).  
1444 Price, D. and Bogert, M. T.: *J. Am. Chem. Soc.*, **56**, 2442-2449 (1934).  
1445 Price, P. and Israelstam, S. S.: *J. Org. Chem.*, **29**, 2800-2802 (1964).  
1446 Priestley, Hill M. and Moness Eugene: *J. Org. Chem.*, **5**, 355-361 (1940).  
1447 Proksch, P. and Gülz, P. G.: *Z. Naturforsch., C: Biosc.*, **35C** (7/8), 529-532 (1980).  
1448 Protiva, M.; Sedivy, Z.; Pomykacek, J.; Bartl, V.; Holubek, J. and Svatek, E.: *Collect. Czech. Chem. Commun.*, **46** (9), 2245-2253 (1981).  
1449 Purushothaman, K. K.; Vasanth, S.; Connolly, J. D. and C. Labbé: *J. Chem. Soc., Perkin Trans. 1*, (23), 2594-2595 (1976).  
1450 Quijano, L.; Calderon, J. J.; Gomez, G. F.; Escobar, E. and Rios, T.: *Phytochemistry*, **24** (5), 1085-1088 (1985).  
1451 Quinn, L. A. and Tang, H. H.: *J. Am. Oil. Chem. Soc.*, **73** (11), 1585-1588 (1996); *Chem. Abstr.*, **126**, 6816n (1997).  
1452 Rabjohn, N. and Rosenberg, D. W.: *J. Org. Chem.*, **24**, 1192-1197 (1959).  
1453 Raghav, S.; Garg, M.; Garg, S. K. and Gupta, S. R.: *Indian J. Chem., Sect. B*, **25B** (4), 409-410 (1986).  
1454 Raghunathan, K.; Rangaswami, S. and Seshadri, T. R.: *Indian J. Chem.*, **12** (11), 1126-1130 (1974).  
1455 Raistrick, H.; Robinson, R. and Todd, A. R.: *J. Chem. Soc.*, 80-88 (1937).  
1456 Rajan, P. S.; Chen, C. L.; Gratzl, J. S. and Hise, R. G.: *Holzforschung*, **48** (Suppl), 117-124 (1994).  
1457 Rajanna, K. C.; Solomon, F.; Ali, Mir Moazzam and Saiprakash, P. K.: *Tetrahedron*, **52** (10), 3669-3682 (1996).  
1458 Raju, Vegesna S.; Subbaraju, Gottumukkala V.; Manhas, Maghar S.; Kaluza, Zbigniew and Bose, Ajay K.: *Tetrahedron*, **48** (39), 8347-8352 (1992).  
1459 Ramachandran, P. K.; Tefteller, A. T.; Paulson, G. O.; Cheng, T.; Lin, C. T. and Horton, W. J.: *J. Org. Chem.*, **28**, 398-403 (1963).  
1460 Ramage, G. R. and Stead, C. V.: *J. Chem. Soc.*, 1393-1395 (1953).  
1461 Ramage, G. R. and Stead, C. V.: *J. Chem. Soc.*, 3602-3606 (1953).  
1462 Ramanamma, C. V.; Dinge, A. S. and Paknikar, S. K.: *Indian J. Chem., Sect. B*, **28B** (6), 517-519 (1989).  
1463 Ramsden, C. A.; Knowles, P.; Lewis, E. J.; Lunt, E. and Wright, D. E.: *Ger. Offen* 2,846,931 (1979); *Chem. Abstr.*, **91**, 74626j (1979).  
1464 Rangaswami, S. and Seshadri, T. R.: *Proc. Indian Acad. Sci.*, **8A**, 214-219 (1938).  
1465 Rani, Indu: *Indian J. Chem., Sect. B*, **26B** (9), 879 (1987).  
1466 Rao, G. S. K.; Rao, K. V. and Seshadri, T. R.: *Proc. Indian Acad. Sci.*, **27A**, 245-247 (1948).  
1467 Rao, G. S. K.; Rao, K. V. and Seshadri, T. R.: *Proc. Indian Acad. Sci.*, **28**, 103-110 (1948).  
1468 Rao, P. S. and Gakhar, K. L.: *Proc. Indian Acad. Sci.*, **30A**, 327-328 (1949).

- 1469 Rao, Y. V. S.; Kulkarni, S. J.; Subrahmanyam, M. and Rao, A. V. R., *Tetrahedron Lett.*, **34** (48), 7799-7800 (1993).
- 1470 Raphael, R. A. and Ravenscroft, P.: *J. Chem. Soc., Perkin Trans. 1*, (7), 1823-1828 (1988).
- 1471 Rapoport, M.; Hancock, C. K. and Meyers, E. A.: *J. Am. Chem. Soc.*, **83**, 3489-3494 (1961).
- 1472 Raposo, C.; Crego, M.; Mussons, M. L.; Caballero, M. C. and Moran, J. R.: *Tetrahedron Lett.*, **35** (20), 3409-3410 (1994).
- 1473 Raposo, C.; Luengo, A.; Almaraz, M.; Martin, M.; Mussons, M. L.; Caballero, M. C. and Moran, J. R.: *Tetrahedron*, **52** (37), 12323-12332 (1996).
- 1474 Rasinski, F.: *J. Prakt. Chem.*, **25**, 53-67 (1882).
- 1475 Raval, A. A. and Shah, N. M.: *J. Org. Chem.*, **21**, 1408-1411 (1956).
- 1476 Reddy, B. P. and Krupadanam, G. L. D.: *J. Heterocycl. Chem.*, **33** (6), 1561-1565 (1996).
- 1477 Rehman, F.; Rastogi, S. N.; Jetley, U. K.; Zaidi, S. Asif and Jhan, I. A.: *Orient. J. Chem.*, **4** (1), 49-52 (1988); *Chem. Abstr.*, **109**, 107570g (1988).
- 1478 Reichel, L. and Steudel, J.: *Justus Liebigs Ann. Chem.*, **553**, 83-97 (1942).
- 1479 Reichel, L. and Weber, F. G.: *Pharmazie*, **30** (3), 195 (1975).
- 1480 Reichel, L.; Proksch, G. and Tobien, G.: *Justus Liebigs Ann. Chem.*, **10**, 1709-1712 (1974).
- 1481 Reichstein, T.: *Helv. Chim. Acta*, **10**, 392-397 (1927).
- 1482 Ren, S.: *Environ. Toxicol.*, **17** (2), 119-127 (2002); *Chem. Abstr.*, **137**, 42773g (2002).
- 1483 Renner, G. and Wolff, E.: *Ger. Offen DE 3,014,669* (1981); *Chem. Abstr.*, **97**, 14750j (1982).
- 1484 Rennie, E. H.; Cooke, W. T. and Finlayson, H. H.: *J. Chem. Soc.*, **117**, 338-350 (1920).
- 1485 Renson, M. and Huls, R.: *Bull. Soc Chim. Belg.*, **61**, 599-608 (1952).
- 1486 Reuben, J.: *J. Am. Chem. Soc.*, **108**, 1735-1738 (1986).
- 1487 Reynolds, D. D.; Cathcart, J. A. and Williams, J. L. R.: *J. Org. Chem.*, **18**, 1709-1715 (1953).
- 1488 Ridderstad, A.; Nossal, G. J. V. and Tarlinton, D. M.: *J. Immunol.*, **157** (8), 3357-3365 (1996); *Chem. Abstr.*, **125**, 273551b (1996).
- 1489 Riedl, W. and Hübner, H.: *Chem. Ber.*, **90**, 2870-2876 (1957).
- 1490 Riedl, W. and Leucht, E.: *Chem. Ber.*, **91**, 2784-2794 (1958).
- 1491 Riedl, W.; Nickl, J.; Risse, K. H. and Mitteldorf, R.: *Chem. Ber.*, **89**, 1849-1863 (1956).
- 1492 Riegel, B. and Wittcoff, H.: *J. Am. Chem. Soc.*, **68**, 1913-1917 (1946).
- 1493 Ringshaw, D. J. and Smith, H. J.: *Chem. Ind. (London)*, 1383-1384 (1965).
- 1494 Rittner, R. and Barbarini, J. E.: *Can. J. Anal. Sci. Spectrosc.*, **43** (1), 14-18 (1998).
- 1495 Rittner, R.; Barbarini, J. E. and Suwinski, J.: *An. Acad. Bras. Cienc.*, **69** (2), 167-172 (1997); *Chem. Abstr.*, **127**, 121535c (1997).
- 1496 Rizzi, George P.: *Synth. Commun.*, **13** (14), 1173-1179 (1983).
- 1497 Robbins, R. J. and Falvey, D. E.: *Tetrahedron Lett.*, **35** (28), 4943-4946 (1994).
- 1498 Robertson, A. and Whalley, W. B.: *J. Chem. Soc.*, 3355-3356 (1951).
- 1499 Robertson, A.; Venkateswarlu, V. and Whalley, W. B.: *J. Chem. Soc.*, 3137-3142 (1954).
- 1500 Robertson, A.; Whalley, W. B. and Yates, J.: *J. Chem. Soc.*, 3117-3123 (1950).
- 1501 Robinson, R. and Shah, R. C.: *J. Chem. Soc.*, 1491-1498 (1934).
- 1502 Robinson, R. and Venkataraman, K.: *J. Chem. Soc.*, 2344-2348 (1926).
- 1503 Roblot, F.; Hocquemiller, R. and Cave, A.: *J. Chem. Res., Synop.*, (11), 344-345, 2637-2651 (1989).
- 1504 Rodriguez-Maroto, J. M.; Garcia, F.; Rodriguez-Mirasol, J.; Cordero, T.; Suau, R. and Rodriguez, J. J.: *J. Environ. Sci. Health, Part A*, **A 28** (3), 651-662 (1993); *Chem. Abstr.*, **119**, 79260s (1993).
- 1505 Romanelli, G.; Autino, J. C.; Baronetti, G. and Thomas, H.: *Molecules*, **6** (12), 1006-1011 (2001).
- 1506 Romeo, A. and Bargellini, G.: *Ann. Chim. (Rome)*, **42**, 361-369 (1952).
- 1507 Rosenau, T.; Potthast, A.; Elder, T.; Lange, T.; Sixta, H. and Kosma, P.: *J. Org. Chem.*, **67** (11), 3607-3614 (2002).
- 1508 Rosenmund, K. W. and Chienchi W.: *Arch. Pharm. Ber. Dtsch. Pharm. Ges.*, **266**, 407-411 (1928).
- 1509 Rosenmund, K. W. and Kuhnhehn, W.: *Ber. Dtsch. Chem. Ges.*, **56**, 1266-1269 (1923).

- 1510 Rosenmund, K. W. and Lohfert, H.: Ber. Dtsch. Chem. Ges., **61**, 2601-2607 (1928).  
1511 Rosenmund, K. W. and Pfroepffer, K.: Chem. Ber., **90**, 1922-1928 (1957).  
1512 Rosenmund, K. W. and Schnurr, W.: Justus Liebigs Ann. Chem., **460**, 56-98 (1928).  
1513 Rosenmund, K. W. and Schulz, H.: Arch. Pharm. Ber. Dtsch. Pharm. Ges., **265**, 308-319 (1927).  
1514 Rosenmund, K. W.; Buchwald, R. and Deligiannis, T.: Arch. Pharm. Ber. Dtsch. Pharm. Ges., **271**, 342-352 (1933).  
1515 Rosenmund, K. W.; Kuhnhehn, W. and Lesch, W.: Ber. Dtsch. Chem. Ges., **56**, 2042-2044 (1923).  
1516 Row, L. R.; Sastry, V. D. N.; Seshadri, T. R. and Thiruvengadam, T. R.: Proc. Indian Acad. Sci., **28**, 189-197 (1948).  
1517 Royer, R. and Bisagni, E.: Bull. Soc. Chim. Fr., 486-492 (1954).  
1518 Royer, R. and René, L.: Bull. Soc. Chim. Fr., 1029-1036 (1970).  
1519 Royer, R. and René, L.: Bull. Soc. Chim. Fr., 3601-3609 (1970).  
1520 Royer, R.: Bull. Soc. Chim. Fr., 412-417 (1953).  
1521 Royer, R.; Bisagni, E.; Laval-Jeantet, A. M. and Marquet, J. P.: Bull. Soc. Chim. Fr., 2607-2616 (1965).  
1522 Royer, R.; Cheutin, A.; Routier, C. and Rips, R.: Bull. Soc. Chim. Fr., 1297-1302 (1956).  
1523 Royer, R.; Demerseman, P. and Cheutin, A.: Bull. Soc. Chim. Fr., 275-277 (1960).  
1524 Royer, R.; Demerseman, P.; Cheutin, A.; Allegrini, E. and Michelet, R.: Bull. Soc. Chim. Fr., 1379-1388 (1957).  
1525 Royer, R.; Demerseman, P.; Michelet, R. and Cheutin, A.: Bull. Soc. Chim. Fr., 1148-1157 (1959).  
1526 Royer, R.; Demerseman, P.; Michelet, R. and Cheutin, A.: Bull. Soc. Chim. Fr., 1378-1388 (1958).  
1527 Royer, R.; Hubert-Habart, M.; René, L.; Cheutin, A. and Desvoye, M. L.: Bull. Soc. Chim. Fr., 1259-1267 (1964).  
1528 Royer, R.; René, L. and Demerseman, P.: Chim. Ther., **2**, 139-142 (1973).  
1529 Ruggeri, G.; Bianchi, M. and Aglietto, M.: Chim. Ind. (Milan), **68** (5), 97-102 (1986).  
1530 Rupe, H. and Majewski, K. v.: Ber. Dtsch. Chem. Ges., **332**, 3401-3410 (1900).  
1531 Russel, A. and Clark, S. F.: J. Am. Chem. Soc., **61**, 2651-2658 (1939).  
1532 Russel, A. and Frye, J. R. in "Organic Syntheses", Collect. Vol. III, E. C. Horning, Ed., Wiley, New-York, N.Y., (1955), p. 281.  
1533 Russel, A.; Frye, J. R. and Mauldin, W. L.: J. Am. Chem. Soc., **62**, 1441-1443 (1940).  
1534 Russel, A.; Frye, J. R.; Shriner, R. L. and Witte, M.: Org. Synth., **21**, 22-27 (1941).  
1535 Sabita, G., Mrs. and Rao, A. V. S.: Synth. Commun., **17** (3), 341-354 (1987).  
1536 Saini, T. R.; Pathak, V. P. and Khanna, R. N.: Indian J. Chem., Sect. B, **22B** (10), 1063 (1983).  
1537 Sakata, Yasutada and Hashimoto, Tadashi: Yakugaku Zasshi, **79**, 878-880 (1959); Chem. Abstr., **54**, 358e (1960).  
1538 Saksena, R. N. and Panday, K. K.: J. Indian Chem. Soc., **49** (8), 779-783 (1972).  
1539 Sala, R.; Doria, G. and Passarotti, C.: Tetrahedron Lett., **25** (40), 4565-4568 (1984).  
1540 Salman, S. R. and Kamounah, F. S.: Magn. Reson. Chem., **25**, 966-969 (1987).  
1541 Sandner, M. R.; Hedaya, E. and Treker, D. J.: J. Am. Chem. Soc., **90**, 7249-7254 (1968).  
1542 Sane, R. T. and Trakru, J. P. N.: Indian J. Chem., Sect. A, **16A** (1), 93 (1978).  
1543 Sane, R. T.; Deodhar, K. D.; Trakru, P. N. and Burkule, V. S.: J. Indian Chem. Soc., **55** (5), 511 (1978).  
1544 Saners, R. R.; Husain, S. N.; Piechowski, A. P. and Bird, G. R.: Dyes Pigments, **8**, 35-53 (1987).  
1545 Sanko Kaihatsu Kagaku Kenkyusho Kanzaki Paper Mfg. Co. Ltd.: Jpn. Kokai Tokkyo Koho JP 59,175,448 [84,175,448] (1984); Chem. Abstr., **102**, 113043j (1985).  
1546 Saraiya, P. R. and Shah, R. C.: Proc. Indian Acad. Sci., **31**, 213-223 (1950).  
1547 Sarbaggya, D. P. and Rangachari, K.: J. Indian Chem. Soc., **58** (2), 196-197 (1981).  
1548 Sartori, G.; Casiraghi, G.; Bolzoni, L. and Casnati, G.: J. Org. Chem. **44** (5), 803-805 (1979).  
1549 Sartori, G.; Casnati, G.; Bigi, F. and Predieri, G.: J. Org. Chem., **55**, 4371-4377 (1990).  
1550 Sastri, V. D. N. and Seshadri, T. R.: Curr. Sci., **15**, 235 (1946).

- 1551 Sastri, V. D. N. and Seshadri, T. R.: Proc. Indian Acad. Sci., **23A**, 262-272 (1946).  
1552 Sastri, V. D. N. and Seshadri, T. R.: Proc. Indian Acad. Sci., **24A** (2), 243-253 (1946).  
1553 Sato, H.; Dan, T.; Onuma, E.; Tanaka, H.; Aoki, B. and Koga, H.: Chem. Pharm. Bull., **39** (7), 1760-1772 (1991).  
1554 Sato, N.: Tetrahedron Lett., **37** (47), 8519-8522 (1996).  
1555 Sato, T.: Jpn. Kokai Tokyo Koho JP 06,157,579 [94,157,579] (1994); Chem. Abstr., **121**, 180113n (1994).  
1556 Satsyperova, I. F.; Kurkin, V. A.; Zapesochnaya, G. G.; Pantova, I. A. and Avdeyeva, E. V.: Rastit. Resur., **31** (2), 27-31 (1995); Chem. Abstr., **123**, 334957w (1995).  
1557 Sawyer, J. S.; Baldwin, R. F.; Sofia, M. J.; Floreancig, P.; Marder, P.; Saussy, D. L., Jr.; Froelich, L. L.; Silbough, S. A.; Stengel, P. W.; Cockerham, S. L. and Jackson, W. T.: J. Med. Chem., **36**, 3982-3984 (1993).  
1558 Scannell, R. T. and Stevenson, R.: J. Chem. Soc., Perkin Trans. 1, (12), 2927-2931 (1983).  
1559 Schaeffer, H. J.; Lauter, W. M. and Foote, P. A.: J. Am. Pharm. Assoc., **43**, 43-45 (1954).  
1560 Schäfer, W. and Leute, R.: Chem. Ber., **99**, 1632-1641 (1966).  
1561 Schäfer, W.; Leute, R. and Schlude, H.: Chem. Ber., **104** (10), 3211-3221 (1971).  
1562 Schering-Kahlbaum A-G. Fr. 803426 (1936); Chem. Abstr., **31**, 2620<sup>7</sup>, 3510<sup>1</sup> (1937).  
1563 Schiemenz, G. P. and Schröder, J. M.: Z. Naturforsch., B: Anorg. Chem., Org. Chem., **40B** (5), 669-680 (1985).  
1564 Schmid, H. and Bolleter, A.: Helv. Chim. Acta, **33**, 917-922 (1950).  
1565 Schmid, H. and Schmid, K.: Helv. Chim. Acta, **35** (6), 1879-1890 (1952).  
1566 Schmiz, C. and Eiden, F.: Liebigs Ann. Chem., **12**, 2021-2030 (1980).  
1567 Schmutz, J.; Hirt, R.; Künzle, F.; Eichenberger, E. and Lauener, H.: Helv. Chim. Acta, **34**, 620-626 (1953).  
1568 Schneider, W. and Kraft, E.: Ber. Dtsch. Chem. Ges., **55**, 1892-1899 (1922).  
1569 Schnitzer, M. and Neyroud, J. A.: Fuel, **54** (1), 17-19 (1975); Chem. Abstr., **82**, 123897y (1975).  
1570 Schöpf, C. and Heuck, K.: Justus Liebigs Ann. Chem., **459**, 233-286 (1927).  
1571 Schreiber, F. G. and Stevenson, R.: J. Chem. Soc., Perkin Trans. 1, (1), 90-92 (1977).  
1572 Schreiber, R. S. and Prichard, W. W.: Org. Synth., Coll. Vol. 3, 280-281 (1960).  
1573 Schroetter, E.; Hoegel, E. and Jeschke, H. J.: Ger. (East) 106,635 (1974); Chem. Abstr., **82**, 155759w (1975).  
1574 Schroetter, E.; Raddatz, A. and Oettel, M.: J. Prakt. Chem., **317** (3), 520-524 (1975).  
1575 Schutte, L. and Havinga, E.: Tetrahedron, **23** (5), 2281-2284 (1967).  
1576 Schwartz, J. A.: Eur. Pat. Appl. EP 343,866 (1989); Chem. Abstr., **113**, 6372w (1990).  
1577 Schwarz, R. and Capek, K.: Monatsh. Chem., **83**, 883-893 (1952).  
1578 Segalle, R.: Monatsh. Chem., **17**, 314-326 (1896).  
1579 Seliger, H.; Cascaval, A. and Birsă, M. L.: An. Stiint. Univ. "Al. I. Cuza" Iasi, Chim., **5**, 129-134 (1997); Chem. Abstr., **132**, 207732e (2000).  
1580 Semmler, F. W. and Schossberger, E.: Ber. Dtsch. Chem. Ges., **44**, 2885-2890 (1911).  
1581 Sen, A. B. and Bhargava, P. M.: J. Indian Chem. Soc., **26** (8), 366-370 (1949).  
1582 Sen, A. B. and Gupta, S. K.: J. Indian Chem. Soc., **38** (10), 825-828 (1961).  
1583 Sen, A. B. and Kakaji, T. N.: J. Indian Chem. Soc., **29** (12), 950-954 (1952).  
1584 Sen, A. B. and Parmar, S. S.: J. Indian Chem. Soc., **30** (10), 720-722 (1953).  
1585 Sen, A. B. and Parmar, S. S.: J. Indian Chem. Soc., **31** (9), 709-710 (1954).  
1586 Sen, A. B. and Saxena, M. S.: J. Indian Chem. Soc., **35** (2), 136-138 (1958).  
1587 Sen, A. B. and Singh, S. B.: J. Indian Chem. Soc., **41** (6), 461-464 (1964).  
1588 Sen, A. B. and Tiwari, S. S.: J. Indian Chem. Soc., **29** (5), 357-362 (1952).  
1589 Sen, A. B. and Tiwari, S. S.: J. Indian Chem. Soc., **29** (6), 419-424 (1952).  
1590 Sen, K. B. and Ghosh, P. C.: J. Chem. Soc., 61-63 (1920).  
1591 Seshadri, S. and Trivedi, P. L.: J. Org. Chem., **22**, 1633-1636 (1957).  
1592 Seshadri, S. and Trivedi, P. L.: J. Org. Chem., **23**, 1735-1738 (1958).  
1593 Setalvad, J. I. and Shah, N. M.: J. Indian Chem. Soc., **30** (6), 373-378 (1953).  
1594 Setalvad, J. I. and Shah, N. M.: J. Indian Chem. Soc., **31** (8), 600-601 (1954).  
1595 Setalvad, J. I.; Amin, G. C. and Shah, N. M.: J. Indian Chem. Soc., **29** (12), 915-920 (1952).  
1596 Setalvad, J. I.; Amin, G. C. and Shah, N. M.: J. Indian Chem. Soc., **33** (4), 249-252 (1956).



- 1597 Sethna, S. M. and Shah, R. C.: J. Indian Chem. Soc., **17**, 211-214 (1940).  
1598 Sethna, S. M. and Shah, R. C.: J. Indian Chem. Soc., **17**, 487-494 (1940).  
1599 Seto, Nobuo and Aoki, Kozo: Jpn. Kokai Tokkyo Koho JP 01,249,739 [89,249,739] (1989); Chem. Abstr., **112**, 138743g (1990).  
1600 Shah, M. V. and Sethna, Suresh: J. Chem. Soc., 2676-2678 (1959).  
1601 Shah, N. J.; Jhaveri, L. C. and Naik, H. B.: J. Inst. Chem. (India), **50** (4), 171-174 (1978); Chem. Abstr., **91**, 56553d (1979).  
1602 Shah, N. M. and Amin, G. C.: Curr. Sci., **21**, 246 (1952).  
1603 Shah, N. M. and Parikh, S. R.: J. Indian Chem. Soc., **36** (11), 784-786 (1959).  
1604 Shah, P. R. and Shah, N. M.: Indian J. Chem., **2**, 296-297 (1964).  
1605 Shah, R. C.; Mehta, C. R. and Wheeler, T. S.: J. Chem. Soc., 1555-1559 (1938).  
1606 Shah, R. C. and Mehta, P. R.: J. Univ. Bombay, **4**, 109-113 (1935).  
1607 Shah, R. R. and Trivedi, K. N.: J. Indian Chem. Soc., **56** (10), 995-998 (1979).  
1608 Shahane, R. Y.: Curr. Sci., **10**, 523-524 (1941).  
1609 Shaikh, Y. A. and Trivedi, K. N.: Indian J. Chem., **12** (12), 1262-1263 (1974).  
1610 Shamshurin, A. A. and Revenko, Yu. M.: Izv. Akad. Nauk Mold. SSR, (10), 86-97 (1962); Chem. Abstr., **62**, 16102f (1965).  
1611 Shannon, P. V. R. and John, G. D.: J. Chem. Soc., Perkin Trans. 1, (23), 2585-2593 (1977).  
1612 Shao, Hua-Wu; Wei, Han-Xun and Li, Yu Lin: Hecheng Huaxue, **3** (4), 314-317 (1995); Chem. Abstr., **124**, 289034a (1996).  
1613 Sharghi, H. and Kaboudin, B.: J. Chem. Res., Synop., (10), 628-629, 2678-2695 (1998).  
1614 Sharma, P. V. and Khanna, R. N.: Acta Chim. Hung., **20** (12), 159-162 (1985).  
1615 Shaw, S. C.; Gupta, A. K. and Kumar, R.: Acta Cienc. Indica, Chem., **18** (2), 137-140 (1992); Chem. Abstr., **121**, 133762p (1994).  
1616 Shaw, S. C.; Jha, A. S. and Gupta, A. K.: J. Indian Chem. Soc., **67** (8), 684-685 (1990).  
1617 Shaw, S. C.; Sharan, V. and Agrhari, S. L.: Acta Cienc. Indica, Chem., **16C** (3), 233-236 (1990); Chem. Abstr., **116**, 59012x (1992).  
1618 Shaw, S. J. and Smith, P. J.: J. Chem. Soc. C, **15**, 1882-1885 (1968).  
1619 Shen, Jianhua; Wang, Lan and Zhou, Bingnan: Chin. Chem. Lett., **2** (8), 629-630 (1991); Chem. Abstr., **116**, 193975s (1992).  
1620 Sherif, E.; Islam, A. and Krishnamurti, M.: Indian J. Chem., Sect. B, **21B** (5), 478-479 (1982).  
1621 Shibalain, Nazar L.: M. Sci. Thesis, University of Basrah, Basrah, Iraq (1984).  
1622 Shigematsu, N.; Kouno, I. and Kawano, N.: Phytochemistry, **33** (1), 323-325 (1983).  
1623 Shine, H. J. and Subotkowski, W.: J. Org. Chem., **52**, 3815-3821 (1987).  
1624 Shinma, N.; Fujiu, M.; Umeda, I.; Ohtsuka, T.; Ishitsuka, H. and Suhara, Y.: Eur. Pat. Appl. EP 51,819 (1982); Chem. Abstr., **97**, 181953j (1982).  
1625 Shinoda, J. and Sato, S.: J. Pharm. Soc. Jpn., **48**, 220-222 (1928); Chem. Abstr., **22**, 2947 (1928).  
1626 Shinoda, J.; Sato, D. and Kawagoye, M.: J. Pharm. Soc. Jpn., **52**, 766-777 (1932); Chem. Abstr., **27**, 295 (1933).  
1627 Shiokawa, Y.; Nagano, M.; Taniguchi, K.; Take, K.; Kato, T. and Tsubaki, K.: PCT Int. Appl. WO 92 18,461 (1992); Chem. Abstr., **118**, 101674h (1993).  
1628 Shionogi and Co., Ltd. Jpn. Kokai Tokkyo Koho JP 59 65, 038 [84 65,038] (1984); Chem. Abstr., **102**, 24285x (1985).  
1629 Shionogi and Co., Ltd.: Jpn. Kokai Tokkyo Koho JP 59 93,077 [84 93,077] (1984); Chem. Abstr., **101**, 230534k (1984).  
1630 Shirai, M.; Shinozuka, T.; Okamura, H.; Tsunooka, M.; Kishimura, S.; Endo, M. and Sasago, M.: J. Photopolym. Sci. Technol., **14** (4), 621-630 (2001).  
1631 Shiraishi, M. and Fukumoto, S.: Can. Pat. Appl. CA 2,099,466 (1994); Chem. Abstr., **121**, 82705n (1994).  
1632 Shriner, R. L. and Witte, M.: Org. Synth., Coll. Vol. 3, 281-285 (1960).  
1633 Shriner, R. L. and Kleiderer, E. C.: J. Am. Chem. Soc., **51**, 1267-1270 (1929).  
1634 Shudo, K.: Eur. Pat. Appl. EP 237,986 (1987); Chem. Abstr., **108**, 94283t (1988).  
1635 Shulgin, A. T. and Dyer, D. C.: J. Med. Chem., **18** (12), 1201-1204 (1975).

- 1636 Simchowicz, L.; Textor, J. A. and Cragoe, E. J., Jr.: *Am. J. Physiol.*, **265** (1, Pt. 1), C143-C155 (1993); *Chem. Abstr.*, **119**, 240916x (1993).
- 1637 Simokoriyama, M.: *Bull. Chem. Soc. Jpn*, **16** (8), 284-291 (1941).
- 1638 Simoneit, Bernd R. T.; Rogge, W. F.; Mazurek, M. A.; Standley, I. J.; Hildemann, L. M. and Cass, G. R.: *Environ. Sci. Technol.*, **27** (12), 2533-2541 (1993); *Chem. Abstr.*, **119**, 209380u (1993).
- 1639 Simonis, H. and Lehmann, C. B. A.: *Ber. Dtsch. Chem. Ges.*, **47**, 692-699 (1914).
- 1640 Simonova, L. L. and Shamshurin, A. A.: *Izv. Akad. Nauk Mold. SSR, Ser. Biol. Khim. Nauk*, (3), 79-81 (1972); *Chem. Abstr.*, **78**, 4072h (1973).
- 1641 Simons, J. H.; Archer, S. and Randall, D. I.: *J. Am. Chem. Soc.*, **62**, 485-486 (1940).
- 1642 Simonyi, Istvan and Tokar, Geza: *Magy. Kem. Foly.*, **63**, 11-14 (1957).
- 1643 Simpson, T. H.: *J. Org. Chem.*, **28**, 2107-2110 (1963).
- 1644 Sin-Teh Feng and Kun-Yuen Chiu: *Hua Hsüeh Hsüeh Pao*, **25** (5), 277-288 (1959); *Chem. Abstr.*, **54**, 17306i (1960).
- 1645 Singh, A. K.; Pathak, V. and Agrawal, P. K.: *Phytochemistry*, **44** (3), 555-557 (1997).
- 1646 Singh, H.; Verma, J. C. and Sharma, S. C.: *J. Indian Chem. Soc.*, **40** (7), 555-556 (1963).
- 1647 Singh, H. and Nand, P.: *Labdev, Part A*, **12A** (2), 63-66 (1974).
- 1648 Sinyavskaya, L. P. and Shamshurin, A. A.: *Zh. Org. Khim.*, **3** (12), 2195-2199 (1967).
- 1649 Sipos, G. v. and Szabo, R.: *Acta Phys. Chem. Szeged*, **7**, 126-128 (1961).
- 1650 Skraup, S. and Beng, E.: *Ber. Dtsch. Chem. Ges.*, **60**, 942-950 (1927).
- 1651 Skraup, S. and Poller, K.: *Ber. Dtsch. Chem. Ges.*, **57**, 2033-2038 (1924).
- 1652 Smalberger, T. M.; Vleggaar, R. and Weber, J. C.: *Tetrahedron*, **31** (18), 2297-2301 (1975).
- 1653 Smith, L. E. and Haller, H. L.: *J. Am. Chem. Soc.*, **56**, 237-239 (1934).
- 1654 Smith, L. I. and Opie, J. W.: *J. Org. Chem.*, **6**, 427-436 (1941).
- 1655 Smith, L. I.; Opie, J. W.; Wawzonek, S. and Prichard, W. W.: *J. Org. Chem.*, **4**, 318-322 (1939).
- 1656 Smith, T. and Smith, H.: *Pharm. J.*, **119**, 688 (1927).
- 1657 Smith, T. J.; Wearne, R. H. and Wallis, A. F. A.: *Chemosphere*, **30** (1), 69-80 (1995).
- 1658 Smith, T. J.; Wearne, R. H. and Wallis, A. F. A.: *Holzforschung*, **48** (Suppl.), 125-132 (1994); *Chem. Abstr.*, **120**, 220640v (1994).
- 1659 Smith, T. J.; Wearne, R. H. and Wallis, A. F. A.: *J. Chromatogr.*, **648**, 289-293 (1993).
- 1660 Snyder, H. R. and Elston, C. T.: *J. Am. Chem. Soc.*, **77**, 364-366 (1955).
- 1661 So, Ying-Hung and Miller, Larry L.: *Synthesis*, (7), 468-469 (1976).
- 1662 So, Ying-Hung; Becker, James Y. and Miller, Larry L.: *J. Chem. Soc., Chem. Commun.*, (7), 262-263 (1975).
- 1663 Sofia, M. J.: *Eur. Pat. Appl. EP 579,412* (1994); *Chem. Abstr.*, **120**, 322935n (1994).
- 1664 Sofia, M. J.; Nelson, K.; Herron, D. K.; Goodson, T.; Froelich, L. L.; Spaethe, S. M.; Marder, P.; Roman, C. R. and Fleisch, J. H.: *Bioorg. Med. Chem. Lett.*, **5** (17), 1995-2000 (1995).
- 1665 Sogawa, A.; Tsukayama, M.; Nozaki, H. and Nakayama, M.: *Heterocycles*, **43** (1), 101-111 (1996).
- 1666 Sogawa, S.; Nihro, Y.; Ueda, H.; Izumi, A.; Miki, T.; Matsumoto, H. and Satoh, T.: *J. Med. Chem.*, **36** (24), 3904-3909 (1993).
- 1667 Sohma, S.; Fujimoto, T. and Hirose, N.: *J. Med. Chem.*, **22** (3), 279-286 (1979).
- 1668 Solladie, G. and Girardin, A.: *Bull. Soc. Chim. Fr.*, (1), 123-124 (1987).
- 1669 Solladie, G. and Girardin, A.: *Synthesis*, (7), 569-570 (1991).
- 1670 Soman, S. S. and Trivedi, K. N.: *Indian J. Chem., Sect. B*, **32B** (3), 372-373 (1993).
- 1671 Song, G.; Zhou, B. and Wu, J.: *Fenzi Kexue Yu Huaxue Yanjiu*, **3** (4), 39-46 (1983); *Chem. Abstr.*, **100**, 174157e (1984).
- 1672 Song, Y. N.; Shibuya, M.; Ebizuka, Y. and Sankawa, U.: *Chem. Pharm. Bull.*, **39** (9), 2347-2350 (1991).
- 1673 Sonn, A. and Bülow, W.: *Ber. Dtsch. Chem. Ges.*, **58**, 1691-1698 (1925).
- 1674 Sonn, A. and Winzer, K.: *Ber. Dtsch. Chem. Ges.*, **61**, 2303-2306 (1928).
- 1675 Sonn, A.: *Ber. Dtsch. Chem. Ges.*, **61**, 2300-2302 (1928).
- 1676 Spada, A. and Casini, E.: *Gazz. Chim. Ital.*, **80**, 642-650 (1950).
- 1677 Späth, E. and Eiter, K.: *Ber. Dtsch. Chem. Ges.*, **74**, 1851-1866 (1941).

- 1678 Spitzer, W. A.; Victor, F.; Pollock, D. G. and Hayes, J. S.: *J. Med. Chem.*, **31** (8), 1590-1595 (1988).
- 1679 Sprague, James M. and Schultz, Everett, M.: US 3,453,312 (1969); *Chem. Abstr.*, **71**, 91096r (1969).
- 1680 Sprecher, A. v. and Beck, A.: *Eur. Pat. Appl. EP 335,315* (1989); *Chem. Abstr.*, **112**, 118648b (1990).
- 1681 Spyroudis, S. and Tarantilli, P.: *Tetrahedron*, **50** (39), 11541-11552 (1994).
- 1682 Srebotnik, E.; Jensen, K. A., Jr.; Kawai, S. and Hammel, K. E.: *Appl. Environ. Microbiol.* **63** (11), 4435-4440 (1997); *Chem. Abstr.*, **128**, 32216c (1998).
- 1683 Sridar, V. and Rao, V. S. S.: *Indian J. Chem., Sect. B*, **33B** (2), 184-185 (1994).
- 1684 Sridar, V. and Rao, V. S. S.: *J. Photochem. Photobiol., A: Chem.*, **69**, 325-327 (1993).
- 1685 Stack, G. P. and Mewshaw, R. E.: *Eur. Pat. Appl. EP 771,801* (1997); *Chem. Abstr.*, **127**, 34125a (1997).
- 1686 Starkov, S. P.; Goncharenko, G. A.; Volkotroub, M. N. and Jidkova, L. A.: *Izv. Vyssh. Uchebn. Zaved. Khim. Khim. Tekhnol.*, **36** (6), 86-89 (1993); *Chem. Abstr.*, **120**, 298178v (1994).
- 1687 Stefanovic, M.; Krstic, L. and Mladenovic, S.: *J. Serb. Chem. Soc.*, **57** (4), 217-220 (1992); *Chem. Abstr.*, **117**, 48150k (1992).
- 1688 Stenhouse, J.: *Justus Liebigs Ann. Chem.*, **89**, 251-253 (1854).
- 1689 Stenhouse, J.: *Justus Liebigs Ann. Chem.*, **104**, 236-239 (1857).
- 1690 Stephen, H. and Weizmann, C.: *J. Chem. Soc., Trans.*, **105** (1), 1046-1057 (1914).
- 1691 Stephen, J. F. and Marcus, E.: *J. Org. Chem.*, **35**, 258-261 (1970).
- 1692 Sterling Drug, Inc.: *Brit. 1,544,872* (1979); *Chem. Abstr.*, **92**, 163686s (1980).
- 1693 Stetter, H. and Vestner, S.: *Chem. Ber.*, **97**, 169-171 (1964).
- 1694 Stockhausen, F. and Gattermann, L.: *Ber. Dtsch. Chem. Ges.*, **25**, 3521-3525 (1892).
- 1695 Stout, G. H. and Stout, V. F.: *Tetrahedron*, **14**, 296-303 (1961).
- 1696 Stout, M. G.; Reich, H. and Huffman, M. N.: *J. Pharm. Sci.*, **53** (2), 192-195 (1964).
- 1697 Stradins, J. P. and Hasanli, B.: *J. Electroanal. Chem.*, **353**, 57-69 (1993).
- 1698 Strat, G.; Strat, M. and Grecu, I.: *Spectrosc. Lett.*, **27** (2), 177-195 (1994).
- 1699 Strubell, W. and Baumgartel, H.: *J. Prakt. Chem.*, **9**, 213-216 (1959).
- 1700 Strunz, G. M.; Giguere, P. and Thomas, A. W.: *J. Chem. Ecol.*, **12** (1), 251-260 (1986); *Chem. Abstr.*, **104**, 125005c (1986).
- 1701 Strupczewski, J. T.; Bordeau, K. J.; Chiang, Y.; Glamkowski, E. J.; Conway, P. G.; Corbett, R.; Hartman, H. B.; Szewczak, M. R.; Wilmot, C. A. and Helsley, G. C.: *J. Med. Chem.*, **38** (7), 1119-1131 (1995).
- 1702 Strupczewski, J. T.; Helsley, G. C.; Chiang, Y.; Bordeau, K. J. and Glamkowski, E. J.: *U.S. US 5,364,866* (1994); *Chem. Abstr.*, **123**, 169657p (1995).
- 1703 Suau, R.; Torres, G. and Valpuesta, M.: *Tetrahedron Lett.*, **36** (8), 1311-1314 (1995).
- 1704 Sudalai, A. and Rao, G. S. K.: *Indian J. Chem., Sect. B*, **28B** (9), 760-761 (1989).
- 1705 Suga, T.; Hirata, T. and Walls, F.: *J. Sci. Hiroshima Univ., Ser. A: Phys. Chem.*, **38** (2-3), 327-331 (1974); *Chem. Abstr.*, **82**, 124987q (1975).
- 1706 Sugawara, S. and Kawasu, M.: *J. Pharm. Soc. Jpn.*, **73**, 1102-1105 (1953).
- 1707 Sugawara, S.: *J. Chem. Soc.*, 1483-1484 (1934).
- 1708 Sugawara, S.: *J. Chem. Soc.*, 1621-1624 (1933).
- 1709 Sugawara, S.: *Proc. Imp. Acad. (Tokyo)*, **10**, 338-340 (1934).
- 1710 Sugawara, T.; Toyoda, T.; Adachi, M. and Sasakura, K.: *J. Am. Chem. Soc.*, **100** (5), 4842-4852 (1978).
- 1711 Sugiura, Koji: *Jpn. Kokai Tokkyo Koho JP 01,193,372* [89,193,372](1989); *Chem. Abstr.*, **112**, 100917d (1990).
- 1712 Sugiyama, N.; Sato, T.; Kataoka, H. and Kashima, C.: *Bull. Chem. Soc. Jpn.*, **44**, 555-556 (1971).
- 1713 Suh, H.; Lee, S.; Kim, N.; Han, J. and Kim, J.: *Bioorg. Med. Chem. Lett.*, **9** (10), 1433-1436 (1999).
- 1714 Sumitomo Chemical Co., Ltd.: *Jpn. Kokai Tokkyo Koho JP 58 38,229* [83 38,229] (1983); *Chem. Abstr.*, **99**, 38201y (1983).
- 1715 Sun, F.; Caiming and Lou, F.: *Zhongguo Zhongyao Zazhi*, **18** (6), 362-263 (1993); *Chem. Abstr.*, **120**, 398g (1994).

- 1716 Sun, Yan-Ping; Wallis, A. F. A. and Nguyen, Kien Loi: *J. Wood Chem. Technol.*, **17** (3), 209-222 (1997); *Chem. Abstr.*, **127**, 346145a (1997).
- 1717 Sunday, M. E.; Benacerraf, B. and Dorf, M. E.: *J. Exp. Med.*, **152** (6), 1554-1562 (1980).
- 1718 Suortti, T.: *Z. Lebensm. Unters. Forsch.*, **177** (2), 94-96 (1983).
- 1719 Suri, J. L.; Gupta, G. K.; Taneja, S. C.; Dhar, K. L. and Atal, C. K.: *Indian J. Chem., Sect. B*, **19B** (9), 813-814 (1980).
- 1720 Süss, M.; John, S. and Hesse, M.: *Helv. Chim. Acta*, **75** (2), 457-470 (1992).
- 1721 Suter, C. M.; Lawson, E. J. and Smith, P. G.: *J. Am. Chem. Soc.*, **61**, 161-165 (1939).
- 1722 Suzuki, T.; Yano, A.; Okada, M. and Ishii, Y.: *Nippon Kagaku Zasshi*, **81** (2), 301-305 (1960); *Chem. Abstr.*, **56**, 434e (1962).
- 1723 Syamala, M. S.; Rao, B. N. and Ramamurthy, V.: *Tetrahedron*, **44** (23), 7234-7242 (1988).
- 1724 Szekeres, L. and Karsay, B.: *Gazz. Chim. Ital.*, **77**, 471-473 (1947).
- 1725 Szell, T. and Furka, A.: *Nature (London)*, **184**, 117 (1959).
- 1726 Szell, T.: *Chem. Ber.*, **91**, 2609-2614 (1958).
- 1727 Szell, T.; Furka, A. and Szilagy, I.: *J. Sci. Ind. Res.*, **18B**, 323-325 (1959).
- 1728 Szell, T.; Hajas, E. and Sipos, S.: *Acta Phys. Chem., Szeged*, **11**, 47-50 (1965).
- 1729 Szell, T.; Sipos, Gy and Szentgali, G.: *Magy. Kem. Foly.*, **59**, 148-151 (1953).
- 1730 Szell, T.; Sweeney, M.; Chadha, S. and Soher, P.: *Chem. Ber.*, **122** (4), 795-796 (1989).
- 1731 Szuchnik, A.; Swiderski, J. and Czerska, W.: *Rocz. Chem.*, **32**, 255-264 (1958); *Chem. Abstr.*, **52**, 17718h (1958).
- 1732 Szymanowski, J.; Voelkel, A. and Rashid, Z. A.: *J. Chromatogr.*, **402**, 55-64 (1987).
- 1733 Szymanowski, J.; Voelkel, A.; Beger, J. and Binte, H. J.: *J. Prakt. Chem.*, **327** (3), 353-361 (1987).
- 1734 Tabuchi, H.; Tajimi, A. and Ichihara, A.: *Biosci., Biotechnol., Biochem.*, **58** (11), 1956-1959 (1994).
- 1735 Tada, A.; Saitoh, T. and Shoji, J.: *Chem. Pharm. Bull.*, **28** (8), 2487-2493 (1980).
- 1736 Tagashira, M.: *Jpn. Kokai Tokkyo Koho JP 08 26,981 [96 26,981]* (1996); *Chem. Abstr.*, **124**, 270565c (1996).
- 1737 Tagashira, M.; Yuasa, M. and Uchama, K.: *Jpn. Kokai Tokkyo Koho JP 08 27,057 [96 27,057]* (1996); *Chem. Abstr.*, **124**, 288998f (1996).
- 1738 Tahara, Y.: *Ber. Dtsch. Chem. Ges.*, **24**, 2459-2462 (1891).
- 1739 Tahara, Y.: *Ber. Dtsch. Chem. Ges.*, **25**, 1292-1305 (1892).
- 1740 Tahara, Y.: *Ber. Dtsch. Chem. Ges.*, **25**, 1306-1310 (1892).
- 1741 Takada, T. and Ohki, S.: *Chem. Pharm. Bull.*, **21** (6), 1369-1372 (1973).
- 1742 Takahashi, I. T. and Mizutani, A.: *Yakugaku Zasshi*, **80**, 782-783 (1960); *Chem. Abstr.*, **54**, 24504e (1960).
- 1743 Takahashi, K. and Miyashita, S.: *Chem. Pharm. Bull.*, **10**, 603-607 (1962).
- 1744 Takahashi, K. and Miyashita, S.: *Chem. Pharm. Bull.*, **11**, 209-213 (1963).
- 1745 Takahashi, K. and Takani, M.: *Chem. Pharm. Bull.*, **18** (9), 1831-1840 (1970); *Chem. Abstr.*, **73**, 130823p (1970).
- 1746 Takahashi, K. and Tanaka, Y.: *Chem. Pharm. Bull.*, **23** (3), 623-628 (1975); *Chem. Abstr.*, **83**, 113363c (1975).
- 1747 Takahashi, T. and Oshika, T.: *J. Pharm. Soc. Jpn.*, **74**, 48-51 (1954).
- 1748 Takaishi, H.; Kishida, M. and Miura, Y.: *Jpn. Kokai Tokkyo Koho JP 04,356,438 [92,356,438]* (1992); *Chem. Abstr.*, **119**, 27827n (1993).
- 1749 Takasugi, M. and Matsuda, T.: *Phytochemistry*, **43** (5), 1019-1021 (1996).
- 1750 Takasuka, M. and Matsui, Y.: *J. Chem. Soc., Perkin Trans. 2*, (12), 1743-1750 (1979).
- 1751 Takeuchi, H.; Kamada, S. and Machida, M.: *Chem. Pharm. Bull.*, **44** (4), 793-799 (1996).
- 1752 Takeda, Y. and Fatope, M. G.: *J. Nat. Prod.*, **51** (4), 725-729 (1988); *Chem. Abstr.*, **109**, 187280a (1988).
- 1753 Takeshita, H.: *Tetrahedron Lett.*, (19), 1657-1658 (1977).
- 1754 Takeshita, H.; Kikuchi, R. and Shoji, Y.: *Bull. Chem. Soc. Jpn.*, **46** (2), 690-691 (1973).
- 1755 Takeuchi, N.; Handa, S.; Koyama, K.; Kamata, K.; Goto, K. and Tobinaga, S.: *Chem. Pharm. Bull.*, **39** (7), 1655-1658 (1991).
- 1756 Takeuchi, N.; Nakagawa, H. and Tobinaga, S.: *Chem. Pharm. Bull.*, **28** (10), 3002-3006 (1980).

- 1757 Takeuchi, Y.; Watanabe, I.; Misumi, K.; Irie, M.; Hirose, Y.; Hirata, K.; Yamato, M. and Harayama, T.: *Chem. Pharm. Bull.*, **45** (12), 2011-2015 (1997).
- 1758 Takuwa, Akio; Iwamoto, Hidetoshi; Soga, Osamu and Maruyama, Kazuhiro: *Bull. Chem. Soc. Jpn.*, **55** (11), 3657-3658 (1982).
- 1759 Talvitie, A.: *Finn. Chem. Lett.*, **8**, 58-59 (1983).
- 1760 Tambor, J.: *Ber. Dtsch. Chem. Ges.*, **41**, 787-792 (1908).
- 1761 Tambor, J.: *Ber. Dtsch. Chem. Ges.*, **41**, 793-799 (1908).
- 1762 Tamura, Y.; Yoshimoto, Y.; Tada, S.; Kunimoto, K.; Matsumura, S.; Murayama, M.; Shibata, Y. and Enomoto, H.: *J. Med. Chem.*, **24** (8), 1006-1010 (1981).
- 1763 Tanaka, T. and Okazaki, S.: *Jpn. Kokai Tokkyo Koho JP 04,112,885* [92,112,885] (1992); *Chem. Abstr.*, **117**, 201990f (1992).
- 1764 Tanaka, T.; Iinuma, M.; Yuki, K.; Fujii, Y. and Mizuno, M.: *Phytochemistry*, **31** (3), 993-998 (1992).
- 1765 Tanaka, T.; Imura, S.; Tanaka, K. and Kida, Y.: *Eur. Pat. Appl. EP 401,958* (1990); *Chem. Abstr.*, **115**, 8577g (1991).
- 1766 Tanaka, T.; Imura, T.; Tanaka, K. and Kida, Y.: *Jpn. Kokai Tokkyo Koho JP 02 69,471* [90 69,471] (1990); *Chem. Abstr.*, **113**, 78167f (1990).
- 1767 Tanaka, T.; Iinuma, M. and Mizuno, M.: *Yakugaku Zasshi*, **107** (10), 827-829 (1987); *Chem. Abstr.*, **109**, 92550z (1988).
- 1768 Tanaka, T.; Sakurai, Y.; Okazaki, H.; Hasegawa, T. and Fukuyama, Y.: *Eur. Pat. Appl. EP 382,213* (1990); *Chem. Abstr.*, **114**, 81225z (1991).
- 1769 Tanaka, T.; Umemura, K.; Iinuma, M. and Mizuno, M.: *Yakugaku Zasshi*, **107** (4), 315-317 (1987); *Chem. Abstr.*, **107**, 197872t (1987).
- 1770 Taniguchi, S.; Miyashita, Y.; Ueyama, T.; Tanaka, H.; Matsumoto, K.; Hirase, J.; Ueda, A.; Sogawa, T.; Oshima, H. and Et, A.: *Jpn. Kokai Tokkyo Koho JP 05 43,570* [93 43,570] (1993); *Chem. Abstr.*, **119**, 180756h (1993).
- 1771 Tankred, S.; Hartmut, K.; Rapoport, S. M.; Binte, H. J.; Beger, J.; Slapke, J. and Grupe, R.: *Eur. Pat. Appl. EP 149,242* (1985); *Chem. Abstr.*, **104**, 129637h (1986).
- 1772 Tanret, M.: *Bull. Soc. Chim. Fr.*, 944-949 (1894).
- 1773 Tarbell, D. S. and Wilson, J. W.: *J. Am. Chem. Soc.*, **64**, 607-612 (1942).
- 1774 Tarbell, D. S. and Wilson, J. W.: *J. Am. Chem. Soc.*, **64**, 1066-1070 (1942).
- 1775 Tasaki, T.: *Acta Phytochim.*, **2**, 49-73 (1925).
- 1776 Tasaki, T.: *Acta Phytochim.*, **3**, 259-315 (1927).
- 1777 Tasaki, T.: *Chem. Zentralbl.*, **II**, 1949-1951 (1927).
- 1778 Tashiro, M.; Tsuzuki, H.; Matsumoto, J.; Mataka, S.; Nakayama, K.; Tsuruta, Y. and Yonemitsu, T.: *J. Chem. Res., Synop.*, (12), 372-373, 2826-2851 (1989).
- 1779 Teague, S. J.: *Tetrahedron Lett.*, **37** (32), 5751-5754 (1996).
- 1780 Tecle, B.; Brophy, J. J. and Toia, R. F.: *Insect Biochem.*, **16** (2), 333-336 (1986).
- 1781 Teikoku, Hormone Mfg. Co., Ltd.: *Jpn. Kokai Tokkyo Koho JP 60,130,567* [85,130,567] (1985); *Chem. Abstr.*, **104**, 50789a (1986).
- 1782 Tennant, S. and Wege, D.: *J. Chem. Soc., Perkin Trans. 1*, (11), 2089-2093 (1989).
- 1783 Terashima, N.; Shinoda, Y. and Kanda, T.: *Mokuzai Gakkaishi*, **20** (10), 494-500 (1974); *Chem. Abstr.*, **82**, 87916t (1975).
- 1784 Teupe, G.: *Dissertation Univ. München* (1977).
- 1785 Tewari, S. S. and Tripathi, B. N.: *J. Indian Chem. Soc.*, **33** (6), 613-614 (1956).
- 1786 Thakar, K. A. and Deshpande, G. D.: *Indian J. Chem.*, **10**, 1065-1067 (1972).
- 1787 Thakar, K. A. and Joshi, R. C.: *J. Indian Chem. Soc.*, **59** (1), 77-79 (1982).
- 1788 Thakar, K. A. and Muley, P. R.: *J. Indian Chem. Soc.*, **52** (3), 243-247 (1975).
- 1789 Thakar, K. A.: *J. Indian Chem. Soc.*, **40** (7), 539-542 (1963).
- 1790 The Merck Index, 11th ed., (1989), Merck & Co., Inc. (USA).
- 1791 Thiele, K.: *U.S. 3,644,525* (1972); *Chem. Abstr.*, **76**, 140214s (1972).
- 1792 Thomas, L. H. and Vlismas, T.: *J. Chem. Soc.*, 612-615 (1963).
- 1793 Thomas, M. B. and Mabry, T. J.: *Tetrahedron*, **24** (9), 3675-3679 (1968).
- 1794 Thompson, R. B.: *US 2,483,566* (1949); *Chem. Abstr.*, **43**, 1539c (1950).
- 1795 Tiemann, F.: *Ber. Dtsch. Chem. Ges.*, **24**, 2854-2855 (1891).
- 1796 Timar, T.; Repasi, J.; Borsos Safranek, I.; Kiss, I.; Maroy, P. and Fodor, A.: *Indian IN 158,187* (1986); *Chem. Abstr.*, **107**, 58857d (1987).

- 1797 Tiwari, S. S. and Singh, A.: J. Indian Chem. Soc., **34** (11), 830-832 (1957).  
1798 Tiwari, S. S. and Singh, A.: J. Indian Chem. Soc., **38** (1), 53-56 (1961).  
1799 Tiwari, S. S. and Tewari, B. N.: J. Indian Chem. Soc., **31**, 76-78 (1954).  
1800 Tiwari, S. S. and Tewari, B. N.: J. Indian Chem. Soc., **31**, 79-82 (1954).  
1801 Tiwari, S. S. and Tripathi, B. N.: J. Indian Chem. Soc., **33** (3), 211-213 (1956).  
1802 Tökés, A. L. and Levai, A.: Stud. Org. Chem. (Amsterdam) 1981 (Pub. **1982**). 11 (Flavonoids Bioflavonoids), 129-132; Chem. Abstr., **97**, 215839u (1982).  
1803 Tökés, A. L.: J. Antibiotics, **43** (10), 1332-1333 (1990).  
1804 Tokoroyama, T. and Kubota, T.: Tetrahedron, **26** (4), 1085-1090 (1970).  
1805 Tokoroyama, T.; Maeda, S.; Nishikawa, T. and Kubota, T.: Tetrahedron, **25** (5), 1047-1054 (1969).  
1806 Tomar, S. S.; Walia, S. and Mukerjee, S. K.: Indian J. Chem., Sect. B, **19B** (9), 792-793 (1980).  
1807 Tomas-Barberan, F.; Iniesta-Sanmartin, E.; Tomas-Lorente, F. and Rumbero, A.: Phytochemistry, **29** (4), 1093-1095 (1990).  
1808 Topp, A. and Boldt, P.: Chem. Ber., **109** (2), 459-465 (1976).  
1809 Torrey, H. A. and Kipper, H. B.: J. Am. Chem. Soc., **30**, 837-861 (1908).  
1810 Trave, R. and Sacco, A.: Rend. Ist. Lomb. Accad. Sci. Lett. A: Sci. Mat., Fis., Chim., Geol.; **A94**, 273-288 (1960); Chem. Abstr., **55**, 16462b (1961).  
1811 Trave, R.: Gazz. Chim. Ital., **80**, 502-509 (1950).  
1812 Trave, R.: Gazz. Chim. Ital., **81**, 773-781 (1951).  
1813 Tripathi, B. N. and Garg, C. L.: Indian J. Chem., **7** (8), 778-779 (1969).  
1814 Tsuda, H.; Ishitani, Y.; Takemura, Y.; Suzuki, Y. and Kato, T.: Heterocycles, **44**, 139-142 (1997).  
1815 Tsuda, Y.; Hosoi, S. and Goto, Y.: Chem. Pharm. Bull., **39** (1), 18-22 (1991).  
1816 Tsuji, N. and Nagashima, K.: Tetrahedron, **25** (15), 3017-3031 (1969).  
1817 Tsujihara, K.; Hongu, M.; Funami, N.; Inamasu, M. and Arakawa, K.: Eur. Pat. Appl. EP 684,254 (1995); Chem. Abstr., **124**, 202943z (1996).  
1818 Tsujihara, K.; Hongu, M.; Saito, K.; Inamasa, M.; Arakawa, K.; Oku, A. and Matsumoto, M.: Chem. Pharm. Bull., **44** (6), 1174-1180 (1996).  
1819 Tsujihara, K.; Saito, K.; Hongu, M.; Matsumoto, M. and Oku, A.: Eur. Pat. Appl. EP 850,948 (1998); Chem. Abstr., **129**, 95682t (1998).  
1820 Tsukayama, M.; Fujimoto, K.; Horie, T.; Masumara, M. and Nakayama, M.: Bull. Chem. Soc. Jpn., **58**, 136-141 (1985).  
1821 Tsukayama, M.; Horie, T.; Fujimoto, K. and Nakayama, M.: Chem. Pharm. Bull., **34** (6), 2369-2374 (1986).  
1822 Tsukayama, M.; Kawamura, Y.; Tamaki, H.; Kubo, T. and Horie, T.: Bull. Chem. Soc. Jpn., **62**, 826-832 (1989).  
1823 Tsukayama, M.; Kikuchi, M. and Kawamura, Y.: Chem. Lett., (7), 1203-1206 (1994).  
1824 Tsukayama, M.; Kikuchi, M. and Yoshioka, S.: Chem. Lett., (11), 1895-1898 (1993).  
1825 Tsukayama, M.; Utsumi, H.; Kunugi, A. and Nozaki, H.: Heterocycles, **45** (6), 1131-1142 (1997).  
1826 Tu, S.; Shi, X.; Jiang, J. and Hua, W.: Zhongguo Yaoke Daxue Xuebao, **21** (5), 291-292 (1990); Chem. Abstr., **114**, 184920b (1991).  
1827 Tunoori, A. R.; Dutta, D. and Georg, G. I.: Tetrahedron Lett., **39** (48), 8751-8754 (1998).  
1828 Turbina, A. I. and Sinyavskii, V. G.: Metody Polucheniya Khim. Reaktivov i Preparatov, Gos. Kom. Sov. Min. SSSR po Khim., **10**, 86-89 (1964); Chem. Abstr., **65**, 8807f (1966).  
1829 Tutin, F.: J. Chem. Soc., **99**, 1240-1248 (1911).  
1830 Tyman, J. H. P.: personal communication, June 13, 2001.  
1831 Tzeng-Shou Tung, Tun-Shun Chung and Minlon-Huang: Yao Hsieh Hsieh Pao, **6** (3), 164-168 (1958); Chem. Abstr., **53**, 14039f (1959).  
1832 Uchino, S.; Takahashi, S.; Ogini, N.; Maoka, T.; Takayama, S.; Hashimoto, K. and Kozuka, M.: Kuromatogurafi, **17** (3), 195-201 (1996); Chem. Abstr., **126**, 51042t (1997).  
1833 Uesugi, Y. and Suzuki, T.: Bull. Nat. Inst. Agr. Sci., Ser. C. **17**, 193-202 (1964); Chem. Abstr., **62**, 16898f (1965).  
1834 Urano, F.; Nakabata, M.; Fujie, H. and Ono, K.: Jpn. Kokai Tokkyo Koho JP 03,223,862 [91,223,862] (1991); Chem. Abstr., **117**, 223096w (1992).

- 1835 Valdebenito, H.; Bittner, M.; Sammes, P. G.; Silva, M. and Watson, W. H.: *Phytochemistry*, **21** (6), 1456-1457 (1982).
- 1836 Valenti, P.; Fabbri, G.; Rampa, A.; Bisi, A.; Gobbi, S.; Da Re, P.; Carrara, M.; Sgevano, A. and Cima, L.: *Anti-Cancer Drug Des.*, **11** (3), 243-252 (1996); *Chem. Abstr.*, **125**, 75671c (1996).
- 1837 Valoti, E.; Pallavicini, M.; Villa, L. and Pezzetta, D.: *J. Org. Chem.*, **66** (3), 1018-1025 (2001).
- 1838 Valyashko, N. A. and Lutsky, A. E.: *J. Gen. Chem. USSR, (Eng. Transl.)*, **21** 1029-1047 (1951).
- 1839 Valyashko, N. A. and Rozum, Yu. S.: *Zh. Obshch. Khim.*, **17**, 755-782 (1947); *Chem. Abstr.*, **42**, 2588g (1948).
- 1840 Van Acker, F. A. A.; Hageman, J. A.; Haenen, G. R. M. M.; van der Vijgh, W. J. F.; Bast, A. and Menge, W. M. P. B.: *J. Med. Chem.*, **43** (20), 3752-3760 (2000).
- 1841 Van den Berg, A. J. J. and Labadie, R. P.: *Planta Med.*, **41** (2), 169-173 (1981).
- 1842 Van der Zeeuw, Abraham J.: *Ger. Offen.* 2,510,352 (1975); *Chem. Abstr.*, **83**, 205944w (1975).
- 1843 Veglia, A. V.; Sanchez, A. M. and de Rossi, R. H.: *J. Org. Chem.*, **55**, 4083-4086 (1990).
- 1844 Vène, J.; Kerfanto, M. and Raphalen, D.: *Bull. Soc. Chim. Fr.*, 1813-1817 (1963).
- 1845 Venkat, G. and Seshadri, T. R.: *Proc. Indian Acad. Sci.*, **36A**, 130-133 (1952).
- 1846 Venkatasubbaiah, P.; Tisserat, N. A. and Chilton, W. S.: *Mycopathologia*, **128** (3), 155-159 (1994); *Chem. Abstr.*, **123**, 108085d (1995).
- 1847 Vermuri, V. S. S.; Rao, C. P.; Rao, J. M. and Rao, K. V. J.: *Indian J. Chem., Sect. B*, **23B** (11), 1122-1123 (1984).
- 1848 Verner, E.; Katz, B. A.; Spencer, J. R.; Allen, D.; Hataye, J.; Hruzewicz, W.; Hui, H. C.; Kolesnikov, A.; Li, Y.; Luong, C.; Martelli, A.; Radika, K.; Rai, R.; She, M.; Shrader, W.; Sprengeler, P. A.; Trapp, S.; Wang, J.; Young, W. B. and Mackman, R. L.: *J. Med. Chem.*, **44** (17), 2753-2771 (2001).
- 1849 Vibhute, Y. B. and Jagdale, M. H.: *J. Indian Chem. Soc.*, **58** (11), 1115-1116 (1981).
- 1850 Vibhute, Y. B.; Wadje, S. S. and Jagdale, M. H.: *J. Shivaji Univ.; Sci.*, **17**, 79-81 (1977); *Chem. Abstr.*, **93**, 126301n (1980).
- 1851 Vogel, A. I.: *A Text Book of Practical Organic Chemistry*, Third Edition, Longmans, London (1962).
- 1852 Vogt, A. H. G. and Kouwenhoven, H. W.: *Collect. Czech. Chem. Commun.*, **57** (4), 853-861 (1992).
- 1853 Vong, A. K. K.; Thompson, M.; Evans, J. M. and Morgan, H. K. A.: *PCT Int. Appl. WO* 95 34,547 (1995); *Chem. Abstr.*, **124**, 260843c (1996).
- 1854 Vongerichten, E.: *Ber. Dtsch. Chem. Ges.*, **33**, 2334-2342 (1900).
- 1855 Vongerichten, E.: *Ber. Dtsch. Chem. Ges.*, **33**, 2904-2909 (1900).
- 1856 Vongerichten, E.: *Justus Liebigs Ann. Chem.*, **318**, 121-136 (1901).
- 1857 Vorozhtsov, N. N., Jr.; Rubina, T. D. and Yakobson, G. G.: *USSR* 143,404 (1962); *Chem. Abstr.*, **57**, 9744b (1962).
- 1858 Vyas, G. N. and Shah, N. M.: *Org. Synth., Coll. Vol.* **4**, 836-838 (1963).
- 1859 Wadsworth, D. J. and Losch, S.: *Tetrahedron*, **50** (29), 8673-8676 (1994).
- 1860 Wagner, G. and Böhm, M.: *Pharmazie*, **17** (11), 670-676 (1962).
- 1861 Wagner, G. and Böhm, M.: *Pharmazie*, **18** (3), 202-206 (1963).
- 1862 Wagner, H.; Farkas, L.; Flores, G. and Strelisky, J.: *Chem. Ber.*, **107** (3), 1049-1056 (1974).
- 1863 Wagner, H.; Maurer, I.; Farkas, L. and Strelisky, J.: *Tetrahedron Lett.*, (1), 67-70 (1976).
- 1864 Wagner, H.; Maurer, I.; Farkas, L. and Strelisky, J.: *Tetrahedron*, **33** (11), 1405-1409 (1977).
- 1865 Wagner, H.; Maurer, I.; Farkas, L. and Strelisky, J.: *Tetrahedron*, **33** (11), 1411-1414 (1977).
- 1866 Wakatsuka, H.; Nakai, H. and Okumoto, I.: *Jpn. Kokai Tokkyo Koho JP* 0395,144 [9195,144] (1991); *Chem. Abstr.*, **115**, 182817v (1991).
- 1867 Wallenfels, K.: *Ber. Dtsch. Chem. Ges.*, **75**, 785-793 (1942).
- 1868 Walsh, D. A.; Franzyshe, S. K. and Yanni, J. M.: *J. Med. Chem.*, **32** (1), 105-118 (1989).
- 1869 Walter, W. and Wohlers, K.: *Justus Liebigs Ann. Chem.*, **752**, 115-135 (1971).

- 1870 Wang, J.; Tang, H. T.; Zhang, P.; Mak, T. C. W. and Zhang, Z. Y.: *Chin. Chem. Lett.*, **9** (10), 899-902 (1998).
- 1871 Wang, L. and Kong, J.: *Xibei Shifan Xueyuan Xuebao, Ziran Kexueban*, **4**, 64-68 (1987); *Chem. Abstr.*, **110**, 7898x (1989).
- 1872 Wang, S.; Yubo, F.; Renyong, L. and Yong, L.: *Zhongguo Yaowuhuaxue Zazhi*, **10** (3), 203-204 (2000); *Chem. Abstr.*, **134**, 237257n (2001).
- 1873 Ward, M.; Settembre, P. A.; Renaud, A. and Langlois, M.: *Eur. Pat. Appl. EP 338,937* (1989); *Chem. Abstr.*, **112**, 178682t (1990).
- 1874 Washburn, W. N.; Girotra, R. N.; Sher, P. M.; Mikkilineni, A. B.; Poss, K. M.; Mathur, A.; Gavai, A. and Bisacchi, G. S.: *Eur. Pat. Appl. EP 659,737* (1995); *Chem. Abstr.*, **124**, 8408p (1996).
- 1875 Watanabe, Y.; Yoshiwara, H. and Kanao, M.: *J. Heterocycl. Chem.*, **30** (2), 445-451 (1993).
- 1876 Waterman, P. G.; Zhong, Shou-Ming; Jeffreys, J. A. D. and Bin Zakaria, Muhamad: *J. Chem. Res., Synop.*, (1), 2-3; (1985); Miniprint, 0101-0144 (1985).
- 1877 Wechsler, A.: *Monatsh. Chem.*, **15**, 239-248 (1894).
- 1878 Wehrli, F. W.: *J. Chem. Soc., Chem. Commun.*, (16), 663-664 (1975).
- 1879 Weiss, R. and Kratz, A.: *Monatsh. Chem.*, **51**, 386-396 (1929).
- 1880 Werder, F. v. and Jung, F.: *Ber. Dtsch. Chem. Ges.*, **71**, 2650-2652 (1938).
- 1881 Wessely, F. and Kallab, F.: *Monatsh. Chem.*, **60**, 26-31 (1932).
- 1882 Wessely, F. and Moser, G. H.: *Monatsh. Chem.*, **56**, 97-105 (1930).
- 1883 Whalley, W. B.: *J. Chem. Soc.*, 105-107 (1955).
- 1884 Whalley, W. B.: *J. Chem. Soc.*, 3229-3235 (1951).
- 1885 Whalley, W. B.: *J. Chem. Soc.*, 3235-3238 (1951).
- 1886 White, W. N.; Gwynn, D.; Schlitt, R.; Girard, C. and Fife, W.: *J. Am. Chem. Soc.*, **80**, 3271-3277 (1958).
- 1887 Whitelaw, M. L. and Daniel, J. R.: *J. Agric. Food Chem.*, **39** (1), 44-51 (1991).
- 1888 Wiley, P. F.: *J. Am. Chem. Soc.*, **73**, 4205-4209 (1951).
- 1889 Williams, H. W. R. and Young, R. N.: *Eur. Pat. Appl. EP 288,202* (1988); *Chem. Abstr.*, **110**, 11450s (1989).
- 1890 Wissner, A.; Carroll, M. L.; Green, K. E.; Kerwar, S. S.; Pickett, W. C.; Schaub, R. E.; Torley, L. W.; Wrenn, S. and Kohler, C. A.: *J. Med. Chem.*, **35** (9), 1650-1662 (1992).
- 1891 Witak, D. T.; Heilman, W. P.; Sankarappa, S. K.; Cavestri, R. C. and Newman, H. A. I.: *J. Med. Chem.*, **18** (9), 934-942 (1975).
- 1892 Witak, D. T.; Kim, S. K.; Tehim, A. K.; Sternitzke, K. D.; McCreery, R. L.; Kim, S. U.; Feller, D. R.; Romstedt, K. J.; Kamanna, V. S. and Newman, H. A. I.: *J. Med. Chem.*, **31** (7), 1437-1445 (1988).
- 1893 Wittig, G. and Schulze, W.: *J. Prakt. Chem.*, **130**, 81-91 (1931).
- 1894 Wittig, G.: *Ber. Dtsch. Chem. Ges.*, **57**, 88-95 (1924).
- 1895 Wittig, G.; Baugert, F. and Richter, H. E.: *Justus Liebigs Ann. Chem.*, **446**, 155-204 (1925).
- 1896 Wojahn, H.: *Arch. Pharm.*, **271**, 417-431 (1933).
- 1897 Woltersdorf, Otto W., Jr.; Robb, Charles M.; Bicking, John B.; Watson, L. Sherman and Cragoe, Edward J., Jr.: *J. Med. Chem.*, **19** (7), 972-975 (1976).
- 1898 Wu, Hsin-Kai and Shen, Shuenn-Jyi: *J. Chromatogr., A*, **753** (1), 139-146 (1996).
- 1899 Wymann, W. E.; Davis, R.; Patterson, J. W., Jr. and Pfister, J. R.: *Synth. Commun.*, **18** (12), 1379-1384 (1988).
- 1900 Xi, Fengde; Liang, Xiaotian and Lu, Yuhua: *Huaxue Shiji*, **12** (5), 312, 299 (1990); *Chem. Abstr.*, **114**, 184917f (1991).
- 1901 Xiao, K.; Xuan, L.-J.; Xu, Y.-X.; Bai, D.-L. and Zhong, D.: *Chem. Pharm. Bull.*, **50** (5), 605-608 (2002).
- 1902 Xie, Jingxi; Wang, Lin; Liu, Chunxue and Ge, Dalun: *Zhongguo Yixue Kexueyuan Xuebao*, **8** (2), 84-87 (1986); *Chem. Abstr.*, **108**, 204365f (1988).
- 1903 Xing, Youquan; Sun, Zhizhong and Chen, Niangai: *Zhongguo Yiyao Gongye Zazhi*, **23** (7), 325-326 (1992); *Chem. Abstr.*, **118**, 233827v (1993).
- 1904 Xu, Linxiao and Giese, R. W.: *Tetrahedron Lett.*, **34** (24), 3829-3832 (1993).



- 1905 Yakobson, G. G.; Rubina, T. P. and Voroshtsov, N. N., Jr.: Dokl. Akad. Nauk SSSR, **141**, 1395-1396 (1961); Chem. Abstr., **56**, 12782c (1962).
- 1906 Yakshin, V. V.; Mirokhin, A. M. and Ignat'ev, M. M.: Kompleksn. Ispol'z. Miner. Syr'ya, **4**, 60-64 (1984); Chem. Abstr., **102**, 95339d (1985).
- 1907 Yale, H. L. and Bernstein, J.: U.S. 3,723,463 (1973); Chem. Abstr., **79**, P42582c (1973).
- 1908 Yamaguchi, S.; Takai, M.; Hanazome, I.; Okada, Y. and Kawase, Y.: Bull. Chem. Soc. Jpn. **60** (10), 3603-3605 (1987).
- 1909 Yamamoto, J.; Asano, M.; Okamoto, Y. and Sugita, K.: Chem. Express, **4** (1), 37-40 (1989).
- 1910 Yamamoto, J.; Isota, Y. and Ohkubo, N.: Nihon Yukagakkaiishi, **49** (5), 505-509 (2000); Chem. Abstr., **133**, 43115y (2000).
- 1911 Yamamoto, J.; Kurokawa, H. and Sugita, K.: Nippon Kagaku Kaishi, **11**, 2107-2110 (1985).
- 1912 Yamanaka, T. and Yaoka, O.: Jpn. Kokai Tokkyo Koho JP 62 33,143 [87 33,143] (1987); Chem. Abstr., **107**, 58650f (1987).
- 1913 Yanagita, M.: Ber. Dtsch. Chem. Ges., **71**, 2269-2273 (1938).
- 1914 Yang, Qing-chuan; Li, Hong-ming; Tang, You-qi and Huang, Wen-long: Acta Crystallogr., Sect. C: Cryst. Struct. Commun., **C52** (11), 2920-2922 (1996).
- 1915 Yao, Run-hua; Ma, Rong-Sheng; Chen, Yao-Qing and Huang, Lan-Sun: Yaoxue Xuebao, **19** (3), 228-231 (1984); Chem. Abstr., **103**, 123103p (1985).
- 1916 Yasufuku, S. and Motonaga, A.: PCT Int. Appl. WO 93 19,066 (1993); Chem. Abstr., **120**, 164170c (1994).
- 1917 Yenesew, A.; Dagne, E.; Mueller, M. and Steglich, W.: Phytochemistry, **37** (2), 525-528 (1994).
- 1918 Yoo, Moohi; Son, Mi Won; Kim, Ik Yon; Kim, Won Bae; Kim, Soon Hoe; Lee, Sang Deuk; Lim, Geun Jho; Lim, Joong In; Ahn, Byoung Ok; Baik, Nam, Gi; Kim, Dong Sung; Oh, Tae Young; Ryu, Byung Kwon; Yang, Jae Sung and Shin, Hee Chan: PCT Int. Appl. WO 98 04,541 (1998); Chem. Abstr., **128**, 180275m (1998).
- 1919 Yoo, Sung Eun; Yi, Kyu Yang; Jeong, Nak Cheol; Suh, Jee Hee; Kim, Seon Ju; Shin, Hwa Sup; Lee, Byung Ho and Jung, Kyu Sik: Eur. Pat. Appl. EP 514,935 (1992); Chem. Abstr., **118**, 169099c (1993).
- 1920 Yoo, Sung Eun; Yi, Kyu Yang; Jeong, Nak Cheol; Suh, Jee Hee; Kim, Seon Ju; Shin, Hwa Sup; Lee, Byung Ho and Jung, Kyu Sik: Eur. Pat. Appl. EP 514,942 (1992); Chem. Abstr., **118**, 147548y (1993).
- 1921 Yoshida, S.; Asami, T.; Tsuchihashi, Y.; Uji-Ie, M.; Yoneyama, K. and Takahashi, N.: Agric. Biol. Chem., **53** (1), 229-233 (1989).
- 1922 Yoshida, Z. and Haruta, M.: Tetrahedron Lett., (37), 2631-2636 (1964).
- 1923 Yoshida, Z. and Haruta, M.: Tetrahedron Lett., (42), 3745-3751 (1965).
- 1924 Yoshikawa, M.; Harada, E.; Kawaguchi, A.; Yamahara, J.; Murakami, N. and Kitagawa, I.: Chem. Pharm. Bull., **41** (3), 630-632 (1993).
- 1925 Yoshino, T.; Kijima, I. and Hashimura, I.: J. Chem. Soc. Jpn., **57**, 898-900 (1954).
- 1926 Yoshino, T.; Kijima, I.; Sugiura, M. and Shoji, T.: Yuki Gosei Kagaku Kyokai Shi, **21**, 463-465 (1963); Chem. Abstr., **59**, 7416y (1963).
- 1927 Yoshioka, T.; Horikoshi, H.; Kanai, T.; Hasegawa, K. and Aizawa, Y.: Eur. Pat. Appl. EP 277,836 (1988); Chem. Abstr., **110**, 23876u (1989).
- 1928 Yoshioka, T.; Kitazawa, E.; Kurumada, T.; Yamazaki, M.; Hasegawa, K. and Fujita, T.: Eur. Pat. Appl. EP 207,581 (1987); Chem. Abstr., **106**, 119879r (1987).
- 1929 Yoshizaki, M.; Fujino, H.; Arise, A.; Ohmura, K.; Arisawa, M. and Morita, N.: Planta Med., **53** (3), 273-275 (1987).
- 1930 Young, S. T.; Turner, J. R. and Tarbell, D. S.: J. Org. Chem., **28**, 928-932 (1963).
- 1931 Youssef, D. T. A.; Ramadan, M. A. and Khalifa, A. A.: Phytochemistry, **49** (8), 2579-2583 (1998).
- 1932 Yuan, Chengye; Xiang, Caili; Li, Shusen; Jiang, Xiqi; Wang, Jiao; Pan, Boxi and Cao, Chiming: Huaxue Xuebao **47** (10), 990-995 (1989); Chem. Abstr., **113**, 5625u (1990).
- 1933 Yuzuru, Yamamoto; Hideo, Kato; Sakae, Kurata and Kazunori, Nishide: Ger. Offen 2,521,347 (1975); Chem. Abstr., **84**, 58911y (1976).
- 1934 Zaghouani, H. and Stanislawski, M.: Mol. Immunol., **24** (12), 1237-1242 (1987).

- 1935 Zagorevskii, V. A.; Zykov, D. A. and Orlova, E. K.: Zh. Obshch. Khim., **30** (12), 3894-3898 (1960); Chem. Abstr., **55**, 22301f (1961).
- 1936 Zagorevskii, V. A.; Zykov, D. A. and Pronina, L. P.: Zh. Obshch. Khim., **29**, 1026-1030 (1959); Chem. Abstr., **54**, 1511b (1960).
- 1937 Zakis, G. and Neiberte, B.: Khim. Drev., **5**, 76-80 (1985); Chem. Abstr., **105**, 78602d (1986).
- 1938 Zakis, G.: Sintez Model'nykh Soedinenii Lignina: Metodiki (Zinatne: Riga, Latv. SSR), 1980, 288pp.; Chem. Abstr., **94**, 85998v (1981).
- 1939 Zakis, G.; Pumpura, L. and Neiberte, B.: Latv. PSR Zinat. Akad. Vestis, Kim. Ser., **5**, 627-632 (1970); Chem. Abstr., **74**, 42078q (1971).
- 1940 Zambias, R. A. and Hammoud, M. L.: Eur. Pat. Appl. EP 399,773 (1990); Chem. Abstr., **114**, 185249b (1991).
- 1941 Zdero, C.; Bohlmann, F. and Niemeyer, H. M.: Phytochemistry, **29** (10), 3247-3253 (1990).
- 1942 Zdero, C.; Bohlmann, F. and Niemeyer, H. M.: Phytochemistry, **30** (2), 693-695 (1991).
- 1943 Zemplen, G. and Bogner, R.: Ber. Dtsch. Chem. Ges., **75**, 645-649 (1942).
- 1944 Zemplen, G.; Bogner, R. and Mechner, J.: Ber. Dtsch. Chem. Ges., **77**, 99-108 (1944).
- 1945 Zemplen, G.; Bogner, R. and Thiele, K.: Ber. Dtsch. Chem. Ges., **77**, 446-451 (1944).
- 1946 Zhang, C.; Liu, F. and Zhu, H.: Yingyong Huaxue, **15** (5), 68-70 (1998); Chem. Abstr., **130**, 66291c (1999).
- 1947 Zhang, D.; Wu, B.; Li, X. and Zhu, T.: Zhongcaoyao, **24** (6), 286-288 (1993); Chem. Abstr., **119**, 156310n (1993).
- 1948 Zhang, F. and Li, Y.: Chin. Chem. Lett., **1** (1), 95-96 (1990).
- 1949 Zhang, F. and Li, Y.: Huaxue Xuebao, **49** (5), 498-501 (1991); Chem. Abstr., **115**, 135736h (1991).
- 1950 Zhang, H. and Ding, Y.: Zhiwu Ziyuan Yu Huanjing, **1** (3), 6-9 (1992); Chem. Abstr., **118**, 35926p (1993).
- 1951 Zhao, K.; Xu, G.; Jin, R.; Xu, L. and Cong, X.: Zhongcaoyao, **25** (2), 66-67, 75 (1995); Chem. Abstr., **122**, 299184x (1995).
- 1952 Zhao, L. Y. and Li, Y.: Chin. Chem. Lett., **5** (12), 1009-1012 (1994); Chem. Abstr., **122**, 160314w (1995).
- 1953 Zhao, L. Y.; Bu, X. Y. and Li, Y.: Bull. Soc. Chim. Belg., **104** (2), 119-120 (1995).
- 1954 Zhao, L. Y.; Bu, X. Y. and Li, Y.: Chin. Chem. Lett., **6** (5), 367-368 (1995); Chem. Abstr., **123**, 82991u (1995).
- 1955 Zilberman, E. N. and Rybakova, N. A.: Zh. Obshch. Khim., **30** (6), 1992-1996 (1960).
- 1956 Zilberman, E. N. and Rybakova, N. A.: Zh. Obshch. Khim., **32** (2), 591-596 (1962).
- 1957 Zilberman, J.; Ioffe, D. and Gozlan, I.: Synthesis, (7), 659-660 (1992).
- 1958 Zolfigol, M. A.; Ghaemi, E. and Madrakian, E.: Synlett, (2), 191-194 (2003).
- 1959 Zolfigol, M. A.; Madrakian, E. and Ghaemi, E.: Indian J. Chem., Sect. B: Org. Chem. Incl. Med. Chem., **40B** (12), 1191-1195 (2001).

## MOLECULAR FORMULA INDEX

### **C<sub>8</sub>H<sub>4</sub>F<sub>4</sub>O<sub>2</sub>**

1-(2,3,4,5-Tetrafluoro-6-hydroxyphenyl)ethanone, 3  
1-(2,3,5,6-Tetrafluoro-4-hydroxyphenyl)ethanone, 3

### **C<sub>8</sub>H<sub>5</sub>Br<sub>2</sub>NO<sub>4</sub>**

1-(3,5-Dibromo-2-hydroxy-4-nitrophenyl)ethanone, 3

### **C<sub>8</sub>H<sub>5</sub>Br<sub>3</sub>O<sub>2</sub>**

1-(2,4,6-Tribromo-3-hydroxyphenyl)ethanone, 3  
1-(3,4,5-Tribromo-2-hydroxyphenyl)ethanone, 4

### **C<sub>8</sub>H<sub>5</sub>ClN<sub>2</sub>O<sub>6</sub>**

1-(4-Chloro-2-hydroxy-3,5-dinitrophenyl)ethanone, 4

### **C<sub>8</sub>H<sub>5</sub>Cl<sub>2</sub>NO<sub>4</sub>**

1-(4,6-Dichloro-2-hydroxy-3-nitrophenyl)ethanone, 4

### **C<sub>8</sub>H<sub>5</sub>Cl<sub>3</sub>O<sub>2</sub>**

1-(Trichloro-4-hydroxyphenyl)ethanone, 5  
1-(3,4,6-Trichloro-2-hydroxyphenyl)ethanone, 4

### **C<sub>8</sub>H<sub>5</sub>Cl<sub>3</sub>O<sub>3</sub>**

1-(2,3,6-Trichloro-4,5-dihydroxyphenyl)ethanone, 5  
1-(2,4,5-Trichloro-3,6-dihydroxyphenyl)ethanone, 5

### **C<sub>8</sub>H<sub>5</sub>F<sub>3</sub>O<sub>3</sub>**

1-(2,3,5-Trifluoro-4,6-dihydroxyphenyl)ethanone, 5

### **C<sub>8</sub>H<sub>6</sub>BrClO<sub>2</sub>**

1-(3-Bromo-5-chloro-2-hydroxyphenyl)ethanone, 6  
1-(3-Bromo-5-chloro-4-hydroxyphenyl)ethanone, 6

### **C<sub>8</sub>H<sub>6</sub>BrFO<sub>2</sub>**

1-(3-Bromo-5-fluoro-2-hydroxyphenyl)ethanone, 6  
1-(3-Bromo-5-fluoro-4-hydroxyphenyl)ethanone, 6

### **C<sub>8</sub>H<sub>6</sub>BrIO<sub>2</sub>**

1-(5-Bromo-2-hydroxy-3-iodophenyl)ethanone, 7

### **C<sub>8</sub>H<sub>6</sub>BrNO<sub>4</sub>**

1-(3-Bromo-2-hydroxy-5-nitrophenyl)ethanone, 7

1-(3-Bromo-4-hydroxy-5-nitrophenyl)ethanone, 7  
1-(5-Bromo-2-hydroxy-3-nitrophenyl)ethanone, 7

**C<sub>8</sub>H<sub>6</sub>BrNO<sub>5</sub>**

1-(3-Bromo-2,4-dihydroxy-5-nitrophenyl)ethanone, 8  
1-(3-Bromo-2,6-dihydroxy-5-nitrophenyl)ethanone, 8

**C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>2</sub>**

1-(2,4-Dibromo-6-hydroxyphenyl)ethanone, 8  
1-(2,6-Dibromo-4-hydroxyphenyl)ethanone, 8  
1-(3,4-Dibromo-2-hydroxyphenyl)ethanone, 9  
1-(3,5-Dibromo-2-hydroxyphenyl)ethanone, 9  
1-(3,5-Dibromo-4-hydroxyphenyl)ethanone, 9  
1-(4,5-Dibromo-2-hydroxyphenyl)ethanone, 10

**C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>3</sub>**

1-(2,5-Dibromo-3,6-dihydroxyphenyl)ethanone, 10  
1-(3,5-Dibromo-2,4-dihydroxyphenyl)ethanone, 10  
1-(3,5-Dibromo-2,6-dihydroxyphenyl)ethanone, 11

**C<sub>8</sub>H<sub>6</sub>Br<sub>2</sub>O<sub>4</sub>**

1-(2,3-Dibromo-4,5,6-trihydroxyphenyl)ethanone, 11  
1-(3,5-Dibromo-2,4,6-trihydroxyphenyl)ethanone, 11

**C<sub>8</sub>H<sub>6</sub>ClFO<sub>2</sub>**

1-(3-Chloro-4-fluoro-2-hydroxyphenyl)ethanone, 11  
1-(3-Chloro-5-fluoro-2-hydroxyphenyl)ethanone, 12  
1-(4-Chloro-2-fluoro-5-hydroxyphenyl)ethanone, 12  
1-(4-Chloro-5-fluoro-2-hydroxyphenyl)ethanone, 12

**C<sub>8</sub>H<sub>6</sub>ClIO<sub>2</sub>**

1-(3-Chloro-2-hydroxy-5-iodophenyl)ethanone, 12  
1-(5-Chloro-2-hydroxy-3-iodophenyl)ethanone, 13

**C<sub>8</sub>H<sub>6</sub>ClIO<sub>3</sub>**

1-(5-Chloro-2,4-dihydroxy-3-iodophenyl)ethanone, 13

**C<sub>8</sub>H<sub>6</sub>ClNO<sub>4</sub>**

1-(3-Chloro-4-hydroxy-5-nitrophenyl)ethanone, 13  
1-(4-Chloro-2-hydroxy-3-nitrophenyl)ethanone, 13  
1-(4-Chloro-2-hydroxy-5-nitrophenyl)ethanone, 13  
1-(5-Chloro-2-hydroxy-3-nitrophenyl)ethanone, 14

**C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>2</sub>**

1-(2,3-Dichloro-4-hydroxyphenyl)ethanone, 14  
1-(2,4-Dichloro-3-hydroxyphenyl)ethanone, 14  
1-(2,4-Dichloro-6-hydroxyphenyl)ethanone, 15

1-(2,5-Dichloro-4-hydroxyphenyl)ethanone, 15  
1-(2,6-Dichloro-4-hydroxyphenyl)ethanone, 15  
1-(3,4-Dichloro-2-hydroxyphenyl)ethanone, 15  
1-(3,5-Dichloro-2-hydroxyphenyl)ethanone, 16  
1-(3,5-Dichloro-4-hydroxyphenyl)ethanone, 16  
1-(3,6-Dichloro-2-hydroxyphenyl)ethanone, 16  
1-(4,5-Dichloro-2-hydroxyphenyl)ethanone, 17

**C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>3</sub>**

1-(3,4-Dichloro-2,5-dihydroxyphenyl)ethanone, 17  
1-(3,5-Dichloro-2,4-dihydroxyphenyl)ethanone, 17  
1-(3,5-Dichloro-2,6-dihydroxyphenyl)ethanone, 17

**C<sub>8</sub>H<sub>6</sub>FNO<sub>4</sub>**

1-(4-Fluoro-2-hydroxy-5-nitrophenyl)ethanone, 18  
1-(5-Fluoro-2-hydroxy-3-nitrophenyl)ethanone, 18

**C<sub>8</sub>H<sub>6</sub>F<sub>2</sub>O<sub>2</sub>**

1-(3,5-Difluoro-2-hydroxyphenyl)ethanone, 18  
1-(3,5-Difluoro-4-hydroxyphenyl)ethanone, 18  
1-(4,5-Difluoro-2-hydroxyphenyl)ethanone, 19

**C<sub>8</sub>H<sub>6</sub>INO<sub>4</sub>**

1-(4-Hydroxy-3-iodo-5-nitrophenyl)ethanone, 19

**C<sub>8</sub>H<sub>6</sub>INO<sub>5</sub>**

1-(2,4-Dihydroxy-3-iodo-5-nitrophenyl)ethanone, 19

**C<sub>8</sub>H<sub>6</sub>I<sub>2</sub>O<sub>2</sub>**

1-(2-Hydroxy-3,5-diiodophenyl)ethanone, 19  
1-(4-Hydroxy-3,5-diiodophenyl)ethanone, 20

**C<sub>8</sub>H<sub>6</sub>I<sub>2</sub>O<sub>3</sub>**

1-(2,4-Dihydroxy-3,5-diiodophenyl)ethanone, 20

**C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>6</sub>**

1-(2-Hydroxy-3,5-dinitrophenyl)ethanone, 20  
1-(2-Hydroxy-4,6-dinitrophenyl)ethanone, 20  
1-(3-Hydroxy-2,6-dinitrophenyl)ethanone, 21  
1-(4-Hydroxy-3,5-dinitrophenyl)ethanone, 21  
1-(5-Hydroxy-2,4-dinitrophenyl)ethanone, 21

**C<sub>8</sub>H<sub>6</sub>N<sub>2</sub>O<sub>7</sub>**

1-(2,4-Dihydroxy-3,5-dinitrophenyl)ethanone, 21  
1-(2,5-Dihydroxy-3,6-dinitrophenyl)ethanone, 22  
1-(2,6-Dihydroxy-3,5-dinitrophenyl)ethanone, 22  
1-(3,6-Dihydroxy-2,4-dinitrophenyl)ethanone, 22

**C<sub>8</sub>H<sub>7</sub>BrO<sub>2</sub>**

1-(2-Bromo-4-hydroxyphenyl)ethanone, 23  
1-(2-Bromo-6-hydroxyphenyl)ethanone, 23  
1-(3-Bromo-2-hydroxyphenyl)ethanone, 23  
1-(3-Bromo-4-hydroxyphenyl)ethanone, 23  
1-(4-Bromo-2-hydroxyphenyl)ethanone, 24  
1-(4-Bromo-3-hydroxyphenyl)ethanone, 24  
1-(5-Bromo-2-hydroxyphenyl)ethanone, 24

**C<sub>8</sub>H<sub>7</sub>BrO<sub>3</sub>**

1-(2-Bromo-3,6-dihydroxyphenyl)ethanone, 25  
1-(3-Bromo-2,4-dihydroxyphenyl)ethanone, 25  
1-(3-Bromo-2,5-dihydroxyphenyl)ethanone, 25  
1-(3-Bromo-2,6-dihydroxyphenyl)ethanone, 26  
1-(4-Bromo-2,5-dihydroxyphenyl)ethanone, 26  
1-(5-Bromo-2,4-dihydroxyphenyl)ethanone, 26

**C<sub>8</sub>H<sub>7</sub>BrO<sub>4</sub>**

1-(3-Bromo-2,4,6-trihydroxyphenyl)ethanone, 27  
1-(5-Bromo-2,3,4-trihydroxyphenyl)ethanone, 27

**C<sub>8</sub>H<sub>7</sub>ClO<sub>2</sub>**

1-(2-Chloro-3-hydroxyphenyl)ethanone, 27  
1-(2-Chloro-4-hydroxyphenyl)ethanone, 27  
1-(2-Chloro-5-hydroxyphenyl)ethanone, 28  
1-(2-Chloro-6-hydroxyphenyl)ethanone, 28  
1-(3-Chloro-2-hydroxyphenyl)ethanone, 28  
1-(3-Chloro-4-hydroxyphenyl)ethanone, 28  
1-(3-Chloro-5-hydroxyphenyl)ethanone, 29  
1-(4-Chloro-2-hydroxyphenyl)ethanone, 29  
1-(4-Chloro-3-hydroxyphenyl)ethanone, 30  
1-(5-Chloro-2-hydroxyphenyl)ethanone, 30

**C<sub>8</sub>H<sub>7</sub>ClO<sub>3</sub>**

1-(2-Chloro-3,4-dihydroxyphenyl)ethanone, 31  
1-(2-Chloro-3,6-dihydroxyphenyl)ethanone, 31  
1-(2-Chloro-4,5-dihydroxyphenyl)ethanone, 31  
1-(3-Chloro-2,6-dihydroxyphenyl)ethanone, 32  
1-(3-Chloro-4,5-dihydroxyphenyl)ethanone, 32  
1-(4-Chloro-2,5-dihydroxyphenyl)ethanone, 32  
1-(5-Chloro-2,4-dihydroxyphenyl)ethanone, 32

**C<sub>8</sub>H<sub>7</sub>ClO<sub>4</sub>**

1-(3-Chloro-2,4,6-trihydroxyphenyl)ethanone, 33

**C<sub>8</sub>H<sub>7</sub>FO<sub>2</sub>**

1-(2-Fluoro-4-hydroxyphenyl)ethanone, 33  
1-(2-Fluoro-5-hydroxyphenyl)ethanone, 33  
1-(2-Fluoro-6-hydroxyphenyl)ethanone, 33

1-(3-Fluoro-2-hydroxyphenyl)ethanone, 34  
1-(3-Fluoro-4-hydroxyphenyl)ethanone, 34  
1-(4-Fluoro-2-hydroxyphenyl)ethanone, 34  
1-(5-Fluoro-2-hydroxyphenyl)ethanone, 35

**C<sub>8</sub>H<sub>7</sub>FO<sub>3</sub>**

1-(3-Fluoro-2,6-dihydroxyphenyl)ethanone, 35  
1-(4-Fluoro-2,5-dihydroxyphenyl)ethanone, 35

**C<sub>8</sub>H<sub>7</sub>IO<sub>2</sub>**

1-(2-Hydroxy-3-iodophenyl)ethanone, 36  
1-(2-Hydroxy-4-iodophenyl)ethanone, 36  
1-(2-Hydroxy-5-iodophenyl)ethanone, 36  
1-(3-Hydroxy-2-iodophenyl)ethanone, 37  
1-(3-Hydroxy-4-iodophenyl)ethanone, 37  
1-(4-Hydroxy-2-iodophenyl)ethanone, 37  
1-(4-Hydroxy-3-iodophenyl)ethanone, 37

**C<sub>8</sub>H<sub>7</sub>IO<sub>3</sub>**

1-(2,4-Dihydroxy-3-iodophenyl)ethanone, 38  
1-(2,4-Dihydroxy-5-iodophenyl)ethanone, 38

**C<sub>8</sub>H<sub>7</sub>NO<sub>3</sub>**

1-(2-Hydroxy-5-nitrosophenyl)ethanone, 38  
1-(4-Hydroxy-3-nitrosophenyl)ethanone, 39

**C<sub>8</sub>H<sub>7</sub>NO<sub>4</sub>**

1-(2-Hydroxy-3-nitrophenyl)ethanone, 39  
1-(2-Hydroxy-4-nitrophenyl)ethanone, 39  
1-(2-Hydroxy-5-nitrophenyl)ethanone, 40  
1-(3-Hydroxy-2-nitrophenyl)ethanone, 40  
1-(3-Hydroxy-4-nitrophenyl)ethanone, 40  
1-(3-Hydroxy-5-nitrophenyl)ethanone, 41  
1-(4-Hydroxy-3-nitrophenyl)ethanone, 41  
1-(5-Hydroxy-2-nitrophenyl)ethanone, 42

**C<sub>8</sub>H<sub>7</sub>NO<sub>5</sub>**

1-(2,4-Dihydroxy-3-nitrophenyl)ethanone, 42  
1-(2,4-Dihydroxy-5-nitrophenyl)ethanone, 42  
1-(2,5-Dihydroxy-3-nitrophenyl)ethanone, 43  
1-(2,6-Dihydroxy-3-nitrophenyl)ethanone, 43  
1-(3,4-Dihydroxy-5-nitrophenyl)ethanone, 43

**C<sub>8</sub>H<sub>7</sub>NO<sub>6</sub>**

1-(2,4,6-Trihydroxy-3-nitrophenyl)ethanone, 44

**C<sub>8</sub>H<sub>8</sub>BrNO<sub>2</sub>**

1-(3-Amino-5-bromo-2-hydroxyphenyl)ethanone, 44

**C<sub>8</sub>H<sub>8</sub>BrNO<sub>2</sub>, HCl**

1-(5-Amino-3-bromo-2-hydroxyphenyl)ethanone (*Hydrochloride*), 44

**C<sub>8</sub>H<sub>8</sub>ClNO<sub>2</sub>**

1-(3-Amino-5-chloro-2-hydroxyphenyl)ethanone, 44

1-(5-Amino-4-chloro-2-hydroxyphenyl)ethanone, 45

**C<sub>8</sub>H<sub>8</sub>ClNO<sub>2</sub>, HCl**

1-(3-Amino-5-chloro-2-hydroxyphenyl)ethanone (*Hydrochloride*), 45

**C<sub>8</sub>H<sub>8</sub>ClNO<sub>4</sub>S**

1-[5-(Aminosulfonyl)-4-chloro-2-hydroxyphenyl]ethanone, 45

**C<sub>8</sub>H<sub>8</sub>FNO<sub>2</sub>**

1-(3-Amino-5-fluoro-2-hydroxyphenyl)ethanone, 45

1-(5-Amino-4-fluoro-2-hydroxyphenyl)ethanone, 45

**C<sub>8</sub>H<sub>8</sub>N<sub>2</sub>O<sub>4</sub>**

1-(3-Amino-2-hydroxy-5-nitrophenyl)ethanone, 46

1-(5-Amino-2-hydroxy-3-nitrophenyl)ethanone, 46

**C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>**

1-(2-Hydroxyphenyl)ethanone, 46

1-(3-Hydroxyphenyl)ethanone, 48

1-(4-Hydroxyphenyl)ethanone, 49

**C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>S**

1-(2-Hydroxy-4-mercaptophenyl)ethanone, 51

1-(2-Hydroxy-5-mercaptophenyl)ethanone, 51

1-(2-Hydroxy-6-mercaptophenyl)ethanone, 52

1-(4-Hydroxy-3-mercaptophenyl)ethanone, 52

**C<sub>8</sub>H<sub>8</sub>O<sub>3</sub>**

1-(2,3-Dihydroxyphenyl)ethanone, 52

1-(2,4-Dihydroxyphenyl)ethanone (*Resacetophenone*), 53

1-(2,4-Dihydroxyphenyl)ethanone-<sup>13</sup>C<sub>2</sub>, 54

1-(2,5-Dihydroxyphenyl)ethanone (*Quinacetophenone*), 54

1-(2,6-Dihydroxyphenyl)ethanone (*γ-Resacetophenone*), 55

1-(3,4-Dihydroxyphenyl)ethanone, 56

1-(3,5-Dihydroxyphenyl)ethanone, 57

**C<sub>8</sub>H<sub>8</sub>O<sub>4</sub>**

1-(2,3,4-Trihydroxyphenyl)ethanone (*Gallacetophenone*), 57

1-(2,3,6-Trihydroxyphenyl)ethanone, 58

1-(2,4,5-Trihydroxyphenyl)ethanone, 58

1-(2,4,6-Trihydroxyphenyl)ethanone (*Phloracetophenone*), 59



1-(3,4,5-Trihydroxyphenyl)ethanone, 60

**C<sub>8</sub>H<sub>8</sub>O<sub>5</sub>**

1-(2,3,4,6-Tetrahydroxyphenyl)ethanone, 60

1-(2,3,5,6-Tetrahydroxyphenyl)ethanone, 60

**C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>**

1-(2-Amino-3-hydroxyphenyl)ethanone, 61

1-(2-Amino-4-hydroxyphenyl)ethanone, 62

1-(2-Amino-5-hydroxyphenyl)ethanone, 62

1-(3-Amino-2-hydroxyphenyl)ethanone, 62

1-(3-Amino-4-hydroxyphenyl)ethanone, 63

1-(4-Amino-2-hydroxyphenyl)ethanone, 64

1-(4-Amino-3-hydroxyphenyl)ethanone, 64

1-(5-Amino-2-hydroxyphenyl)ethanone, 65

**C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HBr**

1-(3-Amino-2-hydroxyphenyl)ethanone (*Hydrobromide*), 63

1-(3-Amino-4-hydroxyphenyl)ethanone (*Hydrobromide*), 63

**C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, HCl**

1-(2-Amino-3-hydroxyphenyl)ethanone (*Hydrochloride*), 61

1-(3-Amino-2-hydroxyphenyl)ethanone (*Hydrochloride*), 63

1-(3-Amino-4-hydroxyphenyl)ethanone (*Hydrochloride*), 64

1-(4-Amino-2-hydroxyphenyl)ethanone (*Hydrochloride*), 64

1-(5-Amino-2-hydroxyphenyl)ethanone (*Hydrochloride*), 65

**2 C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub>**

1-(5-Amino-2-hydroxyphenyl)ethanone (*Sulfate*), 65

**C<sub>8</sub>H<sub>9</sub>NO<sub>3</sub>**

1-(5-Amino-2,4-dihydroxyphenyl)ethanone, 65

**C<sub>8</sub>H<sub>9</sub>NO<sub>3</sub>, HCl**

1-(5-Amino-2,4-dihydroxyphenyl)ethanone (*Hydrochloride*), 66

**C<sub>9</sub>H<sub>7</sub>Cl<sub>3</sub>O<sub>3</sub>**

1-(2,3,6-Trichloro-4-hydroxy-5-methoxyphenyl)ethanone, 66

**C<sub>9</sub>H<sub>7</sub>F<sub>3</sub>O<sub>2</sub>**

1-[2-Hydroxy-5-(trifluoromethyl)phenyl]ethanone, 66

1-[4-Hydroxy-3-(trifluoromethyl)phenyl]ethanone, 66

**C<sub>9</sub>H<sub>7</sub>F<sub>3</sub>O<sub>3</sub>**

1-[2-Hydroxy-5-(trifluoromethoxy)phenyl]ethanone, 67

**C<sub>9</sub>H<sub>7</sub>F<sub>3</sub>O<sub>4</sub>S**

1-[2,4,6-Trihydroxy-3-[(trifluoromethyl)thio]phenyl]ethanone, 67

**C<sub>9</sub>H<sub>7</sub>N<sub>3</sub>O<sub>8</sub>**

1-(3-Hydroxy-5-methyl-2,4,6-trinitrophenyl)ethanone, 67

**C<sub>9</sub>H<sub>8</sub>BrClO<sub>2</sub>**

1-[3-Bromo-5-(chloromethyl)-4-hydroxyphenyl]ethanone, 67

1-[3-(Bromomethyl)-5-chloro-2-hydroxyphenyl]ethanone, 68

**C<sub>9</sub>H<sub>8</sub>BrNO<sub>5</sub>**

1-(3-Bromo-2-hydroxy-4-methoxy-5-nitrophenyl)ethanone, 68

1-(3-Bromo-6-hydroxy-2-methoxy-5-nitrophenyl)ethanone, 68

1-(5-Bromo-2-hydroxy-4-methoxy-3-nitrophenyl)ethanone, 68

**C<sub>9</sub>H<sub>8</sub>Br<sub>2</sub>O<sub>2</sub>**

1-(2,4-Dibromo-6-hydroxy-3-methylphenyl)ethanone, 69

1-(3,5-Dibromo-2-hydroxy-4-methylphenyl)ethanone, 69

**C<sub>9</sub>H<sub>8</sub>Br<sub>2</sub>O<sub>3</sub>**

1-(3,5-Dibromo-2-hydroxy-6-methoxyphenyl)ethanone, 69

**C<sub>9</sub>H<sub>8</sub>ClIO<sub>2</sub>**

1-(5-Chloro-2-hydroxy-3-iodo-4-methylphenyl)ethanone, 69

**C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>2</sub>**

1-[3-Chloro-5-(chloromethyl)-2-hydroxyphenyl]ethanone, 70

1-[5-Chloro-3-(chloromethyl)-2-hydroxyphenyl]ethanone, 70

1-(2,3-Dichloro-4-hydroxy-6-methylphenyl)ethanone, 70

1-(3,5-Dichloro-2-hydroxy-6-methylphenyl)ethanone, 70

**C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>3</sub>**

1-(3,5-Dichloro-2,6-dihydroxy-4-methylphenyl)ethanone, 71

1-(2,3-Dichloro-4-hydroxy-5-methoxyphenyl)ethanone, 71

1-(3,5-Dichloro-2-hydroxy-6-methoxyphenyl)ethanone, 71

**C<sub>9</sub>H<sub>8</sub>Cl<sub>2</sub>O<sub>4</sub>**

1-(2,6-Dichloro-3,4-dihydroxy-5-methoxyphenyl)ethanone, 71

**C<sub>9</sub>H<sub>8</sub>I<sub>2</sub>O<sub>3</sub>**

1-(2-Hydroxy-3,5-diiodo-4-methoxyphenyl)ethanone, 72

1-(2-Hydroxy-3,5-diiodo-6-methoxyphenyl)ethanone, 72

**C<sub>9</sub>H<sub>8</sub>N<sub>2</sub>O<sub>7</sub>**

1-(3-Hydroxy-6-methoxy-2,4-dinitrophenyl)ethanone, 72

**C<sub>9</sub>H<sub>8</sub>O<sub>4</sub>**

1-(4-Hydroxy-1,3-benzodioxol-5-yl)ethanone, 72

1-(6-Hydroxy-1,3-benzodioxol-5-yl)ethanone, 73

**C<sub>9</sub>H<sub>9</sub>BrO<sub>2</sub>**

1-(2-Bromo-6-hydroxy-4-methylphenyl)ethanone, 73

1-(3-Bromo-2-hydroxy-5-methylphenyl)ethanone, 73

1-(3-Bromo-4-hydroxy-5-methylphenyl)ethanone, 74

1-(5-Bromo-2-hydroxy-3-methylphenyl)ethanone, 74

1-(5-Bromo-2-hydroxy-4-methylphenyl)ethanone, 74

**C<sub>9</sub>H<sub>9</sub>BrO<sub>3</sub>**

1-(3-Bromo-2-hydroxy-4-methoxyphenyl)ethanone, 75

1-(3-Bromo-2-hydroxy-5-methoxyphenyl)ethanone, 75

1-(3-Bromo-2-hydroxy-6-methoxyphenyl)ethanone, 75

1-(3-Bromo-4-hydroxy-5-methoxyphenyl)ethanone, 75

1-(4-Bromo-2-hydroxy-5-methoxyphenyl)ethanone, 76

1-(5-Bromo-2-hydroxy-3-methoxyphenyl)ethanone, 76

1-(5-Bromo-2-hydroxy-4-methoxyphenyl)ethanone, 76

1-(5-Bromo-4-hydroxy-2-methoxyphenyl)ethanone, 77

**C<sub>9</sub>H<sub>9</sub>BrO<sub>4</sub>**

1-(5-Bromo-2,4-dihydroxy-3-methoxyphenyl)ethanone, 77

**C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>**

1-(2-Chloro-6-hydroxy-4-methylphenyl)ethanone, 77

1-(3-Chloro-2-hydroxy-5-methylphenyl)ethanone, 77

1-(3-Chloro-2-hydroxy-6-methylphenyl)ethanone, 78

1-(3-Chloro-4-hydroxy-5-methylphenyl)ethanone, 78

1-(4-Chloro-2-hydroxy-3-methylphenyl)ethanone, 78

1-(4-Chloro-2-hydroxy-5-methylphenyl)ethanone, 78

1-(4-Chloro-2-hydroxy-6-methylphenyl)ethanone, 78

1-(5-Chloro-2-hydroxy-3-methylphenyl)ethanone, 79

1-(5-Chloro-2-hydroxy-4-methylphenyl)ethanone, 79

1-[3-(Chloromethyl)-2-hydroxyphenyl]ethanone, 79

1-[3-(Chloromethyl)-4-hydroxyphenyl]ethanone, 80

1-[4-(Chloromethyl)-2-hydroxyphenyl]ethanone, 80

1-[5-(Chloromethyl)-2-hydroxyphenyl]ethanone, 80

**C<sub>9</sub>H<sub>9</sub>ClO<sub>3</sub>**

1-(3-Chloro-2,6-dihydroxy-5-methylphenyl)ethanone, 80

1-[5-Chloro-2-hydroxy-3-(hydroxymethyl)phenyl]ethanone, 81

1-(2-Chloro-4-hydroxy-3-methoxyphenyl)ethanone, 81

1-(2-Chloro-4-hydroxy-5-methoxyphenyl)ethanone, 81

1-(2-Chloro-6-hydroxy-4-methoxyphenyl)ethanone, 81

1-(3-Chloro-2-hydroxy-5-methoxyphenyl)ethanone, 82

1-(3-Chloro-2-hydroxy-6-methoxyphenyl)ethanone, 82  
1-(3-Chloro-4-hydroxy-5-methoxyphenyl)ethanone, 82  
1-(3-Chloro-6-hydroxy-2-methoxyphenyl)ethanone, 83  
1-(4-Chloro-2-hydroxy-5-methoxyphenyl)ethanone, 83  
1-(4-Chloro-2-hydroxy-6-methoxyphenyl)ethanone, 83  
1-(5-Chloro-2-hydroxy-4-methoxyphenyl)ethanone, 83

**C<sub>9</sub>H<sub>9</sub>ClO<sub>4</sub>**

1-(2-Chloro-3,6-dihydroxy-5-methoxyphenyl)ethanone, 84  
1-(3-Chloro-2,4-dihydroxy-6-methoxyphenyl)ethanone, 84  
1-(3-Chloro-2,4,6-trihydroxy-5-methylphenyl)ethanone, 84

**C<sub>9</sub>H<sub>9</sub>FO<sub>3</sub>**

1-(3-Fluoro-2-hydroxy-6-methoxyphenyl)ethanone, 84  
1-(3-Fluoro-6-hydroxy-2-methoxyphenyl)ethanone, 84

**C<sub>9</sub>H<sub>9</sub>IO<sub>2</sub>**

1-(2-Hydroxy-3-iodo-5-methylphenyl)ethanone, 85  
1-(2-Hydroxy-4-iodo-3-methylphenyl)ethanone, 85  
1-(4-Hydroxy-3-iodo-5-methylphenyl)ethanone, 85

**C<sub>9</sub>H<sub>9</sub>IO<sub>3</sub>**

1-(2-Hydroxy-3-iodo-4-methoxyphenyl)ethanone, 85  
1-(2-Hydroxy-3-iodo-6-methoxyphenyl)ethanone, 86  
1-(2-Hydroxy-5-iodo-4-methoxyphenyl)ethanone, 86  
1-(4-Hydroxy-3-iodo-5-methoxyphenyl)ethanone, 86  
1-(6-Hydroxy-3-iodo-2-methoxyphenyl)ethanone, 87

**C<sub>9</sub>H<sub>9</sub>IO<sub>4</sub>**

1-(2,4-Dihydroxy-3-iodo-6-methoxyphenyl)ethanone, 87  
1-(2,5-Dihydroxy-3-iodo-4-methoxyphenyl)ethanone, 87

**C<sub>9</sub>H<sub>9</sub>NO<sub>4</sub>**

1-(2-Hydroxy-3-methyl-4-nitrophenyl)ethanone, 87  
1-(2-Hydroxy-3-methyl-5-nitrophenyl)ethanone, 88  
1-(2-Hydroxy-4-methyl-5-nitrophenyl)ethanone, 88  
1-(2-Hydroxy-5-methyl-3-nitrophenyl)ethanone, 88  
1-(2-Hydroxy-5-methyl-4-nitrophenyl)ethanone, 88  
1-(3-Hydroxy-2-methyl-4-nitrophenyl)ethanone, 89  
1-(3-Hydroxy-4-methyl-5-nitrophenyl)ethanone, 89  
1-(3-Hydroxy-5-methyl-2-nitrophenyl)ethanone, 89  
1-(3-Hydroxy-5-methyl-4-nitrophenyl)ethanone, 89  
1-(4-Hydroxy-2-methyl-5-nitrophenyl)ethanone, 89  
1-(4-Hydroxy-3-methyl-5-nitrophenyl)ethanone, 90  
1-(5-Hydroxy-3-methyl-2-nitrophenyl)ethanone, 90

**C<sub>9</sub>H<sub>9</sub>NO<sub>5</sub>**

1-(2,4-Dihydroxy-3-methyl-5-nitrophenyl)ethanone, 90  
1-(2,5-Dihydroxy-4-methyl-3-nitrophenyl)ethanone, 90

1-(2-Hydroxy-4-methoxy-3-nitrophenyl)ethanone, 91  
1-(2-Hydroxy-4-methoxy-5-nitrophenyl)ethanone, 91  
1-(2-Hydroxy-5-methoxy-3-nitrophenyl)ethanone, 91  
1-(2-Hydroxy-6-methoxy-3-nitrophenyl)ethanone, 91  
1-(4-Hydroxy-2-methoxy-5-nitrophenyl)ethanone, 92  
1-(4-Hydroxy-3-methoxy-5-nitrophenyl)ethanone, 92  
1-(4-Hydroxy-5-methoxy-2-nitrophenyl)ethanone, 92

**C<sub>9</sub>H<sub>9</sub>NO<sub>6</sub>S**

1-[2-Hydroxy-5-(methylsulfonyl)-3-nitrophenyl]ethanone, 93

**C<sub>9</sub>H<sub>9</sub>N<sub>3</sub>O<sub>2</sub>**

1-[3-(Azidomethyl)-4-hydroxyphenyl]ethanone, 93

**C<sub>9</sub>H<sub>10</sub>BrNO<sub>2</sub>**

1-[3-(Aminomethyl)-5-bromo-4-hydroxyphenyl]ethanone, 93

**C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>**

1-(2-Hydroxy-3-methylphenyl)ethanone, 93  
1-(2-Hydroxy-4-methylphenyl)ethanone, 94  
1-(2-Hydroxy-5-methylphenyl)ethanone, 95  
1-(2-Hydroxy-6-methylphenyl)ethanone, 97  
1-(3-Hydroxy-2-methylphenyl)ethanone, 98  
1-(3-Hydroxy-4-methylphenyl)ethanone, 98  
1-(3-Hydroxy-5-methylphenyl)ethanone, 98  
1-(4-Hydroxy-2-methylphenyl)ethanone, 99  
1-(4-Hydroxy-3-methylphenyl)ethanone, 99  
1-(5-Hydroxy-2-methylphenyl)ethanone, 100

**C<sub>9</sub>H<sub>10</sub>O<sub>2</sub>S**

1-[2-Hydroxy-5-(methylthio)phenyl]ethanone, 101  
1-[4-Hydroxy-3-(methylthio)phenyl]ethanone, 101

**C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>**

1-(2,3-Dihydroxy-4-methylphenyl)ethanone, 101  
1-(2,3-Dihydroxy-5-methylphenyl)ethanone, 101  
1-(2,3-Dihydroxy-6-methylphenyl)ethanone, 102  
1-(2,4-Dihydroxy-3-methylphenyl)ethanone, 102  
1-(2,4-Dihydroxy-5-methylphenyl)ethanone, 102  
1-(2,4-Dihydroxy-6-methylphenyl)ethanone (*Orcacetophenone*;  $\beta$ -*Orcacetophenone*; *Orsacetophenone*), 103  
1-(2,5-Dihydroxy-3-methylphenyl)ethanone, 103  
1-(2,5-Dihydroxy-4-methylphenyl)ethanone, 104  
1-(2,6-Dihydroxy-3-methylphenyl)ethanone, 104  
1-(2,6-Dihydroxy-4-methylphenyl)ethanone ( $\gamma$  or *p-Orcacetophenone*), 105  
1-(3,4-Dihydroxy-2-methylphenyl)ethanone, 105  
1-(3,4-Dihydroxy-5-methylphenyl)ethanone, 106  
1-(3,5-Dihydroxy-2-methylphenyl)ethanone, 106  
1-(3,5-Dihydroxy-4-methylphenyl)ethanone, 106

- 1-(3,6-Dihydroxy-2-methylphenyl)ethanone, 106  
1-(4,5-Dihydroxy-2-methylphenyl)ethanone, 107  
1-[2-Hydroxy-4-(hydroxymethyl)phenyl]ethanone, 107  
1-[2-Hydroxy-5-(hydroxymethyl)phenyl]ethanone, 107  
1-(2-Hydroxy-3-methoxyphenyl)ethanone (*o*-Acetovanillone), 107  
1-(2-Hydroxy-4-methoxyphenyl)ethanone (*Paeonol*), 108  
1-(2-Hydroxy-5-methoxyphenyl)ethanone, 109  
1-(2-Hydroxy-6-methoxyphenyl)ethanone, 110  
1-(3-Hydroxy-2-methoxyphenyl)ethanone, 111  
1-(3-Hydroxy-4-methoxyphenyl)ethanone (*Isocetovanillone*), 111  
1-(3-Hydroxy-5-methoxyphenyl)ethanone, 112  
1-(4-Hydroxy-2-methoxyphenyl)ethanone (*Isopaeonol*), 112  
1-(4-Hydroxy-3-methoxyphenyl)ethanone (*Apocynin*; *Acetovanillone*; *Acetoguaiacone*), 112  
1-(4-Hydroxy-3-methoxyphenyl)ethanone-*l*-<sup>13</sup>C, 113  
1-(5-Hydroxy-2-methoxyphenyl)ethanone, 113

**C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>**

- 1-[2,4-Dihydroxy-5-(hydroxymethyl)phenyl]ethanone, 114  
1-(2,3-Dihydroxy-4-methoxyphenyl)ethanone, 114  
1-(2,3-Dihydroxy-5-methoxyphenyl)ethanone, 115  
1-(2,3-Dihydroxy-6-methoxyphenyl)ethanone, 115  
1-(2,4-Dihydroxy-3-methoxyphenyl)ethanone, 115  
1-(2,4-Dihydroxy-5-methoxyphenyl)ethanone, 116  
1-(2,4-Dihydroxy-6-methoxyphenyl)ethanone, 116  
1-(2,5-Dihydroxy-3-methoxyphenyl)ethanone, 117  
1-(2,5-Dihydroxy-4-methoxyphenyl)ethanone, 117  
1-(2,6-Dihydroxy-4-methoxyphenyl)ethanone, 118  
1-(3,4-Dihydroxy-2-methoxyphenyl)ethanone, 119  
1-(3,4-Dihydroxy-5-methoxyphenyl)ethanone, 119  
1-(3,5-Dihydroxy-4-methoxyphenyl)ethanone, 119  
1-(3,6-Dihydroxy-2-methoxyphenyl)ethanone, 119  
1-(4,5-Dihydroxy-2-methoxyphenyl)ethanone, 120  
1-(2,3,4-Trihydroxy-5-methylphenyl)ethanone, 120  
1-(2,4,6-Trihydroxy-3-methylphenyl)ethanone, 120

**C<sub>9</sub>H<sub>10</sub>O<sub>4</sub>S**

- 1-[2-Hydroxy-5-(methylsulfonyl)phenyl]ethanone, 121  
1-[4-Hydroxy-3-(methylsulfonyl)phenyl]ethanone, 121

**C<sub>9</sub>H<sub>10</sub>O<sub>5</sub>**

- 1-(2,3,6-Trihydroxy-4-methoxyphenyl)ethanone, 121  
1-(2,4,6-Trihydroxy-3-methoxyphenyl)ethanone, 121  
1-(3,4,6-Trihydroxy-2-methoxyphenyl)ethanone, 122  
1-(2,3,4,5-Tetrahydroxy-6-methylphenyl)ethanone, 122  
1-(2,3,4,6-Tetrahydroxy-5-methylphenyl)ethanone, 122

**C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>**

- 1-(2-Amino-3-hydroxy-6-methylphenyl)ethanone, 123  
1-(2-Amino-5-hydroxy-3-methylphenyl)ethanone, 123  
1-(2-Amino-6-hydroxy-4-methylphenyl)ethanone, 123  
1-(3-Amino-2-hydroxy-5-methylphenyl)ethanone, 123  
1-(5-Amino-4-hydroxy-2-methylphenyl)ethanone, 124  
1-(6-Amino-3-hydroxy-2-methylphenyl)ethanone, 124

1-[3-Hydroxy-4-(methylamino)phenyl]ethanone, 124  
1-[5-Hydroxy-2-(methylamino)phenyl]ethanone, 125

**C<sub>9</sub>H<sub>11</sub>NO<sub>2</sub>, HCl**

1-(2-Amino-3-hydroxy-5-methylphenyl)ethanone (*Hydrochloride*), 122  
1-(3-Amino-5-hydroxy-4-methylphenyl)ethanone (*Hydrochloride*), 124  
1-(4-Amino-3-hydroxy-5-methylphenyl)ethanone (*Hydrochloride*), 124

**C<sub>9</sub>H<sub>11</sub>NO<sub>3</sub>**

1-(2-Amino-5-hydroxy-3-methoxyphenyl)ethanone, 125  
1-(3-Amino-2-hydroxy-5-methoxyphenyl)ethanone, 125  
1-(3-Amino-2-hydroxy-6-methoxyphenyl)ethanone, 125  
1-(5-Amino-2-hydroxy-3-methoxyphenyl)ethanone, 126  
1-(5-Amino-2-hydroxy-4-methoxyphenyl)ethanone, 126

**C<sub>9</sub>H<sub>11</sub>NO<sub>4</sub>, HCl**

1-(3-Amino-2,4,6-trihydroxy-5-methylphenyl)ethanone (*Hydrochloride*), 126

**C<sub>9</sub>H<sub>11</sub>NO<sub>4</sub>S**

1-[3-Amino-2-hydroxy-5-(methylsulfonyl)phenyl]ethanone, 126

**C<sub>10</sub>H<sub>6</sub>F<sub>6</sub>O<sub>4</sub>S<sub>2</sub>**

1-[2,4,6-Trihydroxy-3,5-bis[(trifluoromethyl)thio]phenyl]ethanone, 127

**C<sub>10</sub>H<sub>8</sub>N<sub>2</sub>O<sub>8</sub>**

1-[4-(Acetyloxy)-2-hydroxy-3,5-dinitrophenyl]ethanone, 127

**C<sub>10</sub>H<sub>9</sub>BrO<sub>4</sub>**

1-[4-(Acetyloxy)-5-bromo-2-hydroxyphenyl]ethanone, 127

**C<sub>10</sub>H<sub>9</sub>ClO<sub>4</sub>**

1-[5-(Acetyloxy)-4-chloro-2-hydroxyphenyl]ethanone, 127

**C<sub>10</sub>H<sub>9</sub>IO<sub>4</sub>**

1-[4-(Acetyloxy)-2-hydroxy-3-iodophenyl]ethanone, 128

**C<sub>10</sub>H<sub>9</sub>NO<sub>6</sub>**

1-[5-(Acetyloxy)-2-hydroxy-3-nitrophenyl]ethanone, 128

**C<sub>10</sub>H<sub>10</sub>BrNO<sub>5</sub>**

1-(3-Bromo-4-ethoxy-2-hydroxy-5-nitrophenyl)ethanone, 128

**C<sub>10</sub>H<sub>10</sub>Br<sub>2</sub>O<sub>4</sub>**

1-(3,5-Dibromo-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 128

1-(3,5-Dibromo-4-hydroxy-2,6-dimethoxyphenyl)ethanone, 129  
**C<sub>10</sub>H<sub>10</sub>Cl<sub>2</sub>O<sub>2</sub>**

1-[3,5-Bis(chloromethyl)-2-hydroxyphenyl]ethanone, 129

**C<sub>10</sub>H<sub>10</sub>Cl<sub>2</sub>O<sub>4</sub>**

1-(2,6-Dichloro-4-hydroxy-3,5-dimethoxyphenyl)ethanone, 129  
1-(3,4-Dichloro-6-hydroxy-2,5-dimethoxyphenyl)ethanone, 129

**C<sub>10</sub>H<sub>10</sub>O<sub>3</sub>**

1-[4-(Ethenyloxy)-2-hydroxyphenyl]ethanone, 130

**C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>**

1-[2-(Acetyloxy)-3-hydroxyphenyl]ethanone, 130  
1-[2-(Acetyloxy)-4-hydroxyphenyl]ethanone, 130  
1-[2-(Acetyloxy)-5-hydroxyphenyl]ethanone, 130  
1-[2-(Acetyloxy)-6-hydroxyphenyl]ethanone, 131  
1-[3-(Acetyloxy)-2-hydroxyphenyl]ethanone, 131  
1-[3-(Acetyloxy)-4-hydroxyphenyl]ethanone, 131  
1-[4-(Acetyloxy)-2-hydroxyphenyl]ethanone, 131  
1-[5-(Acetyloxy)-2-hydroxyphenyl]ethanone, 132

**C<sub>10</sub>H<sub>10</sub>O<sub>5</sub>**

1-[2-(Acetyloxy)-4,6-dihydroxyphenyl]ethanone, 132  
1-[4-(Acetyloxy)-2,6-dihydroxyphenyl]ethanone, 132  
1-[5-(Acetyloxy)-2,4-dihydroxyphenyl]ethanone, 133

**C<sub>10</sub>H<sub>11</sub>BrO<sub>2</sub>**

1-(5-Bromo-3-ethyl-2-hydroxyphenyl)ethanone, 133  
1-(3-Bromo-2-hydroxy-4,5-dimethylphenyl)ethanone, 133  
1-(3-Bromo-6-hydroxy-2,4-dimethylphenyl)ethanone, 133  
1-(5-Bromo-2-hydroxy-3,4-dimethylphenyl)ethanone, 134

**C<sub>10</sub>H<sub>11</sub>BrO<sub>3</sub>**

1-(5-Bromo-4-ethoxy-2-hydroxyphenyl)ethanone, 134  
1-(3-Bromo-5-ethyl-2,4-dihydroxyphenyl)ethanone, 134  
1-(3-Bromo-4-hydroxy-5-methoxy-2-methylphenyl)ethanone, 134  
1-(5-Bromo-2-hydroxy-4-methoxy-3-methylphenyl)ethanone, 135

**C<sub>10</sub>H<sub>11</sub>BrO<sub>4</sub>**

1-(3-Bromo-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 135  
1-(3-Bromo-4-hydroxy-2,6-dimethoxyphenyl)ethanone, 135

**C<sub>10</sub>H<sub>11</sub>BrO<sub>5</sub>**

1-(3-Bromo-2,5-dihydroxy-4,6-dimethoxyphenyl)ethanone, 135

**C<sub>10</sub>H<sub>11</sub>ClO<sub>2</sub>**



1-(3-Chloro-5-ethyl-2-hydroxyphenyl)ethanone, 136  
1-(5-Chloro-3-ethyl-2-hydroxyphenyl)ethanone, 136  
1-(6-Chloro-3-ethyl-2-hydroxyphenyl)ethanone, 136  
1-(3-Chloro-2-hydroxy-4,6-dimethylphenyl)ethanone, 136  
1-(3-Chloro-2-hydroxy-5,6-dimethylphenyl)ethanone, 137  
1-(3-Chloro-6-hydroxy-2,4-dimethylphenyl)ethanone, 137  
1-[3-(Chloromethyl)-2-hydroxy-5-methylphenyl]ethanone, 137  
1-[4-(Chloromethyl)-2-hydroxy-3-methylphenyl]ethanone, 137

**C<sub>10</sub>H<sub>11</sub>ClO<sub>3</sub>**

1-[5-Chloro-2-hydroxy-3-(methoxymethyl)phenyl]ethanone, 138  
1-[4-(2-Chloroethoxy)-2-hydroxyphenyl]ethanone, 138  
1-[3-(Chloromethyl)-2-hydroxy-5-methoxyphenyl]ethanone, 138

**C<sub>10</sub>H<sub>11</sub>ClO<sub>4</sub>**

1-(2-Chloro-4-hydroxy-3,5-dimethoxyphenyl)ethanone, 138  
1-(3-Chloro-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 139  
1-(3-Chloro-6-hydroxy-2,4-dimethoxyphenyl)ethanone, 139  
1-(3-Chloro-6-hydroxy-2,5-dimethoxyphenyl)ethanone, 139  
1-(4-Chloro-2-hydroxy-3,6-dimethoxyphenyl)ethanone, 139

**C<sub>10</sub>H<sub>11</sub>FO<sub>4</sub>**

1-(4-Fluoro-2-hydroxy-3,6-dimethoxyphenyl)ethanone, 140

**C<sub>10</sub>H<sub>11</sub>IO<sub>3</sub>**

1-(6-Ethoxy-2-hydroxy-3-iodophenyl)ethanone, 140

**C<sub>10</sub>H<sub>11</sub>IO<sub>4</sub>**

1-(2-Hydroxy-3-iodo-4,6-dimethoxyphenyl)ethanone, 140

**C<sub>10</sub>H<sub>11</sub>NO<sub>4</sub>**

1-(5-Ethyl-2-hydroxy-3-nitrophenyl)ethanone, 140  
1-(2-Hydroxy-3,6-dimethyl-5-nitrophenyl)ethanone, 141  
1-(2-Hydroxy-4,5-dimethyl-3-nitrophenyl)ethanone, 141  
1-(6-Hydroxy-2,4-dimethyl-3-nitrophenyl)ethanone, 141

**C<sub>10</sub>H<sub>11</sub>NO<sub>5</sub>**

1-(4-Ethoxy-2-hydroxy-5-nitrophenyl)ethanone, 141  
1-(2-Hydroxy-5-methoxy-4-methyl-3-nitrophenyl)ethanone, 142  
1-(4-Hydroxy-2-methoxy-3-methyl-5-nitrophenyl)ethanone, 142

**C<sub>10</sub>H<sub>11</sub>NO<sub>6</sub>**

1-(2-Hydroxy-3,4-dimethoxy-5-nitrophenyl)ethanone, 142  
1-(2-Hydroxy-3,6-dimethoxy-5-nitrophenyl)ethanone, 142  
1-(2-Hydroxy-4,6-dimethoxy-3-nitrophenyl)ethanone, 143

**C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>**

1-(2-Ethyl-4-hydroxyphenyl)ethanone, 143  
 1-(3-Ethyl-2-hydroxyphenyl)ethanone, 143  
 1-(3-Ethyl-4-hydroxyphenyl)ethanone, 143  
 1-(4-Ethyl-2-hydroxyphenyl)ethanone, 144  
 1-(4-Ethyl-3-hydroxyphenyl)ethanone, 144  
 1-(5-Ethyl-2-hydroxyphenyl)ethanone, 144  
 1-(2-Hydroxy-3,4-dimethylphenyl)ethanone, 144  
 1-(2-Hydroxy-3,5-dimethylphenyl)ethanone, 145  
 1-(2-Hydroxy-3,6-dimethylphenyl)ethanone, 145  
 1-(2-Hydroxy-4,5-dimethylphenyl)ethanone, 146  
 1-(2-Hydroxy-4,6-dimethylphenyl)ethanone, 146  
 1-(3-Hydroxy-2,4-dimethylphenyl)ethanone, 147  
 1-(4-Hydroxy-2,3-dimethylphenyl)ethanone, 147  
 1-(4-Hydroxy-2,5-dimethylphenyl)ethanone, 148  
 1-(4-Hydroxy-2,6-dimethylphenyl)ethanone, 148  
 1-(4-Hydroxy-3,5-dimethylphenyl)ethanone, 148  
 1-(5-Hydroxy-2,3-dimethylphenyl)ethanone, 149  
 1-(5-Hydroxy-2,4-dimethylphenyl)ethanone, 149  
 1-(6-Hydroxy-2,3-dimethylphenyl)ethanone, 149

### C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>

1-(2,4-Dihydroxy-3,5-dimethylphenyl)ethanone (*Clavatol*), 149  
 1-(2,4-Dihydroxy-3,6-dimethylphenyl)ethanone, 150  
 1-(2,5-Dihydroxy-3,4-dimethylphenyl)ethanone, 150  
 1-(2,5-Dihydroxy-3,6-dimethylphenyl)ethanone, 150  
 1-(2,6-Dihydroxy-3,4-dimethylphenyl)ethanone, 151  
 1-(2,6-Dihydroxy-3,5-dimethylphenyl)ethanone, 151  
 1-(3,6-Dihydroxy-2,4-dimethylphenyl)ethanone, 151  
 1-(4,6-Dihydroxy-2,3-dimethylphenyl)ethanone, 152  
 1-(2-Ethoxy-6-hydroxyphenyl)ethanone, 152  
 1-(3-Ethoxy-4-hydroxyphenyl)ethanone, 152  
 1-(4-Ethoxy-2-hydroxyphenyl)ethanone, 152  
 1-(4-Ethoxy-3-hydroxyphenyl)ethanone, 153  
 1-(5-Ethoxy-2-hydroxyphenyl)ethanone, 153  
 1-(3-Ethyl-2,4-dihydroxyphenyl)ethanone, 153  
 1-(3-Ethyl-2,6-dihydroxyphenyl)ethanone, 153  
 1-(4-Ethyl-2,5-dihydroxyphenyl)ethanone, 154  
 1-(4-Ethyl-2,6-dihydroxyphenyl)ethanone, 154  
 1-(5-Ethyl-2,4-dihydroxyphenyl)ethanone, 154  
 1-(2-Hydroxy-3-methoxy-4-methylphenyl)ethanone, 155  
 1-(2-Hydroxy-3-methoxy-5-methylphenyl)ethanone, 155  
 1-(2-Hydroxy-3-methoxy-6-methylphenyl)ethanone, 155  
 1-(2-Hydroxy-4-methoxy-3-methylphenyl)ethanone, 156  
 1-(2-Hydroxy-4-methoxy-5-methylphenyl)ethanone, 156  
 1-(2-Hydroxy-4-methoxy-6-methylphenyl)ethanone (*Acetoevernone*), 156  
 1-(2-Hydroxy-5-methoxy-3-methylphenyl)ethanone, 157  
 1-(2-Hydroxy-5-methoxy-4-methylphenyl)ethanone, 157  
 1-(2-Hydroxy-6-methoxy-3-methylphenyl)ethanone, 157  
 1-(2-Hydroxy-6-methoxy-4-methylphenyl)ethanone, 158  
 1-(4-Hydroxy-2-methoxy-3-methylphenyl)ethanone, 158  
 1-(4-Hydroxy-2-methoxy-6-methylphenyl)ethanone (*Isoacetoevernone*), 158  
 1-(4-Hydroxy-3-methoxy-5-methylphenyl)ethanone, 158  
 1-(4-Hydroxy-5-methoxy-2-methylphenyl)ethanone, 159  
 1-(5-Hydroxy-4-methoxy-2-methylphenyl)ethanone, 159  
 1-(6-Hydroxy-3-methoxy-2-methylphenyl)ethanone, 159  
 1-[2-Hydroxy-3-(methoxymethyl)phenyl]ethanone, 160

1-[2-Hydroxy-6-(methoxymethyl)phenyl]ethanone, 160  
**C<sub>10</sub>H<sub>12</sub>O<sub>3</sub>S**

1-[2-Hydroxy-6-methoxy-3-(methylthio)phenyl]ethanone, 160

**C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>**

1-(2,3-Dihydroxy-4-methoxy-6-methylphenyl)ethanone, 160  
1-(2,4-Dihydroxy-6-methoxy-3-methylphenyl)ethanone, 161  
1-(2,6-Dihydroxy-4-methoxy-3-methylphenyl)ethanone, 161  
1-(3,6-Dihydroxy-2-methoxy-4-methylphenyl)ethanone, 162  
1-(3,6-Dihydroxy-4-methoxy-2-methylphenyl)ethanone, 162  
1-(4,6-Dihydroxy-2-methoxy-3-methylphenyl)ethanone (*Pseudoaspidinol-A*), 162  
1-(2-Ethoxy-3,6-dihydroxyphenyl)ethanone, 163  
1-(2-Ethoxy-4,6-dihydroxyphenyl)ethanone, 163  
1-(4-Ethoxy-2,3-dihydroxyphenyl)ethanone, 163  
1-(4-Ethoxy-2,5-dihydroxyphenyl)ethanone, 163  
1-(4-Ethoxy-2,6-dihydroxyphenyl)ethanone, 164  
1-(3-Ethyl-2,4,6-trihydroxyphenyl)ethanone, 164  
1-(5-Ethyl-2,3,4-trihydroxyphenyl)ethanone, 164  
1-(2-Hydroxy-3,4-dimethoxyphenyl)ethanone, 164  
1-(2-Hydroxy-3,5-dimethoxyphenyl)ethanone, 165  
1-(2-Hydroxy-3,6-dimethoxyphenyl)ethanone, 165  
1-(2-Hydroxy-4,5-dimethoxyphenyl)ethanone, 165  
1-(2-Hydroxy-4,5-dimethoxyphenyl)ethanone-2-<sup>14</sup>C, 166  
1-(2-Hydroxy-4,6-dimethoxyphenyl)ethanone (*Xanthoxilin*), 166  
1-(3-Hydroxy-2,4-dimethoxyphenyl)ethanone, 168  
1-(3-Hydroxy-2,6-dimethoxyphenyl)ethanone, 168  
1-(3-Hydroxy-4,5-dimethoxyphenyl)ethanone, 168  
1-(4-Hydroxy-2,5-dimethoxyphenyl)ethanone, 168  
1-(4-Hydroxy-2,6-dimethoxyphenyl)ethanone, 169  
1-(4-Hydroxy-3,5-dimethoxyphenyl)ethanone (*Acetosyringone*), 169  
1-(5-Hydroxy-2,4-dimethoxyphenyl)ethanone, 170  
1-(6-Hydroxy-2,3-dimethoxyphenyl)ethanone, 170  
1-[3-Hydroxy-5-(2-hydroxyethoxy)phenyl]ethanone, 170  
1-[4-Hydroxy-3-(2-hydroxyethoxy)phenyl]ethanone, 170  
1-[2-Hydroxy-4-(methoxymethoxy)phenyl]ethanone, 171  
1-[2-Hydroxy-6-(methoxymethoxy)phenyl]ethanone, 171  
1-(2,4,6-Trihydroxy-3,5-dimethylphenyl)ethanone, 171

**C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>S**

1-[4-Hydroxy-3-[(methylsulfonyl)methyl]phenyl]ethanone, 172

**C<sub>10</sub>H<sub>12</sub>O<sub>5</sub>**

1-(2,3-Dihydroxy-4,5-dimethoxyphenyl)ethanone, 172  
1-(2,3-Dihydroxy-4,6-dimethoxyphenyl)ethanone, 172  
1-(2,4-Dihydroxy-3,5-dimethoxyphenyl)ethanone, 173  
1-(2,4-Dihydroxy-3,6-dimethoxyphenyl)ethanone, 173  
1-(2,5-Dihydroxy-3,4-dimethoxyphenyl)ethanone, 173  
1-(2,5-Dihydroxy-3,6-dimethoxyphenyl)ethanone, 173  
1-(2,6-Dihydroxy-3,4-dimethoxyphenyl)ethanone, 174  
1-(3,6-Dihydroxy-2,4-dimethoxyphenyl)ethanone, 174  
1-(4,6-Dihydroxy-2,3-dimethoxyphenyl)ethanone, 174  
1-(2-Ethoxy-3,4,6-trihydroxyphenyl)ethanone, 175

**C<sub>10</sub>H<sub>12</sub>O<sub>6</sub>**

1-(2,4,5-Trihydroxy-3,6-dimethoxyphenyl)ethanone, 175

**C<sub>10</sub>H<sub>13</sub>NO<sub>2</sub>**

1-(3-Amino-5-ethyl-2-hydroxyphenyl)ethanone, 175

1-[4-(Dimethylamino)-2-hydroxyphenyl]ethanone, 175

1-[5-(Dimethylamino)-2-hydroxyphenyl]ethanone, 176

**C<sub>10</sub>H<sub>13</sub>NO<sub>4</sub>**

1-(3-Amino-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 176

1-(3-Amino-6-hydroxy-2,4-dimethoxyphenyl)ethanone, 176

**C<sub>10</sub>H<sub>13</sub>NO<sub>4</sub>, HCl**

1-(3-Amino-2-hydroxy-4,6-dimethoxyphenyl)ethanone (*Hydrochloride*), 176

**C<sub>11</sub>H<sub>10</sub>O<sub>4</sub>**

1-[4-(Acryloyloxy)-2-hydroxyphenyl]ethanone, 177

1-[2,4-Dihydroxy-6-(2-propynyloxy)phenyl]ethanone, 177

**C<sub>11</sub>H<sub>11</sub>ClO<sub>2</sub>**

1-[3-Chloro-4-hydroxy-5-(2-propenyl)phenyl]ethanone, 177

1-[5-Chloro-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 177

**C<sub>11</sub>H<sub>11</sub>IO<sub>3</sub>**

1-[2-Hydroxy-3-iodo-4-(2-propenyloxy)phenyl]ethanone, 178

**C<sub>11</sub>H<sub>12</sub>O<sub>2</sub>**

1-[2-Hydroxy-3-(1-propenyl)phenyl]ethanone, 178

1-[2-Hydroxy-3-(2-propenyl)phenyl]ethanone, 178

1-[3-Hydroxy-2-(2-propenyl)phenyl]ethanone, 178

1-[3-Hydroxy-4-(1*E*)-1-propenylphenyl]ethanone, 179

1-[3-Hydroxy-4-(2-propenyl)phenyl]ethanone, 179

1-[4-Hydroxy-3-(1-propenyl)phenyl]ethanone, 179

1-[4-Hydroxy-3-(2-propenyl)phenyl]ethanone, 179

**C<sub>11</sub>H<sub>12</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-3-(2-propenyl)phenyl]ethanone, 180

1-[2,4-Dihydroxy-5-(2-propenyl)phenyl]ethanone, 180

1-[2,5-Dihydroxy-4-(2-propenyl)phenyl]ethanone, 180

1-[2,6-Dihydroxy-3-(2-propenyl)phenyl]ethanone, 181

1-[3,6-Dihydroxy-2-(2-propenyl)phenyl]ethanone, 181

1-[2-Hydroxy-4-(2-propenyloxy)phenyl]ethanone, 181

1-[2-Hydroxy-5-(2-propenyloxy)phenyl]ethanone, 181

1-[2-Hydroxy-6-(2-propenyloxy)phenyl]ethanone, 182

**C<sub>11</sub>H<sub>12</sub>O<sub>4</sub>**

1-[3-(Acetyloxy)-2-hydroxy-5-methylphenyl]ethanone, 182  
1-[4-(Acetyloxy)-2-hydroxy-3-methylphenyl]ethanone, 182  
1-[4-(Acetyloxy)-2-hydroxy-6-methylphenyl]ethanone, 182  
1-[5-(Acetyloxy)-2-hydroxy-4-methylphenyl]ethanone, 183  
1-[2,3-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone, 183  
1-[2,4-Dihydroxy-6-(2-propenyloxy)phenyl]ethanone, 183  
1-[2,5-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone, 183  
1-[2,6-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone, 184  
1-[3,6-Dihydroxy-2-(2-propenyloxy)phenyl]ethanone, 184  
1-[2-Hydroxy-4-(oxiranylmethoxy)phenyl]ethanone, 184  
1-[2-Hydroxy-5-(oxiranylmethoxy)phenyl]ethanone, 184  
1-[2-Hydroxy-6-(oxiranylmethoxy)phenyl]ethanone, 185  
1-[2,4,6-Trihydroxy-3-(2-propenyl)phenyl]ethanone, 185

**C<sub>11</sub>H<sub>12</sub>O<sub>5</sub>**

1-[2-(Acetyloxy)-4,6-dihydroxy-3-methylphenyl]ethanone, 185  
1-[2-(Acetyloxy)-5-hydroxy-4-methoxyphenyl]ethanone, 185  
1-[2-(Acetyloxy)-6-hydroxy-4-methoxyphenyl]ethanone, 185  
1-[3-(Acetyloxy)-2-hydroxy-4-methoxyphenyl]ethanone, 186  
1-[4-(Acetyloxy)-2-hydroxy-6-methoxyphenyl]ethanone, 186  
1-[5-(Acetyloxy)-2-hydroxy-4-methoxyphenyl]ethanone, 186

**C<sub>11</sub>H<sub>13</sub>BrO<sub>3</sub>**

1-(3-Bromo-4-ethyl-2-hydroxy-5-methoxyphenyl)ethanone, 186  
1-(5-Bromo-2-hydroxy-4-propoxyphenyl)ethanone, 187

**C<sub>11</sub>H<sub>13</sub>BrO<sub>4</sub>**

1-(3-Bromo-2-hydroxy-4,6-dimethoxy-5-methylphenyl)ethanone, 187

**C<sub>11</sub>H<sub>13</sub>BrO<sub>5</sub>**

1-(3-Bromo-2-hydroxy-4,5,6-trimethoxyphenyl)ethanone, 187

**C<sub>11</sub>H<sub>13</sub>ClO<sub>2</sub>**

1-[4-(Chloromethyl)-3-ethyl-2-hydroxyphenyl]ethanone, 187

**C<sub>11</sub>H<sub>13</sub>ClO<sub>3</sub>**

1-(3-Chloro-2,6-dihydroxy-5-propylphenyl)ethanone, 188  
1-[2-(3-Chloropropoxy)-6-hydroxyphenyl]ethanone, 188  
1-[4-(3-Chloropropoxy)-2-hydroxyphenyl]ethanone, 188  
1-[4-(3-Chloropropoxy)-3-hydroxyphenyl]ethanone, 188

**C<sub>11</sub>H<sub>13</sub>ClO<sub>4</sub>**

1-(3-Chloro-2-hydroxy-4,6-dimethoxy-5-methylphenyl)ethanone, 189  
1-(3-Chloro-6-hydroxy-2,4-dimethoxy-5-methylphenyl)ethanone, 189  
1-[3-(Chloromethyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 189

**C<sub>11</sub>H<sub>13</sub>FO<sub>3</sub>**

1-(3-Fluoro-2,6-dihydroxy-5-propylphenyl)ethanone, 190  
1-(5-Fluoro-2,4-dihydroxy-3-propylphenyl)ethanone, 190

**C<sub>11</sub>H<sub>13</sub>NO<sub>2</sub>**

1-[2-Amino-4-hydroxy-3-(2-propenyl)phenyl]ethanone, 190

**C<sub>11</sub>H<sub>13</sub>NO<sub>4</sub>**

1-(2-Hydroxy-3-nitro-5-propylphenyl)ethanone, 190  
1-(3-Hydroxy-4,5,6-trimethyl-2-nitrophenyl)ethanone, 191

**C<sub>11</sub>H<sub>13</sub>NO<sub>5</sub>**

1-(2-Hydroxy-5-nitro-4-propoxyphenyl)ethanone, 191

**C<sub>11</sub>H<sub>13</sub>NO<sub>6</sub>**

1-(2-Ethoxy-3,6-dihydroxy-4-methyl-5-nitrophenyl)ethanone, 191

**C<sub>11</sub>H<sub>14</sub>ClNO<sub>2</sub>**

1-[3-Chloro-4-hydroxy-5-[(dimethylamino)methyl]phenyl]ethanone, 191

**C<sub>11</sub>H<sub>14</sub>O<sub>2</sub>**

1-(2-Ethyl-6-hydroxy-4-methylphenyl)ethanone, 192  
1-(4-Ethyl-2-hydroxy-6-methylphenyl)ethanone, 192  
1-(3-Ethyl-2-hydroxy-5-methylphenyl)ethanone, 192  
1-(3-Ethyl-2-hydroxy-6-methylphenyl)ethanone, 192  
1-(3-Ethyl-4-hydroxy-5-methylphenyl)ethanone, 193  
1-(4-Ethyl-2-hydroxy-5-methylphenyl)ethanone, 193  
1-(4-Ethyl-5-hydroxy-2-methylphenyl)ethanone, 193  
1-(5-Ethyl-2-hydroxy-3-methylphenyl)ethanone, 194  
1-(5-Ethyl-2-hydroxy-4-methylphenyl)ethanone, 194  
1-(5-Ethyl-4-hydroxy-2-methylphenyl)ethanone, 194  
1-[2-Hydroxy-3-(1-methylethyl)phenyl]ethanone, 195  
1-[2-Hydroxy-4-(1-methylethyl)phenyl]ethanone, 195  
1-[2-Hydroxy-5-(1-methylethyl)phenyl]ethanone, 195  
1-[3-Hydroxy-4-(1-methylethyl)phenyl]ethanone, 195  
1-[4-Hydroxy-3-(1-methylethyl)phenyl]ethanone, 196  
1-(2-Hydroxy-3-propylphenyl)ethanone, 196  
1-(2-Hydroxy-4-propylphenyl)ethanone, 196  
1-(2-Hydroxy-5-propylphenyl)ethanone, 196  
1-(4-Hydroxy-2-propylphenyl)ethanone, 197  
1-(4-Hydroxy-3-propylphenyl)ethanone, 197  
1-(2-Hydroxy-3,4,5-trimethylphenyl)ethanone, 197  
1-(2-Hydroxy-3,4,6-trimethylphenyl)ethanone, 198  
1-(2-Hydroxy-3,5,6-trimethylphenyl)ethanone, 198  
1-(3-Hydroxy-2,4,5-trimethylphenyl)ethanone, 198  
1-(3-Hydroxy-2,4,6-trimethylphenyl)ethanone, 198  
1-(4-Hydroxy-2,3,5-trimethylphenyl)ethanone, 199  
1-(4-Hydroxy-2,3,6-trimethylphenyl)ethanone, 199  
1-(5-Hydroxy-2,3,4-trimethylphenyl)ethanone, 199

1-(6-Hydroxy-2,3,4-trimethylphenyl)ethanone, 199

**C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-3-(1-methylethyl)phenyl]ethanone, 200  
1-(2,3-Dihydroxy-5-propylphenyl)ethanone, 200  
1-(2,4-Dihydroxy-3-propylphenyl)ethanone, 200  
1-(2,4-Dihydroxy-5-propylphenyl)ethanone, 201  
1-(2,5-Dihydroxy-3-propylphenyl)ethanone, 201  
1-(2,5-Dihydroxy-4-propylphenyl)ethanone, 201  
1-(2,6-Dihydroxy-3-propylphenyl)ethanone, 201  
1-(3,6-Dihydroxy-2-propylphenyl)ethanone, 202  
1-(2,5-Dihydroxy-3,4,6-trimethylphenyl)ethanone, 202  
1-(2,6-Dihydroxy-3,4,5-trimethylphenyl)ethanone, 203  
1-(2-Ethoxy-6-hydroxy-4-methylphenyl)ethanone, 203  
1-(5-Ethyl-2,4-dihydroxy-3-methylphenyl)ethanone, 203  
1-(4-Ethyl-2-hydroxy-5-methoxyphenyl)ethanone, 203  
1-(4-Ethyl-2-hydroxy-6-methoxyphenyl)ethanone, 204  
1-(5-Ethyl-2-hydroxy-4-methoxyphenyl)ethanone, 204  
1-(2-Hydroxy-4-methoxy-3,5-dimethylphenyl)ethanone, 204  
1-(2-Hydroxy-4-methoxy-3,6-dimethylphenyl)ethanone, 204  
1-(4-Hydroxy-2-methoxy-3,6-dimethylphenyl)ethanone, 205  
1-[2-Hydroxy-3-(methoxymethyl)-5-methylphenyl]ethanone, 205  
1-[2-Hydroxy-4-(1-methylethoxy)phenyl]ethanone, 205  
1-[2-Hydroxy-5-(1-methylethoxy)phenyl]ethanone, 205  
1-(2-Hydroxy-4-propoxyphenyl)ethanone, 206  
1-(2-Hydroxy-6-propoxyphenyl)ethanone, 206

**C<sub>11</sub>H<sub>14</sub>O<sub>3</sub>S**

1-[3-(Ethylthio)-2-hydroxy-6-methoxyphenyl]ethanone, 206  
1-[2-Hydroxy-3-(2-hydroxypropyl)-4-mercaptophenyl]ethanone, 206  
1-[2-Hydroxy-3-(3-hydroxypropyl)-4-mercaptophenyl]ethanone, 207

**C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>**

1-[2,4-Dihydroxy-3-(2-hydroxypropyl)phenyl]ethanone, 207  
1-(2,6-Dihydroxy-4-methoxy-3,5-dimethylphenyl)ethanone (*Mallophenone*), 207  
1-[2,4-Dihydroxy-3-(methoxymethyl)-5-methylphenyl]ethanone, 207  
1-[3,5-Dihydroxy-4-(1-methylethoxy)phenyl]ethanone, 208  
1-[3,6-Dihydroxy-2-(1-methylethoxy)phenyl]ethanone, 208  
1-(2-Ethoxy-6-hydroxy-4-methoxyphenyl)ethanone, 208  
1-(3-Ethoxy-2-hydroxy-6-methoxyphenyl)ethanone, 208  
1-(4-Ethoxy-2-hydroxy-3-methoxyphenyl)ethanone, 209  
1-(4-Ethoxy-2-hydroxy-5-methoxyphenyl)ethanone, 209  
1-(4-Ethoxy-2-hydroxy-6-methoxyphenyl)ethanone, 209  
1-(5-Ethoxy-2-hydroxy-4-methoxyphenyl)ethanone, 209  
1-(2-Hydroxy-3,4-dimethoxy-6-methylphenyl)ethanone, 209  
1-(2-Hydroxy-3,5-dimethoxy-4-methylphenyl)ethanone, 210  
1-(2-Hydroxy-4,5-dimethoxy-3-methylphenyl)ethanone, 210  
1-(2-Hydroxy-4,6-dimethoxy-3-methylphenyl)ethanone, 210  
1-(4-Hydroxy-2,6-dimethoxy-3-methylphenyl)ethanone, 211  
1-(6-Hydroxy-2,4-dimethoxy-3-methylphenyl)ethanone (*Bancroftinone*), 211  
1-(6-Hydroxy-3,4-dimethoxy-2-methylphenyl)ethanone, 212  
1-[2-Hydroxy-4-(2-hydroxypropoxy)phenyl]ethanone, 212  
1-[4-Hydroxy-3-(2-hydroxypropoxy)phenyl]ethanone, 212  
1-[2-Hydroxy-5-methoxy-3-(methoxymethyl)phenyl]ethanone, 213

**C<sub>11</sub>H<sub>14</sub>O<sub>4</sub>S**

- 1-[3-[(Ethylsulfonyl)methyl]-4-hydroxyphenyl]ethanone, 213  
1-[2-Hydroxy-4,6-dimethoxy-3-(methylthio)phenyl]ethanone, 213  
1-[4-Hydroxy-3-[2-(methylsulfonyl)ethyl]phenyl]ethanone, 213

**C<sub>11</sub>H<sub>14</sub>O<sub>5</sub>**

- 1-[2,4-Dihydroxy-6-(2-hydroxyethyl)-3-methoxyphenyl]ethanone, 214  
1-(2,5-Dihydroxy-4,6-dimethoxy-3-methylphenyl)ethanone, 214  
1-[3-(2,3-Dihydroxypropoxy)-4-hydroxyphenyl]ethanone, 214  
1-(2-Ethoxy-3,6-dihydroxy-4-methoxyphenyl)ethanone, 214  
1-(3-Ethoxy-2,6-dihydroxy-4-methoxyphenyl)ethanone, 215  
1-(4-Ethoxy-2,5-dihydroxy-3-methoxyphenyl)ethanone, 215  
1-[2-Hydroxy-3-methoxy-4-(methoxymethoxy)phenyl]ethanone, 215  
1-[2-Hydroxy-4-methoxy-6-(methoxymethoxy)phenyl]ethanone, 215  
1-[2-Hydroxy-6-methoxy-4-(methoxymethoxy)phenyl]ethanone, 216  
1-(2-Hydroxy-3,4,5-trimethoxyphenyl)ethanone, 216  
1-(2-Hydroxy-3,4,6-trimethoxyphenyl)ethanone (*Xanthoxylone*), 216  
1-(2-Hydroxy-3,5,6-trimethoxyphenyl)ethanone, 217  
1-(3-Hydroxy-2,4,5-trimethoxyphenyl)ethanone, 217  
1-(3-Hydroxy-2,4,6-trimethoxyphenyl)ethanone, 217  
1-(3-Hydroxy-2,5,6-trimethoxyphenyl)ethanone, 218  
1-(6-Hydroxy-2,3,4-trimethoxyphenyl)ethanone, 218  
1-[3,4,6-Trihydroxy-2-(1-methylethoxy)phenyl]ethanone, 219

**C<sub>11</sub>H<sub>14</sub>O<sub>6</sub>**

- 1-(2,4-Dihydroxy-3,5,6-trimethoxyphenyl)ethanone, 219  
1-(2,5-Dihydroxy-3,4,6-trimethoxyphenyl)ethanone, 219  
1-(2,6-Dihydroxy-3,4,5-trimethoxyphenyl)ethanone, 220

**C<sub>11</sub>H<sub>15</sub>NO<sub>2</sub>**

- 1-(2-Amino-4-hydroxy-3-propylphenyl)ethanone, 220  
1-(3-Amino-2-hydroxy-5-propylphenyl)ethanone, 220  
1-(4-Amino-2-hydroxy-3-propylphenyl)ethanone, 220  
1-[2-(Dimethylamino)-6-hydroxy-4-methylphenyl]ethanone, 221  
1-[2-Hydroxy-4-(propylamino)phenyl]ethanone, 221

**C<sub>12</sub>H<sub>12</sub>O<sub>6</sub>**

- 1-[2,3-Bis(acetyloxy)-4-hydroxyphenyl]ethanone, 221  
1-[2,4-Bis(acetyloxy)-6-hydroxyphenyl]ethanone, 221  
1-[2,6-Bis(acetyloxy)-4-hydroxyphenyl]ethanone, 222  
1-[3,4-Bis(acetyloxy)-2-hydroxyphenyl]ethanone, 222  
1-[3,6-Bis(acetyloxy)-2-hydroxyphenyl]ethanone, 222  
1-[4,5-Bis(acetyloxy)-2-hydroxyphenyl]ethanone, 222

**C<sub>12</sub>H<sub>13</sub>ClO<sub>2</sub>**

- 1-[3-(2-Butenyl)-5-chloro-4-hydroxyphenyl]ethanone, 223

**C<sub>12</sub>H<sub>13</sub>IO<sub>3</sub>**



1-[5-(2-Butenyl)-2,4-dihydroxy-3-iodophenyl]ethanone, 223

**C<sub>12</sub>H<sub>13</sub>IO<sub>4</sub>**

1-[2-Hydroxy-3-iodo-6-methoxy-4-(2-propenyloxy)phenyl]ethanone, 223

**C<sub>12</sub>H<sub>14</sub>Br<sub>2</sub>O<sub>2</sub>**

1-(3,5-Dibromo-2,4-diethyl-6-hydroxyphenyl)ethanone, 223

**C<sub>12</sub>H<sub>14</sub>N<sub>2</sub>O<sub>6</sub>**

1-[2-Hydroxy-3-methyl-6-(1-methylethyl)-4,5-dinitrophenyl]ethanone, 224

1-[4-Hydroxy-3-methyl-6-(1-methylethyl)-2,5-dinitrophenyl]ethanone, 224

**C<sub>12</sub>H<sub>14</sub>O<sub>2</sub>**

1-[2-Hydroxy-5-methyl-3-(2-propenyl)phenyl]ethanone, 224

1-[4-Hydroxy-3-(2-methyl-2-propenyl)phenyl]ethanone, 224

**C<sub>12</sub>H<sub>14</sub>O<sub>3</sub>**

1-[3-(2-Butenyl)-2,4-dihydroxyphenyl]ethanone, 225

1-[5-(2-Butenyl)-2,4-dihydroxyphenyl]ethanone, 225

1-[4-(2-Butenyloxy)-2-hydroxyphenyl]ethanone, 225

1-[2,4-Dihydroxy-3-methyl-5-(2-propenyl)phenyl]ethanone, 225

1-[2,4-Dihydroxy-3-(1-methyl-2-propenyl)phenyl]ethanone, 226

1-[2,4-Dihydroxy-3-(2-methyl-2-propenyl)phenyl]ethanone, 226

1-[3,6-Dihydroxy-2-(2-methyl-2-propenyl)phenyl]ethanone, 226

1-[2-Hydroxy-3-methoxy-5-(2-propenyl)phenyl]ethanone, 226

1-[2-Hydroxy-4-methoxy-3-(2-propenyl)phenyl]ethanone, 227

1-[2-Hydroxy-4-methoxy-5-(2-propenyl)phenyl]ethanone, 227

1-[2-Hydroxy-5-methoxy-3-(2-propenyl)phenyl]ethanone, 227

1-[2-Hydroxy-6-methoxy-3-(2-propenyl)phenyl]ethanone, 227

1-[3-Hydroxy-6-methoxy-2-(2-propenyl)phenyl]ethanone, 228

1-[4-Hydroxy-2-methoxy-5-(2-propenyl)phenyl]ethanone, 228

1-[2-Hydroxy-3-methyl-4-(2-propenyloxy)phenyl]ethanone, 228

1-[2-Hydroxy-4-methyl-5-(2-propenyloxy)phenyl]ethanone, 228

1-[2-Hydroxy-4-[(2-methyl-2-propenyl)oxy]phenyl]ethanone, 229

**C<sub>12</sub>H<sub>14</sub>O<sub>4</sub>**

1-[4-(Acetyloxy)-2-ethyl-6-hydroxyphenyl]ethanone, 229

1-[4-(Acetyloxy)-2-hydroxy-3,5-dimethylphenyl]ethanone, 229

1-[4-(Acetyloxy)-2-hydroxy-3,6-dimethylphenyl]ethanone, 229

1-[4-(Acetyloxy)-6-hydroxy-2,3-dimethylphenyl]ethanone, 229

1-[5-(2-Butenyl)-2,3,4-trihydroxyphenyl]ethanone, 230

1-[2,4-Dihydroxy-3-methoxy-5-(2-propenyl)phenyl]ethanone, 230

1-[2,4-Dihydroxy-5-methoxy-3-(2-propenyl)phenyl]ethanone, 230

1-[3,6-Dihydroxy-4-methoxy-2-(2-propenyl)phenyl]ethanone, 230

1-[2-Hydroxy-3-methoxy-4-(2-propenyloxy)phenyl]ethanone, 231

1-[2-Hydroxy-4-methoxy-5-(2-propenyloxy)phenyl]ethanone, 231

1-[2-Hydroxy-5-methoxy-4-(2-propenyloxy)phenyl]ethanone, 231

1-[2-Hydroxy-6-methoxy-3-(2-propenyloxy)phenyl]ethanone, 231

1-[2-Hydroxy-6-methoxy-4-(2-propenyloxy)phenyl]ethanone, 232

1-[2-Hydroxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 232

1-[2-Hydroxy-5-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 232

1-[4-Hydroxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 232  
**C<sub>12</sub>H<sub>14</sub>O<sub>5</sub>**

1-[3-[2-(Acetyloxy)ethoxy]-4-hydroxyphenyl]ethanone, 233

**C<sub>12</sub>H<sub>14</sub>O<sub>6</sub>**

1-[3-(Acetyloxy)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 233  
1-[3-(Acetyloxy)-6-hydroxy-2,4-dimethoxyphenyl]ethanone, 233

**C<sub>12</sub>H<sub>15</sub>BrO<sub>2</sub>**

1-(3-Bromo-4,5-diethyl-2-hydroxyphenyl)ethanone, 233  
1-[3-Bromo-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 234  
1-[3-Bromo-5-(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone, 234

**C<sub>12</sub>H<sub>15</sub>BrO<sub>3</sub>**

1-[4-(2-Bromoethoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 234

**C<sub>12</sub>H<sub>15</sub>ClO<sub>2</sub>**

1-[3-Chloro-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 234  
1-[3-Chloro-5-(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone, 235  
1-[3-Chloro-2-hydroxy-6-methyl-5-(1-methylethyl)phenyl]ethanone, 235  
1-[3-Chloro-6-hydroxy-2-methyl-5-(1-methylethyl)phenyl]ethanone, 235  
1-[4-(Chloromethyl)-2-hydroxy-3-propylphenyl]ethanone, 235

**C<sub>12</sub>H<sub>15</sub>ClO<sub>3</sub>**

1-[3-Chloro-5-(1,1-dimethylethyl)-2,6-dihydroxyphenyl]ethanone, 236

**C<sub>12</sub>H<sub>15</sub>FO<sub>2</sub>**

1-[3-(1,1-Dimethylethyl)-5-fluoro-4-hydroxyphenyl]ethanone, 236

**C<sub>12</sub>H<sub>15</sub>IO<sub>2</sub>**

1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-iodophenyl]ethanone, 236

**C<sub>12</sub>H<sub>15</sub>NO<sub>4</sub>**

1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-nitrophenyl]ethanone, 236  
1-[5-(1,1-Dimethylethyl)-2-hydroxy-3-nitrophenyl]ethanone, 237  
1-[2-Hydroxy-3-methyl-6-(1-methylethyl)-5-nitrophenyl]ethanone, 237  
1-[4-Hydroxy-5-methyl-2-(1-methylethyl)-3-nitrophenyl]ethanone, 237  
1-[2-Hydroxy-5-(1-methylpropyl)-3-nitrophenyl]ethanone, 237  
1-[4-Hydroxy-3-(1-methylpropyl)-5-nitrophenyl]ethanone, 238

**C<sub>12</sub>H<sub>15</sub>N<sub>3</sub>O<sub>3</sub>**

1-[4-(2-Azidoethoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 238

**C<sub>12</sub>H<sub>16</sub>O<sub>2</sub>**

1-(5-Butyl-2-hydroxyphenyl)ethanone, 238

1-(2,4-Diethyl-6-hydroxyphenyl)ethanone, 238  
1-(3,5-Diethyl-2-hydroxyphenyl)ethanone, 239  
1-(3,5-Diethyl-4-hydroxyphenyl)ethanone, 239  
1-(4,5-Diethyl-2-hydroxyphenyl)ethanone, 239  
1-[2-(1,1-Dimethylethyl)-4-hydroxyphenyl]ethanone, 239  
1-[3-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone, 240  
1-[3-(1,1-Dimethylethyl)-4-hydroxyphenyl]ethanone, 240  
1-[4-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone, 240  
1-[4-(1,1-Dimethylethyl)-3-hydroxyphenyl]ethanone, 240  
1-[5-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone, 241  
1-(2-Ethyl-6-hydroxy-3,5-dimethylphenyl)ethanone, 241  
1-(3-Ethyl-2-hydroxy-4,5-dimethylphenyl)ethanone, 241  
1-(3-Ethyl-2-hydroxy-4,6-dimethylphenyl)ethanone, 242  
1-(3-Ethyl-2-hydroxy-5,6-dimethylphenyl)ethanone, 242  
1-(3-Ethyl-6-hydroxy-2,5-dimethylphenyl)ethanone, 242  
1-(4-Ethyl-2-hydroxy-3,5-dimethylphenyl)ethanone, 242  
1-(4-Ethyl-2-hydroxy-3,6-dimethylphenyl)ethanone, 243  
1-(4-Ethyl-3-hydroxy-2,6-dimethylphenyl)ethanone, 243  
1-[2-Hydroxy-3-methyl-6-(1-methylethyl)phenyl]ethanone, 243  
1-[2-Hydroxy-4-methyl-5-(1-methylethyl)phenyl]ethanone, 244  
1-[2-Hydroxy-5-methyl-3-(1-methylethyl)phenyl]ethanone, 244  
1-[2-Hydroxy-6-methyl-3-(1-methylethyl)phenyl]ethanone, 244  
1-[4-Hydroxy-2-methyl-3-(1-methylethyl)phenyl]ethanone, 245  
1-[4-Hydroxy-2-methyl-5-(1-methylethyl)phenyl]ethanone, 245  
1-[4-Hydroxy-3-methyl-2-(1-methylethyl)phenyl]ethanone, 245  
1-[4-Hydroxy-3-methyl-5-(1-methylethyl)phenyl]ethanone, 246  
1-[4-Hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone, 246  
1-[5-Hydroxy-2-methyl-4-(1-methylethyl)phenyl]ethanone, 246  
1-[6-Hydroxy-2-methyl-3-(1-methylethyl)phenyl]ethanone, 247  
1-(2-Hydroxy-3-methyl-5-propylphenyl)ethanone, 247  
1-(4-Hydroxy-2-methyl-5-propylphenyl)ethanone, 247  
1-(4-Hydroxy-3-methyl-5-propylphenyl)ethanone, 248  
1-[2-Hydroxy-3-(1-methylpropyl)phenyl]ethanone, 248  
1-[2-Hydroxy-5-(1-methylpropyl)phenyl]ethanone, 248  
1-[4-Hydroxy-3-(1-methylpropyl)phenyl]ethanone, 248  
1-(2-Hydroxy-3,4,5,6-tetramethylphenyl)ethanone, 249

**C<sub>12</sub>H<sub>16</sub>O<sub>3</sub>**

1-(2-Butoxy-6-hydroxyphenyl)ethanone, 249  
1-(4-Butoxy-2-hydroxyphenyl)ethanone, 249  
1-(5-Butoxy-2-hydroxyphenyl)ethanone, 249  
1-(3-Butyl-2,6-dihydroxyphenyl)ethanone, 249  
1-(5-Butyl-2,4-dihydroxyphenyl)ethanone, 250  
1-(3,5-Diethyl-2,4-dihydroxyphenyl)ethanone, 250  
1-(3,5-Diethyl-2,6-dihydroxyphenyl)ethanone, 250  
1-[2,5-Dihydroxy-6-methyl-3-(1-methylethyl)phenyl]ethanone, 250  
1-[2,4-Dihydroxy-3-(1-methylpropyl)phenyl]ethanone, 251  
1-[3-(1,1-Dimethylethyl)-2,5-dihydroxyphenyl]ethanone, 251  
1-[3-(1,1-Dimethylethyl)-2,6-dihydroxyphenyl]ethanone, 251  
1-[4-(1,1-Dimethylethyl)-2,5-dihydroxyphenyl]ethanone, 251  
1-[5-(1,1-Dimethylethyl)-2,3-dihydroxyphenyl]ethanone, 252  
1-[5-(1,1-Dimethylethyl)-2,4-dihydroxyphenyl]ethanone, 252  
1-(6-Ethoxy-3-ethyl-2-hydroxyphenyl)ethanone, 252  
1-(2-Ethoxy-3-ethyl-6-hydroxyphenyl)ethanone, 252  
1-(2-Ethyl-3,6-dihydroxy-4,5-dimethylphenyl)ethanone, 252  
1-[4-Hydroxy-3-methoxy-5-(1-methylethyl)phenyl]ethanone, 253

1-(2-Hydroxy-3-methoxy-5-propylphenyl)ethanone, 253  
 1-(2-Hydroxy-4-methoxy-3-propylphenyl)ethanone, 253  
 1-(2-Hydroxy-4-methoxy-5-propylphenyl)ethanone, 253  
 1-(2-Hydroxy-5-methoxy-4-propylphenyl)ethanone, 254  
 1-(4-Hydroxy-2-methoxy-3-propylphenyl)ethanone, 254  
 1-(4-Hydroxy-3-methoxy-5-propylphenyl)ethanone, 254  
 1-(5-Hydroxy-4-methoxy-2-propylphenyl)ethanone, 254

### C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>

1-(2-Butoxy-3,6-dihydroxyphenyl)ethanone, 255  
 1-(2,4-Diethoxy-6-hydroxyphenyl)ethanone, 255  
 1-(2,6-Diethoxy-4-hydroxyphenyl)ethanone, 255  
 1-(3,4-Diethoxy-2-hydroxyphenyl)ethanone, 255  
 1-(3,6-Diethoxy-2-hydroxyphenyl)ethanone, 256  
 1-(4,5-Diethoxy-2-hydroxyphenyl)ethanone, 256  
 1-(3,5-Diethyl-2,4,6-trihydroxyphenyl)ethanone, 256  
 1-[5-(1,1-Dimethylethyl)-2,3,4-trihydroxyphenyl]ethanone, 256  
 1-(3-Ethyl-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 257  
 1-(3-Ethyl-4-hydroxy-2,6-dimethoxyphenyl)ethanone, 257  
 1-(2-Hydroxy-4,6-dimethoxy-3,5-dimethylphenyl)ethanone, 257  
 1-[2-Hydroxy-4-(2-hydroxybutoxy)phenyl]ethanone, 257  
 1-[2-Hydroxy-3-methoxy-5-(1-methylethoxy)phenyl]ethanone, 258  
 1-[2-Hydroxy-4-methoxy-6-(1-methylethoxy)phenyl]ethanone, 258  
 1-[2-Hydroxy-6-methoxy-4-(1-methylethoxy)phenyl]ethanone, 258  
 1-(2-Hydroxy-4-methoxy-6-propoxyphenyl)ethanone, 258  
 1-(2-Hydroxy-6-methoxy-3-propoxyphenyl)ethanone, 259

### C<sub>12</sub>H<sub>16</sub>O<sub>4</sub>S

1-[4-Hydroxy-3-[(1-methylethyl)sulfonyl]methyl]phenyl]ethanone, 259  
 1-[4-Hydroxy-3-[3-(methylsulfonyl)propyl]phenyl]ethanone, 259  
 1-[4-Hydroxy-3-[(propylsulfonyl)methyl]phenyl]ethanone, 259

### C<sub>12</sub>H<sub>16</sub>O<sub>5</sub>

1-(2,4-Diethoxy-3,6-dihydroxyphenyl)ethanone, 260  
 1-[2,4-Dihydroxy-6-(4-hydroxybutoxy)phenyl]ethanone, 260  
 1-[3,6-Dihydroxy-2-methoxy-4-(1-methylethoxy)phenyl]ethanone, 260  
 1-[2,4-Dihydroxy-6-(methoxymethoxy)-3,5-dimethylphenyl]ethanone, 260  
 1-(3-Ethoxy-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 260  
 1-(4-Ethoxy-2-hydroxy-3,6-dimethoxyphenyl)ethanone, 261  
 1-(5-Ethoxy-2-hydroxy-3,4-dimethoxyphenyl)ethanone, 261  
 1-(6-Ethoxy-2-hydroxy-3,4-dimethoxyphenyl)ethanone, 261  
 1-[6-Hydroxy-3-(2-hydroxyethyl)-2,4-dimethoxyphenyl]ethanone, 261  
 1-[2-Hydroxy-4-[(2-methoxyethoxy)methoxy]phenyl]ethanone, 262  
 1-[3-Hydroxy-4-[(2-methoxyethoxy)methoxy]phenyl]ethanone, 262

### C<sub>12</sub>H<sub>16</sub>O<sub>6</sub>

1-(4-Ethoxy-2,5-dihydroxy-3,6-dimethoxyphenyl)ethanone, 262  
 1-[6-Hydroxy-2,4-dimethoxy-3-(methoxymethoxy)phenyl]ethanone, 262  
 1-[2-Hydroxy-4,6-bis(methoxymethoxy)phenyl]ethanone, 263  
 1-(2-Hydroxy-3,4,5,6-tetramethoxyphenyl)ethanone, 263

### C<sub>12</sub>H<sub>17</sub>NO<sub>2</sub>

1-[3-Amino-4-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone, 264  
1-[3-Amino-6-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone, 264  
1-[3-[(Dimethylamino)methyl]-4-hydroxy-5-methylphenyl]ethanone, 264  
1-[2-[(1,1-Dimethylethyl)amino]-5-hydroxyphenyl]ethanone, 265

**C<sub>12</sub>H<sub>17</sub>NO<sub>2</sub>, HCl**

1-[3-Amino-4-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone (*Hydrochloride*), 264

**C<sub>13</sub>H<sub>12</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-5-(3-methyl-3-buten-1-ynyl)phenyl]ethanone, 265

**C<sub>13</sub>H<sub>13</sub>O<sub>3</sub>**

1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-3-iodophenyl]ethanone, 265

**C<sub>13</sub>H<sub>14</sub>O<sub>2</sub>**

1-[4-Hydroxy-3-(3-methyl-1,3-butadienyl)phenyl]ethanone, 265

**C<sub>13</sub>H<sub>14</sub>O<sub>3</sub>**

1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxyphenyl]ethanone, 266

**C<sub>13</sub>H<sub>14</sub>O<sub>4</sub>**

1-[4-(Acetoxy)-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 266  
1-[2,4-Dihydroxy-5-(3-hydroxy-3-methyl-1-butenyl)phenyl]ethanone, 266

**C<sub>13</sub>H<sub>15</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-3-iodo-5-(3-methyl-2-butenyl)phenyl]ethanone, 266

**C<sub>13</sub>H<sub>16</sub>O<sub>2</sub>**

1-[2-Hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 267  
1-[3-Hydroxy-2-(3-methyl-2-butenyl)phenyl]ethanone, 267  
1-[4-Hydroxy-3-(3-methyl-1-butenyl)phenyl]ethanone, 267  
1-[4-Hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 267

**C<sub>13</sub>H<sub>16</sub>O<sub>3</sub>**

1-[3-(2-Butenyl)-2-hydroxy-4-methoxyphenyl]ethanone, 268  
1-[2,4-Dihydroxy-3-(3-methyl-1-butenyl)phenyl]ethanone, 268  
1-[2,4-Dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 268  
1-[2,4-Dihydroxy-5-(3-methyl-1-butenyl)phenyl]ethanone, 269  
1-[2,4-Dihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 269  
1-[3,4-Dihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 269  
1-[4-Hydroxy-3-(3-hydroxy-3-methyl-1-butenyl)phenyl]ethanone, 270  
1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone, 270  
1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*E*), 270  
1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*Z*), 271  
1-[2-Hydroxy-5-methoxy-4-methyl-3-(2-propenyl)phenyl]ethanone, 271  
1-[2-Hydroxy-5-methoxy-6-methyl-3-(2-propenyl)phenyl]ethanone, 271  
1-[2-Hydroxy-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 271

1-[3-Hydroxy-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 272  
**C<sub>13</sub>H<sub>16</sub>O<sub>4</sub>**

1-[3-(Acetyloxy)-6-hydroxy-2,4,5-trimethylphenyl]ethanone, 272  
1-[3-(2-Butenyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone, 272  
1-[3-(2-Butenyl)-4,6-dihydroxy-2-methoxyphenyl]ethanone, 272  
1-[2,4-Dihydroxy-6-methoxy-3-(1-methyl-2-propenyl)phenyl]ethanone, 273  
1-[4,6-Dihydroxy-2-methoxy-3-(1-methyl-2-propenyl)phenyl]ethanone, 273  
1-[2-Hydroxy-3,4-dimethoxy-5-(2-propenyl)phenyl]ethanone, 273  
1-[2-Hydroxy-4,6-dimethoxy-3-(2-propenyl)phenyl]ethanone, 273  
1-[3-Hydroxy-4,6-dimethoxy-2-(2-propenyl)phenyl]ethanone, 274  
1-[2-Hydroxy-4-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 274  
1-[2-Hydroxy-6-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 274  
1-[2,3,4-Trihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 274  
1-[2,3,4-Trihydroxy-6-(3-methyl-2-butenyl)phenyl]ethanone, 275  
1-[2,4,6-Trihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 275

**C<sub>13</sub>H<sub>16</sub>O<sub>5</sub>**

1-[2,4-Dihydroxy-6-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 275  
1-[2,6-Dihydroxy-4-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 275  
1-[2-Hydroxy-5-methoxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 276  
1-[2,3,4-Trihydroxy-6-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 276  
1-[2,4,6-Trihydroxy-3-(tetrahydro-2*H*-pyran-2-yl)phenyl]ethanone, 276

**C<sub>13</sub>H<sub>16</sub>O<sub>7</sub>**

1-[2-Hydroxy-4-(β-D-xylopyranosyloxy)phenyl]ethanone, 276

**C<sub>13</sub>H<sub>17</sub>BrO<sub>3</sub>**

1-[2-[(5-Bromopentyl)oxy]-6-hydroxyphenyl]ethanone, 277  
1-[3-Bromo-5-(1,1-dimethylethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 277  
1-[4-[(5-Bromopentyl)oxy]-2-hydroxyphenyl]ethanone, 277  
1-[4-(3-Bromopropoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 277

**C<sub>13</sub>H<sub>17</sub>ClO<sub>2</sub>**

1-[3-Butyl-4-(chloromethyl)-2-hydroxyphenyl]ethanone, 278  
1-[4-(Chloromethyl)-2-hydroxy-3-(2-methylpropyl)phenyl]ethanone, 278

**C<sub>13</sub>H<sub>17</sub>ClO<sub>3</sub>**

1-[4-(2-Chloroethoxy)-2-hydroxy-3-propylphenyl]ethanone, 278

**C<sub>13</sub>H<sub>17</sub>NO<sub>2</sub>**

1-[4-Hydroxy-3-(1-pyrrolidinylmethyl)phenyl]ethanone, 278

**C<sub>13</sub>H<sub>17</sub>NO<sub>2</sub>, HCl**

1-[4-Hydroxy-3-(1-pyrrolidinylmethyl)phenyl]ethanone (*Hydrochloride*), 279

**C<sub>13</sub>H<sub>17</sub>N<sub>3</sub>O<sub>3</sub>**

1-[4-(3-Azidopropoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 279  
**C<sub>13</sub>H<sub>18</sub>O<sub>2</sub>**

1-(5-Butyl-2-hydroxy-3-methylphenyl)ethanone, 279  
1-(2,3-Diethyl-6-hydroxy-4-methylphenyl)ethanone, 279  
1-(2,5-Diethyl-6-hydroxy-3-methylphenyl)ethanone, 280  
1-(3,4-Diethyl-2-hydroxy-5-methylphenyl)ethanone, 280  
1-(4,5-Diethyl-2-hydroxy-3-methylphenyl)ethanone, 280  
1-[3,4-Dimethyl-2-hydroxy-5-(1-methylethyl)phenyl]ethanone, 280  
1-[3-(1,1-Dimethylethyl)-2-hydroxy-5-methylphenyl]ethanone, 281  
1-[3-(1,1-Dimethylethyl)-2-hydroxy-6-methylphenyl]ethanone, 281  
1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-methylphenyl]ethanone, 281  
1-[5-(1,1-Dimethylethyl)-4-hydroxy-2-methylphenyl]ethanone, 282  
1-[5-(1,1-Dimethylpropyl)-2-hydroxyphenyl]ethanone, 282  
1-[3-Ethyl-2-hydroxy-5-(1-methylethyl)phenyl]ethanone, 282  
1-[4-Ethyl-2-hydroxy-5-(1-methylethyl)phenyl]ethanone, 282  
1-[4-Ethyl-2-hydroxy-6-(1-methylethyl)phenyl]ethanone, 283  
1-[6-Ethyl-2-hydroxy-3-(1-methylethyl)phenyl]ethanone, 283  
1-(3-Ethyl-2-hydroxy-5-propylphenyl)ethanone, 283  
1-[4-Hydroxy-3-(3-methylbutyl)phenyl]ethanone, 283  
1-(2-Hydroxy-4-pentylphenyl)ethanone, 283  
1-(2-Hydroxy-5-pentylphenyl)ethanone, 284  
1-(4-Hydroxy-2-pentylphenyl)ethanone, 284

**C<sub>13</sub>H<sub>18</sub>O<sub>3</sub>**

1-(5-Butyl-2-hydroxy-4-methoxyphenyl)ethanone, 284  
1-(3,5-Diethyl-2-hydroxy-6-methoxyphenyl)ethanone, 284  
1-[2,4-Dihydroxy-3-(3-methylbutyl)phenyl]ethanone, 285  
1-[2,4-Dihydroxy-5-(3-methylbutyl)phenyl]ethanone, 285  
1-(2,4-Dihydroxy-3-pentylphenyl)ethanone, 285  
1-(2,4-Dihydroxy-5-pentylphenyl)ethanone, 285  
1-(2,6-Dihydroxy-4-pentylphenyl)ethanone, 286  
1-[4-(1,1-Dimethylethyl)-2,3-dihydroxy-6-methylphenyl]ethanone, 286  
1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-methoxyphenyl]ethanone, 286  
1-[5-(1,1-Dimethylethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 286  
1-[4-Hydroxy-3-(3-hydroxy-3-methylbutyl)phenyl]ethanone, 287  
1-(2-Hydroxy-5-methoxy-4-methyl-3-propylphenyl)ethanone, 287  
1-(2-Hydroxy-5-methoxy-6-methyl-3-propylphenyl)ethanone, 287  
1-[2-Hydroxy-4-(pentyloxy)phenyl]ethanone, 287

**C<sub>13</sub>H<sub>18</sub>O<sub>4</sub>**

1-(4,6-Diethoxy-2-hydroxy-3-methylphenyl)ethanone, 288  
1-(3,5-Diethyl-2,6-dihydroxy-4-methoxyphenyl)ethanone, 288  
1-(3,4-Dimethoxy-6-hydroxy-2-propylphenyl)ethanone, 288  
1-[2-Hydroxy-3-methoxy-4-(1-methylpropoxy)phenyl]ethanone, 288  
1-[2-Hydroxy-4-(methoxymethoxy)-3-propylphenyl]ethanone, 289  
1-[2,4,6-Trihydroxy-3-(3-methylbutyl)phenyl]ethanone, 289

**C<sub>13</sub>H<sub>18</sub>O<sub>5</sub>**

1-(2,3-Diethoxy-6-hydroxy-4-methoxyphenyl)ethanone, 289  
1-(2,4-Diethoxy-6-hydroxy-3-methoxyphenyl)ethanone, 290  
1-(3,6-Diethoxy-2-hydroxy-4-methoxyphenyl)ethanone, 290  
1-(2,3-Dihydroxy-4,5-dimethoxy-6-propylphenyl)ethanone, 290  
1-(3-Ethyl-2-hydroxy-4,5,6-trimethoxyphenyl)ethanone, 290

1-(3-Ethyl-6-hydroxy-2,4,5-trimethoxyphenyl)ethanone, 291  
1-[6-Hydroxy-2,4-dimethoxy-3-(2-methoxyethyl)phenyl]ethanone, 291  
1-[2-Hydroxy-3,6-dimethoxy-4-(1-methylethoxy)phenyl]ethanone, 291  
1-[6-Hydroxy-2,3-dimethoxy-4-(1-methylethoxy)phenyl]ethanone, 291  
1-[6-Hydroxy-2,4-dimethoxy-3-(1-methylethoxy)phenyl]ethanone, 292  
1-[6-Hydroxy-3,4-dimethoxy-2-(1-methylethoxy)phenyl]ethanone, 292

**C<sub>13</sub>H<sub>18</sub>O<sub>6</sub>**

1-(3,6-Diethoxy-2,5-dihydroxy-4-methoxyphenyl)ethanone, 292  
1-(4-Ethoxy-2-hydroxy-3,5,6-trimethoxyphenyl)ethanone, 292  
1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3-methylphenyl]ethanone, 293

**C<sub>13</sub>H<sub>18</sub>O<sub>7</sub>**

1-[2-Hydroxy-3,4,6-trimethoxy-5-(methoxymethoxy)phenyl]ethanone, 293  
1-[2-Hydroxy-3,5,6-trimethoxy-4-(methoxymethoxy)phenyl]ethanone, 293

**C<sub>13</sub>H<sub>19</sub>NO<sub>2</sub>**

1-[3-(Aminomethyl)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 293  
1-[2-(Diethylamino)-6-hydroxy-4-methylphenyl]ethanone, 294  
1-[6-[(1,1-Dimethylethyl)amino]-3-hydroxy-2-methylphenyl]ethanone, 294

**C<sub>13</sub>H<sub>19</sub>NO<sub>2</sub>, HCl**

1-[3-(Aminomethyl)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone (*Hydrochloride*), 294

**C<sub>14</sub>H<sub>10</sub>BrIO<sub>3</sub>**

1-(5-Bromo-2-hydroxy-3-iodo-4-phenoxyphenyl)ethanone, 294

**C<sub>14</sub>H<sub>10</sub>INO<sub>5</sub>**

1-(2-Hydroxy-3-iodo-5-nitro-4-phenoxyphenyl)ethanone, 295

**C<sub>14</sub>H<sub>11</sub>BrO<sub>2</sub>**

1-(5-Bromo-2-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 295

**C<sub>14</sub>H<sub>11</sub>ClO<sub>2</sub>**

1-(4'-Chloro-2-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 295  
1-(4'-Chloro-4-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 295  
1-(4'-Chloro-6-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 296  
1-(5-Chloro-2-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 296

**C<sub>14</sub>H<sub>11</sub>ClO<sub>3</sub>**

1-(4-Chloro-3,5-dihydroxy[1,1'-biphenyl]-2-yl)ethanone, 296  
1-[5-(4-Chlorophenoxy)-2-hydroxyphenyl]ethanone, 296

**C<sub>14</sub>H<sub>11</sub>IO<sub>3</sub>**

1-(2-Hydroxy-3-iodo-4-phenoxyphenyl)ethanone, 297



**C<sub>14</sub>H<sub>11</sub>NO<sub>4</sub>**

1-(2-Hydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone, 297  
1-(4-Hydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone, 297

**C<sub>14</sub>H<sub>11</sub>NO<sub>5</sub>**

1-(2,6-Dihydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone, 298  
1-(2-Hydroxy-3-nitro-5-phenoxyphenyl)ethanone, 298

**C<sub>14</sub>H<sub>12</sub>O<sub>2</sub>**

1-(2-Hydroxy[1,1'-biphenyl]-3-yl)ethanone, 298  
1-(3-Hydroxy[1,1'-biphenyl]-2-yl)ethanone, 298  
1-(3-Hydroxy[1,1'-biphenyl]-4-yl)ethanone, 299  
1-(4-Hydroxy[1,1'-biphenyl]-3-yl)ethanone, 299  
1-(6-Hydroxy[1,1'-biphenyl]-3-yl)ethanone, 299

**C<sub>14</sub>H<sub>12</sub>O<sub>3</sub>**

1-(3,5-Dihydroxy[1,1'-biphenyl]-2-yl)ethanone, 300  
1-(4,4'-Dihydroxy[1,1'-biphenyl]-3-yl)ethanone, 300  
1-(2-Hydroxy-5-phenoxyphenyl)ethanone, 300

**C<sub>14</sub>H<sub>12</sub>O<sub>4</sub>**

1-(3,6-Dihydroxy-2-phenoxyphenyl)ethanone, 301  
1-[2-Hydroxy-4,6-bis(2-propynyloxy)phenyl]ethanone, 301

**C<sub>14</sub>H<sub>12</sub>O<sub>4</sub>S**

1-[2-Hydroxy-5-(phenylsulfonyl)phenyl]ethanone, 301

**C<sub>14</sub>H<sub>12</sub>O<sub>5</sub>S**

1-[3,6-Dihydroxy-2-(phenylsulfonyl)phenyl]ethanone, 301  
1-[2-Hydroxy-5-[(4-hydroxyphenyl)sulfonyl]phenyl]ethanone, 302

**C<sub>14</sub>H<sub>13</sub>NO<sub>2</sub>**

1-(3-Amino-5-hydroxy[1,1'-biphenyl]-2-yl)ethanone, 302  
1-(5-Amino-3-hydroxy[1,1'-biphenyl]-2-yl)ethanone, 302

**C<sub>14</sub>H<sub>15</sub>IO<sub>4</sub>**

1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-3-iodo-6-methoxyphenyl]ethanone, 302

**C<sub>14</sub>H<sub>16</sub>O<sub>2</sub>**

1-[2-Hydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 303

**C<sub>14</sub>H<sub>16</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 303  
1-[2,6-Dihydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 303

1-[2-Hydroxy-6-methoxy-3-(3-methyl-1,3-butadienyl)phenyl]ethanone (*Z*), 304  
1-[2-Hydroxy-3-(2-propenyl)-4-(2-propenyloxy)phenyl]ethanone, 304

**C<sub>14</sub>H<sub>16</sub>O<sub>4</sub>**

1-[2,6-Dihydroxy-3-(2-propenyl)-4-(2-propenyloxy)phenyl]ethanone, 304  
1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-5-methoxyphenyl]ethanone, 304  
1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-6-methoxyphenyl]ethanone, 305  
1-[2-Hydroxy-4,6-bis(2-propenyloxy)phenyl]ethanone, 305  
1-[2-Hydroxy-4-(oxiranylmethoxy)-3-(2-propenyl)phenyl]ethanone, 305  
1-[2,4,6-Trihydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 305

**C<sub>14</sub>H<sub>16</sub>O<sub>5</sub>**

1-[2,6-Dihydroxy-3,5-bis(2-propenyloxy)phenyl]ethanone, 306

**C<sub>14</sub>H<sub>17</sub>IO<sub>4</sub>**

1-[2,4-Dihydroxy-3-iodo-6-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 306

**C<sub>14</sub>H<sub>18</sub>O<sub>2</sub>**

1-(3-Cyclohexyl-4-hydroxyphenyl)ethanone, 306  
1-(4-Cyclohexyl-3-hydroxyphenyl)ethanone, 306  
1-(5-Cyclohexyl-2-hydroxyphenyl)ethanone, 307

**C<sub>14</sub>H<sub>18</sub>O<sub>3</sub>**

1-(5-Cyclohexyl-2,4-dihydroxyphenyl)ethanone, 307  
1-[3-(Cyclohexyloxy)-4-hydroxyphenyl]ethanone, 307  
1-[4-(Cyclohexyloxy)-3-hydroxyphenyl]ethanone, 307  
1-[2,4-Dihydroxy-3-methyl-5-(3-methyl-2-butenyl)phenyl]ethanone, 308  
1-[2,4-Dihydroxy-5-(2-propenyl)-3-propylphenyl]ethanone, 308  
1-[2-Hydroxy-4-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 308  
1-[2-Hydroxy-4-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 308  
1-[4-Hydroxy-3-(3-methoxy-3-methyl-1-butenyl)phenyl]ethanone (*E*), 309  
1-[4-Hydroxy-3-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 309  
1-[2-Hydroxy-4-(2-propenyloxy)-3-propylphenyl]ethanone, 309

**C<sub>14</sub>H<sub>18</sub>O<sub>4</sub>**

1-[3-(Acetyloxy)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 309  
1-[5-(Acetyloxy)-4-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 310  
1-[3-(2-Butenyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 310  
1-[2-(Cyclohexyloxy)-3,6-dihydroxyphenyl]ethanone, 310  
1-[2,4-Dihydroxy-6-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 310  
1-[4,6-Dihydroxy-2-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone (*Acronylin*), 311  
1-[2-Hydroxy-4-methoxy-5-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 311  
1-[2-Hydroxy-4-(oxiranylmethoxy)-3-propylphenyl]ethanone, 311  
1-[2,4,6-Trihydroxy-3-methyl-5-(3-methyl-2-butenyl)phenyl]ethanone, 312

**C<sub>14</sub>H<sub>18</sub>O<sub>5</sub>**

1-[2,6-Dihydroxy-4-methoxy-3-(tetrahydro-2*H*-pyran-2-yl)phenyl]ethanone, 312  
1-[2-Hydroxy-4-methoxy-6-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 312

**C<sub>14</sub>H<sub>18</sub>O<sub>8</sub>**

- 1-[2-( $\beta$ -D-Galactopyranosyloxy)-4-hydroxyphenyl]ethanone, 312
- 1-[2-( $\beta$ -D-Galactopyranosyloxy)-6-hydroxyphenyl]ethanone, 313
- 1-[3-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone, 313
- 1-[4-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone, 313
- 1-[5-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone, 313
- 1-[2-( $\beta$ -D-Glucopyranosyloxy)-4-hydroxyphenyl]ethanone (*Cynanoneside B*; *Bungeiside B*), 314
- 1-[2-( $\beta$ -D-Glucopyranosyloxy)-5-hydroxyphenyl]ethanone (*Bungeiside A*), 314
- 1-[2-( $\beta$ -D-Glucopyranosyloxy)-6-hydroxyphenyl]ethanone, 314
- 1-[3-( $\beta$ -D-Glucopyranosyloxy)-4-hydroxyphenyl]ethanone, 315
- 1-[4-( $\beta$ -D-Glucopyranosyloxy)-2-hydroxyphenyl]ethanone, 315
- 1-[4-( $\beta$ -D-Glucopyranosyloxy)-3-hydroxyphenyl]ethanone (*Cynanoneside A*), 315

**C<sub>14</sub>H<sub>18</sub>O<sub>9</sub>**

- 1-[2-( $\beta$ -D-Glucopyranosyloxy)-4,6-dihydroxyphenyl]ethanone, 316
- 1-[3-( $\beta$ -D-Glucopyranosyloxy)-4,5-dihydroxyphenyl]ethanone, 316

**C<sub>14</sub>H<sub>18</sub>O<sub>10</sub>**

- 1-[2-( $\beta$ -D-Glucopyranosyloxy)-3,4,6-trihydroxyphenyl]ethanone (*Lalioside*), 316
- 1-[3-( $\beta$ -D-Glucopyranosyloxy)-2,4,6-trihydroxyphenyl]ethanone (*Polygoacetophenoside*), 316

**C<sub>14</sub>H<sub>19</sub>BrO<sub>2</sub>S**

- 1-[4-[(3-Bromopropyl)thio]-2-hydroxy-3-propylphenyl]ethanone, 317

**C<sub>14</sub>H<sub>19</sub>BrO<sub>3</sub>**

- 1-[4-(3-Bromopropoxy)-2-hydroxy-3-propylphenyl]ethanone, 317
- 1-[5-(3-Bromopropoxy)-2-hydroxy-3-propylphenyl]ethanone, 317

**C<sub>14</sub>H<sub>19</sub>ClO<sub>3</sub>**

- 1-[4-(3-Chloropropoxy)-2-hydroxy-3-propylphenyl]ethanone, 317

**C<sub>14</sub>H<sub>20</sub>N<sub>2</sub>O<sub>2</sub>**

- 1-[2-(Ethylamino)-5-[1-(ethylimino)ethyl]-4-hydroxyphenyl]ethanone, 318

**C<sub>14</sub>H<sub>20</sub>O<sub>2</sub>**

- 1-[5-Ethyl-2-hydroxy-4-methyl-3-(1-methylethyl)phenyl]ethanone, 318
- 1-[6-Ethyl-2-hydroxy-4-methyl-3-(1-methylethyl)phenyl]ethanone, 318
- 1-(5-Hexyl-2-hydroxyphenyl)ethanone, 318
- 1-[2-Hydroxy-3,5-bis(1-methylethyl)phenyl]ethanone, 319
- 1-(2-Hydroxy-3,5-dipropylphenyl)ethanone, 319
- 1-(3,4,5-Triethyl-2-hydroxyphenyl)ethanone, 319

**C<sub>14</sub>H<sub>20</sub>O<sub>3</sub>**

- 1-(2,4-Dihydroxy-3,5-dipropylphenyl)ethanone, 319
- 1-[4-Ethoxy-3-hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone, 320

1-(5-Hexyl-2,4-dihydroxyphenyl)ethanone, 320  
1-[3-(Hexyloxy)-4-hydroxyphenyl]ethanone, 320  
1-[4-(Hexyloxy)-2-hydroxyphenyl]ethanone, 320

**C<sub>14</sub>H<sub>20</sub>O<sub>4</sub>**

1-[4,6-Dihydroxy-2-methoxy-3-(3-methylbutyl)phenyl]ethanone, 321  
1-[2-Hydroxy-4,6-bis(1-methylethoxy)phenyl]ethanone, 321  
1-[3-Hydroxy-4,6-dimethoxy-2-methyl-5-(1-methylethyl)phenyl]ethanone, 321  
1-[2-Hydroxy-4,6-bis(propyloxy)phenyl]ethanone, 321

**C<sub>14</sub>H<sub>20</sub>O<sub>5</sub>**

1-[3,5-Diethyl-2,4-dihydroxy-6-(methoxymethoxy)phenyl]ethanone, 322  
1-[3,6-Dihydroxy-2,4-bis(1-methylethoxy)phenyl]ethanone, 322  
1-[4,6-Dihydroxy-3-(3-hydroxy-3-methylbutyl)-2-methoxyphenyl]ethanone, 322

**C<sub>14</sub>H<sub>20</sub>O<sub>6</sub>**

1-(2,4-Diethoxy-6-hydroxy-3,5-dimethoxyphenyl)ethanone, 322  
1-[2-Hydroxy-3,5,6-trimethoxy-4-(1-methylethoxy)phenyl]ethanone, 323

**C<sub>14</sub>H<sub>20</sub>O<sub>8</sub>**

1-[2-Hydroxy-3,4,6-tris(methoxymethoxy)phenyl]ethanone, 323

**C<sub>14</sub>H<sub>22</sub>O<sub>4</sub>Si**

1-[4-[(1,1-Dimethylethyl)dimethylsilyl]oxy]-2,6-dihydroxyphenyl]ethanone, 323

**C<sub>15</sub>H<sub>10</sub>N<sub>2</sub>O<sub>8</sub>**

1-[4-(Benzoyloxy)-2-hydroxy-3,5-dinitrophenyl]ethanone, 323

**C<sub>15</sub>H<sub>11</sub>BrO<sub>4</sub>**

1-[4-(Benzoyloxy)-5-bromo-2-hydroxyphenyl]ethanone, 324

**C<sub>15</sub>H<sub>11</sub>NO<sub>6</sub>**

1-[4-(Benzoyloxy)-2-hydroxy-5-nitrophenyl]ethanone, 324

**C<sub>15</sub>H<sub>12</sub>BrNO<sub>5</sub>**

1-[3-Bromo-2-hydroxy-5-nitro-4-(phenylmethoxy)phenyl]ethanone, 324

**C<sub>15</sub>H<sub>12</sub>Cl<sub>2</sub>O<sub>3</sub>**

1-[2-[(2,4-Dichlorophenyl)methoxy]-6-hydroxyphenyl]ethanone, 324  
1-[2-[(3,4-Dichlorophenyl)methoxy]-6-hydroxyphenyl]ethanone, 325

**C<sub>15</sub>H<sub>12</sub>F<sub>2</sub>O<sub>3</sub>**

1-[4-(2,6-Difluorophenyl)methoxy-3-hydroxyphenyl]ethanone, 325

**C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>**

1-[2-(Benzoyloxy)-4-hydroxyphenyl]ethanone, 325  
1-[2-(Benzoyloxy)-5-hydroxyphenyl]ethanone, 325  
1-[2-(Benzoyloxy)-6-hydroxyphenyl]ethanone, 326  
1-[3-(Benzoyloxy)-4-hydroxyphenyl]ethanone, 326  
1-[4-(Benzoyloxy)-2-hydroxyphenyl]ethanone, 326  
1-[5-(Benzoyloxy)-2-hydroxyphenyl]ethanone, 326

**C<sub>15</sub>H<sub>12</sub>O<sub>5</sub>**

1-[2-(Benzoyloxy)-4,6-dihydroxyphenyl]ethanone, 327  
1-[4-(Benzoyloxy)-2,6-dihydroxyphenyl]ethanone, 327

**C<sub>15</sub>H<sub>13</sub>BrO<sub>3</sub>**

1-[3-Bromo-2-hydroxy-6-(phenylmethoxy)phenyl]ethanone, 327  
1-[5-Bromo-2-hydroxy-4-(phenylmethoxy)phenyl]ethanone, 327

**C<sub>15</sub>H<sub>13</sub>IO<sub>3</sub>**

1-[2-Hydroxy-3-iodo-4-(phenylmethoxy)phenyl]ethanone, 328  
1-[2-Hydroxy-5-iodo-4-(phenylmethoxy)phenyl]ethanone, 328

**C<sub>15</sub>H<sub>13</sub>NO<sub>5</sub>**

1-[2-Hydroxy-5-nitro-4-(phenylmethoxy)phenyl]ethanone, 328

**C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>**

1-(2-Hydroxy-5-methyl[1,1'-biphenyl]-3-yl)ethanone, 328  
1-(4-Hydroxy-4'-methyl[1,1'-biphenyl]-3-yl)ethanone, 329  
1-[2-Hydroxy-5-(phenylmethyl)phenyl]ethanone, 329  
1-[4-Hydroxy-3-(phenylmethyl)phenyl]ethanone, 329

**C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>S**

1-[3-Hydroxy-4-(phenylmethyl)thiophenyl]ethanone, 329

**C<sub>15</sub>H<sub>14</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-3-(phenylmethyl)phenyl]ethanone, 330  
1-[2,4-Dihydroxy-5-(phenylmethyl)phenyl]ethanone, 330  
1-(3-Hydroxy-5-methoxy[1,1'-biphenyl]-4-yl)ethanone, 330  
1-(4-Hydroxy-4'-methoxy[1,1'-biphenyl]-3-yl)ethanone, 331  
1-[2-Hydroxy-3-(phenylmethoxy)phenyl]ethanone, 331  
1-[2-Hydroxy-4-(phenylmethoxy)phenyl]ethanone, 331  
1-[2-Hydroxy-4-(phenylmethoxy)phenyl]ethanone-*d*-<sup>14</sup>C, 332  
1-[2-Hydroxy-5-(phenylmethoxy)phenyl]ethanone, 332  
1-[2-Hydroxy-6-(phenylmethoxy)phenyl]ethanone, 332  
1-[3-Hydroxy-4-(phenylmethoxy)phenyl]ethanone, 333  
1-[3-Hydroxy-5-(phenylmethoxy)phenyl]ethanone, 333  
1-[5-Hydroxy-2-(phenylmethoxy)phenyl]ethanone, 333

**C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>**

1-[2,4-Dihydroxy-3-[(2-hydroxyphenyl)methyl]phenyl]ethanone, 333  
1-[2,3-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone, 334  
1-[2,4-Dihydroxy-6-(phenylmethoxy)phenyl]ethanone, 334  
1-[2,5-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone, 334  
1-[2,6-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone, 334  
1-[3,6-Dihydroxy-2-(phenylmethoxy)phenyl]ethanone, 335  
1-[2,3,4-Trihydroxy-5-(phenylmethyl)phenyl]ethanone, 335  
1-[2,4,6-Trihydroxy-3-(phenylmethyl)phenyl]ethanone, 335  
1-(3,4',6-Trihydroxy-3'-methyl[1,1'-biphenyl]-2-yl)ethanone, 335

**C<sub>15</sub>H<sub>14</sub>O<sub>4</sub>S**

1-[2-Hydroxy-5-[(4-methylphenyl)sulfonyl]phenyl]ethanone, 336

**C<sub>15</sub>H<sub>14</sub>O<sub>5</sub>**

1-[3,6-Dihydroxy-2-(4-methoxyphenoxy)phenyl]ethanone, 336  
1-(2',3,4',6-Tetrahydroxy-6'-methyl[1,1'-biphenyl]-2-yl)ethanone, 336

**C<sub>15</sub>H<sub>14</sub>O<sub>6</sub>S**

1-[2,4-Dihydroxy-6-[[4-(4-methylphenyl)sulfonyl]oxy]phenyl]ethanone, 336

**C<sub>15</sub>H<sub>15</sub>NO<sub>2</sub>**

1-[2-Hydroxy-4-methyl-6-(phenylamino)phenyl]ethanone, 337

**C<sub>15</sub>H<sub>18</sub>O<sub>3</sub>**

1-[4-(3-Butenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 337

**C<sub>15</sub>H<sub>18</sub>O<sub>4</sub>**

1-[4-(Acetyloxy)-2-hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 337

**C<sub>15</sub>H<sub>19</sub>BrO<sub>3</sub>**

1-[4-(4-Bromobutoxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 337

**C<sub>15</sub>H<sub>19</sub>N<sub>3</sub>O<sub>3</sub>**

1-[4-(4-Azidobutoxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 338

**C<sub>15</sub>H<sub>20</sub>O<sub>3</sub>**

1-[4-Butoxy-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 338

**C<sub>15</sub>H<sub>20</sub>O<sub>4</sub>**

1-[3-(Cyclohexyloxy)-2-hydroxy-6-methoxyphenyl]ethanone, 338  
1-[2-Hydroxy-4,6-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 338  
1-[4-Hydroxy-2,6-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 339  
1-[6-Hydroxy-2,4-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone

(*Acronylin methyl ether*), 339

1-[2-Hydroxy-4-(4-hydroxybutoxy)-5-(2-propenyl)phenyl]ethanone, 339

1-[2-Hydroxy-4-(methoxymethoxy)-5-(3-methyl-2-butenyl)phenyl]ethanone, 339

### **C<sub>15</sub>H<sub>20</sub>O<sub>9</sub>**

1-[2-(β-D-Glucopyranosyloxy)-6-hydroxy-4-methoxyphenyl]ethanone, 340

1-[4-(β-D-Glucopyranosyloxy)-2-hydroxy-6-methoxyphenyl]ethanone (*Annphenone*), 340

### **C<sub>15</sub>H<sub>21</sub>BrO<sub>3</sub>**

1-[4-(4-Bromobutoxy)-2-hydroxy-3-propylphenyl]ethanone, 340

1-[4-[(5-Bromopentyl)oxy]-5-ethyl-2-hydroxyphenyl]ethanone, 341

### **C<sub>15</sub>H<sub>22</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-3-(1-methylhexyl)phenyl]ethanone, 341

1-(2-Heptyl-4,6-dihydroxyphenyl)ethanone, 341

1-(4-Heptyl-2,6-dihydroxyphenyl)ethanone, 341

1-[4-(Heptyloxy)-2-hydroxyphenyl]ethanone, 341

1-[6-Hydroxy-3-methoxy-2,4-bis(1-methylethyl)phenyl]ethanone, 342

1-(2-Hydroxy-4-methoxy-3,5-dipropylphenyl)ethanone, 342

### **C<sub>15</sub>H<sub>22</sub>O<sub>5</sub>**

1-[6-Hydroxy-3-methoxy-2,4-bis(1-methylethoxy)phenyl]ethanone, 342

### **C<sub>15</sub>H<sub>23</sub>NO<sub>3</sub>**

1-[4-[(5-Aminopentyl)oxy]-5-ethyl-2-hydroxyphenyl]ethanone, 342

### **C<sub>16</sub>H<sub>14</sub>O<sub>5</sub>**

1-[6-(Benzoyloxy)-2,4-dihydroxy-3-methylphenyl]ethanone, 343

1-[2-(Benzoyloxy)-6-hydroxy-4-methoxyphenyl]ethanone, 343

1-[2-Hydroxy-4-(4-methoxybenzoyloxy)phenyl]ethanone, 343

### **C<sub>16</sub>H<sub>14</sub>O<sub>6</sub>S**

1-[5-[[4-(Acetyloxy)phenyl]sulfonyl]-2-hydroxyphenyl]ethanone, 343

### **C<sub>16</sub>H<sub>16</sub>O<sub>2</sub>**

1-(5-Hydroxy-3,4'-dimethyl[1,1'-biphenyl]-2-yl)ethanone, 344

1-[2-Hydroxy-5-methyl-3-(phenylmethyl)phenyl]ethanone, 344

1-[2-Hydroxy-4-(2-phenylethyl)phenyl]ethanone, 344

1-[2-Hydroxy-5-(2-phenylethyl)phenyl]ethanone, 344

### **C<sub>16</sub>H<sub>16</sub>O<sub>3</sub>**

1-(2,2'-Dihydroxy-5,5'-dimethyl[1,1'-biphenyl]-3-yl)ethanone, 345

1-[2,4-Dihydroxy-5-(2-phenylethyl)phenyl]ethanone, 345

1-[2-Hydroxy-4-methoxy-3-(phenylmethyl)phenyl]ethanone, 345

1-[2-Hydroxy-4-methoxy-5-(phenylmethyl)phenyl]ethanone, 345

1-[2-Hydroxy-3-methyl-4-(phenylmethoxy)phenyl]ethanone, 346

1-[2-Hydroxy-6-methyl-4-(phenylmethoxy)phenyl]ethanone, 346

1-[2-Hydroxy-4-(2-phenylethoxy)phenyl]ethanone, 346  
1-[2-Hydroxy-5-(2-phenylethoxy)phenyl]ethanone, 346

**C<sub>16</sub>H<sub>16</sub>O<sub>4</sub>**

1-[2,4-Dihydroxy-3-methyl-6-(phenylmethoxy)phenyl]ethanone, 347  
1-[2-Hydroxy-3-methoxy-4-(phenylmethoxy)phenyl]ethanone, 347  
1-[2-Hydroxy-3-methoxy-6-(phenylmethoxy)phenyl]ethanone, 347  
1-[2-Hydroxy-4-methoxy-5-(phenylmethoxy)phenyl]ethanone, 347  
1-[2-Hydroxy-4-methoxy-6-(phenylmethoxy)phenyl]ethanone, 348  
1-[2-Hydroxy-5-methoxy-4-(phenylmethoxy)phenyl]ethanone, 348  
1-[2-Hydroxy-6-methoxy-3-(phenylmethoxy)phenyl]ethanone, 348  
1-[2-Hydroxy-6-methoxy-4-(phenylmethoxy)phenyl]ethanone, 348  
1-[3-Hydroxy-4-(4-methoxybenzyloxy)phenyl]ethanone, 349  
1-[2-Hydroxy-6-(2-phenoxyethoxy)phenyl]ethanone, 349

**C<sub>16</sub>H<sub>16</sub>O<sub>5</sub>**

1-[2,4-Dihydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxyphenyl]ethanone, 349  
1-[2,6-Dihydroxy-3-methoxy-4-(phenylmethoxy)phenyl]ethanone, 349  
1-[3,6-Dihydroxy-2-methoxy-4-(phenylmethoxy)phenyl]ethanone, 350  
1-[3,6-Dihydroxy-4-methoxy-2-(phenylmethoxy)phenyl]ethanone, 350

**C<sub>16</sub>H<sub>17</sub>NO<sub>2</sub>**

1-[2-Hydroxy-4-methyl-6-[(phenylmethyl)amino]phenyl]ethanone, 350

**C<sub>16</sub>H<sub>18</sub>O<sub>4</sub>**

1-[2-(Acetyloxy)-6-hydroxy-3,5-di-2-propenylphenyl]ethanone, 350  
1-[4-(Acetyloxy)-2-hydroxy-3,5-di-2-propenylphenyl]ethanone, 351

**C<sub>16</sub>H<sub>21</sub>BrO<sub>3</sub>**

1-[4-[(5-Bromopentyl)oxy]-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 351  
1-[6-[(5-Bromopentyl)oxy]-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 351

**C<sub>16</sub>H<sub>22</sub>O<sub>3</sub>**

1-[2-Hydroxy-4-(pentyloxy)-5-(2-propenyl)phenyl]ethanone, 351

**C<sub>16</sub>H<sub>22</sub>O<sub>4</sub>**

1-[4-(Ethoxymethoxy)-2-hydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 352

**C<sub>16</sub>H<sub>22</sub>O<sub>9</sub>**

1-[4-(β-D-Glucopyranosyloxy)-2-hydroxy-6-methoxy-3-methylphenyl]ethanone, 352

**C<sub>16</sub>H<sub>23</sub>BrO<sub>2</sub>S**

1-[4-[(5-Bromopentyl)thio]-2-hydroxy-3-propylphenyl]ethanone, 352

**C<sub>16</sub>H<sub>23</sub>BrO<sub>3</sub>**

1-[4-[(5-Bromopentyl)oxy]-5-ethyl-2-hydroxy-3-methylphenyl]ethanone, 352



1-[4-[(5-Bromopentyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 353  
**C<sub>16</sub>H<sub>23</sub>NO<sub>4</sub>**

1-[2-Hydroxy-3-nitro-5-(1,1,3,3-tetramethylbutyl)phenyl]ethanone, 353

**C<sub>16</sub>H<sub>24</sub>O<sub>2</sub>**

1-[2,4-Bis(1,1-dimethylethyl)-6-hydroxyphenyl]ethanone, 353  
1-[3,5-Bis(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 353  
1-[3,5-Bis(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone, 354  
1-[3-(1,1-Dimethylethyl)-2-hydroxy-6-methyl-5-(1-methylethyl)phenyl]ethanone, 354  
1-[2-Hydroxy-3,5-bis(2-methylpropyl)phenyl]ethanone, 354  
1-(2-Hydroxy-5-octylphenyl)ethanone, 355  
1-[2-Hydroxy-5-(1,1,3,3-tetramethylbutyl)phenyl]ethanone, 355  
(2'-Hydroxy-5'-(1,1,3,3-tetramethylbutyl)acetophenone), 355

**C<sub>16</sub>H<sub>24</sub>O<sub>3</sub>**

1-[4,6-Bis(1,1-dimethylethyl)-2,3-dihydroxyphenyl]ethanone, 355  
1-(2-Heptyl-6-hydroxy-4-methoxyphenyl)ethanone, 355  
1-[2-Hydroxy-4-(isooctyloxy)phenyl]ethanone, 356  
1-[2-Hydroxy-4-(sec-octyloxy)phenyl]ethanone, 356  
1-[2-Hydroxy-5-(sec-octyloxy)phenyl]ethanone, 356

**C<sub>16</sub>H<sub>24</sub>O<sub>6</sub>**

1-[2-Hydroxy-4,5-dimethoxy-3,6-bis(1-methylethoxy)phenyl]ethanone, 356

**C<sub>17</sub>H<sub>14</sub>O<sub>4</sub>**

1-[4-(Cinnamoyloxy)-2-hydroxyphenyl]ethanone, 357  
1-[2-Hydroxy-3-(2-propynyl)-4,6-bis(2-propynyloxy)phenyl]ethanone, 357

**C<sub>17</sub>H<sub>15</sub>IO<sub>3</sub>**

1-[2-Hydroxy-5-iodo-4-phenoxy-3-(2-propenyl)phenyl]ethanone, 357

**C<sub>17</sub>H<sub>16</sub>O<sub>3</sub>**

1-[2-Hydroxy-5-[(3-phenyl-2-propenyl)oxy]phenyl]ethanone, 357

**C<sub>17</sub>H<sub>17</sub>ClO<sub>3</sub>**

1-[4-[(3-Chlorophenyl)methoxy]-5-ethyl-2-hydroxyphenyl]ethanone, 358

**C<sub>17</sub>H<sub>17</sub>FO<sub>3</sub>**

1-[5-Ethyl-4-[(3-fluorophenyl)methoxy]-2-hydroxyphenyl]ethanone, 358

**C<sub>17</sub>H<sub>18</sub>O<sub>2</sub>**

1-[2-Hydroxy-5-(3-phenylpropyl)phenyl]ethanone, 358

**C<sub>17</sub>H<sub>18</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-5-(3-phenylpropyl)phenyl]ethanone, 358

1-(5-Ethoxy-3-hydroxy-2-methyl [1,1'-biphenyl]-4-yl)ethanone, 359  
1-(5'-Ethyl-4-hydroxy-2'-methoxy-[1,1'-biphenyl]-3-yl)ethanone, 359  
1-[2-Hydroxy-5-[1-(4-hydroxyphenyl)-1-methylethyl]phenyl]ethanone, 359  
1-[2-Hydroxy-4-(3-phenylpropoxy)phenyl]ethanone, 359  
1-[2-Hydroxy-5-(3-phenylpropoxy)phenyl]ethanone, 360  
1-[2-Hydroxy-6-(3-phenylpropoxy)phenyl]ethanone, 360

**C<sub>17</sub>H<sub>18</sub>O<sub>4</sub>**

1-[2-Hydroxy-3,4-dimethoxy-5-(phenylmethyl)phenyl]ethanone, 360  
1-[2-Hydroxy-4-methoxy-3-[(2-methoxyphenyl)methyl]phenyl]ethanone, 360  
1-[2-Hydroxy-4-methoxy-3-methyl-6-(phenylmethoxy)phenyl]ethanone, 361  
1-[6-Hydroxy-2-methoxy-3-methyl-4-(phenylmethoxy)phenyl]ethanone, 361  
1-[2-Hydroxy-3-(3-phenoxypropoxy)phenyl]ethanone, 361  
1-[2-Hydroxy-4-[2-(phenylmethoxy)ethoxy]phenyl]ethanone, 361

**C<sub>17</sub>H<sub>18</sub>O<sub>5</sub>**

1-[2-Hydroxy-3,6-dimethoxy-4-(phenylmethoxy)phenyl]ethanone, 362  
1-[2-Hydroxy-4,6-dimethoxy-3-(phenylmethoxy)phenyl]ethanone, 362  
1-[5-Hydroxy-2,4-dimethoxy-3-(phenylmethoxy)phenyl]ethanone, 362  
1-[6-Hydroxy-2,3-dimethoxy-4-(phenylmethoxy)phenyl]ethanone, 363  
1-[6-Hydroxy-2,4-dimethoxy-3-(phenylmethoxy)phenyl]ethanone, 363  
1-[6-Hydroxy-3,4-dimethoxy-2-(phenylmethoxy)phenyl]ethanone, 363  
1-(4-Hydroxy-2,2',4'-trimethoxy[1,1'-biphenyl]-3-yl)ethanone, 363  
1-[2,3,4-Trihydroxy-5-[(4-hydroxy-3,5-dimethylphenyl)methyl]phenyl]ethanone, 364

**C<sub>17</sub>H<sub>18</sub>O<sub>6</sub>**

1-[2,5-Dihydroxy-3,6-dimethoxy-4-(phenylmethoxy)phenyl]ethanone, 364

**C<sub>17</sub>H<sub>19</sub>NO<sub>2</sub>**

1-[4'-(Dimethylamino)-5-hydroxy-3-methyl[1,1'-biphenyl]-2-yl]ethanone, 364

**C<sub>17</sub>H<sub>20</sub>O<sub>3</sub>**

1-[4-(5-Hexenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 365

**C<sub>17</sub>H<sub>22</sub>O<sub>3</sub>**

1-[3-(Cyclohexyloxy)-4-hydroxy-5-(2-propenyl)phenyl]ethanone, 365  
1-[4-(5-Hexenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 365

**C<sub>17</sub>H<sub>23</sub>BrO<sub>3</sub>**

1-[4-[(6-Bromohexyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 365

**C<sub>17</sub>H<sub>24</sub>O<sub>3</sub>**

1-[3-(Hexyloxy)-4-hydroxy-5-(2-propenyl)phenyl]ethanone, 366  
1-[4-(Hexyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 366

**C<sub>17</sub>H<sub>24</sub>O<sub>5</sub>**

1-[2-Hydroxy-4-[(2-methoxyethoxy)methoxy]-5-(3-methyl-2-butenyl)phenyl]ethanone, 366  
**C<sub>17</sub>H<sub>24</sub>O<sub>6</sub>**

1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3-(3-methyl-2-butenyl)phenyl]ethanone, 366  
**C<sub>17</sub>H<sub>25</sub>BrO<sub>3</sub>**

1-[4-[(6-Bromohexyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 367  
**C<sub>17</sub>H<sub>25</sub>NO<sub>3</sub>**

1-[4-[4-(Dimethylamino)butoxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 367  
**C<sub>17</sub>H<sub>25</sub>NO<sub>3</sub>, HCl**

1-[4-[4-(Dimethylamino)butoxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone  
(*Hydrochloride*), 367

**C<sub>17</sub>H<sub>26</sub>O<sub>2</sub>**

1-[2,4-Bis(1,1-dimethylethyl)-3-hydroxy-6-methylphenyl]ethanone, 367  
1-(2-Hydroxy-5-nonylphenyl)ethanone, 368  
1-(2-Hydroxy-5-tert-nonylphenyl)ethanone, 368

**C<sub>17</sub>H<sub>26</sub>O<sub>3</sub>S**

1-[5-Ethyl-2-hydroxy-4-[[6-(methylthio)hexyl]oxy]phenyl]ethanone, 368

**C<sub>17</sub>H<sub>26</sub>O<sub>4</sub>**

1-(3,5-Dibutyl-2,6-dihydroxy-4-methoxyphenyl)ethanone, 368  
1-[2-Hydroxy-4-[(6-hydroxyhexyl)oxy]-3-propylphenyl]ethanone, 369  
1-[2-Hydroxy-3-propyl-4,6-bis(propyloxy)phenyl]ethanone, 369

**C<sub>17</sub>H<sub>26</sub>O<sub>4</sub>S**

1-[5-Ethyl-2-hydroxy-4-[[6-(methylsulfinyl)hexyl]oxy]phenyl]ethanone, 369

**C<sub>17</sub>H<sub>26</sub>O<sub>5</sub>S**

1-[5-Ethyl-2-hydroxy-4-[[6-(methylsulfonyl)hexyl]oxy]phenyl]ethanone, 369

**C<sub>18</sub>H<sub>17</sub>F<sub>3</sub>O<sub>3</sub>**

1-[5-Ethyl-2-hydroxy-4-[[3-(trifluoromethyl)phenyl]methoxy]phenyl]ethanone, 370

**C<sub>18</sub>H<sub>18</sub>O<sub>3</sub>**

1-[3-Hydroxy-6-methoxy-2-(2-propenyl)[1,1'-biphenyl]-4-yl]ethanone, 370  
1-[3-Hydroxy-6-methoxy-4-(2-propenyl)[1,1'-biphenyl]-2-yl]ethanone, 370  
1-[2-Hydroxy-4-(phenylmethoxy)-3-(2-propenyl)phenyl]ethanone, 370  
1-[2-Hydroxy-4-(phenylmethoxy)-5-(2-propenyl)phenyl]ethanone, 370  
1-[3-Hydroxy-6-(phenylmethoxy)-2-(2-propenyl)phenyl]ethanone, 371  
1-[6-Hydroxy-3-(phenylmethoxy)-2-(2-propenyl)phenyl]ethanone, 371

**C<sub>18</sub>H<sub>18</sub>O<sub>4</sub>**

- 1-(2'-Acetoxy-2-hydroxy-5,5'-dimethyl[1,1'-biphenyl]-3-yl)ethanone, 371  
1-[2-Hydroxy-4-(phenylmethoxy)-6-(2-propenyloxy)phenyl]ethanone, 371

**C<sub>18</sub>H<sub>20</sub>O<sub>3</sub>**

- 1-[4-Hydroxy-3-[(2-methoxy-3-methylphenyl)methyl]-5-methylphenyl]ethanone, 372  
1-(3-Hydroxy-6-methoxy-2-propyl[1,1'-biphenyl]-4-yl)ethanone, 372  
1-(3-Hydroxy-6-methoxy-4-propyl[1,1'-biphenyl]-2-yl)ethanone, 372  
1-[2-Hydroxy-4-(4-phenylbutoxy)phenyl]ethanone, 372

**C<sub>18</sub>H<sub>20</sub>O<sub>3</sub>S**

- 1-[5-Ethyl-2-hydroxy-4-[[3-(methylthio)phenyl]methoxy]phenyl]ethanone, 373

**C<sub>18</sub>H<sub>20</sub>O<sub>4</sub>**

- 1-[2-Hydroxy-6-(4-phenoxybutoxy)phenyl]ethanone, 373

**C<sub>18</sub>H<sub>20</sub>O<sub>6</sub>**

- 1-[4-Hydroxy-2-[(4-hydroxy-3-methoxyphenyl)methyl]-3,5-dimethoxyphenyl]ethanone, 373  
1-[2-Hydroxy-3,4,6-trimethoxy-5-(phenylmethoxy)phenyl]ethanone, 373  
1-[2-Hydroxy-3,5,6-trimethoxy-4-(phenylmethoxy)phenyl]ethanone, 374

**C<sub>18</sub>H<sub>24</sub>O<sub>2</sub>**

- 1-[4-Hydroxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 374

**C<sub>18</sub>H<sub>24</sub>O<sub>3</sub>**

- 1-[2,4-Dihydroxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 374  
1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone, 375  
1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone (*Z*), 375  
1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone (*E*), 375  
1-[5-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone, 375  
1-[5-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone (*E*), 376  
1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)-5-(3-methyl-2-butenyl)phenyl]ethanone (*E*), 376  
1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)-5-(3-methyl-2-butenyl)phenyl]ethanone (*Z*), 376

**C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>**

- 1-[2,6-Dihydroxy-3-(3-methyl-2-butenyl)-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 376  
1-[4,6-Dihydroxy-3-(3-methyl-2-butenyl)-2-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 377  
1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4,5-trihydroxyphenyl]ethanone (*Z*), 377  
1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4,5-trihydroxyphenyl]ethanone (*E*), 377  
1-[2-[(3,7-Dimethyl-2,6-octadienyl)oxy]-4,6-dihydroxyphenyl]ethanone (*E*), 378  
1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-2,6-dihydroxyphenyl]ethanone (*E*), 378  
1-[4-Hydroxy-3,5-bis(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*E,Z*), 378  
1-[4-Hydroxy-3,5-bis(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*Z,Z*), 379  
1-[2,4,6-Trihydroxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 379

**C<sub>18</sub>H<sub>24</sub>O<sub>6</sub>**

- 1-[2,4-Dihydroxy-3-(tetrahydro-2*H*-pyran-2-yl)-6-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]-ethanone, 379  
1-[2-Hydroxy-4,6-bis[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 380  
1-[2,4,6-Trihydroxy-3,5-bis(tetrahydro-2*H*-pyran-2-yl)phenyl]ethanone, 380

**C<sub>18</sub>H<sub>25</sub>BrO<sub>3</sub>**

- 1-[4-[(7-Bromoheptyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 380

**C<sub>18</sub>H<sub>26</sub>O<sub>3</sub>**

- 1-[2,4-Dihydroxy-5-(3-methyl-2-butenyl)-3-(3-methylbutyl)phenyl]ethanone, 380  
1-[4-(Heptyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 381

**C<sub>18</sub>H<sub>26</sub>O<sub>3</sub>S**

- 1-[2-Hydroxy-4-[[6-(methylthio)hexyl]oxy]-5-(2-propenyl)phenyl]ethanone, 381

**C<sub>18</sub>H<sub>26</sub>O<sub>4</sub>**

- 1-[5-(Acetyloxy)-2-hydroxy-4-(1,1,3,3-tetramethylbutyl)phenyl]ethanone, 381  
1-[2,4,6-Trihydroxy-3-(3-methyl-2-butenyl)-5-(3-methylbutyl)phenyl]ethanone, 381

**C<sub>18</sub>H<sub>26</sub>O<sub>4</sub>S**

- 1-[2-Hydroxy-4-[[6-(methylsulfinyl)hexyl]oxy]-5-(2-propenyl)phenyl]ethanone, 382

**C<sub>18</sub>H<sub>26</sub>O<sub>5</sub>S**

- 1-[2-Hydroxy-4-[[6-(methylsulfonyl)hexyl]oxy]-5-(2-propenyl)phenyl]ethanone, 382

**C<sub>18</sub>H<sub>27</sub>BrO<sub>3</sub>**

- 1-[4-[(7-Bromoheptyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 382

**C<sub>18</sub>H<sub>28</sub>O<sub>3</sub>**

- 1-(4-Butoxy-5-hexyl-2-hydroxyphenyl)ethanone, 382  
1-[4-(Decyloxy)-2-hydroxyphenyl]ethanone, 383

**C<sub>18</sub>H<sub>28</sub>O<sub>4</sub>**

- 1-[2,4,6-Trihydroxy-3,5-bis(3-methylbutyl)phenyl]ethanone, 383

**C<sub>19</sub>H<sub>19</sub>BrO<sub>3</sub>**

- 1-[4-[[4-(Bromomethyl)phenyl]methoxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 383

**C<sub>19</sub>H<sub>20</sub>O<sub>3</sub>**

- 1-[2-Hydroxy-4-[(3-methylphenyl)methoxy]-5-(2-propenyl)phenyl]ethanone, 383

**C<sub>19</sub>H<sub>20</sub>O<sub>4</sub>**

1-[3-Hydroxy-4-methoxy-6-(phenylmethoxy)-2-(2-propenyl)phenyl]ethanone, 384

**C<sub>19</sub>H<sub>22</sub>O<sub>2</sub>**

1-[4-Hydroxy-2-methyl-5-(1-methylethyl)-3-(phenylmethyl)phenyl]ethanone, 384

**C<sub>19</sub>H<sub>22</sub>O<sub>3</sub>**

1-[4-Hydroxy-3-[(2-methoxy-3,5-dimethylphenyl)methyl]-5-methylphenyl]ethanone, 384

**C<sub>19</sub>H<sub>22</sub>O<sub>5</sub>**

1-[6-Hydroxy-3-methoxy-2-(1-methylethoxy)-4-(phenylmethoxy)phenyl]ethanone, 384

**C<sub>19</sub>H<sub>22</sub>O<sub>7</sub>**

1-[4-Hydroxy-2-[(4-hydroxy-3,5-dimethoxyphenyl)methyl]-3,5-dimethoxyphenyl]ethanone, 385

**C<sub>19</sub>H<sub>26</sub>O<sub>3</sub>**

1-[2-(3,7-Dimethyl-2,6-octadienyl)-4-hydroxy-6-methoxyphenyl]ethanone, 385

1-[2-Hydroxy-4-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (*E*), 385

1-[2-Hydroxy-4-methoxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 385

**C<sub>19</sub>H<sub>26</sub>O<sub>4</sub>**

1-[2,4-Dihydroxy-6-methoxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 386

1-[2,4-Dihydroxy-5-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (*E*), 386

1-[2,5-Dihydroxy-4-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (*E*), 386

**C<sub>19</sub>H<sub>26</sub>O<sub>12</sub>**

1-[2-Hydroxy-4-[(6-O-β-D-xylopyranosyl-β-D-glucopyranosyl)oxy]phenyl]ethanone, (*Bungeiside D*), 387

**C<sub>19</sub>H<sub>28</sub>O<sub>3</sub>**

1-[2-Hydroxy-4-(octyloxy)-5-(2-propenyl)phenyl]ethanone, 387

**C<sub>19</sub>H<sub>28</sub>O<sub>4</sub>**

1-[2-Hydroxy-4-[(6-hydroxy-6-methylheptyl)oxy]-5-(2-propenyl)phenyl]ethanone, 387

**C<sub>19</sub>H<sub>29</sub>BrO<sub>3</sub>**

1-[4-[(8-Bromooctyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 387

**C<sub>20</sub>H<sub>20</sub>O<sub>7</sub>**

1-[2,6-Bis(acetyloxy)-4-hydroxy-3-[(4-methoxyphenyl)methyl]phenyl]ethanone, 388

**C<sub>20</sub>H<sub>22</sub>O<sub>3</sub>**

1-[2-Hydroxy-3-(3-methyl-2-butenyl)-4-(phenylmethoxy)phenyl]ethanone, 388  
**C<sub>20</sub>H<sub>22</sub>O<sub>6</sub>S**

1-[4,6-Dihydroxy-3-(3-methyl-2-butenyl)-2-[[4-methylphenyl)sulfonyl]oxy]phenyl]ethanone, 388  
**C<sub>20</sub>H<sub>24</sub>O<sub>3</sub>**

1-[2-Hydroxy-4-(3-phenylpropoxy)-5-propylphenyl]ethanone, 388  
**C<sub>20</sub>H<sub>24</sub>O<sub>6</sub>**

1-[2-Hydroxy-4,5-dimethoxy-6-(1-methylethoxy)-3-(phenylmethoxy)phenyl]ethanone, 389  
**C<sub>20</sub>H<sub>28</sub>O<sub>4</sub>**

1-[2-Hydroxy-4,5-dimethoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (*E*), 389  
1-[2-Hydroxy-4-(methoxymethoxy)-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 389  
**C<sub>20</sub>H<sub>28</sub>O<sub>13</sub>**

1-[2-[(4-O-β-D-Galactopyranosyl-β-D-glucopyranosyl)oxy]-4-hydroxyphenyl]ethanone, 389  
1-[4-[(4-O-β-D-Galactopyranosyl-β-D-glucopyranosyl)oxy]-2-hydroxyphenyl]ethanone, 390  
1-[4-[(4-O-β-D-Glucopyranosyl-β-D-glucopyranosyl)oxy]-2-hydroxyphenyl]ethanone, 390  
**C<sub>20</sub>H<sub>28</sub>O<sub>14</sub>**

1-[2,4-Bis-(β-D-galactopyranosyloxy)-6-hydroxyphenyl]ethanone, 390  
**C<sub>20</sub>H<sub>31</sub>BrO<sub>3</sub>**

1-[4-[(9-Bromononyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 390  
**C<sub>20</sub>H<sub>32</sub>O<sub>2</sub>**

1-(5-Dodecyl-2-hydroxyphenyl)ethanone, 390  
**C<sub>20</sub>H<sub>32</sub>O<sub>3</sub>**

1-[4-(Dodecyloxy)-2-hydroxyphenyl]ethanone, 391  
**C<sub>21</sub>H<sub>18</sub>O<sub>3</sub>**

1-[3-(Diphenylmethyl)-2,4-dihydroxyphenyl]ethanone, 391  
1-[5-(Diphenylmethyl)-2,4-dihydroxyphenyl]ethanone, 391

**C<sub>21</sub>H<sub>31</sub>BrO<sub>3</sub>**

1-[4-[(10-Bromodecyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 391  
**C<sub>21</sub>H<sub>33</sub>BrO<sub>3</sub>**

1-[4-[(10-Bromodecyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 392  
**C<sub>22</sub>H<sub>6</sub>F<sub>30</sub>O<sub>4</sub>S<sub>2</sub>**

1-[2,4,6-Trihydroxy-3,5-bis[(pentadecafluoroheptyl)thio]phenyl]ethanone, 392

**C<sub>22</sub>H<sub>16</sub>O<sub>6</sub>**

1-[2,4-Bis(benzoyloxy)-6-hydroxyphenyl]ethanone, 392

1-[3,4-Bis(benzoyloxy)-2-hydroxyphenyl]ethanone, 392

**C<sub>22</sub>H<sub>19</sub>O<sub>4</sub>**

1-[2-Hydroxy-3-iodo-4,6-bis(phenylmethoxy)phenyl]ethanone, 393

**C<sub>22</sub>H<sub>20</sub>O<sub>2</sub>**

1-[2-Hydroxy-6-methyl-3-phenyl-4-(phenylmethyl)phenyl]ethanone, 393

**C<sub>22</sub>H<sub>20</sub>O<sub>3</sub>**

1-[2,4-Dihydroxy-3,5-bis(phenylmethyl)phenyl]ethanone, 393

1-[3-(Diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 393

1-[5-(Diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 394

1-[2-Hydroxy-4-(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone, 394

1-[2-Hydroxy-4-(phenylmethoxy)-5-(phenylmethyl)phenyl]ethanone, 394

**C<sub>22</sub>H<sub>20</sub>O<sub>4</sub>**

1-[2,4-Dihydroxy-6-(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone, 394

1-[2,4-Dihydroxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 395

1-[2,4-Dihydroxy-5-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 395

1-[3-(Diphenylmethyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone, 395

1-[3-(Diphenylmethyl)-4,6-dihydroxy-2-methoxyphenyl]ethanone, 395

1-[2-Hydroxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 396

1-[2-Hydroxy-4,5-bis(phenylmethoxy)phenyl]ethanone, 396

1-[2-Hydroxy-4,6-bis(phenylmethoxy)phenyl]ethanone, 396

1-[2-Hydroxy-4,6-bis(phenylmethoxy)phenyl]ethanone-*l*-<sup>13</sup>C, 396

1-[4-Hydroxy-2,6-bis(phenylmethoxy)phenyl]ethanone, 397

1-[6-Hydroxy-2,3-bis(phenylmethoxy)phenyl]ethanone, 397

**C<sub>22</sub>H<sub>20</sub>O<sub>5</sub>**

1-[2,5-Dihydroxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 397

**C<sub>22</sub>H<sub>26</sub>O<sub>12</sub>**

1-[2-Hydroxy-3-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone, 397

1-[2-Hydroxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone, 398

1-[2-Hydroxy-5-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone, 398

1-[2-Hydroxy-6-[(2,3,4,6-tetra-O-acetyl-β-D-galactopyranosyl)oxy]phenyl]ethanone, 398

1-[2-Hydroxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone, 398

1-[2-Hydroxy-6-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone, 399

1-[4-Hydroxy-3-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone  
(*Tetraacetylpuugenin*), 399

**C<sub>22</sub>H<sub>26</sub>O<sub>13</sub>**

1-[2,6-Dihydroxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone, 399



**C<sub>22</sub>H<sub>28</sub>O<sub>3</sub>**

1-[2-Heptyl-6-hydroxy-4-(phenylmethoxy)phenyl]ethanone, 400

**C<sub>22</sub>H<sub>32</sub>O<sub>6</sub>**

1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 400

**C<sub>22</sub>H<sub>36</sub>O<sub>2</sub>**

1-(2-Hydroxy-5-tetradecylphenyl)ethanone, 400

**C<sub>22</sub>H<sub>36</sub>O<sub>5</sub>**

1-[3-(Dodecyloxy)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 400

1-[4-(Dodecyloxy)-2-hydroxy-3,6-dimethoxyphenyl]ethanone, 401

1-[4-(Dodecyloxy)-6-hydroxy-2,3-dimethoxyphenyl]ethanone, 401

**C<sub>23</sub>H<sub>18</sub>O<sub>6</sub>**

1-[4,6-Bis(benzoyloxy)-2-hydroxy-3-methylphenyl]ethanone, 401

**C<sub>23</sub>H<sub>20</sub>O<sub>4</sub>**

1-[2-(Acetyloxy)-3-(diphenylmethyl)-4-hydroxyphenyl]ethanone, 401

1-[2-(Acetyloxy)-5-(diphenylmethyl)-4-hydroxyphenyl]ethanone, 401

**C<sub>23</sub>H<sub>22</sub>O<sub>3</sub>**

1-[2-Hydroxy-4-methoxy-3,5-bis(phenylmethyl)phenyl]ethanone, 402

**C<sub>23</sub>H<sub>22</sub>O<sub>4</sub>**

1-[3-(Diphenylmethyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 402

1-[3-(Diphenylmethyl)-6-hydroxy-2,4-dimethoxyphenyl]ethanone, 402

1-[2-Hydroxy-3-methyl-4,6-bis(phenylmethoxy)phenyl]ethanone, 402

**C<sub>23</sub>H<sub>22</sub>O<sub>5</sub>**

1-[2,4-Dihydroxy-6-methoxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 403

1-[4,6-Dihydroxy-2-methoxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 403

1-[2-Hydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxy-4-(phenylmethoxy)phenyl]ethanone, 403

1-[2,4-Dihydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxyphenyl]ethanone, monoether with benzenemethanol, 403

1-[2-Hydroxy-3-methoxy-4,6-bis(phenylmethoxy)phenyl]ethanone, 404

1-[2-Hydroxy-5-methoxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 404

1-[6-Hydroxy-2-methoxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 404

1-[6-Hydroxy-3-methoxy-2,4-bis(phenylmethoxy)phenyl]ethanone, 404

1-[6-Hydroxy-4-methoxy-2,3-bis(phenylmethoxy)phenyl]ethanone, 405

**C<sub>23</sub>H<sub>22</sub>O<sub>7</sub>S**

1-[6-Hydroxy-3-methoxy-2-[[4-methylphenyl)sulfonyl]oxy]-4-(phenylmethoxy)phenyl]ethanone, 405

**C<sub>23</sub>H<sub>28</sub>O<sub>13</sub>**

1-[2-Hydroxy-6-methoxy-4-[(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)oxy]phenyl]ethanone, 405

**C<sub>23</sub>H<sub>32</sub>O<sub>4</sub>**

1-[2,4-Dihydroxy-6-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone (*E,E*), 405  
1-[2,6-Dihydroxy-4-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone, 406  
1-[2,6-Dihydroxy-4-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone (*E,E*), 406  
1-[2-[(3,7-Dimethyl-2,6-octadienyl)oxy]-4,6-dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone (*E*), 406  
1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-2,6-dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone (*E*), 407  
1-[2-Hydroxy-3-(3-methyl-2-butenyl)-4,6-bis[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 407  
1-[2,4,6-Trihydroxy-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]ethanone, 408  
1-[2,4,6-Trihydroxy-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]ethanone (*E,E*), 408

**C<sub>23</sub>H<sub>37</sub>BrO<sub>3</sub>**

1-[4-[(12-Bromododecyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 408

**C<sub>23</sub>H<sub>38</sub>O<sub>2</sub>**

1-(2-Hydroxy-4-pentadecylphenyl)ethanone, 409

**C<sub>23</sub>H<sub>38</sub>O<sub>3</sub>**

1-(2,4-Dihydroxy-6-pentadecylphenyl)ethanone, 409

**C<sub>24</sub>H<sub>24</sub>O<sub>6</sub>**

1-[2-Hydroxy-3,5-dimethoxy-4,6-bis(phenylmethoxy)phenyl]ethanone, 409

**C<sub>24</sub>H<sub>40</sub>O<sub>3</sub>**

1-[4-(Hexadecyloxy)-2-hydroxyphenyl]ethanone, 409

**C<sub>25</sub>H<sub>30</sub>O<sub>6</sub>S**

1-[4-[(2*E*)-3,7-Dimethyl-2,6-octadienyl]oxy]-2-hydroxy-6-[[4-methylphenyl)sulfonyl]oxy]phenyl]ethanone, 410  
1-[6-Hydroxy-3-(3-methyl-2-butenyl)-4-[(3-methyl-2-butenyl)oxy]-2-[[4-methylphenyl)sulfonyl]oxy]phenyl]ethanone, 410

**C<sub>25</sub>H<sub>36</sub>O<sub>5</sub>**

1-[4,6-Dihydroxy-3-(methoxymethoxy)-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]ethanone, 410

**C<sub>26</sub>H<sub>44</sub>O<sub>3</sub>**

1-[2-Hydroxy-4-(octadecyloxy)phenyl]ethanone, 411

**C<sub>29</sub>H<sub>26</sub>O<sub>3</sub>**

1-[2-Hydroxy-4-(phenylmethoxy)-3,5-bis(phenylmethyl)phenyl]ethanone, 411

**C<sub>29</sub>H<sub>26</sub>O<sub>4</sub>**

1-[2-Hydroxy-3,4-bis(phenylmethoxy)-5-(phenylmethyl)phenyl]ethanone, 411

1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone, 411

1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone-*I*-<sup>13</sup>C, 412

1-[2-Hydroxy-4-(phenylmethoxy)-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 412

1-[2-Hydroxy-4-(phenylmethoxy)-5-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 412

**C<sub>29</sub>H<sub>26</sub>O<sub>5</sub>**

1-[2-Hydroxy-3,4,6-tris(phenylmethoxy)phenyl]ethanone, 412

**C<sub>30</sub>H<sub>28</sub>O<sub>5</sub>**

1-[2-Hydroxy-5-methoxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone, 413

1-[2-Hydroxy-6-methoxy-4-(phenylmethoxy)-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 413

**C<sub>30</sub>H<sub>38</sub>O<sub>6</sub>S**

1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-6-hydroxy-3-(3-methyl-2-butenyl)-2-[[4-methylphenyl)sulfonyl]oxy]phenyl]ethanone (*E*), 413

1-[2-Hydroxy-6-[[4-methylphenyl)sulfonyl]oxy]-4-[[2-(2*E*,6*E*)-3,7,11-trimethyl-2,6,10-dodecatrienyl]oxy]phenyl]ethanone, 414

**C<sub>34</sub>H<sub>28</sub>O<sub>3</sub>**

1-[3,5-Bis(diphenylmethyl)-2,4-dihydroxyphenyl]ethanone, 414

**C<sub>34</sub>H<sub>42</sub>O<sub>20</sub>**

1-[2-Hydroxy-4-[(per-O-acetyl-β-D-galactopyranosyl-β-D-glucopyranosyl)oxy]phenyl]ethanone, 414

**C<sub>35</sub>H<sub>30</sub>O<sub>3</sub>**

1-[3,5-Bis(diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 415

**C<sub>35</sub>H<sub>30</sub>O<sub>4</sub>**

1-[3,5-Bis(diphenylmethyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone, 415

**C<sub>36</sub>H<sub>30</sub>O<sub>4</sub>**

1-[2-(Acetyloxy)-3,5-bis(diphenylmethyl)-4-hydroxyphenyl]ethanone, 415

**C<sub>36</sub>H<sub>32</sub>O<sub>5</sub>**

1-[2-Hydroxy-4-[[2-(phenylmethoxy)phenyl]methoxy]-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 415

**C<sub>36</sub>H<sub>44</sub>O<sub>22</sub>**

1-[2-Hydroxy-4,6-bis[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyl)oxy]phenyl]ethanone, 416

**C<sub>44</sub>H<sub>46</sub>O<sub>9</sub>**

1-[2-Hydroxy-4,6-dimethoxy-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]-phenyl]ethanone, 416

1-[6-Hydroxy-2,4-dimethoxy-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]-phenyl]ethanone, 416

**C<sub>50</sub>H<sub>50</sub>O<sub>9</sub>**

1-[2-Hydroxy-4-methoxy-6-(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417

1-[6-Hydroxy-4-methoxy-2-(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417

**C<sub>56</sub>H<sub>54</sub>O<sub>9</sub>**

1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417

1-[6-Hydroxy-2,4-bis(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417

## CHEMICAL ABSTRACTS REGISTRY NUMBERS

[50-80-6]	1-(5-Amino-2-hydroxyphenyl)ethanone, 65
[89-84-9]	1-(2,4-Dihydroxyphenyl)ethanone ( <i>Resacetophenone</i> ), 53
[90-24-4]	1-(2-Hydroxy-4,6-dimethoxyphenyl)ethanone ( <i>Xanthoxilin</i> ; <i>Brevifolin</i> ), 166
[99-93-4]	1-(4-Hydroxyphenyl)ethanone, 49
[118-93-4]	1-(2-Hydroxyphenyl)ethanone, 46
[121-71-1]	1-(3-Hydroxyphenyl)ethanone, 48
[393-62-4]	1-(3-Bromo-5-fluoro-2-hydroxyphenyl)ethanone, 6
[394-32-1]	1-(5-Fluoro-2-hydroxyphenyl)ethanone, 35
[402-84-6]	1-(3-Bromo-5-fluoro-4-hydroxyphenyl)ethanone, 6
[403-14-5]	1-(3-Fluoro-4-hydroxyphenyl)ethanone, 34
[445-38-5]	1-(3-Chloro-5-fluoro-2-hydroxyphenyl)ethanone, 12
[480-66-0]	1-(2,4,6-Trihydroxyphenyl)ethanone ( <i>Phloracetophenone</i> ), 59
[490-78-8]	1-(2,5-Dihydroxyphenyl)ethanone ( <i>Quinacetophenone</i> ), 54
[493-33-4]	1-(4-Hydroxy-2-methoxyphenyl)ethanone ( <i>Isopaeonol</i> ), 112
[498-02-2]	1-(4-Hydroxy-3-methoxyphenyl)ethanone ( <i>Apocynin</i> ; <i>Acetovanillone</i> ; <i>Acetoguaiacone</i> ), 112
[528-21-2]	1-(2,3,4-Trihydroxyphenyl)ethanone ( <i>Gallacetophenone</i> ), 57
[552-41-0]	1-(2-Hydroxy-4-methoxyphenyl)ethanone ( <i>Paeonol</i> ), 108
[577-45-7]	1-(2,4-Dihydroxy-3,5-dimethylphenyl)ethanone ( <i>Clavatol</i> ), 149
[699-83-2]	1-(2,6-Dihydroxyphenyl)ethanone ( $\gamma$ - <i>Resacetophenone</i> ), 55
[699-91-2]	1-(2-Hydroxy-3-methylphenyl)ethanone, 93
[699-92-3]	1-(3-Fluoro-2-hydroxyphenyl)ethanone, 34
[703-23-1]	1-(2-Hydroxy-6-methoxyphenyl)ethanone, 110
[703-29-7]	1-(2,4-Dihydroxy-6-methylphenyl)ethanone ( <i>Orcacetophenone</i> ; <i>Orsacetophenone</i> ; $\beta$ - <i>Orcacetophenone</i> ), 103
[703-97-9]	1-(3-Chloro-4-fluoro-2-hydroxyphenyl)ethanone, 11
[703-98-0]	1-(2-Hydroxy-3-methoxyphenyl)ethanone ( <i>o</i> - <i>Acetovanillone</i> ), 107
[705-15-7]	1-(2-Hydroxy-5-methoxyphenyl)ethanone, 109
[708-53-2]	1-(2,3-Dihydroxy-4-methoxyphenyl)ethanone, 114
[713-23-5]	1-[4-Hydroxy-3-methyl-5-(1-methylethyl)phenyl]ethanone, 246
[875-59-2]	1-(4-Hydroxy-2-methylphenyl)ethanone, 99
[876-02-8]	1-(4-Hydroxy-3-methylphenyl)ethanone, 99
[1132-05-4]	1-[4-Hydroxy-3-(2-propenyl)phenyl]ethanone, 179
[1197-09-7]	1-(3,4-Dihydroxyphenyl)ethanone, 56
[1198-66-9]	1-(2-Hydroxy-3,5-dimethylphenyl)ethanone, 145
[1450-72-2]	1-(2-Hydroxy-5-methylphenyl)ethanone, 95
[1450-74-4]	1-(5-Chloro-2-hydroxyphenyl)ethanone, 30
[1450-75-5]	1-(5-Bromo-2-hydroxyphenyl)ethanone, 24
[1450-76-6]	1-(2-Hydroxy-5-nitrophenyl)ethanone, 40
[1481-27-2]	1-(4-Fluoro-2-hydroxyphenyl)ethanone, 34
[1632-59-3]	1-[4-Hydroxy-3-(1-methylethyl)phenyl]ethanone, 196
[1634-34-0]	1-(2,6-Dihydroxy-4-methylphenyl)ethanone ( $\gamma$ - or <i>p</i> - <i>orcacetophenone</i> ), 105
[1634-36-2]	1-[2-Hydroxy-5-(1-methylethyl)phenyl]ethanone, 195
[1634-62-4]	1-[3-Hydroxy-4-(1-methylethyl)phenyl]ethanone, 195
[1818-27-5]	1-(2,4,5-Trihydroxyphenyl)ethanone, 58
[1834-91-9]	1-(2-Hydroxy-4-nitrophenyl)ethanone, 39
[1836-05-1]	1-(3-Bromo-2-hydroxyphenyl)ethanone, 23
[1836-06-2]	1-(3-Bromo-4-hydroxyphenyl)ethanone, 23
[1990-24-5]	1-(2-Hydroxy-5-propylphenyl)ethanone, 196
[2476-29-1]	1-(4-Amino-2-hydroxyphenyl)ethanone, 64
[2478-38-8]	1-(4-Hydroxy-3,5-dimethoxyphenyl)ethanone ( <i>Acetosyringone</i> ), 169
[2652-27-9]	1-[2-Hydroxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 396

- [2657-28-5] 1-(2,4,6-Trihydroxy-3-methylphenyl)ethanone, 120  
 [2750-25-6] 1-(2-Ethoxy-6-hydroxyphenyl)ethanone, 152  
 [2887-72-1] 1-(3,5-Dibromo-4-hydroxyphenyl)ethanone, 9  
 [2892-29-7] 1-(3-Chloro-4-hydroxyphenyl)ethanone, 28  
 [2977-53-9] 1-(2,3-Dichloro-4-hydroxyphenyl)ethanone, 14  
 [3162-28-5] 1-(2-Hydroxy-3,4,5,6-tetramethoxyphenyl)ethanone, 263  
 [3162-49-0] 1-[2-Hydroxy-3,5,6-trimethoxy-4-(phenylmethoxy)phenyl]ethanone, 374  
 [3162-50-3] 1-[2,5-Dihydroxy-3,6-dimethoxy-4-(phenylmethoxy)phenyl]ethanone, 364  
 [3162-52-5] 1-[2-Hydroxy-3,6-dimethoxy-4-(phenylmethoxy)phenyl]ethanone, 362  
 [3162-54-7] 1-[2-Hydroxy-3,5-dimethoxy-4,6-bis(phenylmethoxy)phenyl]ethanone, 409  
 [3226-34-4] 1-(3-Chloro-2-hydroxyphenyl)ethanone, 28  
 [3321-92-4] 1-(3,5-Dichloro-2-hydroxyphenyl)ethanone, 16  
 [3328-77-6] 1-(2,4-Dihydroxy-5-nitrophenyl)ethanone, 42  
 [3361-23-7] 1-(3,5-Dichloro-2,6-dihydroxy-4-methylphenyl)ethanone, 71  
 [3410-83-1] 1-(3,5-Dibromo-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 128  
 [3602-54-8] 1-(2,4-Dihydroxy-6-methoxyphenyl)ethanone, 116  
 [3934-89-2] 1-(3,4-Dihydroxy-5-methoxyphenyl)ethanone, 119  
 [4047-24-9] 1-[2-Hydroxy-6-(phenylmethoxy)phenyl]ethanone, 332  
 [4223-84-1] 1-(2-Hydroxy-5-methoxy-4-methylphenyl)ethanone, 157  
 [4223-85-2] 1-(5-Ethyl-2-hydroxy-4-methoxyphenyl)ethanone, 204  
 [4223-86-3] 1-(2-Hydroxy-3-methoxy-6-methylphenyl)ethanone, 155  
 [4460-42-8] 1-(5-Ethyl-2,4-dihydroxyphenyl)ethanone, 154  
 [4502-10-7] 1-(2-Amino-3-hydroxyphenyl)ethanone, 61  
 [4670-13-7] 1-(2-Heptyl-6-hydroxy-4-methoxyphenyl)ethanone, 355  
 [4683-33-4] 1-[6-Hydroxy-2,4-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone  
 (*Acronylin methyl ether*), 339  
 [5325-04-2] 1-(4-Hydroxy-3,5-dimethylphenyl)ethanone, 148  
 [5384-55-4] 1-(2-Hydroxy-3,4-dimethylphenyl)ethanone, 144  
 [5384-57-6] 1-(4-Hydroxy-2,3-dimethylphenyl)ethanone, 147  
 [5396-18-9] 1-(2-Hydroxy-3,4-dimethoxyphenyl)ethanone, 164  
 [5528-13-2] 1-(5-Amino-2,4-dihydroxyphenyl)ethanone, 65  
 [5896-50-4] 1-(4-Ethyl-2-hydroxyphenyl)ethanone, 144  
 [6100-74-9] 1-(3-Hydroxy-4-methoxyphenyl)ethanone (*Isoacetovanillone*), 111  
 [6212-45-9] 1-(2,5-Dihydroxy-3,6-dimethoxyphenyl)ethanone, 173  
 [6322-56-1] 1-(4-Hydroxy-3-nitrophenyl)ethanone, 41  
 [6342-86-5] 1-(3,4-Diethoxy-2-hydroxyphenyl)ethanone, 255  
 [6540-66-5] 1-(2-Hydroxy-4-methoxy-6-methylphenyl)ethanone (*Acetoevernone*), 156  
 [6921-64-8] 1-(2-Hydroxy-4-methylphenyl)ethanone, 94  
 [6921-66-0] 1-(4-Chloro-2-hydroxyphenyl)ethanone, 29  
 [6948-37-4] 1-(5-Hydroxy-4-methoxy-2-methylphenyl)ethanone, 159  
 [6962-57-8] 1-(3,6-Dihydroxy-2,4-dimethoxyphenyl)ethanone, 174  
 [7191-41-5] 1-(2-Hydroxy-5-iodophenyl)ethanone, 36  
 [7191-46-0] 1-(2-Hydroxy-3,5-diiodophenyl)ethanone, 19  
 [7191-55-1] 1-(4-Hydroxy-3,5-diiodophenyl)ethanone, 20  
 [7253-20-5] 1-(3-Bromo-6-hydroxy-2-methoxy-5-nitrophenyl)ethanone, 68  
 [7298-21-7] 1-(2,4-Dihydroxy-5-methoxyphenyl)ethanone, 116  
 [7298-39-7] 1-[2-Hydroxy-4,5-bis(phenylmethoxy)phenyl]ethanone, 396  
 [7452-85-9] 1-(2-Hydroxy-3-methoxy-5-methylphenyl)ethanone, 155  
 [7499-99-2] 1-(2,4-Dihydroxy-3,6-dimethoxyphenyl)ethanone, 173  
 [7507-88-2] 1-(3-Chloro-2-hydroxy-5-methylphenyl)ethanone, 77  
 [7507-89-3] 1-(2,6-Dihydroxy-4-methoxyphenyl)ethanone, 118  
 [7507-98-4] 1-(2-Hydroxy-3,4,6-trimethoxyphenyl)ethanone (*Xanthoxylone*), 216  
 [7714-14-9] 1-(2,4,5-Trichloro-3,6-dihydroxyphenyl)ethanone, 5  
 [7743-16-0] 1-(2,6-Dihydroxy-3,4-dimethylphenyl)ethanone, 151  
 [10139-84-1] 1-(2,4-Dihydroxy-3-methylphenyl)ethanone, 102  
 [10299-59-9] 1-[2-Hydroxy-4-methoxy-6-(phenylmethoxy)phenyl]ethanone, 348  
 [13246-14-5] 1-(4-Hydroxy-2,6-dimethoxyphenyl)ethanone, 169

- [13383-63-6] 1-(2,4,6-Trihydroxy-3,5-dimethylphenyl)ethanone, 171  
[13494-10-5] 1-(2,3-Dihydroxyphenyl)ethanone, 52  
[13667-21-5] 1-(3-Hydroxy-4,5,6-trimethyl-2-nitrophenyl)ethanone, 191  
[13667-28-2] 1-(5-Hydroxy-2,3,4-trimethylphenyl)ethanone, 199  
[13684-24-7] 1-(2-Hydroxy-4,6-dinitrophenyl)ethanone, 20  
[13909-71-2] 1-(4-Hydroxy-2,5-dimethoxyphenyl)ethanone, 168  
[14031-80-2] 1-(4-Hydroxy[1,1'-biphenyl]-3-yl)ethanone, 299  
[14035-33-7] 1-[3,5-Bis(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone, 354  
[14347-14-9] 1-(3-Amino-4-hydroxyphenyl)ethanone (*Hydrochloride*), 64  
[14718-38-8] 1-(2-Hydroxy-6-propoxyphenyl)ethanone, 206  
[14764-76-2] 1-[4,6-Dihydroxy-2-methoxy-3-(3-methylbutyl)phenyl]ethanone, 321  
[14813-18-4] 1-[3-(1,1-Dimethylethyl)-2-hydroxy-5-methylphenyl]ethanone, 281  
[14964-98-8] 1-(6-Hydroxy-2,4-dimethoxy-3-methylphenyl)ethanone (*Bancroftinone*), 211  
[15516-61-7] 1-(2-Hydroxy-5-nitrosophenyl)ethanone, 38  
[15994-32-8] 1-(2,4,5-Trihydroxy-3,6-dimethoxyphenyl)ethanone, 175  
[16108-50-2] 1-(2-Hydroxy-4,6-dimethylphenyl)ethanone, 146  
[16130-28-2] 1-[2-Hydroxy-6-(oxiranylmethoxy)phenyl]ethanone, 185  
[16139-53-0] 1-[2-Hydroxy-5-(oxiranylmethoxy)phenyl]ethanone, 184  
[16290-04-3] 1-(3,5-Dibromo-2-hydroxy-6-methoxyphenyl)ethanone, 69  
[16297-01-1] 1-(2,4,6-Trihydroxy-3-methoxyphenyl)ethanone, 121  
[16928-01-1] 1-[3-(1,1-Dimethylethyl)-4-hydroxyphenyl]ethanone, 240  
[17044-70-1] 1-(3,5-Dichloro-4-hydroxyphenyl)ethanone, 16  
[17063-43-3] 1-[4-( $\beta$ -D-Glucopyranosyloxy)-3-hydroxyphenyl]ethanone (*Cyanoneside A*), 315  
[17488-68-5] 1-[2-Hydroxy-6-methoxy-3-(2-propenyl)phenyl]ethanone, 227  
[17488-71-0] 1-[2,6-Dihydroxy-3-(2-propenyl)phenyl]ethanone, 181  
[17605-00-4] 1-(2-Hydroxy-3,5-dimethoxyphenyl)ethanone, 165  
[17820-32-5] 1-[2,6-Bis(acetyloxy)-4-hydroxyphenyl]ethanone, 222  
[17820-33-6] 1-[2,4-Bis(acetyloxy)-6-hydroxyphenyl]ethanone, 221  
[18064-89-6] 1-(3-Bromo-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 135  
[18065-05-9] 1-[2-Hydroxy-4,6-bis(phenylmethoxy)phenyl]ethanone, 396  
[18065-06-0] 1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone, 411  
[18086-01-6] 1-(2,4-Diethoxy-6-hydroxy-3-methoxyphenyl)ethanone, 290  
[18087-17-7] 1-(4,5-Dihydroxy-2-methylphenyl)ethanone, 107  
[18296-18-9] 1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4,5-trihydroxyphenyl]ethanone (*Z*), 377  
[18296-19-0] 1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone (*Z*), 375  
[18606-50-3] 1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-methylphenyl]ethanone, 281  
[18606-87-6] 1-[4-(1,1-Dimethylethyl)-3-hydroxyphenyl]ethanone, 240  
[18780-96-6] 1-[4-Hydroxy-2,6-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 339  
[19687-48-0] 1-(3,5-Diethyl-2,4,6-trihydroxyphenyl)ethanone, 256  
[19825-40-2] 1-[2,4-Dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 268  
[20180-88-5] 1-[2,5-Dihydroxy-4-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (*E*), 386  
[20212-64-0] 1-[2,4-Dihydroxy-5-methoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (*E*), 386  
[20212-65-1] 1-[2-Hydroxy-4,5-dimethoxy-3-(3,7-dimethyl-2,6-octadienyl)phenyl]ethanone (*E*), 389  
[20212-66-2] 1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4,5-trihydroxyphenyl]ethanone (*E*), 377  
[20212-67-3] 1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone (*E*), 375  
[20212-68-4] 1-[5-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone (*E*), 376  
[20281-51-0] 1-(6-Hydroxy[1,1'-biphenyl]-3-yl)ethanone, 299  
[20628-06-2] 1-(2-Hydroxy-4,5-dimethoxyphenyl)ethanone, 165  
[20716-41-0] 1-(4-Hydroxy-3-methoxy-5-nitrophenyl)ethanone, 92

- [20951-24-0] 1-[2-Hydroxy-5-(methylsulfonyl)phenyl]ethanone, 121  
 [21092-94-4] 1-[3-Hydroxy-4-(phenylmethoxy)phenyl]ethanone, 333  
 [21222-04-8] 1-[5-(Acetyloxy)-2-hydroxyphenyl]ethanone, 132  
 [21312-85-6] 1-(3-Amino-5-chloro-2-hydroxyphenyl)ethanone, 44  
 [21424-82-8] 1-(2-Hydroxy[1,1'-biphenyl]-3-yl)ethanone, 298  
 [21472-87-7] 1-(2,3-Dichloro-4-hydroxy-6-methylphenyl)ethanone, 70  
 [21722-31-6] 1-(2-Hydroxy-4,6-dimethoxy-3,5-dimethylphenyl)ethanone, 257  
 [21919-63-1] 1-[3-(Acetyloxy)-6-hydroxy-2,4-dimethoxyphenyl]ethanone, 233  
 [21919-65-3] 1-[3-(Acetyloxy)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 233  
 [21919-66-4] 1-(2,3-Dihydroxy-4,6-dimethoxyphenyl)ethanone, 172  
 [22089-12-9] 1-(2,5-Dihydroxy-4-methoxyphenyl)ethanone, 117  
 [22248-13-1] 1-(6-Hydroxy-2,3-dimethoxyphenyl)ethanone, 170  
 [22248-14-2] 1-(6-Hydroxy-2,3,4-trimethoxyphenyl)ethanone, 218  
 [22362-66-9] 1-(3,5-Dibromo-2-hydroxyphenyl)ethanone, 9  
 [22518-00-9] 1-[2-Hydroxy-4-(hydroxymethyl)phenyl]ethanone, 107  
 [22526-30-3] 1-(4,5-Dichloro-2-hydroxyphenyl)ethanone, 17  
 [22633-36-9] 1-(5-Hydroxy-2,4-dinitrophenyl)ethanone, 21  
 [22934-47-0] 1-(3-Ethyl-4-hydroxyphenyl)ethanone, 143  
 [23053-45-4] 1-(3-Chloro-6-hydroxy-2,4-dimethoxy-5-methylphenyl)ethanone, 189  
 [23053-47-6] 1-(3-Chloro-2,4,6-trihydroxy-5-methylphenyl)ethanone, 84  
 [23121-32-6] 1-(2-Hydroxy-4,6-dimethoxy-3-methylphenyl)ethanone, 210  
 [23133-83-7] 1-(3-Hydroxy-2,4-dimethoxyphenyl)ethanone, 168  
 [23141-00-6] 1-[2-Hydroxy-6-[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-glucopyranosyl)oxy]phenyl]-ethanone, 399  
 [23164-97-8] 1-(3-Chloro-5-hydroxyphenyl)ethanone, 29  
 [23226-84-8] 1-[2-Hydroxy-6-(2-propenyloxy)phenyl]ethanone, 182  
 [23299-00-5] 1-(3-Cyclohexyl-4-hydroxyphenyl)ethanone, 306  
 [23343-03-5] 1-(2-Hydroxy-3-methoxy-5-propylphenyl)ethanone, 253  
 [23343-04-6] 1-[2-Hydroxy-3-methoxy-5-(2-propenyl)phenyl]ethanone, 226  
 [23343-08-0] 1-(5-Hydroxy-4-methoxy-2-propylphenyl)ethanone, 254  
 [23780-60-1] 1-(4-Hydroxy-1,3-benzodioxol-5-yl)ethanone, 72  
 [24046-00-2] 1-(2,2'-Dihydroxy-5,5'-dimethyl[1,1'-biphenyl]-3-yl)ethanone, 345  
 [24046-01-3] 1-(2'-Acetoxy-2-hydroxy-5,5'-dimethyl[1,1'-biphenyl]-3-yl)ethanone, 371  
 [24085-05-0] 1-[3-(Chloromethyl)-4-hydroxyphenyl]ethanone, 80  
 [24126-73-6] 1-[2-Hydroxy-3-methoxy-4,6-bis(phenylmethoxy)phenyl]ethanone, 404  
 [24242-55-5] 1-[3-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone, 240  
 [24490-25-3] 1-(2-Chloro-6-hydroxy-4-methylphenyl)ethanone, 77  
 [24539-92-2] 1-(5-Ethyl-2-hydroxyphenyl)ethanone, 144  
 [24587-97-1] 1-[2-( $\beta$ -D-Glucopyranosyloxy)-6-hydroxy-4-methoxyphenyl]ethanone, 340  
 [24672-82-0] 1-[2,4-Dihydroxy-3,5-bis-(3-methyl-2-butenyl)phenyl]ethanone, 374  
 [24672-83-1] 1-[2-Hydroxy-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 271  
 [25205-34-9] 1-(2,6-Dihydroxy-3-nitrophenyl)ethanone, 43  
 [25892-94-8] 1-[3,6-Dihydroxy-2-methoxy-4-(phenylmethoxy)phenyl]ethanone, 350  
 [25892-95-9] 1-[6-Hydroxy-2,3-dimethoxy-4-(phenylmethoxy)phenyl]ethanone, 363  
 [26089-54-3] 1-[2-( $\beta$ -D-Glucopyranosyloxy)-4,6-dihydroxyphenyl]ethanone, 316  
 [26207-59-0] 1-(2,4-Diethoxy-6-hydroxyphenyl)ethanone, 255  
 [26216-10-4] 1-(4-Hydroxy-2,5-dimethylphenyl)ethanone, 148  
 [26674-05-5] 1-[2-(Acetyloxy)-6-hydroxyphenyl]ethanone, 131  
 [26931-60-2] 1-[4-Hydroxy-3-(3-methoxy-3-methyl-1-butenyl)phenyl]ethanone (*E*), 309  
 [26931-61-3] 1-[4-Hydroxy-3-(3-hydroxy-3-methyl-1-butenyl)phenyl]ethanone (*E*), 270  
 [26932-05-8] 1-[4-Hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 267  
 [27192-99-0] 1-(6-Hydroxy-2,3,4-trimethylphenyl)ethanone, 199  
 [27193-00-6] 1-(2,3-Diethyl-6-hydroxy-4-methylphenyl)ethanone, 279  
 [27364-64-3] 1-[4,6-Dihydroxy-2-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone (*Acronylin*), 311  
 [27364-71-2] 1-[2,4,6-Trihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 275  
 [27513-07-1] 1-(5-Ethyl-2-hydroxy-4-methylphenyl)ethanone, 194



- [27829-93-2] 1-(3,4-Dihydroxy-2-methoxyphenyl)ethanone, 119  
[27865-58-3] 1-[3,4-Bis(acetyloxy)-2-hydroxyphenyl]ethanone, 222  
[27865-59-4] 1-[3,4-Bis(benzoyloxy)-2-hydroxyphenyl]ethanone, 392  
[28177-69-7] 1-(2-Hydroxy-3-nitrophenyl)ethanone, 39  
[28437-37-8] 1-[2,4-Dihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 269  
[28448-83-1] 1-[2-Hydroxy-4-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 308  
[28467-11-0] 1-(5-Bromo-2-hydroxy-3-iodophenyl)ethanone, 7  
[28480-70-8] 1-(5-Chloro-2-hydroxy-4-methylphenyl)ethanone, 79  
[28862-10-4] 1-[2-[(5-Bromopentyl)oxy]-6-hydroxyphenyl]ethanone, 277  
[29183-78-6] 1-(2,6-Dihydroxy-3-methylphenyl)ethanone, 104  
[29376-65-6] 1-[4-(Acetyloxy)-2,6-dihydroxyphenyl]ethanone, 132  
[29376-66-7] 1-[4-(Acetyloxy)-2-hydroxy-6-methoxyphenyl]ethanone, 186  
[29682-12-0] 1-[2-Hydroxy-4-(phenylmethoxy)phenyl]ethanone, 331  
[30095-73-9] 1-[5-(Acetyloxy)-2-hydroxy-3-nitrophenyl]ethanone, 128  
[30095-74-0] 1-(2,5-Dihydroxy-3-nitrophenyl)ethanone, 43  
[30095-76-2] 1-(2-Bromo-3,6-dihydroxyphenyl)ethanone, 25  
[30186-15-3] 1-(4,5-Dibromo-2-hydroxyphenyl)ethanone, 10  
[30186-18-6] 1-(4-Bromo-2-hydroxyphenyl)ethanone, 24  
[30186-22-2] 1-(5-Amino-3-bromo-2-hydroxyphenyl)ethanone (*Hydrochloride*), 44  
[30225-96-8] 1-(2-Hydroxy-3,4,5-trimethoxyphenyl)ethanone, 216  
[30299-53-7] 2'-Hydroxy-5'-(1,1,3,3-tetramethylbutyl)acetophenone, 355  
[30299-56-0] 1-[2-Hydroxy-3-nitro-5-(1,1,3,3-tetramethylbutyl)phenyl]ethanone, 353  
[30403-01-1] 1-[2,4-Dihydroxy-6-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 310  
[30787-43-0] 1-[5-(Chloromethyl)-2-hydroxyphenyl]ethanone, 80  
[30879-49-3] 1-(5-Hydroxy-2-nitrophenyl)ethanone, 42  
[30954-71-3] 1-(2-Amino-5-hydroxyphenyl)ethanone, 62  
[30992-63-3] 1-[2-Hydroxy-5-(phenylmethoxy)phenyl]ethanone, 332  
[30992-64-4] 1-[2-Hydroxy-3-(phenylmethoxy)phenyl]ethanone, 331  
[31273-60-6] 1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-6-methoxyphenyl]ethanone, 305  
[31405-60-4] 1-(5-Hydroxy-2-methoxyphenyl)ethanone, 113  
[31405-63-7] 1-(2-Hydroxy-6-methoxy-4-methylphenyl)ethanone, 158  
[31611-90-2] 1-[2-Hydroxy-5-(hydroxymethyl)phenyl]ethanone, 107  
[31913-64-1] 1-(3-Chloro-2-hydroxy-4,6-dimethoxy-5-methylphenyl)ethanone, 189  
[32101-38-5] 1-(3-Hydroxy[1,1'-biphenyl]-4-yl)ethanone, 299  
[32101-40-9] 1-(3-Hydroxy-5-methoxy[1,1'-biphenyl]-4-yl)ethanone, 330  
[32541-10-9] 1-(3,4',6-Trihydroxy-3'-methyl[1,1'-biphenyl]-2-yl)ethanone, 335  
[32546-66-0] 1-(2',3,4',6-Tetrahydroxy-6'-methyl[1,1'-biphenyl]-2-yl)ethanone, 336  
[33414-49-2] 1-(3-Hydroxy-4-methylphenyl)ethanone, 98  
[33523-62-5] 1-[2-Hydroxy-4,6-dimethoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 338  
[33537-80-3] 1-[2-(Cyclohexyloxy)-3,6-dihydroxyphenyl]ethanone, 310  
[33537-81-4] 1-[3,6-Dihydroxy-2-(phenylmethoxy)phenyl]ethanone, 335  
[33539-20-7] 1-(3,6-Dihydroxy-2-methoxyphenyl)ethanone, 119  
[33539-21-8] 1-(2-Ethoxy-3,6-dihydroxyphenyl)ethanone, 163  
[33539-22-9] 1-[3,6-Dihydroxy-2-(1-methylethoxy)phenyl]ethanone, 208  
[33539-23-0] 1-(2-Butoxy-3,6-dihydroxyphenyl)ethanone, 255  
[33539-24-1] 1-[3,6-Dihydroxy-2-(2-propenyloxy)phenyl]ethanone, 184  
[33709-29-4] 1-(3,4,5-Trihydroxyphenyl)ethanone, 60  
[33857-20-4] 1-(3-Bromo-2,5-dihydroxyphenyl)ethanone, 25  
[34176-17-5] 1-[2,5-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone, 334  
[34176-18-6] 1-[2-Hydroxy-5-methoxy-4-(phenylmethoxy)phenyl]ethanone, 348  
[34288-73-8] 1-[6-Hydroxy-3-(2-hydroxyethyl)-2,4-dimethoxyphenyl]ethanone, 261  
[34288-74-9] 1-[6-Hydroxy-2,4-dimethoxy-3-(2-methoxyethyl)phenyl]ethanone, 291  
[34603-08-2] 1-(2-Chloro-3,6-dihydroxy-5-methoxyphenyl)ethanone, 84  
[34987-36-5] 1-[5-Chloro-3-(chloromethyl)-2-hydroxyphenyl]ethanone, 70  
[35028-01-4] 1-(4-Ethoxy-2,6-dihydroxyphenyl)ethanone, 164  
[35028-02-5] 1-[2,6-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone, 334

- [35028-03-6] 1-[2,6-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone, 184  
 [35109-98-9] 1-[2-Hydroxy-4,6-dimethoxy-3-(2-propenyl)phenyl]ethanone, 273  
 [35158-23-7] 1-[2-Hydroxy-3,5-bis(1-methylethyl)phenyl]ethanone, 319  
 [35158-27-1] 1-[2-Hydroxy-3,5-bis(2-methylpropyl)phenyl]ethanone, 354  
 [35158-31-7] 1-[2-Hydroxy-5-methyl-3-(1-methylethyl)phenyl]ethanone, 244  
 [35158-35-1] 1-[2-Hydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 303  
 [35198-96-0] 1-(2-Hydroxy-3,5-dipropylphenyl)ethanone, 319  
 [35204-45-6] 1-(2-Hydroxy-5-mercaptophenyl)ethanone, 51  
 [35204-52-5] 1-(2-Hydroxy-4-mercaptophenyl)ethanone, 51  
 [35205-23-3] 1-[3-(1,1-Dimethylethyl)-2,5-dihydroxyphenyl]ethanone, 251  
 [35205-24-4] 1-[4-(1,1-Dimethylethyl)-2,5-dihydroxyphenyl]ethanone, 251  
 [35292-36-5] 1-(6-Ethoxy-2-hydroxy-3-iodophenyl)ethanone, 140  
 [35458-19-6] 1-[2,4,6-Trihydroxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 379  
 [35816-89-8] 1-[4-Hydroxy-3-(3-methyl-1-butenyl)phenyl]ethanone, 267  
 [35816-94-5] 1-[4-Hydroxy-3-(3-hydroxy-3-methyl-1-butenyl)phenyl]ethanone, 270  
 [35817-18-6] 1-[2,3,4-Trihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 274  
 [35999-23-6] 1-(3-Hydroxy-5-methoxyphenyl)ethanone, 112  
 [36436-65-4] 1-(2-Hydroxy-4,5-dimethylphenyl)ethanone, 146  
 [36772-98-2] 1-(3,5-Dibromo-2,4-dihydroxyphenyl)ethanone, 10  
 [37113-61-4] 1-(3-Bromo-2-hydroxy-5-methoxyphenyl)ethanone, 75  
 [37113-62-5] 1-(3-Bromo-2-hydroxy-6-methoxyphenyl)ethanone, 75  
 [37456-29-4] 1-[3,5-Bis(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 353  
 [37467-65-5] 1-(3,5-Diethyl-2,6-dihydroxyphenyl)ethanone, 250  
 [37467-66-6] 1-[2,6-Dihydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 303  
 [37467-68-8] 1-(2,6-Dihydroxy-3,5-dimethylphenyl)ethanone, 151  
 [37470-70-2] 1-(3,5-Diethyl-2-hydroxy-6-methoxyphenyl)ethanone, 284  
 [37470-42-1] 1-(4-Ethoxy-2-hydroxyphenyl)ethanone, 152  
 [37847-35-1] 1-[4-hydroxy-2-methyl-5-(1-methylethyl)phenyl]ethanone, 245  
 [37847-37-3] 1-[4-Hydroxy-5-methyl-2-(1-methylethyl)phenyl]ethanone, 246  
 [38226-01-6] 1-(2-Hydroxy-6-methoxy-3-nitrophenyl)ethanone, 91  
 [38778-41-5] 1-[4-Hydroxy-3-[(2-methoxy-3-methylphenyl)methyl]-5-methylphenyl]-ethanone, 372  
 [38778-48-2] 1-[4-Hydroxy-3-[(2-methoxy-3,5-dimethylphenyl)methyl]-5-methylphenyl]-ethanone, 384  
 [38968-45-5] 1-(2-Amino-3-hydroxy-6-methylphenyl)ethanone, 123  
 [38987-00-7] 1-[2,4-Dihydroxy-3-(2-propenyl)phenyl]ethanone, 180  
 [38987-01-8] 1-[2,4-Dihydroxy-5-(2-propenyl)phenyl]ethanone, 180  
 [39503-61-2] 1-(5-Bromo-2-hydroxy-4-methoxyphenyl)ethanone, 76  
 [39503-62-3] 1-(3-Bromo-2-hydroxy-4-methoxyphenyl)ethanone, 75  
 [39548-85-1] 1-[2,4-Dihydroxy-6-(phenylmethoxy)-3-(phenylmethyl)phenyl]-ethanone, 394  
 [39548-86-2] 1-[2,4-Dihydroxy-6-(phenylmethoxy)phenyl]ethanone, 334  
 [39548-89-5] 1-[2-Hydroxy-6-methoxy-4-(phenylmethoxy)phenyl]ethanone, 348  
 [39548-92-0] 1-[2-Hydroxy-3-methyl-4,6-bis(phenylmethoxy)phenyl]ethanone, 402  
 [39548-93-1] 1-[2,4-Dihydroxy-3-methyl-6-(phenylmethoxy)phenyl]ethanone, 347  
 [39652-85-2] 1-[2,4,6-Trihydroxy-3-(3-methylbutyl)phenyl]ethanone, 289  
 [39701-15-0] 1-(3-Bromo-2-hydroxy-4,6-dimethoxy-5-methylphenyl)ethanone, 187  
 [39730-66-0] 1-(2-Hydroxy-4-iodophenyl)ethanone, 36  
 [40180-70-9] 1-(5-Hydroxy-2-methylphenyl)ethanone, 100  
 [40356-82-9] 1-[3-(Chloromethyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 189  
 [40591-02-4] 1-(2-Hydroxy-4-iodo-3-methylphenyl)ethanone, 85  
 [40785-72-6] 1-[4-[(5-Bromopentyl)oxy]-2-hydroxyphenyl]ethanone, 277  
 [40785-92-0] 1-[2-Hydroxy-4-(oxiranylmethoxy)-3-(2-propenyl)phenyl]ethanone, 305  
 [40786-20-7] 1-[4-(3-Bromopropoxy)-2-hydroxy-3-propylphenyl]ethanone, 317  
 [40786-69-4] 1-(2,4-Dihydroxy-3-propylphenyl)ethanone, 200  
 [40815-74-5] 1-[2-Hydroxy-4-(2-propenyloxy)phenyl]ethanone, 181  
 [40815-75-6] 1-[2-Hydroxy-5-(2-propenyloxy)phenyl]ethanone, 181

- [40815-79-0] 1-[3,6-Dihydroxy-2-(2-propenyl)phenyl]ethanone, 181  
[40815-80-3] 1-[2,4-Dihydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 303  
[40903-02-4] 1-[2-Hydroxy-3-(2-propenyl)-4-(2-propenyloxy)phenyl]ethanone, 304  
[41085-27-2] 1-(2-Hydroxy-6-methylphenyl)ethanone, 97  
[41347-54-0] 1-[2,4-Dihydroxy-5-(3-methyl-1-butenyl)phenyl]ethanone, 269  
[41607-43-6] 1-[4-Hydroxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 374  
[41997-38-0] 1-[3,6-Dihydroxy-4-methoxy-2-(phenylmethoxy)phenyl]ethanone, 350  
[41997-39-1] 1-[6-Hydroxy-3,4-dimethoxy-2-(phenylmethoxy)phenyl]ethanone, 363  
[42059-48-3] 1-[4-(Acetyloxy)-2-hydroxyphenyl]ethanone, 131  
[42059-51-8] 1-[4,5-Bis(acetyloxy)-2-hydroxyphenyl]ethanone, 222  
[43037-65-6] 1-[3-Hydroxy-6-methoxy-2-(2-propenyl)[1,1'-biphenyl]-4-yl]ethanone, 370  
[43037-66-7] 1-[2-Hydroxy-5-methoxy-4-methyl-3-(2-propenyl)phenyl]ethanone, 271  
[43037-67-8] 1-[3-Hydroxy-6-methoxy-4-(2-propenyl)[1,1'-biphenyl]-2-yl]ethanone, 370  
[43037-68-9] 1-[2-Hydroxy-5-methoxy-6-methyl-3-(2-propenyl)phenyl]ethanone, 271  
[43037-69-0] 1-(3-Hydroxy-6-methoxy-2-propyl[1,1'-biphenyl]-4-yl)ethanone, 372  
[43037-70-3] 1-(3-Hydroxy-6-methoxy-4-propyl[1,1'-biphenyl]-2-yl)ethanone, 372  
[43037-71-4] 1-(2-Hydroxy-5-methoxy-4-methyl-3-propylphenyl)ethanone, 287  
[43037-72-5] 1-(2-Hydroxy-5-methoxy-6-methyl-3-propylphenyl)ethanone, 287  
[43113-93-5] 1-(3-Hydroxy-5-methylphenyl)ethanone, 98  
[43140-82-5] 1-(2-Hydroxy-5-methoxy-4-methyl-3-nitrophenyl)ethanone, 142  
[43140-83-6] 1-(2,5-Dihydroxy-4-methyl-3-nitrophenyl)ethanone, 90  
[43640-12-2] 1-(2-Ethoxy-3,6-dihydroxy-4-methyl-5-nitrophenyl)ethanone, 191  
[49602-08-6] 1-[2-(Benzoyloxy)-6-hydroxy-4-methoxyphenyl]ethanone, 343  
[49605-14-3] 1-(2,4,6-Tribromo-3-hydroxyphenyl)ethanone, 3  
[49619-68-3] 1-[5-(Dimethylamino)-2-hydroxyphenyl]ethanone, 176  
[49640-12-2] 1-[4-Hydroxy-3-[(methylsulfonyl)methyl]phenyl]ethanone, 172  
[50317-52-7] 1-[5-Chloro-2-hydroxy-3-(hydroxymethyl)phenyl]ethanone, 81  
[50317-56-1] 1-[3-(Bromomethyl)-5-chloro-2-hydroxyphenyl]ethanone, 68  
[50342-17-1] 1-(5-Bromo-2-hydroxy-4-methylphenyl)ethanone, 74  
[50343-12-9] 1-(5-Chloro-2-hydroxy-3-methylphenyl)ethanone, 79  
[50343-13-0] 1-(3-Chloro-6-hydroxy-2,4-dimethylphenyl)ethanone, 137  
[50634-01-0] 1-[2-(Benzoyloxy)-6-hydroxyphenyl]ethanone, 326  
[50743-14-1] 1-(5-Butyl-2-hydroxyphenyl)ethanone, 238  
[50773-37-0] 1-[2,4-Dihydroxy-3-(3-methylbutyl)phenyl]ethanone, 285  
[50773-38-1] 1-[2,4-Dihydroxy-5-(3-methyl-2-butenyl)-3-(3-methylbutyl)phenyl]-ethanone, 380  
[50773-40-5] 1-[2-Hydroxy-4-methoxy-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 385  
[51410-07-2] 1-(4-Amino-2-hydroxyphenyl)ethanone (*Hydrochloride*), 64  
[51832-82-7] 1-[3-Chloro-4-hydroxy-5-(2-propenyl)phenyl]ethanone, 177  
[51863-60-6] 1-(3,5-Dihydroxyphenyl)ethanone, 57  
[52095-10-0] 1-(3,6-Dihydroxy-2-phenoxyphenyl)ethanone, 301  
[52095-11-1] 1-[3,6-Dihydroxy-2-(4-methoxyphenoxy)phenyl]ethanone, 336  
[52095-12-2] 1-(2-Chloro-3,6-dihydroxyphenyl)ethanone, 31  
[52099-27-1] 1-(2-Hydroxy-3,6-dimethoxyphenyl)ethanone, 165  
[52122-69-7] 1-(2-Hydroxy-4-pentadecylphenyl)ethanone, 409  
[52122-72-2] 1-[4-(Dodecyloxy)-2-hydroxyphenyl]ethanone, 391  
[52129-61-0] 1-(4-Hydroxy-3,5-dinitrophenyl)ethanone, 21  
[52129-62-1] 1-(3-Chloro-4-hydroxy-5-nitrophenyl)ethanone, 13  
[52189-90-9] 1-(4,4'-Dihydroxy[1,1'-biphenyl]-3-yl)ethanone, 300  
[52200-61-0] 1-(4,6-Dihydroxy-2-methoxy-3-methylphenyl)ethanone (*Pseudoaspidinol-A*), 162  
[52249-85-1] 1-[2-Hydroxy-3-methoxy-4-(phenylmethoxy)phenyl]ethanone, 347  
[52249-87-3] 1-[6-Hydroxy-2,4-dimethoxy-3-(phenylmethoxy)phenyl]ethanone, 363  
[52249-88-4] 1-[2-Hydroxy-4-methoxy-5-(phenylmethoxy)phenyl]ethanone, 347  
[52376-19-9] 1-(4-Bromo-2,5-dihydroxyphenyl)ethanone, 26  
[52601-06-6] 1-[2-Hydroxy-4-methoxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 308  
[52751-41-4] 1-[2-(Acetyloxy)-4,6-dihydroxyphenyl]ethanone, 132

- [52751-42-5] 1-[2-(Acetyloxy)-4-hydroxyphenyl]ethanone, 130  
 [52774-08-0] 1-[2-Hydroxy-4-methyl-5-(1-methylethyl)phenyl]ethanone, 244  
 [53000-17-2] 1-[2-Hydroxy-3,4,6-tris(methoxymethoxy)phenyl]ethanone, 323  
 [53347-06-1] 1-(5-Chloro-3-ethyl-2-hydroxyphenyl)ethanone, 136  
 [53542-79-3] 1-(2,6-Dihydroxy-3-propylphenyl)ethanone, 201  
 [53771-23-6] 1-[2-Hydroxy-4,6-bis(2-propynyloxy)phenyl]ethanone, 301  
 [53771-24-7] 1-[2,4-Dihydroxy-6-(2-propynyloxy)phenyl]ethanone, 177  
 [53771-25-8] 1-[2-Hydroxy-3-(2-propenyl)-4,6-bis(2-propynyloxy)phenyl]ethanone, 357  
 [53771-27-0] 1-[2-Hydroxy-4,6-bis(2-propenyloxy)phenyl]ethanone, 305  
 [53771-28-1] 1-[2,6-Dihydroxy-3-(2-propenyl)-4-(2-propenyloxy)phenyl]ethanone, 304  
 [53771-29-2] 1-[2,4,6-Trihydroxy-3,5-bis(2-propenyl)phenyl]ethanone, 305  
 [53889-99-9] 1-[4-Hydroxy-3-(1-propenyl)phenyl]ethanone, 179  
 [53967-72-9] 1-(3-Hydroxy-2-nitrophenyl)ethanone, 40  
 [54255-50-4] 1-(3-Amino-4-hydroxyphenyl)ethanone, 63  
 [54299-56-8] 1-[6-Hydroxy-4-methoxy-2,3-bis(phenylmethoxy)phenyl]ethanone, 405  
 [54299-57-9] 1-[2-Hydroxy-4,6-dimethoxy-3-(phenylmethoxy)phenyl]ethanone, 362  
 [54337-59-6] 1-(3-Ethyl-2,6-dihydroxyphenyl)ethanone, 153  
 [54439-83-7] 1-(3,5-Dihydroxy[1,1'-biphenyl]-2-yl)ethanone, 300  
 [54439-90-6] 1-(5-Amino-3-hydroxy[1,1'-biphenyl]-2-yl)ethanone, 302  
 [54439-91-7] 1-(3-Amino-5-hydroxy[1,1'-biphenyl]-2-yl)ethanone, 302  
 [54514-40-8] 1-(4-Hydroxy-3-methoxy-5-propylphenyl)ethanone, 254  
 [54556-95-5] 1-(3-Chloro-4-hydroxy-5-methylphenyl)ethanone, 78  
 [54698-17-8] 1-(2,5-Dihydroxy-4-methylphenyl)ethanone, 104  
 [54903-54-7] 1-(4-Amino-3-hydroxyphenyl)ethanone, 64  
 [54903-57-0] 1-[3-Hydroxy-4-(methylamino)phenyl]ethanone, 124  
 [54917-82-7] 1-(2,4-Dihydroxy-3,5-dinitrophenyl)ethanone, 21  
 [54918-24-0] 1-[4-( $\beta$ -D-Glucopyranosyloxy)-2-hydroxyphenyl]ethanone, 315  
 [54918-26-2] 1-[4-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone, 313  
 [54918-27-3] 1-[2-Hydroxy-4-[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyl)oxy]-phenyl]ethanone, 398  
 [54918-29-5] 1-[2-Hydroxy-4-( $\beta$ -D-xylopyranosyloxy)phenyl]ethanone, 276  
 [54918-30-8] 1-[4-[(4-O- $\beta$ -D-Glucopyranosyl- $\beta$ -D-glucopyranosyl)oxy]-2-hydroxy-phenyl]ethanone, 390  
 [55008-15-6] 1-(3-Amino-2-hydroxy-5-methoxyphenyl)ethanone, 125  
 [55168-29-1] 1-[5-(Acetyloxy)-2,4-dihydroxyphenyl]ethanone, 133  
 [55168-32-6] 1-(5-Hexyl-2-hydroxyphenyl)ethanone, 318  
 [55168-33-7] 1-(5-Cyclohexyl-2-hydroxyphenyl)ethanone, 307  
 [55329-63-0] 1-(2-Hydroxy-4-propoxyphenyl)ethanone, 206  
 [55380-57-9] 1-[2,4,6-Trihydroxy-3,5-bis(3-methylbutyl)phenyl]ethanone, 383  
 [55380-58-0] 1-[2,4,6-Trihydroxy-3-methyl-5-(3-methyl-2-butenyl)phenyl]ethanone, 312  
 [55483-00-6] 1-[3-( $\beta$ -D-Glucopyranosyloxy)-4-hydroxyphenyl]ethanone, 315  
 [55736-04-4] 1-(2-Chloro-6-hydroxyphenyl)ethanone, 28  
 [55736-69-1] 1-(2-Bromo-6-hydroxyphenyl)ethanone, 23  
 [55736-71-5] 1-(3,4-Dichloro-2-hydroxyphenyl)ethanone, 15  
 [55736-72-6] 1-(3,6-Dichloro-2-hydroxyphenyl)ethanone, 16  
 [55742-65-9] 1-(2,5-Dihydroxy-3,4,6-trimethoxyphenyl)ethanone, 219  
 [56002-87-0] 1-[2-Hydroxy-3,5,6-trimethoxy-4-(1-methylethoxy)phenyl]ethanone, 323  
 [56146-52-2] 1-[2,4-Dihydroxy-5-(3-methylbutyl)phenyl]ethanone, 285  
 [56358-73-7] 1-(2,3-Dihydroxy-6-methoxyphenyl)ethanone, 115  
 [56358-74-8] 1-(3-Hydroxy-2,6-dimethoxyphenyl)ethanone, 168  
 [56394-40-2] 1-(4,5-Diethyl-2-hydroxyphenyl)ethanone, 239  
 [56414-14-3] 1-(5-Ethoxy-2-hydroxyphenyl)ethanone, 153  
 [56490-43-8] 1-[4-Hydroxy-3-(methylsulfonyl)phenyl]ethanone, 121  
 [56490-44-9] 1-[4-Hydroxy-3-[2-(methylsulfonyl)ethyl]phenyl]ethanone, 213  
 [56490-61-0] 1-[4-Hydroxy-3-[3-(methylsulfonyl)propyl]phenyl]ethanone, 259  
 [56490-62-1] 1-[3-[(Ethylsulfonyl)methyl]-4-hydroxyphenyl]ethanone, 213  
 [56490-63-2] 1-[4-Hydroxy-3-[(propylsulfonyl)methyl]phenyl]ethanone, 259

- [56490-64-3] 1-[4-Hydroxy-3-[(1-methylethyl)sulfonyl]methyl]phenyl]ethanone, 259  
[56504-43-9] 1-(2-Hydroxy-6-methoxy-3-methylphenyl)ethanone, 157  
[56581-46-5] 1-(3-Chloro-2,6-dihydroxy-5-methylphenyl)ethanone, 80  
[56609-14-4] 1-(2-Hydroxy-5-methyl-4-nitrophenyl)ethanone, 88  
[56609-15-5] 1-(3-Bromo-2-hydroxy-5-methylphenyl)ethanone, 73  
[56926-34-2] 1-(2-Hydroxy-5-phenoxyphenyl)ethanone, 300  
[56961-48-9] 1-(2-Chloro-3,4-dihydroxyphenyl)ethanone, 31  
[57051-50-0] 1-(2,4-Dichloro-6-hydroxyphenyl)ethanone, 15  
[57051-51-1] 1-(4-Chloro-2-hydroxy-5-methylphenyl)ethanone, 78  
[57161-85-0] 1-[2-Hydroxy-4-(oxiranylmethoxy)-3-propylphenyl]ethanone, 311  
[57221-60-0] 1-(4-Butoxy-2-hydroxyphenyl)ethanone, 249  
[57373-80-5] 1-[2-Hydroxy-5-(1,1,3,3-tetramethylbutyl)phenyl]ethanone, 355  
[57373-81-6] 1-[5-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone, 241  
[57375-45-8] 1-(2-Hydroxy-5-tert-nonylphenyl)ethanone, 368  
[57393-65-4] 1-(3,5-Dibromo-4-hydroxy-2,6-dimethoxyphenyl)ethanone, 129  
[57442-27-0] 1-(5-Bromo-2-hydroxy-4-propoxyphenyl)ethanone, 187  
[57471-32-6] 1-(5-Amino-2-hydroxyphenyl)ethanone (*Hydrochloride*), 65  
[57517-42-7] 1-(3-Bromo-4-hydroxy-2,6-dimethoxyphenyl)ethanone, 135  
[57600-87-0] 1-[4-(Acetyloxy)-2-hydroxy-6-methylphenyl]ethanone, 182  
[57600-88-1] 1-[4-(Acetyloxy)-2-ethyl-6-hydroxyphenyl]ethanone, 229  
[57600-89-2] 1-[4-(Acetyloxy)-2-hydroxy-3,6-dimethylphenyl]ethanone, 229  
[57600-90-5] 1-[4-(Acetyloxy)-6-hydroxy-2,3-dimethylphenyl]ethanone, 229  
[57744-70-4] 1-[2,4,6-Trihydroxy-3-(3-methyl-2-butenyl)-5-(3-methylbutyl)phenyl]-ethanone, 381  
[57899-03-3] 1-[4-Hydroxy-3-(2-methyl-2-propenyl)phenyl]ethanone, 224  
[58020-38-5] 1-(2-Chloro-5-hydroxyphenyl)ethanone, 28  
[58084-93-8] 1-(4-Ethoxy-2,5-dihydroxyphenyl)ethanone, 163  
[58483-48-0] 1-(3-Chloro-5-ethyl-2-hydroxyphenyl)ethanone, 136  
[58621-37-7] 1-[3-Hydroxy-2-(2-propenyl)phenyl]ethanone, 178  
[58621-38-8] 1-[3-Hydroxy-4-(2-propenyl)phenyl]ethanone, 179  
[58621-39-9] 1-[2-Hydroxy-3-(2-propenyl)phenyl]ethanone, 178  
[58972-39-7] 1-(2-Hydroxy-3,4,5-trimethylphenyl)ethanone, 197  
[59443-15-1] 1-(3-Bromo-5-chloro-2-hydroxyphenyl)ethanone, 6  
[59656-68-7] 1-(2-Hydroxy-3-iodo-4,6-dimethoxyphenyl)ethanone, 140  
[59862-06-5] 1-(2,3,4-Trihydroxy-5-methylphenyl)ethanone, 120  
[59862-07-6] 1-(2,3-Dihydroxy-6-methylphenyl)ethanone, 102  
[60441-58-9] 1-(2-Hydroxy-4-pentylphenyl)ethanone, 283  
[60441-59-0] 1-(4-Hydroxy-2-pentylphenyl)ethanone, 284  
[60640-95-1] 1-[2,4-Dihydroxy-5-(2-phenylethyl)phenyl]ethanone, 345  
[60840-18-8] 1-[2-Hydroxy-3,4,6-tris(phenylmethoxy)phenyl]ethanone, 412  
[60840-21-3] 1-[3,4,6-Trihydroxy-2-(1-methylethoxy)phenyl]ethanone, 219  
[60965-25-5] 1-(5-Bromo-2,4-dihydroxyphenyl)ethanone, 26  
[60990-39-8] 1-(3-Bromo-2,4-dihydroxyphenyl)ethanone, 25  
[61124-56-9] 1-(4-Chloro-3-hydroxyphenyl)ethanone, 30  
[61270-14-2] 1-[2-Hydroxy-6-(2-phenoxyethoxy)phenyl]ethanone, 349  
[61270-17-5] 1-[2-Hydroxy-5-(3-phenylpropyl)phenyl]ethanone, 358  
[61270-18-6] 1-[6-[(5-Bromopentyl)oxy]-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 351  
[61270-23-3] 1-[4-[(5-Bromopentyl)oxy]-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 351  
[61270-24-4] 1-[2-Hydroxy-4-(oxiranylmethoxy)phenyl]ethanone, 184  
[61270-28-8] 1-(4-Hydroxy-3-propylphenyl)ethanone, 197  
[61300-15-0] 1-[2-Hydroxy-5-(phenylmethyl)phenyl]ethanone, 329  
[61405-64-9] 1-(4-Hydroxy-2,3,5-trimethylphenyl)ethanone, 199  
[61405-65-0] 1-[4-Hydroxy-3-methyl-2-(1-methylethyl)phenyl]ethanone, 245  
[61775-18-6] 1-[4-( $\beta$ -D-Glucopyranosyloxy)-2-hydroxy-6-methoxyphenyl]ethanone (*Annphe*none), 340  
[61791-99-9] 1-(2-Bromo-4-hydroxyphenyl)ethanone, 23  
[62069-33-4] 1-(2,4-Dihydroxy-5-iodophenyl)ethanone, 38

- [62069-34-5] 1-(2,4-Dihydroxy-3,5-diodophenyl)ethanone, 20  
 [62615-24-1] 1-(4-Hydroxy-3-iodophenyl)ethanone, 37  
 [62615-25-2] 1-(5-Bromo-2,4-dihydroxy-3-methoxyphenyl)ethanone, 77  
 [62615-26-3] 1-(2,4-Dihydroxy-3-methoxyphenyl)ethanone, 115  
 [62615-64-9] 1-(6-Hydroxy-3,4-dimethoxy-2-methylphenyl)ethanone, 212  
 [63013-36-5] 1-[2-(Acetyloxy)-6-hydroxy-4-methoxyphenyl]ethanone, 185  
 [63359-84-2] 1-[2-Hydroxy-4-(2-phenylethoxy)phenyl]ethanone, 346  
 [63359-85-3] 1-[2-Hydroxy-5-(2-phenylethoxy)phenyl]ethanone, 346  
 [63359-86-4] 1-[2-Hydroxy-4-(3-phenylpropoxy)phenyl]ethanone, 359  
 [63359-87-5] 1-[2-Hydroxy-5-(3-phenylpropoxy)phenyl]ethanone, 360  
 [63359-88-6] 1-[2-Hydroxy-4-(4-phenylbutoxy)phenyl]ethanone, 372  
 [63411-82-5] 1-(3-Butyl-2,6-dihydroxyphenyl)ethanone, 249  
 [63411-84-7] 1-(3,5-Dibromo-2,6-dihydroxyphenyl)ethanone, 11  
 [63411-85-8] 1-[2-[(3,4-Dichlorophenyl)methoxy]-6-hydroxyphenyl]ethanone, 325  
 [63411-86-9] 1-[2-[(2,4-Dichlorophenyl)methoxy]-6-hydroxyphenyl]ethanone, 324  
 [63411-87-0] 1-(2,4-Dihydroxy-5-propylphenyl)ethanone, 201  
 [63411-88-1] 1-(5-Hexyl-2,4-dihydroxyphenyl)ethanone, 320  
 [63437-82-1] 1-[3-[2-(Acetyloxy)ethoxy]-4-hydroxyphenyl]ethanone, 233  
 [63437-85-4] 1-[4-Hydroxy-3-(2-hydroxyethoxy)phenyl]ethanone, 170  
 [63437-86-5] 1-[3-Hydroxy-5-(2-hydroxyethoxy)phenyl]ethanone, 170  
 [63437-94-5] 1-[4-Hydroxy-3-(2-hydroxypropoxy)phenyl]ethanone, 212  
 [63438-68-6] 1-(2-Butoxy-6-hydroxyphenyl)ethanone, 249  
 [63542-37-0] 1-(2-Hydroxy-3,4-dimethoxy-6-methylphenyl)ethanone, 209  
 [63609-52-9] 1-[5-Hydroxy-2-(methylamino)phenyl]ethanone, 125  
 [63609-62-1] 1-[2-[(1,1-Dimethylethyl)amino]-5-hydroxyphenyl]ethanone, 265  
 [63635-39-2] 1-(2,3,4,6-Tetrahydroxyphenyl)ethanone, 60  
 [63635-41-6] 1-(2-Ethoxy-3,4,6-trihydroxyphenyl)ethanone, 175  
 [63854-17-1] 1-[2-Hydroxy-6-[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone, 274  
 [63990-67-0] 1-(3,5-Dibromo-2,4,6-trihydroxyphenyl)ethanone, 11  
 [64648-09-5] 1-[2-Hydroxy-6-methyl-3-phenyl-4-(phenylmethyl)phenyl]ethanone, 393  
 [64794-45-2] 1-(2,5-Dihydroxy-3,4,6-trimethylphenyl)ethanone, 202  
 [65039-99-8] 1-[5-Hydroxy-2,4-dimethoxy-3-(phenylmethoxy)phenyl]ethanone, 362  
 [65490-08-6] 1-[2-Hydroxy-4-(methoxymethoxy)phenyl]ethanone, 171  
 [65490-09-7] 1-[2-Hydroxy-4,6-bis(methoxymethoxy)phenyl]ethanone, 263  
 [65883-24-1] 1-(2,3-Dibromo-4,5,6-trihydroxyphenyl)ethanone, 11  
 [66003-50-7] 1-(6-Hydroxy-1,3-benzodioxol-5-yl)ethanone, 73  
 [66108-30-3] 1-(2-Hydroxy-5-methyl-3-nitrophenyl)ethanone, 88  
 [66264-55-9] 1-(4-Hydroxy-3-mercaptophenyl)ethanone, 52  
 [66264-56-0] 1-[4-Hydroxy-3-(methylthio)phenyl]ethanone, 101  
 [66296-84-2] 1-(3,4-Dihydroxy-2-methylphenyl)ethanone, 105  
 [66296-85-3] 1-(2,3,4,5-Tetrahydroxy-6-methylphenyl)ethanone, 122  
 [66625-03-4] 1-[2,4,6-Trihydroxy-3-[(trifluoromethyl)thio]phenyl]ethanone, 67  
 [66625-04-5] 1-[2,4,6-Trihydroxy-3,5-bis[(trifluoromethyl)thio]phenyl]ethanone, 127  
 [66842-24-8] 1-(2,6-Dihydroxy-3,4,5-trimethylphenyl)ethanone, 203  
 [66883-87-2] 1-[3-Chloro-5-(chloromethyl)-2-hydroxyphenyl]ethanone, 70  
 [66901-79-9] 1-[3-(Acetyloxy)-6-hydroxy-2,4,5-trimethylphenyl]ethanone, 272  
 [67088-16-8] 1-[2,4-Dihydroxy-3-(phenylmethyl)phenyl]ethanone, 330  
 [67127-96-2] 1-[2-Hydroxy-3-(1-propenyl)phenyl]ethanone, 178  
 [67589-15-5] 1-[2-Hydroxy-5-(trifluoromethyl)phenyl]ethanone, 66  
 [67895-11-8] 1-(2,6-Dihydroxy-4-pentylphenyl)ethanone, 286  
 [68034-24-2] 1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone, 270  
 [68301-59-7] 1-(2-Chloro-4-hydroxyphenyl)ethanone, 27  
 [68531-86-2] 1-(3,6-Dihydroxy-4-methoxy-2-methylphenyl)ethanone, 162  
 [69027-37-8] 1-(2-Hydroxy-3,5-dinitrophenyl)ethanone, 20  
 [69051-59-8] 1-(3-Ethyl-2-hydroxy-4,6-dimethylphenyl)ethanone, 242  
 [69079-91-0] 1-[2-Hydroxy-6-(4-phenoxybutoxy)phenyl]ethanone, 373  
 [69079-92-1] 1-[2-Hydroxy-3-(3-phenoxypropoxy)phenyl]ethanone, 361

- [69079-93-2] 1-[2-Hydroxy-6-(3-phenylpropoxy)phenyl]ethanone, 360  
[69082-35-5] 1-(2,4-Dihydroxy-3,6-dimethylphenyl)ethanone, 150  
[69114-99-4] 1-[2,3-Dihydroxy-4-(phenylmethoxy)phenyl]ethanone, 334  
[69240-96-6] 1-(2-Chloro-3-hydroxyphenyl)ethanone, 27  
[69240-97-7] 1-(2-Chloro-4,5-dihydroxyphenyl)ethanone, 31  
[69240-98-8] 1-(2-Chloro-4-hydroxy-5-methoxyphenyl)ethanone, 81  
[69469-91-6] 1-(2-Hydroxy-4-methoxy-3-methylphenyl)ethanone, 156  
[69470-86-6] 1-[5-(Acetyloxy)-2-hydroxy-4-methoxyphenyl]ethanone, 186  
[69480-06-4] 1-(2,6-Dihydroxy-4-methoxy-3-methylphenyl)ethanone, 161  
[69616-56-4] 1-(2,5-Dihydroxy-3,4-dimethoxyphenyl)ethanone, 173  
[69616-59-7] 1-(4-Ethoxy-2-hydroxy-3-methoxyphenyl)ethanone, 209  
[69616-62-2] 1-(5-Ethoxy-2-hydroxy-3,4-dimethoxyphenyl)ethanone, 261  
[69751-80-0] 1-(2,3-Dihydroxy-5-methylphenyl)ethanone, 101  
[69751-81-1] 1-(2,3-Dihydroxy-4-methylphenyl)ethanone, 101  
[69976-76-7] 1-(6-Amino-3-hydroxy-2-methylphenyl)ethanone, 124  
[69976-81-4] 1-(3-Hydroxy-2-methylphenyl)ethanone, 98  
[70064-44-7] 1-[3-(2,3-Dihydroxypropoxy)-4-hydroxyphenyl]ethanone, 214  
[70284-07-0] 1-(3-Hydroxy-5-nitrophenyl)ethanone, 41  
[70662-40-7] 1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-5-methoxyphenyl]ethanone, 304  
[70668-14-3] 1-(2-Hydroxy-5-nitro-4-propoxyphenyl)ethanone, 191  
[70977-71-8] 1-(3-Amino-2-hydroxy-5-methylphenyl)ethanone, 123  
[70977-72-9] 1-(3-Amino-2-hydroxyphenyl)ethanone, 62  
[70977-78-5] 1-(3-Amino-5-ethyl-2-hydroxyphenyl)ethanone, 175  
[70977-79-6] 1-(3-Amino-2-hydroxy-5-nitrophenyl)ethanone, 46  
[70977-84-3] 1-(3-Amino-5-fluoro-2-hydroxyphenyl)ethanone, 45  
[70977-85-4] 1-(3-Amino-5-bromo-2-hydroxyphenyl)ethanone, 44  
[70977-88-7] 1-[3-Amino-2-hydroxy-5-(methylsulfonyl)phenyl]ethanone, 126  
[70978-22-2] 1-(3-Amino-2-hydroxy-5-propylphenyl)ethanone, 220  
[70978-38-0] 1-(2-Hydroxy-3-nitro-5-propylphenyl)ethanone, 190  
[70978-39-1] 1-(5-Fluoro-2-hydroxy-3-nitrophenyl)ethanone, 18  
[70978-46-0] 1-[2-Hydroxy-5-(methylsulfonyl)-3-nitrophenyl]ethanone, 93  
[70978-54-0] 1-(5-Bromo-2-hydroxy-3-nitrophenyl)ethanone, 7  
[71002-71-6] 1-(5-Ethyl-2-hydroxy-3-nitrophenyl)ethanone, 140  
[71243-12-4] 1-(2,4-Dihydroxy-3-iodophenyl)ethanone, 38  
[71452-36-3] 1-(6-Hydroxy-3-methoxy-2-methylphenyl)ethanone, 159  
[71582-56-4] 1-(3-Chloro-2-hydroxy-4,6-dimethylphenyl)ethanone, 136  
[71582-57-5] 1-(3-Bromo-6-hydroxy-2,4-dimethylphenyl)ethanone, 133  
[71582-58-6] 1-(3,6-Dihydroxy-2,4-dimethylphenyl)ethanone, 151  
[71582-59-7] 1-(2,5-Dihydroxy-3,4-dimethylphenyl)ethanone, 150  
[71815-42-4] 1-[2-Hydroxy-4-(phenylmethoxy)phenyl]ethanone-*l*-<sup>14</sup>C, 332  
[72018-33-8] 1-(2-Hydroxy-4-methoxy-3-propylphenyl)ethanone, 253  
[72018-35-0] 1-(2-Hydroxy-4-methoxy-5-propylphenyl)ethanone, 253  
[72018-36-1] 1-(2,4-Dihydroxy-3,5-dipropylphenyl)ethanone, 319  
[72018-37-2] 1-(2-Hydroxy-4-methoxy-3,5-dipropylphenyl)ethanone, 342  
[72422-80-1] 1-(5-Bromo-2-hydroxy-3-methylphenyl)ethanone, 74  
[72424-28-3] 1-(2-Hydroxy-3,5,6-trimethoxyphenyl)ethanone, 217  
[72511-76-3] 1-[2-Hydroxy-3-iodo-4-(2-propenyloxy)phenyl]ethanone, 178  
[72545-51-8] 1-[2-Hydroxy-6-methyl-4-(phenylmethoxy)phenyl]ethanone, 346  
[73034-32-9] 1-(3-Hydroxy-2,5,6-trimethoxyphenyl)ethanone, 218  
[73051-30-6] 1-[5-(4-Chlorophenoxy)-2-hydroxyphenyl]ethanone, 296  
[73239-04-0] 1-(2,5-Dichloro-4-hydroxyphenyl)ethanone, 15  
[73239-52-8] 1-(3,4,6-Trihydroxy-2-methoxyphenyl)ethanone, 122  
[73239-53-9] 1-[6-Hydroxy-2-methoxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 404  
[73331-27-8] 1-[2,6-Dihydroxy-3,5-bis(2-propenyloxy)phenyl]ethanone, 306  
[73473-62-8] 1-[2-Hydroxy-4-(1-methylethoxy)phenyl]ethanone, 205  
[73640-74-1] 1-[2-Hydroxy-3-methyl-4-(phenylmethoxy)phenyl]ethanone, 346

- [73869-86-0] 1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*E*), 270  
 [73869-90-6] 1-[4-Hydroxy-3-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 309  
 [73898-20-1] 1-(4-Ethyl-3-hydroxyphenyl)ethanone, 144  
 [73898-21-2] 1-(4-Cyclohexyl-3-hydroxyphenyl)ethanone, 306  
 [73898-22-3] 1-(4-Bromo-3-hydroxyphenyl)ethanone, 24  
 [73898-23-4] 1-(3-Hydroxy-4-iodophenyl)ethanone, 37  
 [74047-32-8] 1-(2,4-Dihydroxy-3-iodo-6-methoxyphenyl)ethanone, 87  
 [74047-33-9] 1-[2-Hydroxy-3-iodo-6-methoxy-4-(2-propenyloxy)phenyl]ethanone, 223  
 [74047-37-3] 1-[2-Hydroxy-6-methoxy-4-(2-propenyloxy)phenyl]ethanone, 232  
 [74291-78-4] 1-(2,4-Dihydroxyphenyl)ethanone-<sup>13</sup>C<sub>2</sub>, 54  
 [74556-32-4] 1-(2,6-Dihydroxy-3,4-dimethoxyphenyl)ethanone, 174  
 [74604-19-6] 1-(2-Hydroxy-5-octylphenyl)ethanone, 355  
 [74727-08-5] 1-[2,4-Dihydroxy-3-methyl-5-(3-methyl-2-butenyl)phenyl]ethanone, 308  
 [75060-91-2] 1-[3-(Aminomethyl)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 293  
 [75254-93-2] 1-[2-Hydroxy-3,4-dimethoxy-5-(2-propenyl)phenyl]ethanone, 273  
 [75322-34-8] 1-(2,6-Dichloro-3,4-dihydroxy-5-methoxyphenyl)ethanone, 71  
 [75452-54-9] 1-(4-Amino-2-hydroxy-3-propylphenyl)ethanone, 220  
 [75452-86-7] 1-(3-Amino-2-hydroxy-6-methoxyphenyl)ethanone, 125  
 [75672-59-2] 1-(5-Ethoxy-2-hydroxy-4-methoxyphenyl)ethanone, 209  
 [75672-62-7] 1-(4-Ethoxy-2-hydroxy-5-methoxyphenyl)ethanone, 209  
 [76267-82-8] 1-[2-Hydroxy-4-methyl-5-(2-propenyloxy)phenyl]ethanone, 228  
 [76538-42-6] 1-(4-Chloro-3,5-dihydroxy[1,1'-biphenyl]-2-yl)ethanone, 296  
 [76554-77-3] 1-(2-Hydroxy-4-methoxy-6-propoxyphenyl)ethanone, 258  
 [76554-78-4] 1-[2-Hydroxy-4-methoxy-6-(1-methylethoxy)phenyl]ethanone, 258  
 [76554-79-5] 1-(2-Ethoxy-6-hydroxy-4-methoxyphenyl)ethanone, 208  
 [76554-80-8] 1-(4-Ethoxy-2-hydroxy-6-methoxyphenyl)ethanone, 209  
 [76576-61-9] 1-(2,3-Dihydroxy-4,5-dimethoxy-6-propylphenyl)ethanone, 290  
 [76609-35-3] 1-[2,4-Dihydroxy-6-(2-propenyloxy)phenyl]ethanone, 183  
 [76609-36-4] 1-[2-Hydroxy-4-(phenylmethoxy)-6-(2-propenyloxy)phenyl]ethanone, 371  
 [76748-71-5] 1-(4-Hydroxy-3-iodo-5-nitrophenyl)ethanone, 19  
 [76799-38-7] 1-[4-Hydroxy-2,6-bis(phenylmethoxy)phenyl]ethanone, 397  
 [76844-54-7] 1-[2-Hydroxy-3,4,6-trimethoxy-5-(phenylmethoxy)phenyl]ethanone, 373  
 [76951-07-0] 1-(4-Ethoxy-2-hydroxy-5-nitrophenyl)ethanone, 141  
 [77036-77-2] 1-[2-Hydroxy-3-methyl-4-(2-propenyloxy)phenyl]ethanone, 228  
 [77184-92-0] 1-(2-Hydroxy-4,5-dimethoxyphenyl)ethanone-2-<sup>14</sup>C, 166  
 [77347-23-0] 1-[3-(Acetyloxy)-2-hydroxy-5-methylphenyl]ethanone, 182  
 [77370-28-6] 1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)-5-(3-methyl-2-butenyl)-phenyl]ethanone (*Z*), 376  
 [77370-30-0] 1-[4-Hydroxy-3,5-bis(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*Z,Z*), 379  
 [77869-01-3] 1-[2,4-Dihydroxy-3-methyl-5-(2-propenyl)phenyl]ethanone, 225  
 [77869-43-3] 1-(2-Hydroxy-3-methoxy-4-methylphenyl)ethanone, 155  
 [77893-88-0] 1-(4'-Chloro-6-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 296  
 [77893-89-1] 1-(4'-Chloro-2-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 295  
 [77936-48-2] 1-(2-Hydroxy-5-methoxy-3-methylphenyl)ethanone, 157  
 [78268-45-8] 1-(3-Ethoxy-4-hydroxyphenyl)ethanone, 152  
 [78269-19-9] 1-(4-Ethoxy-3-hydroxyphenyl)ethanone, 153  
 [78274-02-9] 1-(2-Ethoxy-6-hydroxy-4-methylphenyl)ethanone, 203  
 [78646-28-3] 1-[2-Hydroxy-6-(methoxymethoxy)phenyl]ethanone, 171  
 [79557-72-5] 1-[4-(2-Butenyloxy)-2-hydroxyphenyl]ethanone, 225  
 [79557-73-6] 1-[2,4-Dihydroxy-3-(1-methyl-2-propenyl)phenyl]ethanone, 226  
 [79557-74-7] 1-[2,4-Dihydroxy-3-(1-methylpropyl)phenyl]ethanone, 251  
 [79557-82-7] 1-[4-[(9-Bromononyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 390  
 [79557-94-1] 1-[2,4-Dihydroxy-3-(1-methylhexyl)phenyl]ethanone, 341  
 [79558-02-4] 1-[4-(3-Chloropropoxy)-2-hydroxy-3-propylphenyl]ethanone, 317  
 [79755-07-8] 1-(3,4-Dichloro-2,5-dihydroxyphenyl)ethanone, 17  
 [79950-56-4] 1-[2-Hydroxy-5-[(3-phenyl-2-propenyl)oxy]phenyl]ethanone, 357



- [80190-95-0] 1-[2,4-Dihydroxy-3-(3-methyl-1-butenyl)phenyl]ethanone, 268  
[80547-86-0] 1-(3,4-Dihydroxy-5-methylphenyl)ethanone, 106  
[80938-23-4] 1-(4,5-Diethoxy-2-hydroxyphenyl)ethanone, 256  
[81053-02-3] 1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)-5-(3-methyl-2-butenyl)-phenyl]ethanone (*E*), 376  
[81053-03-4] 1-[4-Hydroxy-3,5-bis(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (*E,Z*), 378  
[81325-85-1] 1-(3-Chloro-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 139  
[81325-86-2] 1-(3-Chloro-6-hydroxy-2,4-dimethoxyphenyl)ethanone, 139  
[81325-87-3] 1-(2-Hydroxy-4,6-dimethoxy-3-nitrophenyl)ethanone, 143  
[81325-88-4] 1-(2,4,6-Trihydroxy-3-nitrophenyl)ethanone, 44  
[81325-91-9] 1-(3-Amino-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 176  
[81325-92-0] 1-(3-Amino-2-hydroxy-4,6-dimethoxyphenyl)ethanone (*Hydrochloride*), 176  
[81325-95-3] 1-(3-Amino-6-hydroxy-2,4-dimethoxyphenyl)ethanone, 176  
[81468-73-7] 1-(5-Butyl-2,4-dihydroxyphenyl)ethanone, 250  
[81511-52-6] 1-(2-Hydroxy-4-methoxy-5-methylphenyl)ethanone, 156  
[81515-01-7] 1-(4,6-Dichloro-2-hydroxy-3-nitrophenyl)ethanone, 4  
[81591-14-2] 1-(6-Chloro-3-ethyl-2-hydroxyphenyl)ethanone, 136  
[81591-15-3] 1-(3-Ethyl-2-hydroxy-5-methylphenyl)ethanone, 192  
[81591-16-4] 1-(3-Ethyl-2-hydroxy-6-methylphenyl)ethanone, 192  
[81591-17-5] 1-(5-Bromo-3-ethyl-2-hydroxyphenyl)ethanone, 133  
[81732-54-9] 1-[3-Hydroxy-5-(phenylmethoxy)phenyl]ethanone, 333  
[81944-40-3] 1-[4-Hydroxy-3-(3-hydroxy-3-methylbutyl)phenyl]ethanone, 287  
[82320-47-6] 1-(3-Bromo-2,6-dihydroxyphenyl)ethanone, 26  
[82506-14-7] 1-[3-[(Dimethylamino)methyl]-4-hydroxy-5-methylphenyl]ethanone, 264  
[82538-73-6] 1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-3-iodophenyl]ethanone, 265  
[82538-74-7] 1-[2,4-Dihydroxy-3-iodo-5-(3-methyl-2-butenyl)phenyl]ethanone, 266  
[82538-75-8] 1-[4-[(1,1-Dimethyl-2-propynyl)oxy]-2-hydroxy-3-iodo-6-methoxyphenyl]ethanone, 302  
[82538-76-9] 1-[2,4-Dihydroxy-3-iodo-6-methoxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 306  
[83069-04-9] 1-[5-Hydroxy-2-(phenylmethoxy)phenyl]ethanone, 333  
[83080-88-0] 1-(2-Hydroxy-6-mercaptophenyl)ethanone, 52  
[83332-29-0] 1-[2-(Benzoyloxy)-4,6-dihydroxyphenyl]ethanone, 327  
[83375-18-2] 1-(2-Heptyl-4,6-dihydroxyphenyl)ethanone, 341  
[83375-19-3] 1-(4-Heptyl-2,6-dihydroxyphenyl)ethanone, 341  
[83459-37-4] 1-(2,4-Dihydroxy-6-methoxy-3-methylphenyl)ethanone, 161  
[83812-26-4] 1-(2,5-Dihydroxy-3-propylphenyl)ethanone, 201  
[84092-45-5] 1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3-(3-methyl-2-butenyl)phenyl]ethanone, 366  
[84296-64-0] 1-[5-(1,1-Dimethylethyl)-2,3-dihydroxyphenyl]ethanone, 252  
[84296-99-1] 1-[4,6-Bis(1,1-dimethylethyl)-2,3-dihydroxyphenyl]ethanone, 355  
[84297-01-8] 1-[4-(1,1-Dimethylethyl)-2,3-dihydroxy-6-methylphenyl]ethanone, 286  
[84297-04-1] 1-[3-(Acetyloxy)-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 309  
[84653-58-7] 1-(3-Ethyl-2,4,6-trihydroxyphenyl)ethanone, 164  
[84744-37-6] 1-(5-Dodecyl-2-hydroxyphenyl)ethanone, 390  
[84942-36-9] 1-[2-Hydroxy-5-(1-methylpropyl)-3-nitrophenyl]ethanone, 237  
[84942-37-0] 1-(4-Hydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone, 297  
[84942-38-1] 1-(2-Hydroxy-3-nitro-5-phenoxyphenyl)ethanone, 298  
[84942-39-2] 1-[2-Hydroxy-5-(1-methylpropyl)phenyl]ethanone, 248  
[84942-40-5] 1-(5-Chloro-2-hydroxy-3-nitrophenyl)ethanone, 14  
[85128-50-3] 1-(3-Chloro-2-hydroxy-6-methylphenyl)ethanone, 78  
[85918-30-5] 1-(2,3,6-Trihydroxyphenyl)ethanone, 58  
[86253-71-6] 1-(2,3-Dihydroxy-5-propylphenyl)ethanone, 200  
[86608-89-1] 1-(4'-Chloro-4-hydroxy[1,1'-biphenyl]-3-yl)ethanone, 295

- [86989-84-6] 1-(5-Ethyl-2,3,4-trihydroxyphenyl)ethanone, 164  
 [87165-49-9] 1-[3-(Chloromethyl)-2-hydroxyphenyl]ethanone, 79  
 [87165-50-2] 1-[2-Hydroxy-3-(methoxymethyl)phenyl]ethanone, 160  
 [87165-59-1] 1-[5-Chloro-2-hydroxy-3-(methoxymethyl)phenyl]ethanone, 138  
 [87165-62-6] 1-[3-(Chloromethyl)-2-hydroxy-5-methylphenyl]ethanone, 137  
 [87165-63-7] 1-[2-Hydroxy-3-(methoxymethyl)-5-methylphenyl]ethanone, 205  
 [87165-70-6] 1-[3-(Chloromethyl)-2-hydroxy-5-methoxyphenyl]ethanone, 138  
 [87165-71-7] 1-[2-Hydroxy-5-methoxy-3-(methoxymethyl)phenyl]ethanone, 213  
 [87239-37-0] 1-(4-Chloro-2-hydroxy-6-methylphenyl)ethanone, 78  
 [87472-78-4] 1-(2-Amino-4-hydroxy-3-propylphenyl)ethanone, 220  
 [87953-86-4] 1-(3-Chloro-6-hydroxy-2-methoxyphenyl)ethanone, 83  
 [87953-91-1] 1-(3-Chloro-2-hydroxy-6-methoxyphenyl)ethanone, 82  
 [87953-93-3] 1-(3-Chloro-2,6-dihydroxyphenyl)ethanone, 32  
 [87953-94-4] 1-(3,5-Dichloro-2-hydroxy-6-methoxyphenyl)ethanone, 71  
 [87953-95-5] 1-(3,5-Dichloro-2,6-dihydroxyphenyl)ethanone, 17  
 [88086-96-8] 1-[2-Hydroxy-3-[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyl)oxy]-phenyl]ethanone, 397  
 [88086-97-9] 1-[3-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone, 343  
 [88086-98-0] 1-[2-Hydroxy-5-[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyl)oxy]-phenyl]ethanone, 398  
 [88086-99-1] 1-[5-( $\beta$ -D-Galactopyranosyloxy)-2-hydroxyphenyl]ethanone, 313  
 [88087-00-7] 1-[2-Hydroxy-4,6-bis[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranosyl)oxy]-phenyl]ethanone, 416  
 [88087-01-8] 1-[2,4-Bis-( $\beta$ -D-galactopyranosyloxy)-6-hydroxyphenyl]ethanone, 390  
 [88087-03-0] 1-[2-(Benzoyloxy)-5-hydroxyphenyl]ethanone, 325  
 [88087-04-1] 1-[2-( $\beta$ -D-Galactopyranosyloxy)-6-hydroxyphenyl]ethanone, 313  
 [88661-97-6] 1-[3-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone, 375  
 [88771-46-4] 1-(4-Chloro-2-hydroxy-3,6-dimethoxyphenyl)ethanone, 139  
 [88771-47-5] 1-(3,6-Diethoxy-2-hydroxyphenyl)ethanone, 256  
 [88771-57-7] 1-(4-Fluoro-2-hydroxy-3,6-dimethoxyphenyl)ethanone, 140  
 [88771-58-8] 1-(3-Chloro-6-hydroxy-2,5-dimethoxyphenyl)ethanone, 139  
 [88771-59-9] 1-(2-Hydroxy-3,6-dimethoxy-5-nitrophenyl)ethanone, 142  
 [88771-63-5] 1-(3,4-Dichloro-6-hydroxy-2,5-dimethoxyphenyl)ethanone, 129  
 [88772-48-9] 1-(4-Fluoro-2,5-dihydroxyphenyl)ethanone, 35  
 [89684-58-2] 1-(2,4-Dihydroxy-3-nitrophenyl)ethanone, 42  
 [89877-53-2] 1-(3-Hydroxy-2-methyl-4-nitrophenyl)ethanone, 89  
 [89880-47-7] 1-(3-Ethoxy-2-hydroxy-4,6-dimethoxyphenyl)ethanone, 260  
 [89942-63-2] 1-(3-Hydroxy-4-nitrophenyl)ethanone, 40  
 [90004-97-0] 1-(3-Bromo-2-hydroxy-5-nitrophenyl)ethanone, 7  
 [90004-98-1] 1-(3-Bromo-4-hydroxy-5-nitrophenyl)ethanone, 7  
 [90005-55-3] 1-(3-Amino-2-hydroxyphenyl)ethanone (*Hydrochloride*), 63  
 [90033-64-0] 1-(2-Amino-4-hydroxyphenyl)ethanone, 62  
 [90110-31-9] 1-(4-Chloro-2,5-dihydroxyphenyl)ethanone, 32  
 [90110-32-0] 1-(5-Chloro-2,4-dihydroxyphenyl)ethanone, 32  
 [90377-24-5] 1-(3,6-Dihydroxy-2-methoxy-4-methylphenyl)ethanone, 162  
 [90564-25-3] 1-(2-Hydroxy-5-methoxy-3-nitrophenyl)ethanone, 91  
 [90743-02-5] 1-(2-Hydroxy-3,6-dimethylphenyl)ethanone, 145  
 [90743-03-6] 1-(3-Chloro-2-hydroxy-5,6-dimethylphenyl)ethanone, 137  
 [90971-91-8] 1-(4-Bromo-2-hydroxy-5-methoxyphenyl)ethanone, 76  
 [91060-92-3] 1-(4-Hydroxy-2,6-dimethylphenyl)ethanone, 148  
 [91061-75-5] 1-(5-Hydroxy-2,4-dimethoxyphenyl)ethanone, 170  
 [91124-33-3] 1-[3-(1,1-Dimethylethyl)-2,6-dihydroxyphenyl]ethanone, 251  
 [91497-16-4] 1-[2-Hydroxy-5-methoxy-4-(2-propenyloxy)phenyl]ethanone, 231  
 [91664-14-1] 1-[5-(2-Butenyl)-2,3,4-trihydroxyphenyl]ethanone, 230  
 [91664-16-3] 1-[3-(2-Butenyl)-2,4-dihydroxyphenyl]ethanone, 225  
 [91664-17-4] 1-[5-(2-Butenyl)-2,4-dihydroxyphenyl]ethanone, 225  
 [91664-19-6] 1-[5-(2-Butenyl)-2,4-dihydroxy-3-iodophenyl]ethanone, 223

- [91664-20-9] 1-[2,4-Dihydroxy-6-methoxy-3-(1-methyl-2-propenyl)phenyl]ethanone, 273  
[91664-21-0] 1-[4,6-Dihydroxy-2-methoxy-3-(1-methyl-2-propenyl)phenyl]ethanone, 273  
[91664-22-1] 1-[3-(2-Butenyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone, 272  
[91664-23-2] 1-[3-(2-Butenyl)-4,6-dihydroxy-2-methoxyphenyl]ethanone, 272  
[91664-24-3] 1-[3-(2-Butenyl)-2-hydroxy-4-methoxyphenyl]ethanone, 268  
[91969-72-1] 1-[2-Hydroxy-4-(1-methylethyl)phenyl]ethanone, 195  
[92119-05-6] 1-(2,4-Dichloro-3-hydroxyphenyl)ethanone, 14  
[92518-06-4] 1-[4-(4-Bromobutoxy)-2-hydroxy-3-propylphenyl]ethanone, 340  
[92518-46-2] 1-[4-[(6-Bromohexyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 367  
[92831-82-8] 1-[2,5-Dihydroxy-4-(2-propenyloxy)phenyl]ethanone, 183  
[93339-98-1] 1-(2-Fluoro-6-hydroxyphenyl)ethanone, 33  
[93344-48-0] 1-[2-Hydroxy-4,6-bis(1-methylethoxy)phenyl]ethanone, 321  
[93344-49-1] 1-[3,6-Dihydroxy-2,4-bis(1-methylethoxy)phenyl]ethanone, 322  
[93344-50-4] 1-[6-Hydroxy-3-methoxy-2,4-bis(1-methylethoxy)phenyl]ethanone, 342  
[93344-52-6] 1-[2-Hydroxy-3,6-dimethoxy-4-(1-methylethoxy)phenyl]ethanone, 291  
[93351-16-7] 1-(4-Ethyl-2-hydroxy-5-methylphenyl)ethanone, 193  
[93434-27-6] 1-[2-Hydroxy-4-methoxy-5-(phenylmethyl)phenyl]ethanone, 345  
[93578-16-6] 1-(2,4-Dihydroxy-5-methylphenyl)ethanone, 102  
[93898-99-8] 1-[2,4-Dihydroxy-5-(phenylmethyl)phenyl]ethanone, 330  
[93915-84-5] 1-(2-Hydroxy-3-propylphenyl)ethanone, 196  
[94245-10-0] 1-[2-Hydroxy-3-methoxy-4-(1-methylpropoxy)phenyl]ethanone, 288  
[94649-69-1] 1-(2,3,6-Trichloro-4-hydroxy-5-methoxyphenyl)ethanone, 66  
[94649-70-4] 1-(2-Chloro-4-hydroxy-3,5-dimethoxyphenyl)ethanone, 138  
[94649-71-5] 1-(2,6-Dichloro-4-hydroxy-3,5-dimethoxyphenyl)ethanone, 129  
[94650-96-1] 1-(Trichloro-4-hydroxyphenyl)ethanone, 5  
[95102-24-2] 1-[4-Hydroxy-3-(phenylmethyl)phenyl]ethanone, 329  
[95165-66-5] 1-[2-Hydroxy-3-iodo-4,6-bis(phenylmethoxy)phenyl]ethanone, 393  
[95604-05-0] 1-[4-(Acetyloxy)-2-hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 337  
[95832-44-3] 1-[2,4-Dihydroxy-3,5-bis(phenylmethyl)phenyl]ethanone, 393  
[95832-45-4] 1-[2-Hydroxy-4-methoxy-3-(phenylmethyl)phenyl]ethanone, 345  
[95832-46-5] 1-[2-Hydroxy-4-methoxy-3,5-bis(phenylmethyl)phenyl]ethanone, 402  
[96501-84-7] 1-[6-Hydroxy-2,4-dimethoxy-3-(1-methylethoxy)phenyl]ethanone, 292  
[96864-14-1] 1-[2-Heptyl-6-hydroxy-4-(phenylmethoxy)phenyl]ethanone, 400  
[97066-04-1] 1-[2-Hydroxy-4-methyl-6-(phenylamino)phenyl]ethanone, 337  
[97066-06-3] 1-[2-(Dimethylamino)-6-hydroxy-4-methylphenyl]ethanone, 221  
[97066-07-4] 1-[2-(Diethylamino)-6-hydroxy-4-methylphenyl]ethanone, 294  
[97066-15-4] 1-(2-Amino-6-hydroxy-4-methylphenyl)ethanone, 123  
[97066-16-5] 1-[2-Hydroxy-4-methyl-6-[(phenylmethyl)amino]phenyl]ethanone, 350  
[97304-17-1] 1-(2,4-Dihydroxy-5-pentylphenyl)ethanone, 285  
[97565-35-0] 1-(3-Hydroxy-2,4,5-trimethoxyphenyl)ethanone, 217  
[97582-36-0] 1-[4-(Chloromethyl)-2-hydroxy-3-propylphenyl]ethanone, 235  
[97582-37-1] 1-[4-(Chloromethyl)-2-hydroxy-3-methylphenyl]ethanone, 137  
[97582-38-2] 1-[4-(Chloromethyl)-3-ethyl-2-hydroxyphenyl]ethanone, 187  
[97582-41-7] 1-[4-(Chloromethyl)-2-hydroxy-3-(2-methylpropyl)phenyl]ethanone, 278  
[97761-88-1] 1-(4-Hydroxy-2-methoxy-3,6-dimethylphenyl)ethanone, 205  
[97871-70-0] 1-(4-Hydroxy-3-nitrosophenyl)ethanone, 39  
[98619-07-9] 1-(2-Fluoro-4-hydroxyphenyl)ethanone, 33  
[99217-72-8] 1-[2-Hydroxy-4-(methoxymethoxy)-5-(3-methyl-2-butenyl)phenyl]ethanone, 339  
[99283-88-2] 1-[2-Hydroxy-4-(octadecyloxy)phenyl]ethanone, 411  
[99370-47-5] 1-[2-Hydroxy-4-(2-propenyloxy)-3-propylphenyl]ethanone, 309  
[99370-48-6] 1-[2,4-Dihydroxy-5-(2-propenyl)-3-propylphenyl]ethanone, 308  
[99453-85-7] 1-[4-[(5-Bromopentyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 353  
[99892-62-3] 1-(3-Hydroxy-2,4,5-trimethylphenyl)ethanone, 198  
[99892-63-4] 1-(3-Hydroxy-2,4-dimethylphenyl)ethanone, 147  
[100245-06-5] 1-[5-(1,1-Dimethylethyl)-2-hydroxy-3-nitrophenyl]ethanone, 237  
[100612-87-1] 1-[3-Hydroxy-4,6-dimethoxy-2-(2-propenyl)phenyl]ethanone, 274

- [101002-29-3] 1-[2-Hydroxy-4-(pentyloxy)phenyl]ethanone, 287  
 [101002-31-7] 1-(4-Butoxy-5-hexyl-2-hydroxyphenyl)ethanone, 382  
 [101140-07-2] 1-[3-(Benzoyloxy)-4-hydroxyphenyl]ethanone, 326  
 [101140-09-4] 1-[3-Hydroxy-4-[(2-methoxyethoxy)methoxy]phenyl]ethanone, 262  
 [101140-11-8] 1-[4-Hydroxy-3-[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-glucopyranosyl)oxy]phenyl]-ethanone (*Tetraacetylpungenin*), 399  
 [101161-93-7] 1-[3,5-Bis(diphenylmethyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone, 415  
 [101161-94-8] 1-[3-(Diphenylmethyl)-2,4-dihydroxy-6-methoxyphenyl]ethanone, 395  
 [101161-95-9] 1-[3-(Diphenylmethyl)-4,6-dihydroxy-2-methoxyphenyl]ethanone, 395  
 [101161-96-0] 1-[3-(Diphenylmethyl)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 402  
 [101161-97-1] 1-[3-(Diphenylmethyl)-6-hydroxy-2,4-dimethoxyphenyl]ethanone, 402  
 [102056-82-6] 1-[2,4-Dihydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxyphenyl]-ethanone, 349  
 [102056-83-7] 1-[2-Hydroxy-3-[(2-hydroxyphenyl)methyl]-6-methoxy-4-(phenylmethoxy)-phenyl]ethanone, 403  
 [102104-05-2] 1-[2-Hydroxy-6-methoxy-4-(phenylmethoxy)-3-[[2-(phenylmethoxy)-phenyl]methyl]phenyl]ethanone, 413  
 [102297-89-2] 1-(5-Chloro-2,4-dihydroxy-3-iodophenyl)ethanone, 13  
 [102624-59-9] 1-(3-Chloro-2,6-dihydroxy-5-propylphenyl)ethanone, 188  
 [102624-71-5] 1-(3-Fluoro-2,6-dihydroxy-5-propylphenyl)ethanone, 190  
 [102877-53-2] 1-(2-Hydroxy-4-methoxy-5-nitrophenyl)ethanone, 91  
 [103323-22-4] 1-(3-Ethyl-2-hydroxyphenyl)ethanone, 143  
 [103440-57-9] 1-(2-Hydroxy-3-iodo-6-methoxyphenyl)ethanone, 86  
 [103440-59-1] 1-(4-Hydroxy-3-iodo-5-methoxyphenyl)ethanone, 86  
 [103633-31-4] 1-[2,4-Dihydroxy-6-methoxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]-ethanone, 403  
 [103633-32-5] 1-[4,6-Dihydroxy-2-methoxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]-ethanone, 403  
 [103633-36-9] 1-[2,4-Dihydroxy-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]-ethanone, 395  
 [103633-37-0] 1-[2,4-Dihydroxy-5-[[2-(phenylmethoxy)phenyl]methyl]phenyl]-ethanone, 395  
 [103633-38-1] 1-[2,4-Dihydroxy-3-(2-hydroxyphenyl)methyl]phenyl]ethanone, 333  
 [103633-39-2] 1-[2-Hydroxy-4-methoxy-3-[(2-methoxyphenyl)methyl]phenyl]-ethanone, 360  
 [103633-40-5] 1-[2-Hydroxy-4-(phenylmethoxy)-3-[[2-(phenylmethoxy)phenyl]methyl]-phenyl]ethanone, 412  
 [103633-43-8] 1-[2-Hydroxy-4-(phenylmethoxy)-5-[[2-(phenylmethoxy)phenyl]methyl]-phenyl]ethanone, 412  
 [103633-46-1] 1-[2-Hydroxy-4-[[2-(phenylmethoxy)phenyl]methoxy]-3-[[2-(phenylmethoxy)phenyl]methyl]phenyl]ethanone, 415  
 [103653-14-1] 1-(3-Bromo-4-hydroxy-5-methoxyphenyl)ethanone, 75  
 [103777-42-0] 1-(4,6-Dihydroxy-2,3-dimethoxyphenyl)ethanone, 174  
 [103777-43-1] 1-[4-(Dodecyloxy)-6-hydroxy-2,3-dimethoxyphenyl]ethanone, 401  
 [103777-44-2] 1-[4-(Dodecyloxy)-2-hydroxy-3,6-dimethoxyphenyl]ethanone, 401  
 [103777-45-3] 1-(3-Hydroxy-2,4,6-trimethoxyphenyl)ethanone, 217  
 [103777-47-5] 1-[3-(Dodecyloxy)-2-hydroxy-4,6-dimethoxyphenyl]ethanone, 400  
 [103867-84-1] 1-[2-Hydroxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 232  
 [103867-85-2] 1-[2-Hydroxy-5-methoxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]-ethanone, 276  
 [103867-86-3] 1-[2-Hydroxy-6-methoxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]-ethanone, 276  
 [103867-87-4] 1-[2-Hydroxy-5-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 232  
 [103867-88-5] 1-[4-Hydroxy-3-(2-methyl-1,3-dioxolan-2-yl)phenyl]ethanone, 232  
 [104074-07-9] 1-[4-(2-Chloroethoxy)-2-hydroxy-3-propylphenyl]ethanone, 278  
 [104174-27-8] 1-(4-Hydroxy-2-propylphenyl)ethanone, 197  
 [104175-18-0] 1-[2-Hydroxy-3-(1-methylethyl)phenyl]ethanone, 195

- [104481-00-7] 1-[6-Hydroxy-2,4-dimethoxy-3-(methoxymethoxy)phenyl]ethanone, 262  
[104654-33-3] 1-[3,6-Bis(acetyloxy)-2-hydroxyphenyl]ethanone, 222  
[104676-26-8] 1-[2-Hydroxy-5-[1-(4-hydroxyphenyl)-1-methylethyl]phenyl]ethanone, 359  
[105277-74-5] 1-[2-(3-Chloropropoxy)-6-hydroxyphenyl]ethanone, 188  
[105337-34-6] 1-[2-Hydroxy-6-methyl-3-(1-methylethyl)phenyl]ethanone, 244  
[105337-35-7] 1-[6-Hydroxy-2-methyl-3-(1-methylethyl)phenyl]ethanone, 247  
[105340-27-0] 1-[3-Bromo-5-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 234  
[105342-70-9] 1-(3-Ethoxy-2,6-dihydroxy-4-methoxyphenyl)ethanone, 215  
[105342-72-1] 1-(3,6-Diethoxy-2-hydroxy-4-methoxyphenyl)ethanone, 290  
[105485-44-7] 1-[2,3,4-Trihydroxy-5-(phenylmethyl)phenyl]ethanone, 335  
[105485-45-8] 1-[2-Hydroxy-4-(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone, 394  
[105485-46-9] 1-[2-Hydroxy-3,4-bis(phenylmethoxy)-5-(phenylmethyl)phenyl]ethanone, 411  
[105485-47-0] 1-[2-Hydroxy-4-(phenylmethoxy)-3,5-bis(phenylmethyl)phenyl]ethanone, 411  
[105485-48-1] 1-[2-Hydroxy-4-(phenylmethoxy)-5-(phenylmethyl)phenyl]ethanone, 394  
[105485-57-2] 1-[2-Hydroxy-3,4-dimethoxy-5-(phenylmethyl)phenyl]ethanone, 360  
[105533-69-5] 1-(4-Chloro-5-fluoro-2-hydroxyphenyl)ethanone, 12  
[106627-20-7] 1-[2-Hydroxy-4-[(6-hydroxyhexyl)oxy]-3-propylphenyl]ethanone, 369  
[106627-33-2] 1-[4-[(7-Bromoheptyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 382  
[106627-34-3] 1-[4-[(8-Bromooctyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 387  
[106627-35-4] 1-[4-[(10-Bromodecyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 392  
[106627-36-5] 1-[4-[(12-Bromododecyl)oxy]-2-hydroxy-3-propylphenyl]ethanone, 408  
[106627-41-2] 1-(3,6-Dihydroxy-2-propylphenyl)ethanone, 202  
[106929-57-1] 1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3-methylphenyl]ethanone, 293  
[106987-29-5] 1-[4-(Acetyloxy)-2-hydroxy-3,5-di-2-propenylphenyl]ethanone, 351  
[107070-69-9] 1-[4-(Dimethylamino)-2-hydroxyphenyl]ethanone, 175  
[107114-29-4] 1-[3,5-Bis(diphenylmethyl)-2,4-dihydroxyphenyl]ethanone, 414  
[107114-31-8] 1-[3,5-Bis(diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 415  
[107114-32-9] 1-[3-(Diphenylmethyl)-2,4-dihydroxyphenyl]ethanone, 391  
[107114-34-1] 1-[3-(Diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 393  
[107114-35-2] 1-[5-(Diphenylmethyl)-2,4-dihydroxyphenyl]ethanone, 391  
[107114-37-4] 1-[5-(Diphenylmethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 394  
[107188-26-1] 1-[5-(Acetyloxy)-4-(1,1-dimethylethyl)-2-hydroxyphenyl]ethanone, 310  
[107188-54-5] 1-[5-(Acetyloxy)-2-hydroxy-4-(1,1,3,3-tetramethylbutyl)phenyl]ethanone, 381  
[107223-42-7] 1-[4-(Chloromethyl)-2-hydroxyphenyl]ethanone, 80  
[107223-43-8] 1-[3-Butyl-4-(chloromethyl)-2-hydroxyphenyl]ethanone, 278  
[107724-60-7] 1-[3-Bromo-5-(chloromethyl)-4-hydroxyphenyl]ethanone, 67  
[108129-55-1] 1-(5-Amino-2-hydroxy-3-nitrophenyl)ethanone, 46  
[108293-73-8] 1-[2-Hydroxy-5-methyl-3-(2-propenyl)phenyl]ethanone, 224  
[108909-47-3] 1-(5-Hydroxy-3,4'-dimethyl[1,1'-biphenyl]-2-yl)ethanone, 344  
[108909-48-4] 1-[4'-(Dimethylamino)-5-hydroxy-3-methyl[1,1'-biphenyl]-2-yl]ethanone, 364  
[109311-05-9] 1-[4-(Benzoyloxy)-2-hydroxyphenyl]ethanone, 326  
[109314-52-5] 1-[3-(Aminomethyl)-5-bromo-4-hydroxyphenyl]ethanone, 93  
[109661-95-2] 1-[4-(Ethenyloxy)-2-hydroxyphenyl]ethanone, 130  
[109661-96-3] 1-[4-(2-Chloroethoxy)-2-hydroxyphenyl]ethanone, 138  
[110906-84-8] 1-[3-( $\beta$ -D-Glucopyranosyloxy)-2,4,6-trihydroxyphenyl]ethanone (*Polygoacetophenoside*), 316  
[111224-13-6] 1-(3-Ethyl-2,4-dihydroxyphenyl)ethanone, 153  
[111224-14-7] 1-(2,4-Dihydroxy-3-pentylphenyl)ethanone, 285  
[111841-07-7] 1-[2-Hydroxy-4-[(tetrahydro-2H-pyran-2-yl)oxy]phenyl]ethanone, 274  
[112747-62-3] 1-(3-Bromo-2-hydroxy-4,5-dimethylphenyl)ethanone, 133  
[112954-19-5] 1-(2-Chloro-6-hydroxy-4-methoxyphenyl)ethanone, 81  
[113027-08-0] 1-[4-(1,1-Dimethylethyl)-2-hydroxyphenyl]ethanone, 240  
[114012-82-7] 1-(3-Hydroxy-4,5-dimethoxyphenyl)ethanone, 168

- [114412-47-4] 1-(4-Hydroxy-4'-methoxy[1,1'-biphenyl]-3-yl)ethanone, 331  
 [115130-46-6] 1-[2-Hydroxy-4,6-dimethoxy-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]-phenyl]ethanone, 416  
 [115436-75-4] 1-[3-(Acetyloxy)-4-hydroxyphenyl]ethanone, 131  
 [115349-97-8] 1-[2-(Ethylamino)-5-[1-(ethylimino)ethyl]-4-hydroxyphenyl]ethanone, 318  
 [115851-77-9] 1-(2-Hydroxy-5-nonylphenyl)ethanone, 368  
 [116265-99-7] 1-(5-Chloro-2-hydroxy-4-methoxyphenyl)ethanone, 83  
 [116296-35-6] 1-(3-Chloro-4-hydroxy-5-methoxyphenyl)ethanone, 82  
 [116313-84-9] 1-(3,4-Dihydroxy-5-nitrophenyl)ethanone, 43  
 [116465-22-6] 1-(3-Bromo-2,4-dihydroxy-5-nitrophenyl)ethanone, 8  
 [116964-03-5] 1-[2-( $\beta$ -D-Glucopyranosyloxy)-3,4,6-trihydroxyphenyl]ethanone (*Lalioside*), 316  
 [117156-76-0] 1-[2-(Acetyloxy)-6-hydroxy-3,5-di-2-propenylphenyl]ethanone, 350  
 [117156-86-2] 1-[2-Hydroxy-4-methoxy-3-(2-propenyl)phenyl]ethanone, 227  
 [117690-46-7] 1-[2-Hydroxy-4-(octyloxy)-5-(2-propenyl)phenyl]ethanone, 387  
 [117690-47-8] 1-[4-(Hexyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 366  
 [117690-48-9] 1-[4-Butoxy-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 338  
 [117690-49-0] 1-[2-Hydroxy-4-(pentyloxy)-5-(2-propenyl)phenyl]ethanone, 351  
 [117690-52-5] 1-[2-Hydroxy-4-(4-hydroxybutoxy)-5-(2-propenyl)phenyl]ethanone, 339  
 [117690-53-6] 1-[4-(3-Butenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 337  
 [117690-54-7] 1-[4-(5-Hexenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 365  
 [117690-55-8] 1-[2-Hydroxy-4-(phenylmethoxy)-5-(2-propenyl)phenyl]ethanone, 370  
 [117690-76-3] 1-[5-Ethyl-2-hydroxy-4-[[6-(methylsulfonyl)hexyl]oxy]phenyl]-ethanone, 369  
 [117690-80-9] 1-[4-[(5-Bromopentyl)oxy]-5-ethyl-2-hydroxyphenyl]ethanone, 341  
 [117705-59-6] 1-[4-Hydroxy-2-methoxy-5-(2-propenyl)phenyl]ethanone, 228  
 [117705-66-5] 1-[2,4-Dihydroxy-5-(hydroxymethyl)phenyl]ethanone, 114  
 [117705-90-5] 1-[4-[(5-Aminopentyl)oxy]-5-ethyl-2-hydroxyphenyl]ethanone, 342  
 [117706-02-2] 1-[2-Hydroxy-4-[(6-hydroxy-6-methylheptyl)oxy]-5-(2-propenyl)phenyl]-ethanone, 387  
 [117706-26-0] 1-[4-(3-Azidopropoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 279  
 [117706-27-1] 1-[4-(2-Azidoethoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 238  
 [117706-32-8] 1-[4-[4-(Dimethylamino)butoxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone (*Hydrochloride*), 367  
 [117706-34-0] 1-[2-Hydroxy-4-[[6-(methylthio)hexyl]oxy]-5-(2-propenyl)phenyl]-ethanone, 381  
 [117706-35-1] 1-[2-Hydroxy-4-[[6-(methylsulfinyl)hexyl]oxy]-5-(2-propenyl)phenyl]-ethanone, 382  
 [117706-36-2] 1-[2-Hydroxy-4-[[6-(methylsulfonyl)hexyl]oxy]-5-(2-propenyl)phenyl]-ethanone, 382  
 [117706-37-3] 1-[5-Ethyl-2-hydroxy-4-[[6-(methylthio)hexyl]oxy]phenyl]ethanone, 368  
 [117706-38-4] 1-[5-Ethyl-2-hydroxy-4-[[6-(methylsulfinyl)hexyl]oxy]phenyl]-ethanone, 369  
 [117706-39-5] 1-[4-[(10-Bromodecyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 391  
 [117706-40-8] 1-[4-[(7-Bromoheptyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 380  
 [117706-41-9] 1-[4-[(6-Bromohexyl)oxy]-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 365  
 [117706-42-0] 1-[4-(4-Bromobutoxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 337  
 [117706-45-3] 1-[2-Hydroxy-4-[(3-methylphenyl)methoxy]-5-(2-propenyl)phenyl]-ethanone, 383  
 [117706-46-4] 1-[4-[[4-(Bromomethyl)phenyl]methoxy]-2-hydroxy-5-(2-propenyl)phenyl]-ethanone, 383  
 [117706-47-5] 1-[2-Hydroxy-4-(3-phenylpropoxy)-5-propylphenyl]ethanone, 388  
 [117706-48-6] 1-[5-Ethyl-4-[(3-fluorophenyl)methoxy]-2-hydroxyphenyl]ethanone, 358  
 [117706-49-7] 1-[4-[(3-Chlorophenyl)methoxy]-5-ethyl-2-hydroxyphenyl]ethanone, 358  
 [117706-50-0] 1-[4-(5-Hexenyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 365  
 [117706-51-1] 1-[5-Ethyl-2-hydroxy-4-[[3-(trifluoromethyl)phenyl]methoxy]phenyl]-ethanone, 370

- [117706-52-2] 1-[5-Ethyl-2-hydroxy-4-[[3-(methylthio)phenyl]methoxy]phenyl]-ethanone, 373
- [117706-54-4] 1-[4-(2-Bromoethoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 234
- [117706-55-5] 1-[4-(3-Bromopropoxy)-5-ethyl-2-hydroxyphenyl]ethanone, 277
- [117706-56-6] 1-[4-(Heptyloxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 381
- [117713-79-8] 1-[2-Hydroxy-4-methoxy-5-(2-propenyl)phenyl]ethanone, 227
- [117902-12-2] 1-(3-Fluoro-6-hydroxy-2-methoxyphenyl)ethanone, 84
- [117902-13-3] 1-(3-Fluoro-2-hydroxy-6-methoxyphenyl)ethanone, 84
- [117902-14-4] 1-(3-Fluoro-2,6-dihydroxyphenyl)ethanone, 35
- [118062-86-5] 1-[2,4,6-Trihydroxy-3-(2-propenyl)phenyl]ethanone, 185
- [118078-21-0] 1-(2-Hydroxy-3,4,5,6-tetramethylphenyl)ethanone, 249
- [118469-76-4] 1-(2-Hydroxy-5-tetradecylphenyl)ethanone, 400
- [118604-45-8] 1-[2,4-Dihydroxy-3-(1-methylethyl)phenyl]ethanone, 200
- [118683-88-8] 1-[2-Hydroxy-4-[(2-methyl-2-propenyl)oxy]phenyl]ethanone, 229
- [118683-89-9] 1-[2,4-Dihydroxy-3-(2-methyl-2-propenyl)phenyl]ethanone, 226
- [118684-00-7] 1-[2-Amino-4-hydroxy-3-(2-propenyl)phenyl]ethanone, 190
- [118684-26-7] 1-[2-Hydroxy-4-(propylamino)phenyl]ethanone, 221
- [118824-02-5] 1-(2,4-Dihydroxy-3-methyl-5-nitrophenyl)ethanone, 90
- [118824-97-8] 1-(4-Hydroxy-2-methoxy-3-methylphenyl)ethanone, 158
- [118824-98-9] 1-(4-Hydroxy-2-methoxy-3-methyl-5-nitrophenyl)ethanone, 142
- [119136-15-1] 1-[2-Hydroxy-6-methoxy-4-(1-methylethoxy)phenyl]ethanone, 258
- [119136-16-2] 1-[3,6-Dihydroxy-2-methoxy-4-(1-methylethoxy)phenyl]ethanone, 260
- [119136-17-3] 1-[6-Hydroxy-2,3-dimethoxy-4-(1-methylethoxy)phenyl]ethanone, 291
- [119257-53-3] 1-(5-Fluoro-2,4-dihydroxy-3-propylphenyl)ethanone, 190
- [119892-31-8] 1-(2,3-Dihydroxy-4,5-dimethoxyphenyl)ethanone, 172
- [119994-02-4] 1-(4-Fluoro-2-hydroxy-5-nitrophenyl)ethanone, 18
- [120034-10-8] 1-[3-Chloro-5-(1,1-dimethylethyl)-2,6-dihydroxyphenyl]ethanone, 236
- [121379-44-0] 1-[2-(3,7-Dimethyl-2,6-octadienyl)-4-hydroxy-6-methoxyphenyl]-ethanone, 385
- [121379-45-1] 1-[2,4-Dihydroxy-6-(4-hydroxybutoxy)phenyl]ethanone, 260
- [122379-44-6] 1-[2-Hydroxy-4-(2-phenylethyl)phenyl]ethanone, 344
- [123253-31-6] 1-[2-Hydroxy-4-[(2-methoxyethoxy)methoxy]phenyl]ethanone, 262
- [123614-13-1] 1-[4-Hydroxy-3-(4-hydroxy-3-methyl-2-butenyl)phenyl]ethanone (Z), 271
- [123999-38-2] 1-[2,4-Dihydroxy-6-methoxy-3,5-bis(3-methyl-2-butenyl)phenyl]-ethanone, 386
- [125249-30-1] 1-(6-Hydroxy-2,4-dimethyl-3-nitrophenyl)ethanone, 141
- [125617-25-6] 1-[5-(3-Bromopropoxy)-2-hydroxy-3-propylphenyl]ethanone, 317
- [125617-43-8] 1-[4-[(3-Bromopropyl)thio]-2-hydroxy-3-propylphenyl]ethanone, 317
- [125617-44-9] 1-[4-[(5-Bromopentyl)thio]-2-hydroxy-3-propylphenyl]ethanone, 352
- [126259-76-5] 1-[2-[(3,7-Dimethyl-2,6-octadienyl)oxy]-4,6-dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone (E), 406
- [126405-75-2] 1-[2-Hydroxy-3-methoxy-6-(phenylmethoxy)phenyl]ethanone, 347
- [126405-76-3] 1-(3-Ethoxy-2-hydroxy-6-methoxyphenyl)ethanone, 208
- [126405-77-4] 1-(2-Hydroxy-6-methoxy-3-propoxyphenyl)ethanone, 259
- [126405-78-5] 1-[2-Hydroxy-6-methoxy-3-(2-propenyl)oxy]phenyl]ethanone, 231
- [126405-79-6] 1-[2-Hydroxy-6-methoxy-3-(phenylmethoxy)phenyl]ethanone, 348
- [126405-80-9] 1-[3-(Cyclohexyloxy)-2-hydroxy-6-methoxyphenyl]ethanone, 338
- [126405-81-0] 1-[2-Hydroxy-6-methoxy-3-(methylthio)phenyl]ethanone, 160
- [126405-82-1] 1-[3-(Ethylthio)-2-hydroxy-6-methoxyphenyl]ethanone, 206
- [126570-32-9] 1-[5-(Acetyloxy)-2-hydroxy-4-methylphenyl]ethanone, 183
- [126570-37-4] 1-[5-Hydroxy-2-methyl-4-(1-methylethyl)phenyl]ethanone, 246
- [126712-08-1] 1-(3,4,6-Trichloro-2-hydroxyphenyl)ethanone, 4
- [126893-27-4] 1-(2-Amino-5-hydroxy-3-methoxyphenyl)ethanone, 125
- [127313-62-6] 1-[2-Hydroxy-5-(sec-octyloxy)phenyl]ethanone, 356
- [127313-63-7] 1-[2-Hydroxy-4-(sec-octyloxy)phenyl]ethanone, 356
- [127313-67-1] 1-[2-Hydroxy-4-(isooctyloxy)phenyl]ethanone, 356
- [127371-46-4] 1-[5-(1,1-Dimethylethyl)-2-hydroxy-4-methoxyphenyl]ethanone, 286

- [127371-47-5] 1-[3-Bromo-5-(1,1-dimethylethyl)-2-hydroxy-4-methoxyphenyl]-ethanone, 277
- [127701-70-6] 1-(5-Hydroxy-2,3-dimethylphenyl)ethanone, 149
- [127870-07-9] 1-[3,6-Dihydroxy-2-(2-methyl-2-propenyl)phenyl]ethanone, 226
- [127923-55-1] 1-(3-Bromo-4-hydroxy-5-methylphenyl)ethanone, 74
- [127940-12-9] 1-(2,3-Dihydroxy-4-methoxy-6-methylphenyl)ethanone, 160
- [128546-82-7] 1-(4-Ethyl-2-hydroxy-6-methoxyphenyl)ethanone, 204
- [129375-13-9] 1-[3-(1,1-Dimethylethyl)-2-hydroxy-6-methyl-5-(1-methylethyl)phenyl]-ethanone, 354
- [129399-54-8] 1-(2,6-Dihydroxy-4-methoxy-3,5-dimethylphenyl)ethanone (*Mallophenone*), 207
- [130435-29-9] 1-(3-Chloro-2,4,6-trihydroxyphenyl)ethanone, 33
- [130471-75-9] 1-[4-(Benzoyloxy)-2,6-dihydroxyphenyl]ethanone, 327
- [130600-90-7] 1-[2-Hydroxy-4,6-bis[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 380
- [131303-37-2] 1-[2-Hydroxy-4,6-bis(methoxymethoxy)-3,5-bis(3-methyl-2-butenyl)phenyl]ethanone, 400
- [131359-44-9] 1-(5-Bromo-4-ethoxy-2-hydroxyphenyl)ethanone, 134
- [131845-25-5] 1-(5'-Ethyl-4-hydroxy-2'-methoxy-[1,1'-biphenyl]-3-yl)ethanone, 359
- [133186-55-7] 1-(3,5-Difluoro-4-hydroxyphenyl)ethanone, 18
- [133393-99-4] 1-[4-Hydroxy-3-methoxy-5-(1-methylethyl)phenyl]ethanone, 253
- [134255-78-0] 1-(2-Hydroxy-3,5-dimethoxy-4-methylphenyl)ethanone, 210
- [134255-79-1] 1-(2-Hydroxy-4,5-dimethoxy-3-methylphenyl)ethanone, 210
- [134700-74-6] 1-(3-Bromo-2-hydroxy-4-methoxy-5-nitrophenyl)ethanone, 68
- [134716-11-3] 1-(3-Bromo-4-ethoxy-2-hydroxy-5-nitrophenyl)ethanone, 128
- [135936-88-8] 1-[2-Hydroxy-5-(methylthio)phenyl]ethanone, 101
- [136257-82-4] 1-[2,4,6-Trihydroxy-3,5-bis(tetrahydro-2*H*-pyran-2-yl)phenyl]ethanone, 380
- [136257-83-5] 1-[2,4-Dihydroxy-3-(tetrahydro-2*H*-pyran-2-yl)-6-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 379
- [136257-85-7] 1-[2,6-Dihydroxy-4-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 275
- [136257-86-8] 1-[2,4-Dihydroxy-6-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]ethanone, 275
- [136258-09-8] 1-[2-Hydroxy-4-methoxy-6-[(tetrahydro-2*H*-pyran-2-yl)oxy]phenyl]-ethanone, 312
- [136258-10-1] 1-[2,6-Dihydroxy-4-methoxy-3-(tetrahydro-2*H*-pyran-2-yl)phenyl]-ethanone, 312
- [136450-03-8] 1-(3-Amino-2-hydroxyphenyl)ethanone (*Hydrobromide*), 63
- [136608-20-3] 1-[2-Hydroxy-5-(2-phenylethyl)phenyl]ethanone, 344
- [136819-93-7] 1-(3-Hydroxy[1,1'-biphenyl]-2-yl)ethanone, 298
- [137170-49-1] 1-[2-Hydroxy-4-(phenylmethoxy)-3-(2-propenyl)phenyl]ethanone, 370
- [138151-67-4] 1-(5-Ethoxy-3-hydroxy-2-methyl [1,1'-biphenyl]-4-yl)ethanone, 359
- [139140-13-9] 1-[4-[[1,1-Dimethylethyl]dimethylsilyl]oxy]-2,6-dihydroxyphenyl]-ethanone, 323
- [139545-92-9] 1-[2-Hydroxy-6-methoxy-4-[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-glucopyranosyl)-oxy]phenyl]ethanone, 405
- [140155-06-2] 1-(4-Chloro-2-hydroxy-6-methoxyphenyl)ethanone, 83
- [140660-31-7] 1-[5-(1,1-Dimethylethyl)-2,4-dihydroxyphenyl]ethanone, 252
- [140660-34-0] 1-(5-Ethyl-2,4-dihydroxy-3-methylphenyl)ethanone, 203
- [140660-35-1] 1-[4-[(5-Bromopentyl)oxy]-5-ethyl-2-hydroxy-3-methylphenyl]-ethanone, 352
- [140660-37-3] 1-[4-(4-Azidobutoxy)-2-hydroxy-5-(2-propenyl)phenyl]ethanone, 338
- [140675-42-9] 1-(3,5-Difluoro-2-hydroxyphenyl)ethanone, 18
- [141215-43-2] 1-[2-Hydroxy-6-methoxy-3-(3-methyl-1,3-butadienyl)phenyl]ethanone (*Z*), 304
- [142045-74-7] 1-[2,3,4-Trihydroxy-5-[(4-hydroxy-3,5-dimethylphenyl)methyl]phenyl]-ethanone, 364
- [142608-87-5] 1-[2-Hydroxy-4-methoxy-5-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 311
- [142905-38-2] 1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-2,6-dihydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone (*E*), 407



- [142905-39-3] 1-[2-[(3,7-Dimethyl-2,6-octadienyl)oxy]-4,6-dihydroxyphenyl]ethanone  
(*E*), 378
- [142905-40-6] 1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-2,6-dihydroxyphenyl]ethanone  
(*E*), 378
- [143286-85-5] 1-[4-(Hexyloxy)-2-hydroxyphenyl]ethanone, 320
- [143286-86-6] 1-[4-(Decyloxy)-2-hydroxyphenyl]ethanone, 383
- [143286-87-7] 1-[4-(Hexadecyloxy)-2-hydroxyphenyl]ethanone, 409
- [144152-29-4] 1-[2-(Acetyloxy)-5-hydroxyphenyl]ethanone, 130
- [144152-30-7] 1-[2-(Acetyloxy)-5-hydroxy-4-methoxyphenyl]ethanone, 185
- [144152-31-8] 1-[2,3-Bis(acetyloxy)-4-hydroxyphenyl]ethanone, 221
- [144224-86-2] 1-[4-(Acetyloxy)-2-hydroxy-3-methylphenyl]ethanone, 182
- [144224-87-3] 1-[3-(Acetyloxy)-2-hydroxyphenyl]ethanone, 131
- [144406-93-9] 1-[2-(Benzoyloxy)-4-hydroxyphenyl]ethanone, 325
- [144691-35-0] 1-(2-Hydroxy-3-iodo-4-phenoxyphenyl)ethanone, 297
- [144691-36-1] 1-[2-Hydroxy-5-iodo-4-phenoxy-3-(2-propenyl)phenyl]ethanone, 357
- [145194-40-7] 1-[4-( $\beta$ -D-Glucopyranosyloxy)-2-hydroxy-6-methoxy-3-methylphenyl]-  
ethanone, 352
- [145300-04-5] 1-(2-Fluoro-5-hydroxyphenyl)ethanone, 33
- [145489-48-1] 1-(5-Bromo-2-hydroxy-3-iodo-4-phenoxyphenyl)ethanone, 294
- [145489-93-6] 1-(2-Hydroxy-3-iodo-5-nitro-4-phenoxyphenyl)ethanone, 295
- [145666-17-7] 1-(3,5-Dibromo-2-hydroxy-4-methylphenyl)ethanone, 69
- [145666-18-8] 1-(3,4-Dibromo-2-hydroxyphenyl)ethanone, 9
- [145666-19-9] 1-(3,4,5-Tribromo-2-hydroxyphenyl)ethanone, 4
- [145723-28-0] 1-[2-(Acetyloxy)-3-hydroxyphenyl]ethanone, 130
- [145746-54-9] 1-[3,6-Dihydroxy-2-(phenylsulfonyl)phenyl]ethanone, 301
- [145747-37-1] 1-[2-(Acetyloxy)-3-(diphenylmethyl)-4-hydroxyphenyl]ethanone, 401
- [145747-38-2] 1-[2-(Acetyloxy)-5-(diphenylmethyl)-4-hydroxyphenyl]ethanone, 401
- [145747-39-3] 1-[2-(Acetyloxy)-3,5-bis(diphenylmethyl)-4-hydroxyphenyl]ethanone, 415
- [145747-40-6] 1-[2,6-Bis(acetyloxy)-4-hydroxy-3-[(4-methoxyphenyl)methyl]phenyl]-  
ethanone, 388
- [145797-51-9] 1-(2,3,5,6-Tetrafluoro-4-hydroxyphenyl)ethanone, 3
- [146575-61-3] 1-[2-Hydroxy-5-(phenylsulfonyl)phenyl]ethanone, 301
- [146575-64-6] 1-[2-Hydroxy-5-(trifluoromethoxy)phenyl]ethanone, 67
- [146954-92-9] 1-[5-(3,7-Dimethyl-2,6-octadienyl)-2,4-dihydroxyphenyl]ethanone, 375
- [147816-49-7] 1-[5-[[4-(Acetyloxy)phenyl]sulfonyl]-2-hydroxyphenyl]ethanone, 343
- [147816-50-0] 1-[2-Hydroxy-5-[(4-hydroxyphenyl)sulfonyl]phenyl]ethanone, 302
- [147816-51-1] 1-[2-Hydroxy-5-[(4-methylphenyl)sulfonyl]phenyl]ethanone, 336
- [147904-71-0] 1-[4-Hydroxy-2-[(4-hydroxy-3-methoxyphenyl)methyl]-3,5-dimethoxy-  
phenyl]ethanone, 373
- [147904-74-3] 1-[4-Hydroxy-2-[(4-hydroxy-3,5-dimethoxyphenyl)methyl]-3,5-dimethoxy-  
phenyl]ethanone, 385
- [148204-58-4] 1-(3,5-Dihydroxy-4-methoxyphenyl)ethanone, 119
- [148254-30-2] 1-(4-Chloro-2-fluoro-5-hydroxyphenyl)ethanone, 12
- [149105-11-3] 1-[4-Hydroxy-3-(trifluoromethyl)phenyl]ethanone, 66
- [149454-53-5] 1-[2-Hydroxy-4-(2-hydroxybutoxy)phenyl]ethanone, 257
- [149454-57-9] 1-[2-Hydroxy-4-(2-hydroxypropoxy)phenyl]ethanone, 212
- [149475-52-5] 1-[2-( $\beta$ -D-Glucopyranosyloxy)-5-hydroxyphenyl]ethanone  
(*Bungeiside A*), 314
- [149475-54-7] 1-[2-Hydroxy-4-[(6-O- $\beta$ -xylopyranosyl- $\beta$ -D-glucopyranosyl)oxy]-  
phenyl]ethanone (*Bungeiside D*), 387
- [149561-88-6] 1-[2-( $\beta$ -D-Glucopyranosyloxy)-4-hydroxyphenyl]ethanone  
(*Cyanoneside B*; *Bungeiside B*), 314
- [149810-09-3] 1-[4-(Acetyloxy)-2-hydroxy-3-iodophenyl]ethanone, 128
- [149810-10-6] 1-[4-(Acetyloxy)-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 266
- [149876-26-6] 1-[2,3,4-Trihydroxy-6-(3-methyl-2-butenyl)phenyl]ethanone, 275
- [150313-75-0] 1-[4-Hydroxy-3-(1-methylpropyl)-5-nitrophenyl]ethanone, 238
- [151027-43-9] 1-(4-Hydroxy-2-methoxy-3-propylphenyl)ethanone, 254

- [151148-87-9] 1-[2,5-Dihydroxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 397  
 [151340-06-6] 1-(2-Chloro-4-hydroxy-3-methoxyphenyl)ethanone, 81  
 [151719-65-2] 1-[4-(3-Chloropropoxy)-3-hydroxyphenyl]ethanone, 188  
 [152810-05-4] 1-[2-Hydroxy-5-(1-methylethoxy)phenyl]ethanone, 205  
 [152810-06-5] 1-(5-Butoxy-2-hydroxyphenyl)ethanone, 249  
 [153356-01-5] 1-[3-Chloro-5-(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone, 235  
 [153356-02-6] 1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-iodophenyl]ethanone, 236  
 [153356-03-7] 1-[3-(1,1-Dimethylethyl)-5-fluoro-4-hydroxyphenyl]ethanone, 236  
 [153356-04-8] 1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-nitrophenyl]ethanone, 236  
 [153356-09-3] 1-[3-(1,1-Dimethylethyl)-4-hydroxy-5-methoxyphenyl]ethanone, 286  
 [153356-10-6] 1-[3-Bromo-5-(1,1-dimethylethyl)-4-hydroxyphenyl]ethanone, 234  
 [153399-38-3] 1-[4,6-Dihydroxy-3-(3-methyl-2-butenyl)-2-[(3-methyl-2-butenyl)oxy]-phenyl]ethanone, 377  
 [153399-41-8] 1-[4,6-Dihydroxy-3-(3-hydroxy-3-methylbutyl)-2-methoxyphenyl]-ethanone, 322  
 [153404-65-0] 1-(3-Amino-5-chloro-2-hydroxyphenyl)ethanone (*Hydrochloride*), 45  
 [154389-63-6] 1-[2-Hydroxy-4,6-dimethoxy-3-(methylthio)phenyl]ethanone, 213  
 [154520-54-4] 1-[3-Hydroxy-2-(3-methyl-2-butenyl)phenyl]ethanone, 267  
 [154603-69-7] 1-[3-(Azidomethyl)-4-hydroxyphenyl]ethanone, 93  
 [154638-85-4] 1-(2,3-Dichloro-4-hydroxy-5-methoxyphenyl)ethanone, 71  
 [154638-86-5] 1-(3-Chloro-4,5-dihydroxyphenyl)ethanone, 32  
 [154638-87-6] 1-(2,3,6-Trichloro-4,5-dihydroxyphenyl)ethanone, 5  
 [155818-27-2] 1-(3-Bromo-2,4,6-trihydroxyphenyl)ethanone, 27  
 [155982-91-5] 1-[2-(1,1-Dimethylethyl)-4-hydroxyphenyl]ethanone, 239  
 [156483-08-8] 1-(4-Hydroxy-2,3,6-trimethylphenyl)ethanone, 199  
 [156499-51-3] 1-[2,4,6-Trihydroxy-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]-ethanone, 408  
 [156499-52-4] 1-[2,6-Dihydroxy-4-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]-ethanone, 406  
 [158013-69-5] 1-[6-[(1,1-Dimethylethyl)amino]-3-hydroxy-2-methylphenyl]ethanone, 294  
 [158148-88-0] 1-[2-Hydroxy-5-methoxy-3,4-bis(phenylmethoxy)phenyl]ethanone, 404  
 [158499-95-7] 1-[4,6-Dihydroxy-3-(3-methyl-2-butenyl)-2-[(4-methylphenyl)sulfonyl]-oxy]phenyl]ethanone, 388  
 [158499-96-8] 1-[4-[(3,7-Dimethyl-2,6-octadienyl)oxy]-6-hydroxy-3-(3-methyl-2-butenyl)-2-[(4-methylphenyl)sulfonyl]oxy]phenyl]ethanone (*E*), 413  
 [158499-97-9] 1-[6-Hydroxy-3-(3-methyl-2-butenyl)-4-[(3-methyl-2-butenyl)oxy]-2-[(4-methylphenyl)sulfonyl]oxy]phenyl]ethanone, 410  
 [158499-98-0] 1-[2,6-Dihydroxy-3-(3-methyl-2-butenyl)-4-[(3-methyl-2-butenyl)oxy]-phenyl]ethanone, 376  
 [159848-01-8] 1-[3-Hydroxy-4,6-dimethoxy-2-methyl-5-(1-methylethyl)phenyl]-ethanone, 321  
 [159977-36-3] 1-(5-Cyclohexyl-2,4-dihydroxyphenyl)ethanone, 307  
 [160246-79-7] 1-(2,6-Dihydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone, 298  
 [161358-64-1] 1-[2-Hydroxy-6-(methoxymethyl)phenyl]ethanone, 160  
 [162853-19-2] 1-[2-Hydroxy-3-methyl-6-(1-methylethyl)phenyl]ethanone, 243  
 [162853-20-5] 1-(4-Hydroxy-5-methoxy-2-methylphenyl)ethanone, 159  
 [163429-79-6] 1-(2-Hydroxy-3,4,6-trimethylphenyl)ethanone, 198  
 [165186-29-8] 1-[2,4-Dihydroxy-6-(2-hydroxyethyl)-3-methoxyphenyl]ethanone, 214  
 [167211-56-5] 1-[2,4-Dihydroxy-3-(2-hydroxypropyl)phenyl]ethanone, 207  
 [167211-59-8] 1-[2-Hydroxy-3-(2-hydroxypropyl)-4-mercaptophenyl]ethanone, 206  
 [167211-71-4] 1-[2-Hydroxy-3-(3-hydroxypropyl)-4-mercaptophenyl]ethanone, 207  
 [169130-25-0] 1-[2-Hydroxy-4,5-dimethoxy-3,6-bis(1-methylethoxy)phenyl]ethanone, 356  
 [169130-27-2] 1-[2-Hydroxy-4,5-dimethoxy-6-(1-methylethoxy)-3-(phenylmethoxy)-phenyl]ethanone, 389  
 [169566-44-3] 1-[2-Hydroxy-4-methoxy-6-(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417

- [169566-46-5] 1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417
- [169566-54-5] 1-[6-Hydroxy-2,4-dimethoxy-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]-phenyl]ethanone, 416
- [169566-55-6] 1-[6-Hydroxy-4-methoxy-2-(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417
- [169566-56-7] 1-[6-Hydroxy-2,4-bis(phenylmethoxy)-3-[2,3,4,6-tetrakis-O-(phenylmethyl)- $\beta$ -D-glucopyranosyl]phenyl]ethanone, 417
- [172669-49-7] 1-(3-Hydroxy-2,6-dinitrophenyl)ethanone, 21
- [172739-45-6] 1-[4-(3-Chloropropoxy)-2-hydroxyphenyl]ethanone, 188
- [173217-34-0] 1-[2-Hydroxy-3,4,6-trimethoxy-5-(methoxymethoxy)phenyl]ethanone, 293
- [174901-51-0] 1-[2,5-Dihydroxy-4-(2-propenyl)phenyl]ethanone, 180
- [175438-44-5] 1-[2,4-Bis(1,1-dimethylethyl)-3-hydroxy-6-methylphenyl]ethanone, 367
- [175465-97-1] 1-[2,4-Dihydroxy-6-(methoxymethoxy)-3,5-dimethylphenyl]ethanone, 260
- [175546-56-2] 1-[4-(Ethoxymethoxy)-2-hydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 352
- [175655-10-4] 1-(2-Hydroxy-3-iodo-5-methylphenyl)ethanone, 85
- [175655-11-5] 1-(5-Chloro-2-hydroxy-3-iodophenyl)ethanone, 13
- [175785-86-1] 1-(3,5-Diethyl-2,6-dihydroxy-4-methoxyphenyl)ethanone, 288
- [175785-88-3] 1-(3,5-Dibutyl-2,6-dihydroxy-4-methoxyphenyl)ethanone, 368
- [175785-90-7] 1-[3,5-Diethyl-2,4-dihydroxy-6-(methoxymethoxy)phenyl]ethanone, 322
- [176177-16-5] 1-(3,6-Dihydroxy-2-methylphenyl)ethanone, 106
- [176662-07-0] 1-[2-Hydroxy-3,5,6-trimethoxy-4-(methoxymethoxy)phenyl]ethanone, 293
- [181047-51-8] 1-[2-Hydroxy-4-[(2-methoxyethoxy)methoxy]-5-(3-methyl-2-butenyl)-phenyl]ethanone, 366
- [182951-74-2] 1-(2,3,4,5-Tetrafluoro-6-hydroxyphenyl)ethanone, 3
- [182951-75-3] 1-(2,3,5-Trifluoro-4,6-dihydroxyphenyl)ethanone, 5
- [183143-90-0] 1-[2,4,6-Trihydroxy-3-(3,7,11-trimethyl-2,6,10-dodecatrienyl)phenyl]ethanone (*E,E*), 408
- [183143-91-1] 1-[2,6-Dihydroxy-4-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone (*E,E*), 406
- [186693-85-6] 1-[2-Hydroxy-4-methoxy-6-(methoxymethoxy)phenyl]ethanone, 215
- [186956-46-7] 1-[5-Chloro-2-hydroxy-3-(2-propenyl)phenyl]ethanone, 177
- [186956-47-8] 1-[2-Hydroxy-5-methoxy-3-(2-propenyl)phenyl]ethanone, 227
- [186966-69-8] 1-[3-Hydroxy-4-[(3-methyl-2-butenyl)oxy]phenyl]ethanone, 272
- [186966-70-1] 1-[3,4-Dihydroxy-5-(3-methyl-2-butenyl)phenyl]ethanone, 269
- [187966-38-7] 1-[3-Hydroxy-4-(4-methoxybenzyloxy)phenyl]ethanone, 349
- [188903-79-9] 1-[6-Hydroxy-3-methoxy-2,4-bis(1-methylethyl)phenyl]ethanone, 342
- [188927-29-9] 1-[6-Hydroxy-3,4-dimethoxy-2-(1-methylethoxy)phenyl]ethanone, 292
- [188927-30-2] 1-[6-Hydroxy-3-methoxy-2-[(4-methylphenyl)sulfonyl]oxy]-4-(phenylmethoxy)phenyl]ethanone, 405
- [188927-31-3] 1-[6-Hydroxy-3-methoxy-2-(1-methylethoxy)-4-(phenylmethoxy)-phenyl]ethanone, 384
- [190730-40-6] 1-(2-Hydroxy-3-methyl-4-nitrophenyl)ethanone, 87
- [192625-58-4] 1-[3,5-Dihydroxy-4-(1-methylethoxy)phenyl]ethanone, 208
- [193333-24-3] 1-[2,4-Dihydroxy-5-(3-hydroxy-3-methyl-1-butynyl)phenyl]ethanone, 266
- [193333-25-4] 1-[2,4-Dihydroxy-5-(3-methyl-3-buten-1-ynyl)phenyl]ethanone, 265
- [198203-68-8] 1-(2,4-Dihydroxy-3,5-dimethoxyphenyl)ethanone, 173
- [198344-86-4] 1-(4-Chloro-2-hydroxy-3-methylphenyl)ethanone, 78
- [199586-38-4] 1-(4,5-Difluoro-2-hydroxyphenyl)ethanone, 19
- [199793-91-4] 1-(4-Hydroxy-3-methoxyphenyl)ethanone-*I*- $^{13}\text{C}$ , 113
- [200129-18-6] 1-[2,4-Dihydroxy-6-[(3,7,11-trimethyl-2,6,10-dodecatrienyl)oxy]phenyl]ethanone (*E,E*), 405
- [200355-19-7] 1-[2-Hydroxy-4-(methoxymethoxy)-3-propylphenyl]ethanone, 289
- [200878-65-5] 1-(3-Chloro-2,4-dihydroxy-6-methoxyphenyl)ethanone, 84
- [204590-48-7] 1-[2,6-Dihydroxy-3-methoxy-4-(phenylmethoxy)phenyl]ethanone, 349
- [204781-71-5] 1-(3-Hydroxy-2-methoxyphenyl)ethanone, 111

- [207281-53-6] 1-(2-Hydroxy-3,6-dimethyl-5-nitrophenyl)ethanone, 141  
 [209746-96-3] 1-(4-Ethyl-2,6-dihydroxyphenyl)ethanone, 154  
 [212494-38-7] 1-(2,4-Dibromo-6-hydroxy-3-methylphenyl)ethanone, 69  
 [217442-59-6] 1-[2-Hydroxy-4-(methoxymethoxy)-3,5-bis(3-methyl-2-butenyl)phenyl]-ethanone, 389  
 [219696-56-7] 1-[4-(Heptyloxy)-2-hydroxyphenyl]ethanone, 341  
 [220504-99-4] 1-[2-Hydroxy-3-methoxy-4-(methoxymethoxy)phenyl]ethanone, 215  
 [225088-72-2] 1-[2,4-Dihydroxy-6-[[4-(methylphenyl)sulfonyl]oxy]phenyl]ethanone, 336  
 [225088-73-3] 1-[4-[[2(E)-3,7-Dimethyl-2,6-octadienyl]oxy]-2-hydroxy-6-[[4-(methylphenyl)sulfonyl]oxy]phenyl]ethanone, 410  
 [225088-74-4] 1-[2-Hydroxy-6-[[4-(methylphenyl)sulfonyl]oxy]-4-[[2(E,6E)-3,7,11-trimethyl-2,6,10-dodecatrienyl]oxy]phenyl]ethanone, 414  
 [229007-00-5] 1-(4-Hydroxy-4'-methyl[1,1'-biphenyl]-3-yl)ethanone, 329  
 [263138-72-3] 1-[6-Hydroxy-3-(phenylmethoxy)-2-(2-propenyl)phenyl]ethanone, 371  
 [274259-41-5] 1-(2,5-Dihydroxy-3-methylphenyl)ethanone, 103  
 [286931-53-1] 1-(3-Chloro-2-hydroxy-5-methoxyphenyl)ethanone, 82  
 [292144-84-4] 1-(3-Chloro-2-hydroxy-5-iodophenyl)ethanone, 12  
 [292144-86-6] 1-(5-Chloro-2-hydroxy-3-iodo-4-methylphenyl)ethanone, 69  
 [292144-89-9] 1-(4-Hydroxy-3-iodo-5-methylphenyl)ethanone, 85  
 [307520-94-1] 1-[2-Hydroxy-4-[2-(phenylmethoxy)ethoxy]phenyl]ethanone, 361  
 [310402-63-2] 1-[2-Hydroxy-3-(3-methyl-2-butenyl)phenyl]ethanone, 267  
 [319923-51-8] 1-(5-Bromo-2-hydroxy-3,4-dimethylphenyl)ethanone, 134  
 [332900-03-5] 1-[2-Hydroxy-4,6-bis(phenylmethoxy)phenyl]ethanone-*I*-<sup>13</sup>C, 396  
 [333763-54-5] 1-[2,4-Dihydroxy-3-(methoxymethyl)-5-methylphenyl]ethanone, 207  
 [348616-32-0] 1-(3-Hydroxy-2-iodophenyl)ethanone, 37  
 [350981-92-9] 1-[2-Hydroxy-5-methyl-3-(phenylmethyl)phenyl]ethanone, 344  
 [357409-15-5] 1-[2-Hydroxy-4,6-bis(phenylmethoxy)-3-(phenylmethyl)phenyl]ethanone-*I*-<sup>13</sup>C, 412  
 [360791-68-0] 1-(2-Hydroxy-5-methyl[1,1'-biphenyl]-3-yl)ethanone, 328  
 [360791-69-1] 1-(2-Hydroxy-5-nitro[1,1'-biphenyl]-3-yl)ethanone, 297  
 [396639-83-1] 1-(2-Ethyl-3,6-dihydroxy-4,5-dimethylphenyl)ethanone, 252  
 [404597-93-9] 1-[2-Hydroxy-6-methoxy-4-(methoxymethoxy)phenyl]ethanone, 216  
 [418759-58-7] 1-(4-Hydroxy-5-methoxy-2-nitrophenyl)ethanone, 92  
 [430474-15-0] 1-[3-Hydroxy-4-(1*E*)-1-propenylphenyl]ethanone, 179  
 [448949-59-5] 1-[3-(β-D-Glucopyranosyloxy)-4,5-dihydroxyphenyl]ethanone, 316

## USUAL NAMES INDEX

**Acetophenone.** *Phenyl methyl ketone*, 39, 47, 49, 51  
**Acetoevernone.** *2'-Hydroxy-4'-methoxy-6'-methylacetophenone*, 156  
**Acetoguaiacone.** *4'-Hydroxy-3'-methoxyacetophenone*, 32, 56, 71, 82, 112  
**Acetopiperone.** *(3',4'-Methylenedioxy)acetophenone*, 56  
**Acetosyringone.** *4'-Hydroxy-3',5'-dimethoxyacetophenone*, 71, 129, 138, 169  
**Acetovanillone.** *4'-Hydroxy-3'-methoxyacetophenone*, 56, 75, 82, 86, 112  
**o-Acetovanillone.** *2'-Hydroxy-3'-methoxyacetophenone*, 107  
**Acetyldihydrodillapiole.** *4-Acetyl-6,7-dimethoxy-5-propyl-1,3-benzodioxole*, 290  
**Acetylhydroquinone.** *2',5'-Dihydroxyacetophenone*, 17  
**2-Acetylhydroquinone.** *2',5'-Dihydroxyacetophenone*, 31  
**8-Acetyl-4-methylumbelliferone.** *8-Acetyl-7-hydroxy-4-methylcoumarin*, 55  
**2-Acetylorcinol.** *2',6'-Dihydroxy-4'-methylacetophenone*, 105  
**8-Acetyl-4-phenylumbelliferone.** *8-Acetyl-7-hydroxy-4-phenylcoumarin*, 55  
**2-Acetylresorcinol.** *2',6'-Dihydroxyacetophenone*, 11, 152  
**Acronylin.** *4',6'-Dihydroxy-2'-methoxy-3'-isopentenylacetophenone*, 275, 311, 321  
**Agehoustonin C.** *3'-Hydroxy-5,6,7,8,2',4',5'-heptamethoxyflavone*, 217  
**Agehoustonin D.** *5,3'-Dihydroxy-6,7,8,2',4',5'-hexamethoxyflavone*, 217  
**3-Allylresacetophenone.** *3'-Allyl-2',4'-dihydroxyacetophenone*, 227  
**4-n-Amylresorcinol.** *4-n-Amyl-1,3-benzenediol*, 285  
**Anisole.** *Methoxybenzene*, 108  
**p-Anisoyl chloride.** *4-Methoxy benzoyl chloride*, 343  
**Annphenone.** *1-[4-(β-D-Glucopyranosyloxy)-2-hydroxy-6-methoxyphenyl]ethanone*, 340  
**Antiarol.** *3,4,5-Trimethoxyphenol*, 174, 218  
**Antiarol acetate.** *3,4,5-Trimethoxyphenyl acetate*, 218  
**Antiarol benzylether.** *3,4,5-Trimethoxyphenyl benzylether*, 218  
**Antiarol ethylether.** *3,4,5-Trimethoxyphenetole*, 261  
**Apigenin.** *4',5,7-Trihydroxyflavone*, 51  
**Apiin.** *4',5,7-Trihydroxyflavone-7-apiosylglucoside*, 51  
**Apocynin.** *4'-Hydroxy-3'-methoxyacetophenone*, 112  
**Apocynol.** *1-(4-Hydroxy-3-methoxyphenyl)ethanol*, 82  
**Artocarpetin.** *5,2',4'-Trihydroxy-7-methoxyflavone*, 118  
**Bancroftinone.** *6'-Hydroxy-2',4'-dimethoxy-3'-methylacetophenone*, 211  
**Bavachinin.** *4'-Hydroxy-7-methoxy-6-isopentenylflavanone*, 308  
**Benzotetronic acid.** *4-Hydroxycoumarin*, 48  
**2-Benzylresorcinol.** *2-Benzyl-1,3-benzenediol*, 330  
**4-Benzylresorcinol.** *4-Benzyl-1,3-benzenediol*, 330  
**Bisphenol A diacetate.** *2,2-Bis(4-acetoxyphenyl)propane*, 359  
**Bisphenol S diacetate.** *4,4'-Diacetoxydiphenyl sulfone*, 302, 343  
**Brevifolin.** *2'-Hydroxy-4',6'-dimethoxyacetophenone*, 166  
**2-Bromohydroquinone diacetate.** *2-Bromo-1,4-benzenediol diacetate*, 26  
**5-Bromoresacetophenone.** *5'-Bromo-2',4'-dihydroxyacetophenone*, 76, 294  
**4-Bromoresorcinol.** *4-Bromo-1,3-benzenediol*, 26  
**4-Bromoresorcinol diacetate.** *4-Bromo-1,3-benzenediol diacetate*, 26  
**4-Bromoresorcinol dimethylether.** *4-Bromo-1,3-dimethoxybenzene*, 76  
**Bungeiside A.** *2'-(β-D-glucopyranosyloxy)-5'-hydroxyacetophenone*, 314

- Bungeiside B.** 2'-( $\beta$ -D-glucopyranosyloxy)-4'-hydroxyacetophenone, 314
- Bungeiside D.** 1-[2-Hydroxy-4-[(6-O- $\beta$ -D-xylopyranosyl- $\beta$ -D-glucopyranosyl)oxy]-phenyl]ethanone, 387
- 2-tert-Butylhydroquinone.** 2-tert-Butyl-1,4-benzenediol, 251
- 4-n-Butylresorcinol.** 4-n-Butyl-1,3-benzenediol, 250
- Carbitol.** Diethylene glycol monoethylether, 384
- Carvacrol.** 2-Methyl-5-isopropylphenol, 243, 246
- Carvacryl acetate.** 2-Methyl-5-isopropylphenyl acetate, 243, 246
- 2-Chlorohydroquinone diacetate.** 2-Chloro-1,4-benzenediol diacetate, 127
- 4-Chlororesorcinol.** 4-Chloro-1,3-benzenediol, 32
- 4-Chlororesorcinol dimethylether.** 4-Chloro-1,3-dimethoxybenzene, 83
- 4-Chlorothymol methylether.** 4-Chloro-5-methyl-2-isopropylanisole, 79
- 2-Chlorovanillin acetate.** 4-Acetoxy-2-chloro-3-methoxybenzaldehyde, 81
- 5-Chlorovanillin acetate.** 4-Acetoxy-3-chloro-5-methoxybenzaldehyde, 82
- 6-Chlorovanillin acetate.** 4-Acetoxy-2-chloro-5-methoxybenzaldehyde, 81
- Clavatul.** 2',4'-Dihydroxy-3',5'-dimethylacetophenone, 149
- Creosol.** 2-Methoxy-4-methylphenol, 101, 159
- Creosol acetate.** 2-Methoxy-4-methylphenyl acetate, 107, 155, 159
- Cumene.** Isopropylbenzene, 281
- Cynanoneside A.** 4'-( $\beta$ -D-glucopyranosyloxy)-3'-hydroxyacetophenone, 315
- Cynanoneside B.** 2'-( $\beta$ -D-glucopyranosyloxy)-4'-hydroxyacetophenone, 314
- p-Cymene.** 4-Isopropyltoluene, 98
- Decalin.** Decahydronaphthalene, 377
- Deoxyacetohumulone.** 2',4',6'-Trihydroxy-3',5'-diisopentenylacetophenone, 383
- 2,4-Diacetyl-5-(allyloxy)resorcinol.** 3'-Acetyl-4'-allyloxy-2',6'-dihydroxyacetophenone, 184
- 2,4-Diacetyl-5-(benzyloxy)resorcinol.** 3'-Acetyl-4'-benzyloxy-2',6'-dihydroxyacetophenone, 334
- 2,4-Diacetyl-5-ethoxyresorcinol.** 3'-Acetyl-4'-ethoxy-2',6'-dihydroxyacetophenone, 164
- 2,4-Diacetyl-5-methoxyresorcinol.** 3'-Acetyl-2',6'-dihydroxy-4'-methoxyacetophenone, 118
- 2,4-Diacetylresorcinol.** 3'-Acetyl-2',6'-dihydroxy-4'-methylacetophenone, 105
- 2,4-Dibromophloroglucinol.** 2,4-Dibromo-1,3,5-benzenetriol, 11
- 2,3-Dichlorohydroquinone diacetate.** 2,3-Dichloro-1,4-benzenediol diacetate, 17
- 2,4-Diethylphloroglucinol.** 2,4-Diethyl-1,3,5-benzenetriol, 256
- 2,4-Diethylresorcinol.** 2,4-Diethyl-1,3-benzenediol, 250
- 4,6-Diethylresorcinol.** 4,6-Diethyl-1,3-benzenediol, 250, 318
- Dihydroeugenol acetate.** 2-Methoxy-4-propylphenyl acetate, 254
- Dihydrousnic acid.** 2,6-Diacetyl-3,7,9-trihydroxy-8,9b-dimethyl-1-(4H,4aH,9bH)-dibenzo-furanone, 104
- 3,5-Dihydroxy-o-xylene.** 4,5-Dimethyl-1,3-benzenediol, 152
- 2,5-Dimethoxyhydroquinone diacetate.** 2,5-Dimethoxy-1,4-benzenediol diacetate, 173
- 2,6-Dimethoxyhydroquinone.** 2,6-Dimethoxy-1,4-benzenediol, 174
- 2,6-Dimethoxyhydroquinone diacetate.** 2,6-Dimethoxy-1,4-benzenediol diacetate, 233
- 2,5-Dimethoxyresorcinol.** 2,5-Dimethoxy-1,3-benzenediol, 173
- 2,5-Dimethoxyresorcinol dibenzylether.** 1,3-Dibenzyloxy-2,5-dimethoxybenzene, 362
- 2,3-Dimethylhydroquinone.** 2,3-Dimethyl-1,4-benzenediol, 150
- 2,5-Dimethylhydroquinone.** 2,5-Dimethyl-1,4-benzenediol, 150
- 2,6-Dimethylhydroquinone.** 2,6-Dimethyl-1,4-benzenediol, 151
- 3,5-Dimethylphloracetophenone.** 2',4',6'-Trihydroxy-3',5'-Dimethylacetophenone, 257
- 1,3-Dimethylphloroglucinol.** 2,4-Dimethyl-1,3,5-benzenetriol, 171

- 2,4-Dimethylresorcinol.** *2,4-Dimethyl-1,3-benzenediol*, 149  
**4,5-Dimethylresorcinol.** *4,5-Dimethyl-1,3-benzenediol*, 151  
**4,6-Dimethylresorcinol.** *4,6-Dimethyl-1,3-benzenediol*, 151  
**4,5-Dimethylresorcinol diacetate.** *4,5-Dimethyl-1,3-benzenediol diacetate*, 151  
**Diphenylcarbinol.** *α-Phenylbenzenemethanol*, 391, 395, 414, 415  
**3-(Diphenylmethyl)resacetophenone.** *2',4'-Dihydroxy-3'-(diphenylmethyl)acetophenone*, 393  
**5-(Diphenylmethyl)resacetophenone.** *2',4'-Dihydroxy-5'-(diphenylmethyl)acetophenone*, 394  
**Epichlorohydrin.** *1-Chloro-2,3-epoxypropane*, 184, 185, 305, 311  
**2-Ethylhydroquinone dimethylether.** *2-Ethyl-1,4-dimethoxybenzene*, 203  
**4-Ethylpyrogallol.** *4-Ethyl-1,2,3-benzenetriol*, 164  
**2-Ethylresorcinol.** *2-Ethyl-1,3-benzenediol*, 153  
**4-Ethylresorcinol.** *4-Ethyl-1,3-benzenediol*, 154  
**4-Ethylresorcinol diacetate.** *4-Ethyl-1,3-benzenediol diacetate*, 154  
**Farnesyl bromide.** *3,7,11-trimethyl-2,6,10-dodecatrienyl bromide*, 406, 408, 414  
**2-Fluorohydroquinone diacetate.** *2-Fluoro-1,4-benzenediol diacetate*, 35  
**Formalin.** *Formaldehyde solution*, 70, 176, 191, 264  
**3-Formylphloracetophenone.** *3'-Formyl-2',4',6'-trihydroxyacetophenone*, 120  
**3-Formylresacetophenone.** *3'-Formyl-2',4'-dihydroxyacetophenone*, 58  
**Gallacetophenone.** *2',3',4'-Trihydroxyacetophenone*, 11, 27, 57, 72, 114, 115, 163, 164, 183, 222, 230, 256, 334, 392, 396  
**Gallacetophenone trimethylether.** *2',3',4'-Trimethoxyacetophenone*, 60, 115  
**Geraniol.** *3,7-Dimethyl-2,6-octadien-1-ol*, 377  
**Geranyl bromide.** *3,7-Dimethyl-2,6-octadienyl bromide*, 375, 376, 386, 410, 413  
**Guaiacol.** *2-Methoxyphenol*, 111-113, 253  
**Guaiacol acetate.** *2-Methoxyphenyl acetate*, 56, 108, 111-113,  
**4-n-Hexylresorcinol.** *4-n-Hexyl-1,3-benzenediol*, 320  
**Hinokiflavone.** *5,7,5'',7'',4'''-Pentahydroxy-4'-O-6''-biflavone*, 51, 167  
**Homoflemingol.** *2,2',4',5'-Tetrahydroxy-5'-methoxy-3'-(3,7-dimethyl-2,6-octadienyl)chalcone*, 386  
**Homoveratrole.** *3,4-Dimethoxytoluene*, 159  
**Hydroquinone.** *1,4-Benzenediol*, 54, 55  
**Hydroquinone diacetate.** *1,4-Benzenediol diacetate*, 54, 132  
**Hydroquinone monomethylether.** *4-Methoxyphenol*, 336  
**Hydroquinone dimethylether.** *1,4-Dimethoxybenzene*, 109  
**3-Hydroxykynurenine.** *α,2-Diamino-3-hydroxy-γ-oxobenzenebutanoic acid*, 61  
**Hydroxyquinol.** *1,2,4-Benzenetriol*, 58  
**2-Hydroxyseneciophenone.** *2'-Hydroxy-3,3-dimethylacrylophenone*, 48  
**6-Hydroxytremetone.** *5-Acetyl-6-hydroxy-2-isopropenyl-2,3-dihydrobenzofuran*, 285  
**5-Iodoacetovanillone.** *4'-Hydroxy-5'-iodo-3'-methoxyacetophenone*, 169  
**Iretol.** *2-Methoxy-1,3,5-benzenetriol*, 121  
**Isoacetoevernone.** *4'-Hydroxy-2'-methoxy-6'-methylacetophenone*, 158  
**Isoacetovanillone.** *3'-Hydroxy-4'-methoxyacetophenone*, 111  
**2-Isoamylphloroglucinol.** *2-Isoamyl-1,3,5-benzenetriol*, 289  
**4-Isoamylresorcinol diacetate.** *4-Isoamyl-1,3-benzenediol diacetate*, 285  
**Isobavachin.** *4',7-Dihydroxy-8-(3,3-dimethylallyl)flavanone*, 269  
**Isocaproaldehyde.** *4-Methylpentanal*, 354  
**Isocresol.** *2-Methoxy-5-methylphenol*, 159  
**Isocresol acetate.** *2-Methoxy-5-methylphenyl acetate*, 159  
**Isopaeonol.** *4'-Hydroxy-2'-methoxyacetophenone*, 77, 92  
**Isopentylphloracetophenone.** *2',4',6'-Trihydroxy-3'-isopentylacetophenone*, 381

- Isopseudocumenol acetate.** 2,3,5-Trimethylphenyl acetate, 198
- Isosordidone dimethylether.** 6-Chloro-5,7-dimethoxy-2,8-dimethylchromone, 189
- Isothymol methylether.** 4-Methyl-2-isopropylanisole, 246
- Isovaleraldehyde.** 3-Methylbutanal, 319
- Kayaflavone.** 5,7,5"-Trihydroxy-4',7",4'''-trimethoxy-3',8"-biflavone, 255
- Kayaflavone triethylether.** 5,7,5"-Triethoxy-4',7""',4'''-trimethoxy-3',8"-biflavone, 255
- Leptorumol monomethylether.** 5-Hydroxy-7-methoxy-6,8-dimethylchromone, 207
- Lucidin dibenzyl ether.** 5,7-Dibenzoyloxy-6,8-dimethoxy-3',4'-methylenedioxyflavone, 409
- Lucidin dimethyl ether.** 5,6,7,8-Tetramethoxy-3',4'-methylenedioxyflavone, 263
- Luteolin.** 3',4',5,7-Tetrahydroxyflavone, 56
- Mallophenone.** 2',6'-Dihydroxy-4'-methoxy-3',5'-dimethylacetophenone, 207
- Mesitol.** 2,4,6-Trimethylphenol, 198
- Mesitol methylether.** 2,4,6-Trimethylanisole, 198
- Mesityl acetate.** 2,4,6-Trimethylphenyl acetate, 96
- 2-Methoxyhydroquinone diacetate.** 2-Methoxy-1,4-benzenediol diacetate, 117, 186
- 2-Methoxyphloroglucinol.** 2-Methoxy-1,3,5-benzenetriol, 121
- 3-Methylanthranil.** 3-Methyl-2,1-benzisoxazole, 61, 62
- Methyldihydrousnic acid.** 4,8-diacetyl-3,7-dihydroxy-2,2,9a-trimethyl-1,9(2H,5aH,6H,9aH) dibenzofuranedione, 104
- 2-Methylhydroquinone.** 2-Methyl-1,4-benzenediol, 104
- 2-Methylhydroquinone diacetate.** 2-Methyl-1,4-benzenediol diacetate, 104, 183
- 2-Methyl-5-isopropylhydroquinone dimethylether.** 1,4-Dimethoxy-2-methyl-5-isopropylbenzene, 250
- 2-Methyl-4-nitroresorcinol.** 2-Methyl-4-nitro-1,3-benzenediol, 90
- Methylphloracetophenone.** 2',4',6'-Trihydroxy-3'-methylacetophenone, 84, 312
- 3-Methylphloracetophenone.** 2',4',6'-Trihydroxy-3'-methylacetophenone, 402
- 2-Methylphloroglucinol.** 2-Methyl-1,3,5-benzenetriol, 120
- 3-Methylpyrocatechol.** 3-Methyl-1,2-benzenediol, 106
- 3-Methylpyrocatechol diacetate.** 3-Methyl-1,2-benzenediol diacetate, 101, 105, 106
- 4-Methylpyrocatechol diacetate.** 4-Methyl-1,2-benzenediol diacetate, 107
- 3-Methylresacetophenone.** 2',4'-Dihydroxy-3'-methylacetophenone, 150
- 2-Methylresorcinol.** 2-Methyl-1,3-benzenediol, 102
- 4-Methylresorcinol.** 4-Methyl-1,3-benzenediol, 102
- 4-Methylresorcinol diacetate.** 4-Methyl-1,3-benzenediol diacetate, 102
- 4-Methylumbelliferone.** 7-Hydroxy-4-methylcoumarin, 53
- 5-Nitroresacetophenone.** 2',4'-Dihydroxy-5'-nitroacetophenone, 8, 295
- 4-Nitroresorcinol.** 4-Nitro-1,3-benzenediol, 42, 43
- 4-Nitroresorcinol diacetate.** 4-Nitro-1,3-benzenediol diacetate, 43
- Olivetol.** 5-Amyl-1,3-benzenediol, 286
- Ommatin D.** Dihydroxanthommatin 5-sulfate ester, 61
- Orcacetophenone.** 2',4'-Dihydroxy-6'-methylacetophenone, 103, 156
- β-Orcacetophenone.** 2',4'-Dihydroxy-6'-methylacetophenone, 103, 156
- γ-Orcacetophenone.** 2',6'-Dihydroxy-4'-methylacetophenone, 105
- p-Orcacetophenone.** 2',6'-Dihydroxy-4'-methylacetophenone, 105, 158
- β-Orcinol.** 2,5-Dimethyl-1,3-benzenediol, 150
- Orcinol.** 5-Methyl-1,3-benzenediol, 103, 105, 336
- Orcinol diacetate.** 5-Methyl-1,3-benzenediol diacetate, 103
- Orcinol monomethylether.** 3-Methoxy-5-methylphenol, 158
- Orcinol dimethylether.** 3,5-dimethoxytoluene, 103, 156, 158



- Orsacetophenone.** *2',4'-Dihydroxy-6'-methylacetophenone*, 103
- Paenol.** *2'-Hydroxy-4'-methoxyacetophenone*, 72, 76, 86, 91, 117
- Paenol acetate.** *2'-Acetoxy-4'-methoxyacetophenone*, 76
- 5-Pentadecylresorcinol.** *5-Pentadecyl-1,3-benzenediol*, 409
- Phloroacetophenone.** *2',4',6'-Trihydroxyacetophenone*, 11, 27, 33, 59, 67, 118, 120, 127, 132, 166, 171, 177, 183, 210, 222, 255, 257, 263, 275, 276, 301, 305, 321, 327, 334, 335, 379, 380, 392, 394, 396, 399, 407, 408, 411, 416
- Phloroacetophenone triethylether.** *2',4',6'-Triethoxyacetophenone*, 255
- Phloroacetophenone 4-methylether.** *2',6'-Dihydroxy-4'-methoxyacetophenone*, 348
- Phloroacetophenone dimethylether.** *2'-Hydroxy-4',6'-dimethoxyacetophenone*, 140
- Phloroacetophenone trimethylether.** *2',4',6'-Trimethoxyacetophenone*, 167, 169
- Phloroglucinol.** *1,3,5-Benzenetriol*, 59, 205
- Phloroglucinol diethylether.** *3,5-Diethoxyphenol*, 255
- Phloroglucinol monomethylether.** *5-Methoxy-1,3-benzenediol*, 116
- Phloroglucinol dimethylether.** *3,5-Dimethoxyphenol*, 166, 169
- Phloroglucinol trimethylether.** *1,3,5-Trimethoxybenzene*, 167, 169
- Phloroglucinol triacetate.** *1,3,5-Benzenetriol triacetate*, 59
- Picein.** *4'-Hydroxyacetophenone-D-glucoside*, 51
- Prenyl bromide.** *4-Bromo-2-methyl-2-butene*, 268, 271, 310, 366, 374, 379, 380, 410
- 2-Propylhydroquinone dimethylether.** *1,4-Dimethoxy-2-propylbenzene*, 201, 254
- 2-Propylresorcinol.** *2-Propyl-1,3-benzenediol*, 200
- 4-Propylresorcinol.** *4-Propyl-1,3-benzenediol*, 201
- 4-Propylresorcinol diacetate.** *4-Propyl-1,3-benzenediol diacetate*, 201
- Pseudoaspidinol A.** *4',6'-Dihydroxy-2'-methoxy-3'-methylacetophenone*, 162
- Pseudocumenol acetate.** *2,4,5-Trimethylphenyl acetate*, 146, 198
- Pyrocatechol.** *1,2-Benzenediol*, 52, 56, 131
- Pyrocatechol monoacetate.** *1,2-Benzenediol monoacetate*, 52, 56
- Pyrocatechol diacetate.** *1,2-Benzenediol diacetate*, 56
- Pyrogallol.** *1,2,3-Benzenetriol*, 57
- Pyrogallol triacetate.** *1,2,3-Benzenetriol triacetate.*, 57, 222
- Pyrogallol 1-methylether.** *3-Methoxy-1,2-benzenediol*, 114
- Pyrogallol 2-methylether.** *2-Methoxy-1,3-benzenediol*, 115
- Pyrogallol trimethylether.** *1,2,3-Trimethoxybenzene*, 164
- Quinacetophenone.** *2',5'-Dihydroxyacetophenone*, 10, 22, 25, 43, 54, 114, 132, 153, 181, 205, 332, 346, 357, 360, 398
- Quinacetophenone diacetate.** *2',5'-Diacetoxyacetophenone*, 132
- γ-Resacetophenone.** *2',6'-Dihydroxyacetophenone*, 55
- Resacetophenone.** *2',4'-Dihydroxyacetophenone*, 10, 17, 20, 21, 22, 25, 26, 38, 42, 58, 102, 108, 131, 138, 150, 152, 156, 171, 177, 181, 184, 188, 206, 212, 225, 226, 229, 249, 252, 257, 262, 266, 268, 269, 271, 274, 277, 287, 297, 320, 325, 326, 330, 331, 341, 346, 357, 372, 374, 375, 383, 391, 393-395, 398, 409, 411, 414, 415
- Resacetophenone diacetate.** *2',4'-Diacetoxyacetophenone*, 53
- Resorcinol.** *1,3-Benzenediol*, 53, 54, 131
- Resorcinol monoacetate.** *1,3-Benzenediol monoacetate*, 53
- Resorcinol diacetate.** *1,3-Benzenediol diacetate*, 53, 130
- Resorcinol monomethylether.** *3-Methoxyphenol*, 108, 112
- Resorcinol dimethylether.** *1,3-Dimethoxybenzene*, 108, 153
- Sakuranin.** *5,4'-Dihydroxy-7-methoxyflavone-5-D-glucoside*, 118
- Sciadopitysin.** *5,5'',7''-Trihydroxy-7,4',4'''-trimethoxy-3',8''-biflavone*, 167

- Sciadopitysin trimethylether.** 5,7,4',5'',7'',4'''-Hexamethoxy-3',8''-biflavone, 167
- Sesamol.** 5-Hydroxy-1,3-benzodioxole, 73
- Siphulin.** 7-Hydroxy-5-heptyl-2-[3',5'-dihydroxy-2-carboxybenzyl]chroman-4-one, 356
- Sorbicillin.** 1-(2,4-Dihydroxy-3,5-dimethylphenyl)-2,4-hexadien-1-one, 150
- Sordidone.** 8-Chloro-5,7-dihydroxy-2,6-dimethylchromone, 189
- Sordidone dimethylether.** 8-Chloro-5,7-dimethoxy-2,6-dimethylchromone, 189
- Sotetsuflavone.** 5,7,4',5'',4'''-Pentahydroxy-7''-methoxy-3',8''-biflavone, 255
- Sotetsuflavone pentaethylether.** 5,7,4',5'',4'''-Pentaethoxy-7''-methoxy-3',8''-biflavone, 255
- Swertisin.** 4',5-Dihydroxy-7-methoxyflavone-6-C- $\beta$ -D-glucopyranoside, 211
- Swertisin dimethylether.** 4',5,7-Trimethoxyflavone-6-C- $\beta$ -D-glucopyranoside, 211
- Tetraacetylpuingenin.** 1-[4-Hydroxy-3-[(2,3,4,6-tetra-O-acetyl- $\beta$ -D-glucopyranosyl)oxy]-phenyl]ethanone, 399
- Tetrahydrodeoxyusnic acid.** 2,6-Diacetyl-7,9-dihydroxy-8,9b-dimethyl-1-(2H,3H,4H,4aH,9bH)-dibenzofuranone, 104
- Tetralin.** 1,2,3,4-Tetrahydronaphthalene, 330
- p-Thymol.** 3-Methyl-4-isopropylphenol, 244
- Thymol.** 5-Methyl-2-isopropylphenol, 244, 245
- Thymyl acetate.** 5-Methyl-2-isopropylphenyl acetate, 244, 245
- p-Thymyl acetate.** 3-Methyl-4-isopropylphenyl acetate, 245
- o-Tolyl acetate.** 2-Methylphenyl acetate, 93-95, 99, 100
- m-Tolyl acetate.** 3-Methylphenyl acetate, 94, 99
- p-Tolyl acetate.** 4-Methylphenyl acetate, 95, 96, 99
- p-Tolyl borate.** 4-Methylphenyl borate, 96
- Tremetone.** 5-Acetyl-2-isopropyl-2,3-dihydrobenzofuran, 283
- Tricin.** 4',5,7-Trihydroxy-3',5'-dimethoxyflavone, 167
- Triflic acid.** Trifluoromethanesulfonic acid, 50, 53, 100
- Triglykol.** Triethylene glycol, 267
- Trimethylhydroquinone.** 2,3,5-Trimethyl-1,4-benzenediol, 202, 203, 272
- 2,3,5-Trimethylhydroquinone diacetate.** 2,3,5-Trimethyl-1,4-benzenediol diacetate, 202
- n-Valeraldehyde.** Pentanal, 108, 319
- Vanillic acid.** 4-Hydroxy-3-methoxybenzoic acid, 113
- o-Veratraldehyde.** 2,3-Dimethoxybenzaldehyde, 108
- Wogonin.** 5,7-Dihydroxy-8-methoxyflavone, 217
- Xanthoxylin.** 2'-Hydroxy-4',6'-dimethoxyacetophenone, 118, 128, 166, 167
- Xanthoxylone.** 2'-Hydroxy-3',4',6'-Trimethoxyacetophenone, 216

## COMMON ABBREVIATIONS

*Common abbreviations used in the dictionary for organic chemistry*

Å	Angström units
$(\alpha)_D^{20}$	Specific optical rotation at 20°C for D (sodium) line
b.p.	Boiling point (for example, b.p. <sub>0.1</sub> 100° means boils at 100° if the pressure is 0.1 mm Hg)
d	Density (for example, $d_4^{20}$ specific gravity at 20°C referred to water at 4°C)
20°	20 degrees Celsius
DEAD	Diethyl azodicarboxylate
dl	Racemic
DME	1,2-Dimethoxyethane (glyme)
DMF	Dimethylformamide
DMSO	Dimethyl sulfoxide
EIMS	Electron impact mass spectra
GC	Gas chromatography
GLC	Gas liquid chromatography
HMPA	Hexamethylphosphoramide (hexamethylphosphoric triamide),
HMPT	Hexamethylphosphorous triamide
HPLC	High performance (pressure, power) liquid chromatography
$^{13}\text{C}$ NMR	Nuclear magnetic resonance relative to carbon 13
(E)	Geometric stereodescriptor used for compounds having achiral elements resulting from double bonds where the groups of highest priority are on the opposite sides of the vertical reference plane
$^{19}\text{F}$ NMR	Nuclear magnetic resonance relative to fluorine 19
h	Hour
HREIMS	High resolution electron impact mass spectra
HRMS	High resolution mass spectra
$^1\text{H}$ NMR	Nuclear magnetic resonance relative to proton
IR	Infrared spectra

iso-	Aliphatic hydrocarbon having two methyl groups on the terminal carbon atom of the chain (for example, isoamyl (CH <sub>3</sub> ) <sub>2</sub> CH-CH <sub>2</sub> -CH <sub>2</sub> -)
m-	Meta-
M	Molar (concentration)
min	Minute
mol	Molecule
mol. equiv.	Molecular equivalent
mol.wt.	Molecular weight
m.p.	Melting point
MS	Mass spectra
n-	Normal (as n-butyl)
N	Normal (equivalents per liter, as applied to concentration)
NA	Not available
N.B.:	Nota bene
NBS	N-Bromosuccinimide
$n_D^{20} =$	Index of refraction ( $n_D^{20}$ for 20°C and sodium light)
o-	Ortho-
p-	Para-
Pd/C	Palladium on charcoal
PdCl <sub>2</sub> /C	Palladium chloride on charcoal
PdO/C	Palladium oxide on charcoal
pH	Log of reciprocal of hydrogen ion concentration
pK <sub>a</sub>	Log of the reciprocal of the dissociation constant, 1/log K <sub>a</sub>
Pt/C	Platinum on charcoal
r.t.	Room temperature
sec-	Secondary (as sec-butyl)
SM	Starting material
TBAI	Tetrabutylammonium iodide

## COMMON ABBREVIATIONS

553

tert-	Tertiary (as tert-butyl)
TFE	2,2,2-Trifluoroethanol
THF	Tetrahydrofuran
TLC	Thin layer chromatography
UV	Ultraviolet spectra
( <i>Z</i> )	Opposite of ( <i>E</i> )