

*Volume IV in the series originated by
I.T. Harrison and S. Harrison*

Compendium of Organic Synthetic Methods

By Leroy G. Wade, Jr.

Compendium of Organic Synthetic Methods

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Volume 4

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PREFACE

By their compilation of Volumes 1 and 2 of this *Compendium*, Ian and Shuyen Harrison filled one of the greatest needs of the synthetic community: a method for rapidly retrieving needed information from the literature by reaction type rather than by the author's name or publication date.

Compendium of Organic Synthetic Methods, Volume 4, presents the functional group transformations and difunctional compound preparations of 1977, 1978, and 1979. We have attempted to follow as closely as possible the classification schemes of the first three volumes; the experienced user of the *Compendium* will require no additional instructions on the use of this volume.

Perhaps it is fitting here to echo the Harrisons' request stated in Volume 2 of the *Compendium*: The synthetic literature would become more easily accessible and more useful if chemists could write well-organized, concise papers with charts and diagrams that allow the reader to assess quickly and easily the scope of the published research. In addition, the reporting of actual, isolated yields and detailed experimental conditions will save a great deal of wasted effort on the part of other chemists hoping to apply the reported reactions to their own synthetic problems.

I wish to express my gratitude to the many people who helped to bring this book to completion: To Mrs. JoAnn Barley for her patience and dedication in the typing of the camera-ready copy; to Roy Smith, James McKearin, and Jon Lawson for proofreading the manuscript with great care and offering hundreds of helpful suggestions; and to my wife Betsy for her patience and moral support throughout the arduous preparation of this *Compendium*.

LEROY G. WADE, JR.

Fort Collins, Colorado
September, 1980

ABBREVIATIONS

An attempt has been made to use only abbreviations whose meaning will be readily apparent to the reader. Some of those more commonly used are the following:

Ac	Acetyl
Am	Amyl
Ar	Aryl
9-BBN	9-borabicyclo[3.3.1]nonane
Bu	Butyl
Bz	Benzyl
Cp	Cyclopentadienyl
DBU	1,5-diazabicyclo[5.4.0]undecene-5
DCC	Dicyclohexylcarbodiimide
DDQ	2,3-Dichloro-5,6-dicyanobenzoquinone
DEAD	Diethyl azodicarboxylate
DIBAL (DIBALH)	Diisobutylaluminum hydride
DMAD	Dimethyl acetylenedicarboxylate
DME	1,2-Dimethoxyethane
DMF	Dimethylformamide
DMSO	Dimethyl sulfoxide
Et	Ethyl
Hex	Hexyl
HMPA, HMPT	Hexamethylphosphoramide (hexamethylphosphoric triamide)
h ν	Irradiation with light
L	Triphenylphosphine ligand (if not specified)
LAH	Lithium aluminum hydride
LDA	Lithium diisopropylamide
MCPBA	<i>meta</i> -Chloroperbenzoic acid
Me	Methyl
MEM	β -Methoxyethoxymethyl
Ms	Methanesulfonyl
MVK	Methyl vinyl ketone
NBS	N-bromosuccinimide
Ni	Raney nickel
Ⓟ	Polymeric backbone
Ph	Phenyl
PPA	Polyphosphoric acid

PPE	Polyphosphate ester
Pr	Propyl
Py, Pyr	Pyridine
Sia	<i>secondary</i> -isoamyl
Tf	Trifluoromethane sulfonate
TFA	Trifluoroacetic acid
TFAA	Trifluoroacetic anhydride
THF	Tetrahydrofuran
THP	Tetrahydropyranyl
TMEDA	Tetramethylethylenediamine
TMP	2,2,6,6-Tetramethylpiperidine
TMS	Trimethylsilyl
Ts	<i>p</i> -Toluenesulfonyl
Δ	Heat

Sections—heavy type
Pages—light type

Pages—light type

FROM

	Sec.	Pg.
Acetylenes	15A	8
Carboxylic acids	30A	22
Alcohols, phenols	45A	63
Aldehydes	60A	95
Amides	90A	145
Amines	105A	165
Esters	120A	197
Ketones	180A	287
Olefins	210A	338

Blanks in the table correspond to sections for which no additional examples were found in the literature.

INDEX, DIFUNCTIONAL COMPOUNDS

Sections—heavy type

Pages—light type

Acetylene											
300	Carboxylic acid										
340											
312		Alcohol									
349											
302	313	323	Aldehyde								
340	351	364									
303	324		333	Amide							
343	366		389								
315			325	342		Amine					
352			367	402							
305	316	326	335	343	350	Ester					
344	354	367	389	403	408						
306	317	327	344			351	357	Ether, epoxide			
344	359	370	403			410	415				
307	318	328	337	358			363	Halide			
344	360	372	391	417			439				
308	319	329	338	346	353	359	364	368	Ketone		
345	360	374	392	406	412	417	439	446			
309	320	330	339	354		360	365	369	372	Nitrile	
345	361	375	392	412		420	440	448	465		
310	331		340	355		361	370		373	Olefin	
347	381		394	413		429	456		474		
311	322	332	341	349	356	362	367	371	374	376	377
348	362	382	395	407	413	430	441	457	475	490	493

Blanks in the table correspond to sections for which no examples were found in the literature.

INTRODUCTION

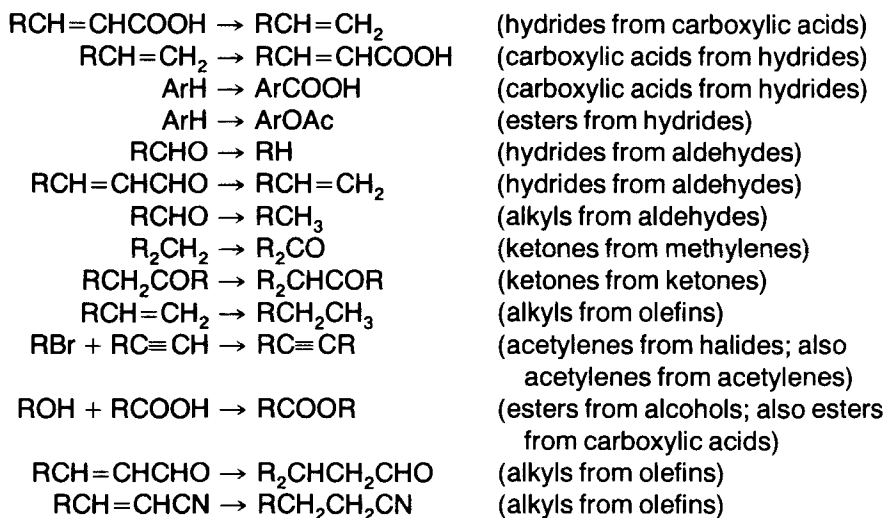
Relationship between Volume 4 and Previous Volumes. *Compendium of Organic Synthetic Methods, Volume 4* presents over 1000 examples of published methods for the preparation of monofunctional compounds, updating the 5000 in Volumes 1, 2, and 3. In addition, Volume 4 contains over 1000 additional examples of preparations of difunctional compounds and various functional groups, updating these sections which were initially introduced in Volume 2. The same systems of section and chapter numbering are used in all four volumes.

Classification and Organization of Reactions Forming Monofunctional Compounds. Examples of published chemical transformations are classified according to the reacting functional group of the starting material and the functional group formed. Those reactions that give products with the same functional group form a chapter. The reactions in each chapter are further classified into sections on the basis of the functional group of the starting material. Within each section reactions are listed in a somewhat arbitrary order, although an effort has been made to put similar reactions together when possible.

The classification is unaffected by allylic, vinylic, or acetylenic unsaturation, which appears in both starting material and product, or increases or decreases in the length of carbon chains; for example, the reactions $t\text{-BuOH} \rightarrow t\text{-BuCOOH}$, $\text{PhCH}_2\text{OH} \rightarrow \text{PhCOOH}$ and $\text{PhCH}=\text{CHCH}_2\text{OH} \rightarrow \text{PhCH}=\text{CHCOOH}$ would all be considered as preparations of carboxylic acids from alcohols. Entries in which conjugate reduction or alkylation of an unsaturated ketone, aldehyde, ester, acid, or nitrile occurs have generally been placed in category 74, Alkyls from Olefins.

The terms hydrides, alkyls, and aryls classify compounds containing reacting hydrogens, alkyl groups, and aryl groups, respectively; for example, $\text{RCH}_2\text{-H} \rightarrow \text{RCH}_2\text{COOH}$ (carboxylic acids from hydrides), $\text{RMe} \rightarrow \text{RCOOH}$ (carboxylic acids from alkyls), $\text{RPh} \rightarrow \text{RCOOH}$ (carboxylic acids from aryls). Note the distinction between $\text{R}_2\text{CO} \rightarrow \text{R}_2\text{CH}_2$ (methylenes from ketones) and $\text{RCOR}' \rightarrow \text{RH}$ (hydrides from ketones). Alkylations which involve additions across a double bond are found in section 74, Alkyls from Olefins.

The following examples illustrate the application of the classification scheme to some potentially confusing cases:



Reactions are included even when full experimental details are lacking in the given reference. In some cases the quoted reaction is a minor part of a paper or may have been investigated from a purely mechanistic aspect.

How to Use the Book to Locate Examples of the Preparation or Protection of Monofunctional Compounds. Examples of the preparation of one functional group from another are located via the monofunctional index on p. xi, which lists the corresponding section and page. Thus Section 1 contains examples of the preparation of acetylenes from other acetylenes; Section 2, acetylenes from carboxylic acids; and so forth.

Sections that contain examples of the reactions of a functional group are found in the horizontal rows of the index. Thus Section 1 gives examples of the reactions of acetylenes that form other acetylenes; Section 16, reactions of acetylenes that form carboxylic acids; and Section 31, reactions of acetylenes that form alcohols.

Examples of alkylation, dealkylation, homologation, isomerization, and transposition are found in Sections 1, 17, 33, and so on, which lie close to a diagonal of the index. These sections correspond to such topics as the preparation of acetylenes from acetylenes, carboxylic acids from carboxylic acids, and alcohols and phenols from alcohols and phenols. Alkylations which involve conjugate additions across a double bond are found in section 74, Alkyls from Olefins.

Examples of name reactions can be found by first considering the nature of the starting material and product. The Wittig reaction, for instance, is in Section 199 on olefins from aldehydes and Section 207 on olefins from ketones.

Examples of the protection of acetylenes, carboxylic acids, alcohols, phenols, aldehydes, amides, amines, esters, ketones, and olefins are also indexed on p. xi.

The pairs of functional groups alcohol, ester; carboxylic acid, ester; amine, amide; carboxylic acid, amide can be interconverted by quite trivial reactions. When a member of these groups is the desired product or starting material, the other member should, of course, also be consulted in the text.

The original literature must be used to determine the generality of reactions. A reaction given in this book for a primary aliphatic substrate may also be applicable to tertiary or aromatic compounds.

The references usually yield a further set of references to previous work. Subsequent publications can be found by consulting the Science Citation Index.

Classification and Organization of Reactions forming Difunctional Compounds. This chapter considers all possible difunctional compounds formed from the groups acetylene, carboxylic acid, alcohol, aldehyde, amide, amine, ester, ether, epoxide, halide, ketone, nitrile, and olefin. Reactions that form difunctional compounds are classified into sections on the basis of the two functional groups of the product. The relative positions of the groups do not affect the classification. Thus preparations of 1,2-aminoalcohols, 1,3-aminoalcohols and 1,4-aminoalcohols are included in a single section. The following examples illustrate the application of this classification system:

<i>Difunctional Product</i>	<i>Section Title</i>
$RC\equiv C-C\equiv CR$	Acetylene—Acetylene
$RCH(OH)COOH$	Carboxylic Acid—Alcohol
$RCH=CHOMe$	Ether—Olefin
$RCHF_2$	Halide—Halide
$RCH(Br)CH_2F$	Halide—Halide
$RCH(OAc)CH_2OH$	Alcohol—Ester
$RCH(OH)COOMe$	Alcohol—Ester
$RCH=CHCH_2COOMe$	Ester—Olefin
$RCH=CHOAc$	Ester—Olefin

How to Use the Book to Locate Examples of the Preparation of Difunctional Compounds. The difunctional index on p. xii gives the section and page corresponding to each difunctional product. Thus Section 327

(Alcohol—Ester) contains examples of the preparation of hydroxyesters; Section 323 (Alcohol—Alcohol) contains examples of the preparation of diols.

Some preparations of olefinic and acetylenic compounds from olefinic and acetylenic starting materials can, in principle, be classified in either the monofunctional or difunctional sections; for example, $\text{RCH=CHBr} \rightarrow \text{RCH=CHCOOH}$, Carboxylic acids from Halides (monofunctional sections) or Carboxylic acid—Olefin (difunctional sections). In such cases both sections should be consulted.

Reactions applicable to both aldehyde and ketone starting materials are in many cases illustrated by an example that uses only one of them.

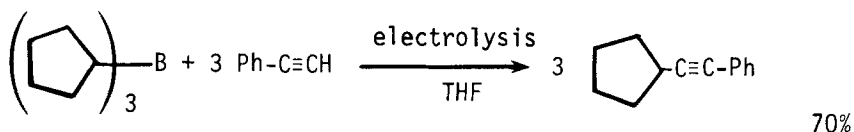
Many literature preparations of difunctional compounds are extensions of the methods applicable to monofunctional compounds. Thus the reaction $\text{RCI} \rightarrow \text{ROH}$ can clearly be extended to the preparation of diols by using the corresponding dichloro compound as a starting material. Such methods are not fully covered in the difunctional sections.

The user should bear in mind that the pairs of functional groups alcohol, ester; carboxylic acid, ester; amine, amide; and carboxylic acid, amide can be interconverted by quite trivial reactions. Compounds of the type $\text{RCH(OAc)CH}_2\text{OAc}$ (Ester—Ester) would thus be of interest to anyone preparing the diol $\text{RCH(OH)CH}_2\text{OH}$ (Alcohol—Alcohol).

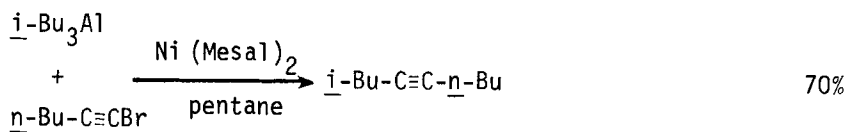
CHAPTER 1

PREPARATION OF ACETYLENES

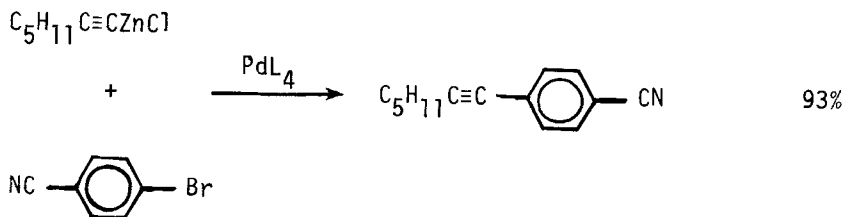
Section 1 Acetylenes from Acetylenes



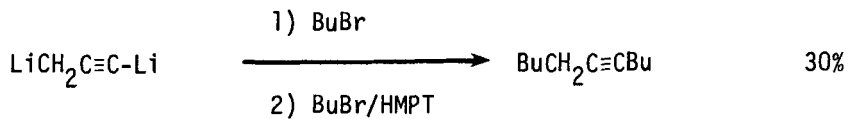
Chem Lett, 999 (1977)



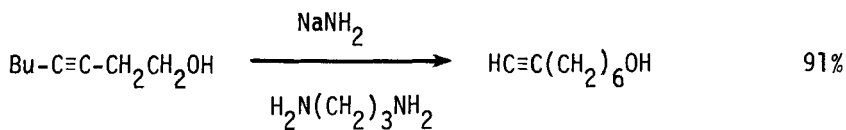
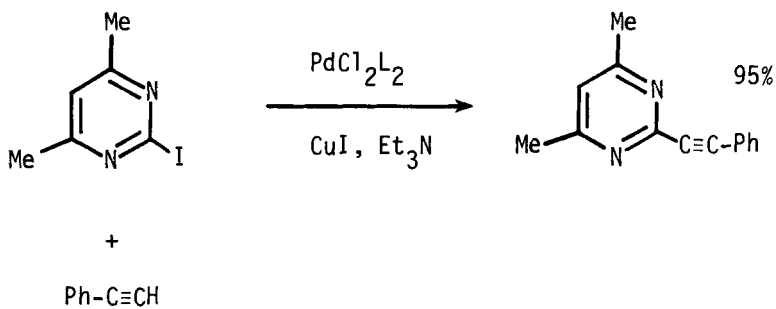
Tetr Lett, 2831 (1978)



JOC 43, 358 (1978)



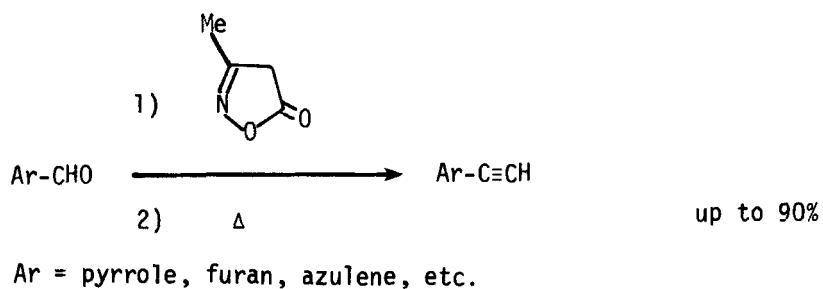
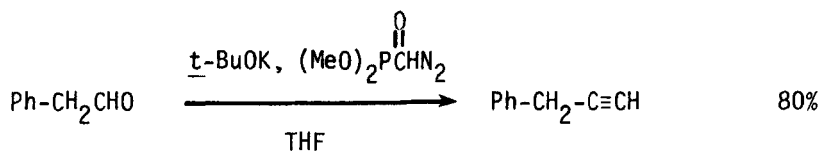
JCS Perkin I, 1218 (1979)

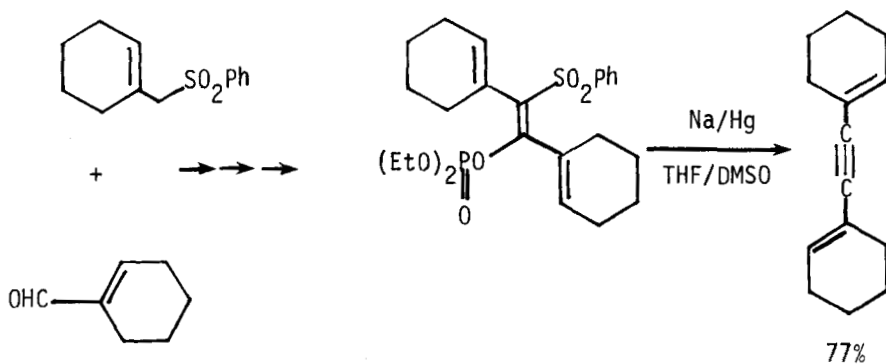
Rec Trav Chim 96, 160 (1977)Chem Pharm Bull 26, 3843 (1978)Section 2 Acetylenes from Carboxylic Acids

No additional examples

Section 3 Acetylenes from Alcohols

No additional examples

Section 4 Acetylenes from AldehydesAngew Int Ed 17, 609 (1978)JOC 44, 4997 (1979)



Tetr Lett, 2625 (1978)

Section 5 Acetylenes from Alkyls, Methylenes and Aryls

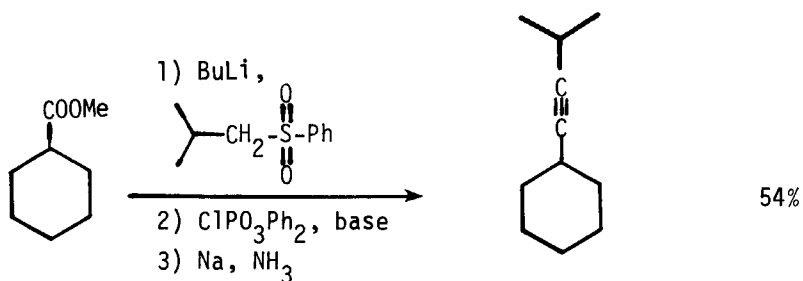
No Examples

Section 6 Acetylenes from Amides

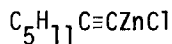
No additional examples

Section 7 Acetylenes from Amines

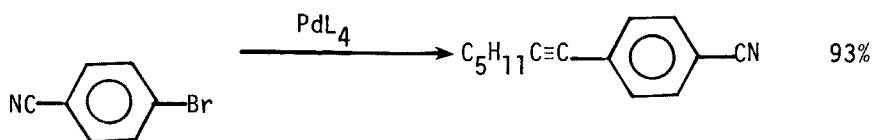
No additional examples

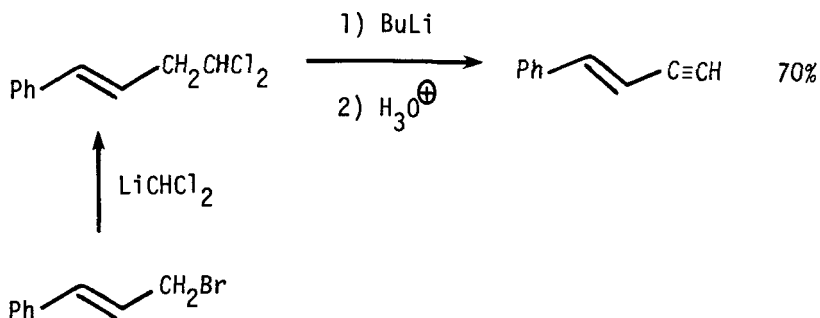
Section 8 Acetylenes from EstersJACS 100, 4852 (1978)Section 9 Acetylenes from Ethers

No examples

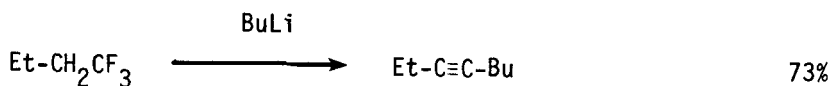
Section 10 Acetylenes from Halides

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JOC 43, 358 (1978)



Synthesis, 502 (1979)

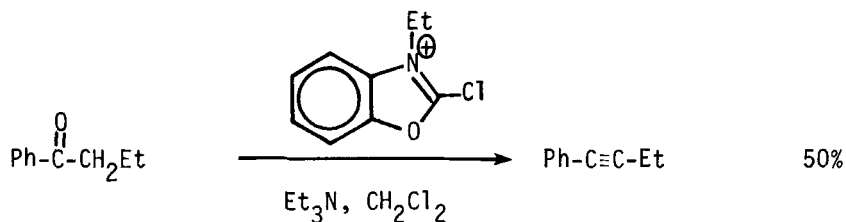


Tetr Lett, 3103 (1978)

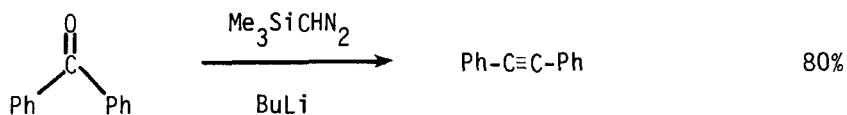
Section 11 Acetylenes from Hydrides

No examples

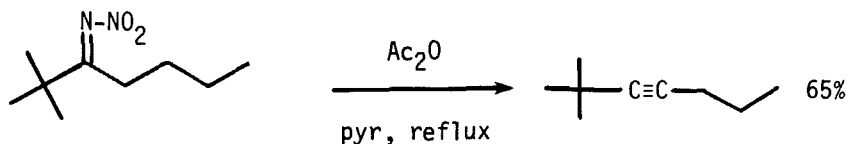
For examples of the reaction $\text{RC}\equiv\text{CH} \rightarrow \text{RC}\equiv\text{C}-\text{C}\equiv\text{CR}'$ see section 300
(Acetylene - Acetylene)

Section 12 Acetylenes from Ketones

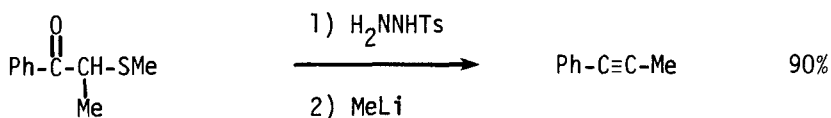
Chem Lett, 481 (1979)



JCS Perkin I, 869 (1977)



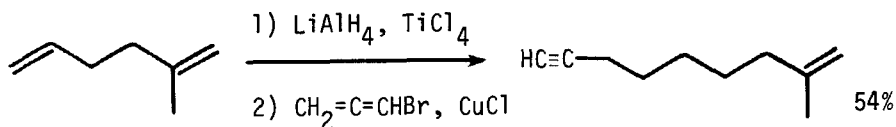
JOC 44, 4116 (1979)



Synthesis, 305 (1978)

Section 13 Acetylenes from Nitriles

No examples

Section 14 Acetylenes from Olefins

Chem Lett, 789 (1978)

Section 15 Acetylenes from Miscellaneous Compounds

No additional examples

Section 15A Protection of Acetylenes

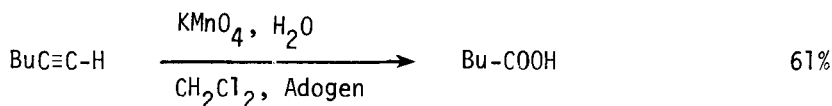
Use of the Trimethylsilyl group to terminate polyeneynes of the form $-(CH=CH)_n-C\equiv C-TMS$. Stable to Grignard reagents etc., but removed by aqueous base.

Tetrahedron 34, 1037 (1978)

CHAPTER 2

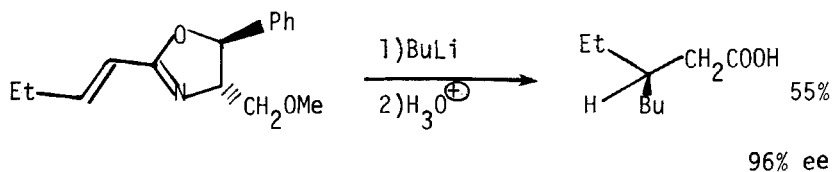
PREPARATION OF CARBOXYLIC ACIDS, ACID HALIDES, AND ANHYDRIDES

Section 16 Carboxylic Acids from Acetylenes

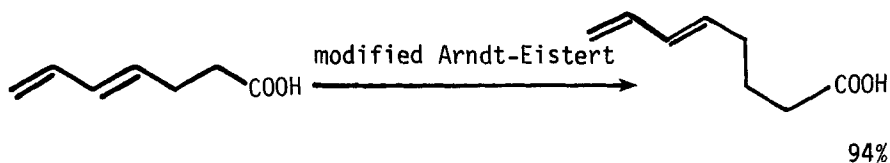


Synthesis, 462 (1978)

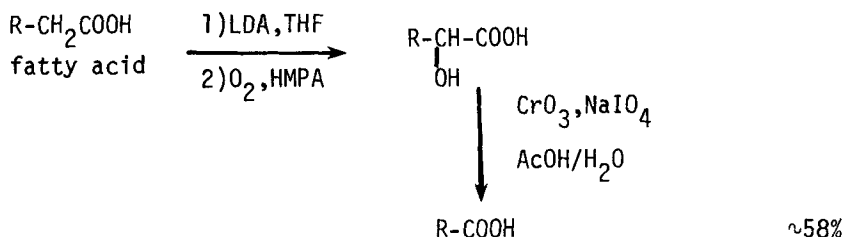
Section 17 Carboxylic Acids and Acid Halides from Carboxylic Acids



JOC 44, 2250 (1979)



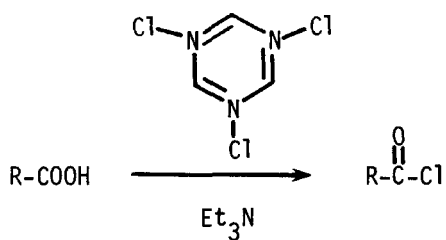
Tetr Lett, 2667 (1979)

Synth Comm 9, 63 (1979)

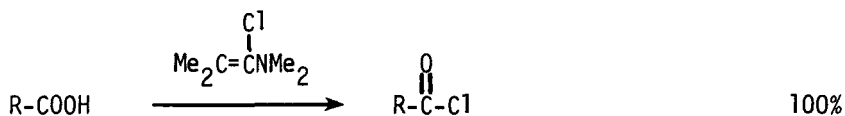
Review: "Synthesis of Aldehydes, Ketones, and Carboxylic Acids
from Lower Carbonyl Compounds by C-C Coupling Reactions"

Synthesis, 633 (1979)

Carboxylic Acids may be alkylated and homologated via ketoacid, ketoester and olefinic acid intermediates. See section 320 (Carboxylic Acid - Ketone), section 360 (Ester - Ketone) and Section 322 (Carboxylic Acid - Olefin). Conjugate reductions of unsaturated acids are listed in Section 74 (Alkyls from Olefins).



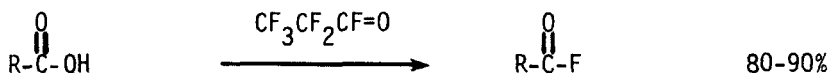
Tetr Lett, 3037 (1979)



100%

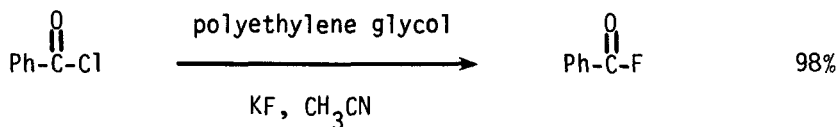
R = Cl_3C , t-Bu , HCO , furan-2-yl, etc.

Chem Comm, 1180 (1979)



80-90%

Chem Lett, 483 (1977)

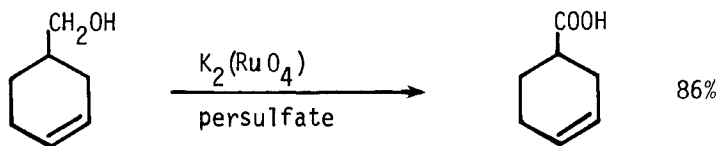


98%

Chem Lett, 283 (1978)

Review: "Activation and Protection of the Carboxyl Group"

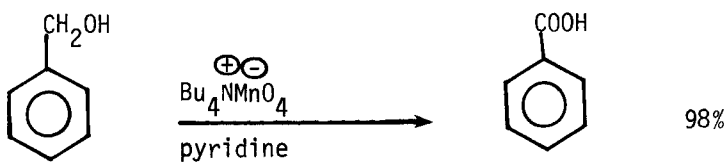
Chem & Ind, 610 (1979)

Section 18 Carboxylic Acids from Alcohols

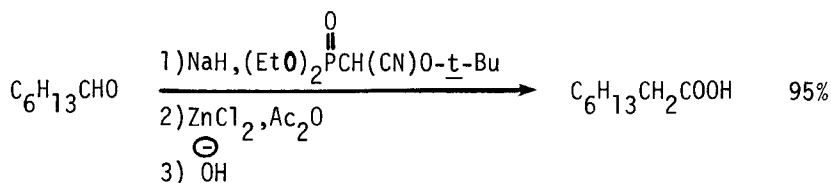
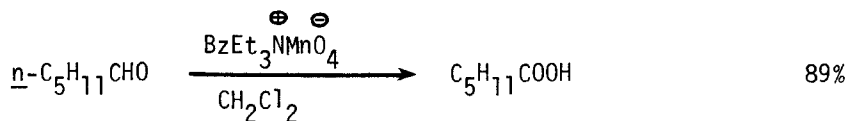
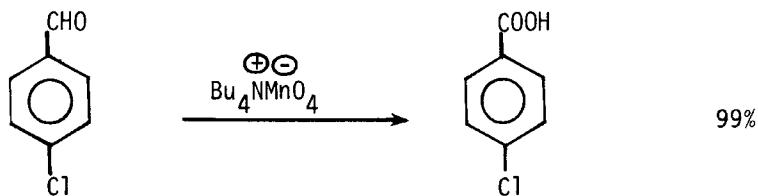
JCS Chem Comm, 58 (1979)



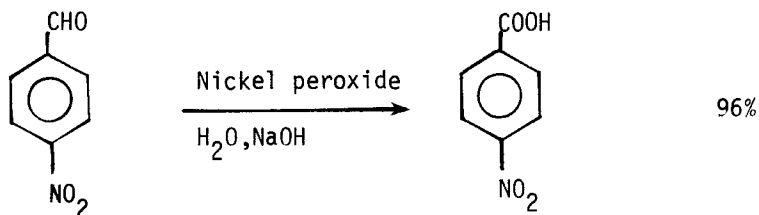
Synthesis, 513 (1979)

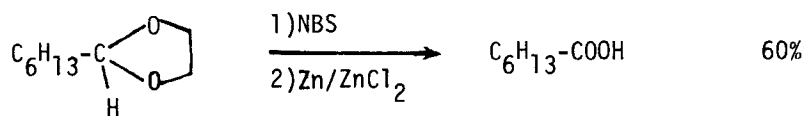
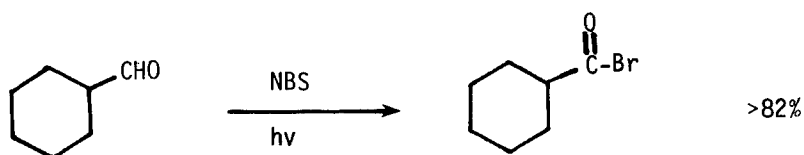


JCS Chem Comm, 253 (1978)

Section 19 Carboxylic Acids and Acid Halides from AldehydesJACS 99, 182 (1977)Monatsh Chem 110, 1471 (1979)

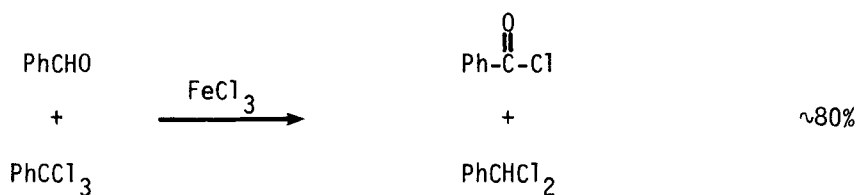
JCS Chem Comm, 253 (1978)

Chem Pharm Bull 26, 299 (1978)

JOC 43, 3417 (1978)

(converted to ester)

Tetr Lett, 3809 (1979)

J Gen Chem (USSR) 47, 1531 (1977)

Related methods: Carboxylic Acids from Ketones (Section 27).
 Also via: Esters - Section 109.

Section 20 Carboxylic Acids from Alkyls

No additional examples

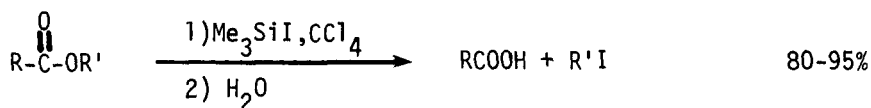
Section 21 Carboxylic Acids from Amides

No additional examples

Section 22 Carboxylic Acids from Amines

No additional examples

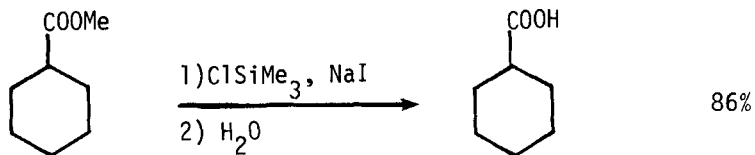
Section 23 Carboxylic Acids and Acid Halides from Esters



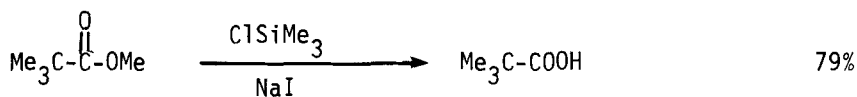
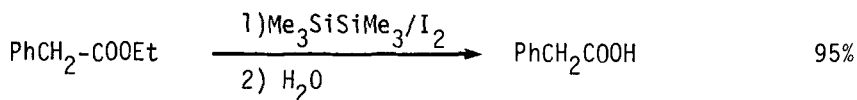
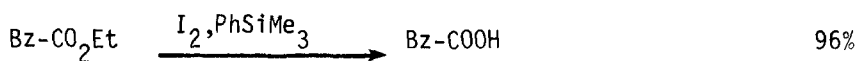
R = alkyl, aryl, heterocyclic

R' = Me, Et

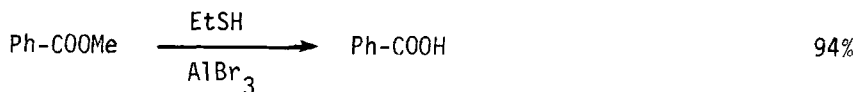
JACS 99, 968 (1977)



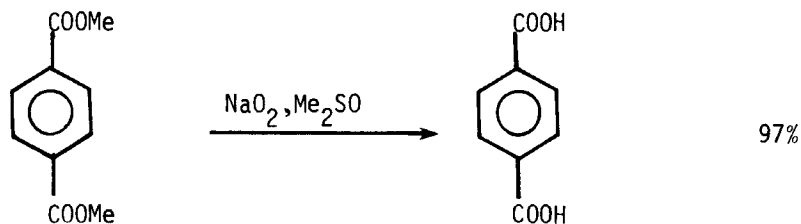
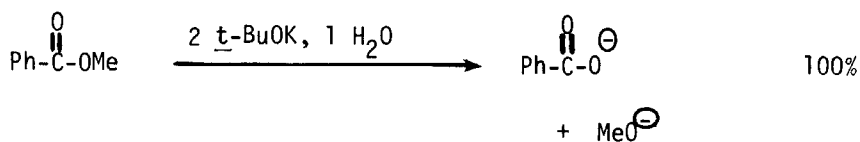
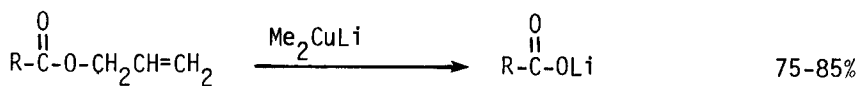
JCS Chem Comm, 874 (1978)

JOC 44, 1247 (1979)Angew Int Ed 18, 612 (1979)

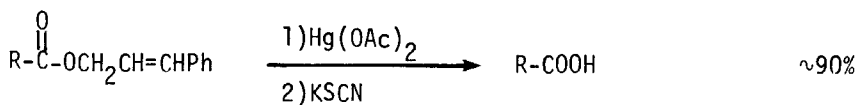
Synthesis, 417 (1977)



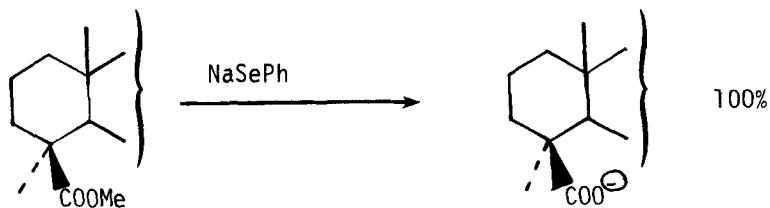
Tetr Lett, 5211 (1978)

JOC 44, 4727 (1979)JOC 42, 918 (1977)

R = alkyl, aryl

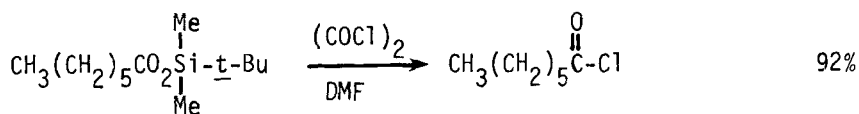
Synth Comm 8, 15 (1978)

Tetr Lett, 2081 (1977)

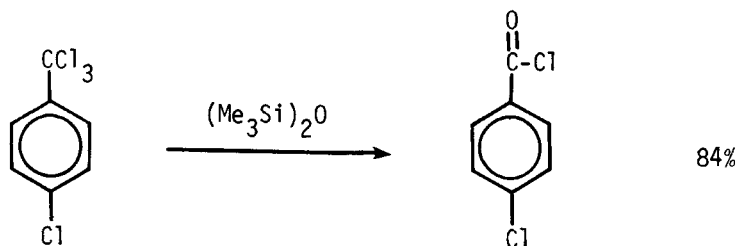


Tetr Lett, 4365 (1977)

Other reactions useful for the hydrolysis of esters may be found in Section 30A (Protection of Carboxylic Acids).

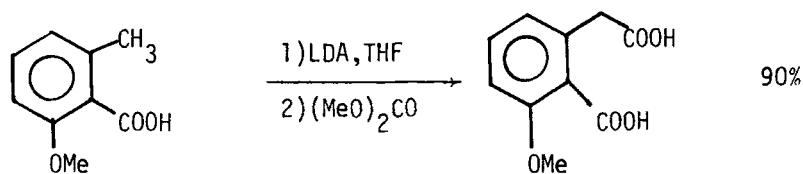
JOC 43, 3972 (1978)Section 24 Carboxylic Acids from Ethers

No additional examples

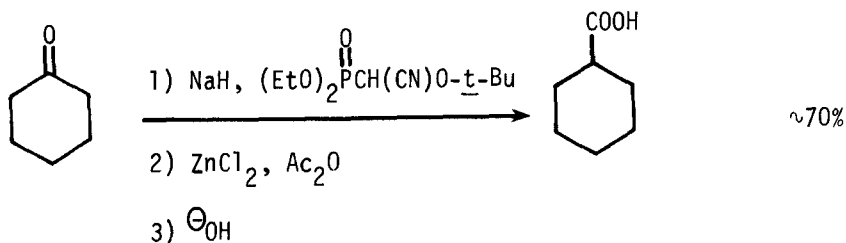
Section 25 Carboxylic Acids and Acid Halides from Alkyl Halides

JCS Chem Comm, 808 (1977)

Also via: Esters - Section 115

Section 26 Carboxylic Acids from Hydrides

Synthesis, 245 (1977)

SECTION 27 Carboxylic Acids from KetonesJACS 99, 182 (1977)

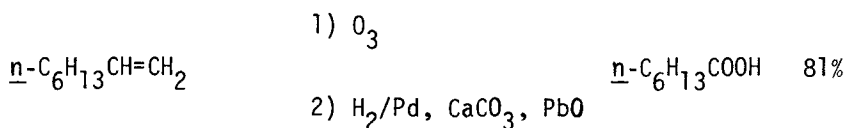
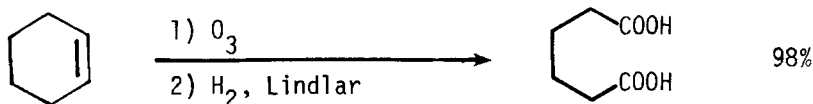
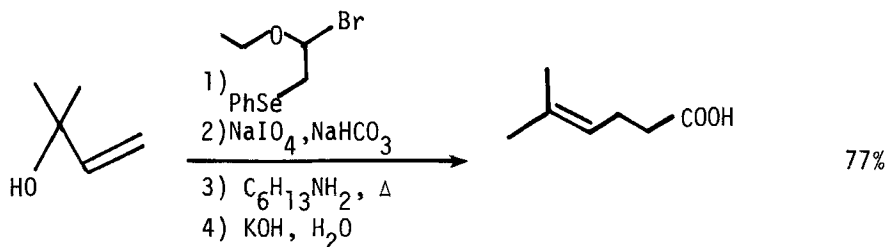
Review: "Synthesis of Aldehydes, Ketones, and Carboxylic Acids from Lower Carbonyl Compounds by C-C Coupling Reactions"

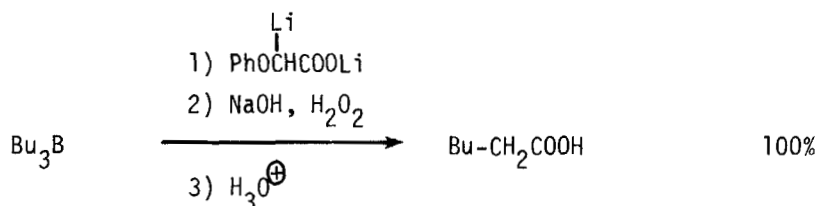
Synthesis, 633 (1979)

Also via: Esters - Section 117.

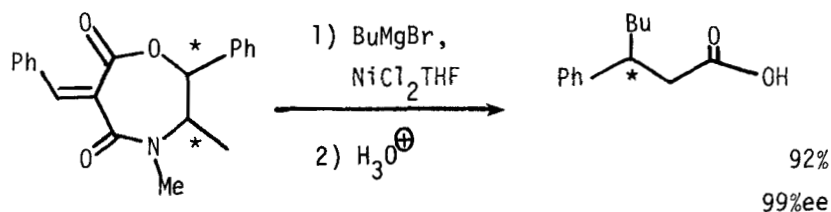
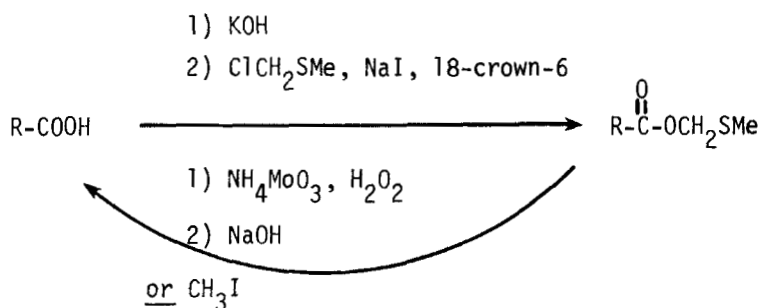
Section 28 Carboxylic Acids from Nitriles

No additional examples

Section 29 Carboxylic Acids from OlefinsJOC 42, 3749 (1977)JOC (USSR) 14, 48 (1978)Bull Akad USSR Chem 25, 1790 (1977)Helv Chim Acta 61, 2286 (1978)

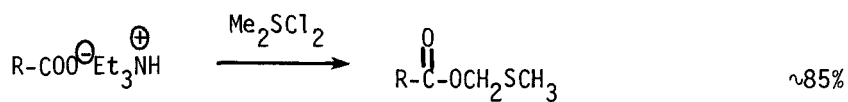
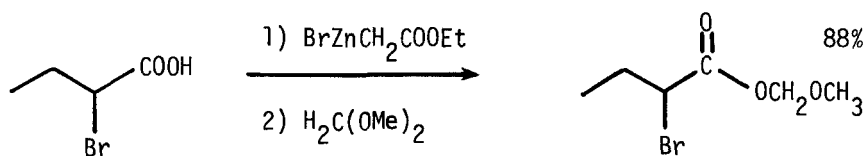
Section 30 Carboxylic Acids from Miscellaneous Compounds

Tetr Lett, 2891 (1978)

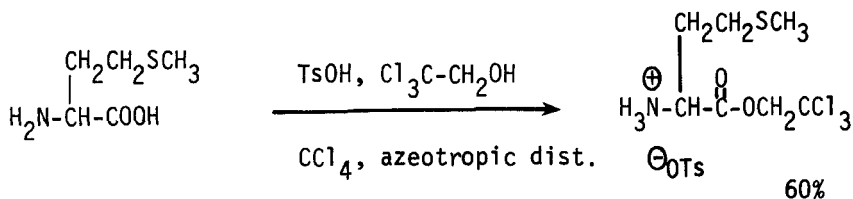
BCS Japan 51, 3368 (1978)Section 30A Protection of Carboxylic Acids

Tetr Lett, 731 (1978)

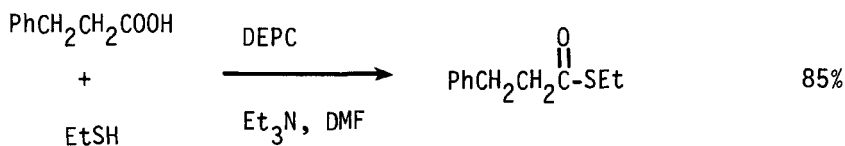
Tetr Lett, 689 (1979)

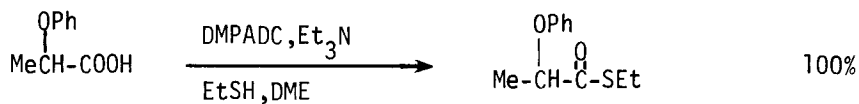
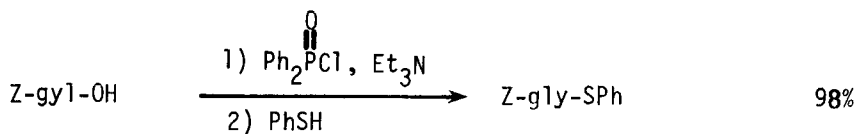
Synth Comm 9, 267 (1979)

Synthesis, 567 (1977)

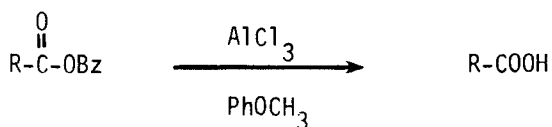


Synthesis, 24 (1979)

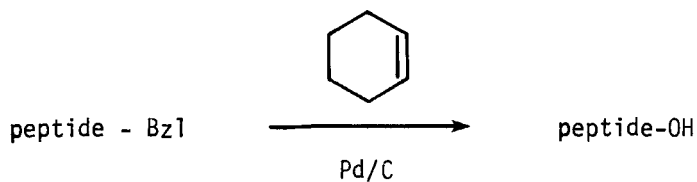
Chem Pharm Bull 25, 2423 (1977)

Synth Comm 9, 91 (1979)Synth Comm 7, 251 (1977)

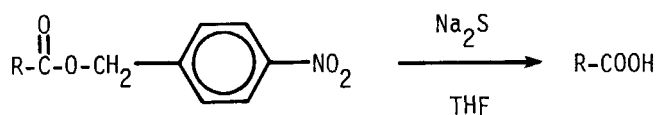
1,4-cyclohexadiene/Pd-C removes benzyl ester protecting groups.

JOC 43, 4194 (1978)

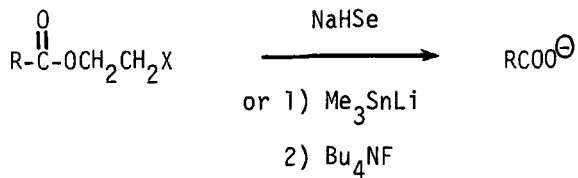
Tetr Lett, 2793 (1979)



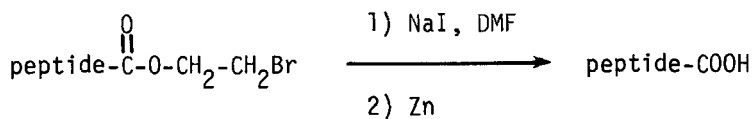
JCS perkin I, 490 (1977)



R = Azetidinone

JOC 43, 1243 (1978)

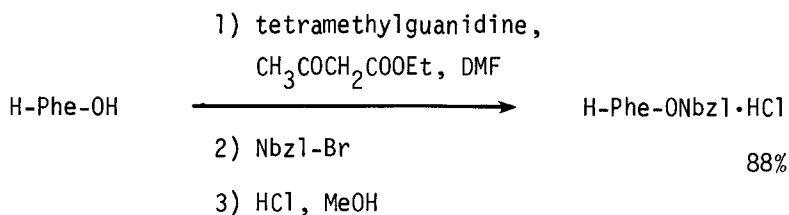
X = Cl, Br

Synth Comm 8, 301 and 359 (1978)Chem Ber 112, 2145 (1979)

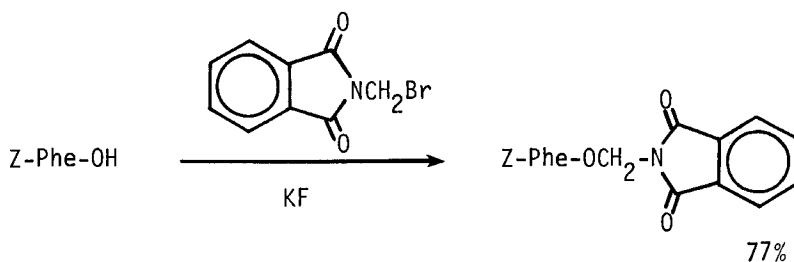
Use of the p-methoxyphenacyl acid protecting group in gibberellin synthesis. Stable to Koenigs-Knorr conditions, MnO_2 oxidation, etc.

Removed by photolysis in ethanol or by Zn/HOAc .

Tetrahedron 34, 345 (1978)



Aust J Chem 31, 1865 (1978)

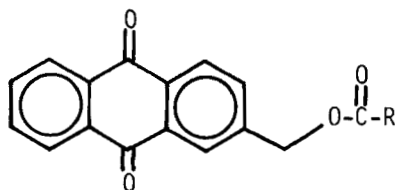


Synth Comm 8, 515 (1978)

Use of immobilized carboxypeptidase Y (at pH 8.5) to remove ethyl ester blocking groups in peptide synthesis.

JACS 101, 3394 (1979)

Use of Maq esters
in peptide synthesis:



Prepared using Maq-OH and DCC; removed by sodium dithionite, photolysis, or polymer-bound 9,10-dihydroxyanthracene. Soluble in organic solvents, and UV-active allowing facile detection on TLC.

Tetr Lett, 1031 (1977)

Review: "Activation and Protection of the Carboxyl Group"

Chem & Ind, 610 (1979)

Review: "Protecting Groups in Peptide Synthesis"

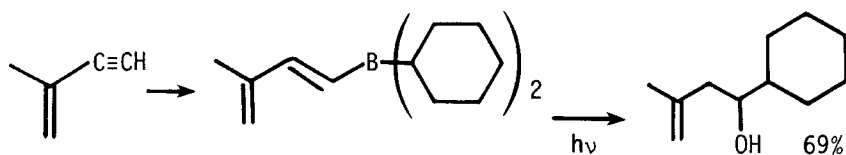
Chem & Ind, 617 (1979)

Other reactions useful for the protection of carboxylic acids are included in Section 107 (Esters from Carboxylic Acids and Acid Halides) and Section 23 (Carboxylic Acids from Esters).

CHAPTER 3

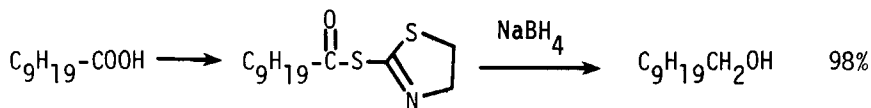
PREPARATION OF ALCOHOLS AND PHENOLS

Section 31 Alcohols from Acetylenes

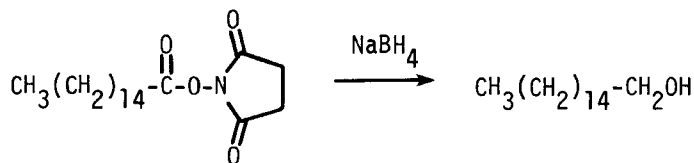


JACS 99, 5192 (1977)

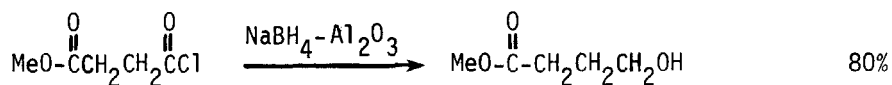
Section 32 Alcohols from Carboxylic Acids and Acid Halides



JCS Chem Comm, 330 (1978)



Chem Lett, 981 (1979)



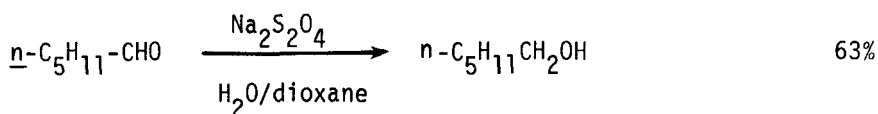
Synthesis, 912 (1979)

Also via: Esters (Section 38)

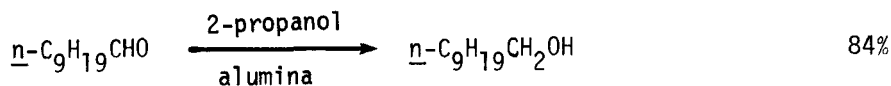
Section 33 Alcohols from Alcohols

No additional examples

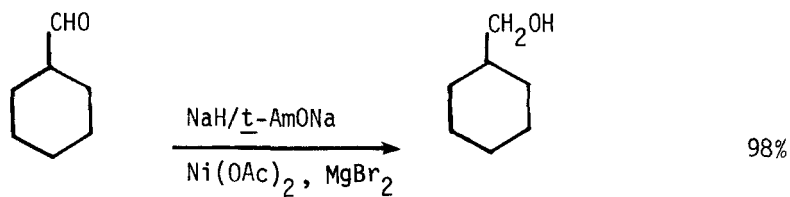
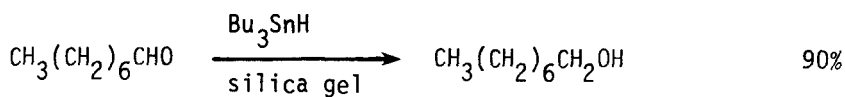
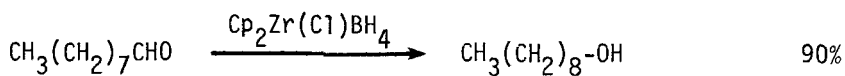
Section 34 Alcohols from Aldehydes



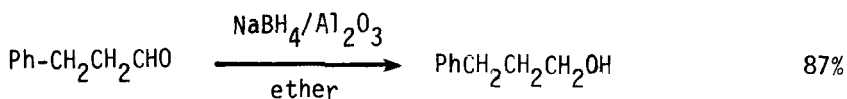
Synthesis, 246 (1977)



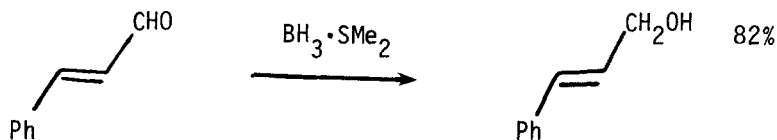
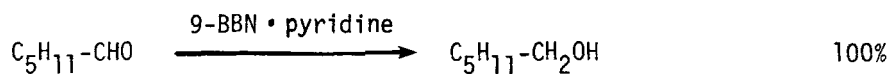
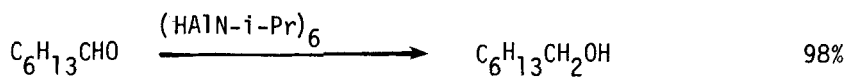
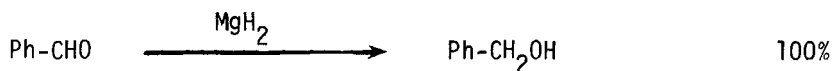
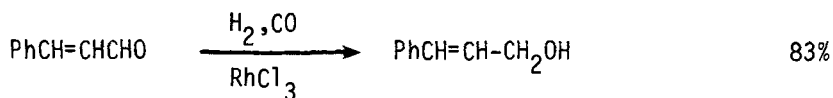
JOC 42, 1202 (1977)

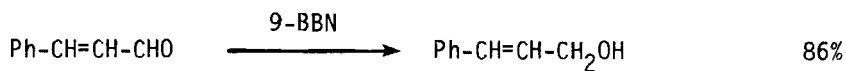
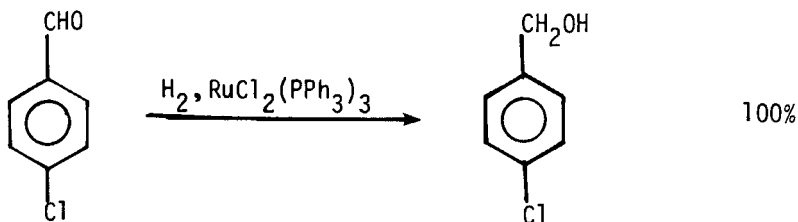
JOC 43, 4804 (1978)JOC 43, 3977 (1978)

Tetr Lett, 4985 (1978)

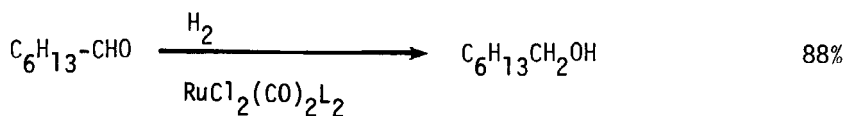
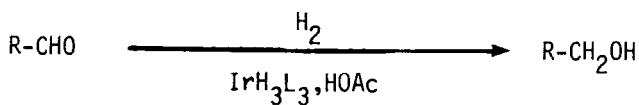


Synthesis, 891 (1978)

JOC 43, 1829 (1978)JOC 42, 4169 (1977)Z Chem 17, 18 (1977)JOC 43, 1557 (1978)BCS Japan 50, 2148 (1977)

JOC 42, 1197 (1977)

Chem Lett, 1085 (1977)

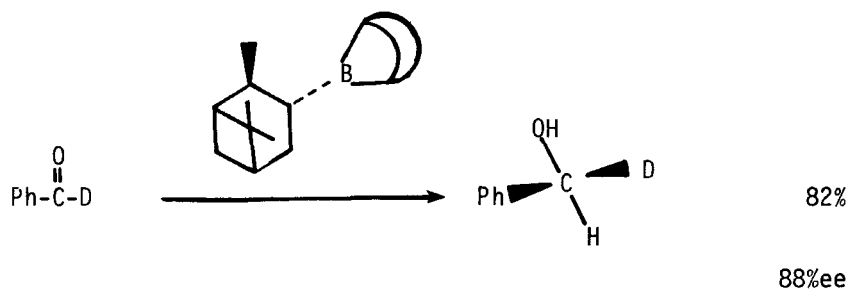
J Organometal Chem 145, 189 (1978)

Ketones are not reduced.

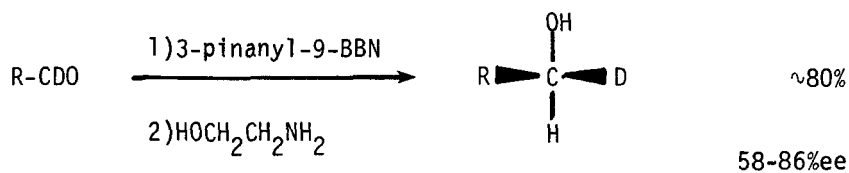
J Organometal Chem 129, C43 (1977)

Aldehydes are selectively reduced in the presence of ketones by LiBH_4 on molecular sieves.

JOC 44, 3969 (1979)

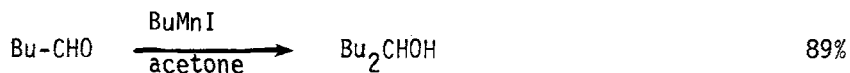


JACS 99, 5211 (1977)

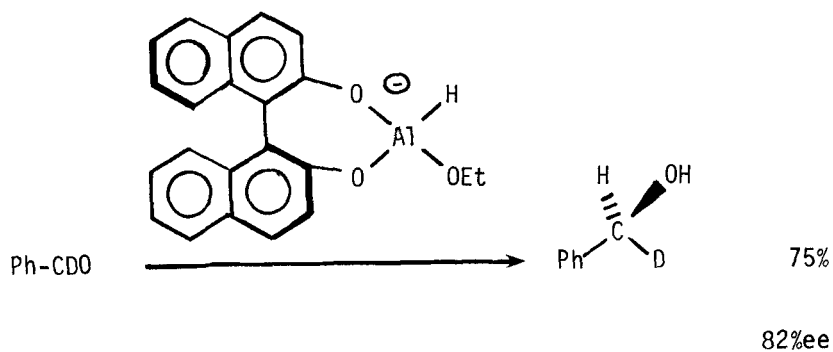
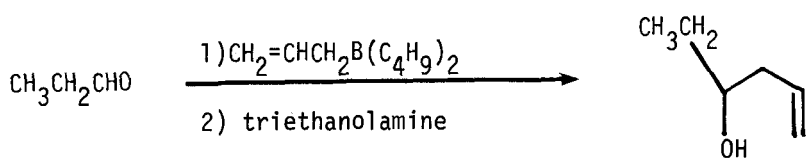
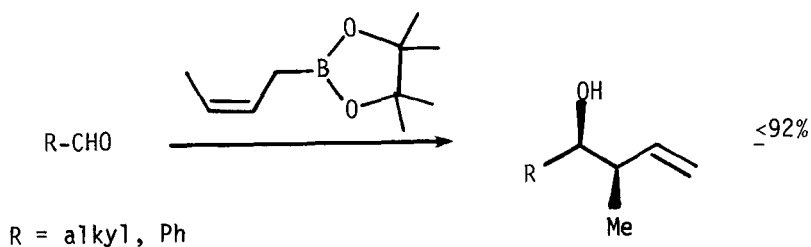


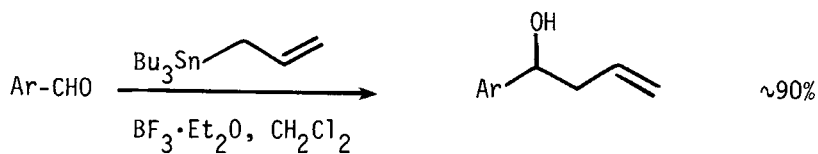
R = alkyl, aryl, allyl

JACS 101, 2352 (1979)



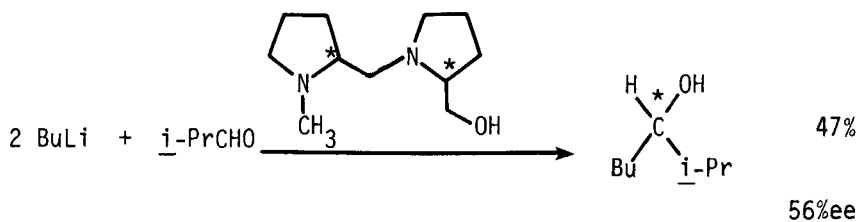
Tetr Lett, 3383 (1977)

JACS 101, 3129 (1979)Bull Acad USSR Chem 27, 1663 (1979)Angew Int Ed 18, 306 (1979)

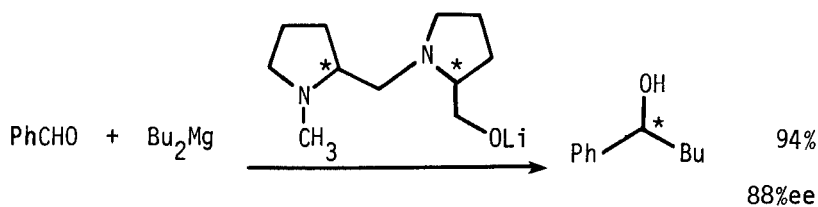


Ar = Subst. Ph, furyl, thiophenyl, etc.

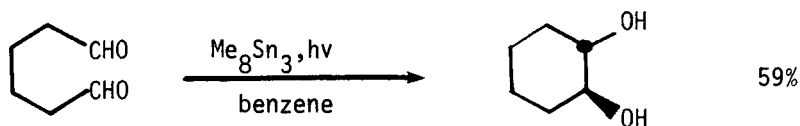
Chem Lett, 919 (1979)



Chem Lett, 219 (1978)



Chem Lett, 601 (1978)

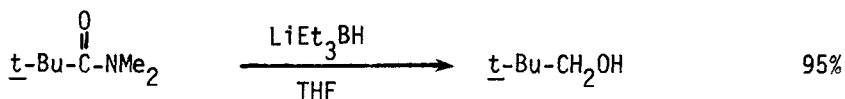


Tetr Lett, 2847 (1978)

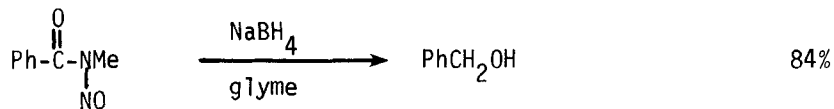
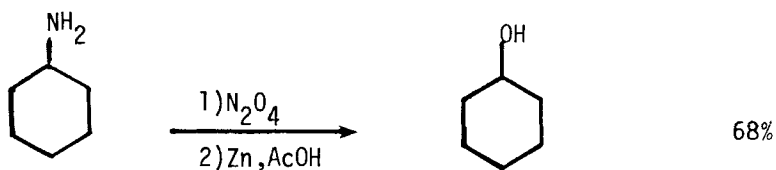
Related methods: Alcohols from Ketones (Section 42)

Section 35 Alcohols and Phenols from Alkyls, Methylenes and Aryls

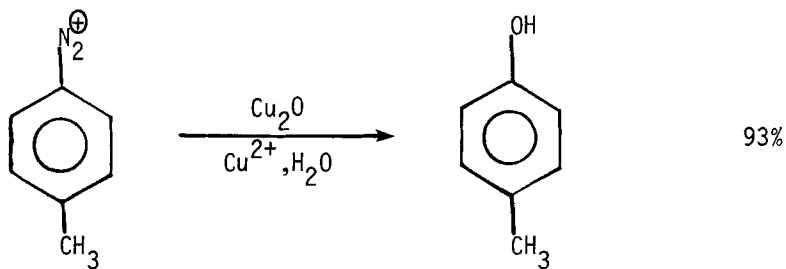
No examples of the reaction $\text{RR}' \rightarrow \text{ROH}$ ($\text{R}' = \text{alkyl, aryl, etc.}$) occur in the literature. For reactions of the type $\text{RH} \rightarrow \text{ROH}$ ($\text{R} = \text{alkyl or aryl}$) see Section 41 (Alcohols and Phenols from Hydrides).

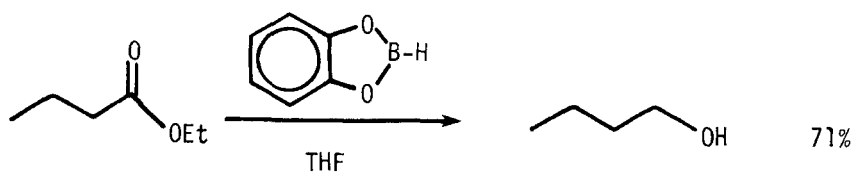
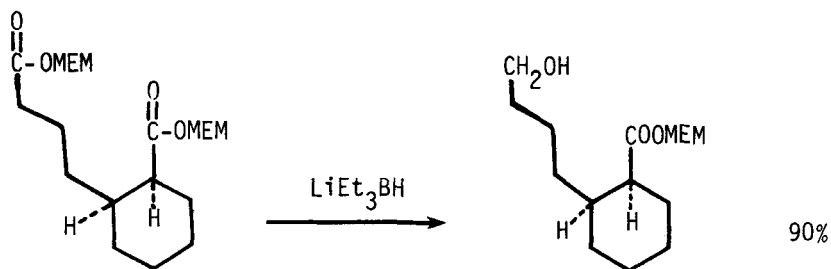
Section 36 Alcohols from Amides

Synthesis, 635 (1977)

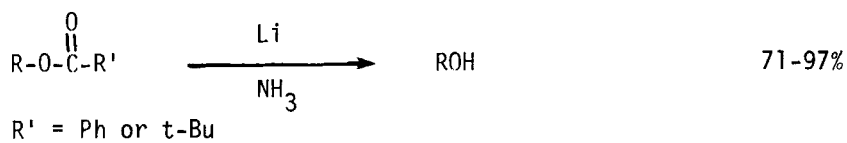
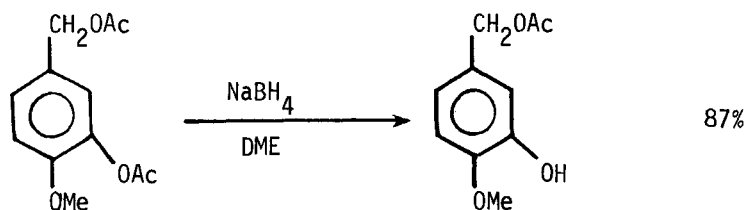
JOC 44, 860 (1979)Section 37 Alcohols and Phenols from Amines

JCS Perkin I, 1114 (1977)

JOC 42, 2053 (1977)

Section 38 Alcohols and Phenols from EstersJOC 42, 512 (1977)JOC 42, 3963 (1977)

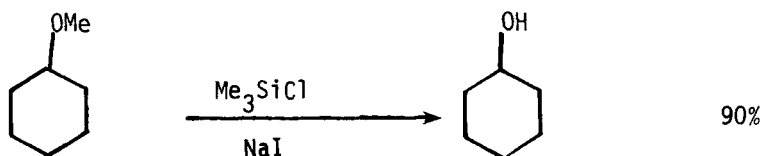
Tetr Lett, 4705 (1979)

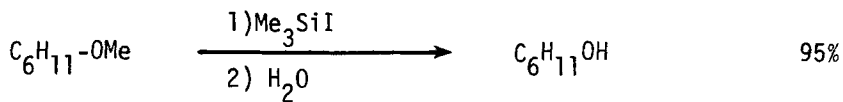
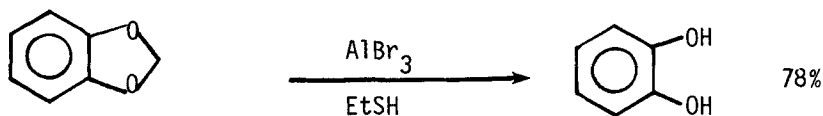
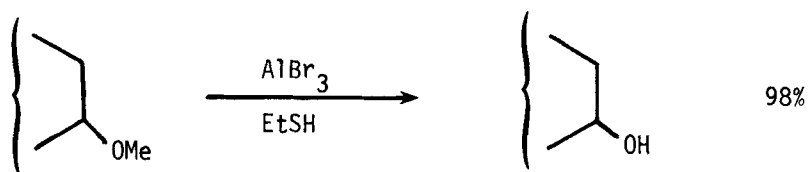
JOC 44, 2810 (1979)

Benzyl esters, benzoates, and cinnamates are unaffected.

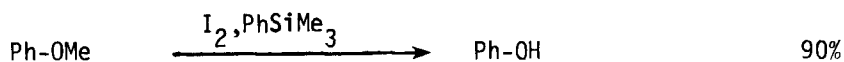
JOC 43, 155 (1978)

Related Methods: Carboxylic Acids from Esters - Section 23,
Protection of Alcohols - Section 45A

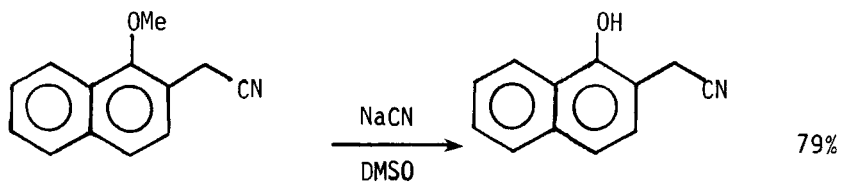
Section 39 Alcohols and Phenols from Ethers and EpoxidesJOC 44, 1247 (1979)

JOC 42, 3761 (1977)

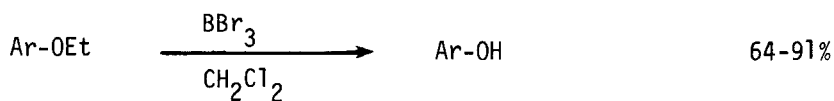
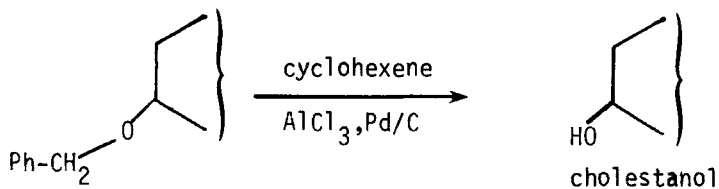
Chem Lett, 97 (1979)



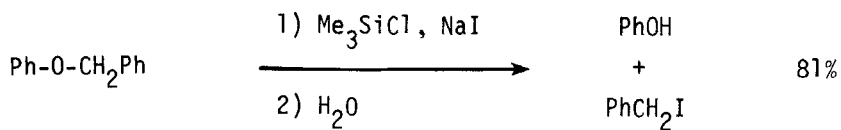
Synthesis, 417 (1977)



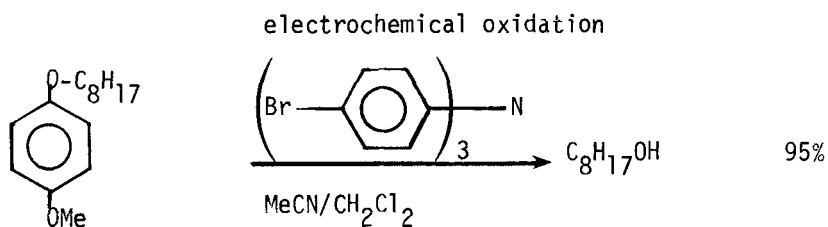
Tetr Lett, 5183 (1978)

Synth Comm 9, 407 (1979)

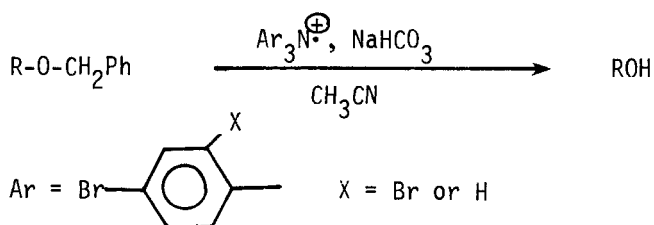
Synthesis, 825 (1978)



JCS Chem Comm, 874 (1978)

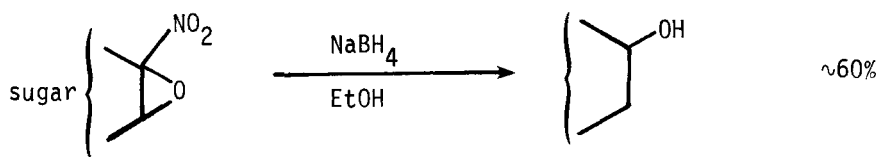


Angew Int Ed 17, 673 (1978)

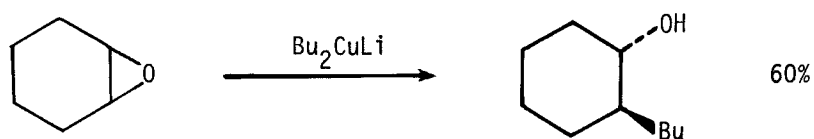


Angew Int Ed 18, 801 and 802
(1979)

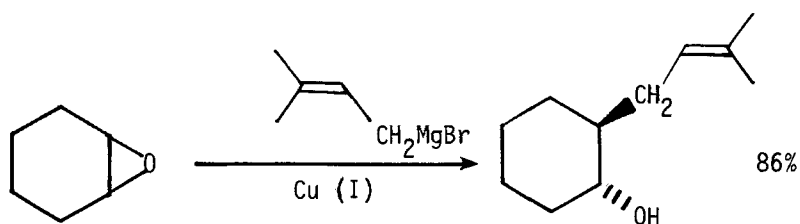
Additional examples of ether cleavages may be found in Section 45A (Protection of Alcohols and Phenols).



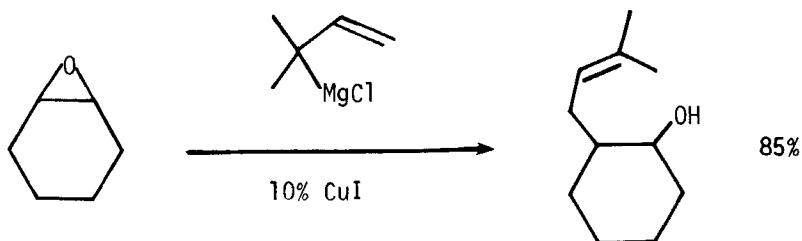
Can J Chem 56, 1177 (1978)



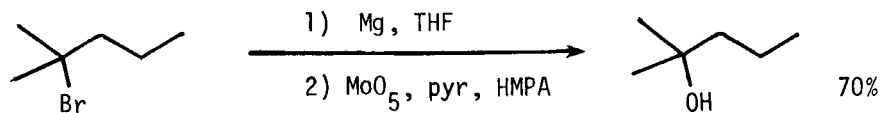
Tetr Lett, 3407 (1977)



Tetr Lett, 1503 (1979)

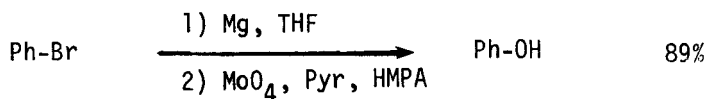


Tetr Lett, 4069 (1978)

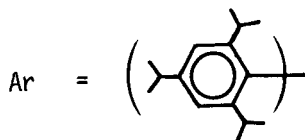
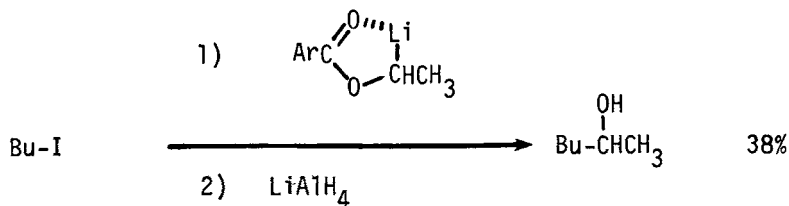
Section 40 Alcohols and Phenols from Halides

Also works with aromatic halides.

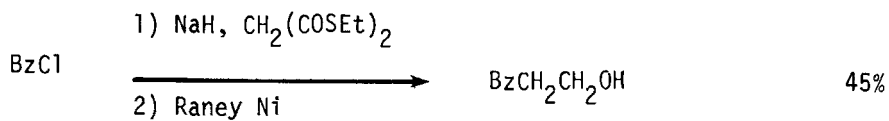
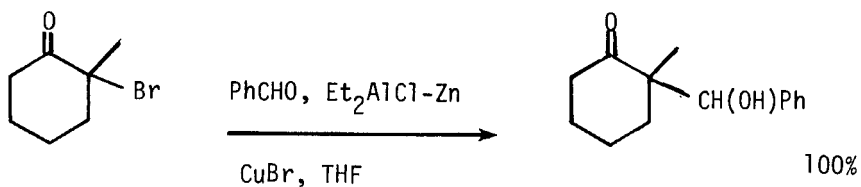
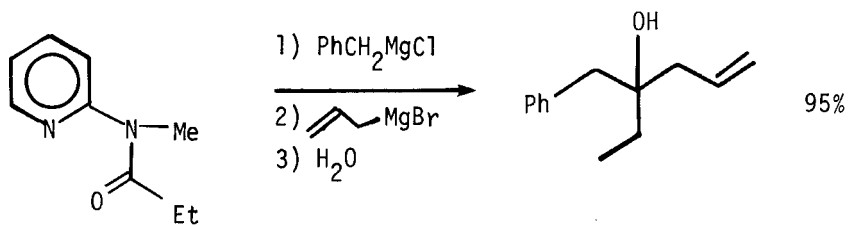
Aust J Chem 31, 2091 (1978)



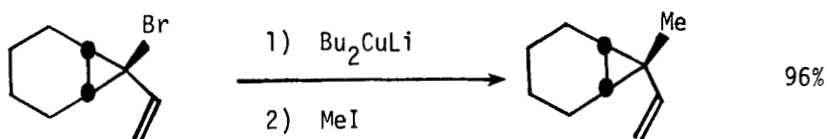
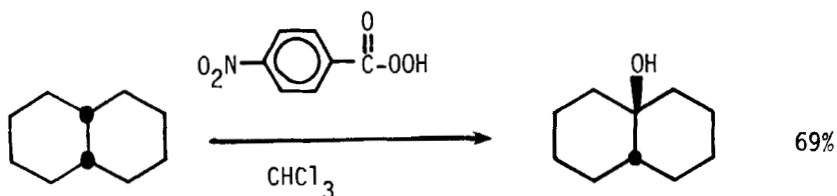
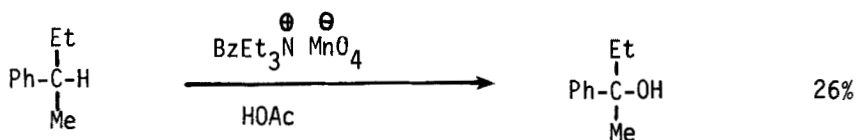
JOC 42, 1479 (1977)



JOC 43, 4255 (1978)

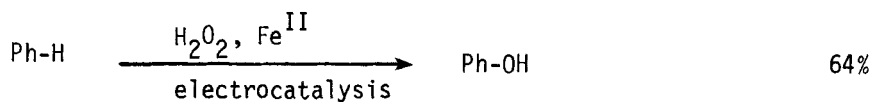
Can J Chem 57, 2522 (1979)JACS 99, 7705 (1977)

Tetr Lett, 5179 (1978)

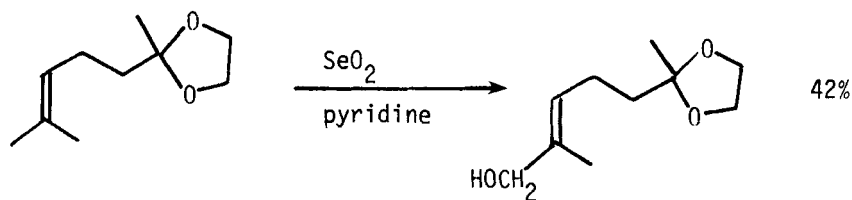
JACS 99, 5816 (1977)Section 41 Alcohols and Phenols from HydridesAngew Int Ed 18, 407 (1979)Angew Int Ed 18, 68 and 69 (1979)

Review: "Superacid-Catalyzed Oxygenation of Alkanes"

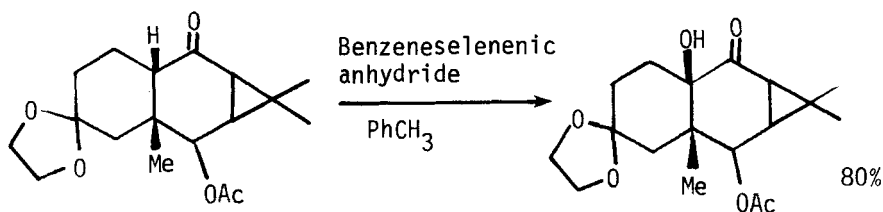
Angew Int Ed 17, 909 (1978)



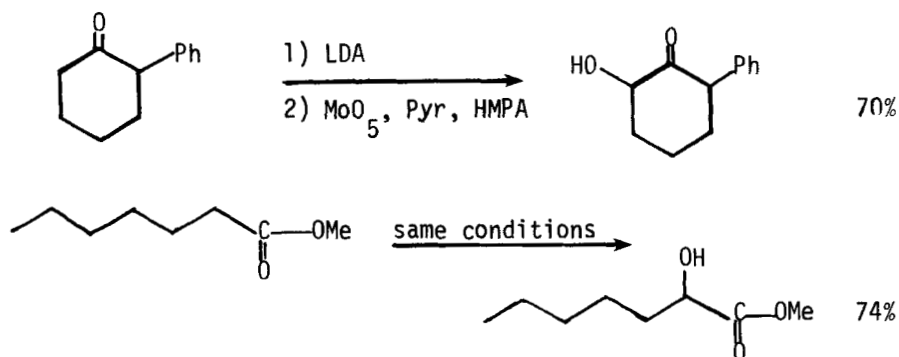
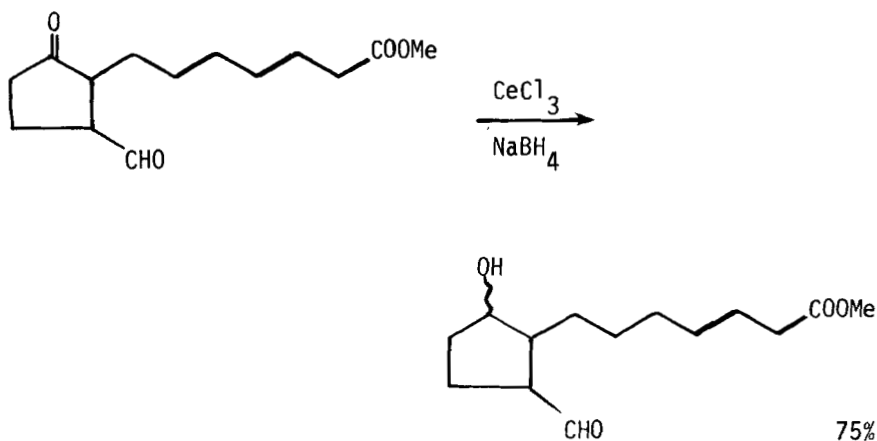
Chem Ber 110, 3561 (1977)

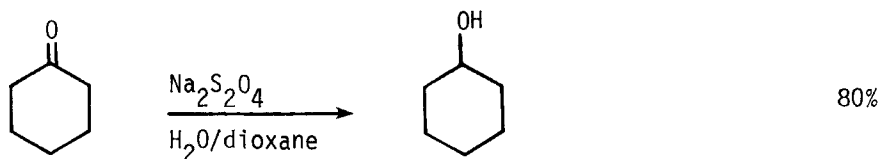


Synthesis, 215 (1978)

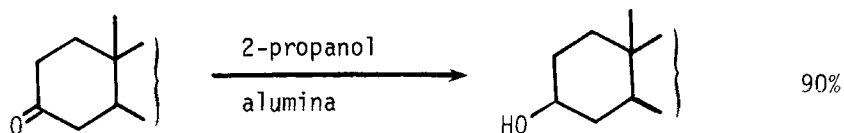
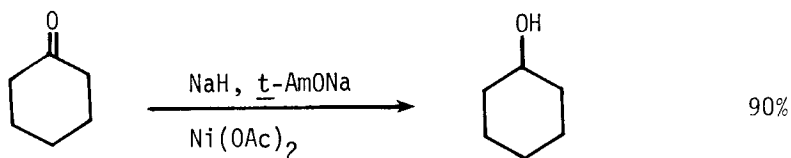


Chem Lett, 763 (1979)

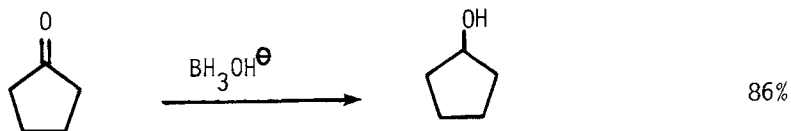
JOC 43, 188 (1978)Section 42 Alcohols from KetonesJACS 101, 5848 (1979)

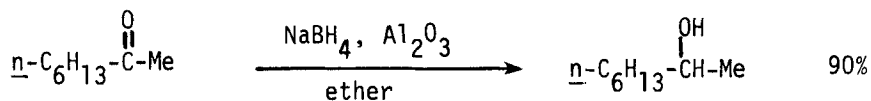


Synthesis, 246 (1977)

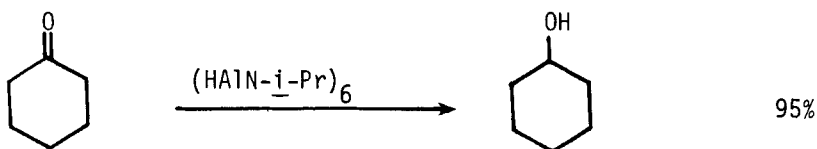
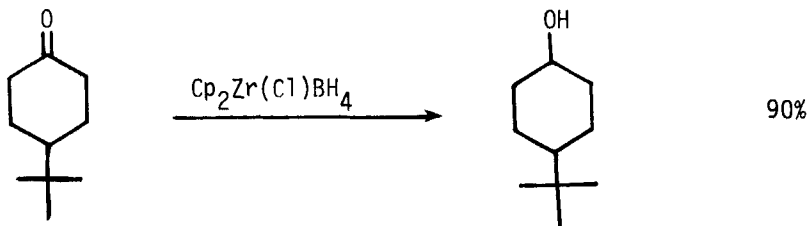
JOC 42, 1202 (1977)JOC 43, 4804 (1978)

Tetr Lett, 1069 (1977)

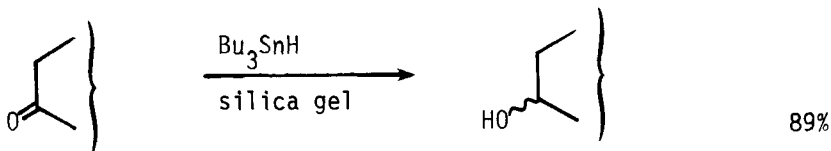
JOC 42, 3963 (1977)

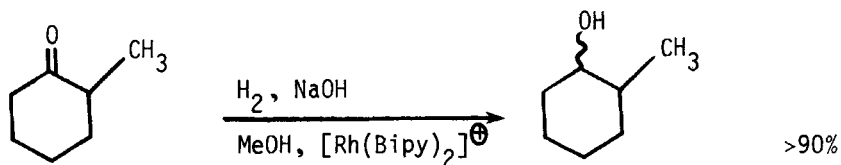


Synthesis, 891 (1978)

Z Chem 17, 18 (1977)

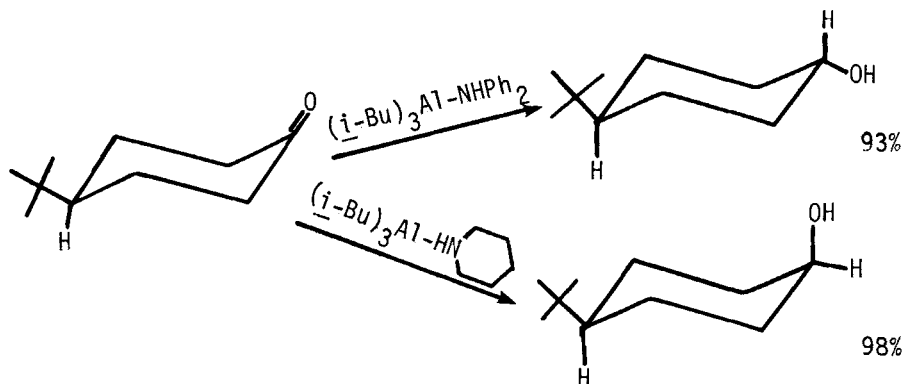
Tetr Lett, 4985 (1978)

JOC 43, 3977 (1978)

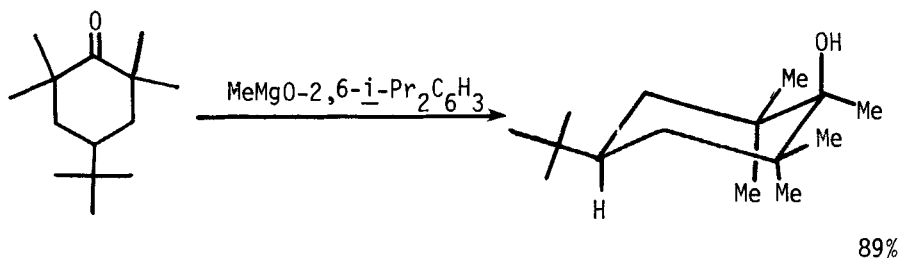


Can be accomplished in the presence of olefins.

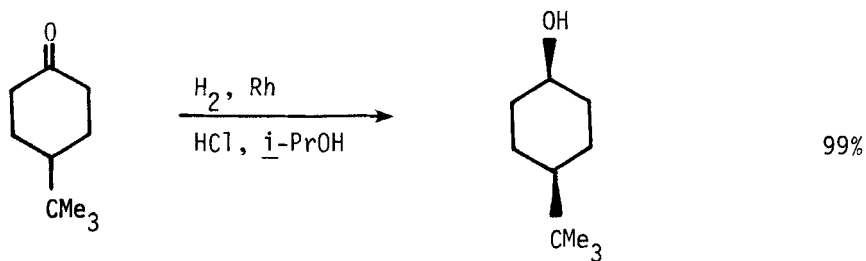
J Organometal Chem 157, 345(1978)



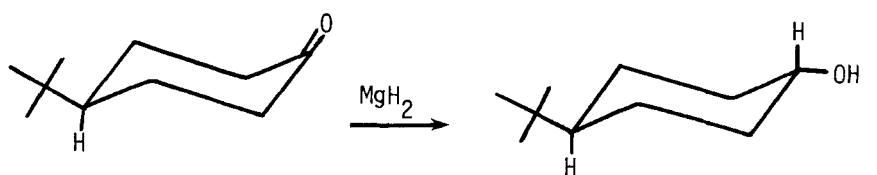
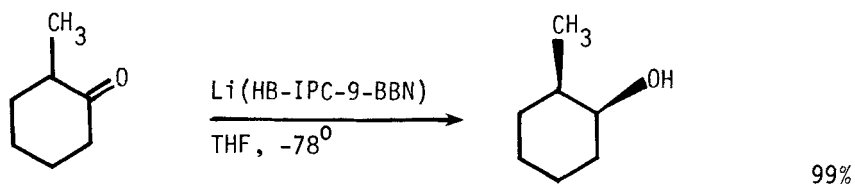
BCS Japan 51, 2664 (1978)

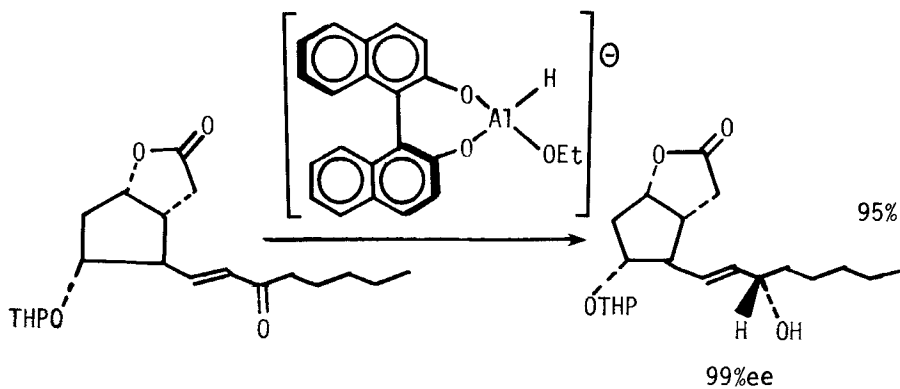
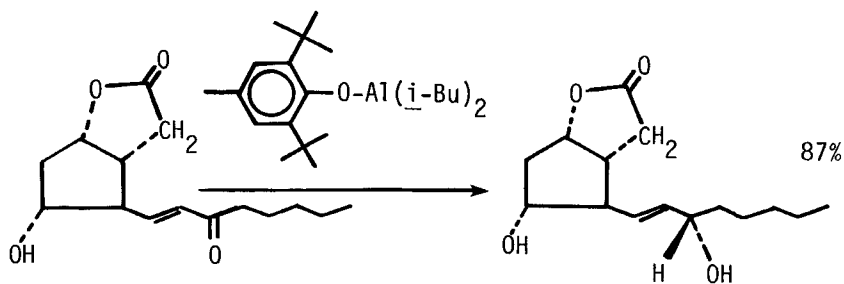


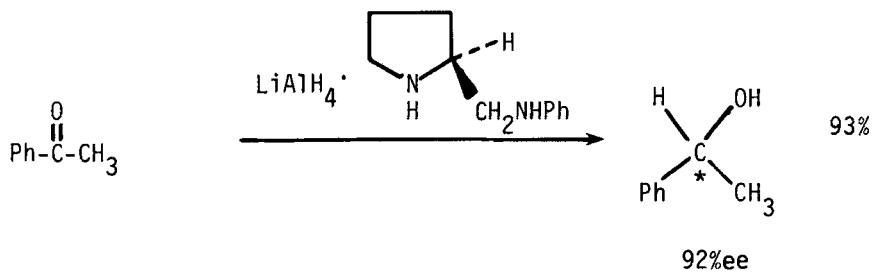
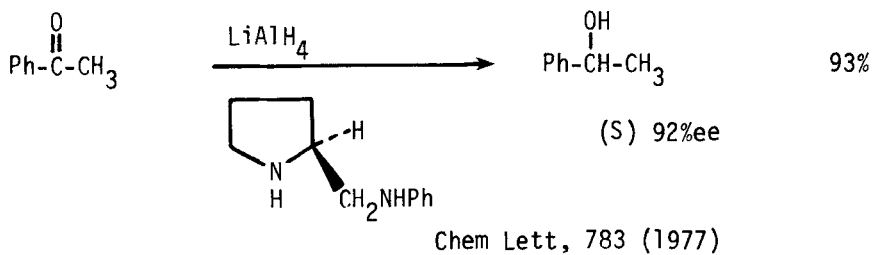
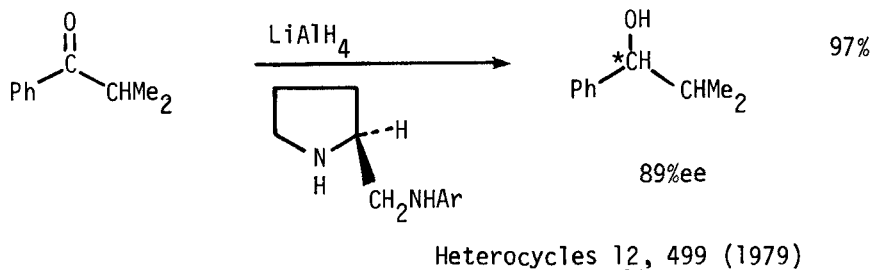
JOC 43, 4094 (1978)

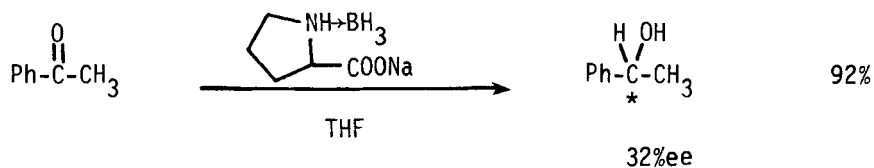
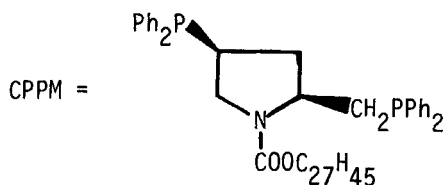
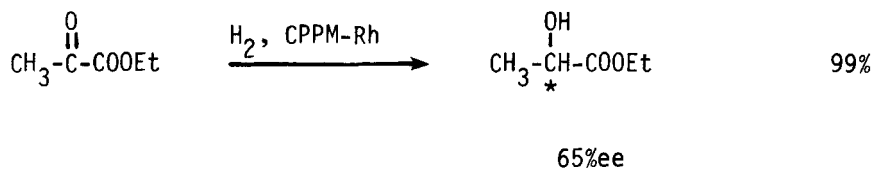


Chem Lett, 963 (1977)

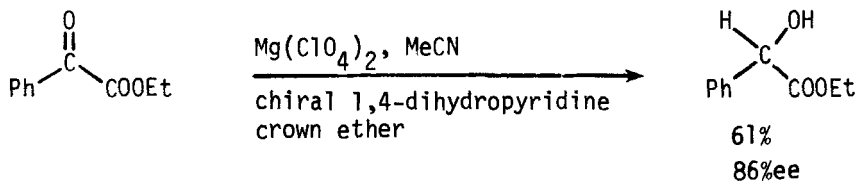
JOC 43, 1564 (1978)JOC 42, 2534 (1977)

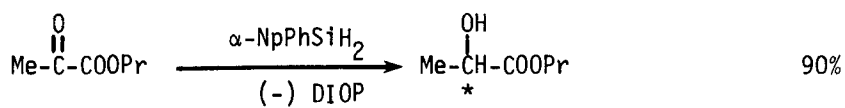
JACS 101, 3129 (1979)JACS 101, 5843 (1979)JOC 44, 1363 (1979)

BCS Japan 51, 1869 (1978)

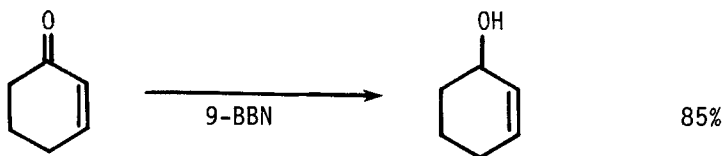
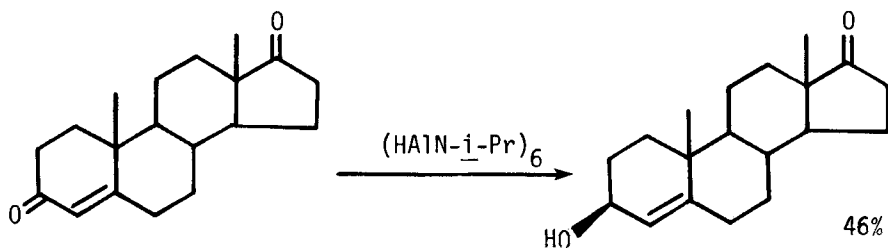
Chem Pharm Bull 27, 1479 (1979)

Tetr Lett, 3735 (1977)

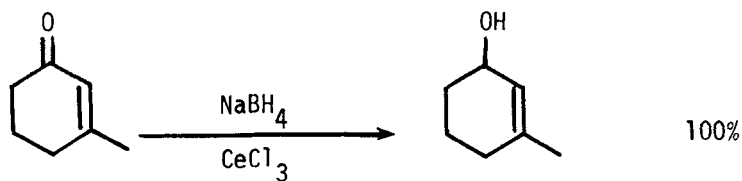
JACS 101, 2759 (1979)JACS 101, 7036 (1979)



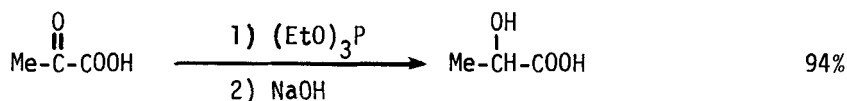
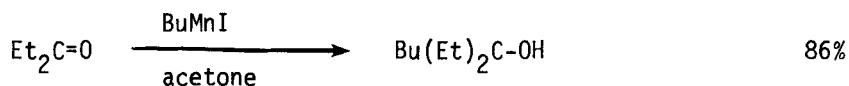
85%ee

JOC 42, 1671 (1977)JOC 42, 1197 (1977)

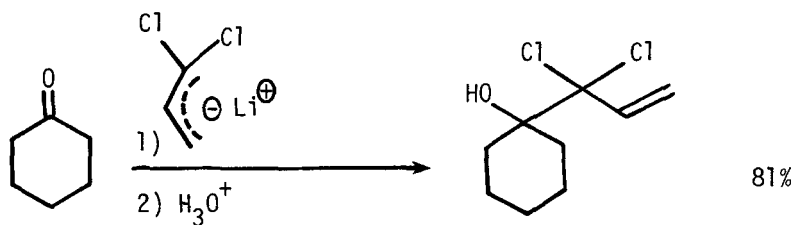
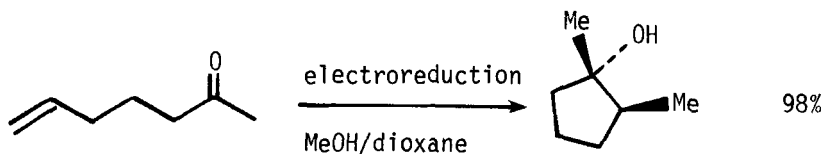
Tetr Lett, 2369 (1977)

JACS 100, 2226 (1978)

The catalyst $\text{Rh}(\text{bipy})_2^{\oplus}$ selectively hydrogenates ketones to alcohols in the presence of olefins.

J Organometal Chem 140, 63 (1977)JOC 42, 2797 (1977)

Tetr Lett, 3383 (1977)

JACS 99, 5317 (1977)JACS 100, 545 (1978)

Review: "Stereochemistry and Mechanism of Ketone Reductions by Hydride Reagents"

Tetrahedron 35, 449 (1979)

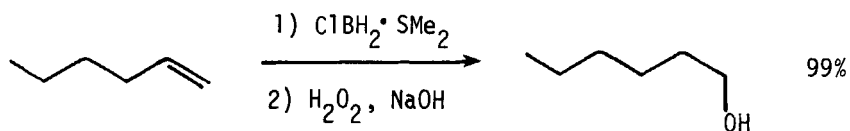
Related methods: Alcohols from Aldehydes (Section 34)

Section 43 Alcohols and Phenols from Nitriles

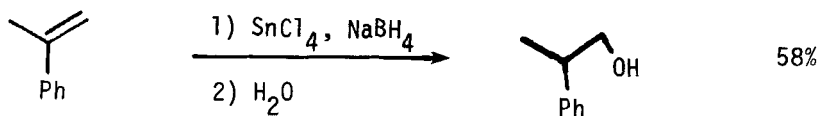
No additional examples

Section 44 Alcohols from Olefins

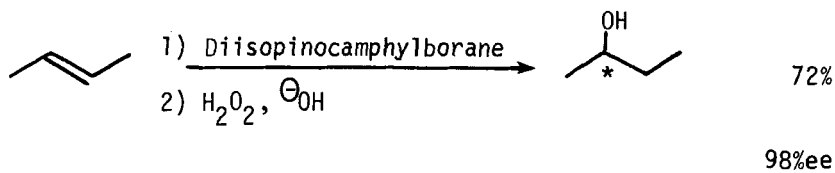
For the preparation of diols from olefins see Section 323
(Alcohol-Alcohol)



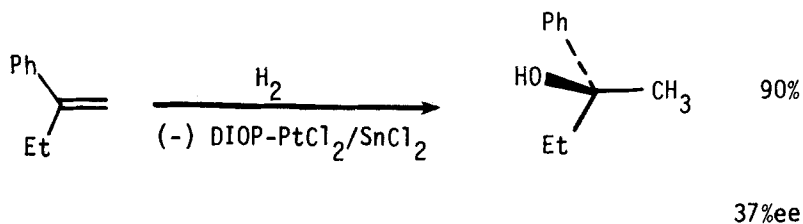
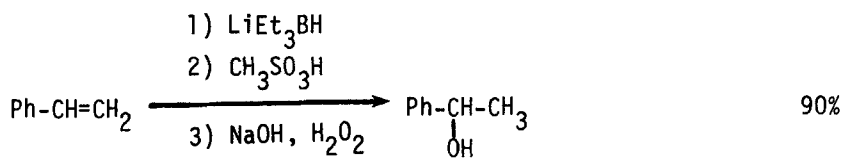
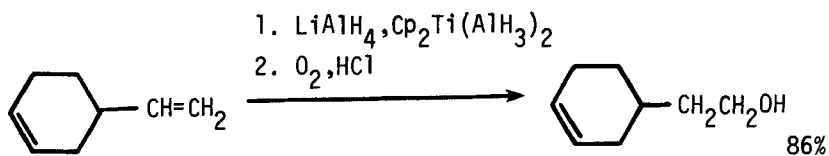
JOC 42, 2533 (1977)



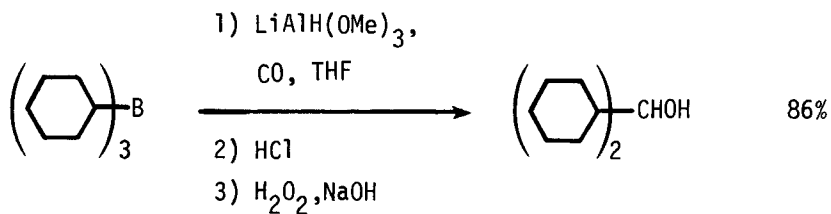
JCS Chem Comm, 796 (1979)



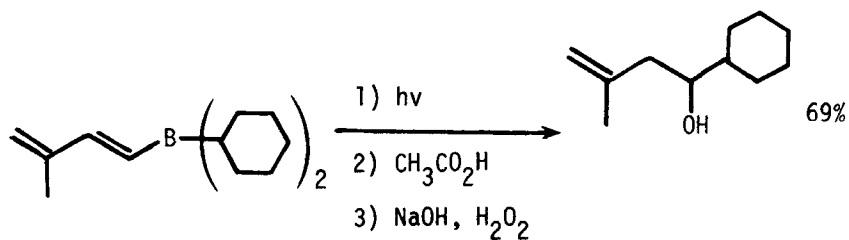
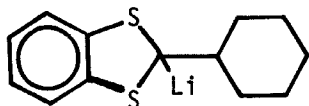
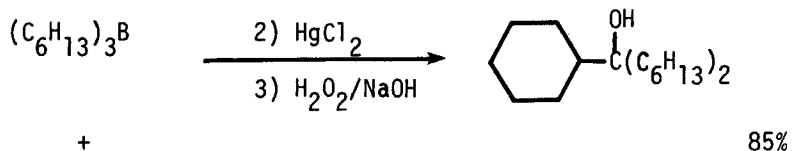
Israel J Chem 15, 12 (1977)

Israel J Chem 15, 221 (1977)JOC 42, 1482 (1977)

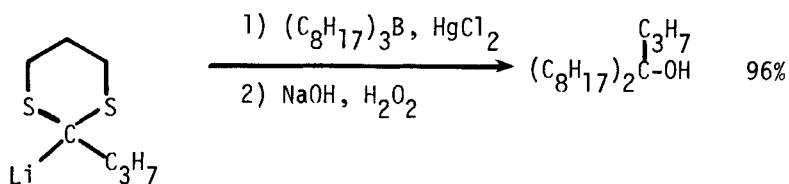
Chem Lett, 1117 (1977)



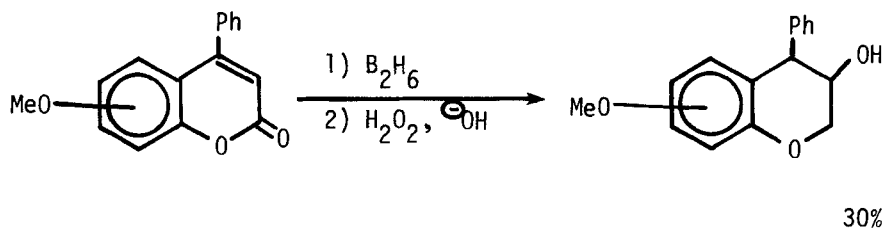
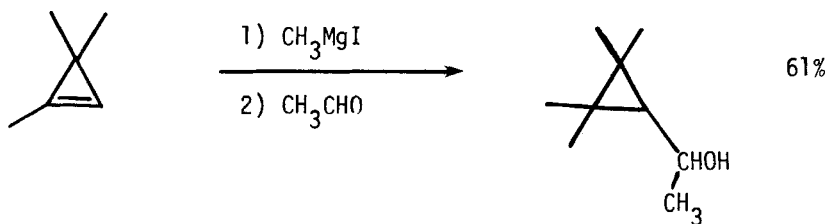
Synthesis, 676 (1978)

JACS 99, 5192 (1977)

Tetr Lett, 1895 (1979)



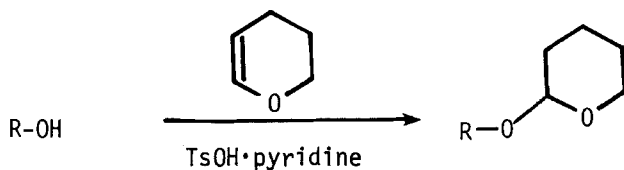
JCS Perkin I, 1172 (1977)

Comptes Rendus 289, 227 (1979)Bull Acad USSR Chem 27, 1364 (1979)

Section 45 Alcohols from Miscellaneous Compounds

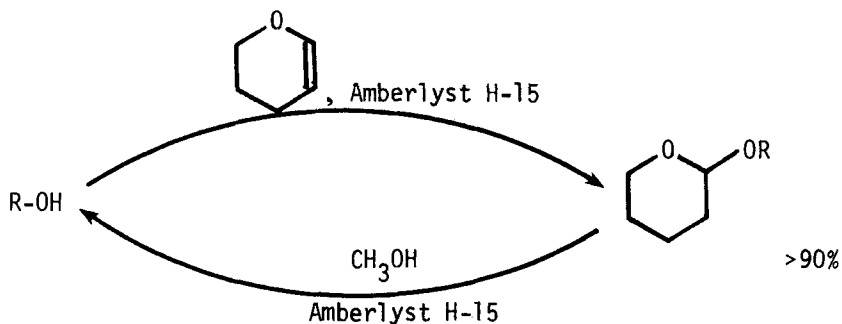
No additional examples

For conversions of boranes to alcohols, see Section 44

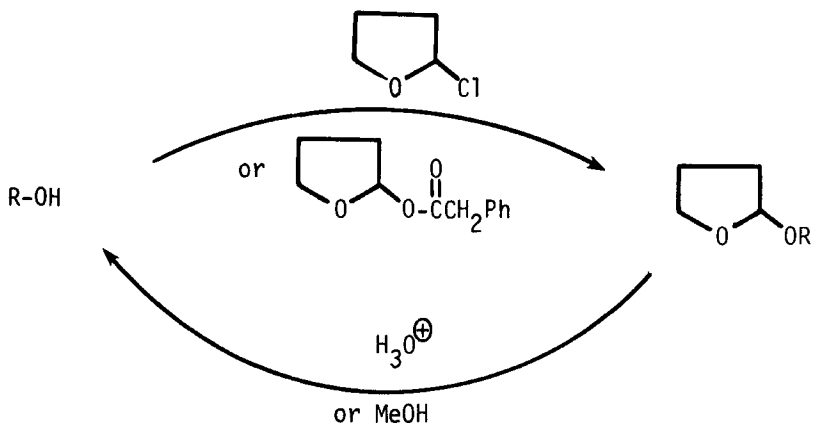
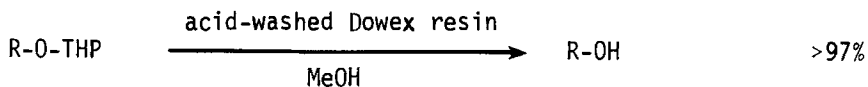
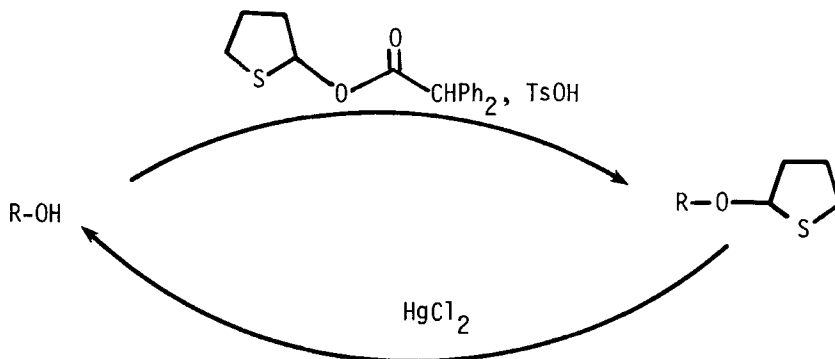
Section 45A Protection of Alcohols and Phenols

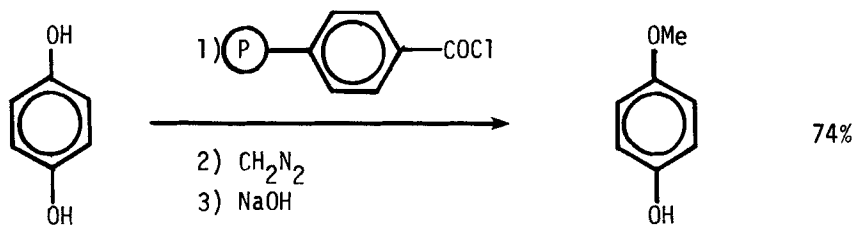
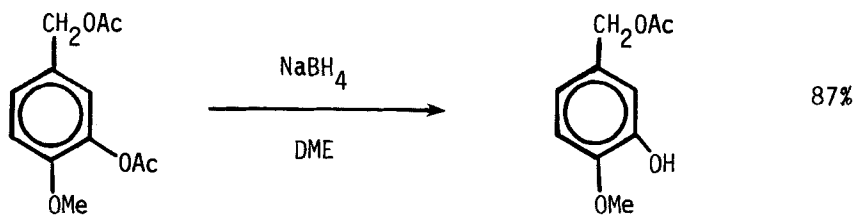
This catalyst is milder than most others, and is useful with acid-sensitive alcohols.

JOC 42, 3772 (1977)

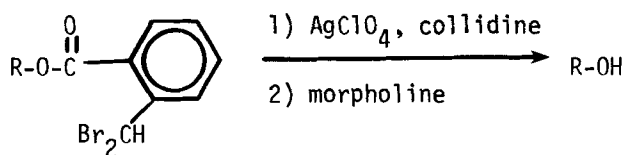


Synthesis, 618 (1979)

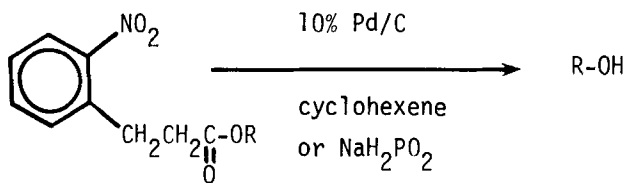
Rec Trav Chim 98, 371 (1979)Synth Comm 9, 271 (1979)JOC 43, 3548 (1978)

Can J Chem 55, 3351 (1977)

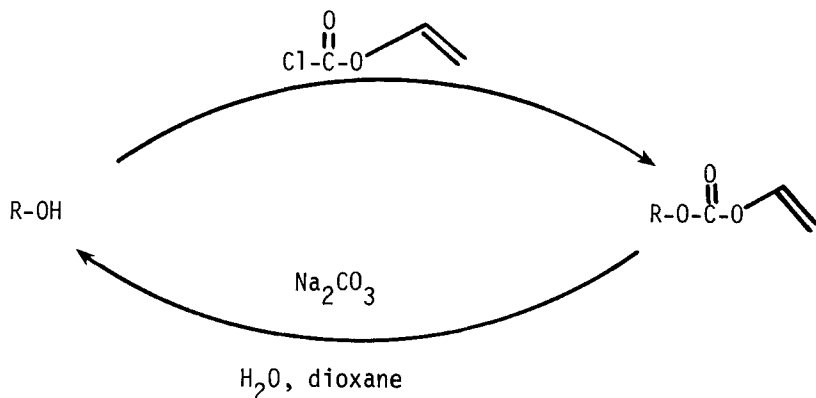
Benzyl esters, benzoates, and cinnamates are unaffected.

JOC 43, 155 (1978)

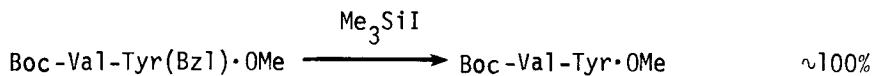
JCS Chem Comm, 987 (1979)



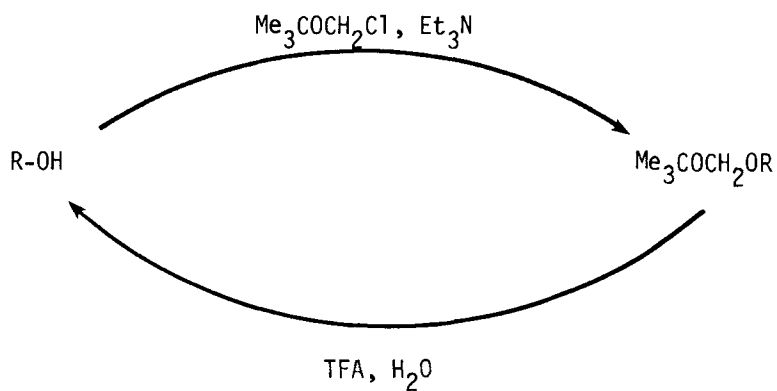
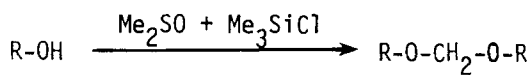
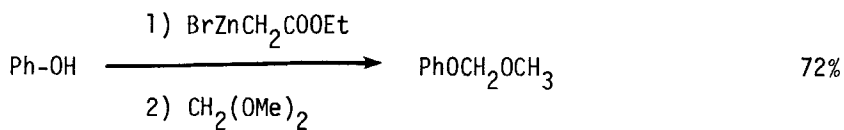
Tetr Lett, 555 (1979)



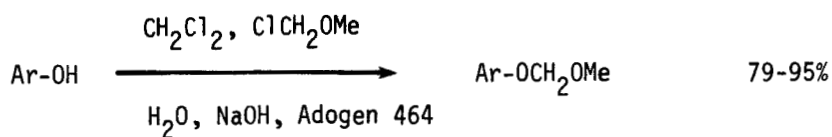
Tetr Lett, 1571 (1977)



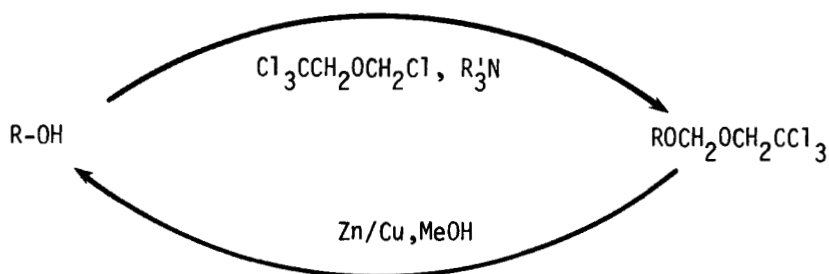
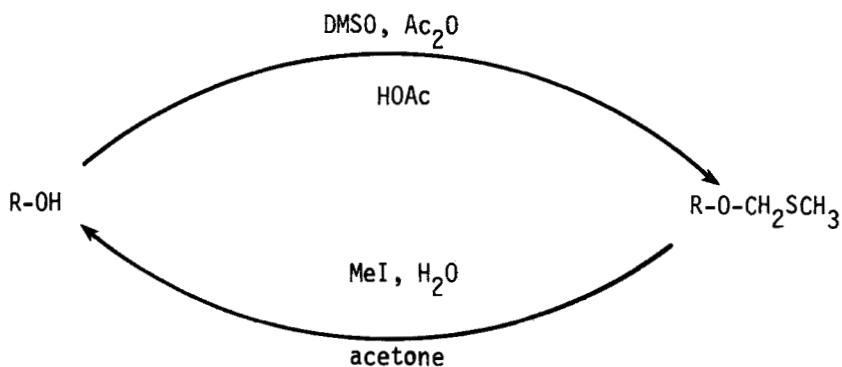
JCS Chem Comm, 495 (1979)

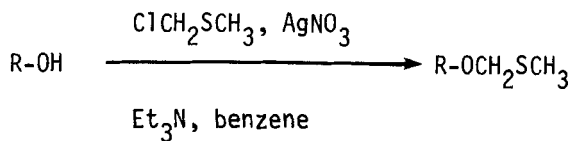
JOC 43, 3964 (1978)JOC 44, 3727 (1979)

Synthesis, 567 (1977)

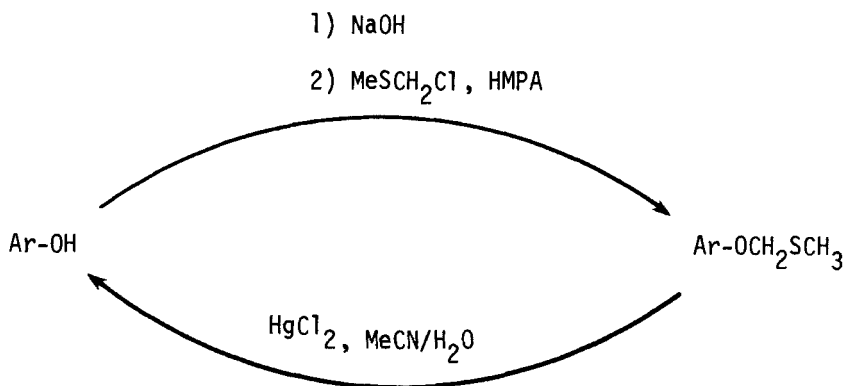


Tetr Lett, 661 (1978)

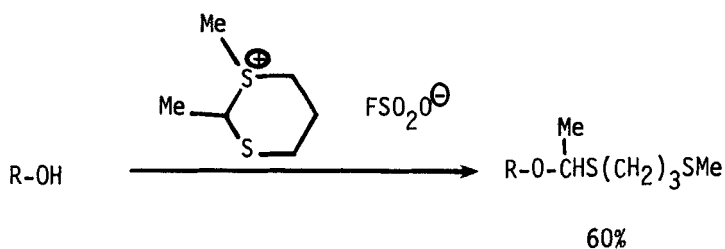
Synth Comm 9, 57 (1979)Aust J Chem 31, 1031 (1978)

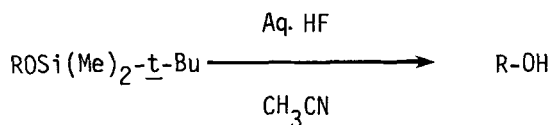


Chem Lett, 1277 (1979)

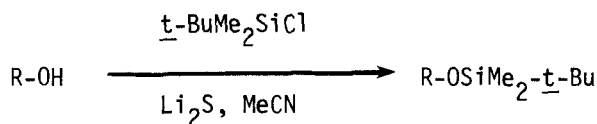
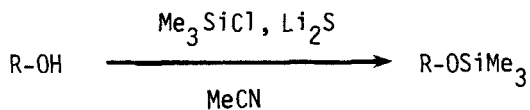


Tetr Lett, 533 (1977)

Synth Comm 9, 107 (1979)

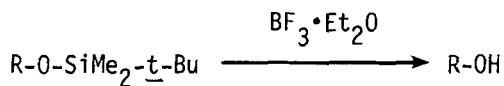


Tetr Lett, 3981 (1979)

JOC 44, 4272 (1979)

Use of triethylsilyl ethers as -OH protecting groups in the synthesis of prostaglandin D₁.

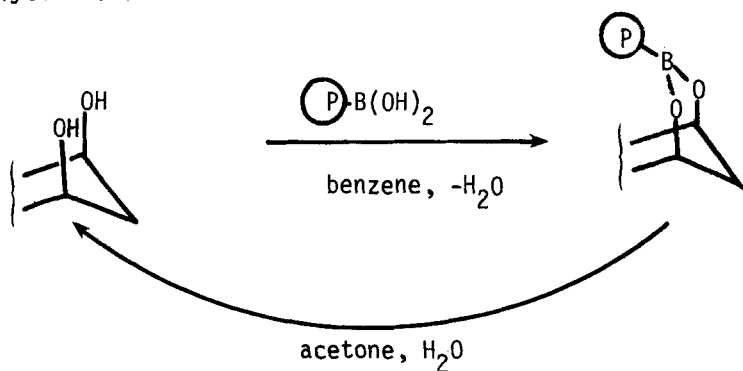
JCS Chem Comm, 156 (1979)



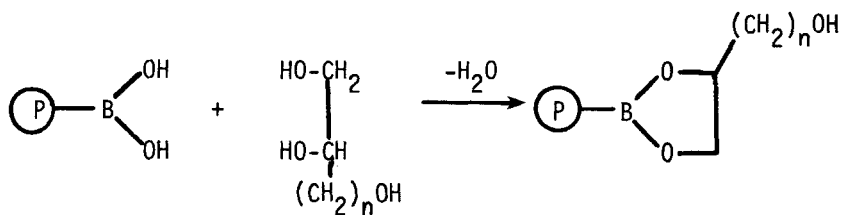
Used with prostaglandin intermediates.

Synth Comm 9, 295 (1979)

Use of polystyrylboronic acid to protect cis-1, 3-diols in glycosides.



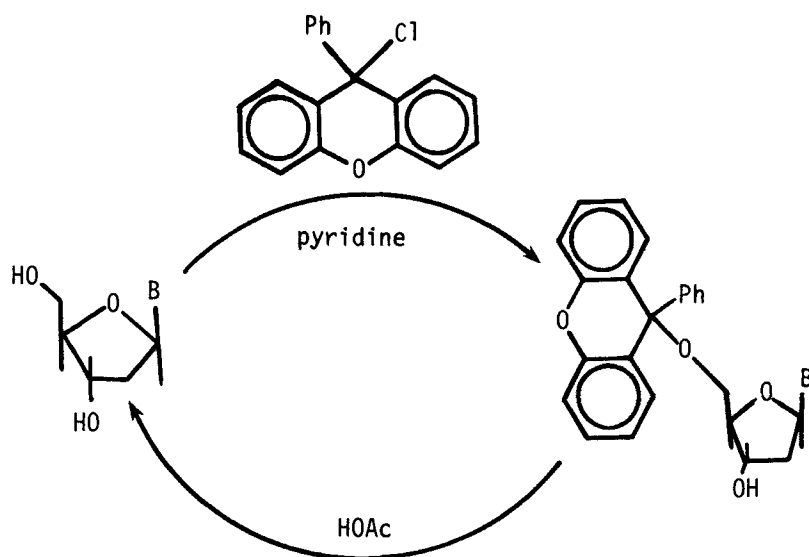
JACS 101, 432 (1979)



Israel J Chem 17, 253 (1978)

Review: "Carbohydrate Cyclic Acetal Formation and Migration"

Chem Rev 79, 491 (1979)



JCS Chem Comm, 639 (1978)

Related methods:

- Ethers from Alcohols - Section 123
- Alcohols from Ethers - Section 39
- Esters from Alcohols - Section 108
- Alcohols from Esters - Section 38

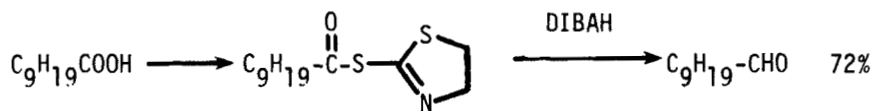
CHAPTER 4

PREPARATION OF ALDEHYDES

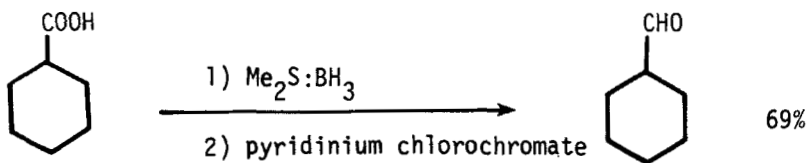
Section 46 Aldehydes from Acetylenes

No additional examples

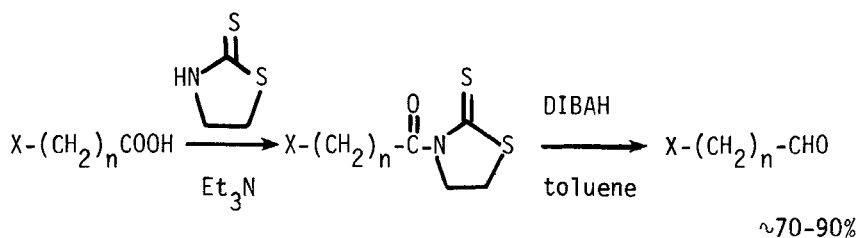
Section 47 Aldehydes from Carboxylic Acids and Acid Halides



JCS Chem Comm, 330 (1978)

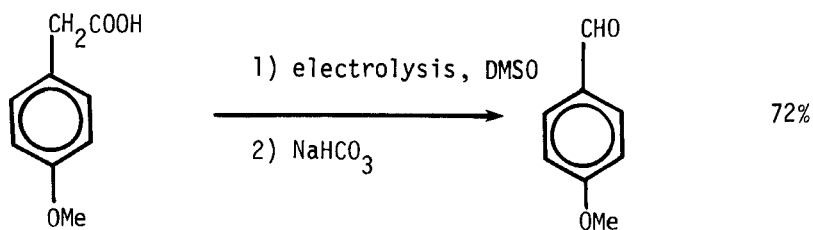


Synthesis, 704 (1979)

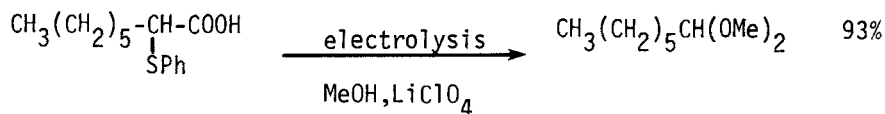


X = Ph, CN, Br

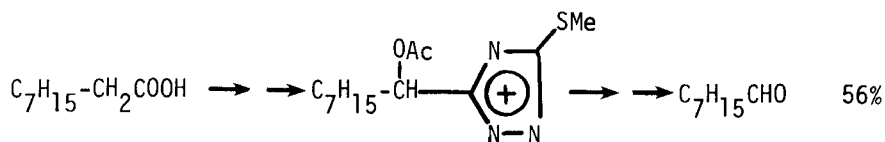
Bull Chem Soc Japan 52, 555 (1979)



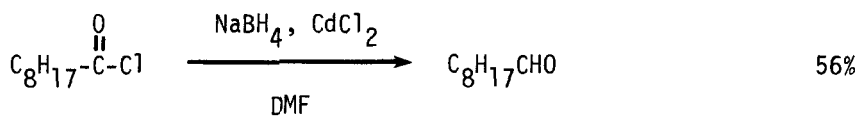
JOC 42, 1461 (1977)



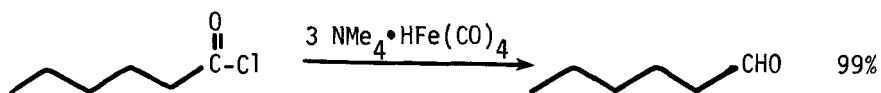
Tetr Lett, 1045 (1979)



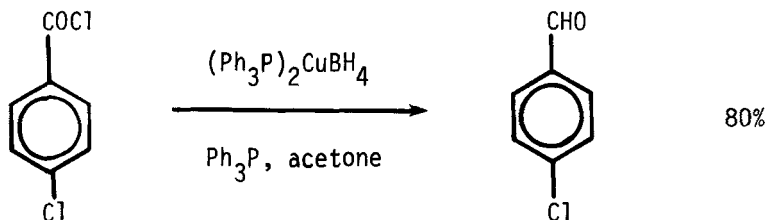
Tetr Lett, 381 (1977)



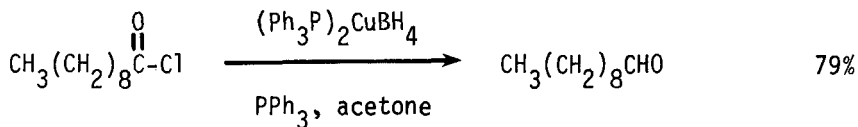
JCS Chem Comm, 354 (1978)



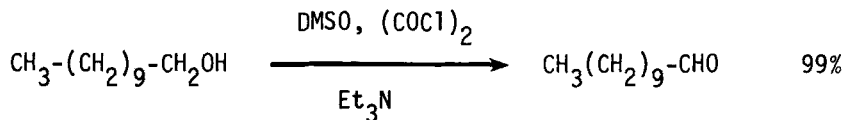
Tetr Lett, 781 (1977)



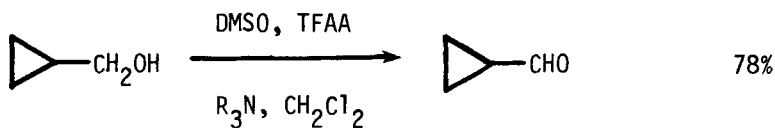
Tetr Lett, 1437 and 2473 (1978)



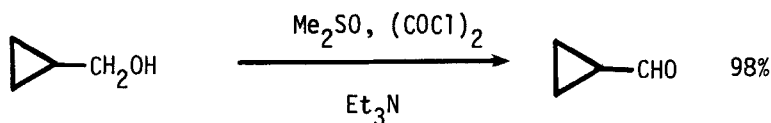
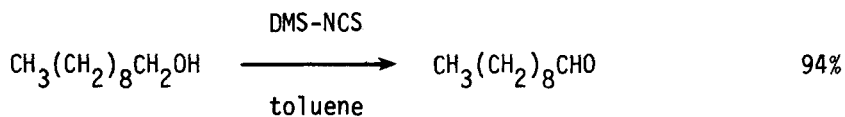
Tetr Lett, 975 (1979)

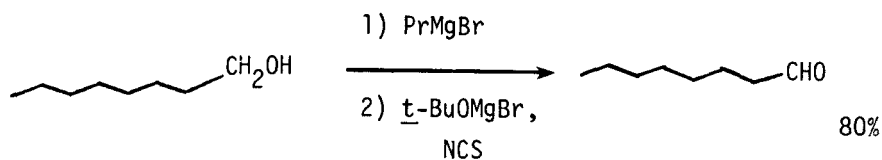
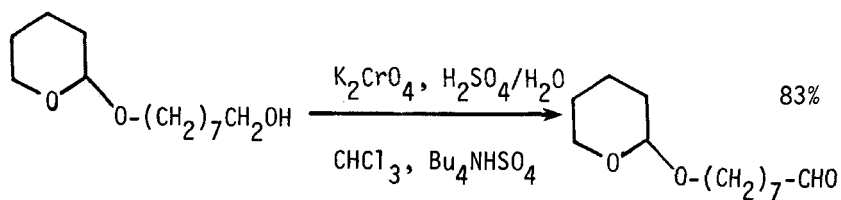
Section 48 Aldehydes from Alcohols

Synthesis, 297 (1978)

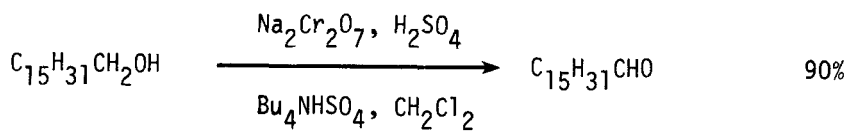
Tetrahedron 34, 1651 (1978)JOC 43, 2480 (1978)

Synthesis, 297 (1978)

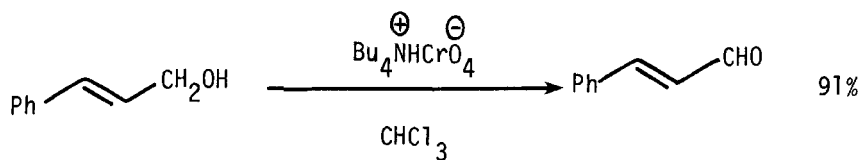
JOC 44, 4148 (1979)Tetrahedron 34, 1651 (1978)

BCS Japan 50, 2773 (1977)

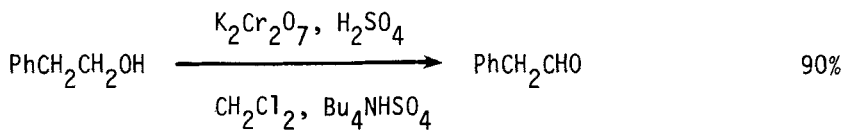
Synthesis, 134 (1979)



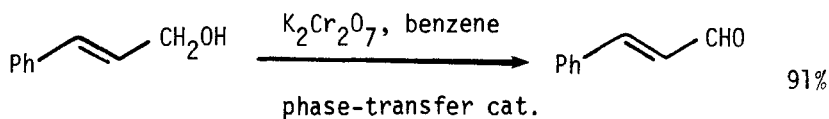
JCS Perkin II, 788 (1979)



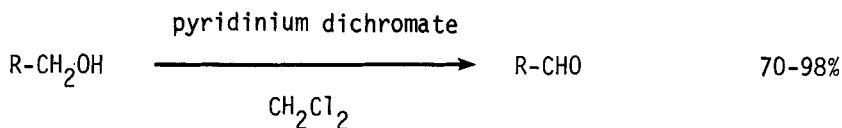
Synthesis, 356 (1979)



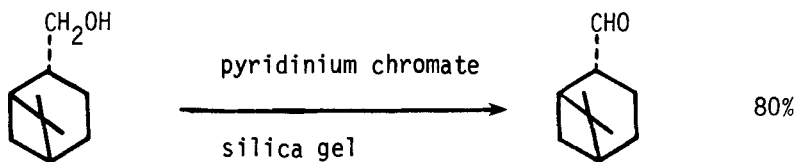
Tetr Lett, 1601 (1978)

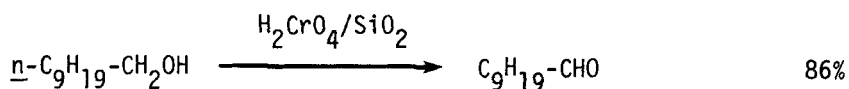


Tetr Lett, 4167 (1977)

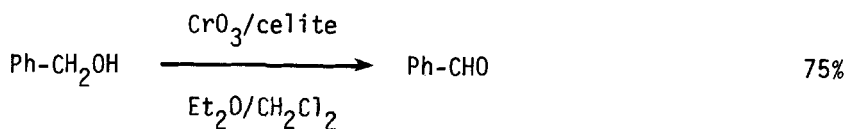


Tetr Lett, 399 (1979)

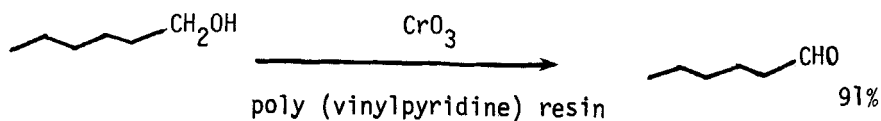
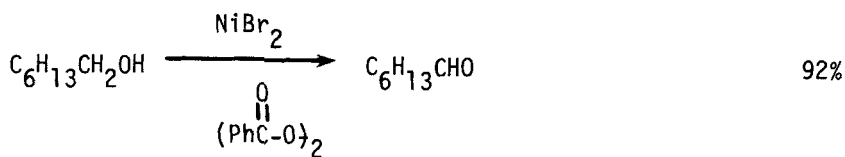
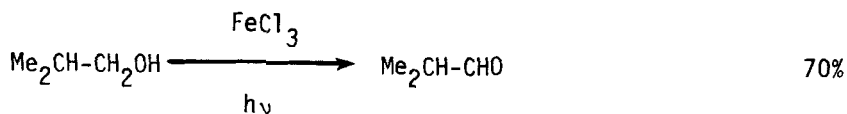
Tetrahedron 35, 1789 (1979)

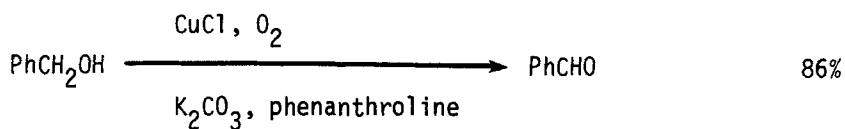


Synthesis, 534 (1978)

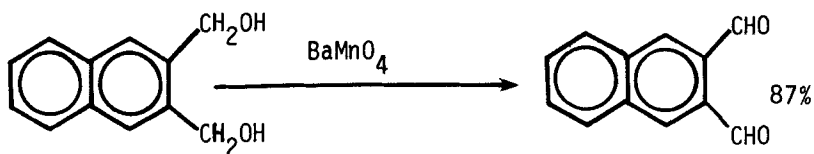


Synthesis, 815 (1979)

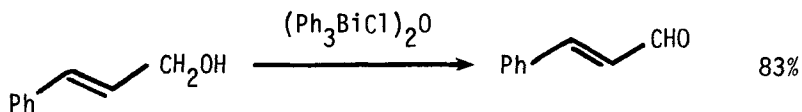
JOC 43, 2618 (1978)JOC 44, 2955 (1979)JOC 42, 171 (1977)



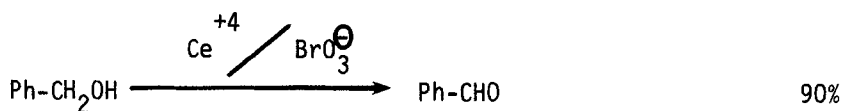
Tetr Lett, 1215 (1977)



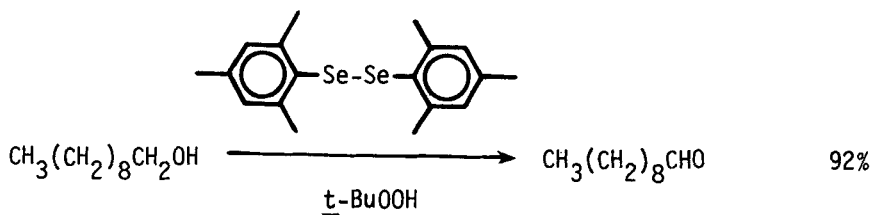
Tetr Lett, 839 (1978)



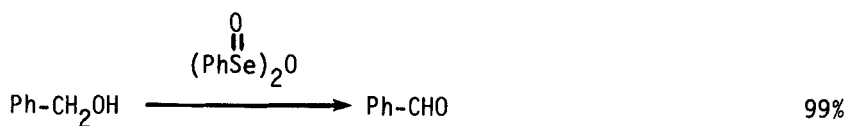
JCS Chem Comm, 1099 (1978)



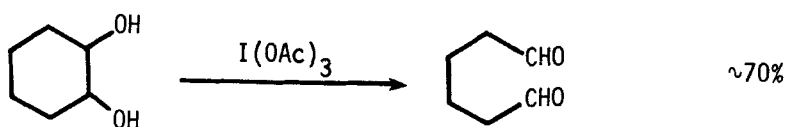
Synthesis, 936 (1978)



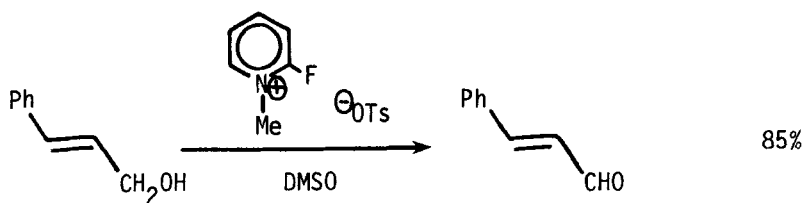
Tetr Lett, 2801 (1979)



JCS Chem Comm, 952 (1978)



JCS Perkin I, 1483 (1978)

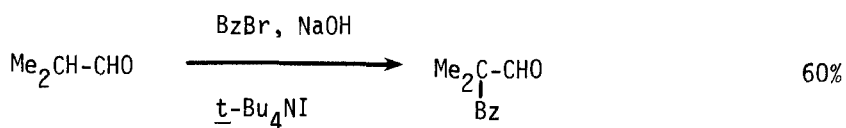


Chem Lett, 369 (1978)

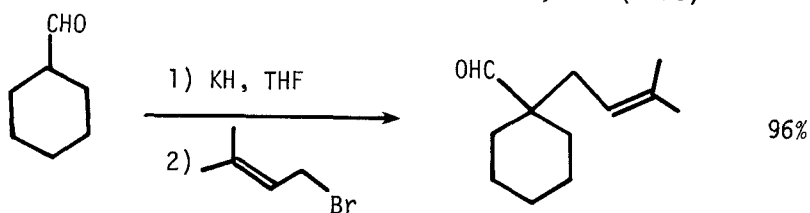
Related methods: Ketones from Alcohols and Phenols (Section 168)

Section 49 Aldehydes from Aldehydes

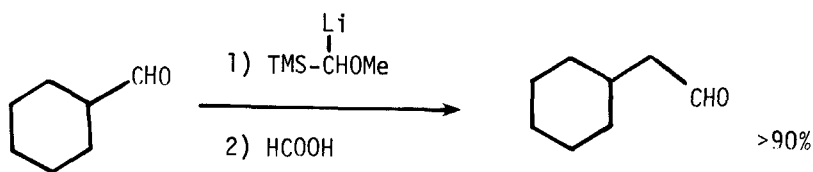
Conjugate reductions and Michael alkylations of conjugated aldehydes are listed in Section 74 (Alkyls from Olefins).



Chem and Ind, 731 (1978)



Tetr Lett, 491 (1978)



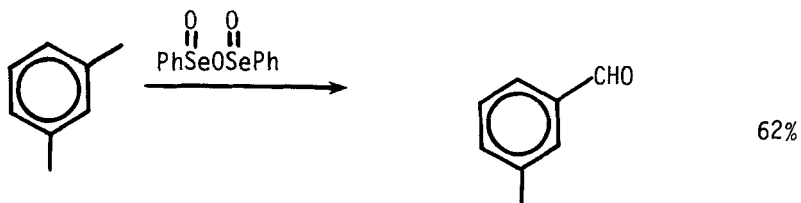
JCS Chem Comm, 822 (1979)

Review: "Synthesis of Aldehydes, Ketones, and Carboxylic Acids from Lower Carbonyl Compounds by C-C Coupling Reactions".

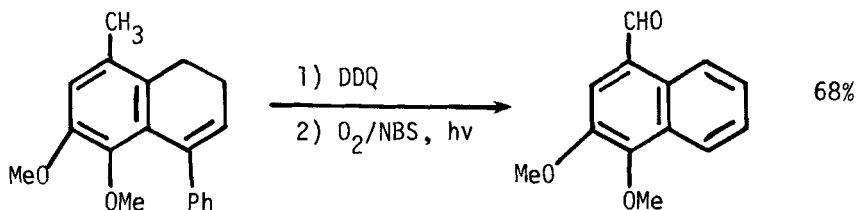
Synthesis, 633 (1979)

Related Methods: Aldehydes from Ketones (Section 57), Ketones from Ketones (Section 177). Also via: Olefinic aldehydes (Section 341).

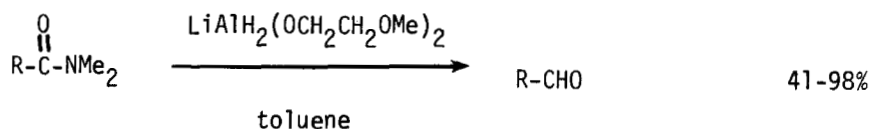
Section 50 Aldehydes from Alkyls



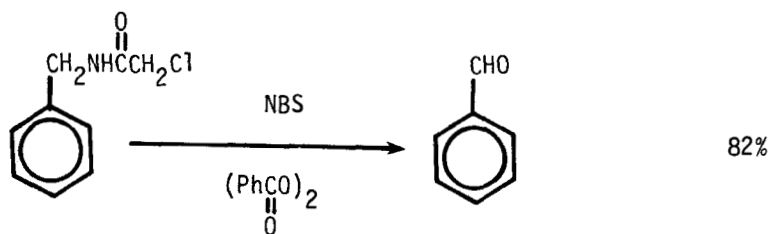
Tetr Lett, 3331 (1979)



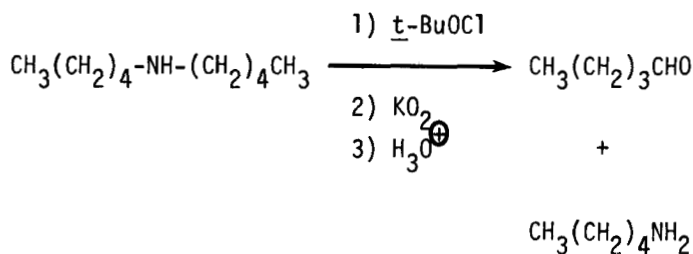
Synthesis, 144 (1979)

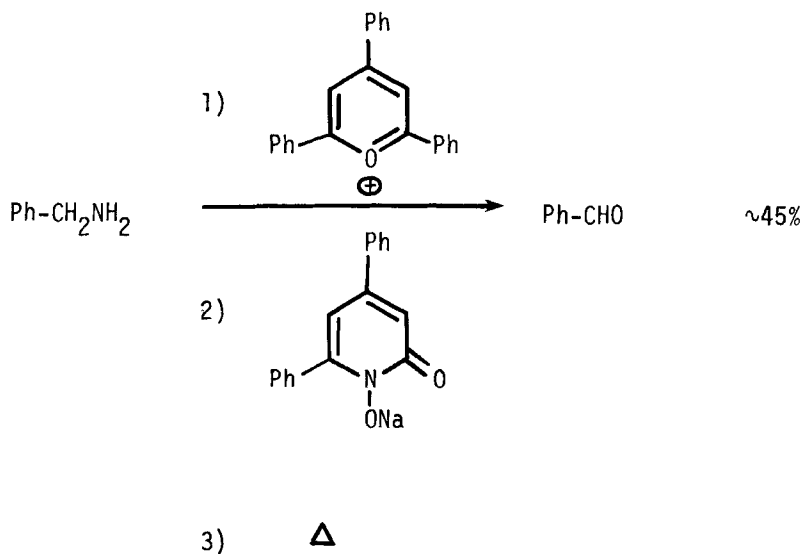
Section 51 Aldehydes from Amides

R = long-chain alkyl

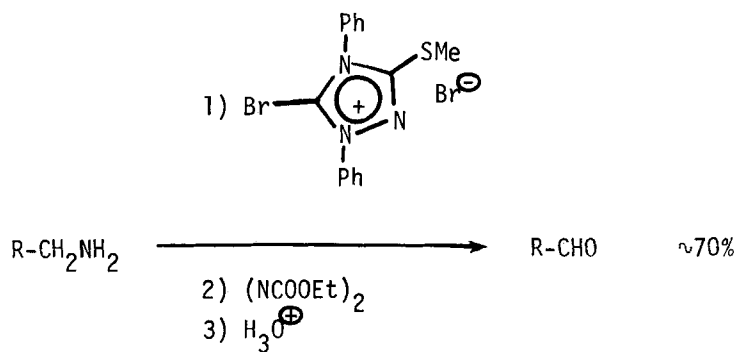
JOC (USSR) 13, 1081 (1977)

Tetr Lett, 3875 (1979)

Section 52 Aldehydes from AminesJOC 43, 1467 (1978)

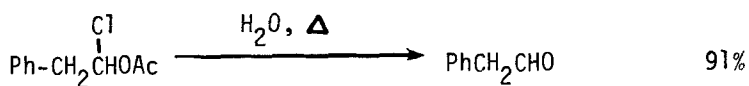
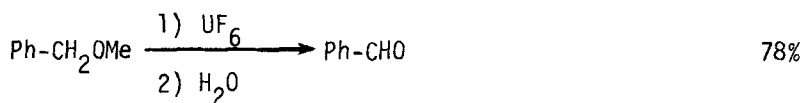
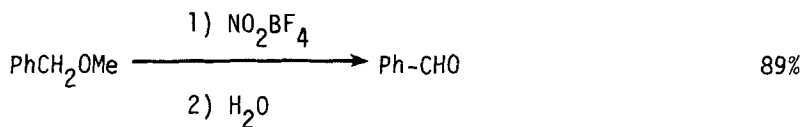


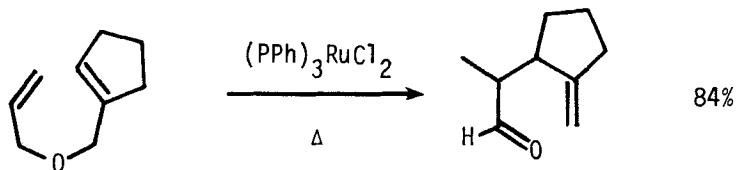
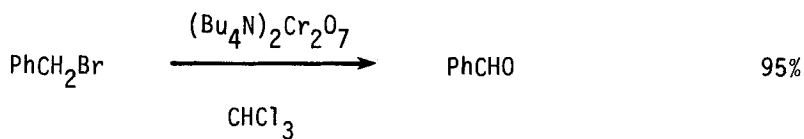
JCS Perkin I, 2500 (1979)



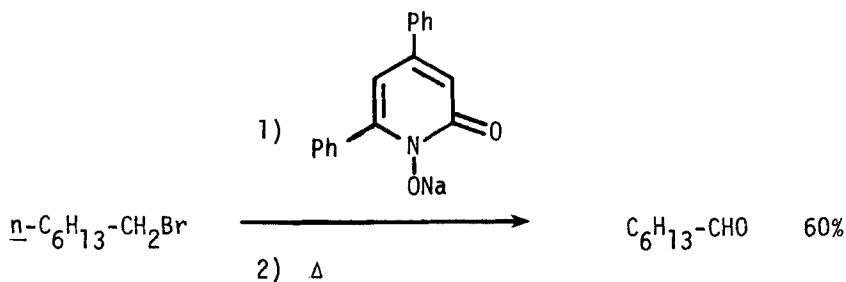
R = alkyl, aryl

Tetr Lett, 2131 (1978)

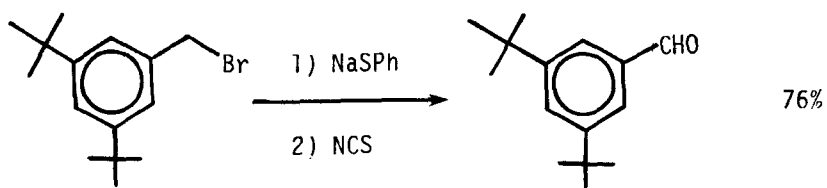
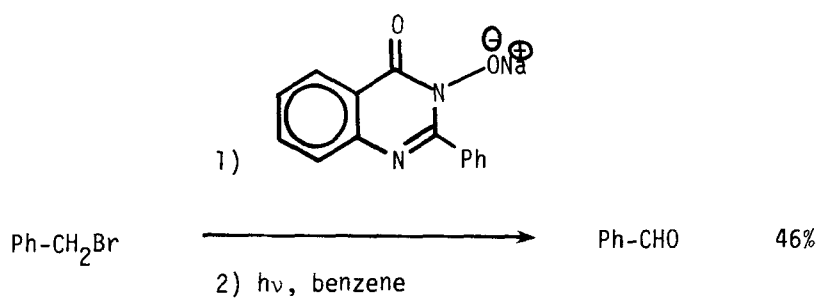
Section 53 Aldehydes from EstersJOC (USSR) 14, 254 (1978)Section 54 Aldehydes from EthersJACS 100, 5396 (1978)JOC 42, 3097 (1977)

JOC 42, 3360 (1977)Section 55 Aldehydes from Halides

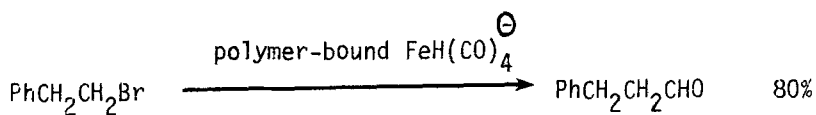
Chem & Ind, 213 (1979)

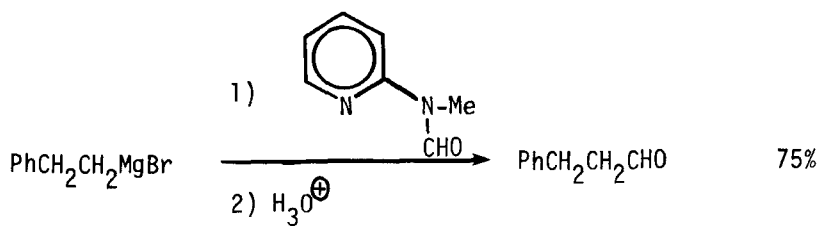


JCS Perkin I, 2493 (1979)

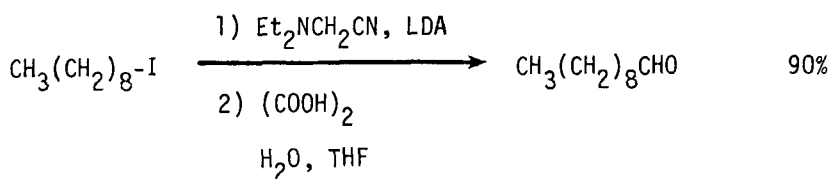
Synth Comm 6, 575 (1976)

Synthesis, 619 (1978)

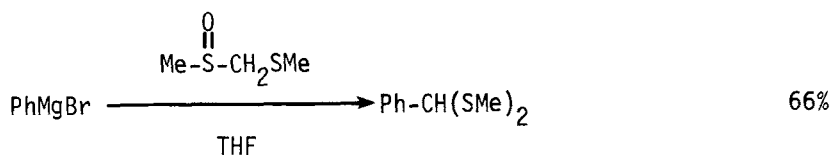
JOC 43, 1598 (1978)



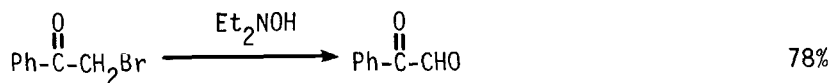
Synthesis, 403 (1978)



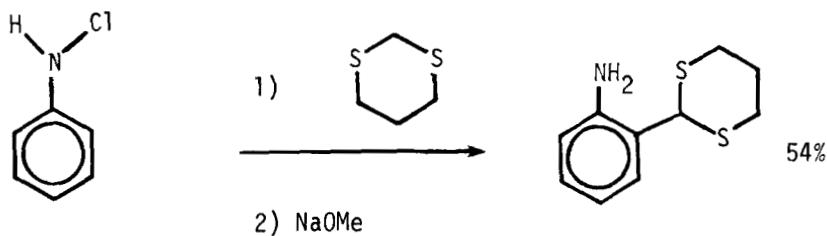
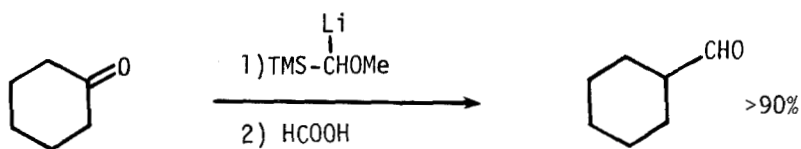
Tetr Lett, 5175 (1978)



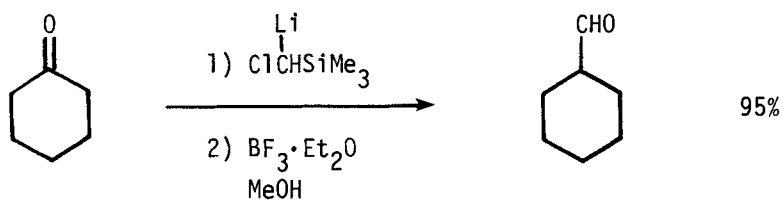
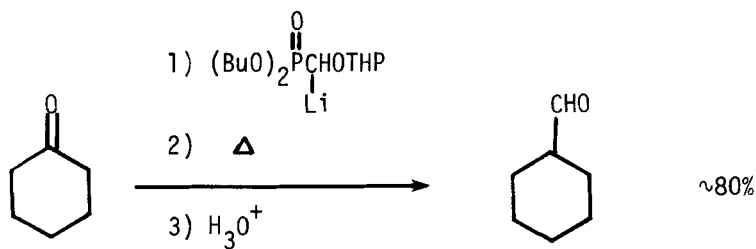
Tetr Lett, 3883 (1977)



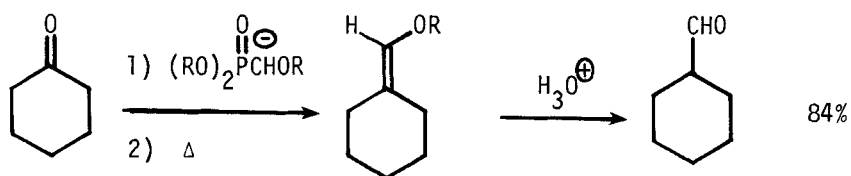
JOC 42, 754 (1977)

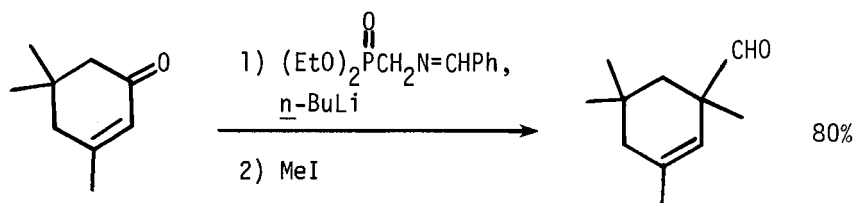
Section 56 Aldehydes from HydridesJACS 100, 7600 (1978)Section 57 Aldehydes from Ketones

JCS Chem Comm, 822 (1979)

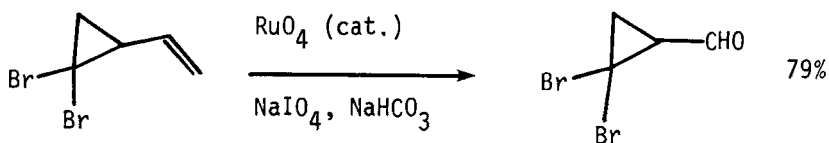
JACS 99, 4536 (1977)

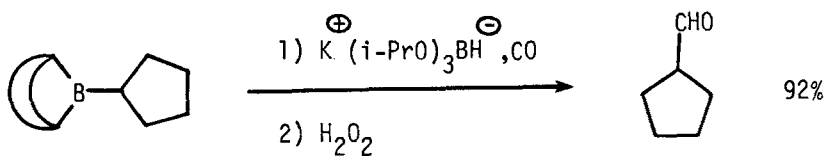
Tetr Lett, 3629 (1978)

JOC 44, 4847 (1979)

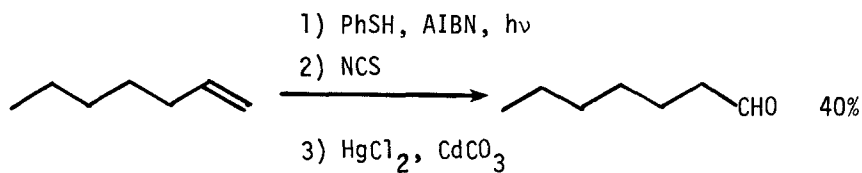
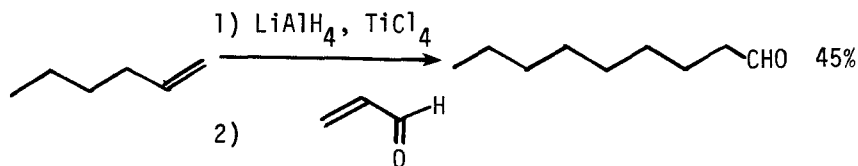
JOC 43, 3792 (1978)Section 58 Aldehydes from Nitriles

No additional examples

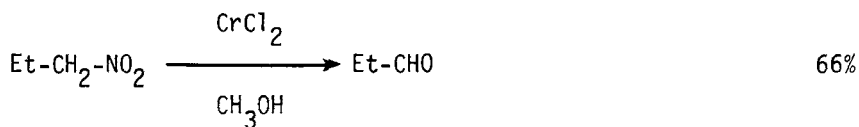
Section 59 Aldehydes from OlefinsActa Chem Scand B32, 693 (1978)



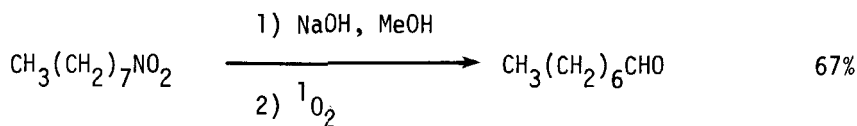
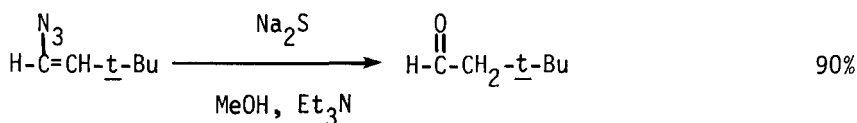
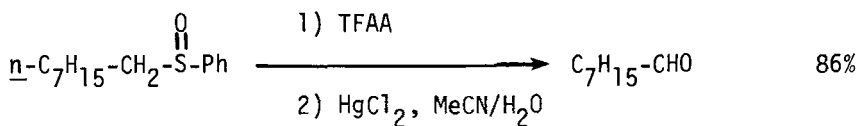
Synthesis, 701 (1979)

Synth Comm 6, 575 (1976)

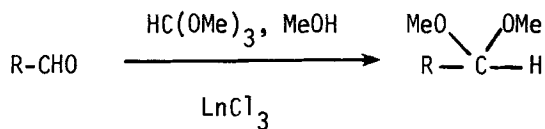
Chem Lett, 167 (1979)

Section 60 Aldehydes from Miscellaneous Compounds

Synthesis, 792 (1977)

JOC 43, 1271 (1978)JOC 44, 4712 (1979)

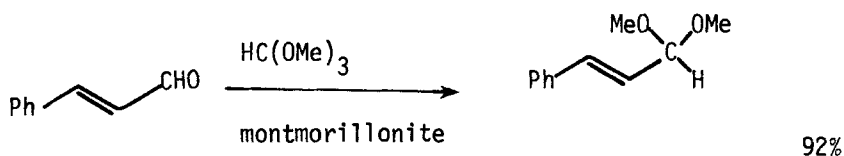
Synthesis, 881 (1978)

Section 60A Protection of Aldehydes

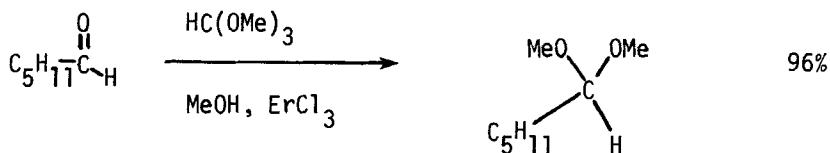
Ln = any of several lanthanides

Ketones remain unaffected under these reaction conditions.

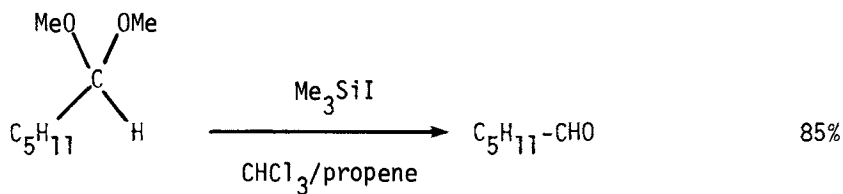
JOC 44, 4187 (1979)



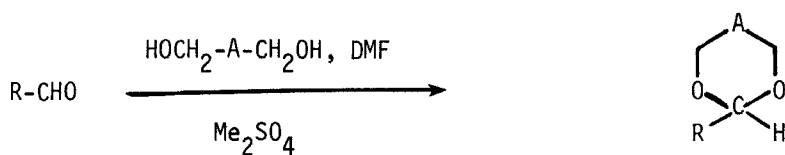
Synthesis, 467 (1977)



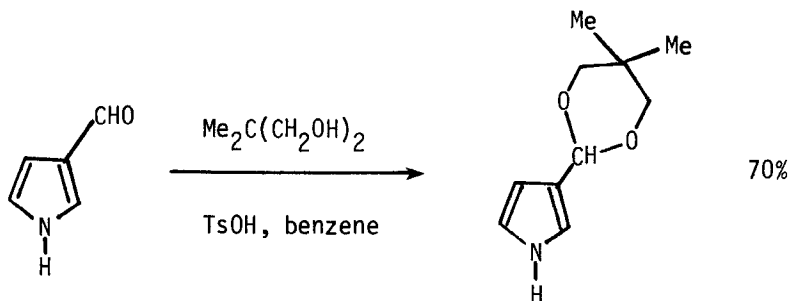
JCS Chem Comm, 976 (1978)



Tetr Lett, 4175 (1977)

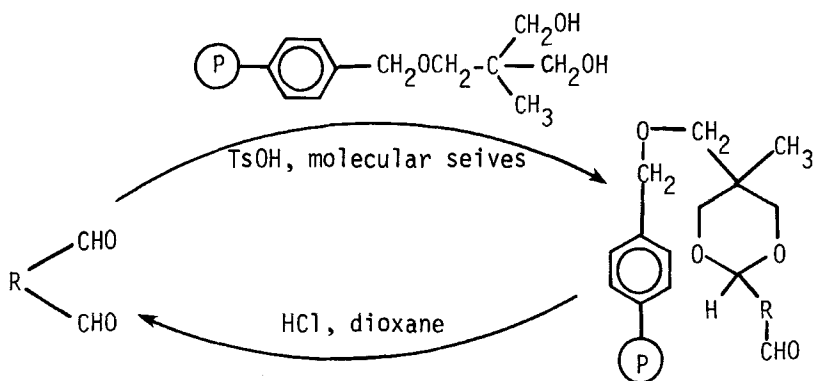
A = $-\text{CH}_2\text{CH}_2-$ or $-\text{CH}=\text{CH}-$

Synthesis, 975 (1979)

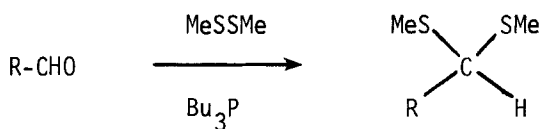


Synthesis, 295 (1978)

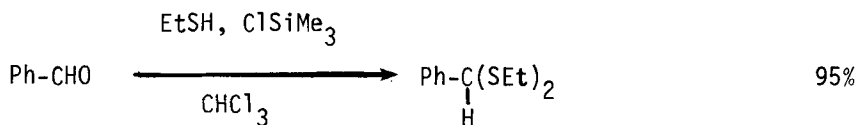
A divinylbenzene-styrene copolymer containing 1,3-diol groups can serve as a monoblocking agent for dialdehydes:



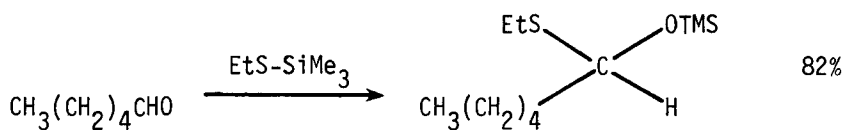
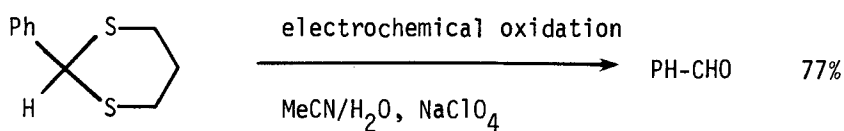
Can J Chem 54, 3824 (1976)



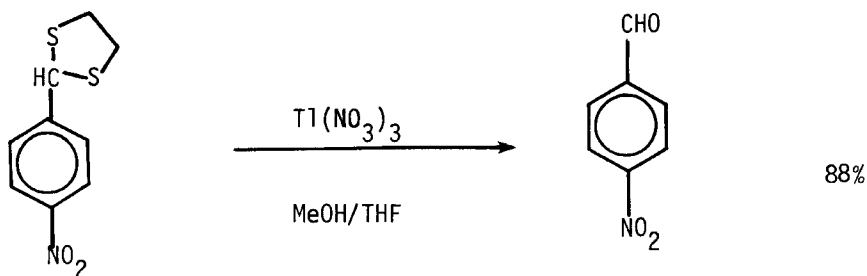
Chem Lett, 767 (1979)

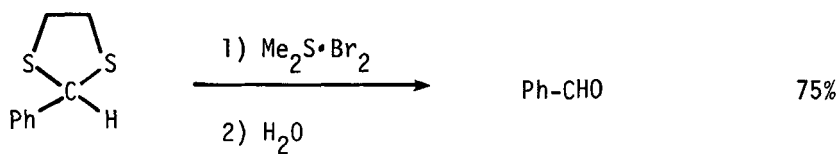


Synth Comm 7, 283 (1977)

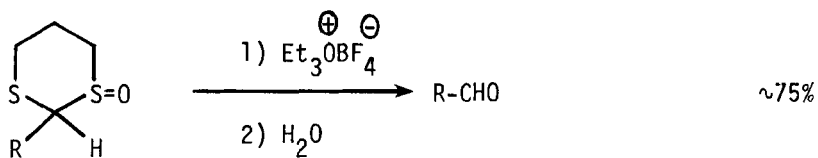
JACS 99, 5009 (1977)

JCS Chem Comm, 255 (1978)

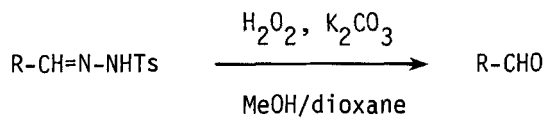
Chem Pharm 26, 3743 (1978)



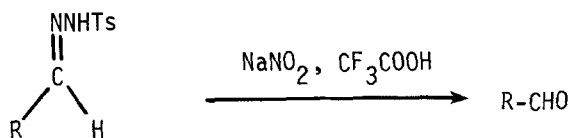
Synthesis, 720 (1979)



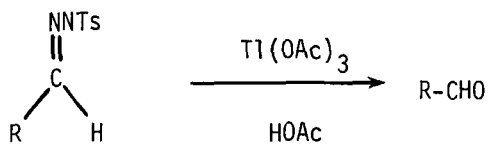
R = alkyl, subst. Ph

Angew Int Ed 18, 165 (1979)

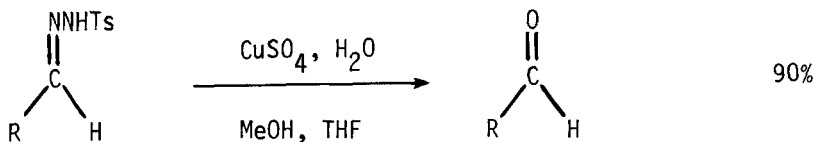
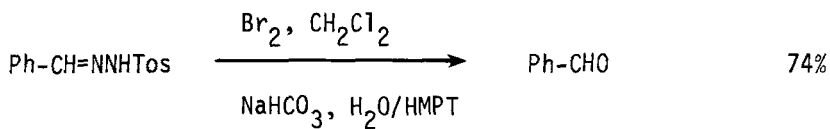
Synthesis, 919 (1978)



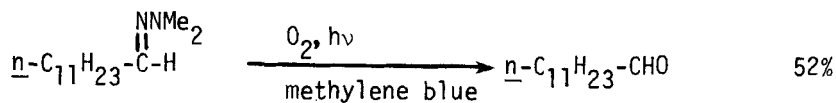
Synthesis, 207 (1979)



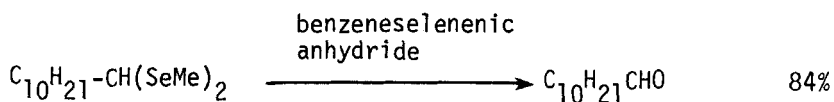
Tetr Lett, 4583 (1979)

Gazz Chim Ital 108, 137 (1978)

Synthesis, 113 (1979)



Synthesis, 893 (1977)



Synthesis, 877 (1979)

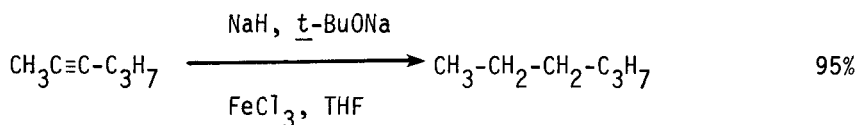
See Section 367 (Ether - Olefin) for the formation of enol ethers. Many of the methods in Section 180A (Protection of Ketones) are also applicable to aldehydes.

CHAPTER 5

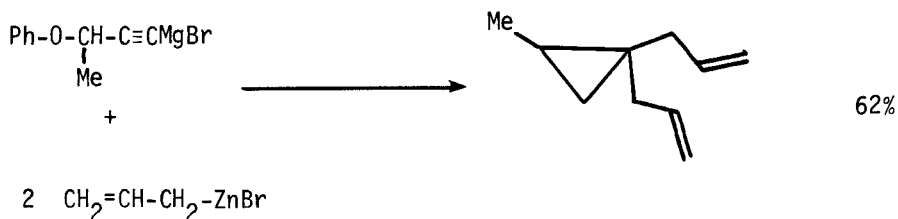
PREPARATION OF ALKYLs, METHYLENES, AND ARYLs

This chapter lists the conversion of functional groups into Me, Et..., CH₂, Ph, etc.

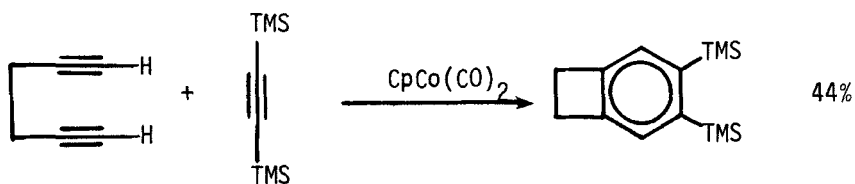
Section 61 Alkyls, Methylenes, and Aryls from Acetylenes



Tetr Lett, 3947 (1977)



Synthesis, 838 (1978)

JACS 99, 4058 (1977)

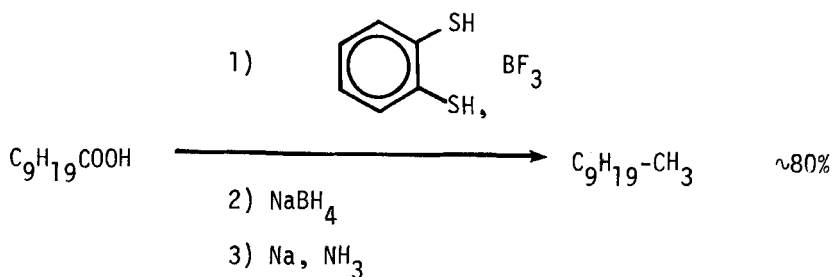
Review: "Transition - Metal - Catalyzed Acetylene Cyclizations in Organic Synthesis"

Accounts Chem Res 10, 1 (1977)

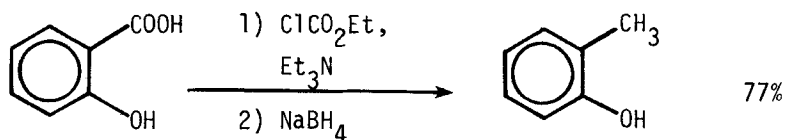
Review: "Transition Metal Catalyzed Acetylene Cooligomerizations for the Synthesis of Complex Molecules"

Strem Chemiker VI, #2, 1 (1978)

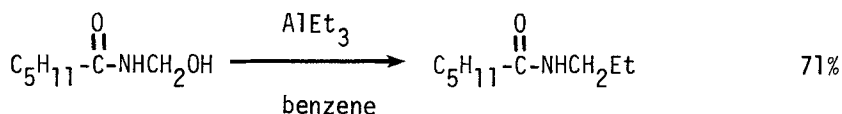
Section 62 Alkyls from Carboxylic Acids



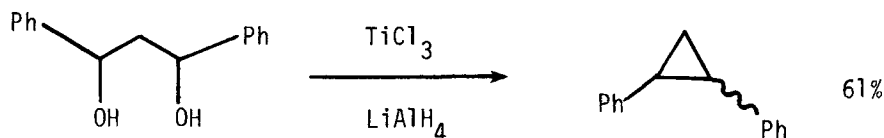
JCS Perkin I, 1133 (1978)

Chem Pharm Bull 27, 816 (1979)Section 63 Alkyls from Alcohols

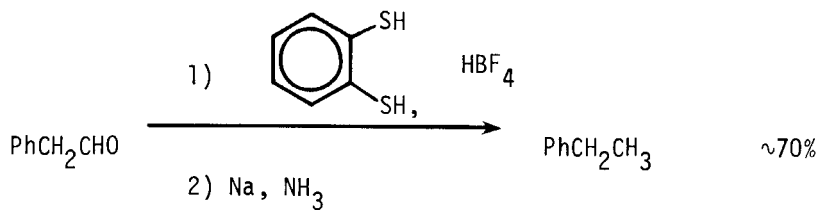
Reactions in which hydroxyl groups are replaced by alkyl, e.g., $\text{ROH} \rightarrow \text{RMe}$, are included in this section. For the conversion $\text{ROH} \rightarrow \text{RH}$ see Section 153 (Hydrides from Alcohols and Phenols)



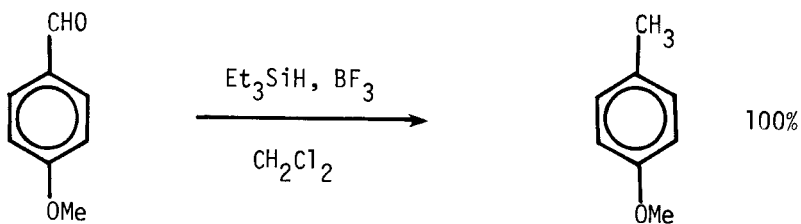
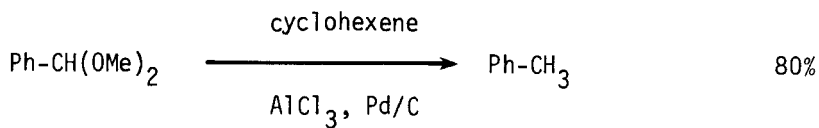
Tetr Lett, 1465 (1977)



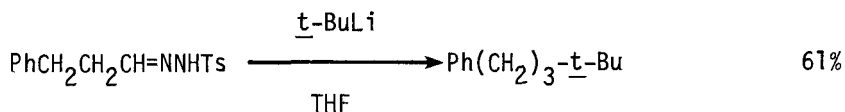
Tetr Lett, 3003 (1977)

Section 64 Alkyls from Aldehydes

JCS Perkin I, 1133 (1978)

JOC 43, 374 (1978)

Synthesis, 825 (1978)



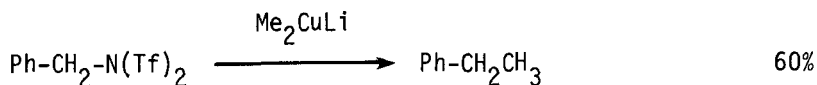
Tetr Lett, 135 (1977)

Related methods: Alkyls and Methylenes from Ketones (Section 72)

Also via: Vinyl Ethers (Section 69)

Section 65 Alkyls and Aryls from Alkyls and Aryls

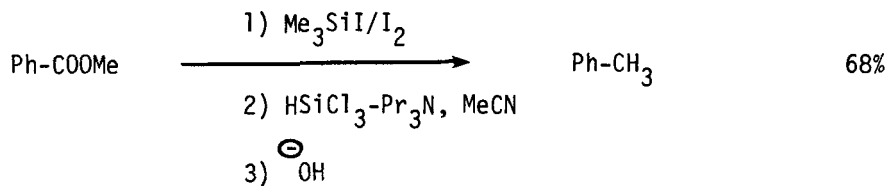
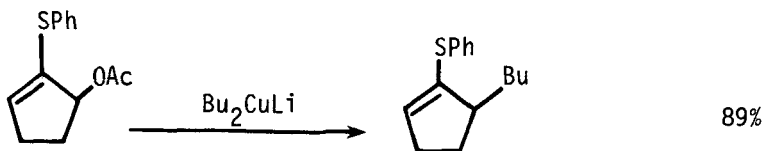
No additional examples

Section 66 Alkyls from Amides

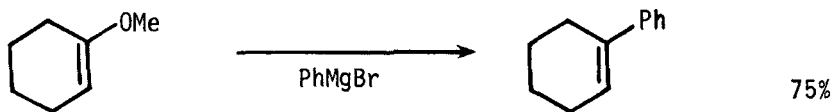
Tetr Lett, 4727 (1978)

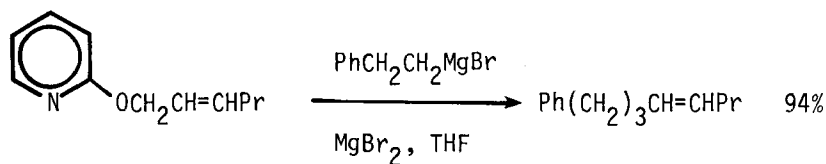
Section 67 Alkyls, Methylenes, and Aryls from Amines

No additional examples

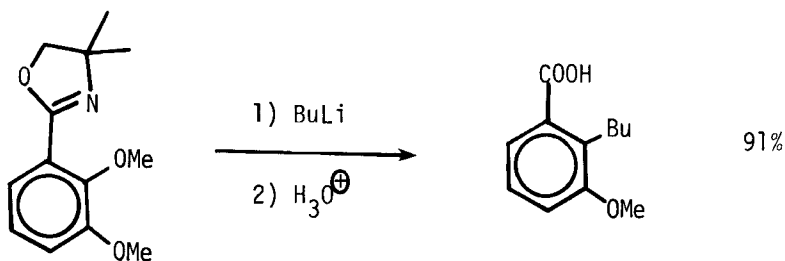
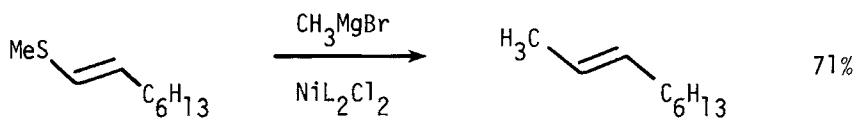
Section 68 Alkyls from EstersJOC 44, 2185 (1979)JACS 101, 4413 (1979)Section 69 Alkyls and Aryls from Ethers

The conversion $\text{ROR} \rightarrow \text{RR}'$ ($\text{R}' = \text{alkyl, aryl}$) is included in this section.

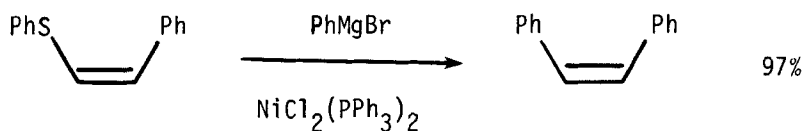
JACS 101, 2246 (1979)



Chem Lett, 689 (1978)

JOC 43, 1372 (1978)

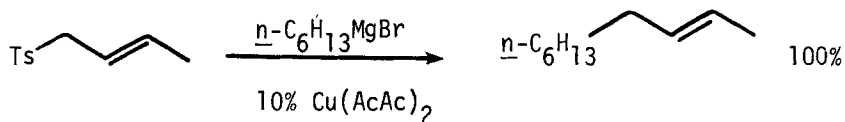
JCS Chem Comm, 637 (1979)



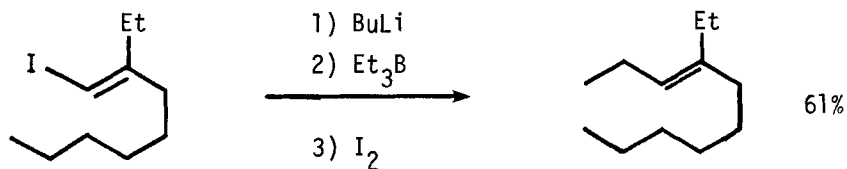
Tetr Lett, 43 (1979)

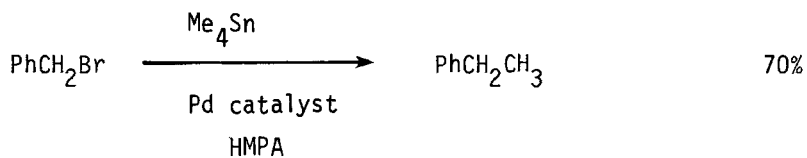
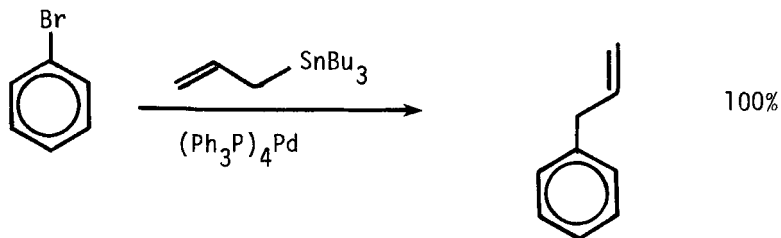
Section 70 Alkyls and Aryls from Halides and Sulfonates

The replacement of halogen by alkyl or aryl Groups is included in this section. For the conversion $\text{RX} \rightarrow \text{RH}$ ($\text{X}=\text{halo}$) see Section 160 (Hydrides from Halides and Sulfonates).

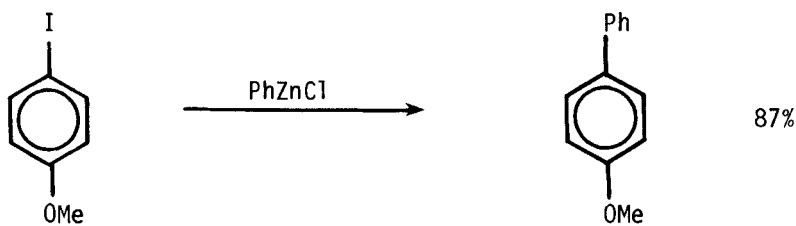
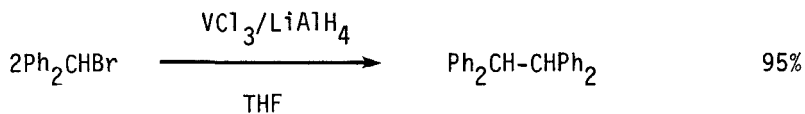


Tetr Lett, 2393 (1979)

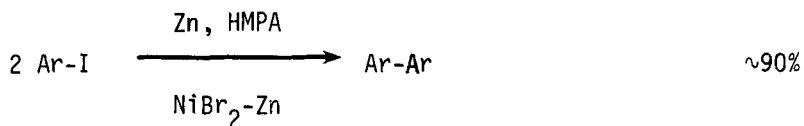
JOC 43, 1279 (1978)

JACS 101, 4992 (1979)

Chem Lett, 301 (1977)

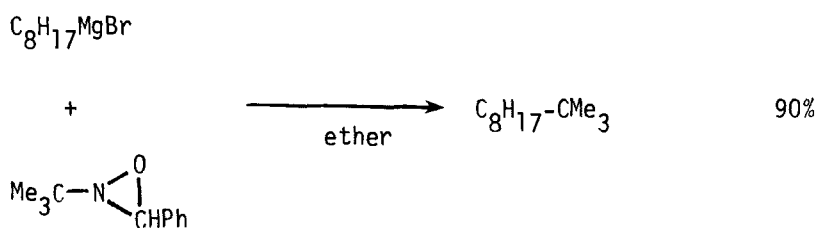
JOC 42, 1821 (1977)

Synthesis, 170 (1977)

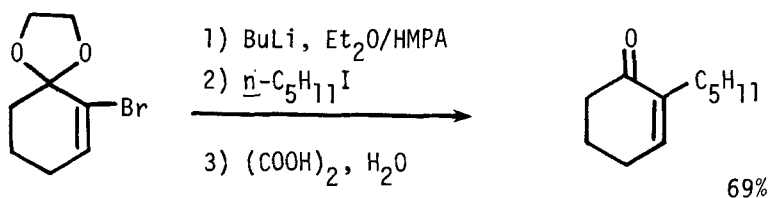


Ar = subst. Ph

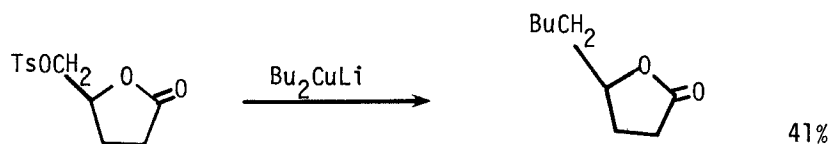
Chem Lett, 917 (1979)



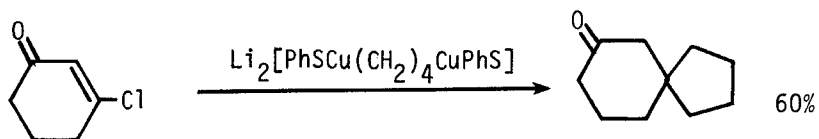
JACS 101, 1044 (1979)



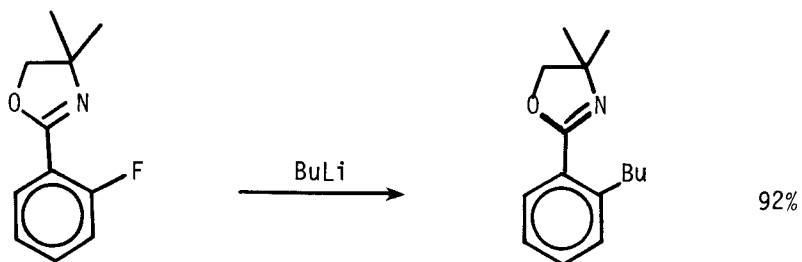
Tetr Lett, 4661 (1978)



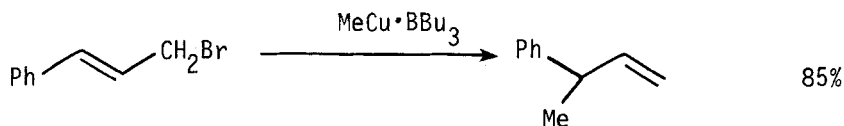
Tetr Lett, 423 (1977)



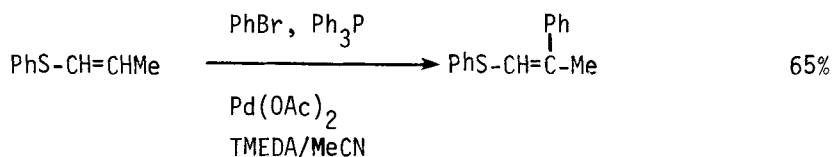
Tetr Lett, 1245 (1977)

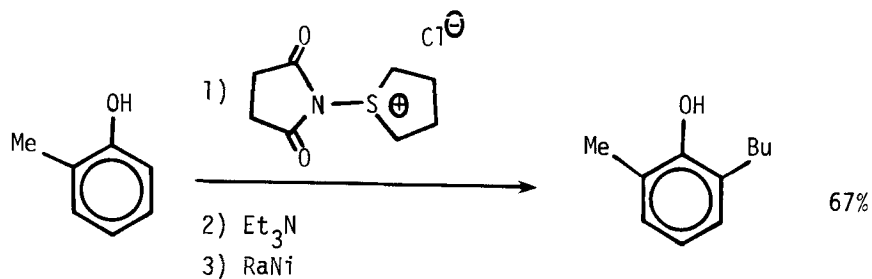
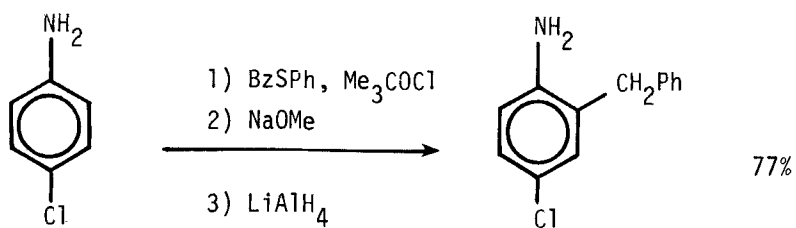
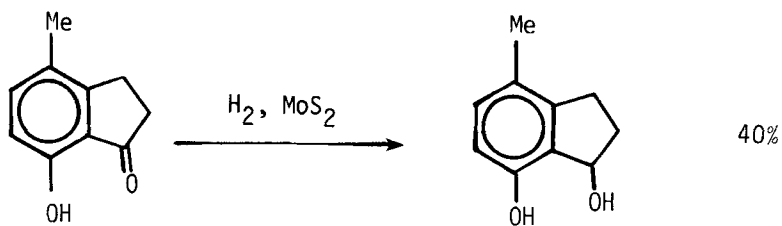


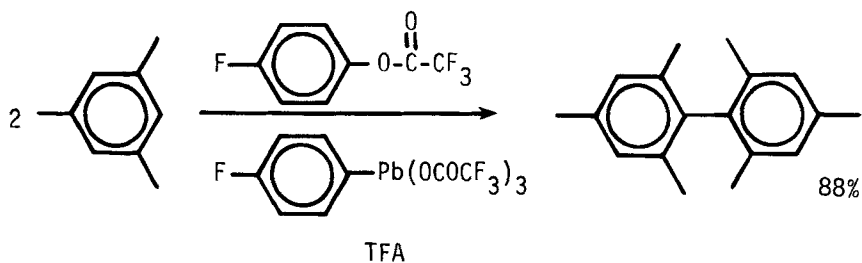
Tetr Lett, 223 (1978)

JACS 99, 8068 (1977)Section 71 Alkyls and Aryls from Hydrides

This section lists examples of the reaction $\text{RH} \rightarrow \text{RR}'$ ($\text{R}, \text{R}' =$ alkyl or aryl). For the reaction $\text{C}=\text{CH} \rightarrow \text{C}=\text{CR}$ ($\text{R} =$ alkyl or aryl) see Section 209 (Olefins from Olefins). For alkylations of ketones and esters, see Section 177 (Ketones from Ketones) and Section 113 (Esters from Esters).

JACS 101, 4743 (1979)

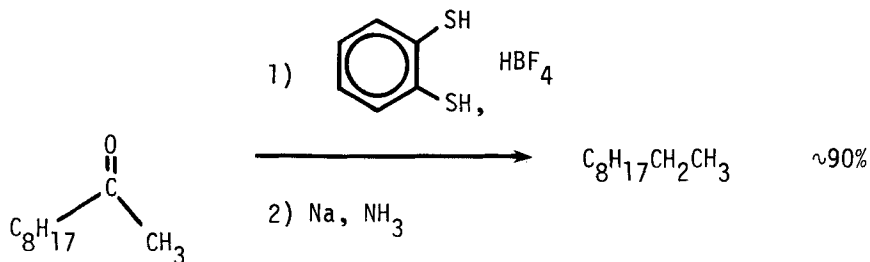
JACS 100, 7611 (1978)JACS 100, 7600 (1978)Coll Czech Chem Comm 43, 2174 (1978)



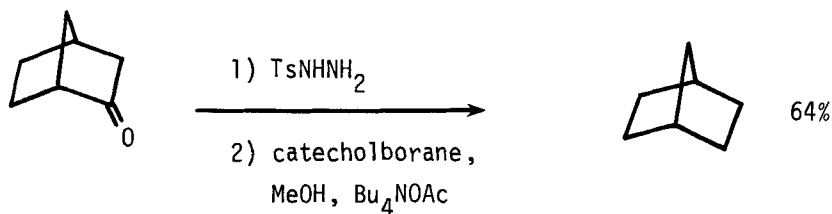
Australian J Chem 32, 1531 (1979)

Section 72 Alkyls, Methylene, and Aryls from Ketones

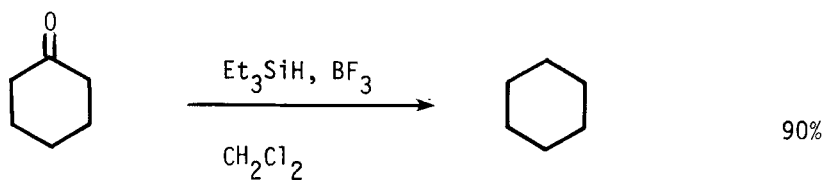
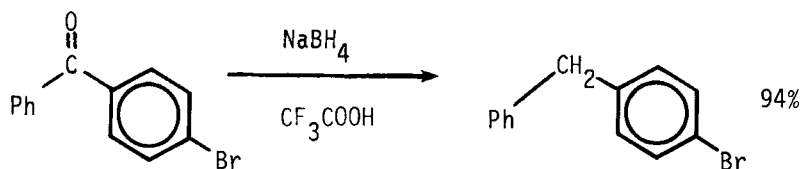
The conversions $R_2CO \rightarrow RR$, R_2CH_2 , R_2CHR' , etc. are listed in this section.



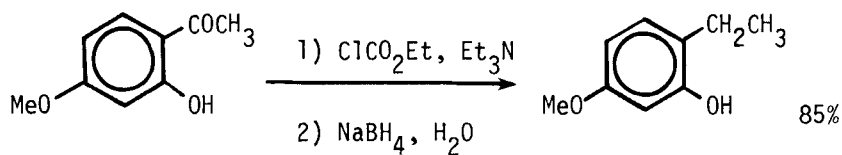
JCS Perkin I, 1133 (1978)

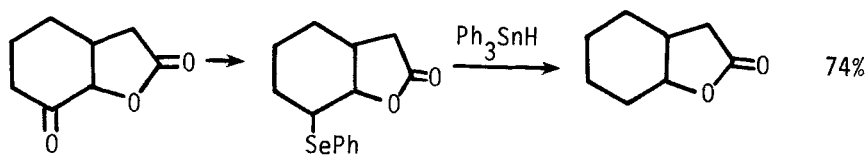


Synth Comm 9, 275 (1979)

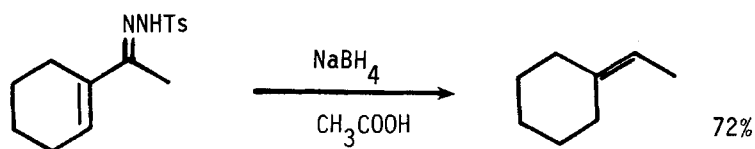
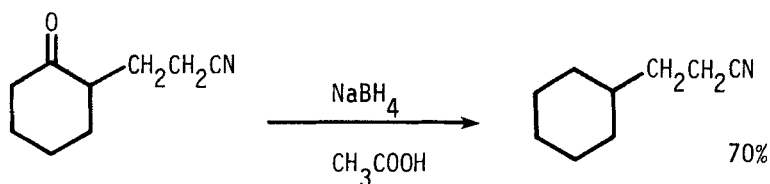
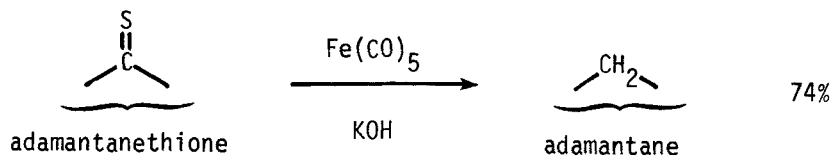
JOC 43, 374 (1978)

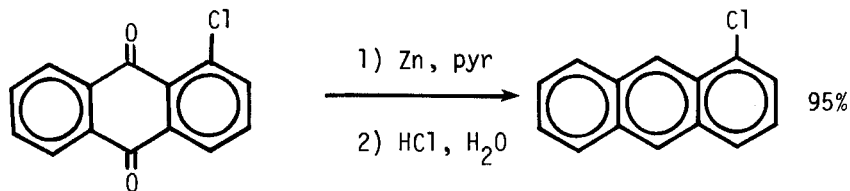
Synthesis, 763 (1978)

Chem Pharm Bull 27, 1490 (1979)



JCS Chem Comm, 41 (1978)

JOC 43, 2299 (1978)JOC 42, 3522 (1977)



Synth Comm 7, 161 (1977)

Related methods: Alkyls from Aldehydes (Section 64)

Also via vinyl ethers (Section 69)

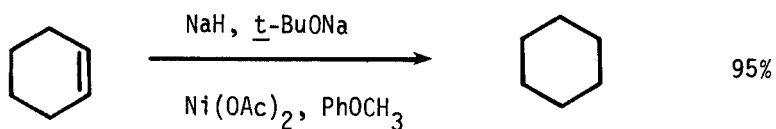
Section 73 Alkyls, Methylenes and Aryls from Nitriles

No additional examples

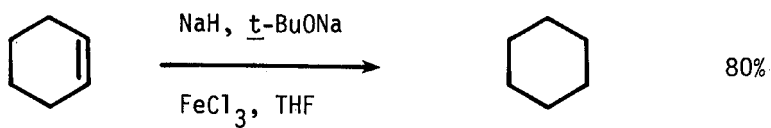
Section 74 Alkyls, Methylenes and Aryls from Olefins

The following reaction types are included in this section:

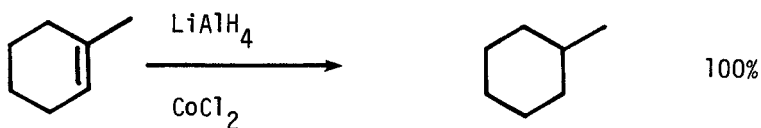
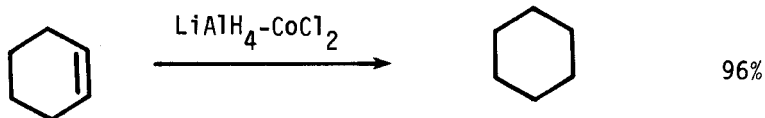
- A. Hydrogenation of olefins (and aryls).
- B. Dehydrogenations to form aryls.
- C. Alkylations and arylations of olefins.
- D. Conjugate reductions of conjugated aldehydes, ketones, acids, esters and nitriles.
- E. Conjugate alkylations.
- F. Cyclopropanations, including halocyclopropanations.

74A: Hydrogenation of olefins (and aryls)

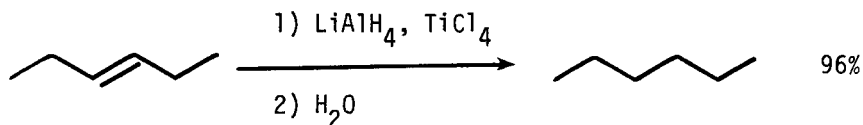
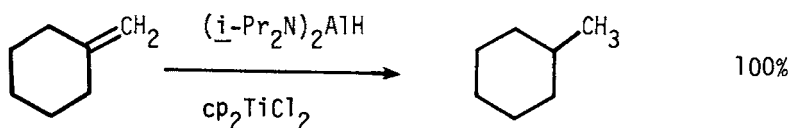
Tetr Lett, 1069 (1977)



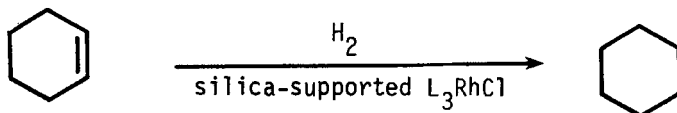
Tetr Lett, 3947 (1977)

JOC 43, 2567 (1978)

Tetr Lett, 4481 (1977)

J Organometal Chem 142, 71 (1977)

Tetr Lett, 4579 (1977)



(Higher rates than for the homogeneous reaction.)

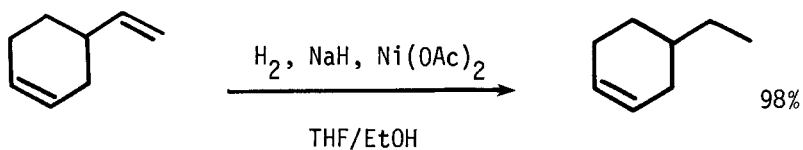
JCS Chem Comm, 510 (1977)

Use of $[\text{Ir}(\text{COD})\text{L}(\text{py})]\text{PF}_6$ and $[\text{Ir}(\text{COD})\text{L}_2]\text{PF}_6$ as active hydrogenation catalysts for olefins.

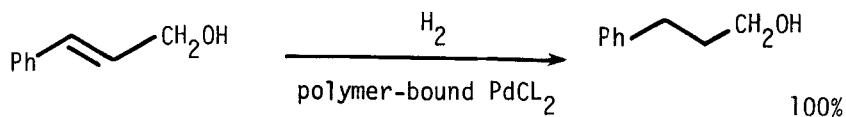
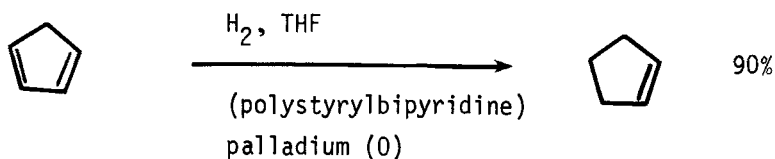
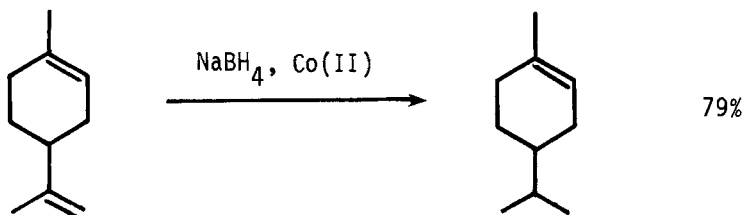
J Organometal 141, 205 (1977)

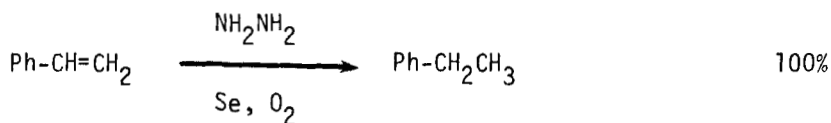
$\text{Ir}(\text{CO})\text{ClL}_2$ catalyzes the hydrogenation of cyclopentene, styrene, and ethyl acrylate at 10 atm.

J. Organometal 129, 331 (1977)

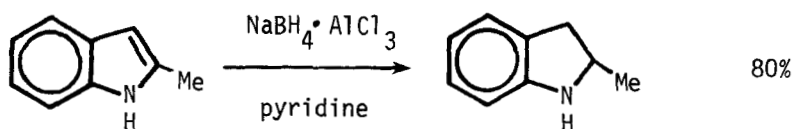
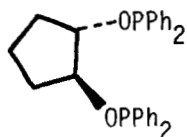


Tetr Lett, 3955 (1977)

JOC 43, 4686 (1978)Israel J Chem 17, 269 (1978)JOC 44, 1014 (1979)



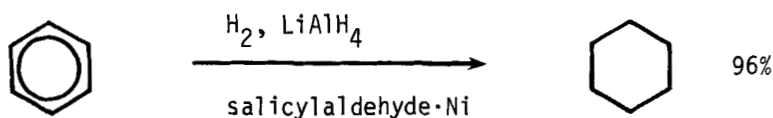
Tetr Lett, 3727 (1977)

Chem Pharm 26, 108 (1978)

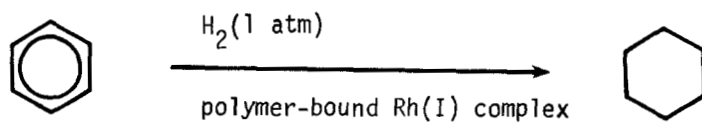
as a chiral ligand for use in rhodium-catalyzed

hydrogenation. Gives 60% ee with α -ethylstyrene.

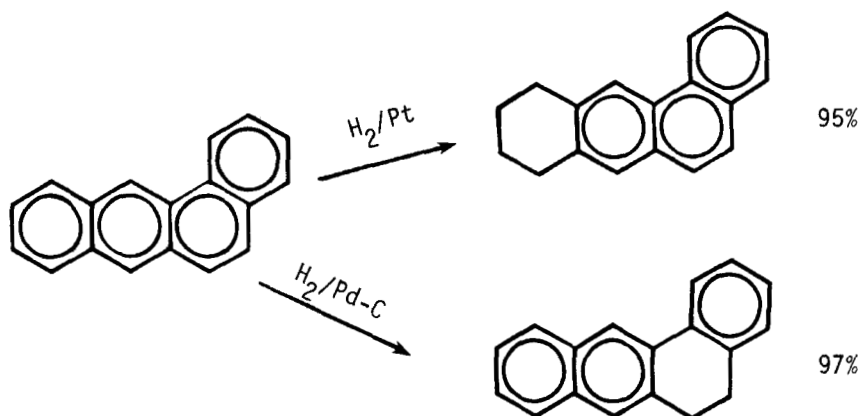
Tetr Lett, 295 (1977)



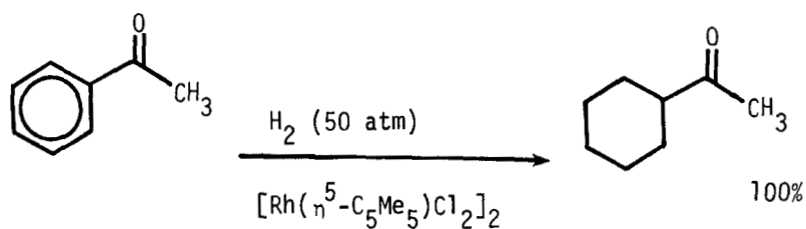
Tetr Lett, 2531 (1977)



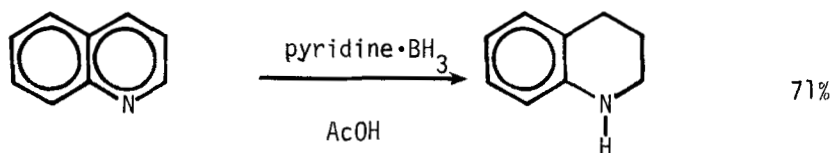
Tetr Lett, 3703 (1977)



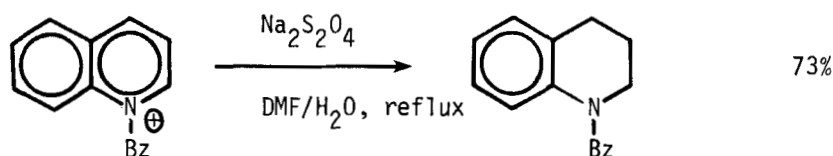
Tetr Lett, 415 (1977)



JCS Chem Comm, 427 (1977)



Synthesis, 447 (1978)



Chem Lett, 1091 (1977)

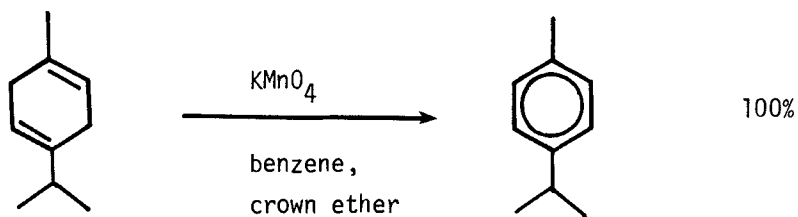
Review: "Highly Selective Hydrogenations over Group VIII Metals"

Strem Chemiker VI, #2, 7 (1978)

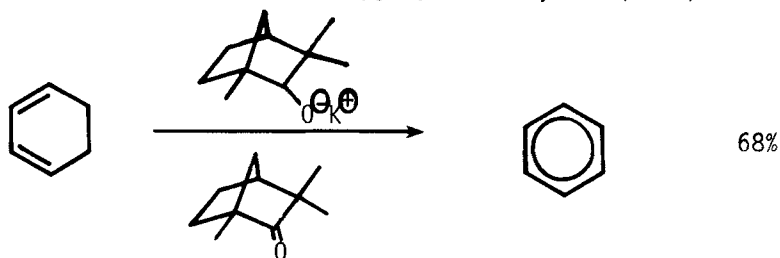
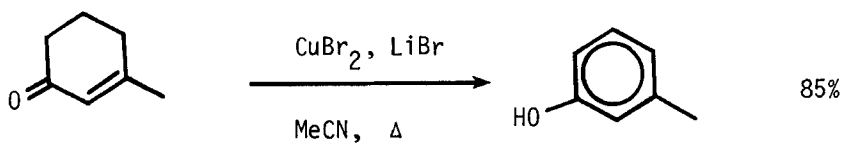
Review: "Catalytic Hydrogenation of Aromatic Hydrocarbons"

Accounts Chem Res 12, 324 (1979)

Reactions involving partial reduction of aromatic rings (to olefins) are found in Section 200 (Olefins from Aryls).

74B: Dehydrogenations to form aryls

JCS Chem Comm, 244 (1979)

Angew Int Ed 17, 278 (1978)

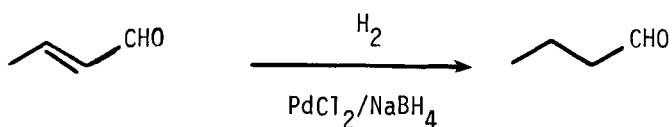
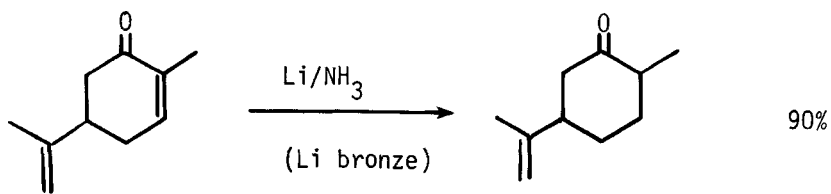
Tetr Lett, 821 (1977)

Review: "Dehydrogenation of Polycyclic Hydroaromatic Compounds"

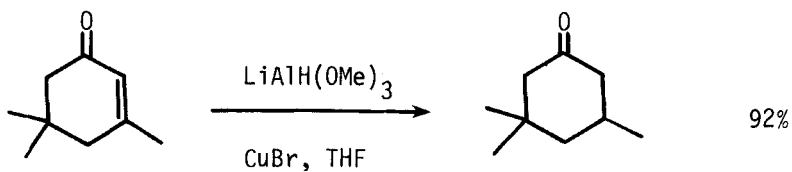
Chem Rev 78, 317 (1978)

74C: Alkylations and arylations of olefins

No additional examples

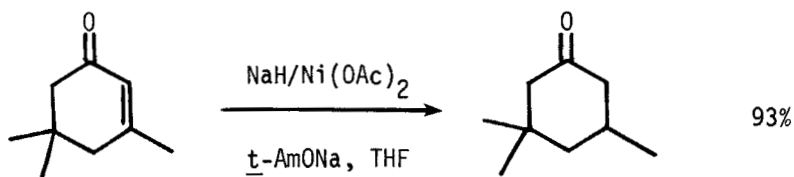
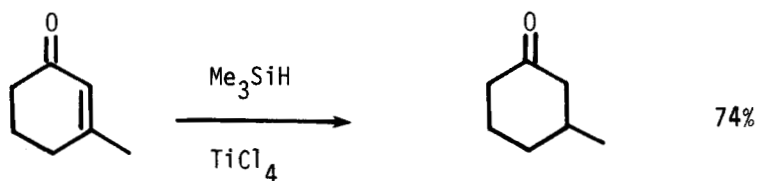
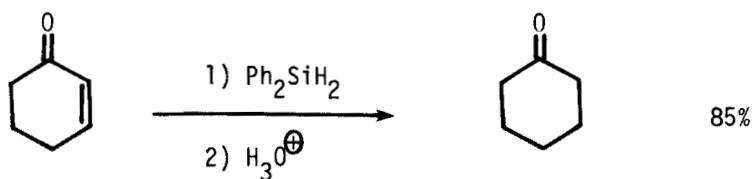
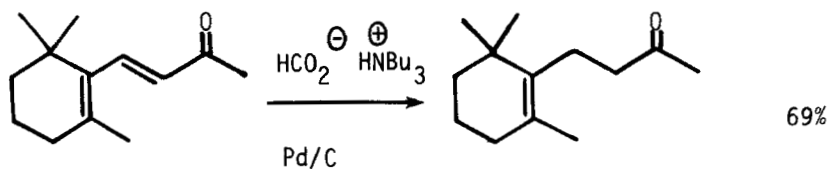
74D: Conjugate reductionsJOC 42, 551 (1977)

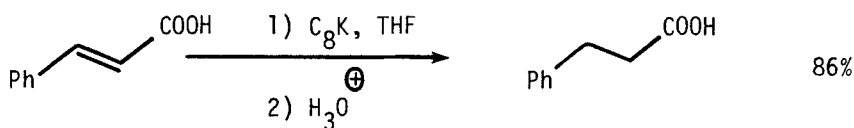
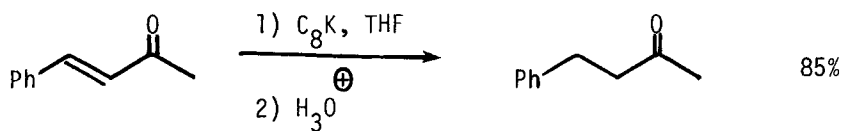
90%

JOC 43, 4647 (1978)

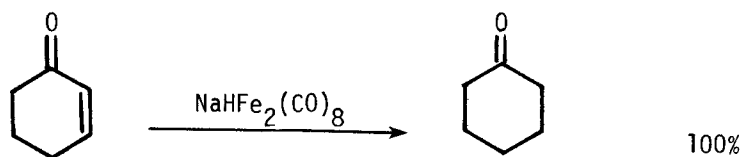
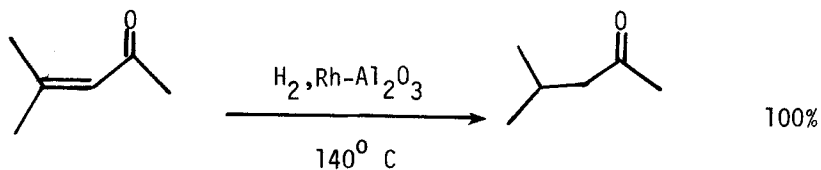
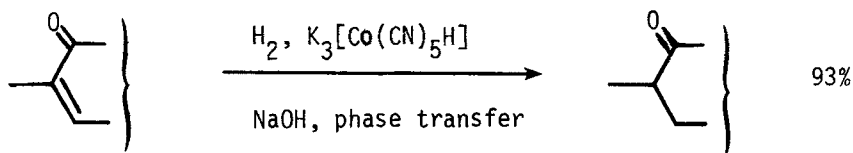
92%

JOC 42, 3180 (1977)

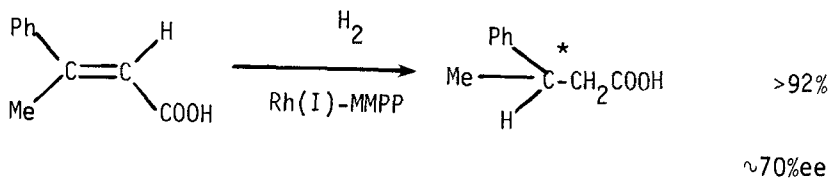
JOC 44, 2203 (1979)Chem Pharm 25, 1468 (1977)Bull Akad USSR Chem 26, 995 (1977)JOC 43, 3985 (1978)



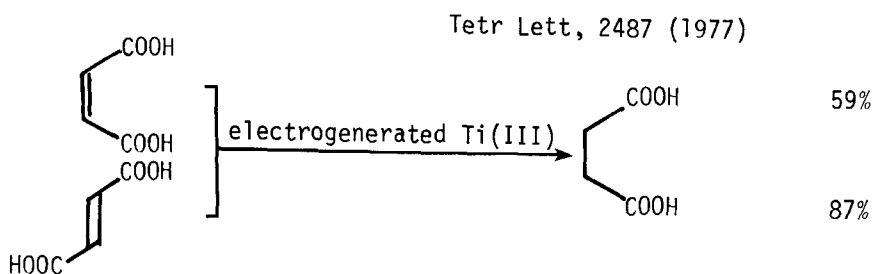
Synthesis, 30 (1979)

JACS 100, 1119 (1978)Comptes Rendus (C) 284, 577 (1977)

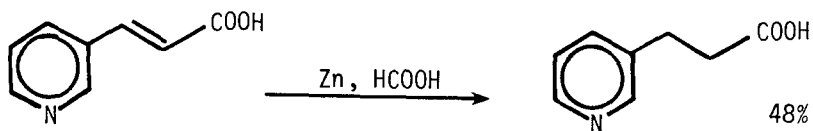
Tetr Lett, 115 (1979)



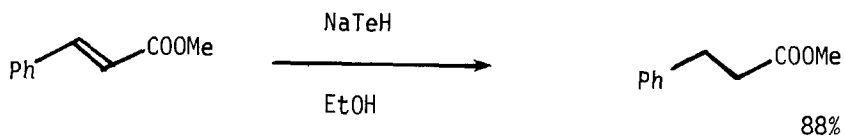
(MMPP = *l*-menthylmethylphenylphosphine)



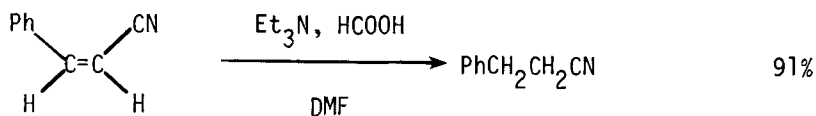
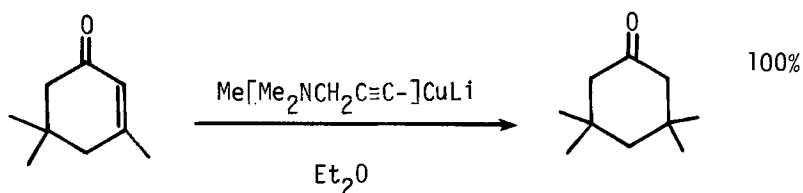
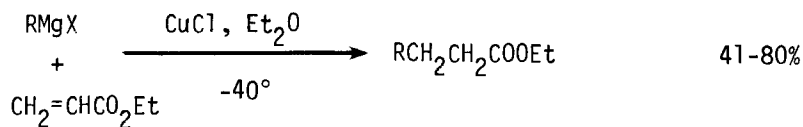
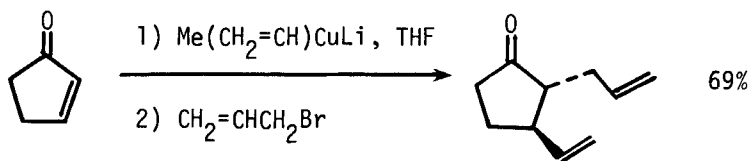
Can J Chem 56, 2269 (1978)



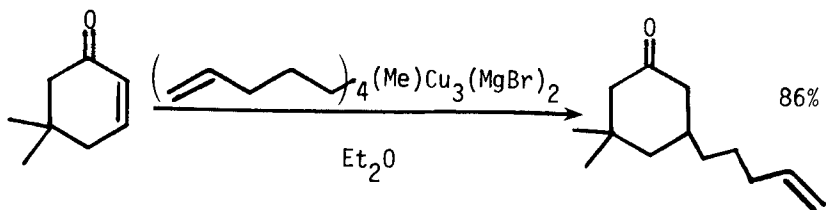
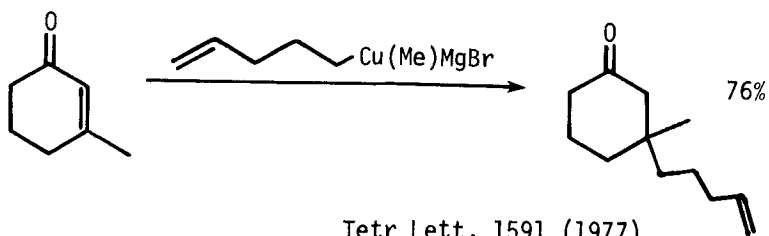
Coll Czech Chem Comm 43, 1628 (1978)



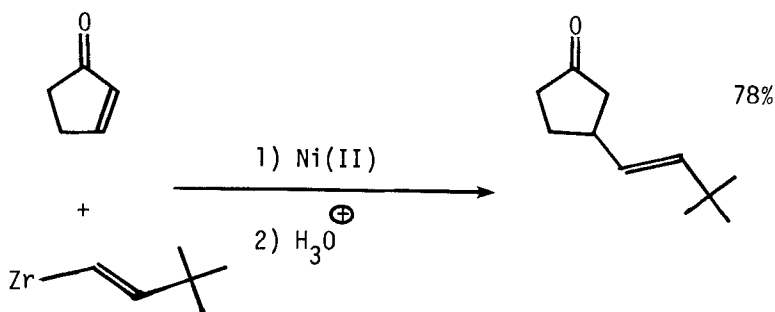
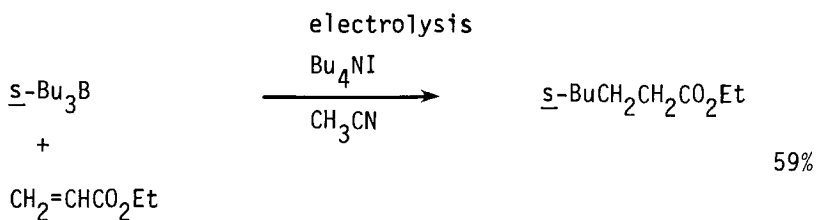
Synthesis, 545 (1978)

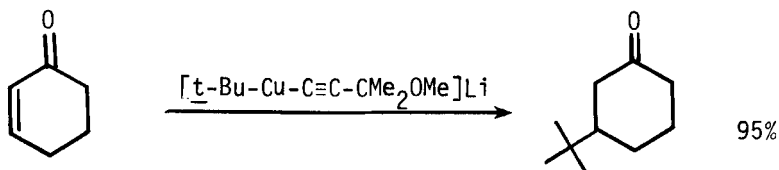
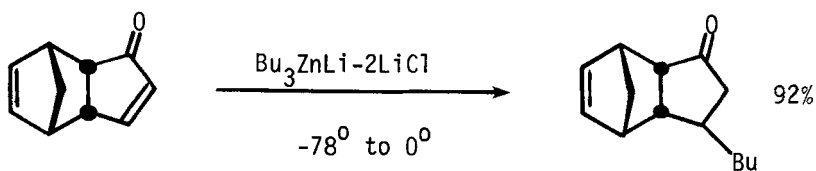
Chem Pharm 25, 2396 (1977)74E: Conjugate alkylationsJOC 44, 1006 (1979)R = alkyl, Ph, benzyl, c-HxJOC 42, 3209 (1977)

Tetr Lett, 3215 (1977)

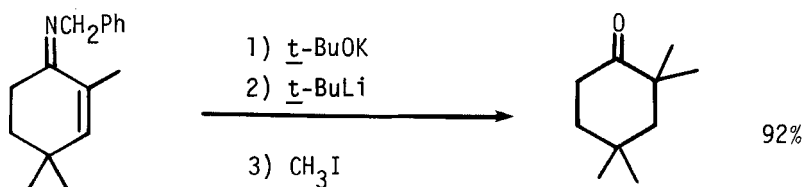
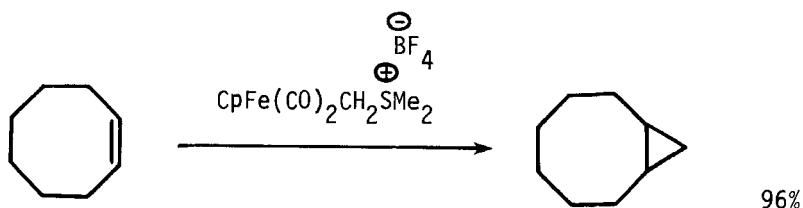
Nouveau J Chem 2, 271 (1978)

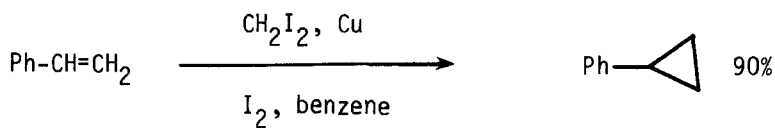
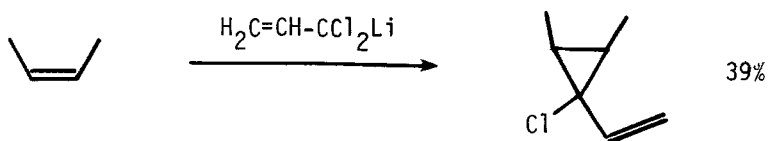
Tetr Lett, 1591 (1977)

JACS 99, 8045 (1977)BCS Japan 51, 339 (1978)

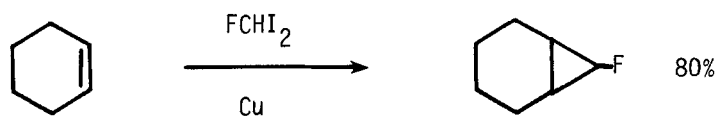
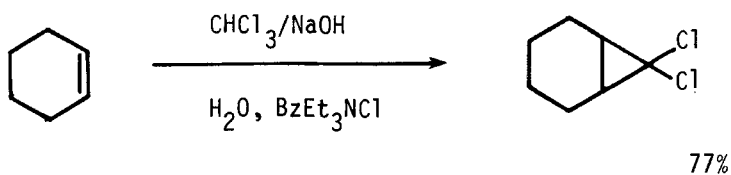
JOC 43, 3418 (1978)

Chem Lett, 679 (1977)

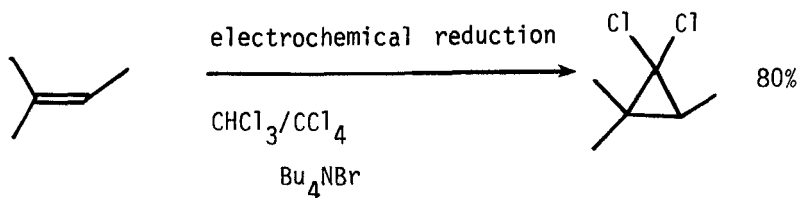
JACS 100, 292 (1978)74F: CyclopropanationsJACS 101, 6473 (1979)

JACS 101, 2139 (1979)

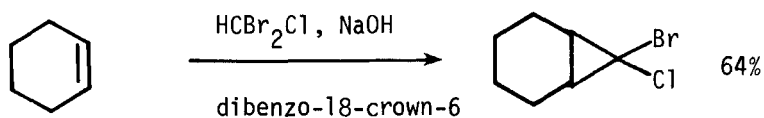
Synthesis, 425 (1979)

Tetrahedron 35, 1919 (1979)

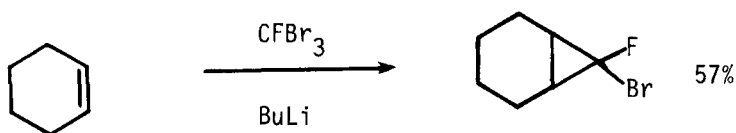
Synthesis, 682 (1977)



Liebigs Ann Chem, 1416 (1978)



Synthesis, 783 (1977)



JOC 42, 828 (1977)

Section 75 Alkyls and Methylene from Miscellaneous Compounds

No additional examples

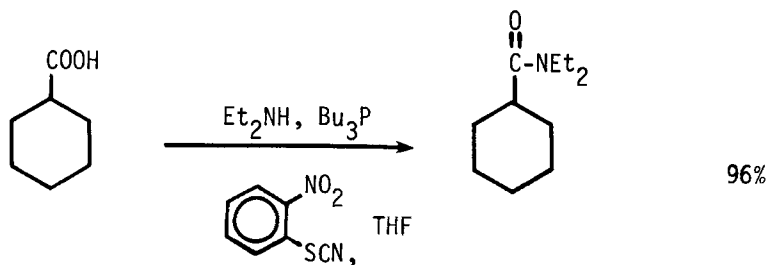
CHAPTER 6

PREPARATION OF AMIDES

Section 76 Amides from Acetylenes

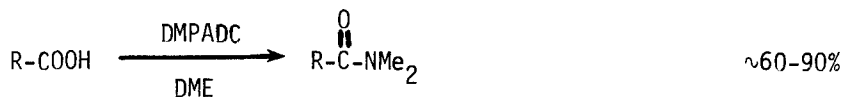
No additional examples

Section 77 Amides from Carboxylic Acids



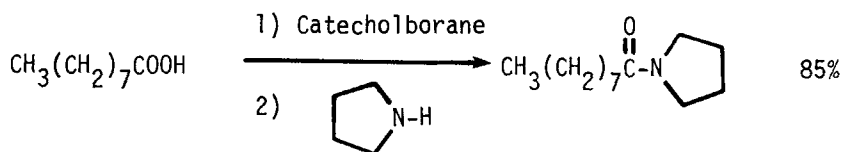
A very general reaction for formation of amides.

JOC 44, 2945 (1979)

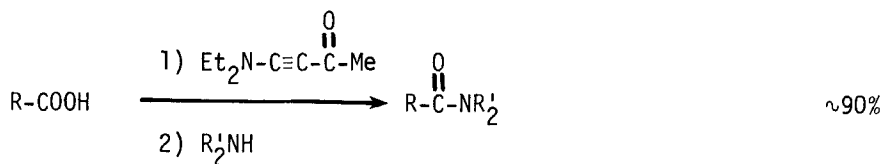


DMPADC = N, N-dimethylphosphoramidic dichloride

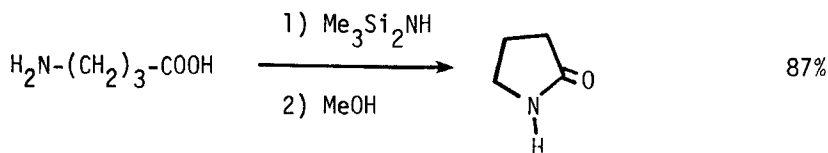
Synth Comm 9, 31 (1979)



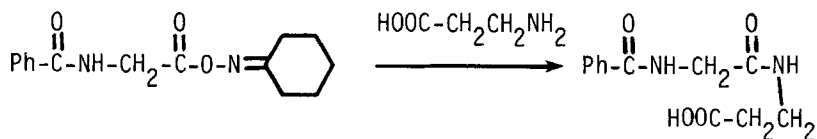
JOC 43, 4393 (1978)



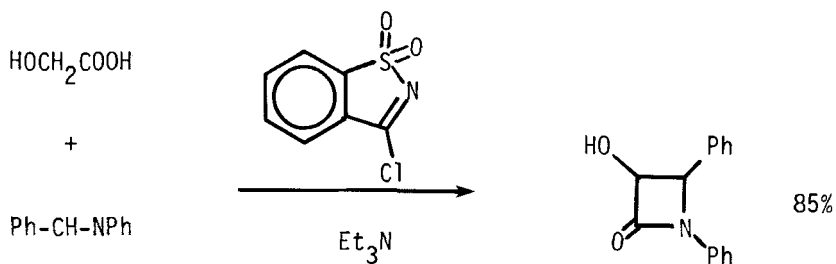
Helv Chim Acta 61, 2428 and 2437 (1978)



Synthesis, 614 (1978)



Synthesis, 726 (1979)



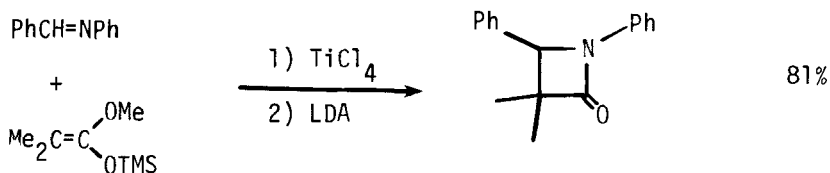
Synthesis, 407 (1977)

Related methods: Amides from Amines (Section 82)

Section 78 Amides from Alcohols

No additional examples

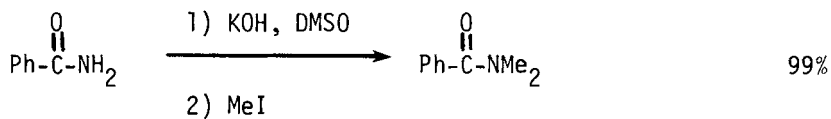
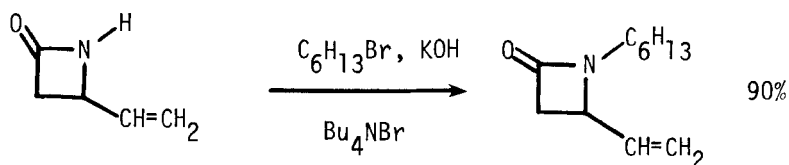
Section 79 Amides from Aldehydes



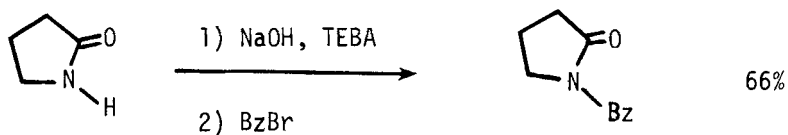
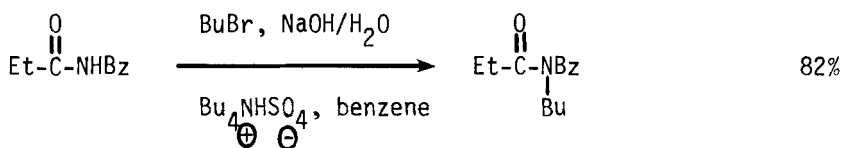
Tetr Lett, 3643 (1977)

Section 80 Amides from Alkyls, Methylene and Aryls

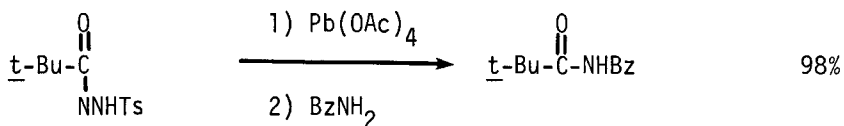
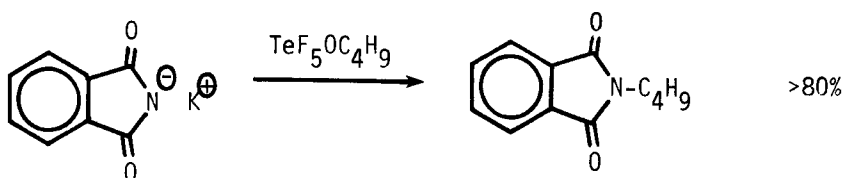
No additional examples

Section 81 Amides from AmidesTetrahedron 35, 2169 (1979)

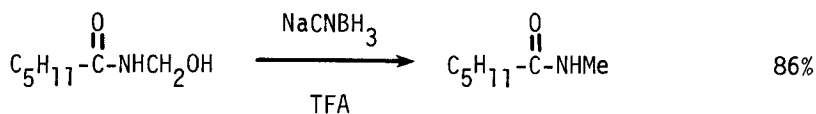
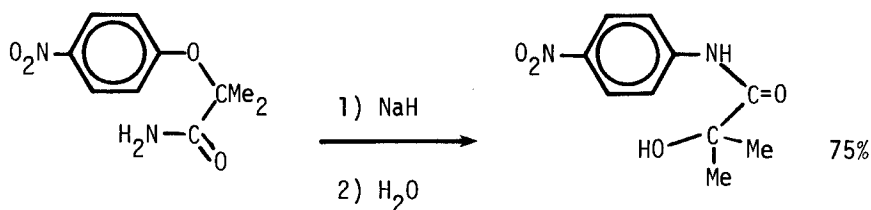
Tetr Lett, 615 (1978)

Z Chem 17, 260 (1977)

Synthesis, 527 (1979)

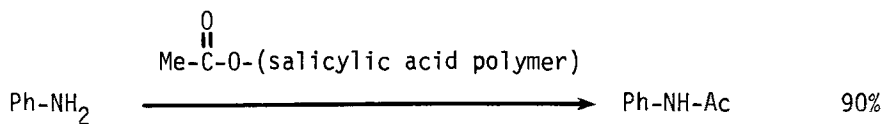
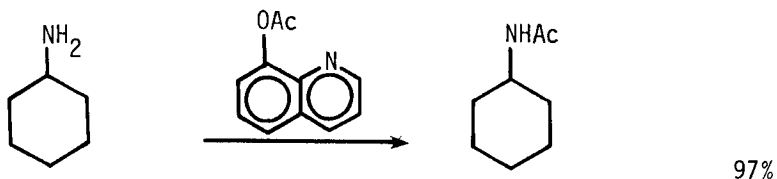
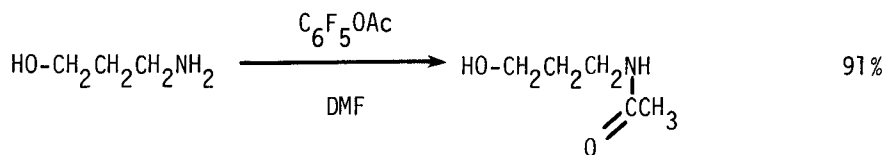
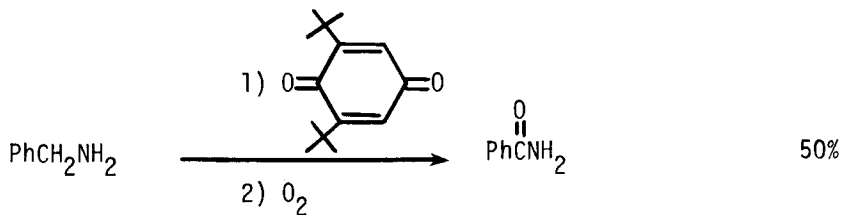
Angew Int Ed 16, 728 (1977)

JCS Perkin I, 2005 (1979)

Synth Comm 7, 549 (1977)

Synthesis, 31 and 33 (1977)

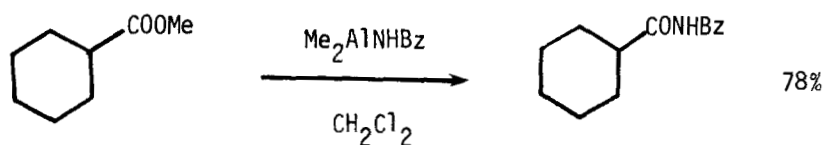
Conjugate reductions of unsaturated amides are listed in Section 74 (Alkyls from Olefins).

Section 82 Amides from AminesSynth Comm 7, 57 (1977)Synth Comm 7, 393 (1977)JOC 44, 654 (1979)

JCS Chem Comm, 970 (1979)

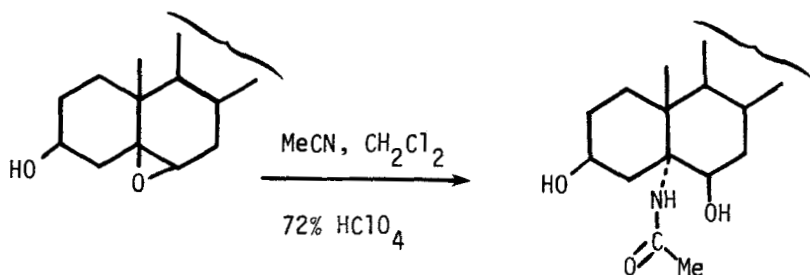
Related methods: Amides from Carboxylic Acids (Section 77)
Protection of Amines (Section 105A)

Section 83 Amides from Esters

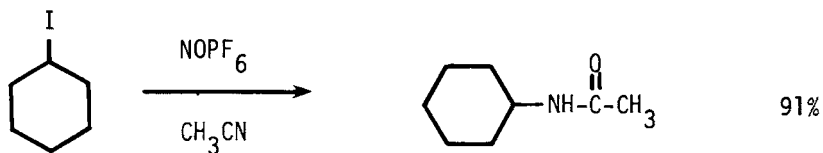


Tetr Lett, 4171 (1977)

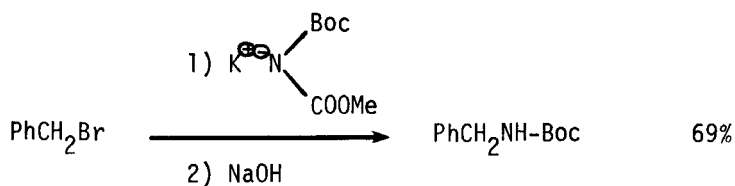
Section 84 Amides from Ethers and Epoxides



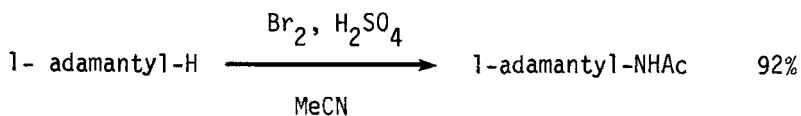
Synthesis, 35 (1977)

Section 85 Amides from Halides

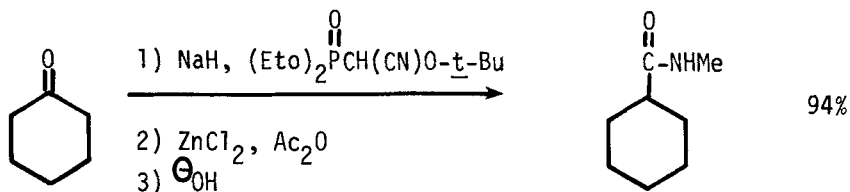
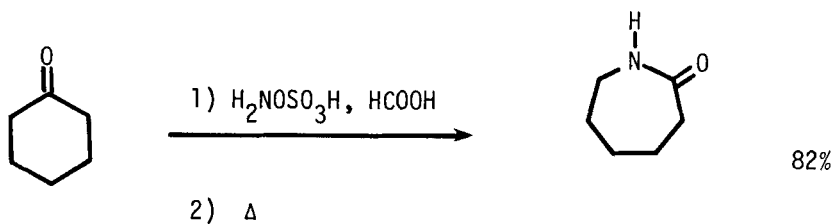
Synthesis, 274 (1979)



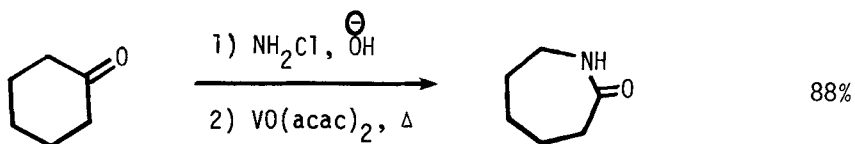
JCS Chem Comm, 758 (1977)

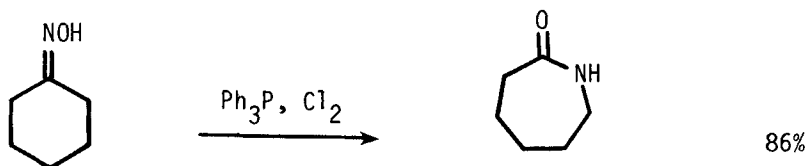
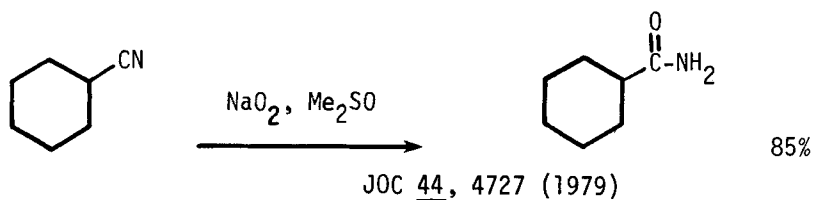
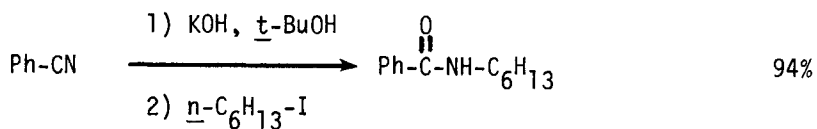
Section 86 Amides from Hydrides

Synthesis, 632 (1977)

Section 87 Amides from KetonesJACS 99, 182 (1977)

Synthesis, 537 (1979)

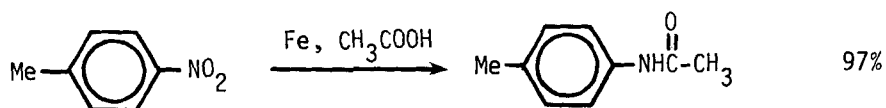
J Prakt Chem 319, 274 (1977)

Bull Chem Soc Japan 52, 3381 (1979)Section 88 Amides from NitrilesJOC 44, 4727 (1979)

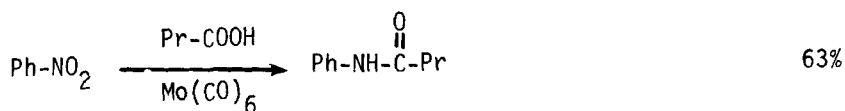
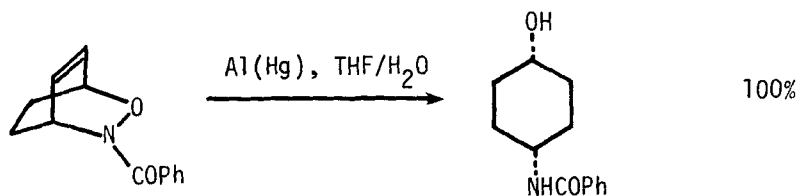
Synthesis, 303 (1978)

Section 89 Amides from Olefins

No additional examples

Section 90 Amides from Miscellaneous Compounds

Synthesis, 118 (1977)

JOC 42, 3755 (1977)Synth Comm 9, 281 (1979)Section 90A Protection of Amides

Review: "Advances in the Chemistry of the Acetals of Acid Amides and Lactams"

Russ Chem Rev 46, 361 (1977)

CHAPTER 7

PREPARATION OF AMINES

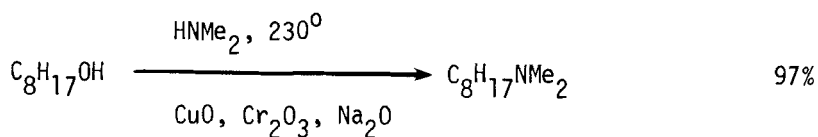
Section 91 Amines from Acetylenes

No additional examples

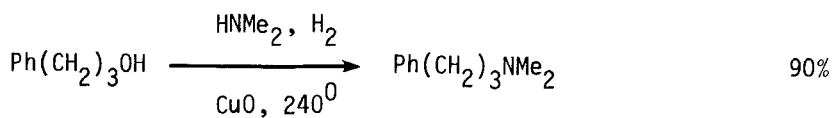
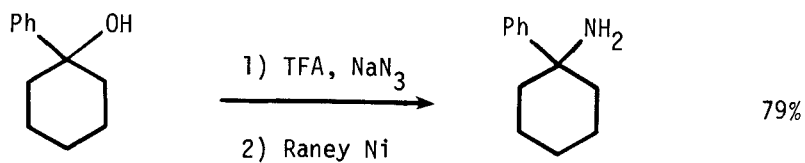
Section 92 Amines from Carboxylic Acids and Acid Halides

No additional examples

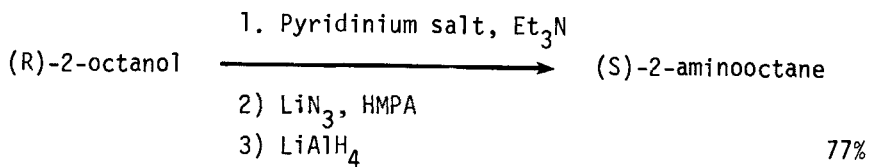
Section 93 Amines from Alcohols



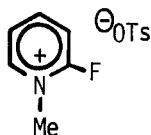
Tetr Lett, 1937 (1977)

Synth Comm 8, 27 (1978)

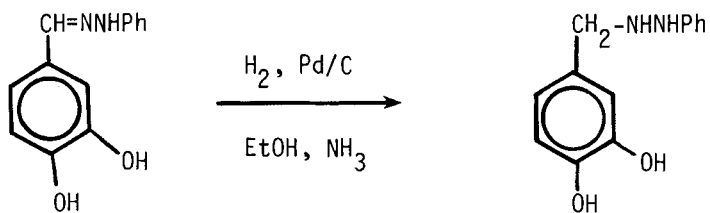
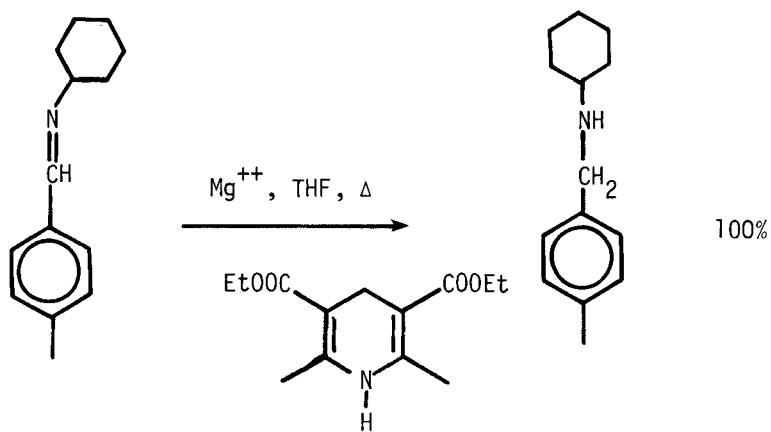
Synthesis, 24 (1978)



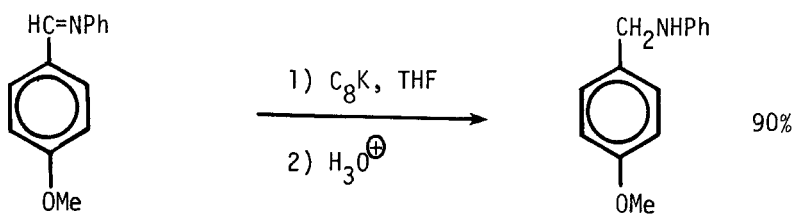
Pyridinium salt =



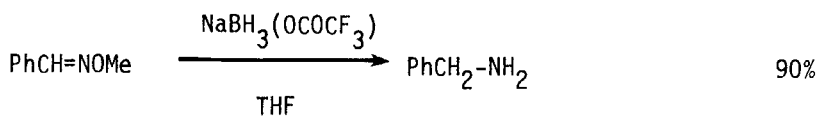
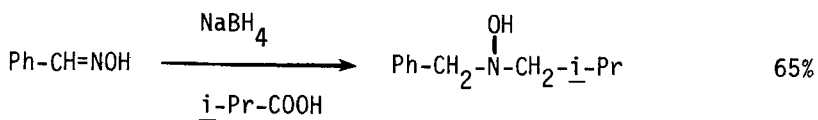
Chem Lett, 635 (1977)

Section 94 Amines from AldehydesSynth Comm 7, 71 (1977)

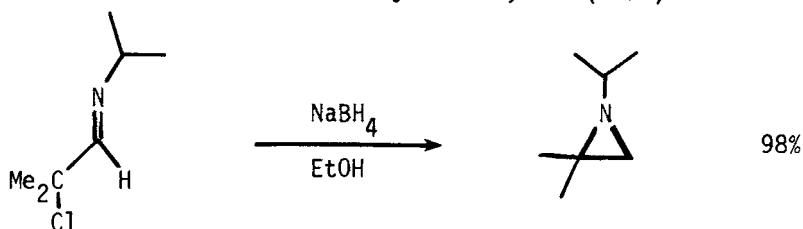
Tetr Lett, 913 (1977)



Synthesis, 30 (1979)

Chem Pharm 26, 2897 (1978)

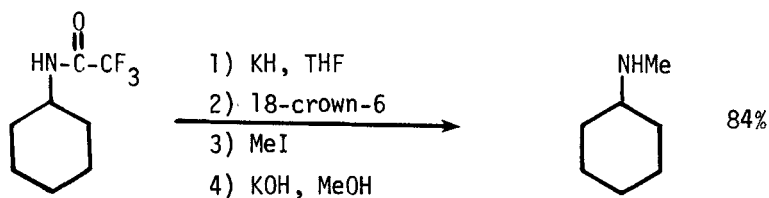
Synthesis, 856 (1977)

Rec Trav Chim 96, 242 (1977)

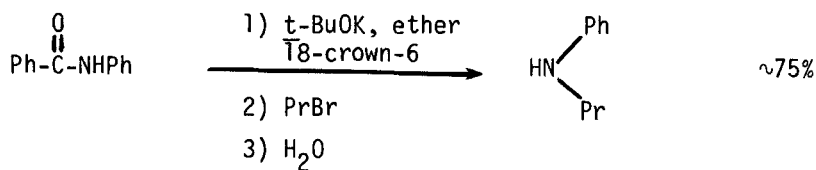
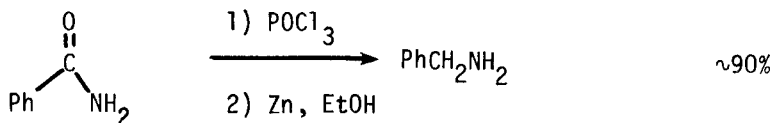
Related methods: Amines from Ketones (Section 102)

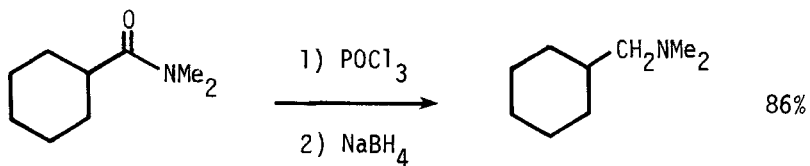
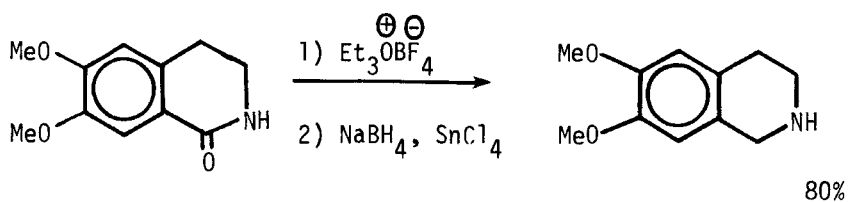
Section 95 Amines from Alkyls, Methylenes and Aryls

No Examples

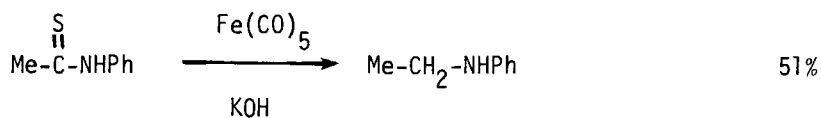
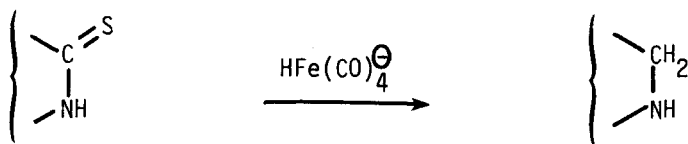
Section 96 Amines from Amides

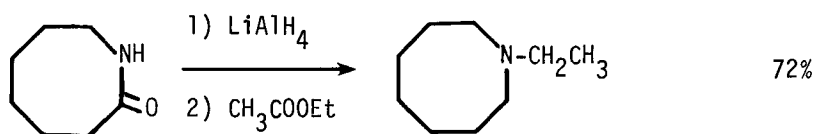
Tetr Lett, 4987 (1978)

Synth Comm 9, 757 (1979)Experientia 33, 101 (1977)

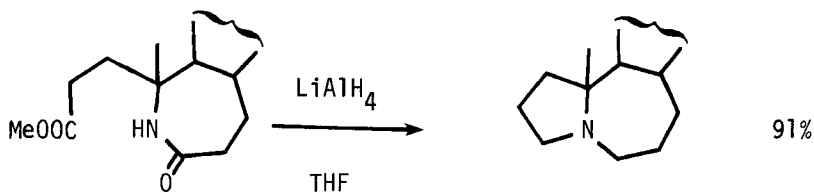
JOC 42, 2082 (1977)

Synthesis, 652 (1977)

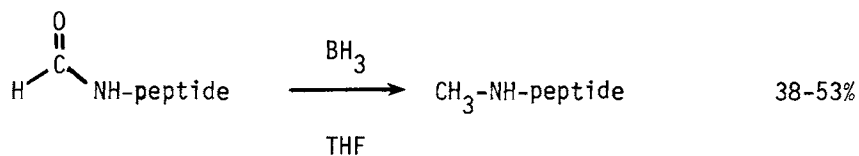
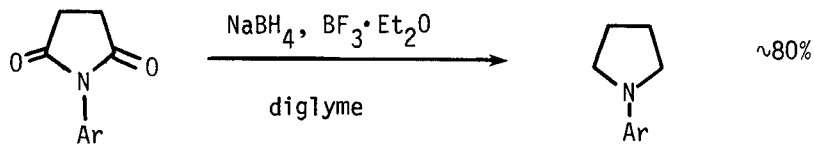
JOC 42, 3522 (1977)JOC 42, 3522 (1977)



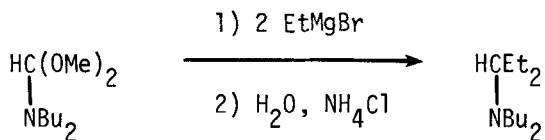
Tetr Lett, 3395 (1979)



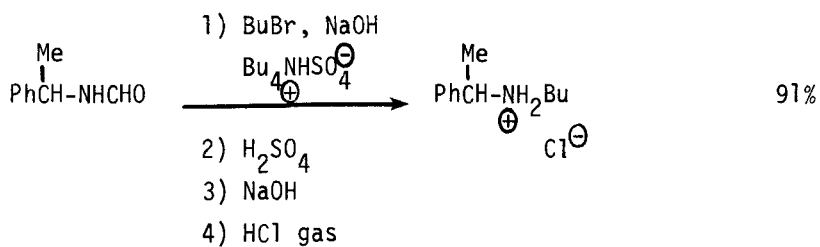
Tetr Lett, 1077 (1978)

JOC 42, 4148 (1977)

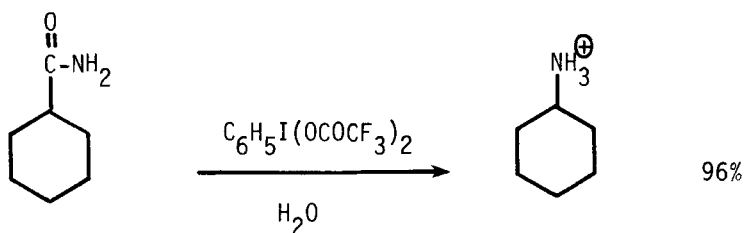
Liebigs Ann Chem, 461 (1979)



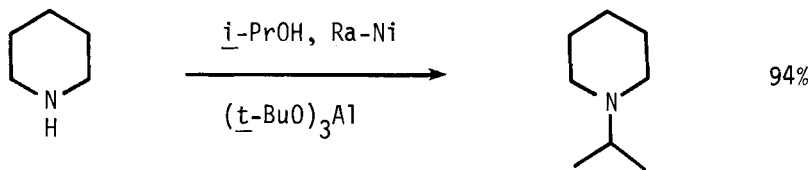
Synthesis, 757 (1978)



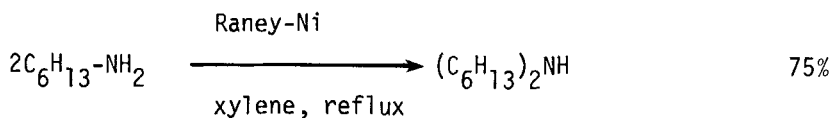
Synthesis, 549 (1979)

JOC 44, 1746 (1979)

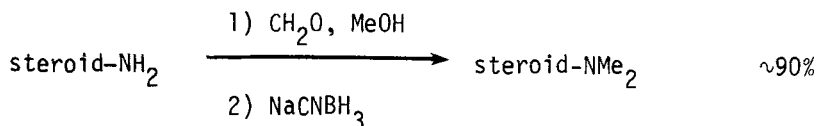
Related methods: Protection of Amines (Section 105A)

Section 97 Amines from Amines

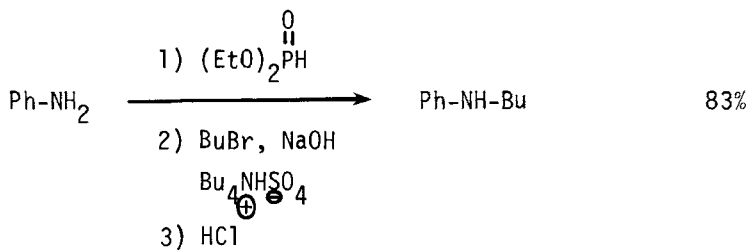
Synthesis, 722 (1977)

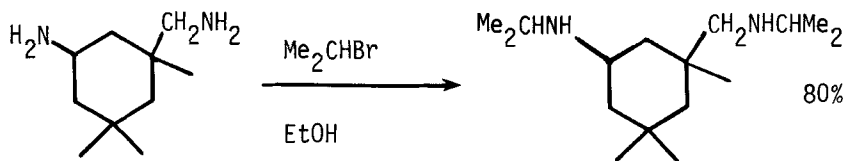
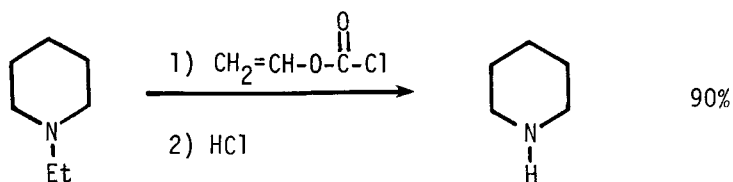


Synthesis, 70 (1979)

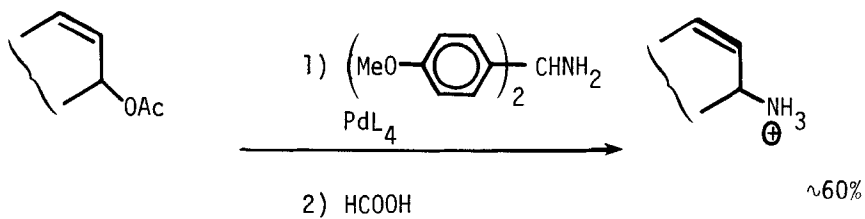


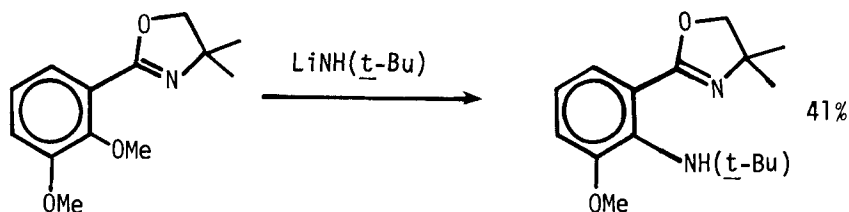
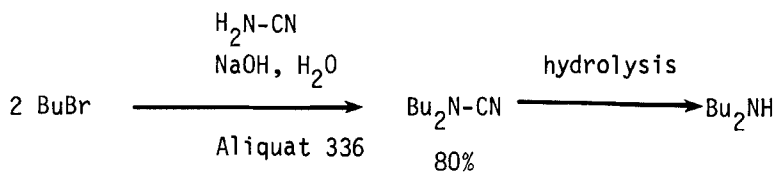
Tetr Lett, 3469 (1977)

Angew Int Ed 16, 107 (1977)

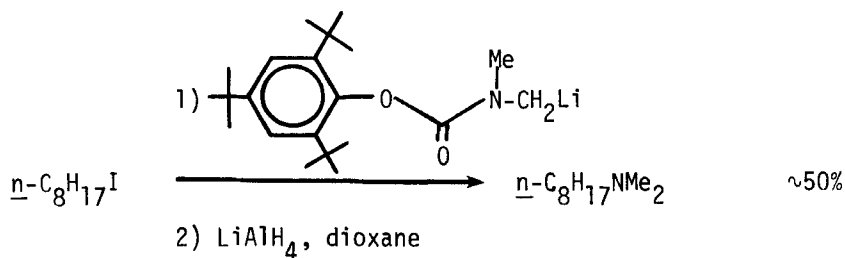
J Prakt Chem 321, 680 (1979)

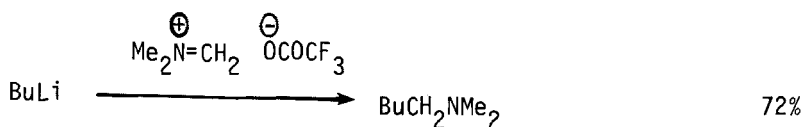
Tetr Lett, 1567 (1977)

Section 98 Amines from EstersJOC 44, 3451 (1979)

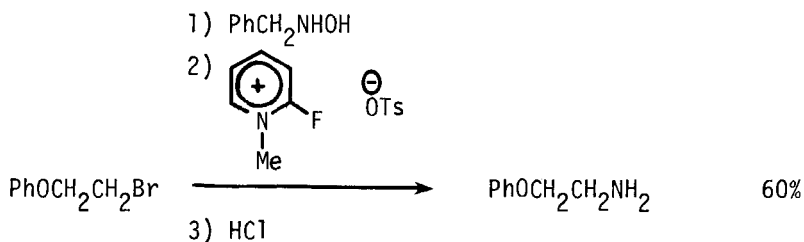
Section 99 Amines from EthersJOC 42, 2653 (1977)Section 100 Amines from Halides

Synthesis, 882 (1978)

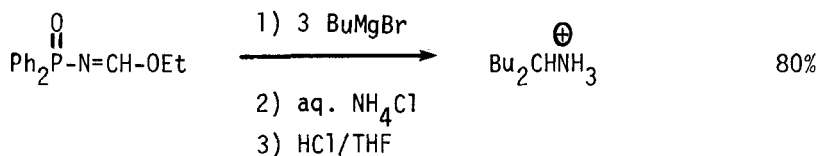
Angew Int Ed 17, 274 (1978)



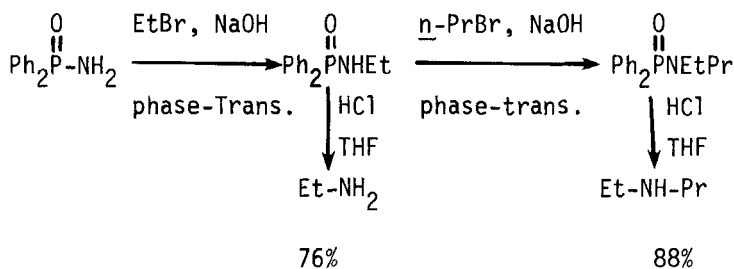
Synth Comm 6, 539 (1976)



Chem Lett, 1057 (1978)



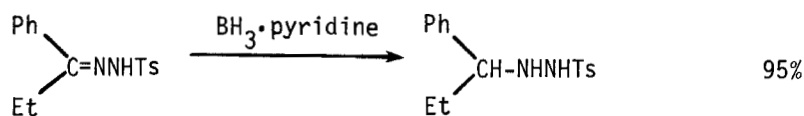
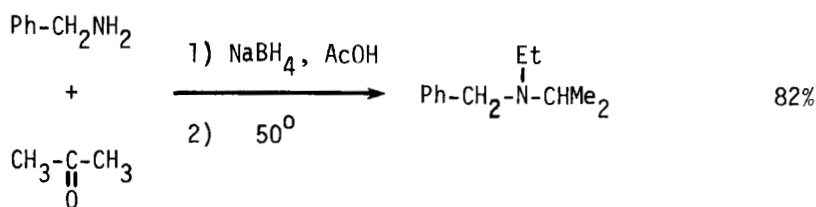
Synthesis, 691 (1979)



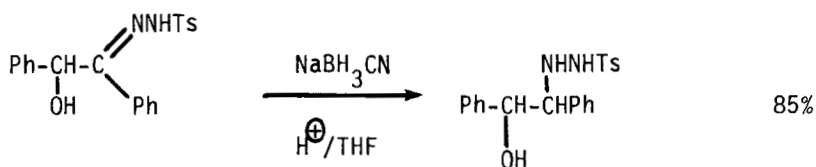
Angew Int Ed 16, 702 (1977)

Section 101 Amines from Hydrides

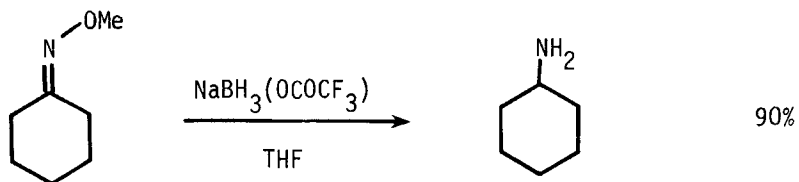
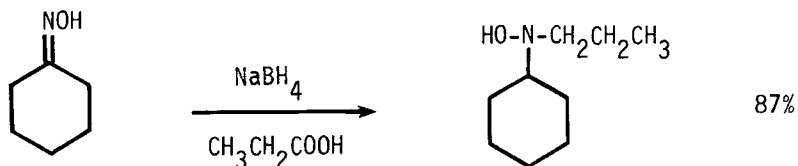
No additional examples

Section 102 Amines from KetonesSynth Comm 9, 49 (1979)

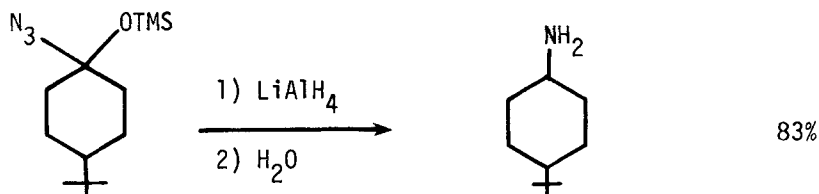
Synthesis, 766 (1978)



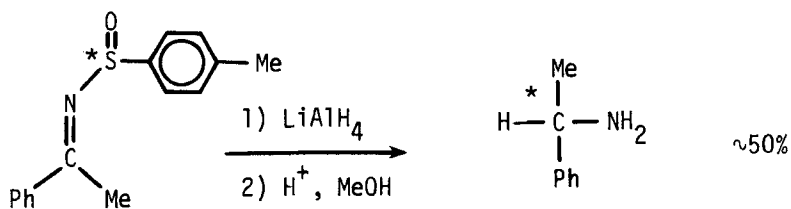
Synthesis, 789 (1979)

Chem Pharm 26, 2897 (1978)

Synthesis, 856 (1977)



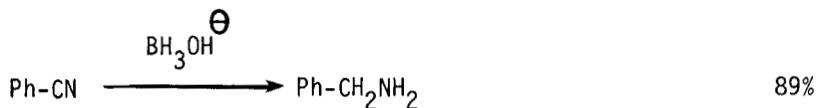
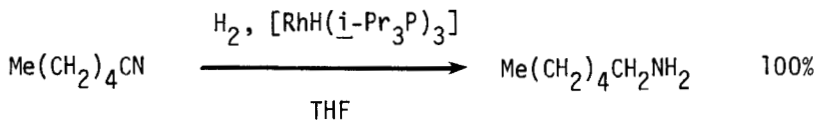
Tetr Lett, 2737 (1977)



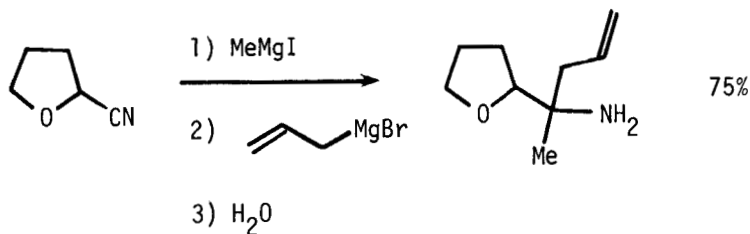
78%ee

JCS Chem Comm, 723 (1977)

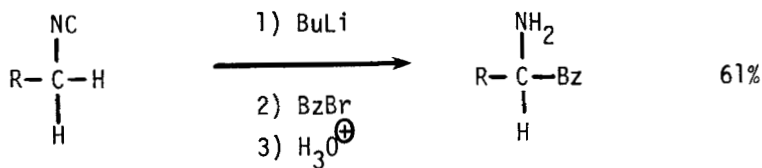
Related methods: Amines from Aldehydes (Section 94)

Section 103 Amines from NitrilesJOC 42, 3963 (1977)

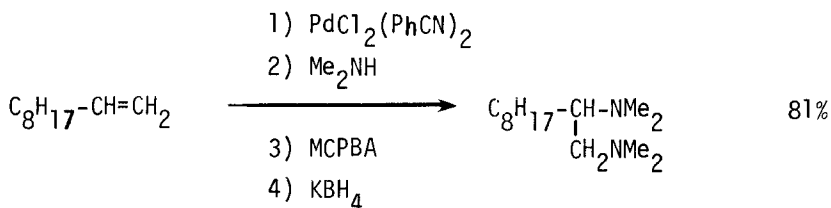
JCS Chem Comm, 870 (1979)



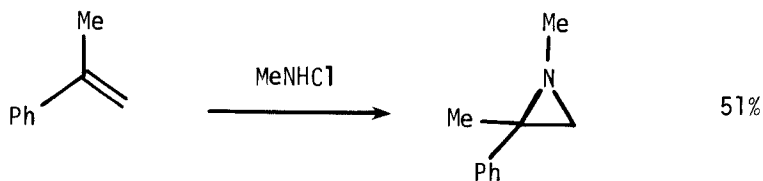
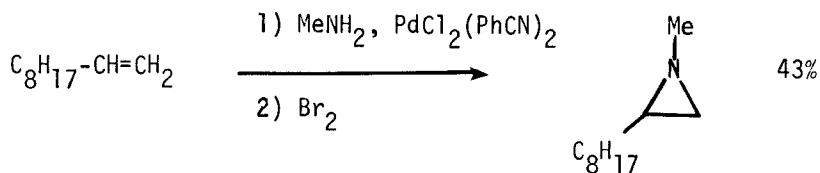
Tetr Lett, 23 (1977)



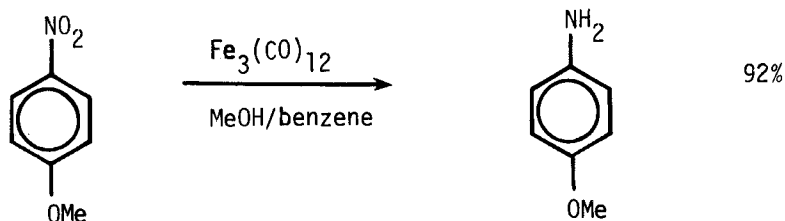
Liebigs Ann Chem, 40 (1977)

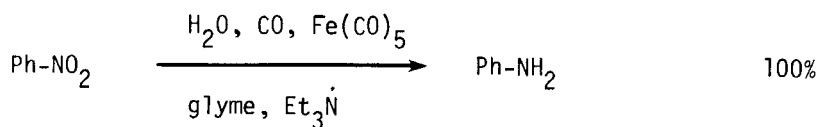
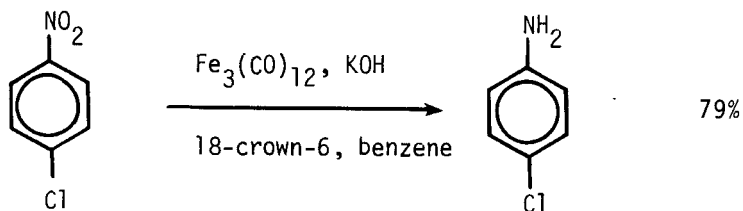
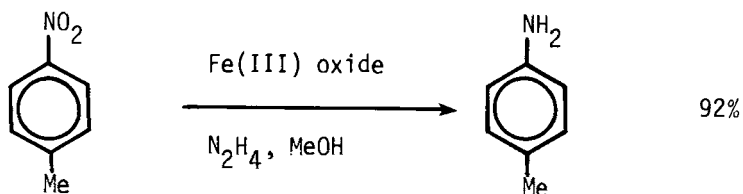
Section 104 Amines from Olefins

Tetr Lett, 163 (1978)

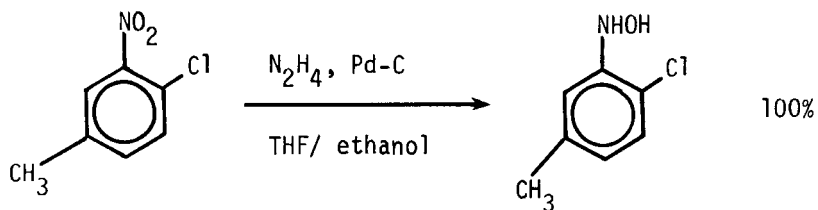
J Prakt Chem 320, 413 (1978)

JCS Chem Comm, 413 (1977)

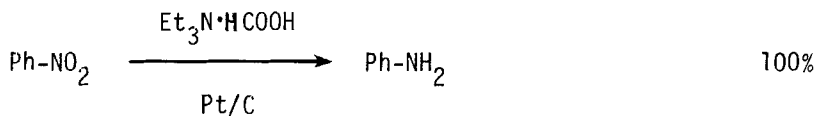
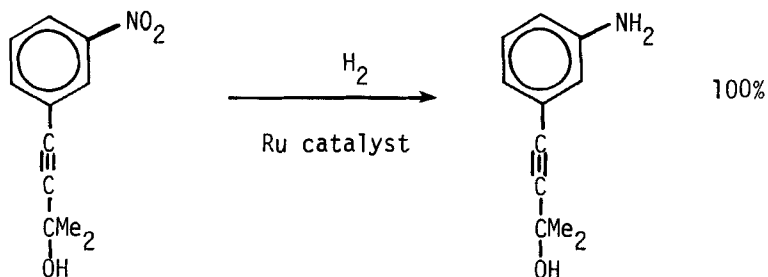
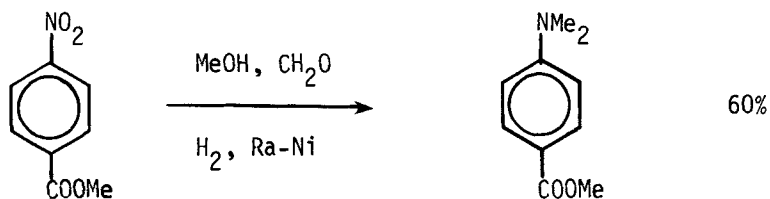
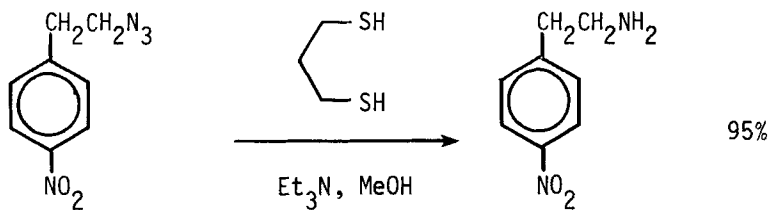
Section 105 Amines from Miscellaneous CompoundsJACS 99, 98 (1977)

JACS 100, 3969 (1978)Angew Int Ed 16, 41 (1977)

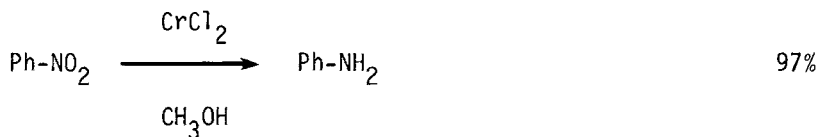
Synthesis, 834 (1978)



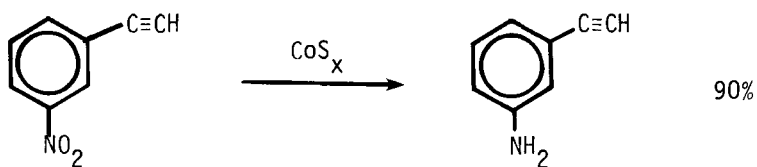
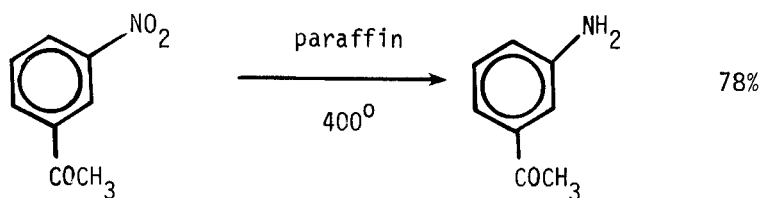
Synthesis, 850 (1977)

JOC 42, 3491 (1977)JOC 44, 1233 (1979)Indian J Chem 14B, 904 (1976)

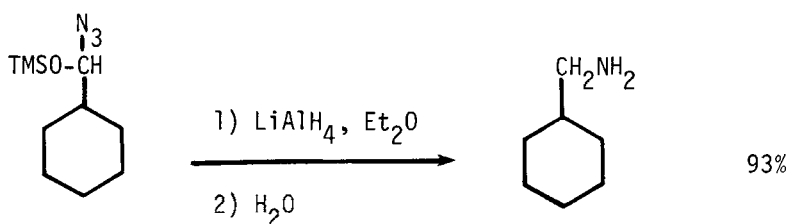
Tetr Lett, 3633 (1978)



Synthesis, 792 (1977)

JOC 44, 3671 (1979)

Synthesis, 23 (1978)



Tetr Lett, 2737 (1977)

Review: "o-Mesitylenesulfonylhydroxylamine and Related Compounds--
Powerful Aminating Reagents"

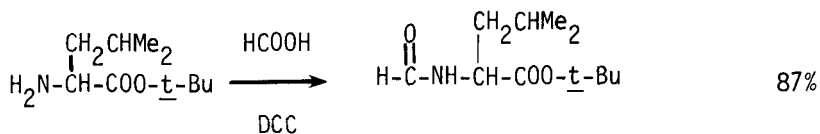
Synthesis, 1 (1977)

Review: "General Methods of Alkaloid Synthesis"

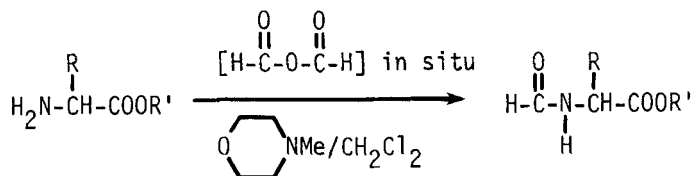
Accounts Chem Res 10, 193 (1977)

Section 105A Protection of Amines

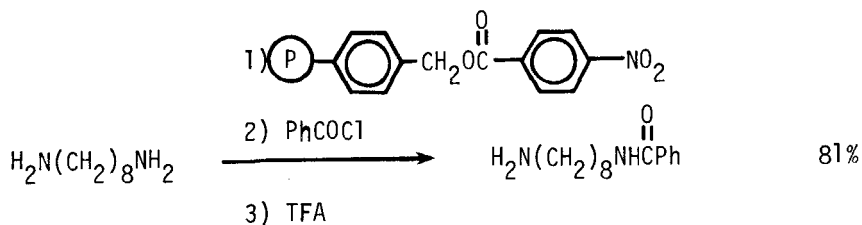
Related methods: Amides from Amines (Section 82); Amines from Amides (Section 96)



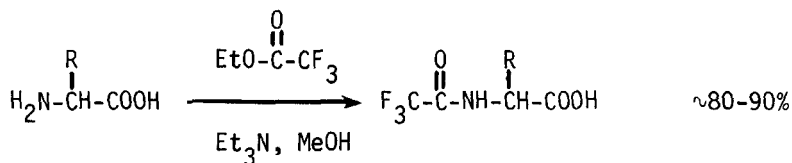
JOC 42, 2019 (1977)



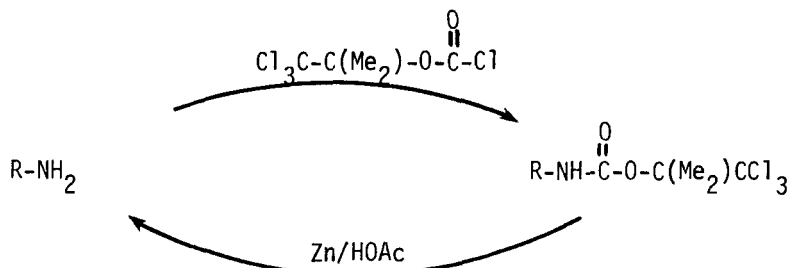
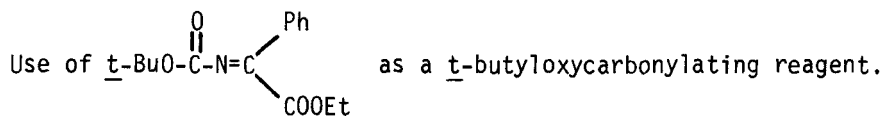
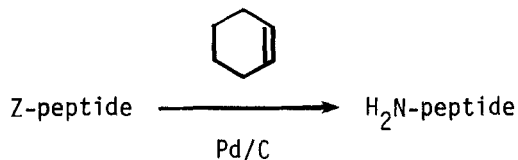
Synthesis, 709 (1979)



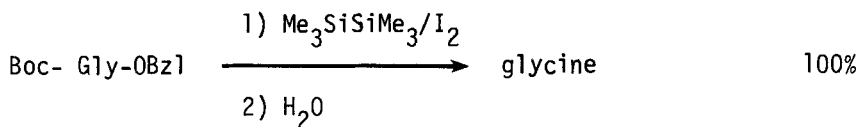
Israel J Chem 17, 248 (1979)

JOC 44, 2805 (1979)

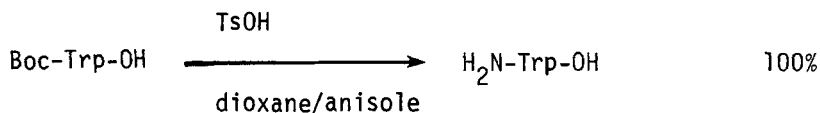
Use of the p-hydroxybenzyloxycarbonyl protecting group in peptide synthesis. Removed by $\text{H}_2\text{O}_2/\text{NH}_3$.

Tetrahedron 34, 3105 (1978)Angew Int Ed 17, 361 (1978)BCS Japan 50, 718 (1977)

JCS Perkin I, 490 (1977)



Angew Int Ed 18, 612 (1979)



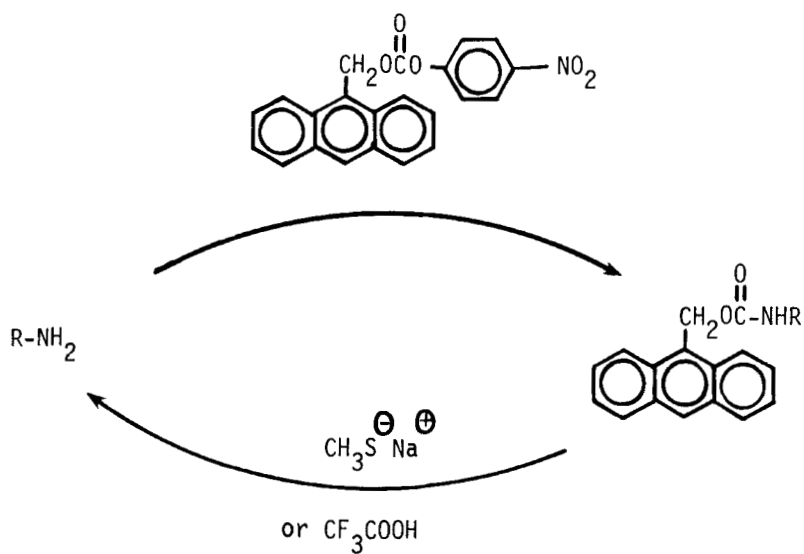
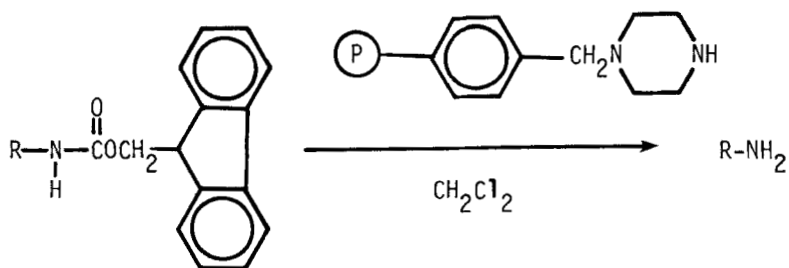
Chem Pharm Bull 26, 2198 (1978)

Boc and Z(OMe) protecting groups are removed by ethanesulfonic acid in acetic acid or methylene chloride. Z, benzyl ester, S-p-methoxybenzyl, and N-Gp methoxybenzenesulfonyl groups are unaffected.

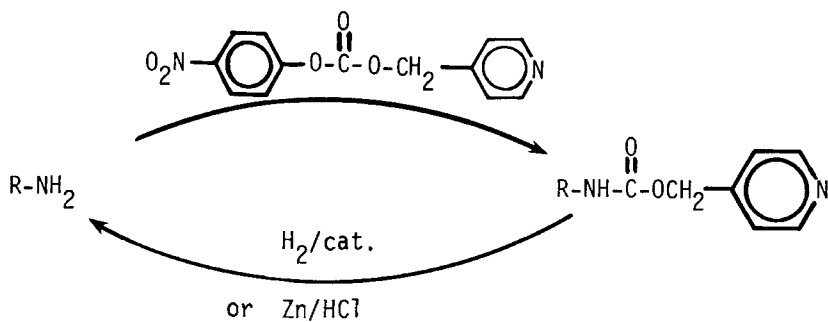
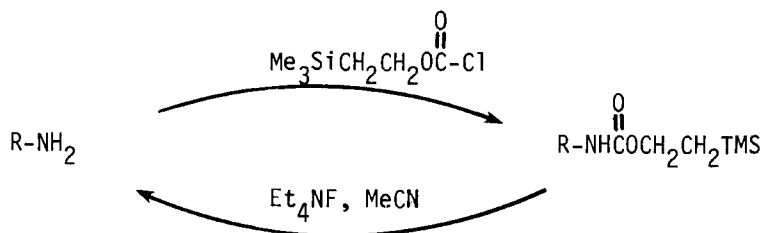
Chem Pharm Bull 25, 740 (1977)

1, 4-cyclohexadiene/Pd-C removes N-benzyloxycarbonyl protecting groups.

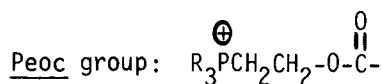
JOC 43, 4194 (1978)

JOC 42, 399 (1977)

JCS Chem Comm, 450 (1978)

JOC 42, 3286 (1977)

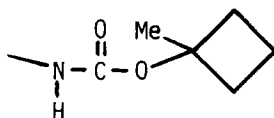
JCS Chem Comm, 358 (1978)

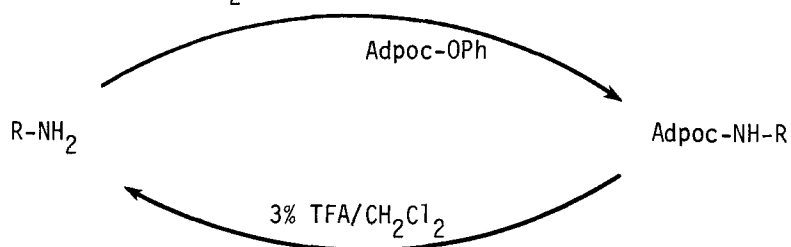
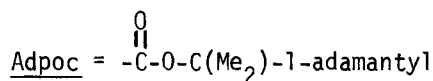


Enhances the water-solubility of protected amino acids and peptides; extremely resistant to acids, including TFA. Removed by weak bases.

Angew Int Ed 17, 67 (1978)

Use of the 1-methylcyclobutyloxycarbonyl protecting group in peptide synthesis. More stable than t-Boc toward HOAc.

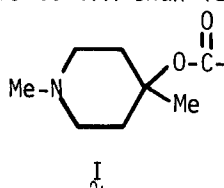
JOC 42, 143 (1977)



Stable toward hydrogenolysis.

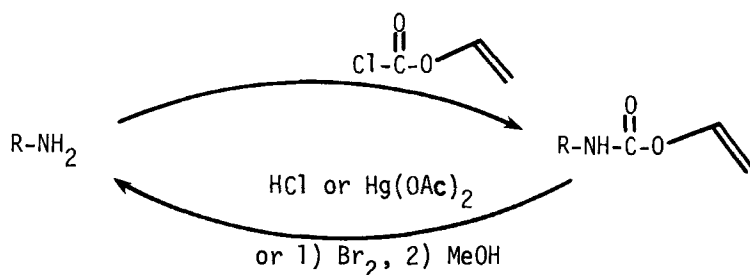
Angew Int Ed 17, 944 (1978)

I is more stable to TFA than is the t-Boc group.

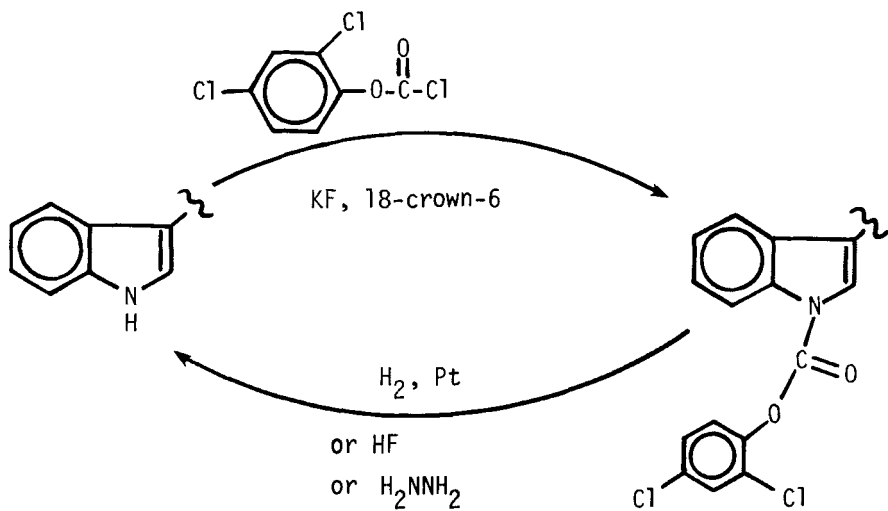


Cleaved by HBr/HOAc

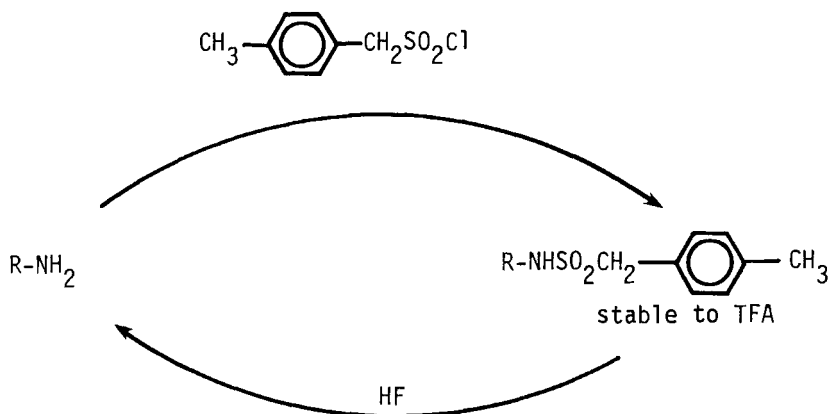
JCS Perkin I, 1459 (1979)



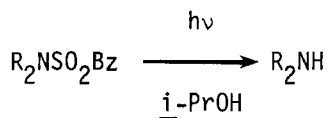
Tetr Lett, 1563 (1977)



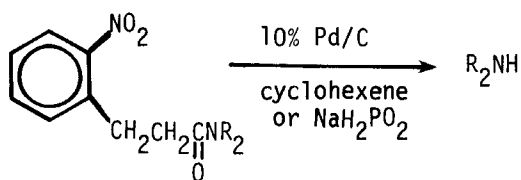
JCS Perkin I, 627 (1977)



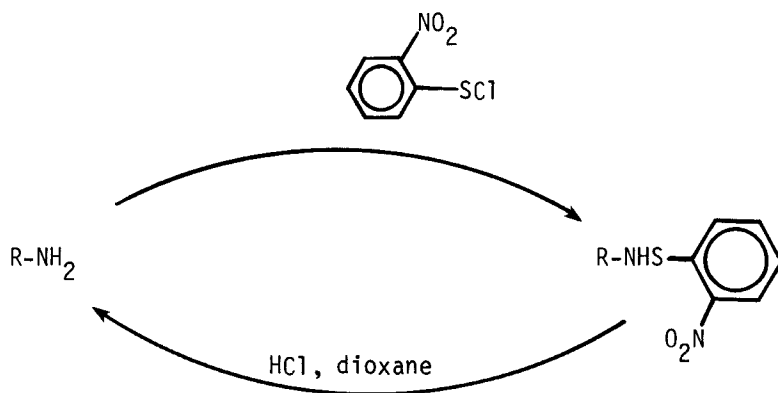
JCS Chem Comm, 220 (1978)

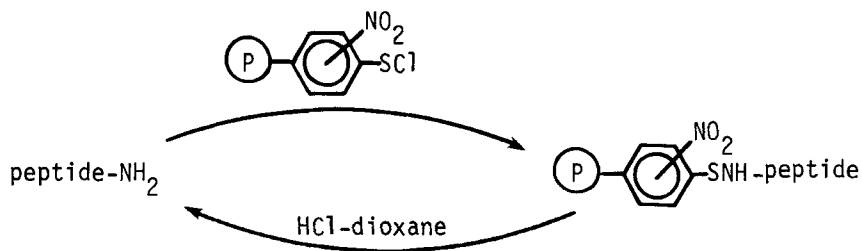


Tetr Lett, 1029 (1978)

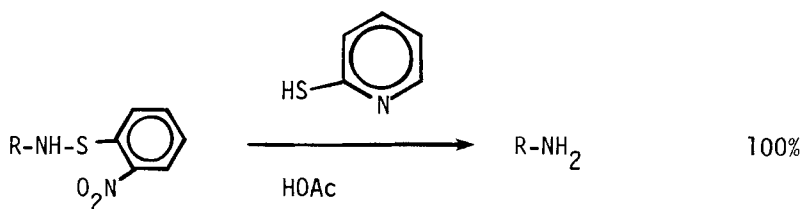


Tetr Lett, 555 (1979)

Chem Pharm Bull 26, 296 (1978)

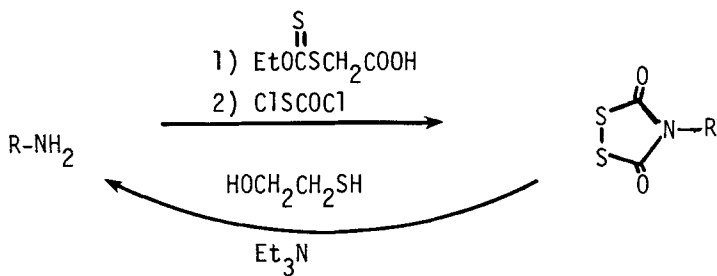


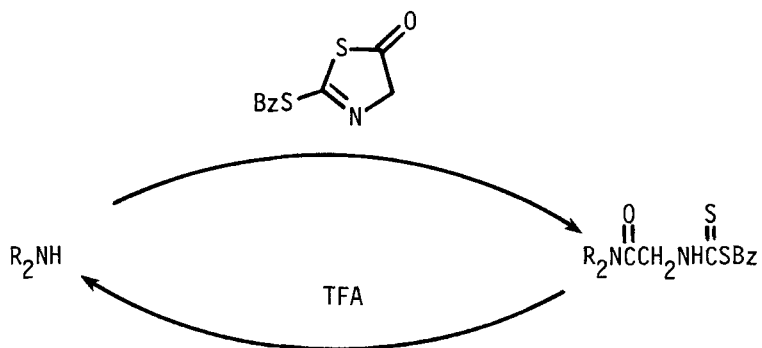
Chem Lett, 7 (1978)



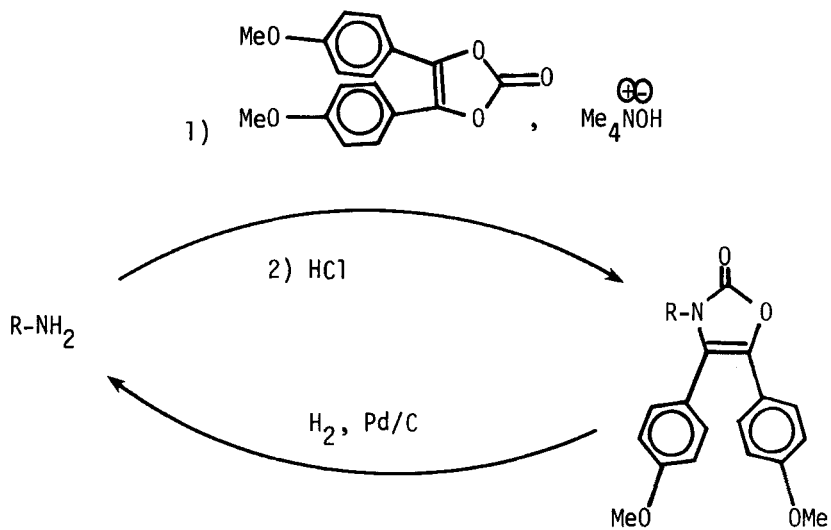
R = peptide

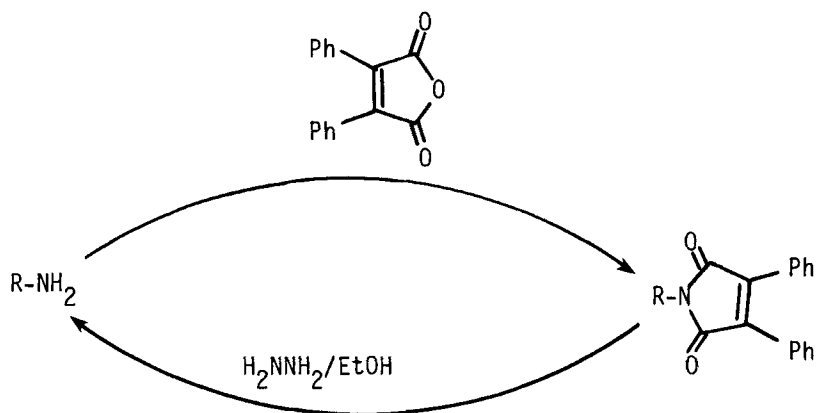
AZOC, BPOC, BOC, *t*-butyl ester, MSOC, and Tos are unaffected by the reaction conditions.

Helv Chim Acta 61, 1086 (1978)JACS 99, 7363 (1977)



Tetr Lett, 325 (1979)

Chem Pharm Bull 26, 660 (1978)



Yellow, fluorescent derivatives.

JOC 42, 2819 (1977)

Review: "Protecting Groups in Peptide Synthesis"

Chem & Ind, 617 (1979)

CHAPTER 8

PREPARATION OF ESTERS

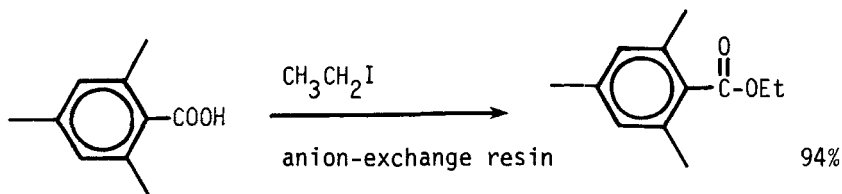
Section 106 Esters from Acetylenes

No additional examples

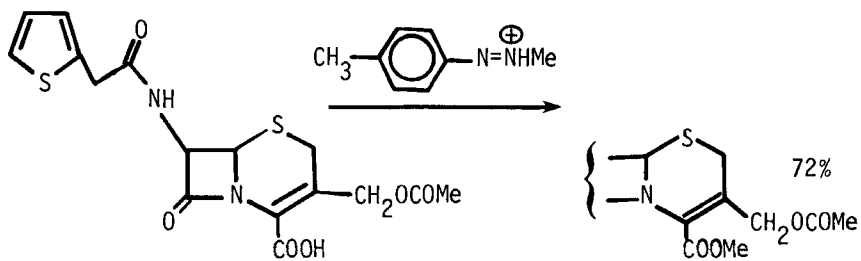
Section 107 Esters from Carboxylic Acids and Acid Halides

The following types of reactions are found in this section:

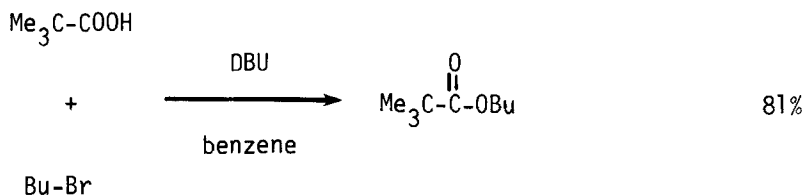
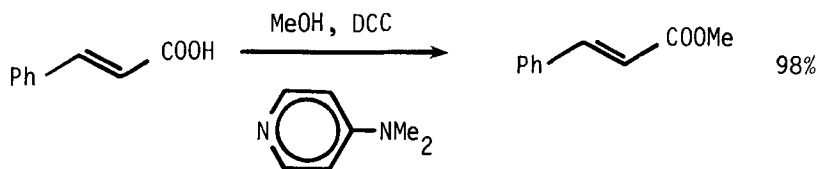
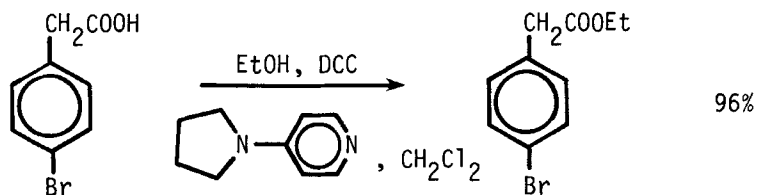
1. Esters from carboxylic acids (and acid halides) and alcohols.
2. Lactones from hydroxy acids.
3. Esters from carboxylic acids and halides, sulfonates, and miscellaneous compounds.



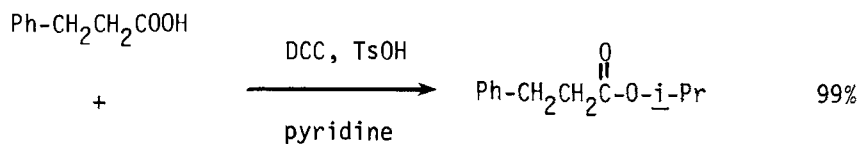
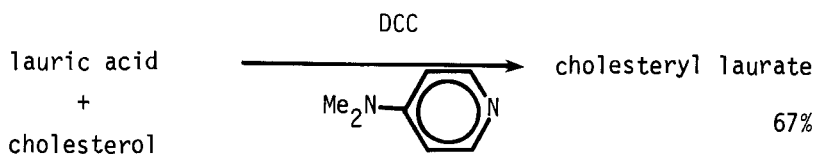
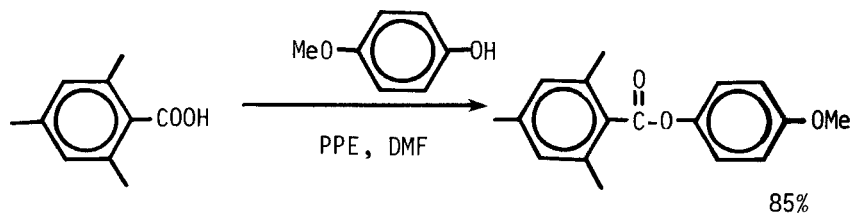
JOC 44, 2425 (1979)



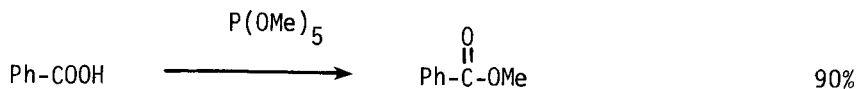
Tetr Lett, 5219 (1978)

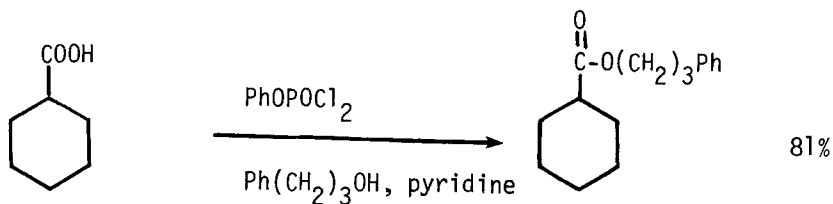
BCS Japan 51, 2401 (1978)Angew Int Ed 17, 522 (1978)

Tetr Lett, 4475 (1978)

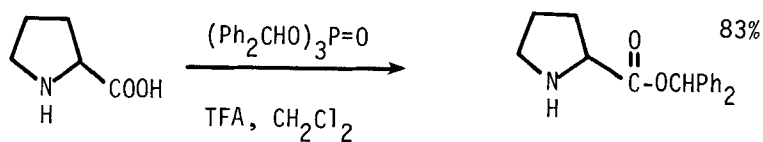
Acta Chem Scand B, 33, 410 (1979)Synth Comm 9, 539 (1979)

Synthesis, 429 (1979)

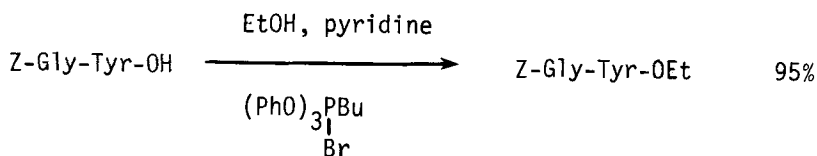
JOC 43, 4672 (1978)



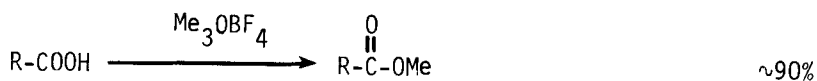
Tetr Lett, 4461 (1978)



Tetr Lett, 4697 (1978)

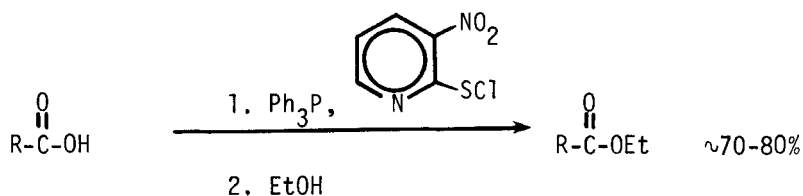


Synthesis, 355 (1979)



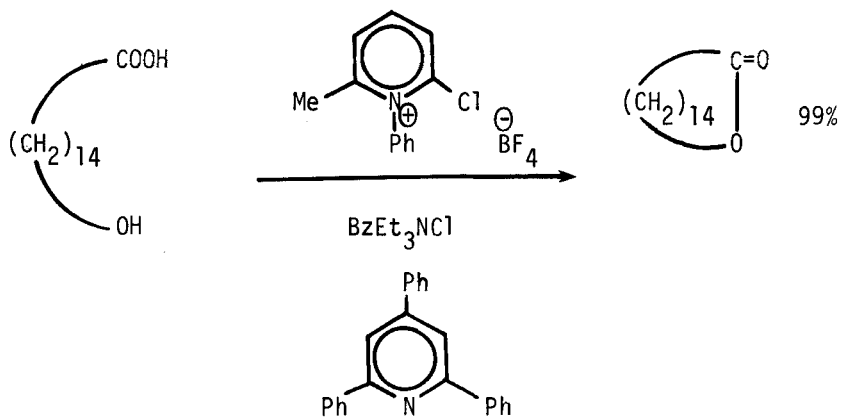
R = alkyl, aryl, vinyl

JOC 44, 1149 (1979)

JOC 44, 638 (1979)

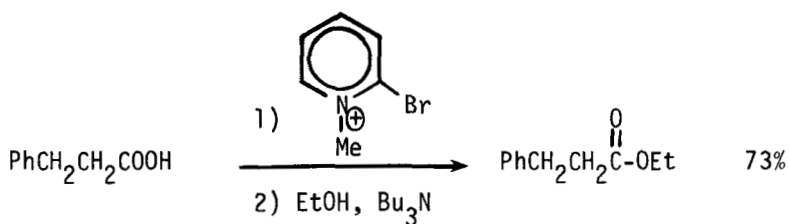
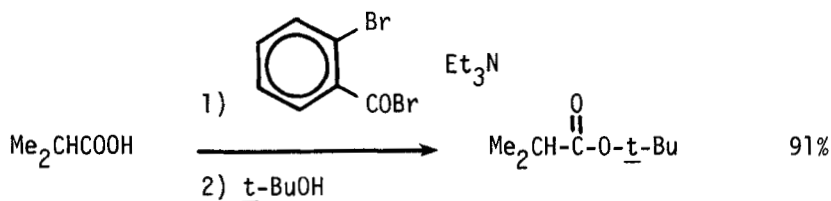
R = cephalosporinic acid.

Chem Lett, 979 (1978)

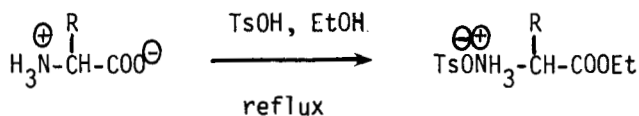
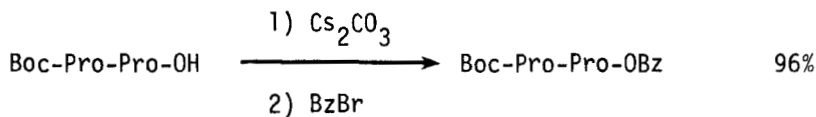


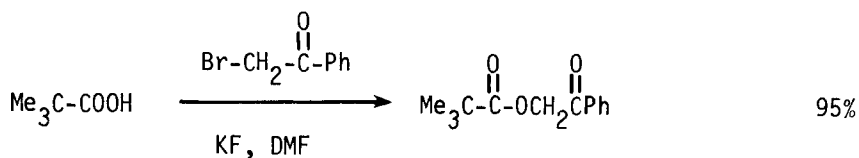
Chem Lett, 441 and 763 (1977)

Chem Lett, 885 (1978)

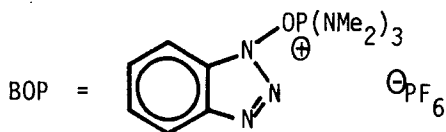
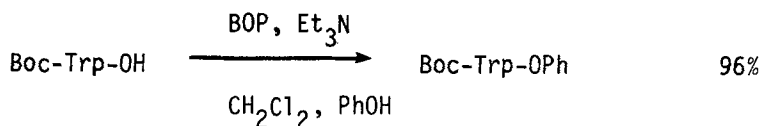
BCS Japan 50, 1863 (1977)

Chem Lett, 145 (1979)

Bull Chem Soc Japan 52, 1879 (1979)JOC 42, 1286 (1977)



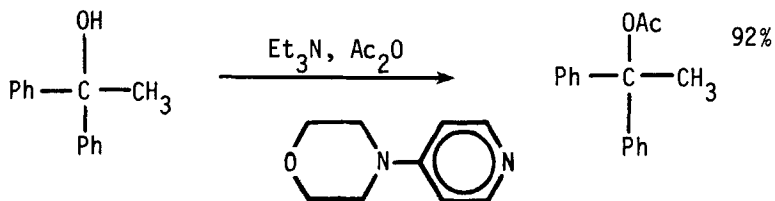
Tetr Lett, 599 (1977)

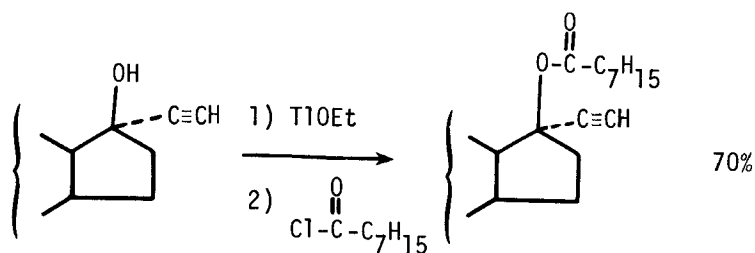
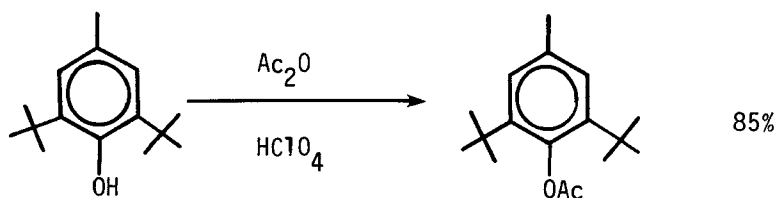
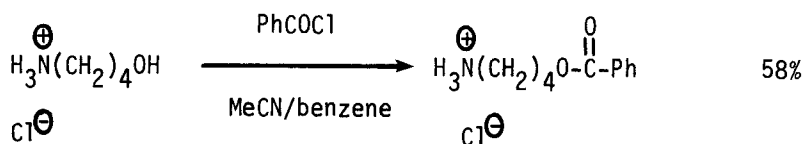
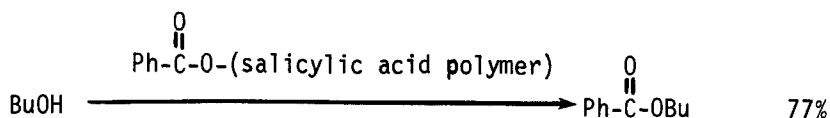


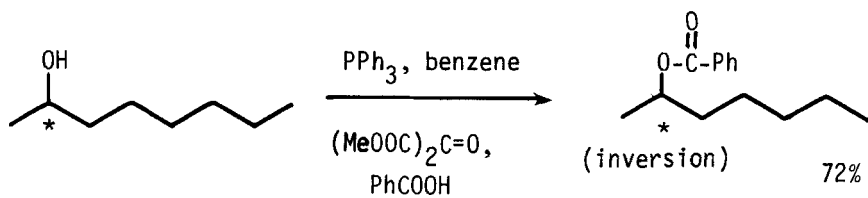
Synthesis, 413 (1977)

Further examples of the reaction $\text{RCOOH} + \text{ROH} \rightarrow \text{RCOOR}$ are included in Section 108 (Esters from Alcohols and Phenols) and Section 10A (Protection of Carboxylic Acids).

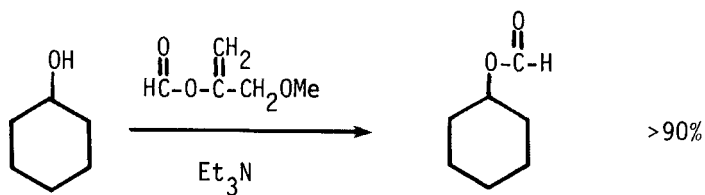
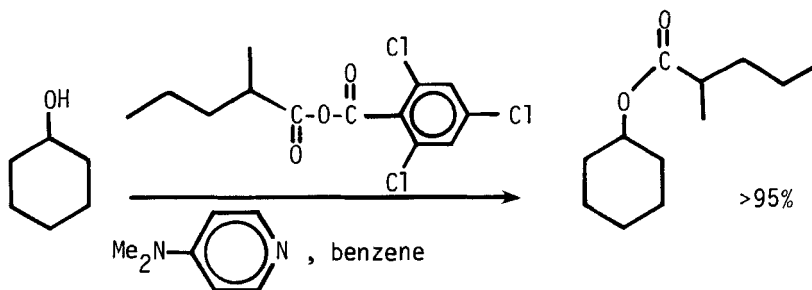
Section 108 Esters from Alcohols and Phenols

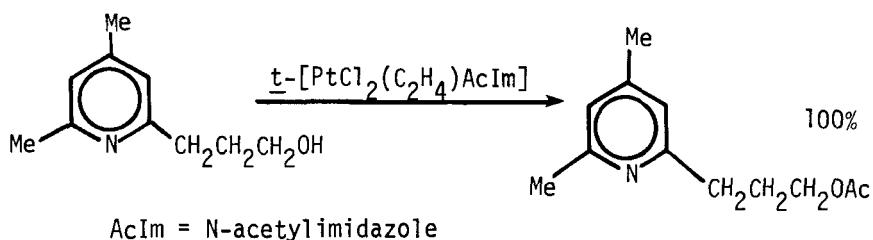
Tetrahedron 34, 2069 (1978)

Synth Comm 7, 383 (1977)JOC (USSR) 13, 608 (1977)Synth Comm 8, 327 (1978)Synth Comm 7, 57 (1977)



Tetr Lett, 3179 (1977)

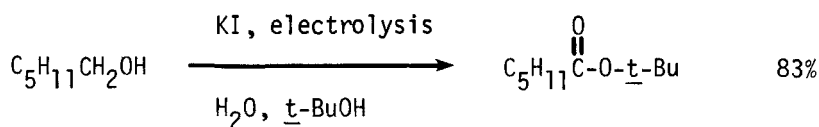
Rec Trav Chim 98, 324 (1979)Bull Chem Soc Japan 52, 1989 (1979)

JACS 99, 3531 (1977)

$\text{Ph}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CN}$ acylates steroid alcohols selectively in the order
 $21 > 17\beta > 3\beta > 6\alpha$, $3\alpha > 20\alpha > 20\beta > 7\beta > 7\alpha > 6\beta > 22\beta > 22\alpha$

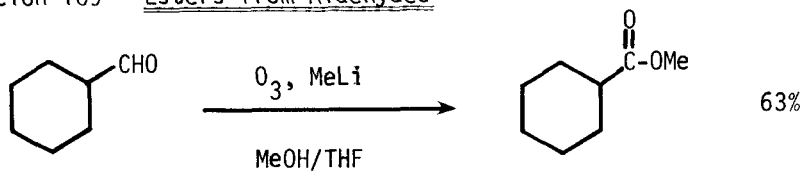
Coll Czech Chem Commun 44, 2443 (1979)

Review: "4-Dialkylaminopyridines as Highly Active Acylation Catalysts"

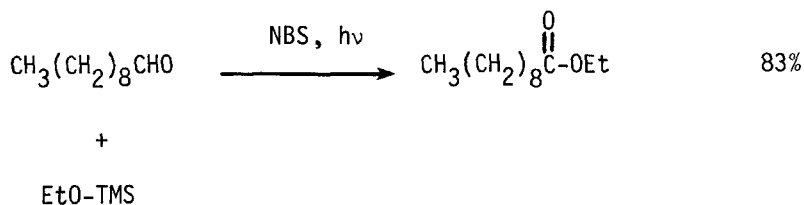
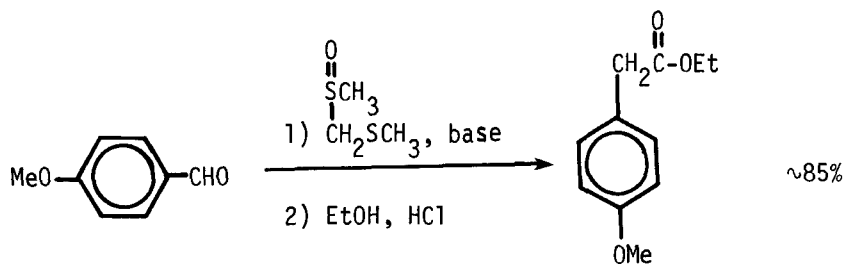
Angew Int Ed 17, 569 (1978)

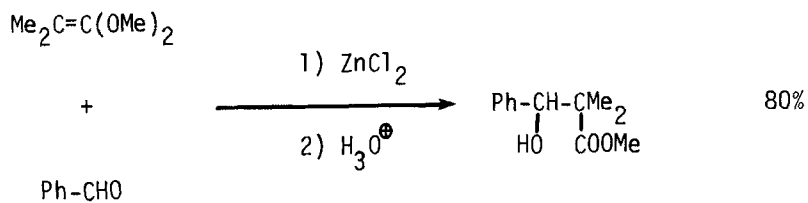
Tetr Lett, 165 (1979)

Further examples of the reaction $\text{ROH} \rightarrow \text{R}'\text{COOR}$ are included in Section 107 (Esters from Carboxylic Acids and Acid Halides) and Section 45A (Protection of Alcohols and Phenols).

Section 109 Esters from Aldehydes

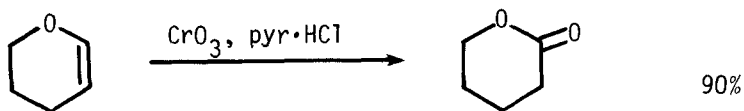
Tetr Lett, 1627 (1978)

JOC 43, 371 (1978)Bull Chem Soc Japan 52, 2013 (1979)



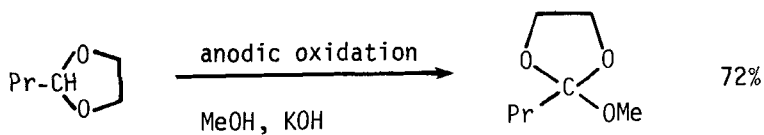
80%

Synthesis, 400 (1978)



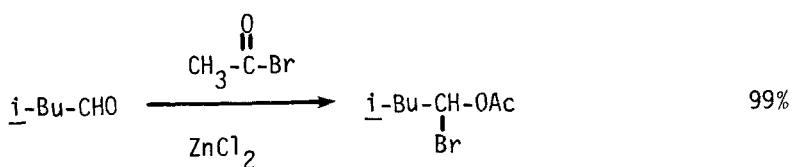
90%

Tetr Lett, 3483 (1977)



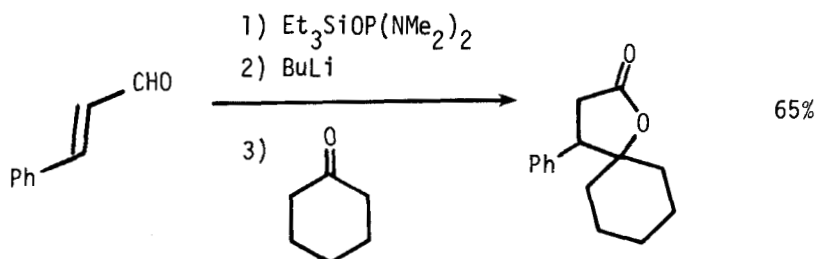
72%

Synthesis, 283 (1978)



99%

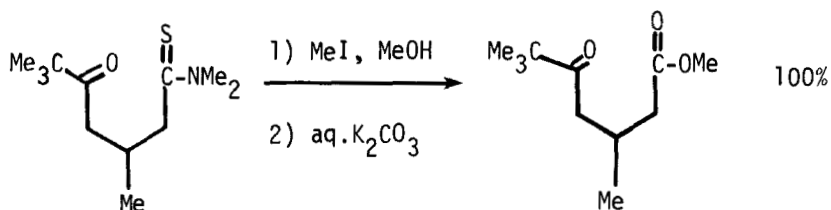
Synthesis, 593 (1978)

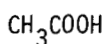
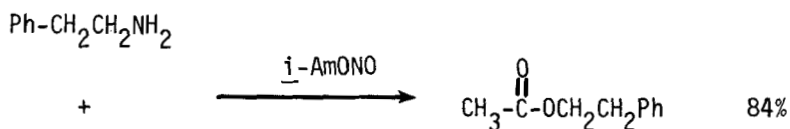
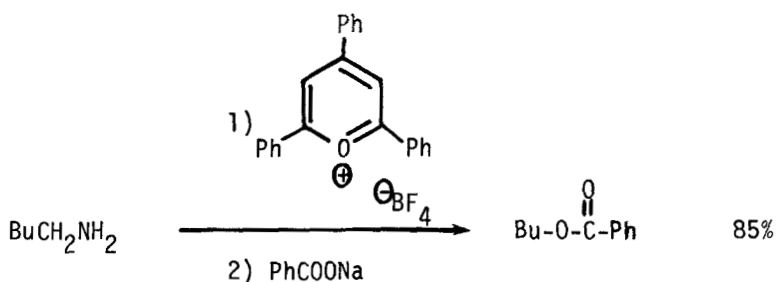
JACS 101, 371 (1979)

Related methods: Esters from Ketones (Section 117)

Section 110 Esters from Alkyls, Methylene and Aryls

No examples of the reaction $\text{RR} \rightarrow \text{RCOOR}'$ or $\text{R}'\text{COOR}$ ($\text{R}, \text{R}' = \text{alkyl, aryl, etc.}$) occur in the literature. For the reaction $\text{RH} \rightarrow \text{RCOOR}'$ or $\text{R}'\text{COOR}$ see Section 116 (Esters from Hydrides).

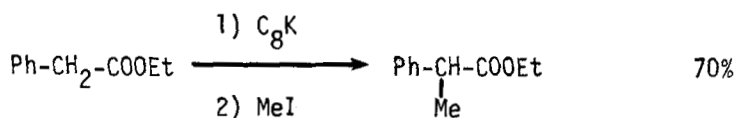
Section 111 Esters from AmidesJACS 101, 1316 (1979)

Section 112 Esters from AminesSynth Comm 8, 33 (1978)

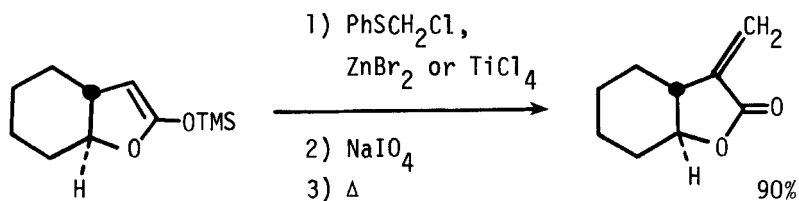
JCS Chem Comm, 701 (1977)

Section 113 Esters from Esters

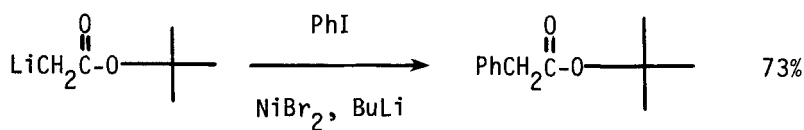
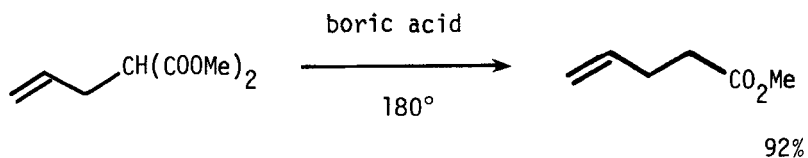
Conjugate reductions and conjugate alkylations of unsaturated esters are found in Section 74 (Alkyls from Olefins).

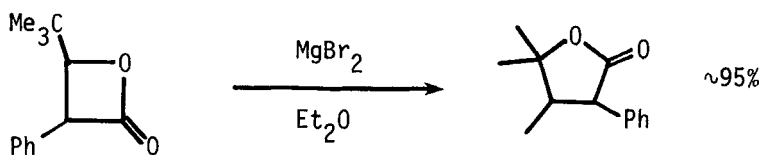


Tetr Lett, 653 (1977)



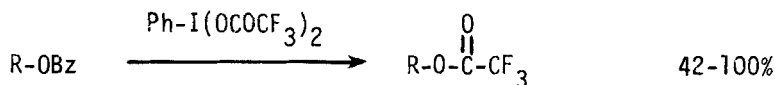
Tetr Lett, 993 and 995 (1979)

JACS 99, 4833 (1977)Synth Comm 9, 609 (1979)



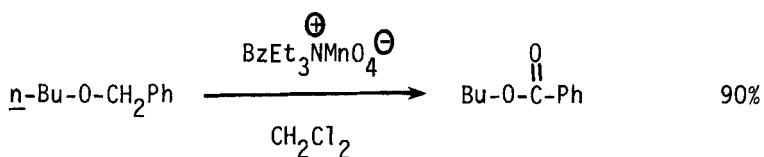
Angew Chem Int Ed 18, 793 (1979)

Section 114 Esters from Ethers



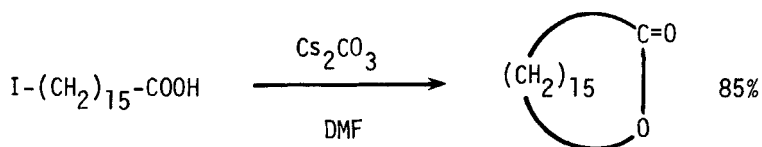
$\text{R} = \text{n-alkyl, Ph, Bz}$

JCS Chem Comm, 615 (1979)

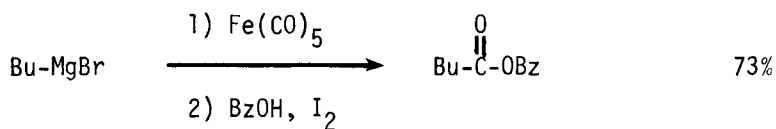


Angew Int Ed 18, 68 and 69 (1979)

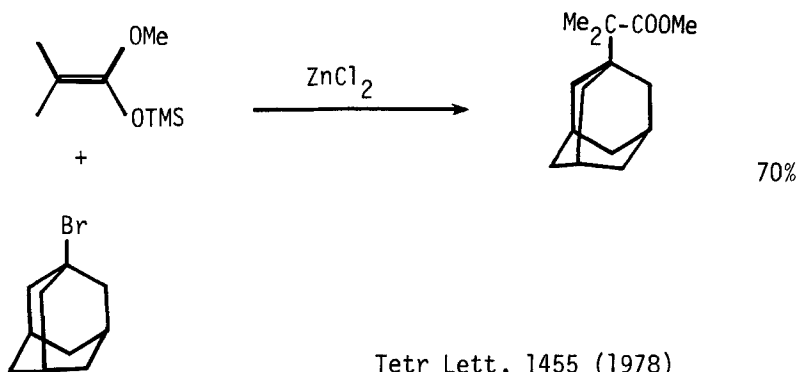
Section 115 Esters from Halides and Sulfonates



JCS Chem Comm, 286 (1979)



Tetr Lett, 1477 (1978)

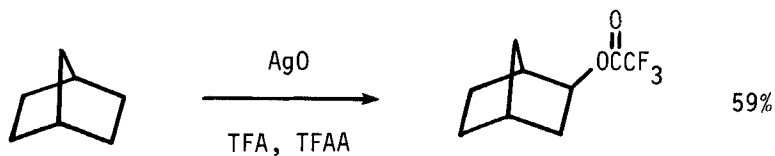


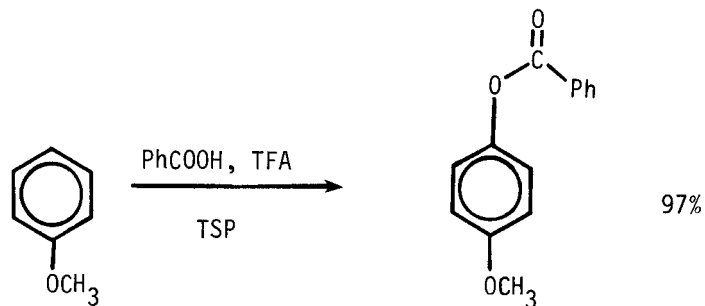
Tetr Lett, 1455 (1978)

Related methods: Carboxylic Acids from Halides (Section 25)

Section 116 Esters from Hydrides

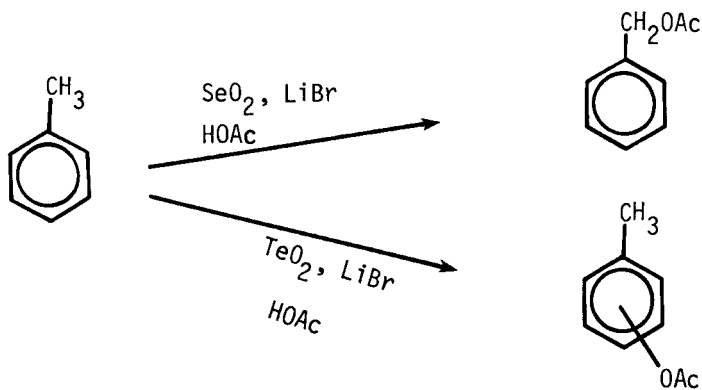
This section contains examples of the reaction $\text{RH} \rightarrow \text{RCOOR}'$ or $\text{R}'\text{COOR}$ ($\text{R}=\text{alkyl}$, aryl , etc.).

Synth Comm 6, 543 (1976)



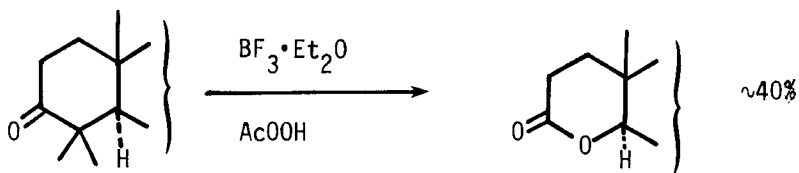
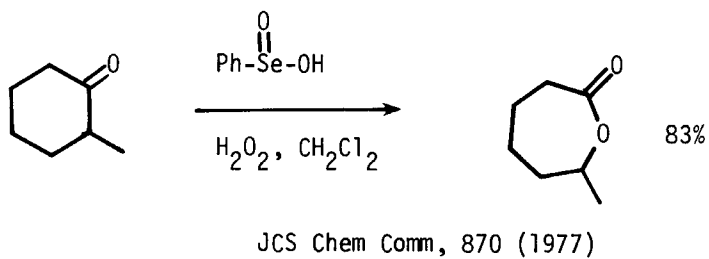
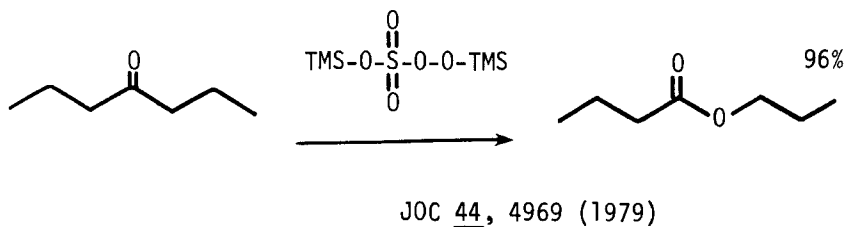
(TSP = 2-trifluoromethanesulfonyloxy pyridine)

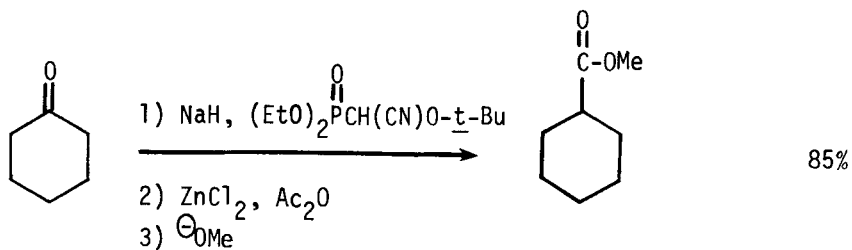
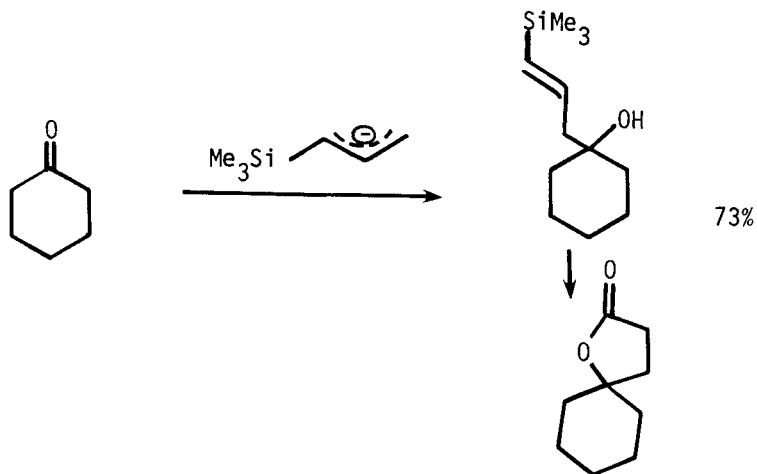
Chem Lett, 1099 (1977)



Tetr Lett, 3279 (1978)

Also via: Carboxylic acids, Section 26; Alcohols, Section 41

Section 117 Esters from KetonesActa Chem Scand (B) 32, 467 (1978)

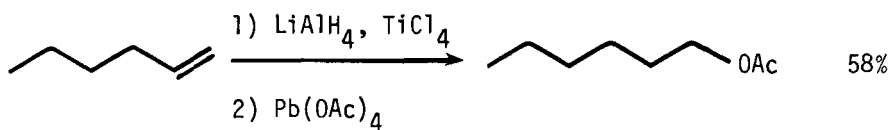
JACS 99, 182 (1977)

JCS Chem Comm, 772 (1977)

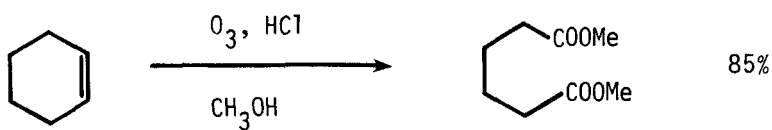
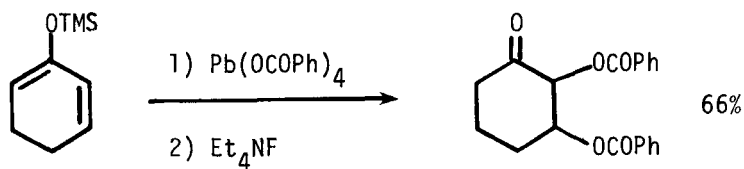
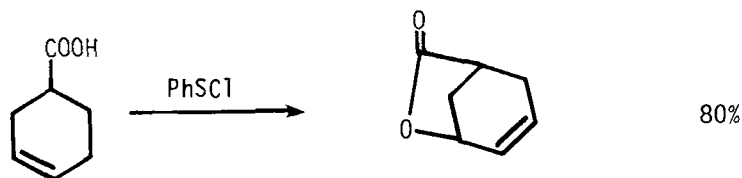
Also via Carboxylic acids, Section 27

Section 118 Esters from Nitriles

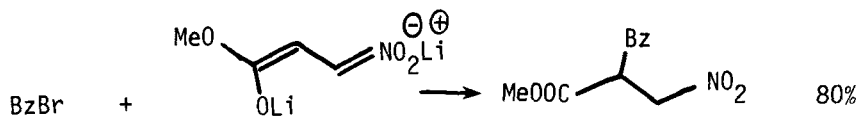
No additional examples

Section 119 Esters from Olefins

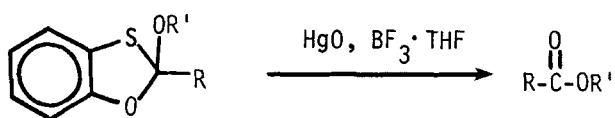
Tetr Lett, 1405 (1979)

Angew Int Ed 17, 939 (1978)JOC 42, 1051 (1977)JACS 101, 3884 (1979)

Also via Alcohols, Section 44

Section 120 Esters from Miscellaneous Compounds

Tetr Lett, 1161 (1977)

Section 120A Protection of Esters

Synthesis, 223 (1979)

CHAPTER 9

PREPARATION OF ESTERS AND EPOXIDES

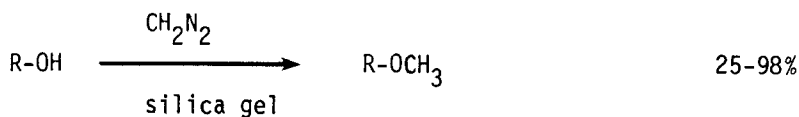
Section 121 Ethers and Epoxides from Acetylenes

No examples

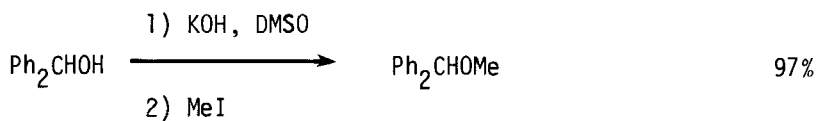
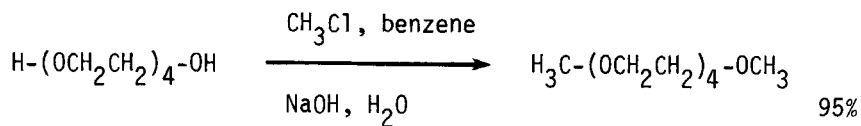
Section 122 Ethers and Epoxides from Carboxylic Acids

No additional examples

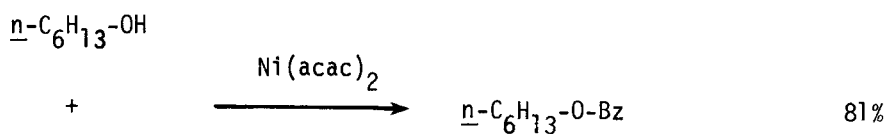
Section 123 Ethers and Epoxides from Alcohols and Phenols



Tetr Lett, 4405 (1979)

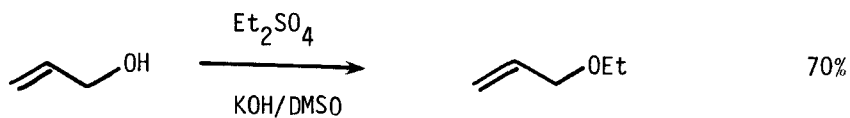
Tetrahedron 35, 2169 (1979)

Synthesis, 123 (1979)

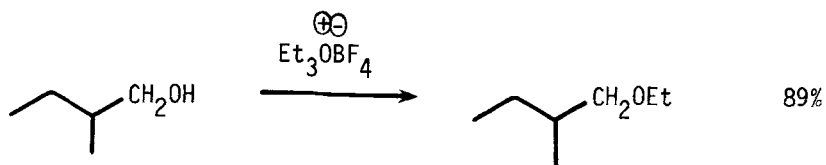


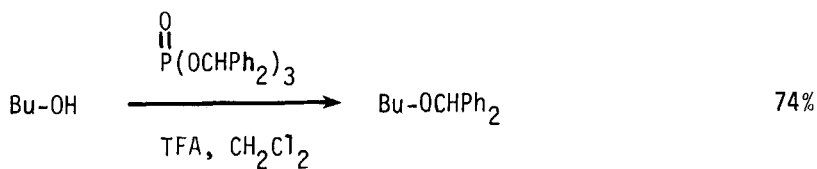
Bz-Cl

Synthesis, 803 (1977)

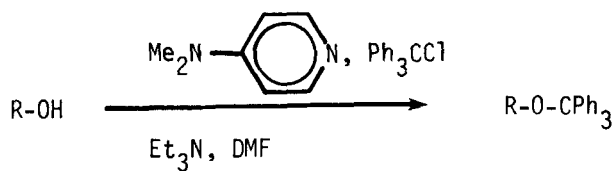


Synthesis, 428 (1979)

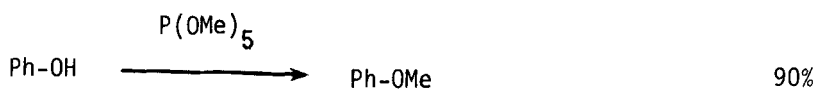
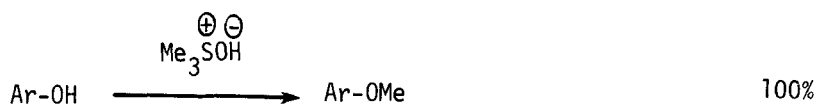
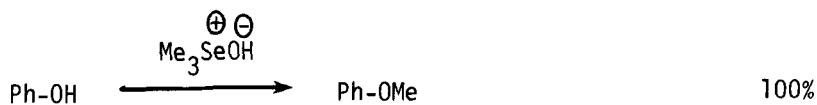
JOC 42, 1801 (1977)



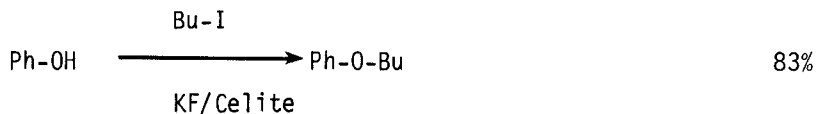
Tetr Lett, 3943 (1978)



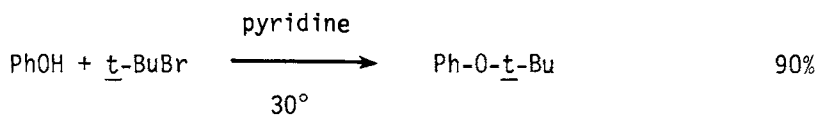
Tetr Lett, 95 and 99 (1979)

JOC 43, 4672 (1978)JOC 44, 638 (1979)

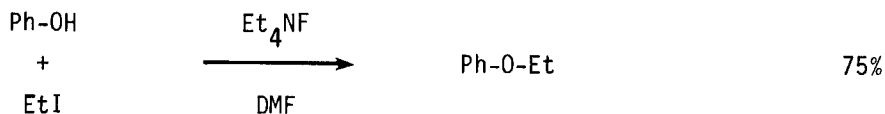
Tetr Lett, 1787 (1979)



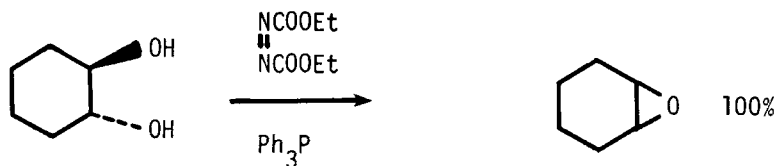
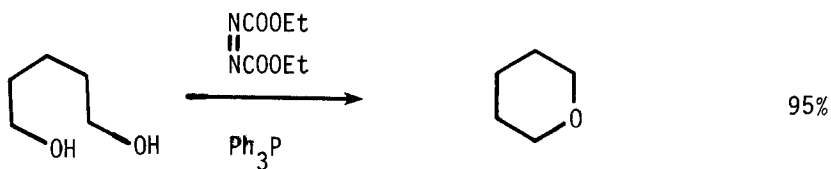
Chem Lett, 45 (1979)



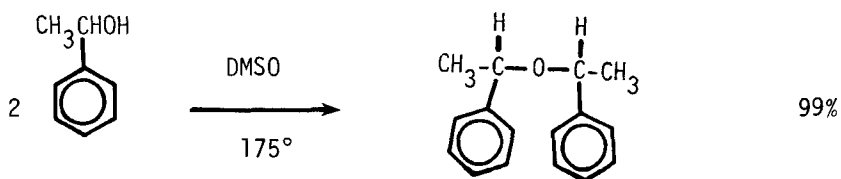
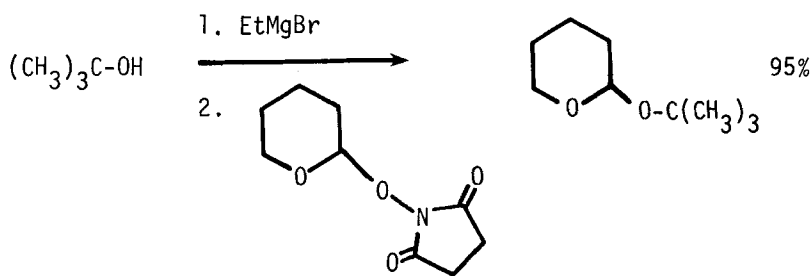
Chem Lett, 57 (1978)

Can J Chem 57, 1887 (1979)

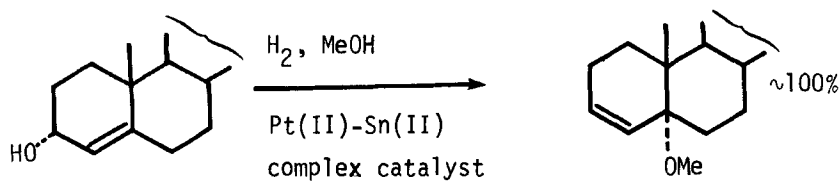
Related methods: Protection of Alcohols (Section 45A).



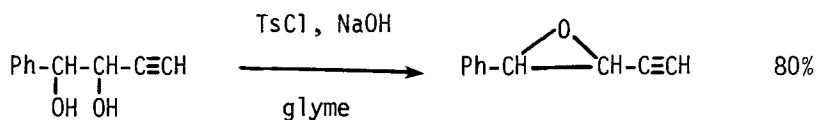
Tetr Lett, 5153 (1978)

JOC 42, 2012 (1977)

Chem Lett 817 (1977)



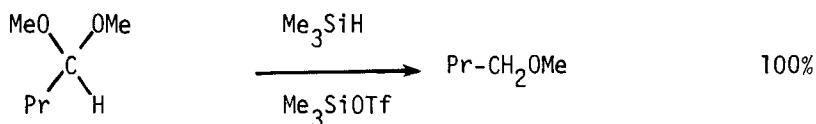
Chem Lett, 835 (1978)



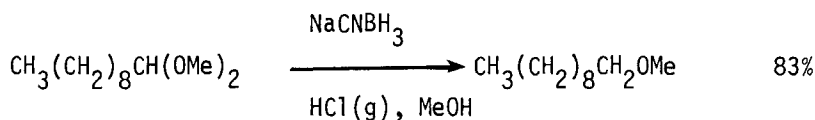
Synthesis, 706 (1977)

Related methods: Protection of Alcohols and Phenols (Section 45A)

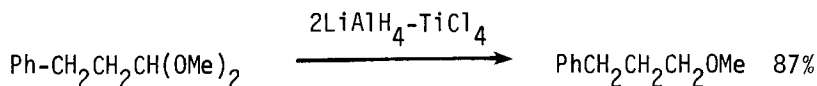
Section 124 Ethers and Epoxides from Aldehydes



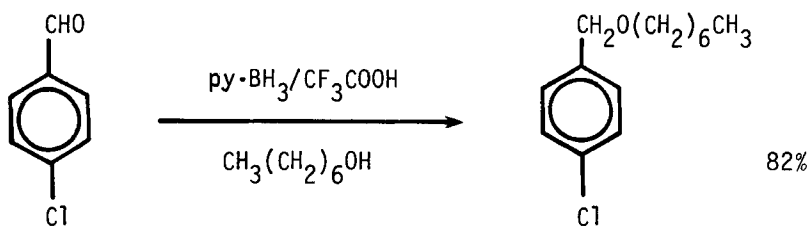
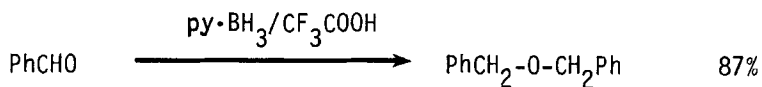
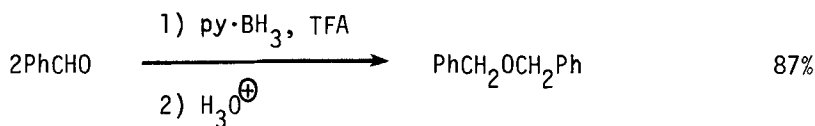
Tetr Lett, 4679 (1979)



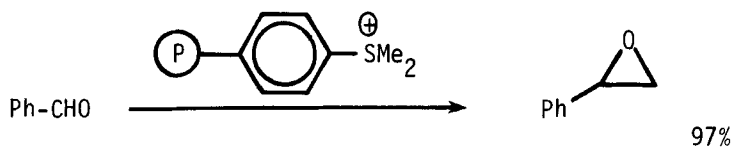
Tetr Lett, 1357 (1978)



BCS Japan 51, 2059 (1978)

Chem Pharm Bull 27, 2405 (1979)

Chem Lett, 415 (1979)



Tetr Lett, 203 (1979)

Related methods: Ethers and Epoxides from Ketones (Section 132)

Section 125 Ethers and Epoxides from Alkyls, Methylenes and Aryls

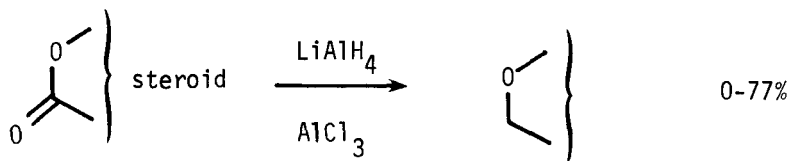
No examples of the preparation of ethers and epoxides by replacement of alkyl, methylene and aryl groups occur in the literature. For the conversion of $RH \rightarrow ROR'$ ($R, R' = \text{alkyl}$) see Section 131 (Ethers from Hydrides)

Section 126 Ethers and Epoxides from Amides

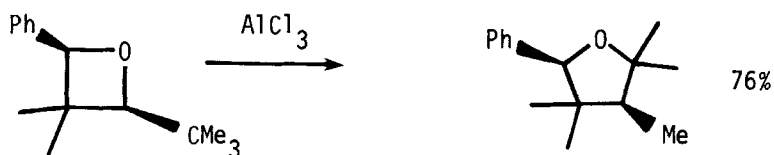
No additional examples

Section 127 Ethers and Epoxides from Amines

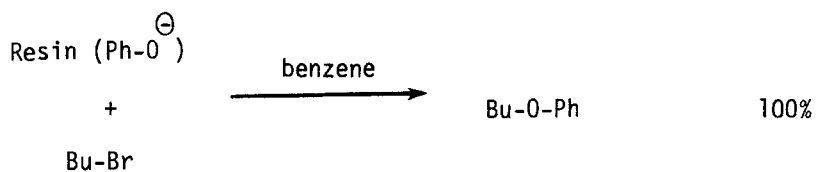
No additional examples

Section 128 Ethers and Epoxides from Esters

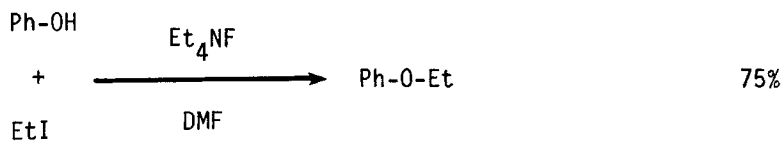
Chem and Ind, 230 (1977)

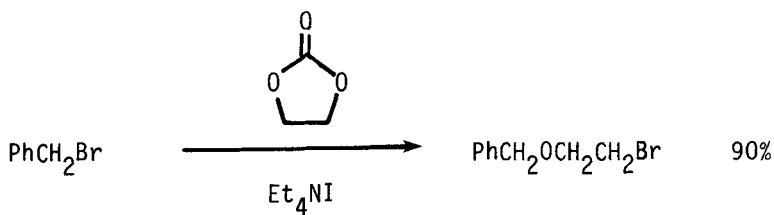
Section 129 Ethers and Epoxides from Ethers and Epoxides

JCS Chem Comm, 382 (1979)

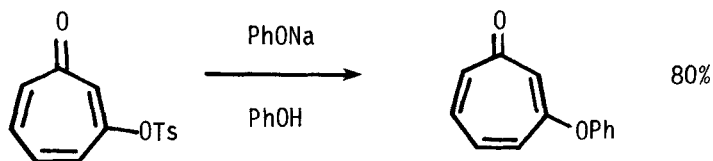
Section 130 Ethers from Halides and Sulfonates

Synthesis, 113 (1977)

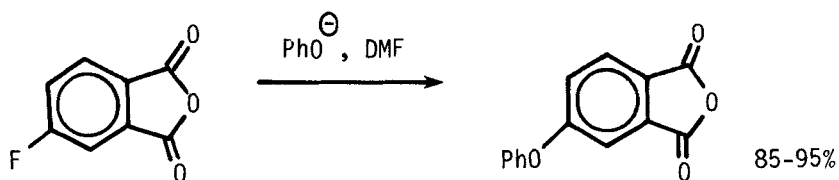
Can J Chem 57, 1887 (1979)



Tetr Lett, 2639 (1979)



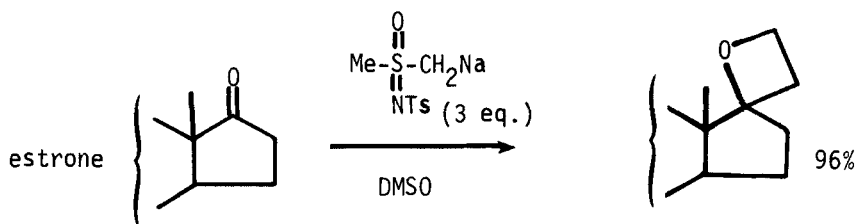
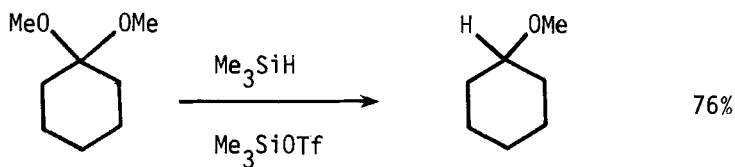
Synthesis, 298 (1977)

JOC 42, 3425 (1977)

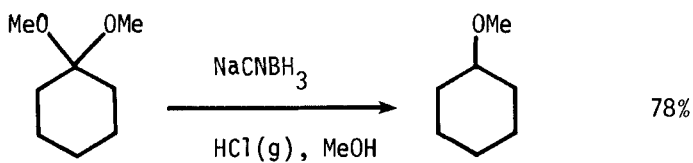
Related methods: Ethers from Alcohols (Section 123)

Section 131 Ethers from Hydrides

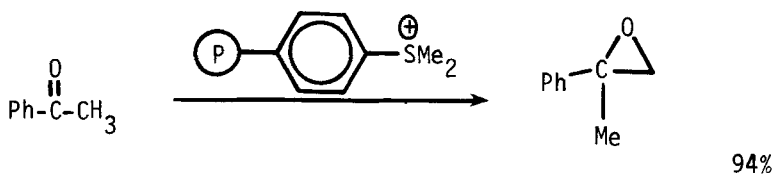
No additional examples

Section 132 Ethers and Epoxides from KetonesJACS 101, 6135 (1979)

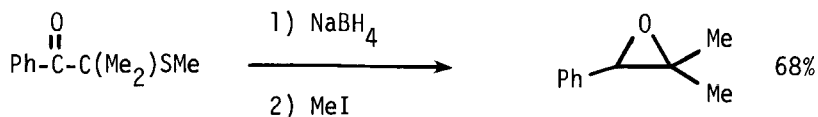
Tetr Lett, 4679 (1979)



Tetr Lett, 1357 (1978)



Tetr Lett, 203 (1979)

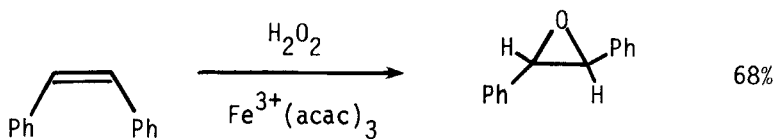


JCS Chem Comm, 785 (1978)

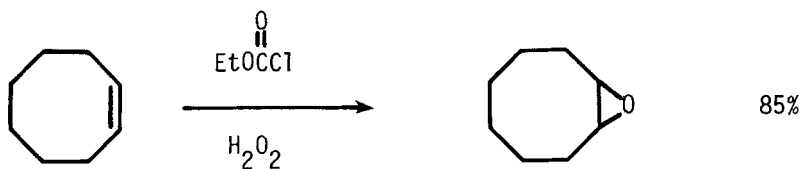
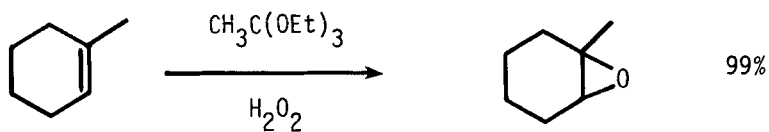
Related methods: Ethers and Epoxides from Aldehydes (Section 124)

Section 133 Ethers and Epoxides from Nitriles

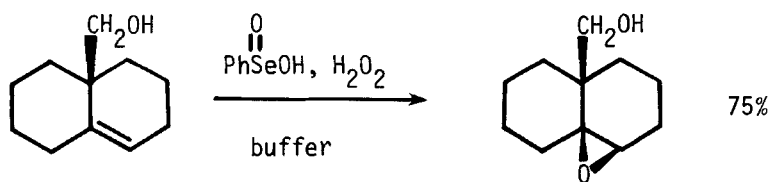
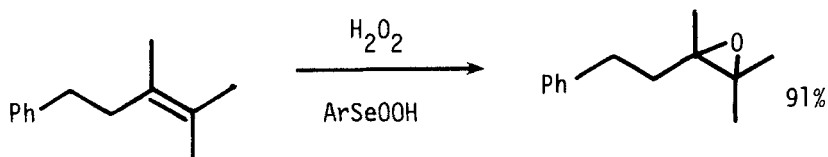
No additional examples

Section 134 Ethers and Epoxides from Olefins

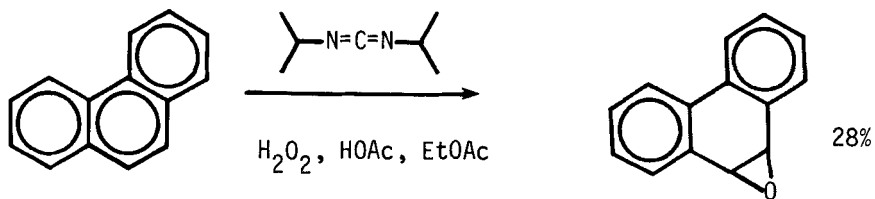
JCS Chem Comm, 948 (1977)

JOC 44, 2569 (1979)

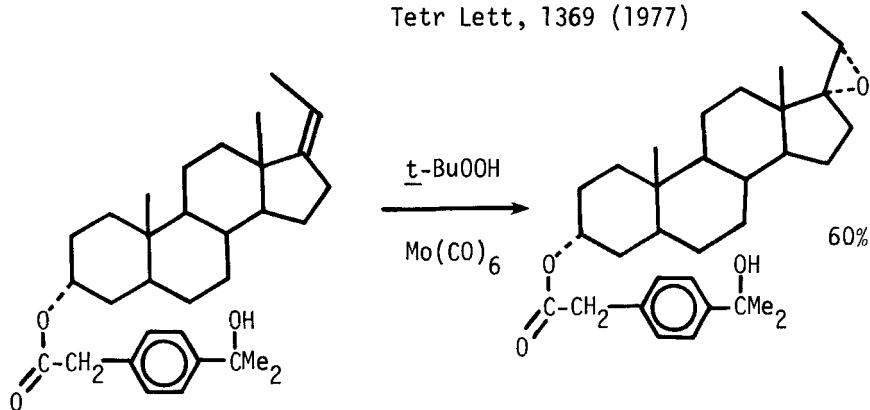
Tetr Lett, 1001 (1979)

JOC 42, 2034 (1977)

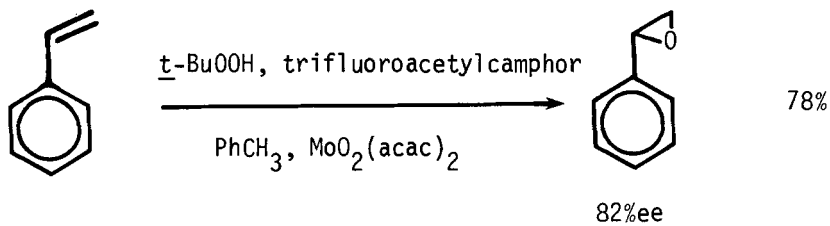
Synthesis, 299 (1978)

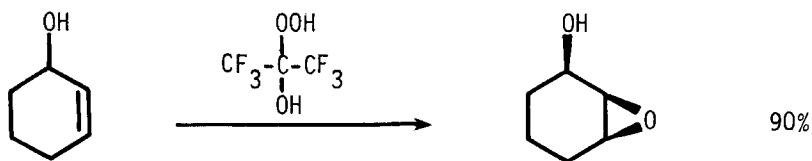
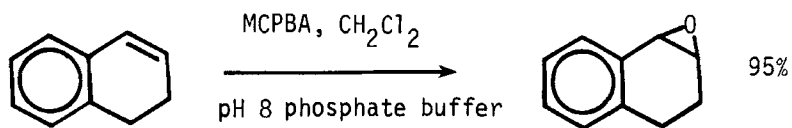
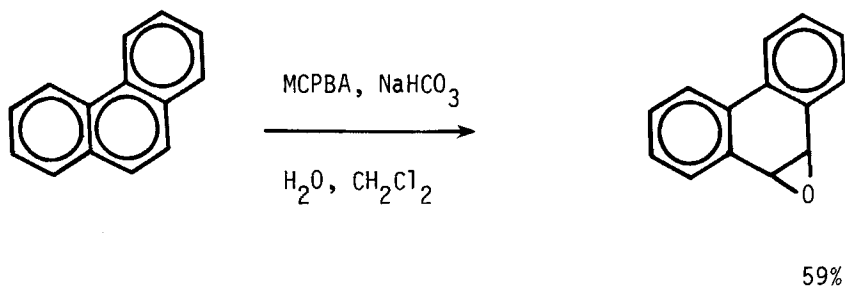


Tetr Lett, 1369 (1977)

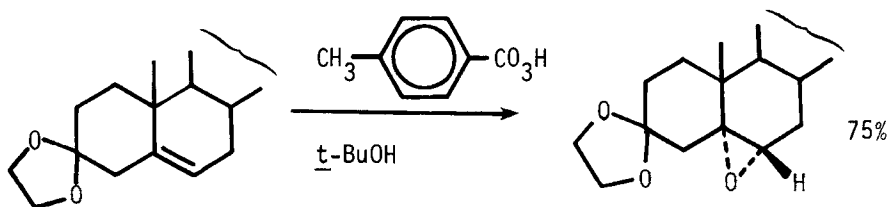


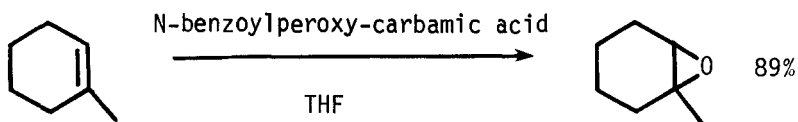
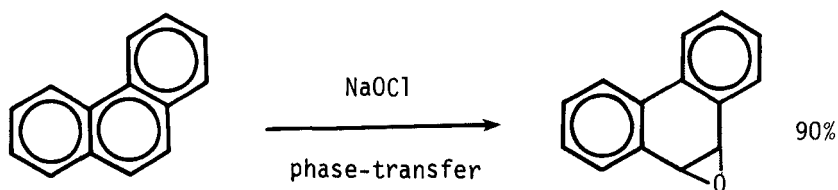
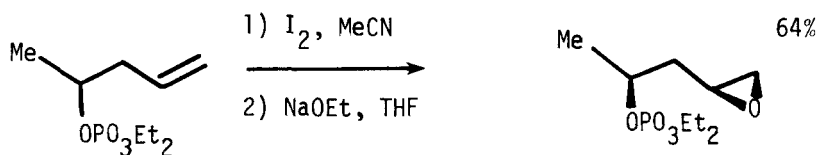
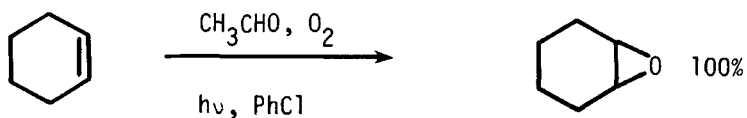
Tetr Lett, 623 (1977)

Z Chem 18, 218 (1978)

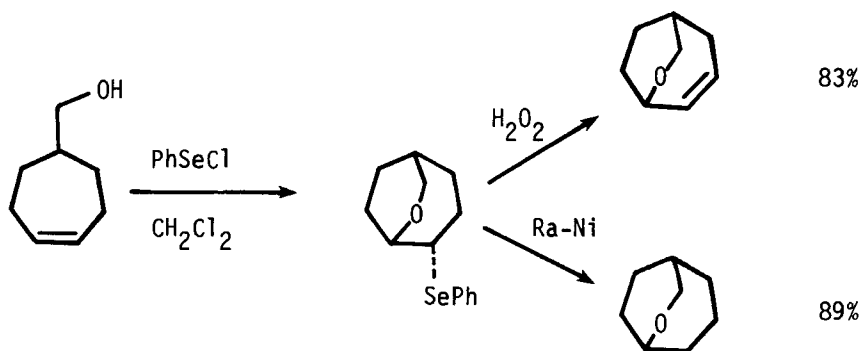
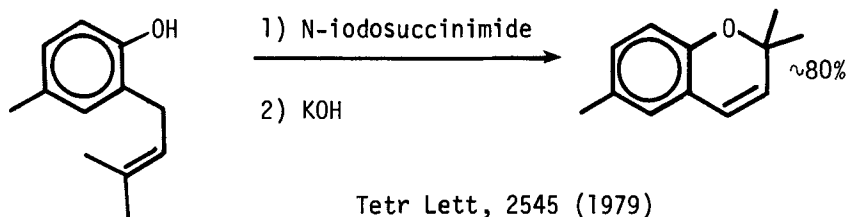
JACS 101, 2484 (1979)JOC 44, 1351 (1979)

Tetr Lett, 427 (1977)

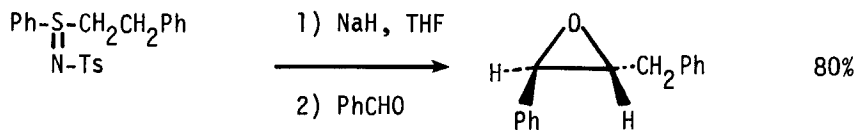
Bull Akad USSR Chem 27, 387 (1978)

JOC 44, 1485 (1979)JACS 99, 8121 (1977)JACS 99, 4829 (1977)

Synthesis, 711 (1977)



Tetr Lett, 1257 (1977)

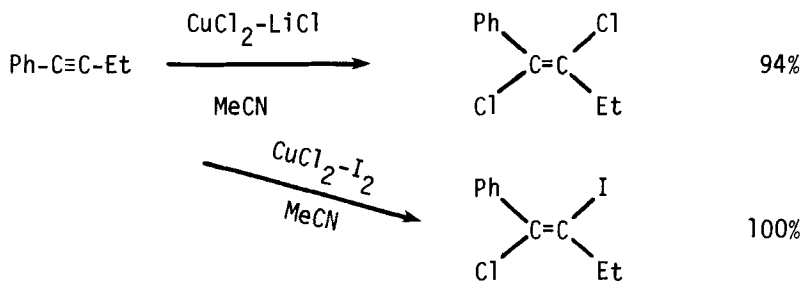
JACS 102, 3784 (1978)Section 135 Ethers and Epoxides from Miscellaneous Compounds

Synthesis, 693 (1977)

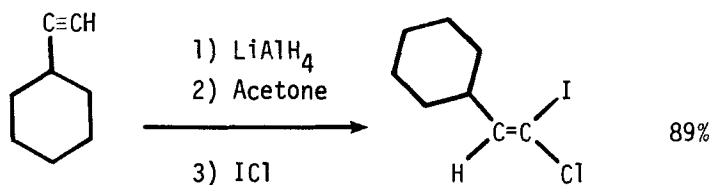
CHAPTER 10

PREPARATION OF HALIDES AND SULFONATES

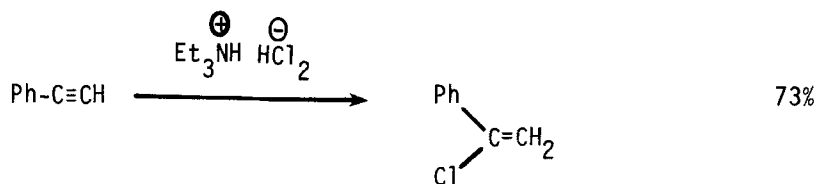
Section 136 Halides from Acetylenes



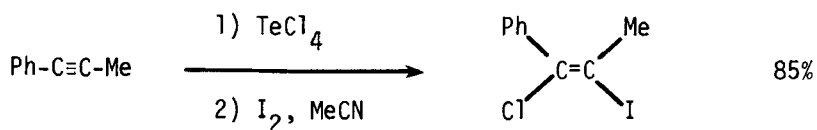
JCS Perkin I, 676 (1977)



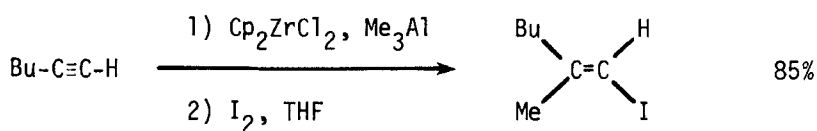
JACS 101, 5101 (1979)



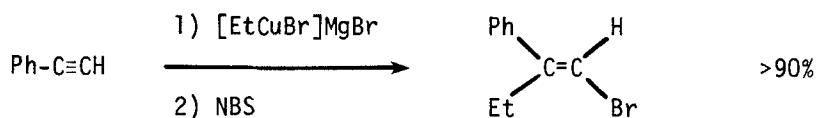
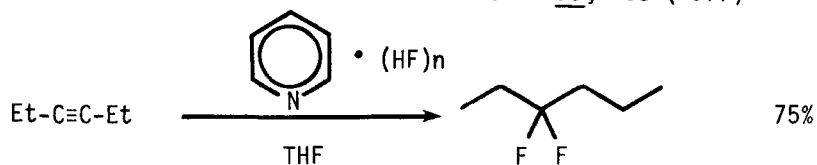
JCS Perkin I, 1797 (1977)

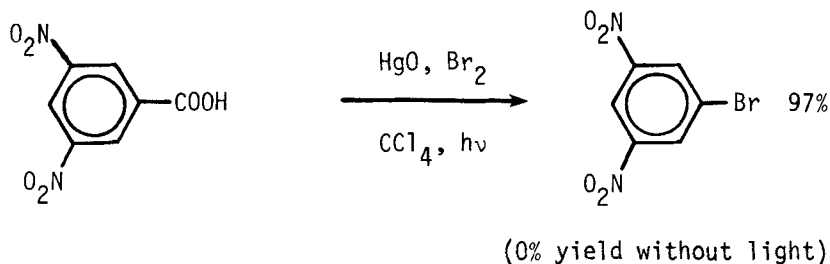


Chem Lett, 1357 (1979)

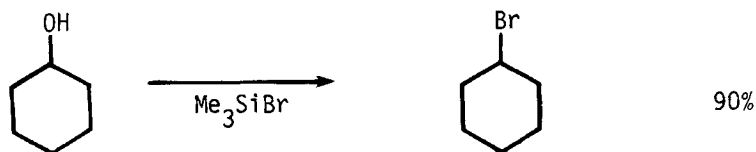


Synthesis, 501 (1979)

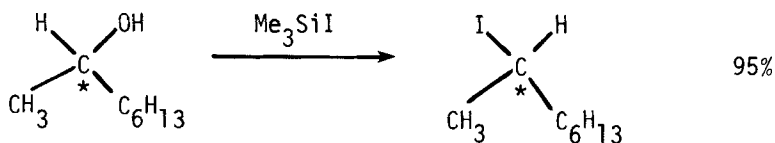
Rec Trav Chim 96, 168 (1977)JOC 44, 3872 (1979)

Section 137 Halides from Carboxylic Acids

JOC 44, 3405 (1979)

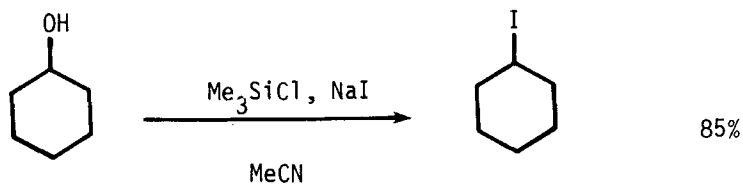
Section 138 Halides and Sulfonates from Alcohols

Tetr Lett, 4483 (1978)

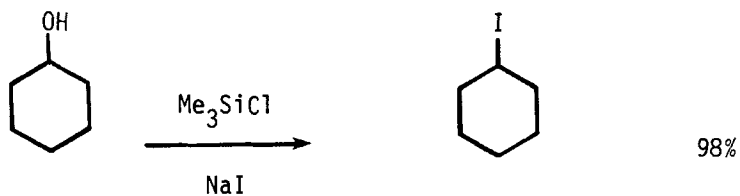
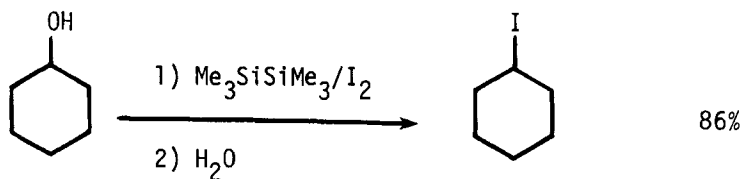
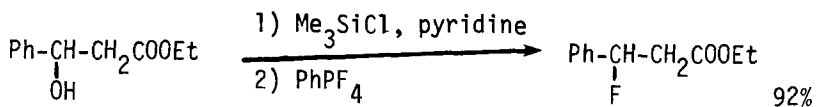


>90% inversion

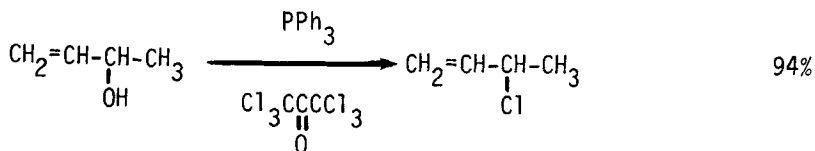
Tetr Lett, 2659 (1977)



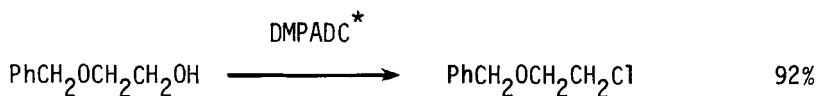
Synthesis, 379 (1979)

JOC 44, 1247 (1979)Angew Int Ed 18, 612 (1979)

Tetr Lett, 4507 (1978)

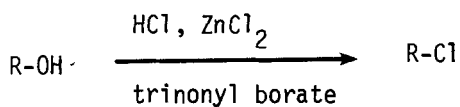


Tetr Lett, 2999 (1977)



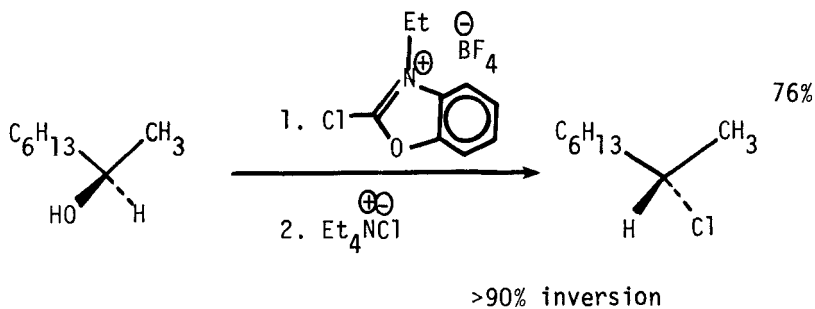
*N, N-Dimethylphosphoramidic dichloride

Chem Lett, 923 (1978)

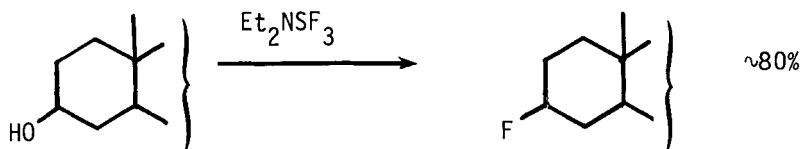


R = 1° alkyl

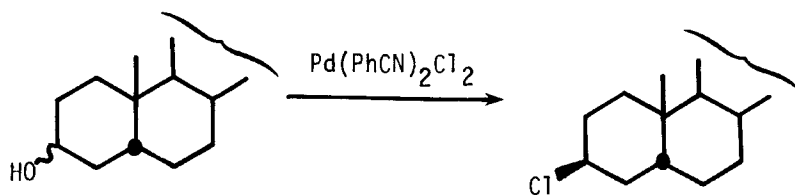
JOC (USSR) 13, 604 (1977)



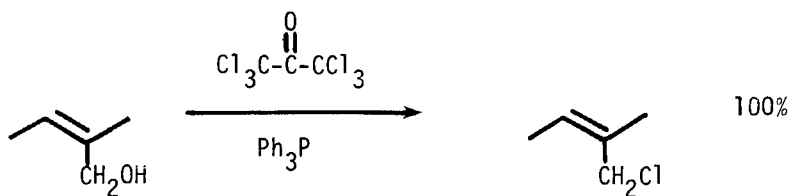
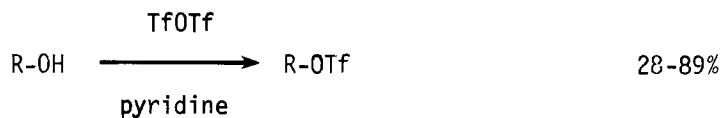
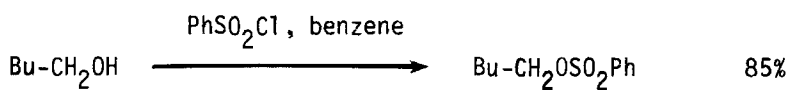
Chem Lett, 383 (1977)



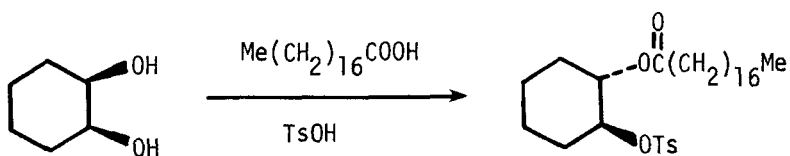
Tetr Lett, 1823 (1979)



Tetr Lett, 4575 (1978)

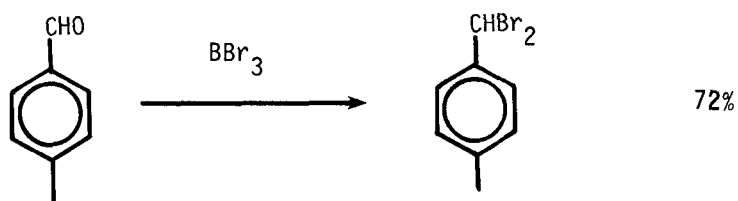
JOC 44, 359 (1979)JOC 42, 3109 (1977)

Synthesis, 822 (1979)

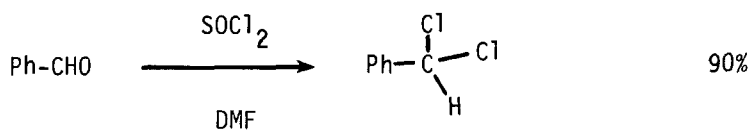


Aust J Chem 30, 2479 and 2487 (1977)

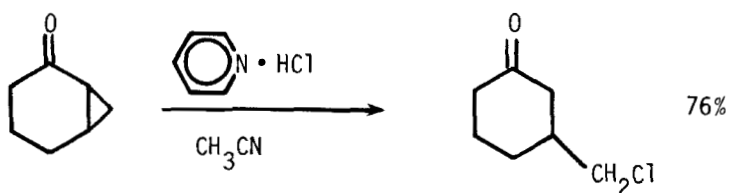
Section 139 Halides from Aldehydes



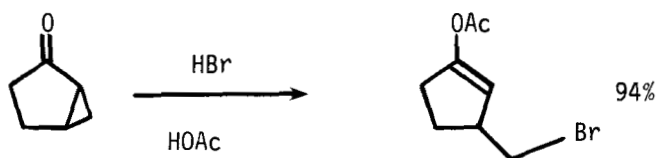
Synth Comm 9, 341 (1979)



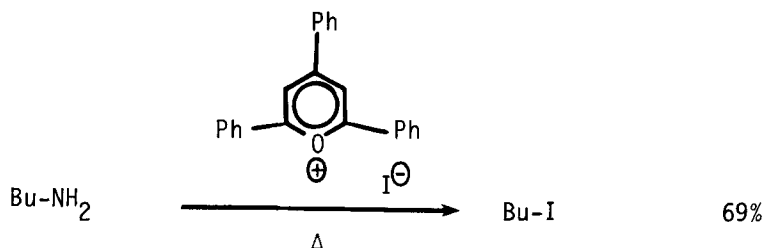
JOC 43, 4367 (1978)

Section 140 Halides from Alkyls

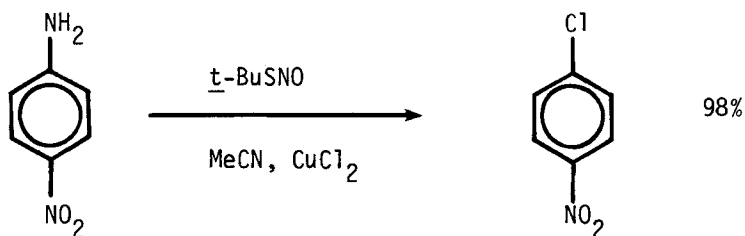
Synthesis, 227 (1978)

Helv Chim Acta 62, 2338 (1979)For the conversion $RH \rightarrow RHal$ see Section 146 (Halides from Hydrides)Section 141 Halides and Sulfonates from Amides

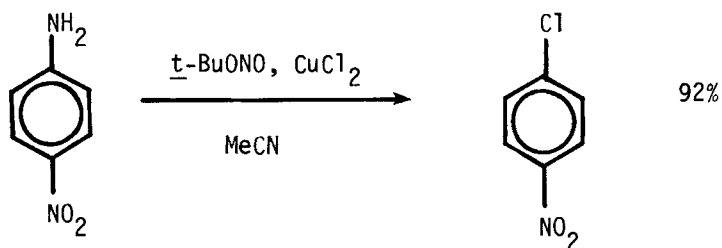
No additional examples

Section 142 Halides from Amines

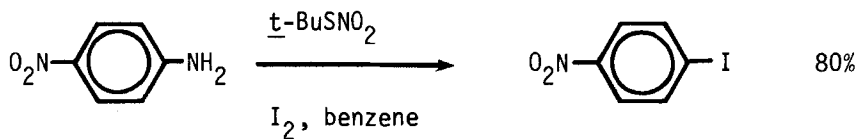
Synthesis, 634 (1977)



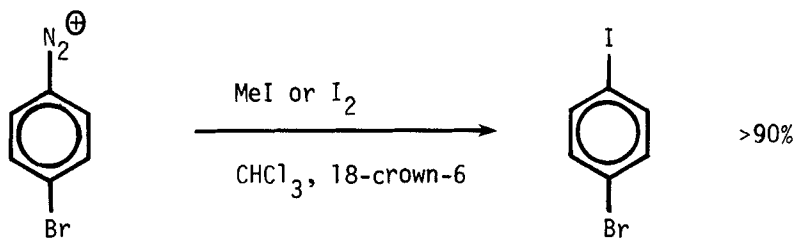
Tetr Lett, 4519 (1978)



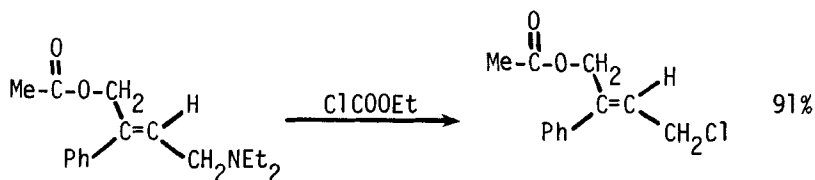
JOC 42, 2426 (1977)



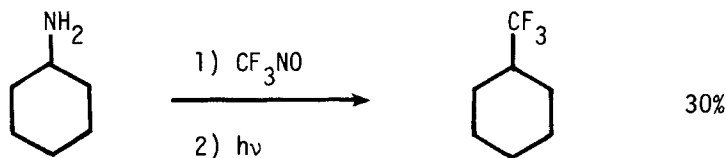
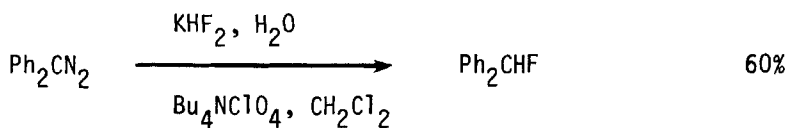
Chem Lett, 939 (1979)



Tetr Lett, 3519 (1977)



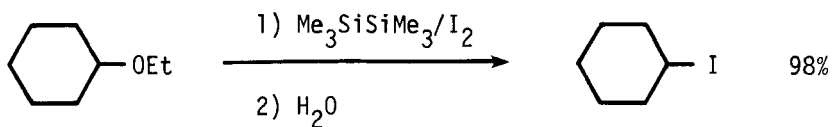
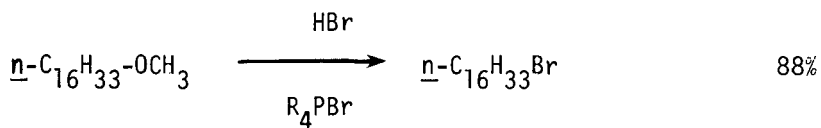
Synthesis, 786 (1977)

Angew Int Ed 16, 854 (1977)

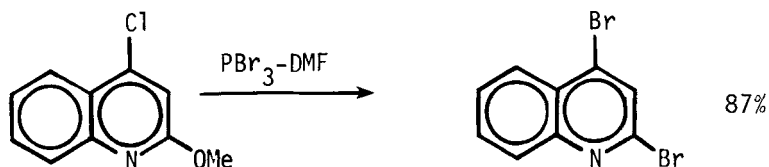
Tetr Lett, 1447 (1977)

Section 143 Halides and Sulfonates from Esters and Epoxides

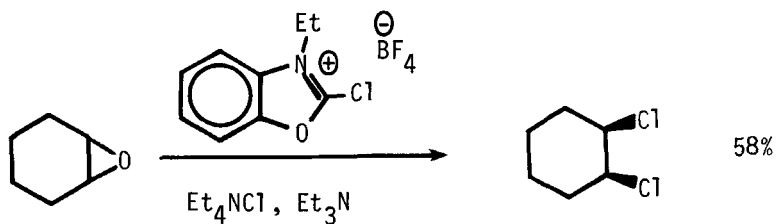
No additional examples

Section 144 Halides from EthersAngew Int Ed 18, 612 (1979)

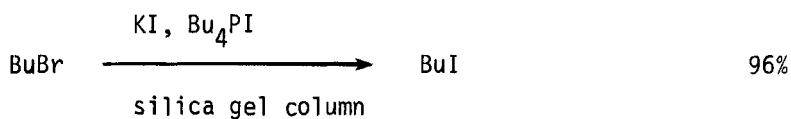
Synthesis, 771 (1978)



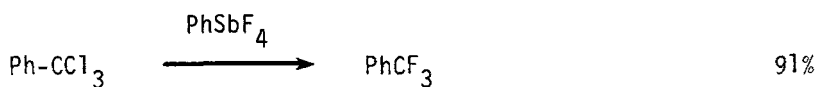
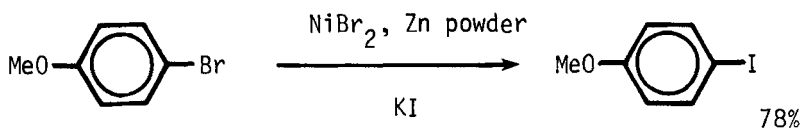
Chem Lett, 891 (1977)



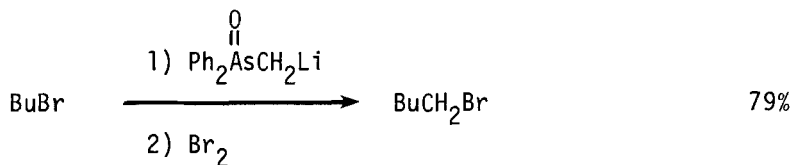
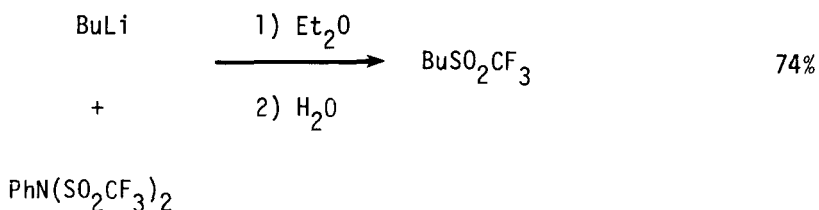
Chem Lett, 1013 (1977)

Section 145 Halides from Halides and Sulfonates

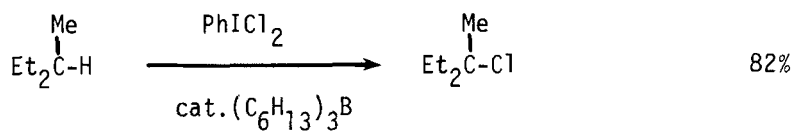
Synthesis, 952 (1979)

JOC (USSR) 13, 561 (1977)

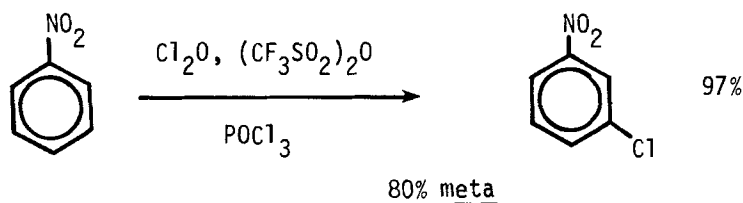
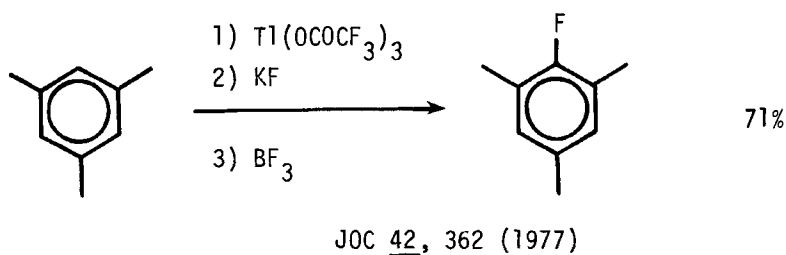
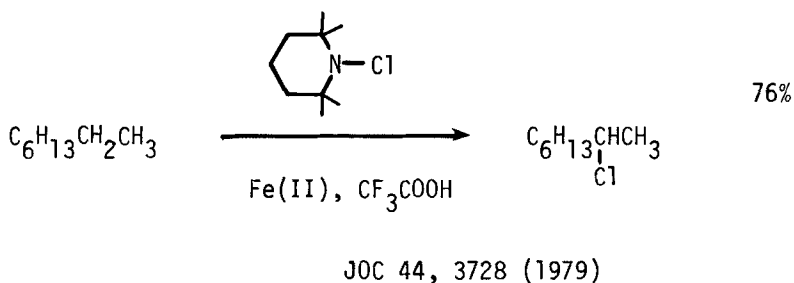
Chem Lett, 191 (1978)

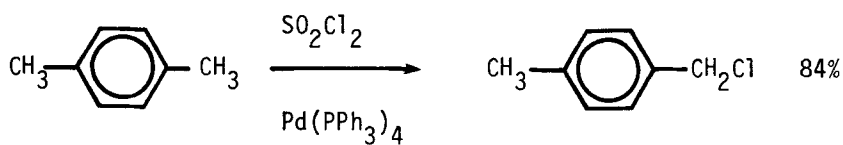
Angew Int Ed 16, 53 (1977)JOC 42, 3875 (1977)Section 146 Halides from Hydrides

α -Halogenations of ketones, esters, and acids are found in Sections 369 (Haloketones), 359 (Haloesters), and 319 (Haloacids).

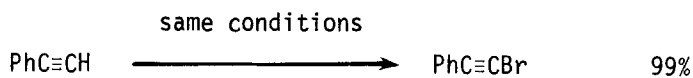
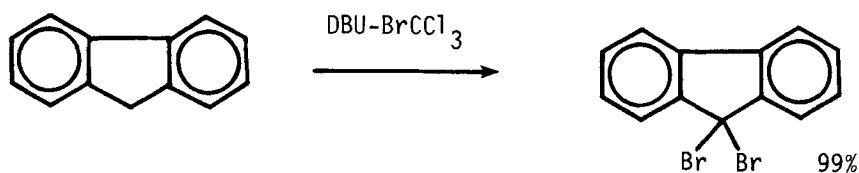


Chem Lett, 961 (1979)

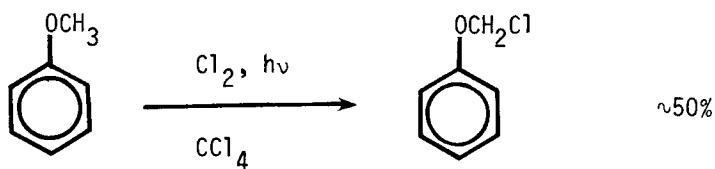
Chem Ber 112, 1677 (1979)JOC 44, 4733 (1979)



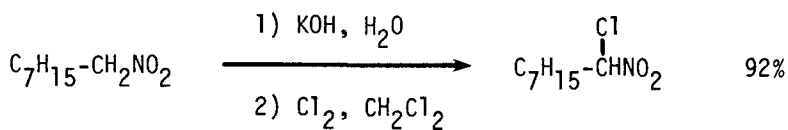
Chem Lett, 223 (1978)

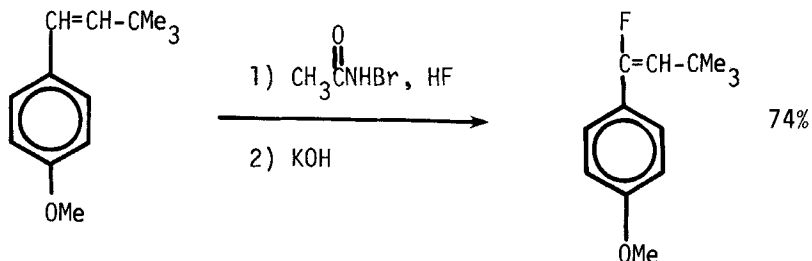


Chem Lett, 73 (1978)

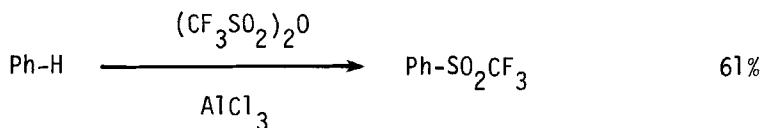


Chem and Ind, 127 (1977)

JOC 42, 3764 (1977)



Synthesis, 217 (1978)

JOC 42, 3875 (1977)

"Selective Halogenation of Steroids Using Attached Aryl Iodide Templates"

JACS 99, 905 (1977)Section 147 Halides from Ketones

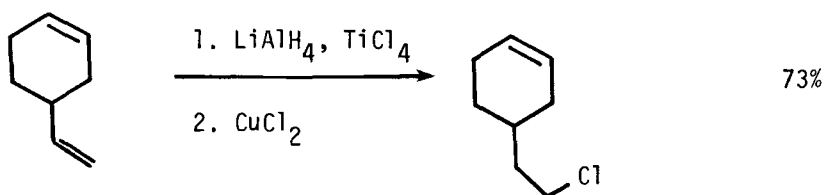
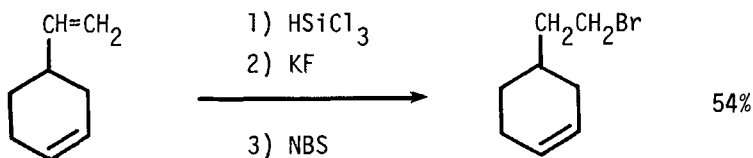
JCS Perkin I, 1354 (1979)

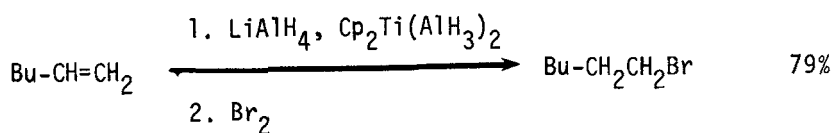
JOC 43, 4367 (1978)Section 148 Halides and Sulfonates from Nitriles

No examples

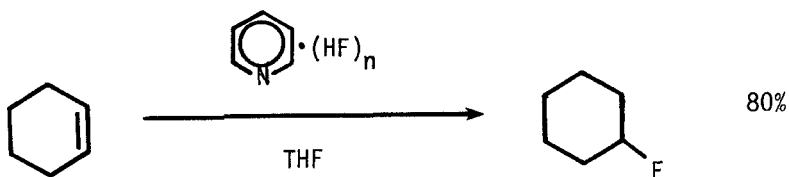
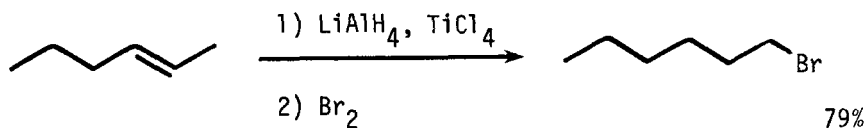
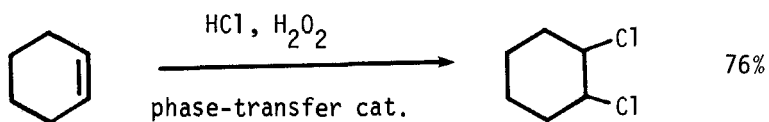
Section 149 Halides from Olefins

For halocyclopropanations see Section 74 (Alkyls from Olefins)

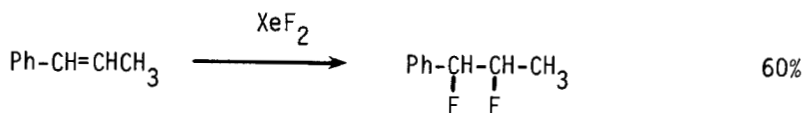
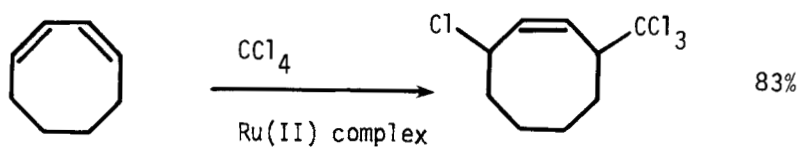
Chem Lett, 833 (1978)JACS 100, 290 (1978)



Chem Lett, 1117 (1977)

JOC 44, 3872 (1979)J Organometal Chem 142, 71 (1977)

Synthesis, 676 (1977)

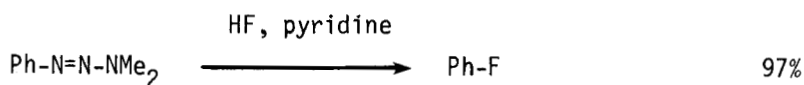
JOC 42, 1559 (1977)

Chem Lett, 115 (1978)

Use of a heterogeneous solvent suspension method for benchtop fluorination of alkenes using XeF_2 .

Tetr Lett, 363 (1977)

Section 150 Halides from Miscellaneous Compounds



JCS Chem Comm, 914 (1979)

Review: "Introduction of Fluorine into Organic Molecules: Why and How"

Tetrahedron 34, 3 (1978)

Review: "The Invention of Reactions Useful for the Synthesis of Specifically Fluorinated Natural Products"

Pure and Appl Chem 49, 1241 (1977)

CHAPTER 11

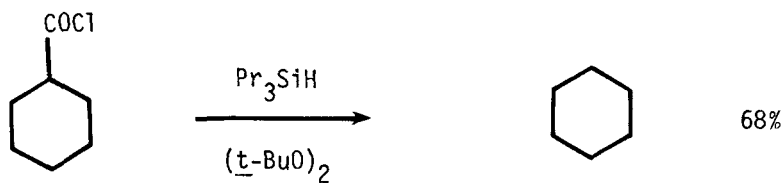
PREPARATION OF HYDRIDES

This chapter lists hydrogenolysis and related reactions by which functional groups are replaced by hydrogen, e.g. $\text{RCH}_2\text{X} \rightarrow \text{RCH}_2\text{-H}$ or R-H

Section 151 Hydrides from Acetylenes

No examples of the reaction $\text{RC}\equiv\text{CR} \rightarrow \text{RH}$ occur in the literature.

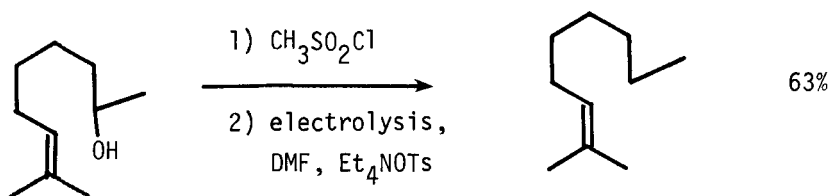
Section 152 Hydrides from Acid Halides



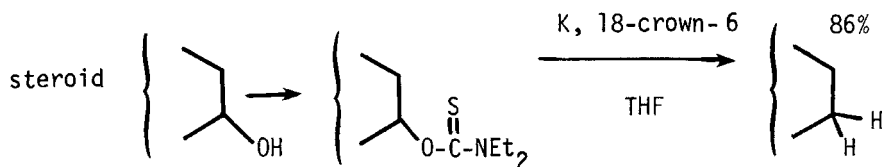
JCS Perkin I, 1137 (1979)

Section 153 Hydrides from Alcohols and Phenols

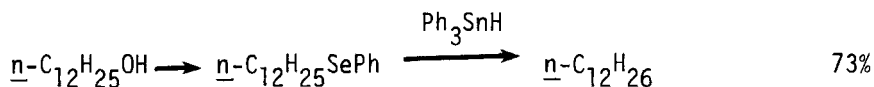
This section lists examples of the hydrogenolysis of alcohols and phenols, $\text{ROH} \rightarrow \text{RH}$



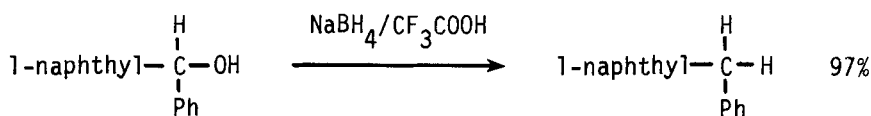
Tetr Lett, 2157 (1979)



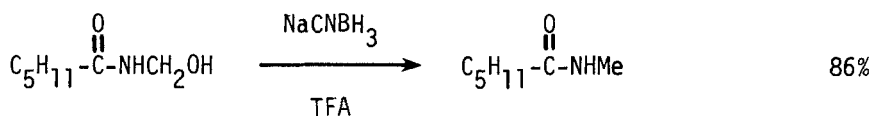
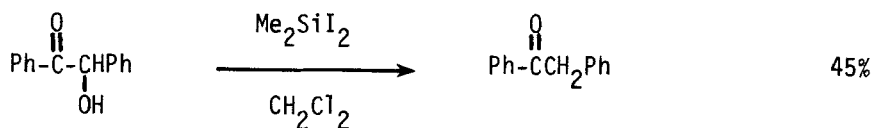
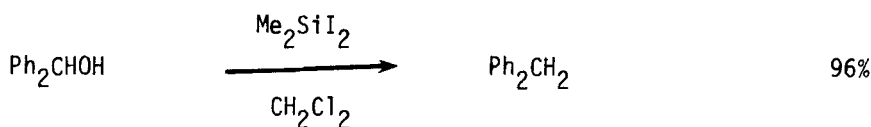
JCS Chem Comm, 1175 (1979)



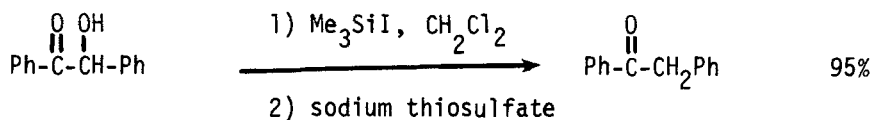
JCS Chem Comm, 41 (1978)

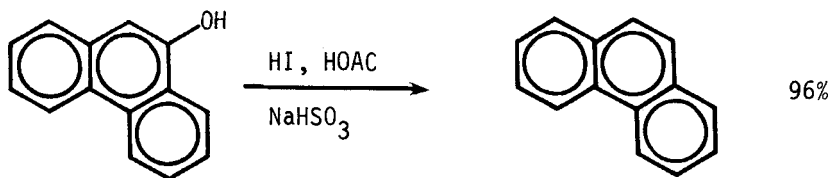
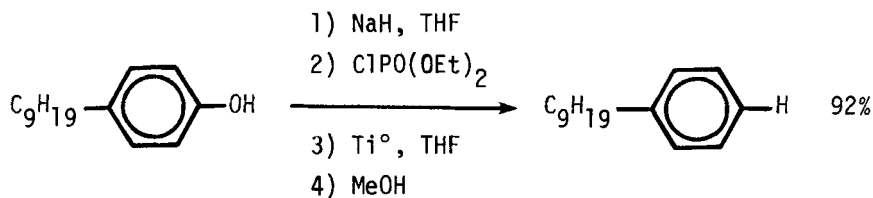
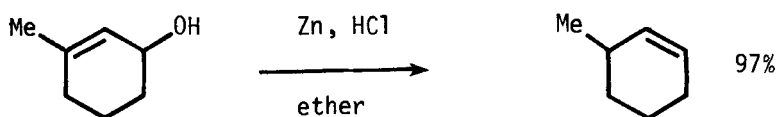


Synthesis, 172 (1977)

Synth Comm 7, 549 (1977)

Tetr Lett, 4941 (1979)

Synth Comm 9, 665 (1979)

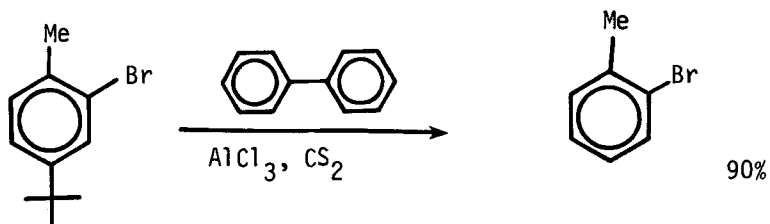
JOC 44, 4813 (1979)JOC 43, 4797 (1978)Tetrahedron 33, 511 (1977)

Also via Halides and Sulfonates, Section 160

Section 154 Hydrides from Aldehydes

No additional examples

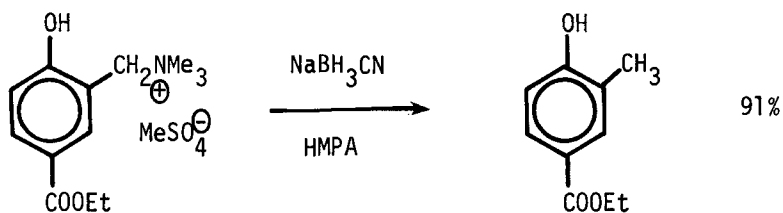
For the conversion $\text{RCHO} \rightarrow \text{RMe}$ etc. see Section 64 (Alkyls from Aldehydes)

Section 155 Hydrides from Alkyls

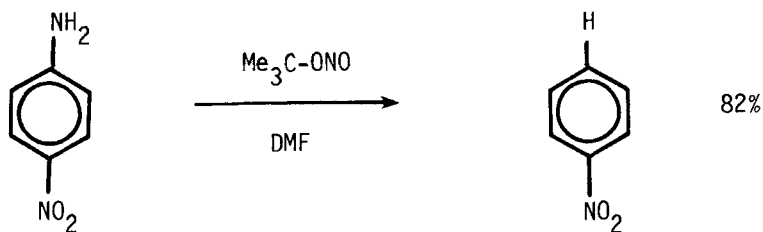
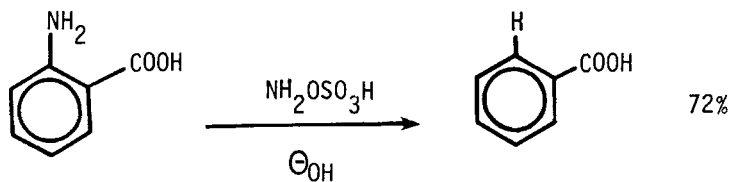
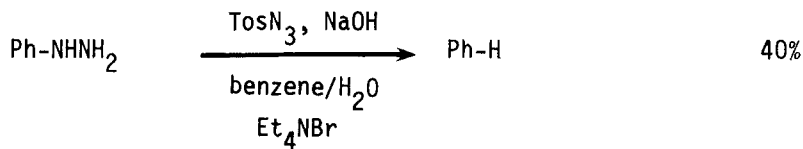
JCS Perkin I, 176 (1979)

Section 156 Hydrides from Amides

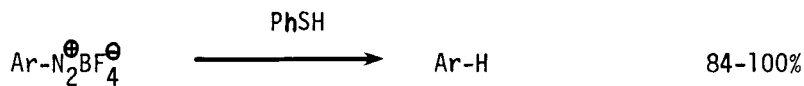
No additional examples

Section 157 Hydrides from AminesThis section lists examples of the conversion $\text{RNH}_2 \rightarrow \text{RH}$ 

JCS Chem Comm, 1089 (1978)

JOC 42, 3494 (1977)JACS 100, 341 (1978)

Tetr Lett, 3059 (1978)

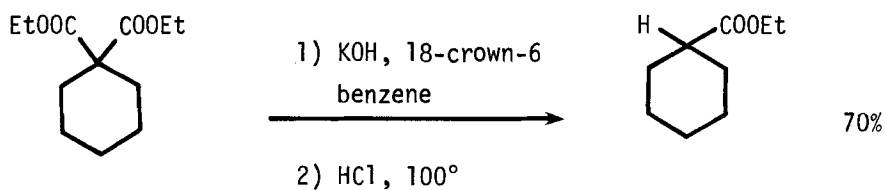


Ar = subst. Ph

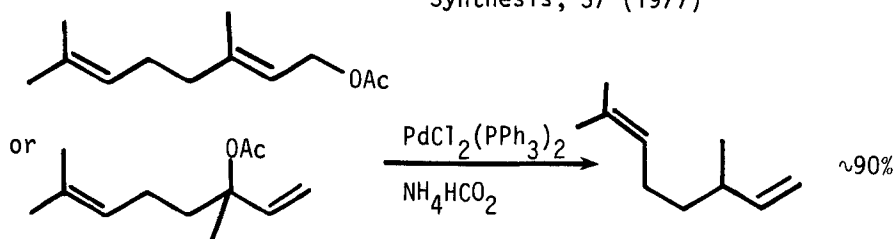
Chem Lett, 1051 (1979)

Section 158 Hydrides from Esters

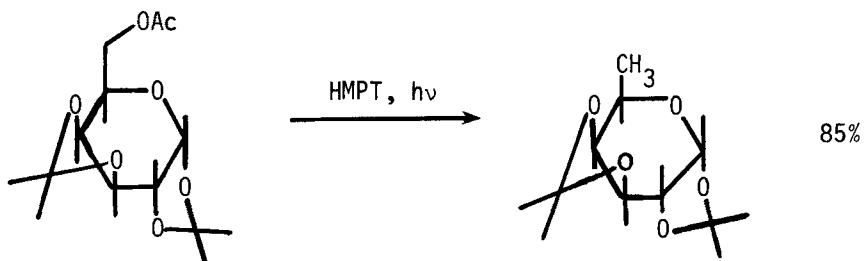
This section lists examples of the reactions $\text{RCOOR}' \rightarrow \text{RH}$ and $\text{RCOOR}' \rightarrow \text{R}'\text{H}$



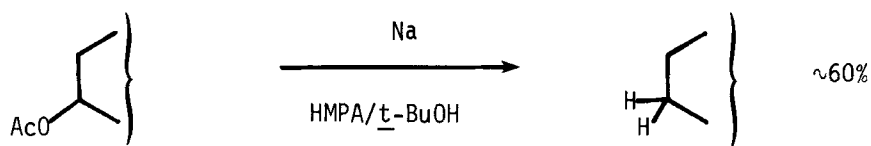
Synthesis, 37 (1977)



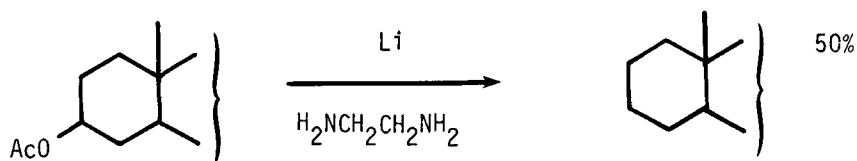
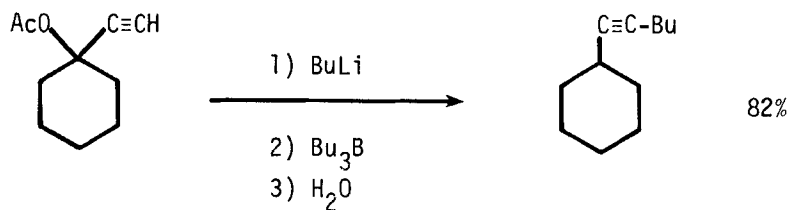
Tetr Lett, 613 (1979)



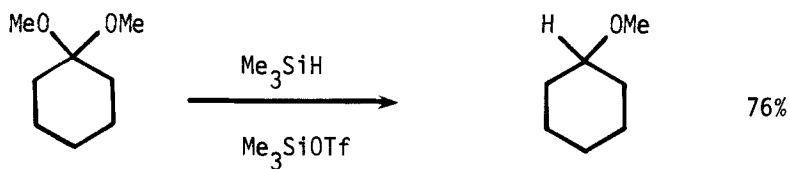
Synthesis, 774 (1977)



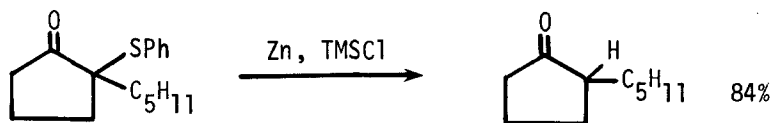
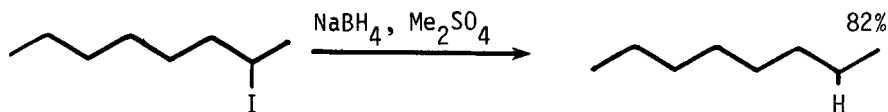
JCS Chem Comm, 567 (1978)

Indian J Chem 18B, 179 (1979)JOC 42, 2650 (1977)Section 159 Hydrides from Ethers

This section lists examples of the reaction $\text{R-X-R}' \rightarrow \text{RH}$, where $\text{X}=\text{O}$ or S .

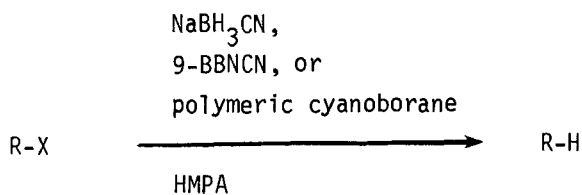


Tetr Lett, 4679 (1979)

Synth Comm 7, 427 (1977)Section 160 Hydrides from Halides and SulfonatesThis section lists the reduction of halides and sulfonates $\text{RX} \rightarrow \text{RH}$ 

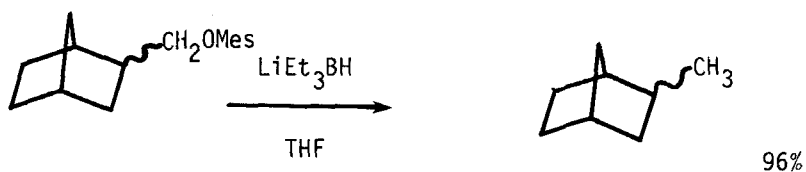
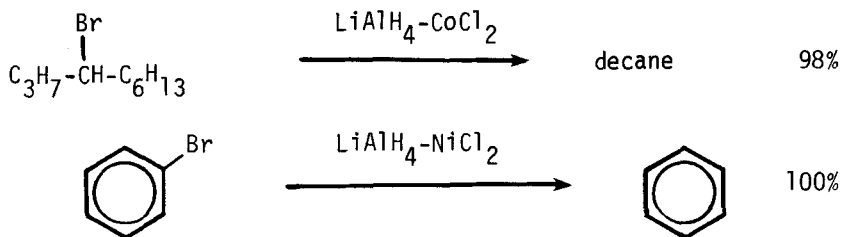
Full paper, many examples.

JOC 43, 2259 (1978)

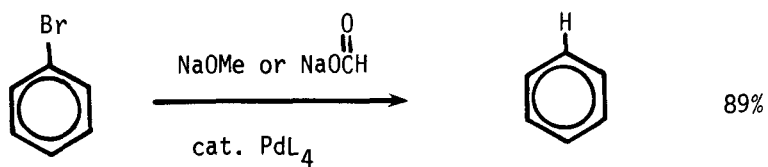


R = alkyl

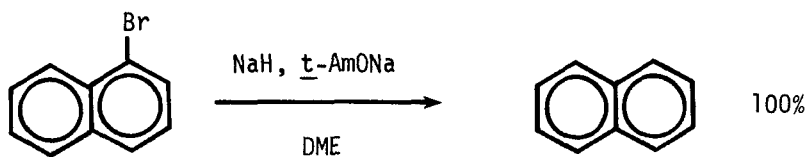
X = halide, tosylate

JOC 42, 82 (1977)JOC 42, 2166 (1977)

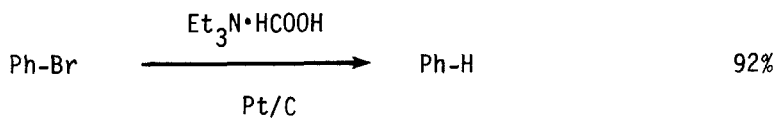
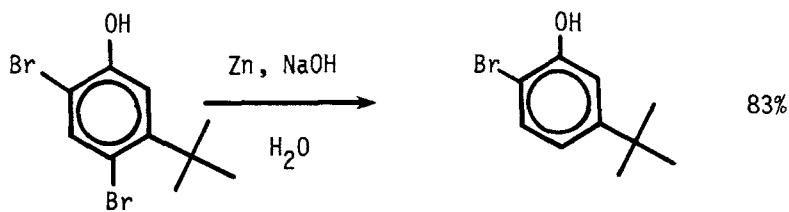
Tetr Lett, 4481 (1977)

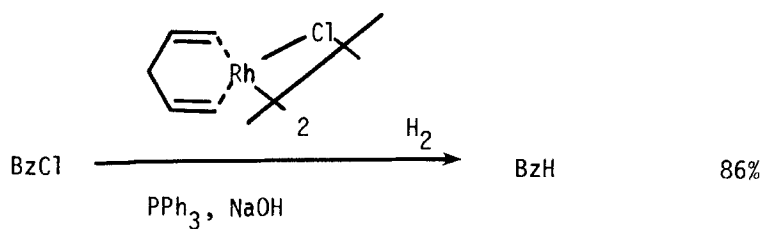
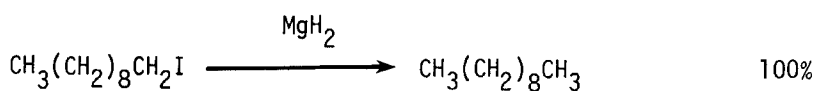
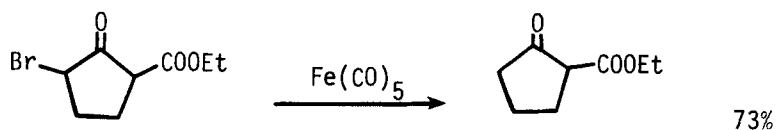
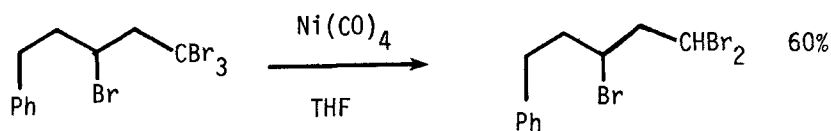
JOC 43, 1619 (1978)

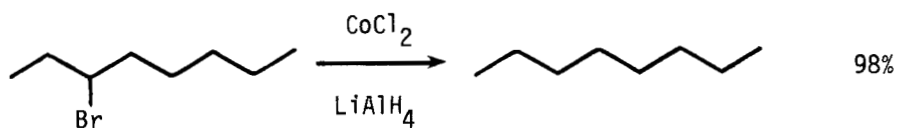
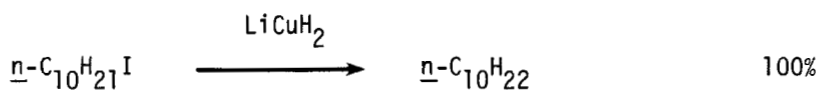
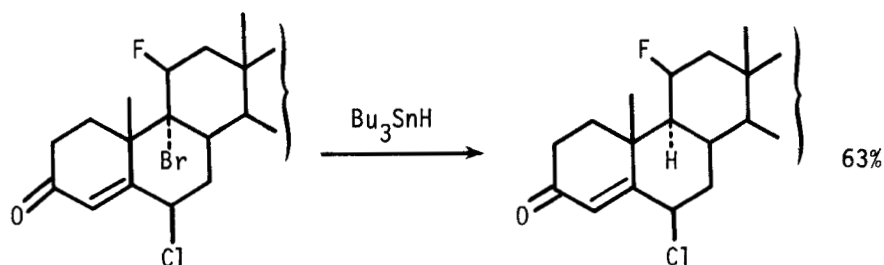
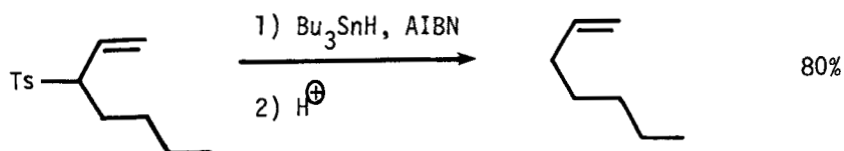
Tetr Lett, 1913 (1978)

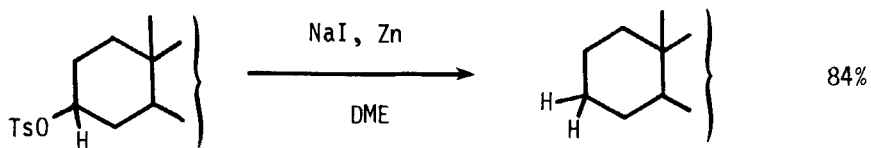


Tetr Lett, 3951 (1977)

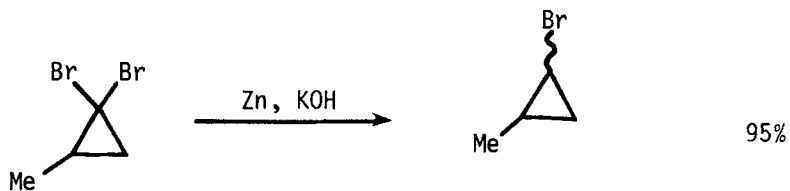
JOC 42, 3491 (1977)JOC 42, 835 (1977)

J Organometal Chem 148, 311 (1978)JOC 43, 1557 (1978)JOC 44, 641 (1979)Chem Pharm 25, 1749 (1977)

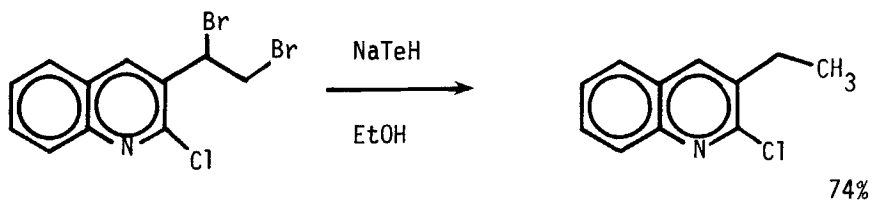
JOC 43, 1263 (1978)JOC 43, 183 (1978)JOC 44, 151 (1979)JACS 101, 5414 (1979)



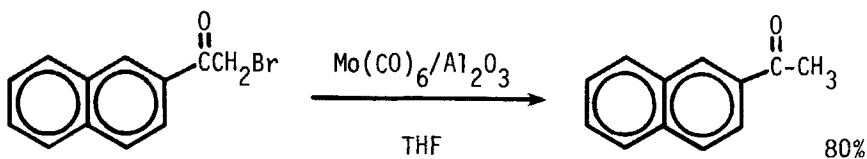
Coll Czech Chem Comm 44, 246 (1979)



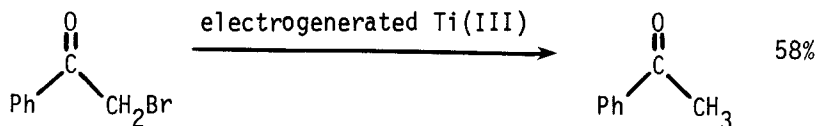
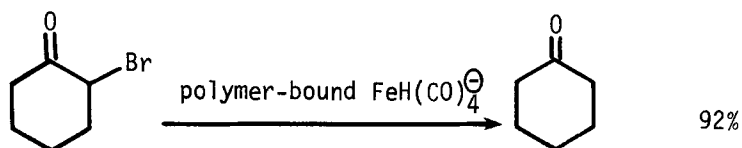
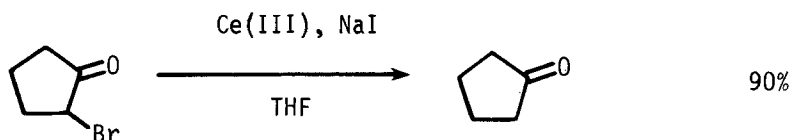
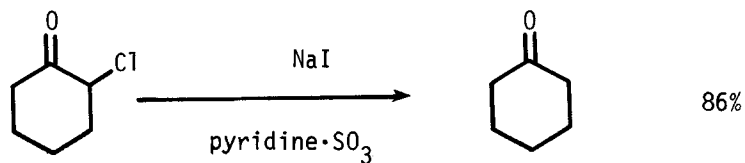
JOC 43, 3500 (1978)



Synthesis, 545 (1978)



JOC 44, 2568 (1979)

Can J Chem 56, 2269 (1978)JOC 43, 1598 (1978)Synth Comm 9, 241 (1979)

Synthesis, 59 (1979)

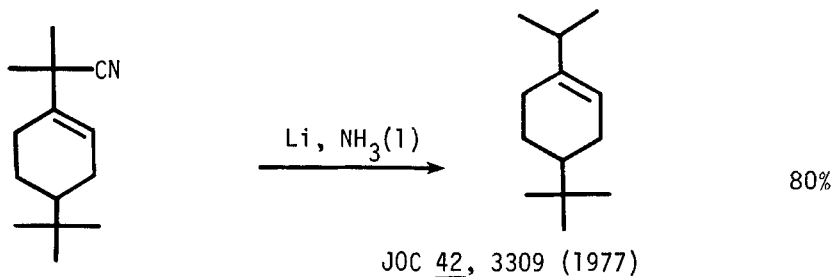
Section 161 Hydrides from Hydrides

No additional examples

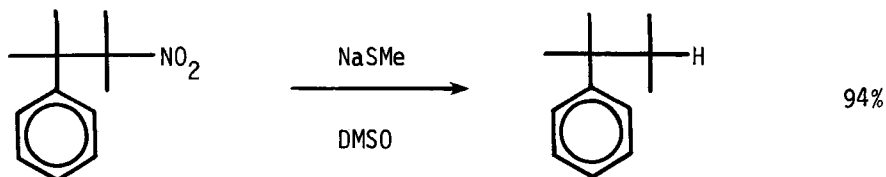
Section 162 Hydrides from Ketones

No additional examples

For the conversion $R_2CO \rightarrow R_2CH_2$ or R_2CHR' see Section 72 (Alkyls and Methylenes from Ketones)

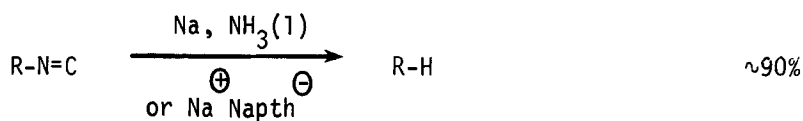
Section 163 Hydrides from NitrilesSection 164 Hydrides from Olefins

No additional examples

Section 165 Hydrides from Miscellaneous Compounds

Many examples (must be tertiary).

JACS 101, 647 (1979)

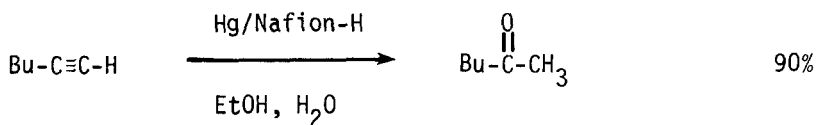


JOC 43, 2396 (1978)

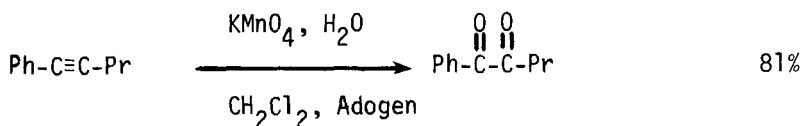
CHAPTER 12

PREPARATION OF KETONES

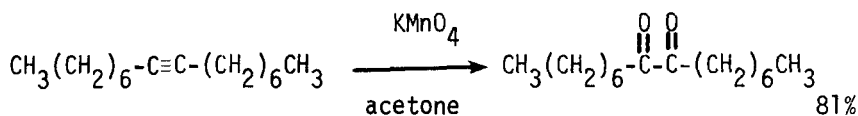
Section 166 Ketones from Acetylenes



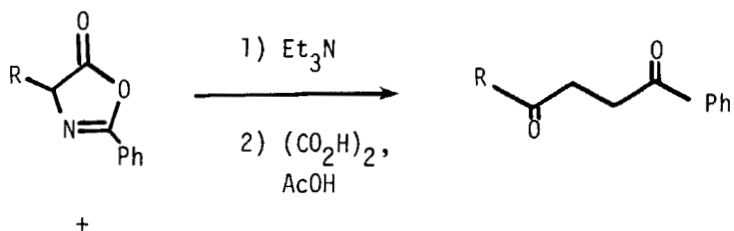
Synthesis, 671 (1978)



Synthesis, 462 (1978)



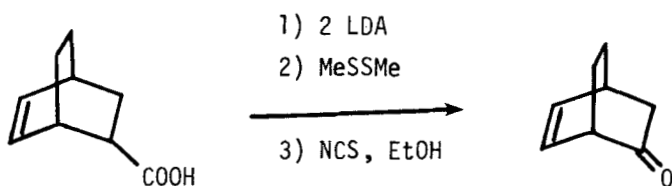
JOC 44, 1574 (1979)



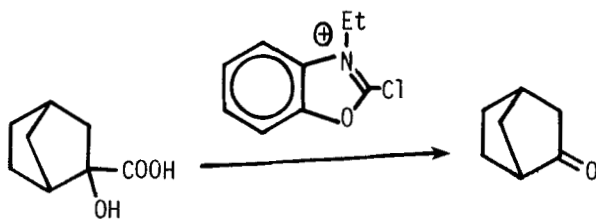
$\text{HC}\equiv\text{C}-\text{COPh}$

Chem Ber 112, 322 (1979)

Section 167 Ketones from Carboxylic Acids and Acid Halides

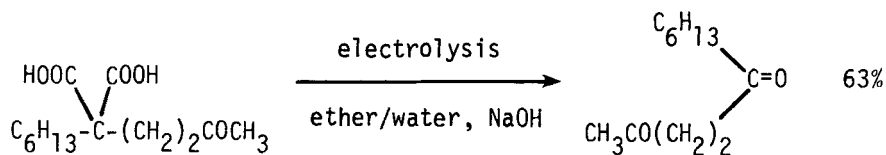


JACS 99, 3101 (1977)

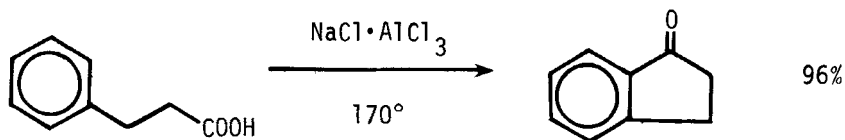
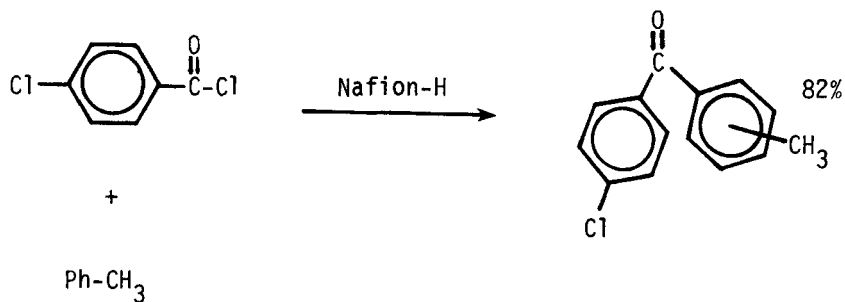


66%

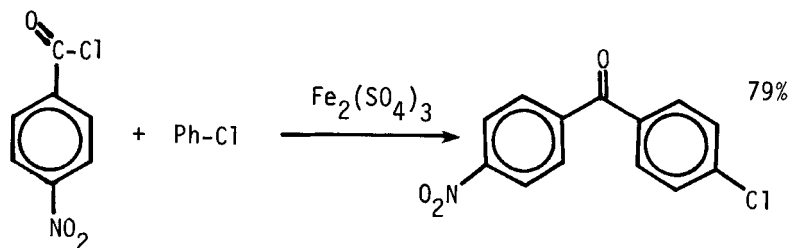
Chem Lett, 49 (1978)



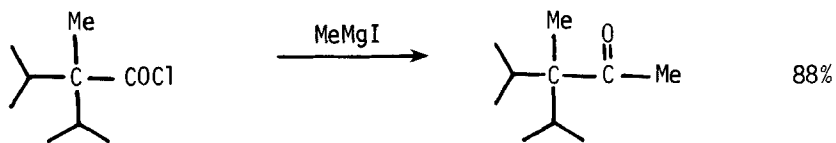
Tetr. Lett, 1047 (1979)

JOC 44, 3724 (1979)

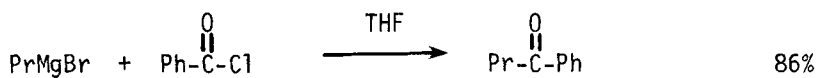
Synthesis, 672 (1978)



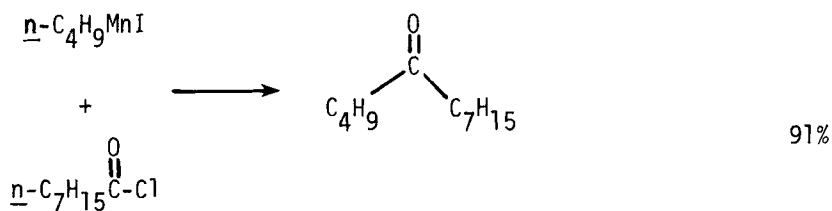
Synthesis, 54 (1977)



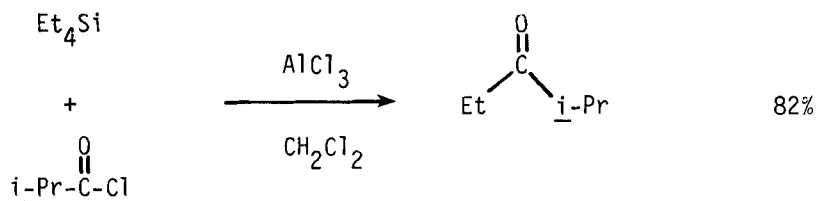
J Chem Research (S), 46 (1978)



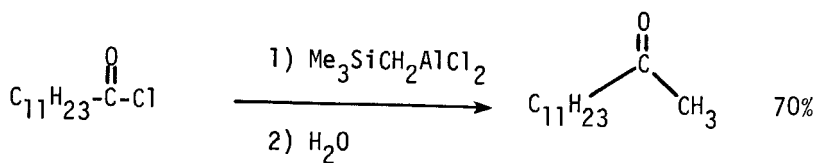
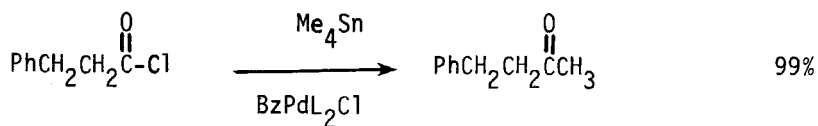
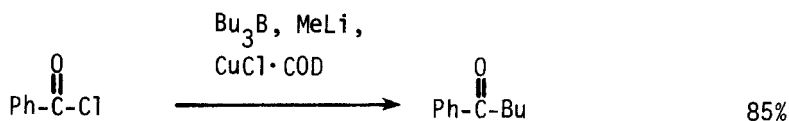
Tetr Lett, 4303 (1979)



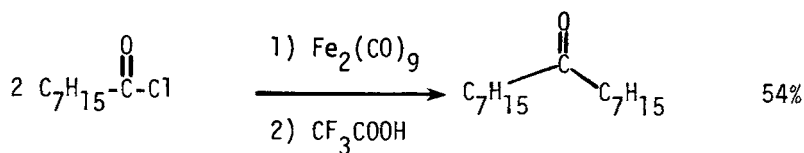
Synthesis, 130 (1977)



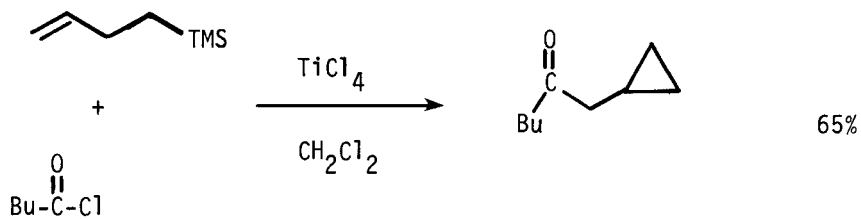
Synthesis, 677 (1977)

J Prakt Chem 320, 341 (1978)JOC 44, 1613 (1979)

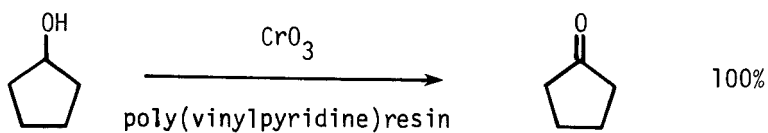
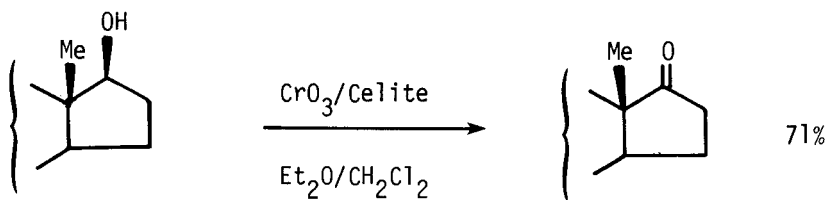
Tetr Lett, 173 (1977)



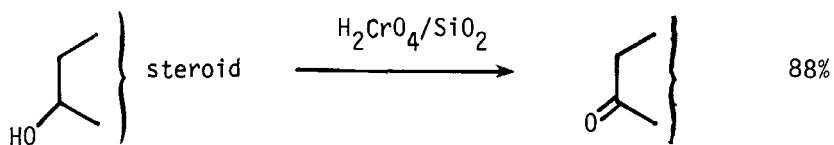
Tetr Lett, 3861 (1977)



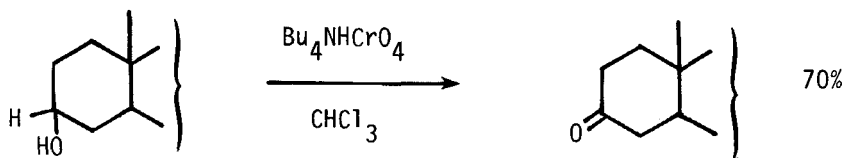
Tetr Lett, 4045 (1977)

Section 168 Ketones from Alcohols and PhenolsJOC 43, 2618 (1978)

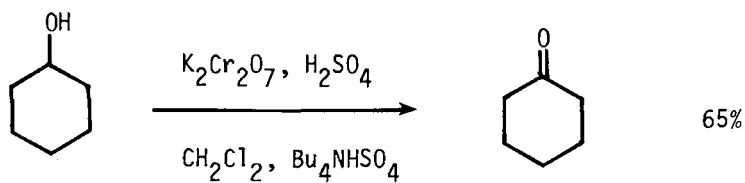
Synthesis, 815 (1979)



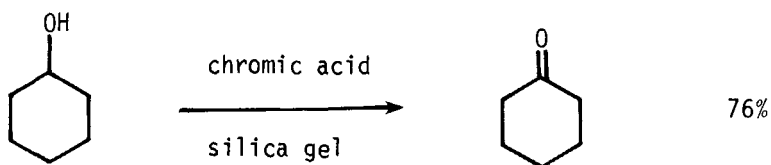
Synthesis, 534 (1978)

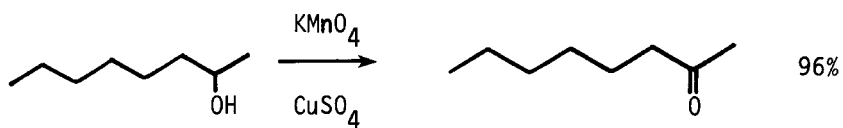
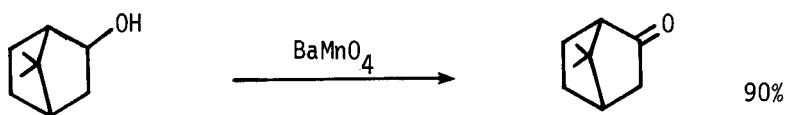


Synthesis, 356 (1979)

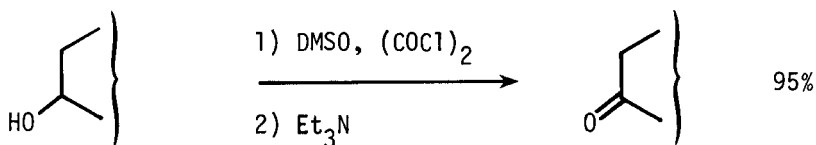


Tetr Lett, 1601 (1978)

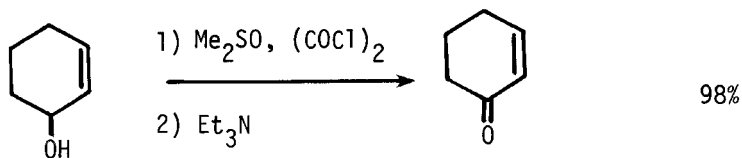
Tetrahedron 35, 1789 (1979)

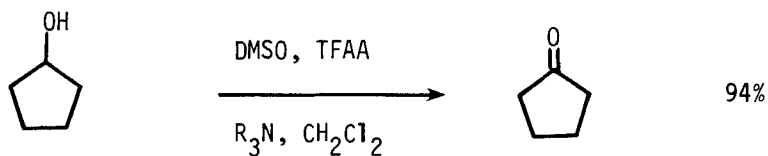
JOC 44, 3446 (1979)

Tetr Lett, 839 (1978)

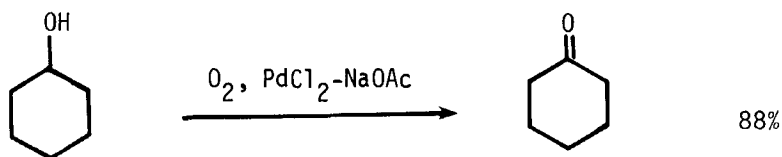


Synthesis, 297 (1978)

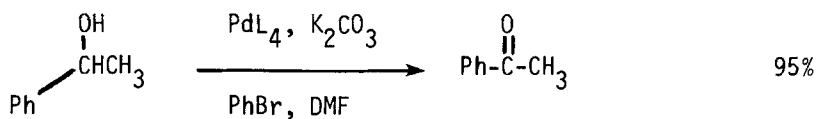
Tetrahedron 34, 1651 (1978)JOC 43, 2480 (1978)JOC 44, 4148 (1979)



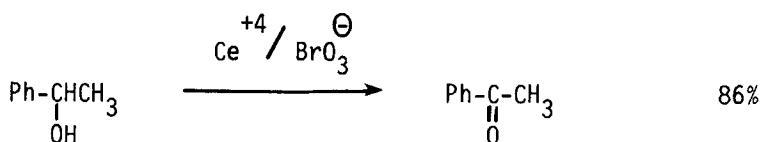
Synthesis, 297 (1978)



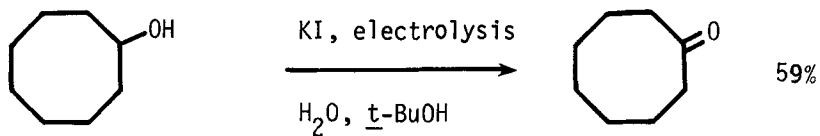
JCS Chem Comm, 157 (1977)



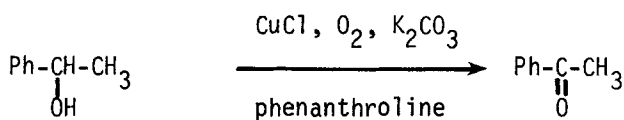
Tetr Lett, 1401 (1979)



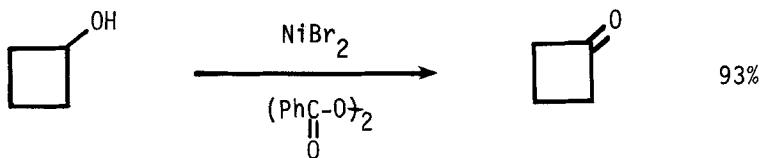
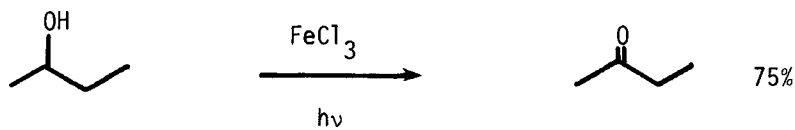
Synthesis, 936 (1978)

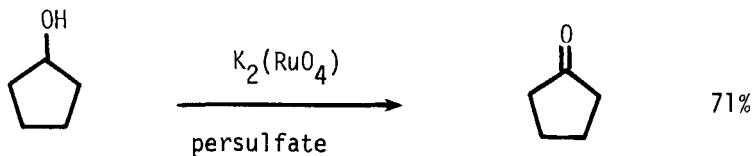


Tetr Lett, 165 (1979)

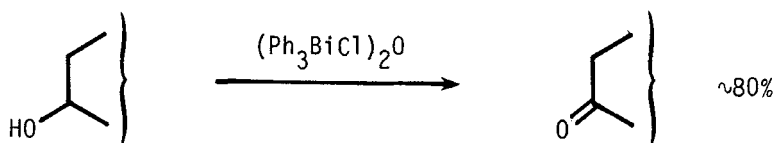


Tetr Lett, 1215 (1977)

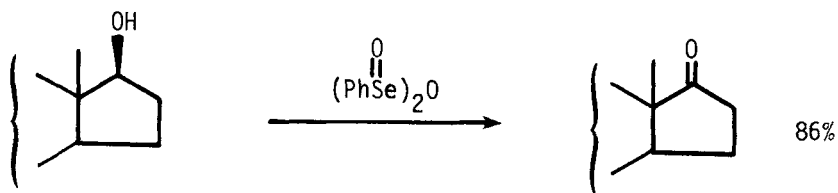
JOC 44, 2955 (1979)JOC 42, 171 (1977)



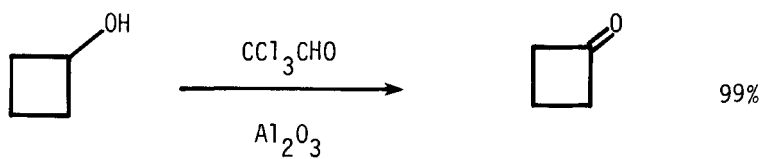
JCS Chem Comm, 58 (1979)



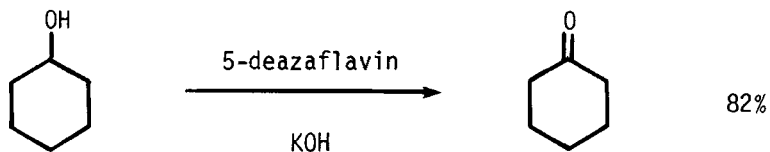
JCS Chem Comm, 1099 (1978)



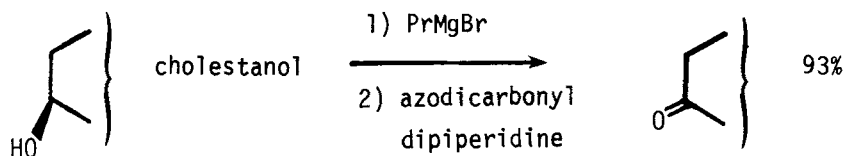
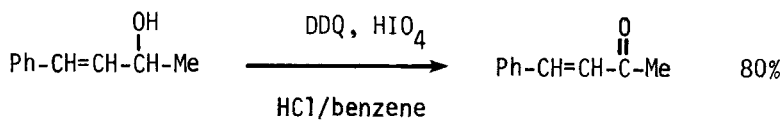
JCS Chem Comm, 952 (1978)



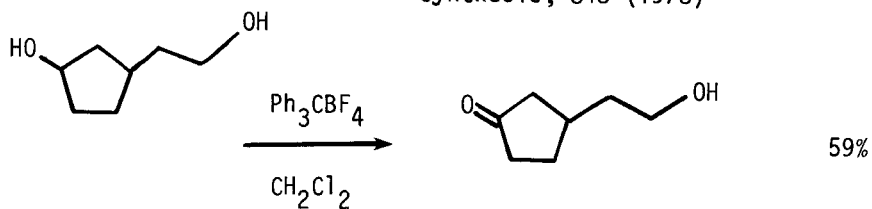
Synthesis, 555 (1977)



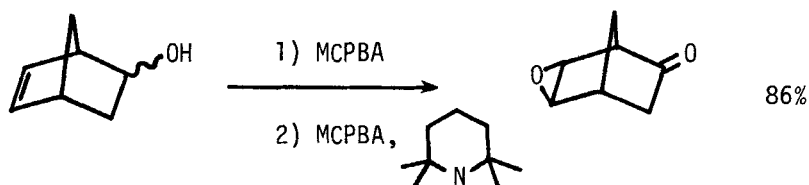
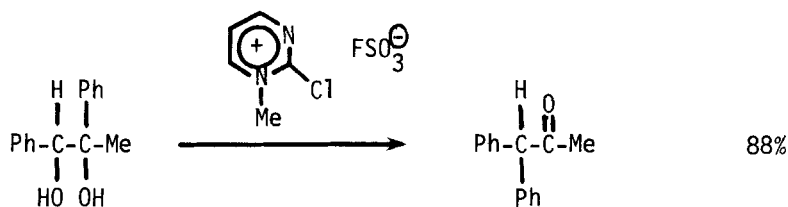
JCS Chem Comm, 825 (1977)

BCS Japan 50, 2773 (1977)

Synthesis, 848 (1978)

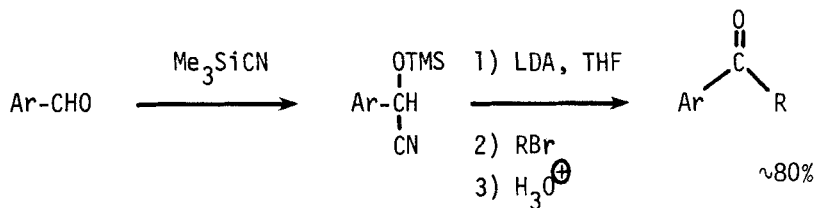


Tetr Lett, 2771 (1978)

JOC 42, 2077 (1977)

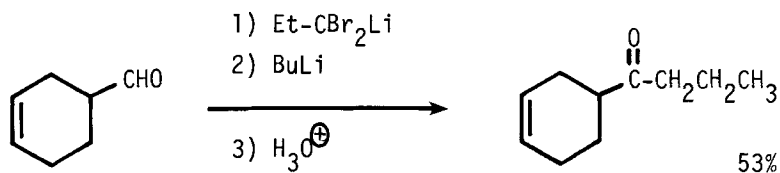
Chem Lett, 179 (1977)

Related Methods: Aldehydes from Alcohols and Phenols (Section 48)

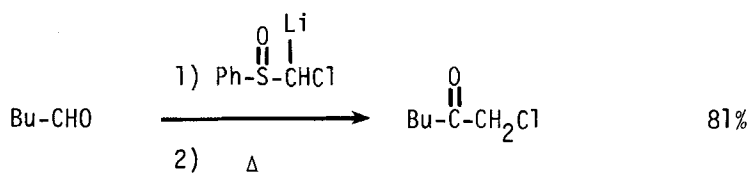
Section 169 Ketones from Aldehydes

Ar = subst. Ph, pyridyl, furyl

R = Me, i-Pr, BzChem Ber 112, 2045 (1979)

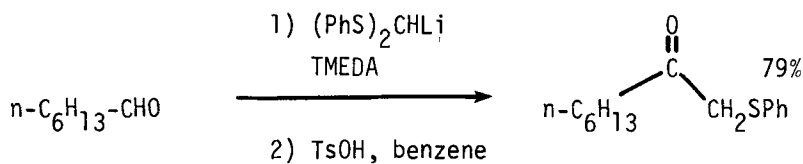


Synthesis, 968 (1979)

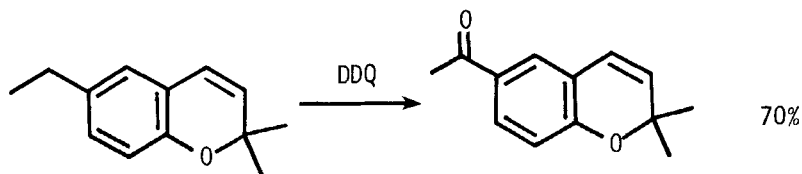


Tetr Lett, 1225 (1977)

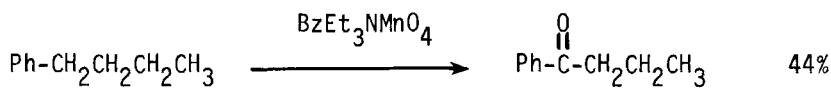
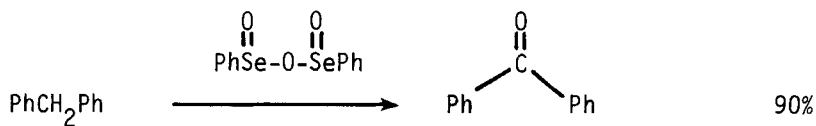
Chem Lett, 209 (1979)



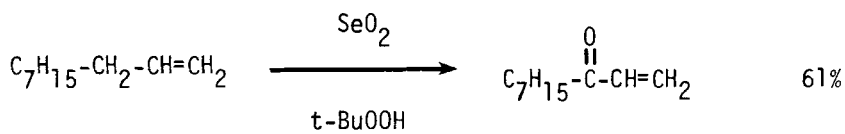
JCS Perkin I, 1074 (1979)

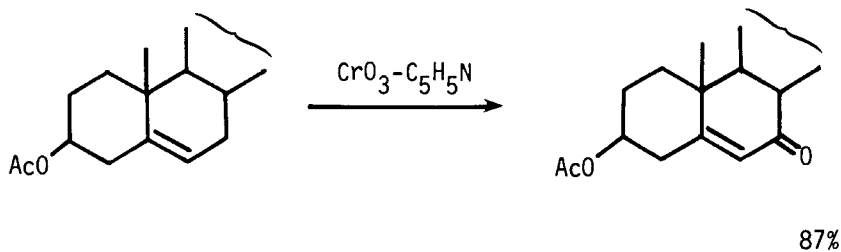
Section 170 Ketones from Alkyls, Methylene, and Aryls

Synthesis, 144 (1979)

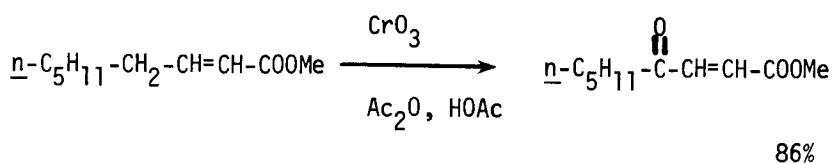
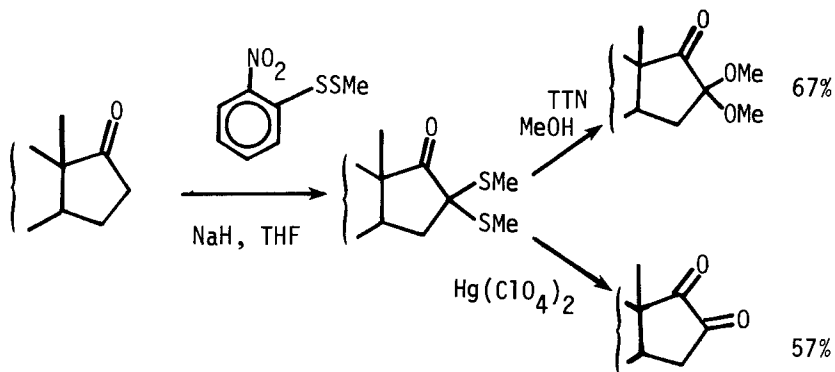
Angew Int Ed 18, 68 and 69 (1979)

Tetr Lett, 3331 (1979)

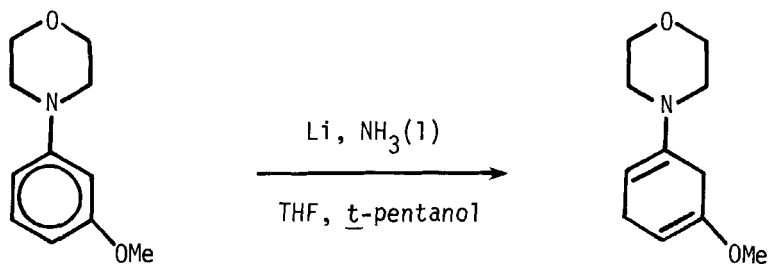
JACS 99, 5526 (1977)



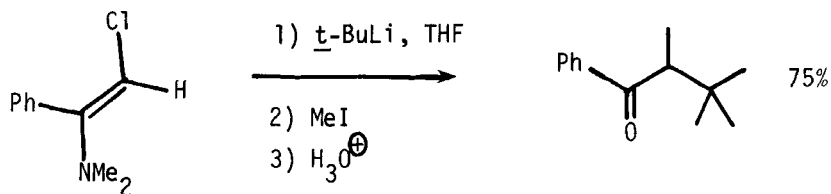
J Chem Res (S), 42 (1979)

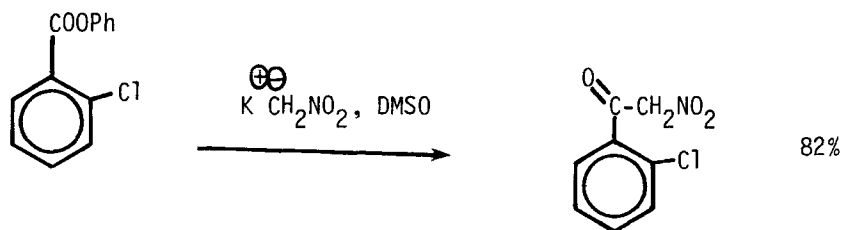
Bull Chem Soc Japan 52, 184 (1979)

Tetr Lett, 5021 (1978)

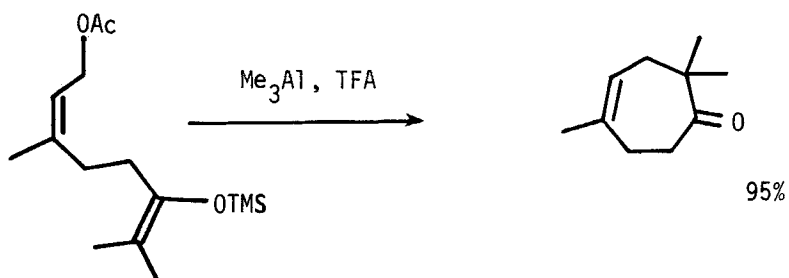
Aust J Chem 31, 1625 (1978)Section 171 Ketones from Amides

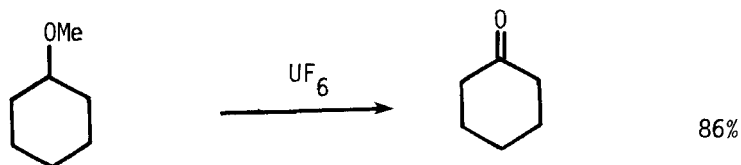
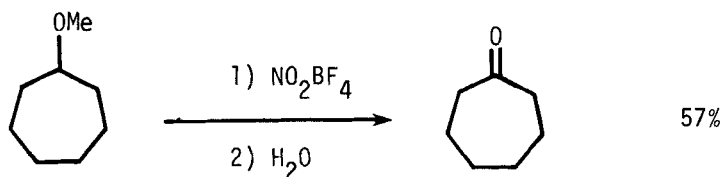
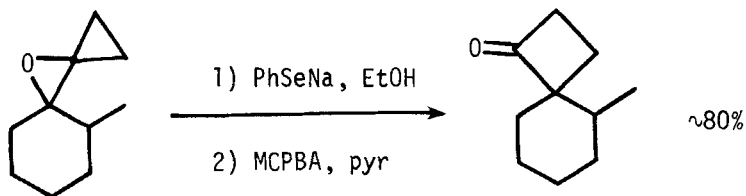
No additional examples

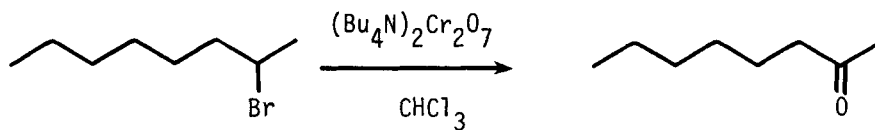
Section 172 Ketones from AminesJOC 44, 3585 (1979)

Section 173 Ketones from Esters

Synthesis, 295 (1979)

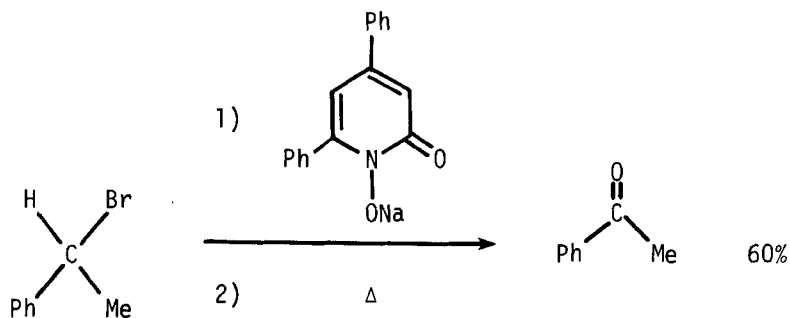
JACS 99, 4192 (1977)

Section 174 Ketones from Ethers and EpoxidesJACS 100, 5396 (1978)JOC 42, 3097 (1977)JACS 99, 7601 (1977)

Section 175 Ketones from Halides

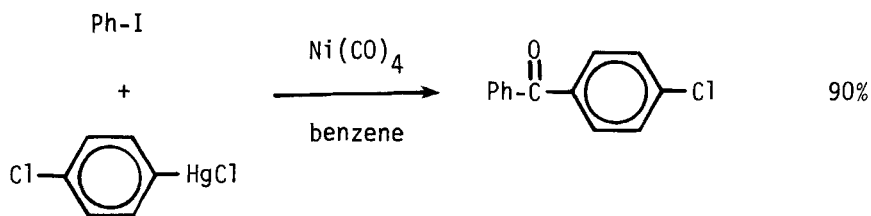
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Chem & Ind, 213 (1979)



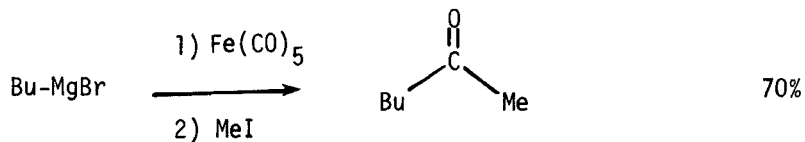
60%

JCS Perkin I, 2493 (1979)

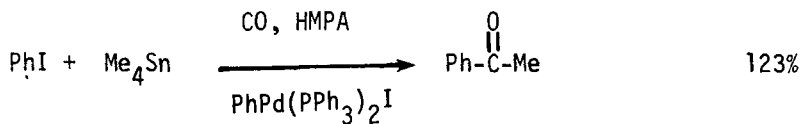


90%

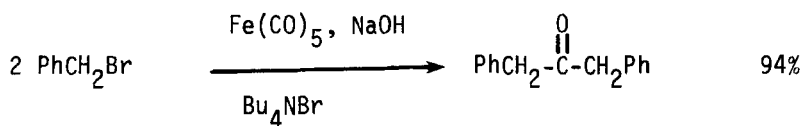
Synthesis, 776 (1977)



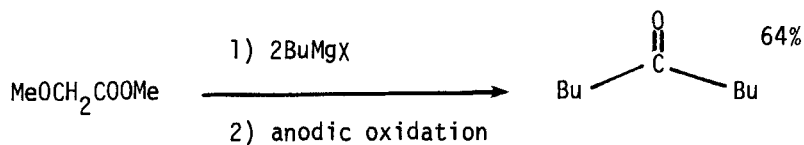
Tetr Lett, 761 (1978)



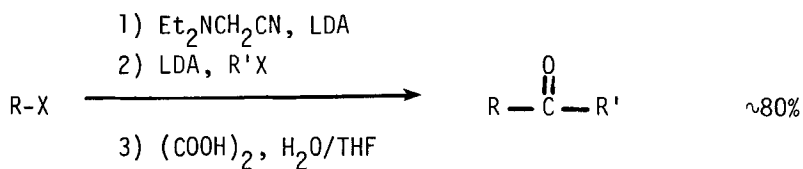
Tetr Lett, 2601 (1979)



Chem Lett, 321 (1979)

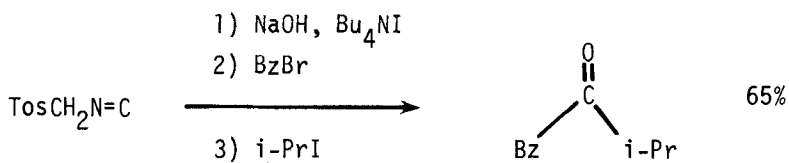


Tetr Lett, 3625 (1977)

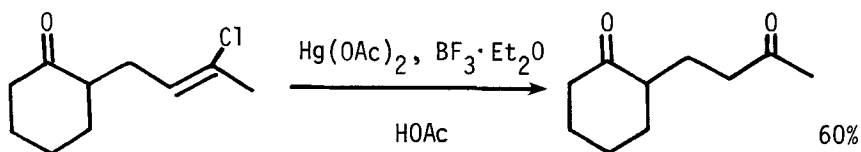


$R, R' = 1^\circ \text{ alkyl}$

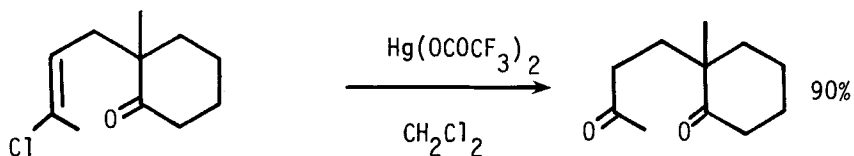
Tetr Lett, 5175 (1978)



Tetr Lett, 4229 (1977)



Tetr Lett, 1943 (1978)

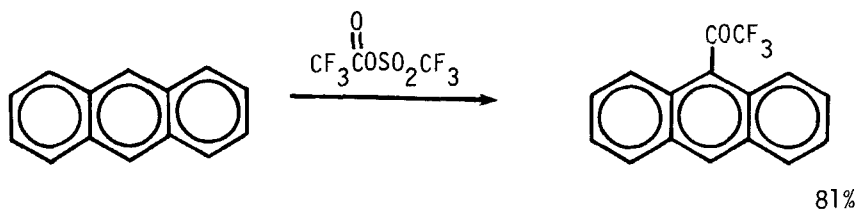


Tetr Lett, 3489 (1979)

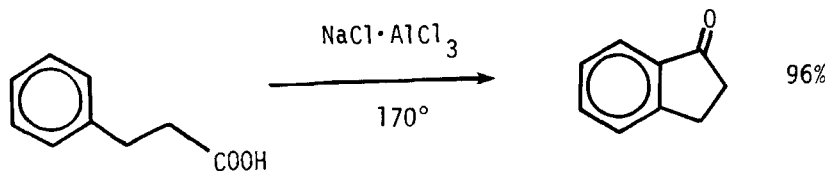
Related methods: Ketones from Ketones (Section 177), Aldehydes from Halides (Section 55)

Section 176 Ketones from Hydrides

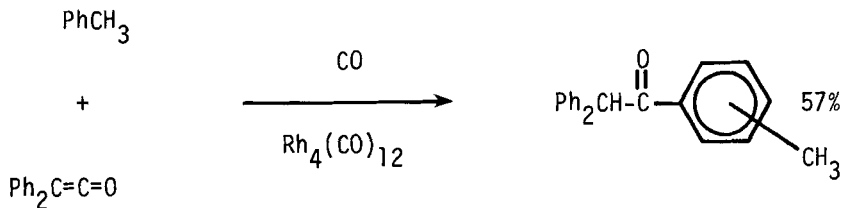
This section lists examples of the replacement of hydrogen by ketonic groups, $RH \rightarrow RCOR'$. For the oxidation of methylenes $R_2CH_2 \rightarrow R_2CO$ see Section 170 (Ketones from Alkyls and Methylenes)



JOC 44, 313 (1979)



JOC 44, 3724 (1979)

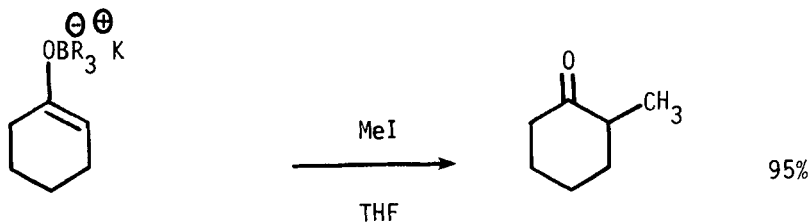


Chem Lett, 535 (1978)

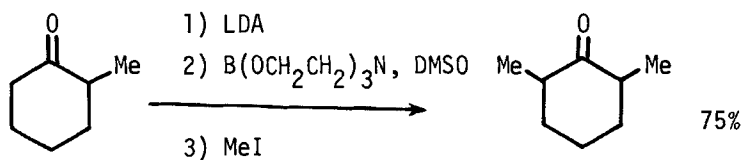
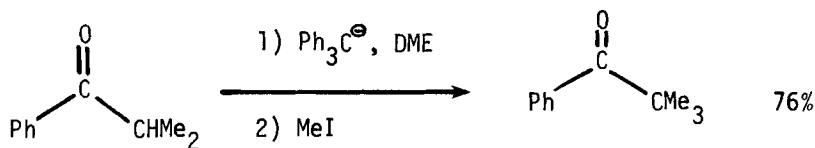
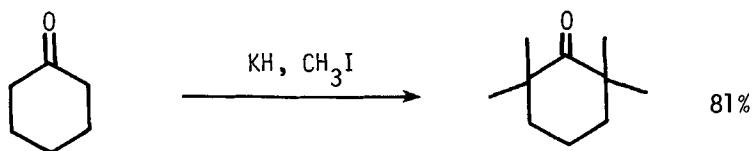
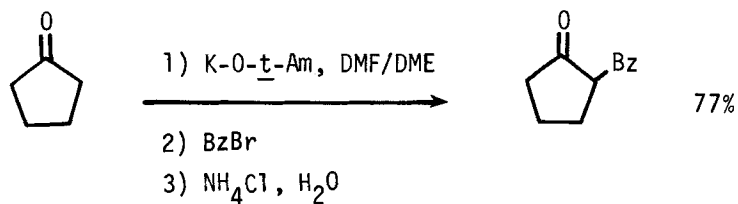
Section 177 Ketones from Ketones

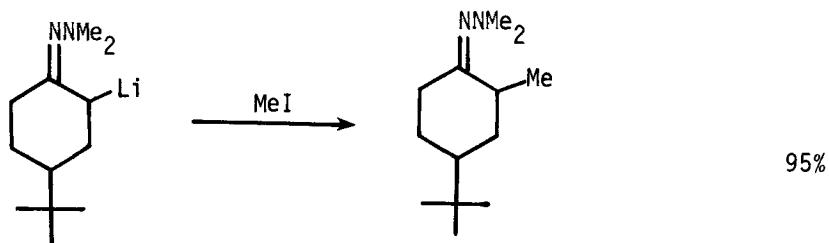
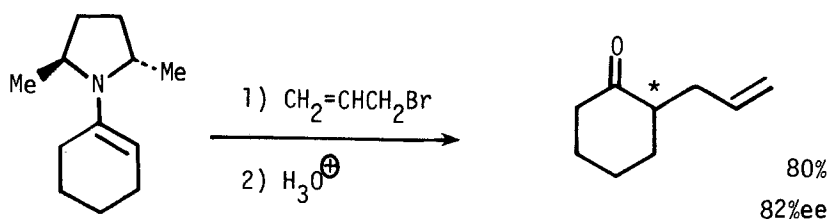
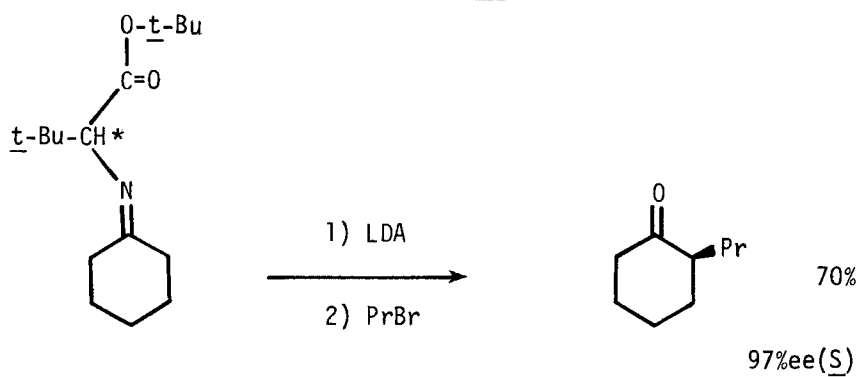
This section contains alkylations of ketones and protected ketones, ketone transpositions and annelations, ring expansions and ring openings, and dimerizations. Conjugate reductions and Michael alkylations of enones are listed in Section 74 (Alkyls from Olefins).

For the preparation of enamines from ketones see Section 356 (Amine-Olefin).

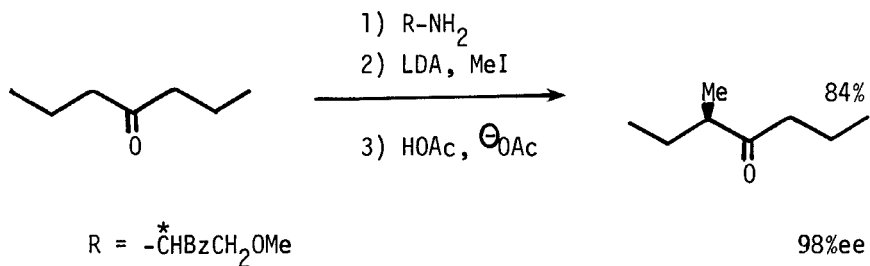
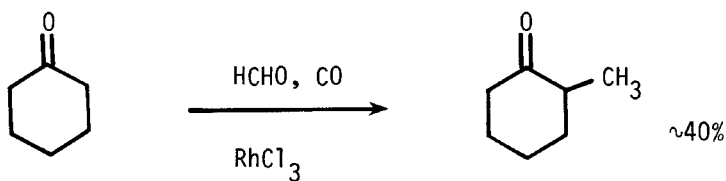


Tetr Lett, 845 (1979)

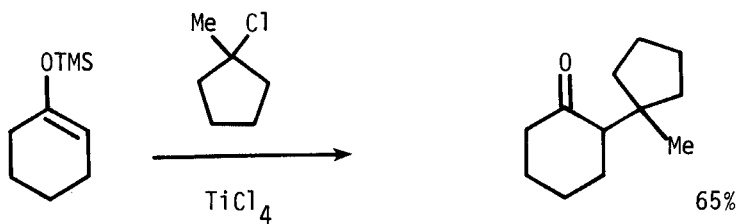
Synth Comm 8, 9 (1978)Synth Comm 7, 137 (1977)JOC 43, 1834 (1978)Synth Comm 8, 563 (1978)

Chem Ber 111, 1337 (1978)JOC 42, 1663 (1977)

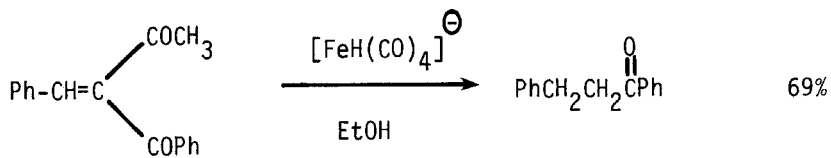
Tetr Lett, 573 (1978)

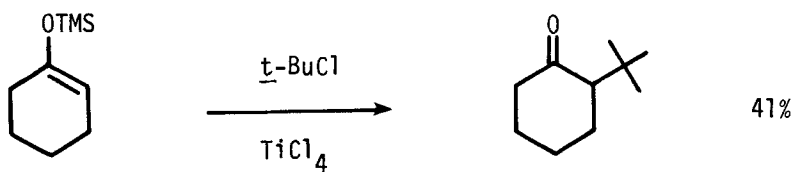
JOC 43, 3245 (1978)

Chem Lett, 215 (1978)

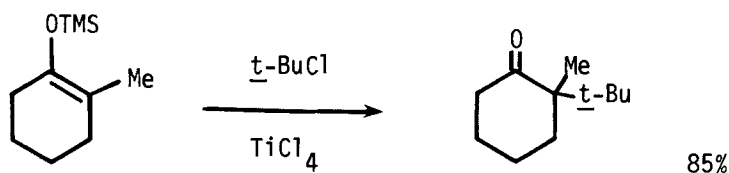
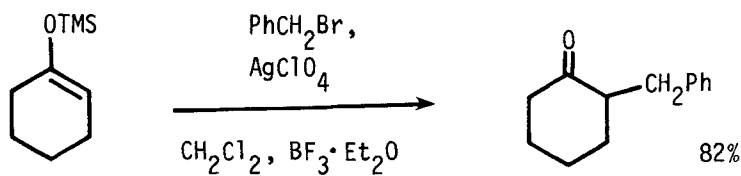
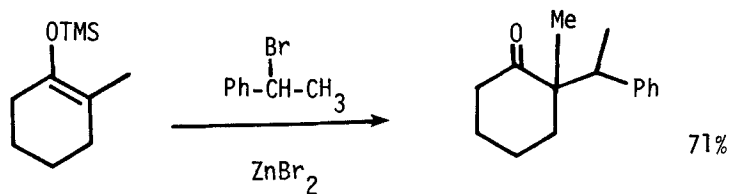


Tetr Lett, 1427 (1979)

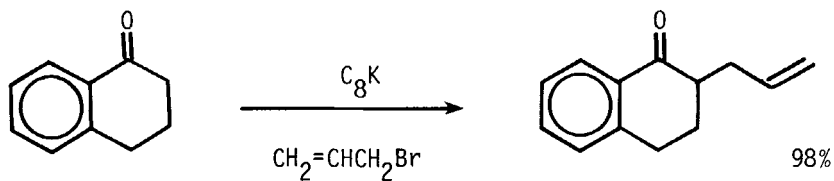
BCS Japan 51, 835 (1978)



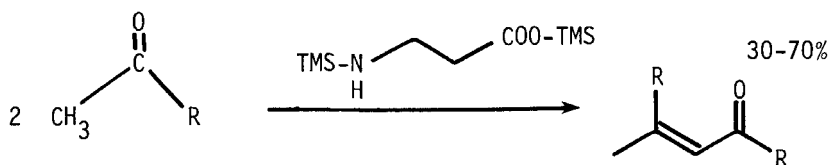
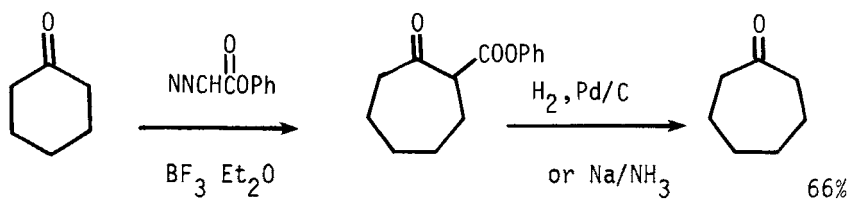
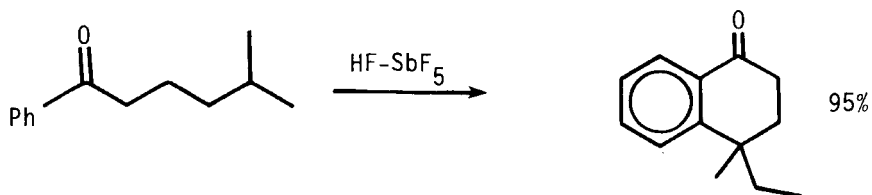
Tetr Lett, 4183 (1977)

Angew Int Ed 17, 48 (1978)Bull Chem Soc Japan 52, 1241 (1979)

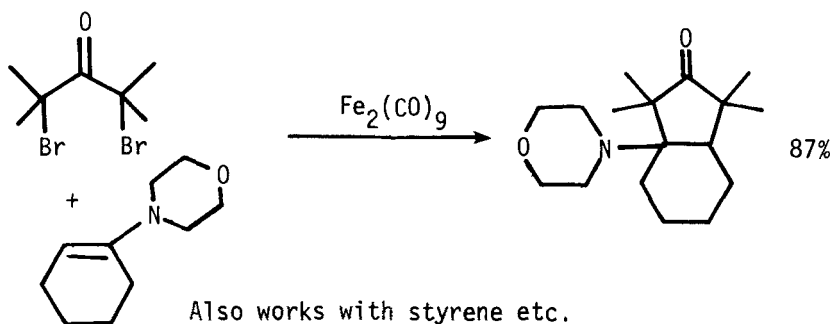
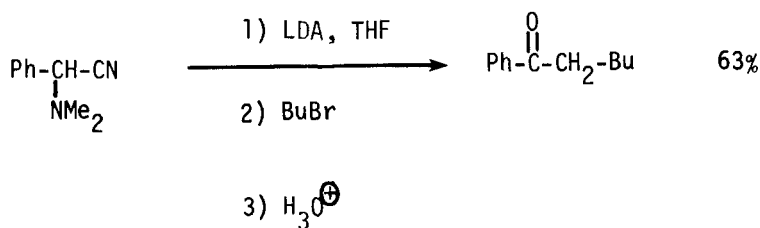
Tetr Lett, 1519 (1979)



Tetr Lett, 3121 (1977)

Angew Int Ed 16, 251 (1977)Synth Comm 8 413 (1978)

Chem Lett, 231 (1978)

JACS 100, 1791 and 1799 (1978)

Synthesis, 127 (1979)

Review: "Synthesis of Aldehydes, Ketones, and Carboxylic Acids from Lower Carbonyl Compounds by C-C Coupling Reactions"

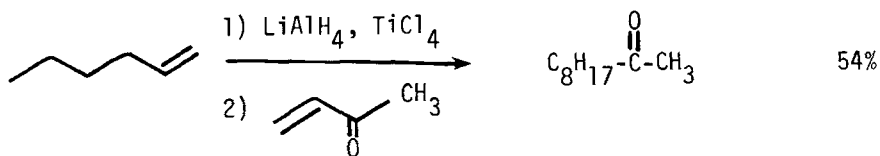
Synthesis, 633 (1979)

Ketones may also be alkylated and homologated via olefinic ketones (Section 374)

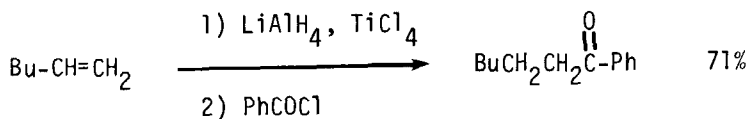
Related methods: Aldehydes from Aldehydes (Section 49)

Section 178 Ketones from Nitriles

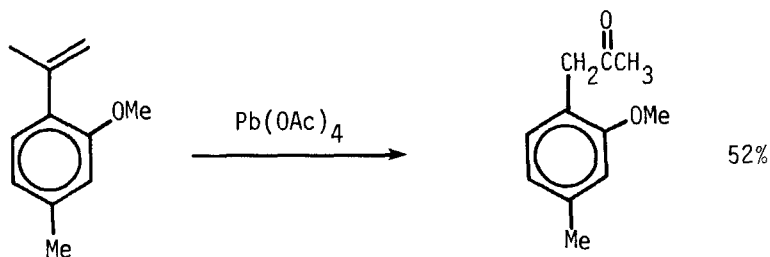
No additional examples

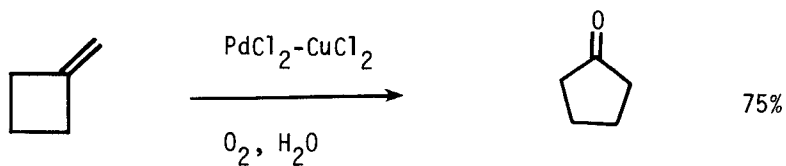
Section 179 Ketones from Olefins

Chem Lett, 167 (1979)

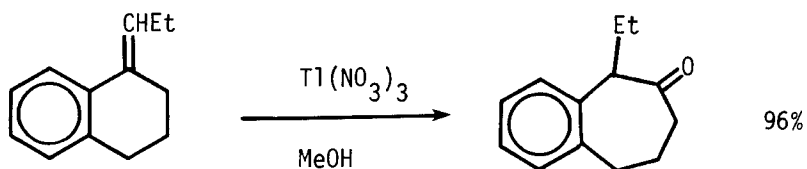


Chem Lett, 623 (1979)

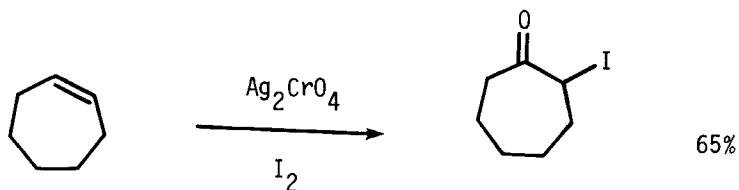
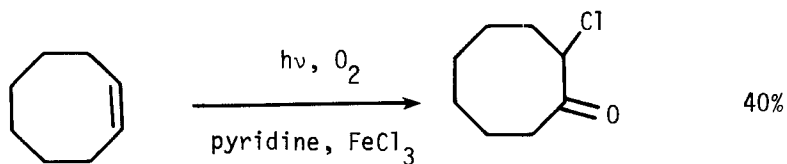
Indian J Chem 14B, 704 (1976)



JCS Chem Comm, 583 (1977)



Tetr Lett, 1827 (1977)

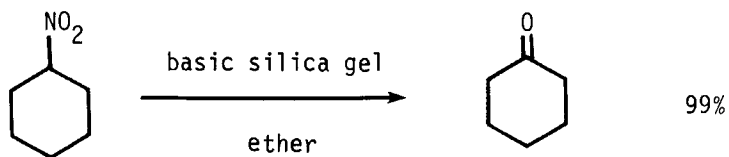
JOC 42, 4268 (1977)

Chem Lett, 161 (1978)

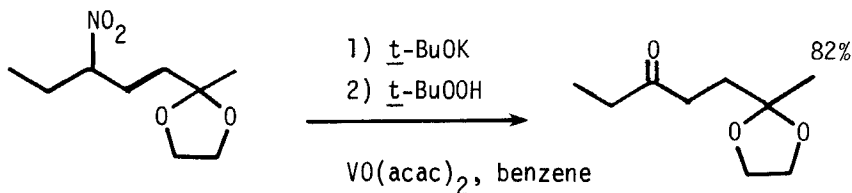
See also Section 134 (Ethers and Epoxides from Olefins) and Section 174 (Ketones from Ethers and Epoxides).

Section 180 Ketones from Miscellaneous Compounds

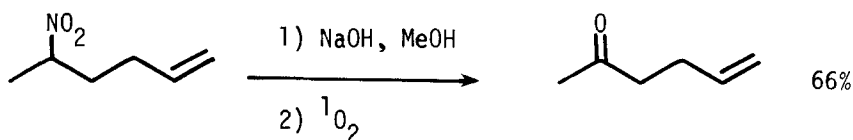
Conjugate reductions and reductive alkylations of enones are listed in Section 74 (Alkyls from Olefins).



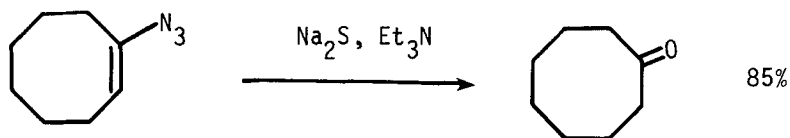
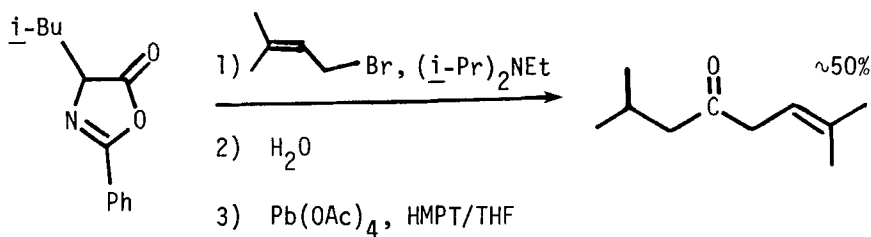
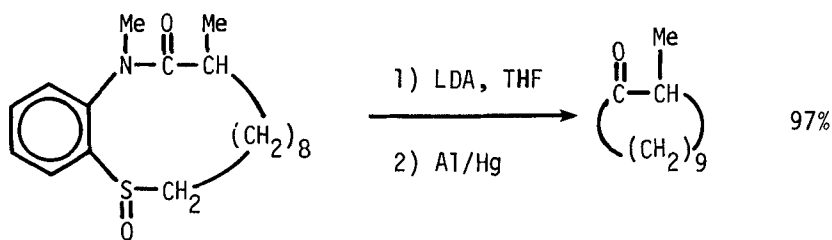
JACS 99, 3861 (1977)



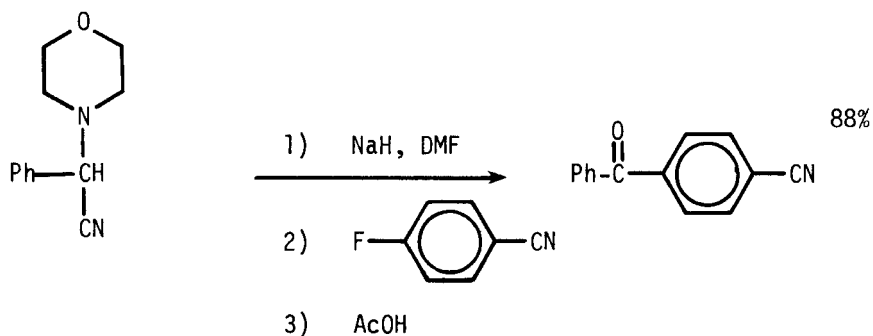
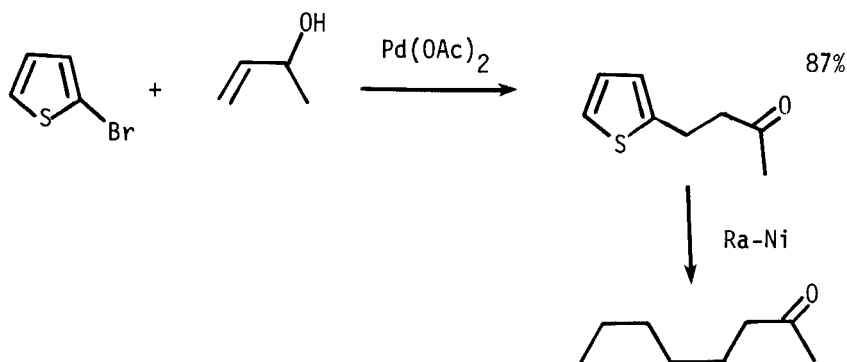
Tetr Lett, 331 (1977)



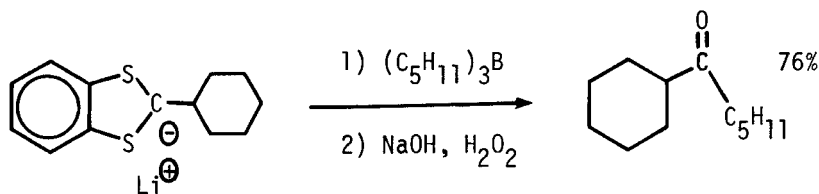
JOC 43, 1271 (1978)

JOC 44, 4712 (1979)Angew Int Ed 17, 450 (1978)

Tetr Lett, 4487 (1979)

JOC 44, 4597 (1979)

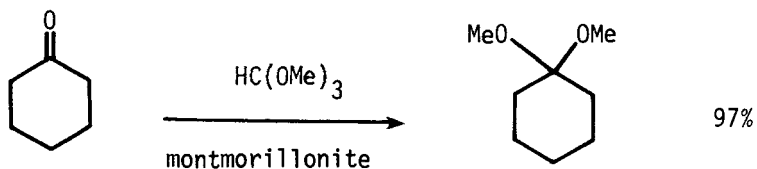
Chem Lett, 423 (1977)



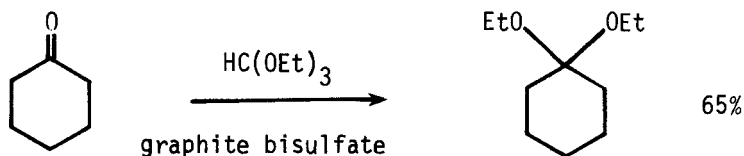
Tetr Lett, 1893 (1979)

Section 180A Protection of Ketones

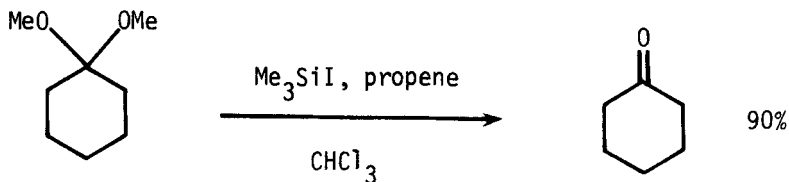
See Section 367 (Ether-Olefin) for the formation of enol ethers. Many of the methods in Section 60A (Protection of Aldehydes) are also applicable to ketones.



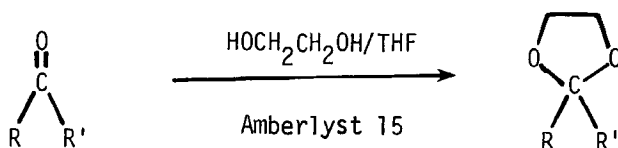
Synthesis, 467 (1977)



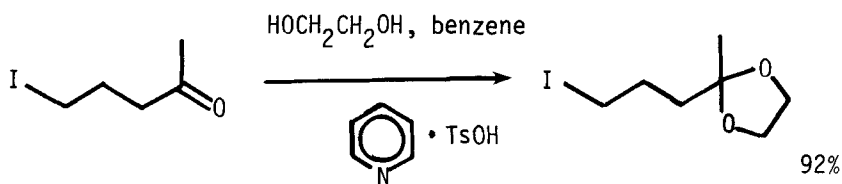
BSC France, 499 (1977)



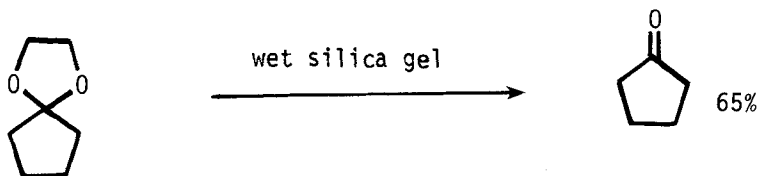
Tetr Lett, 4175 (1977)



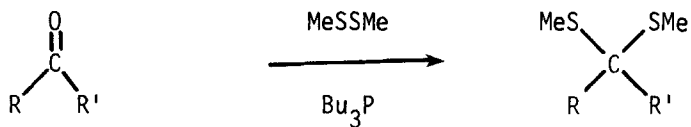
JCS Perkin I, 158 (1979)



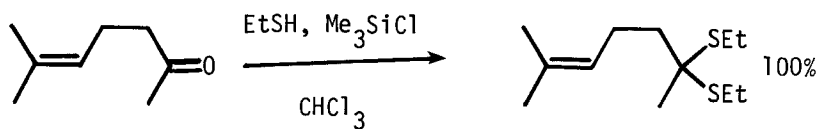
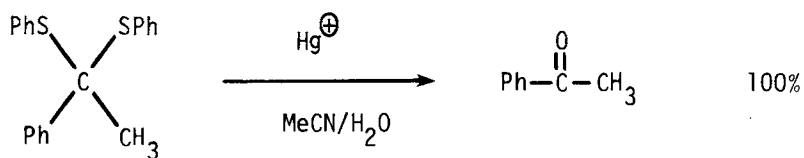
Synthesis, 724 (1979)



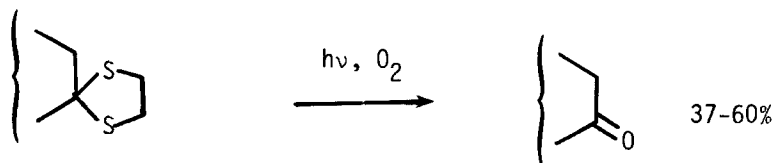
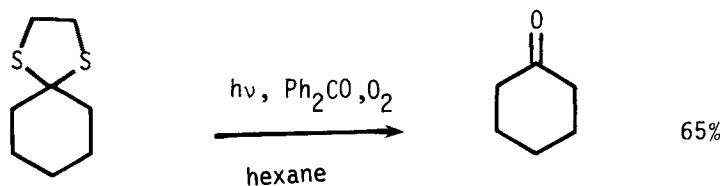
Synthesis, 63 (1978)



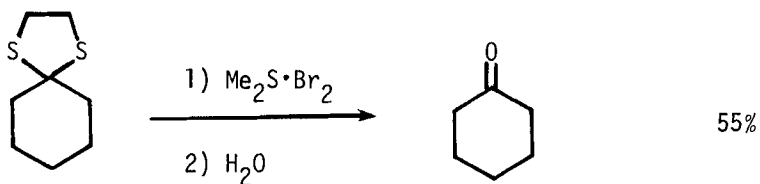
Chem Lett, 767 (1979)

Synth Comm 7, 283 (1977)

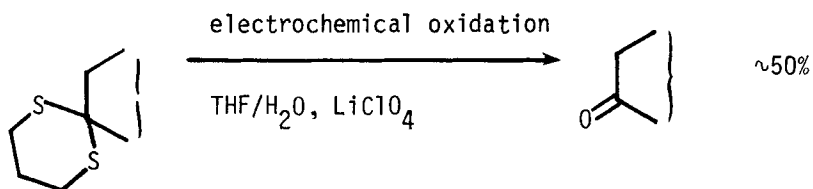
Tetr Lett, 675 (1978)

Chem Pharm Bull 27, 538 (1979)

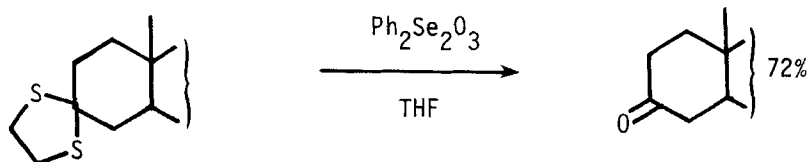
JCS Chem Comm, 680 (1977)



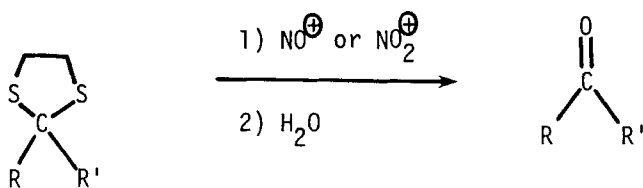
Synthesis, 720 (1979)



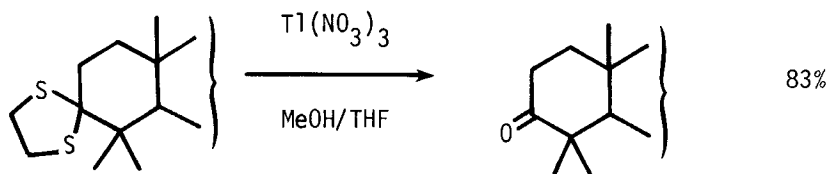
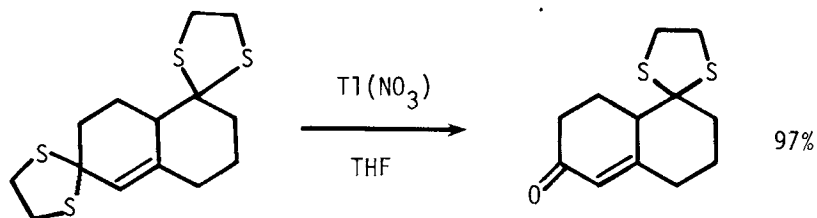
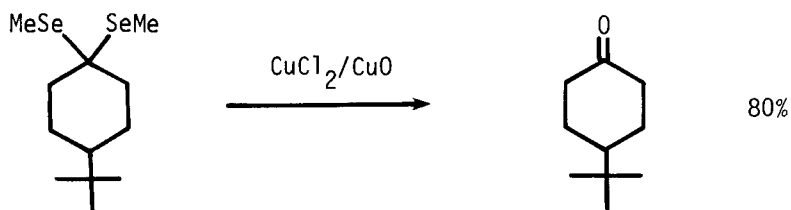
JCS Chem Comm, 255 (1978)



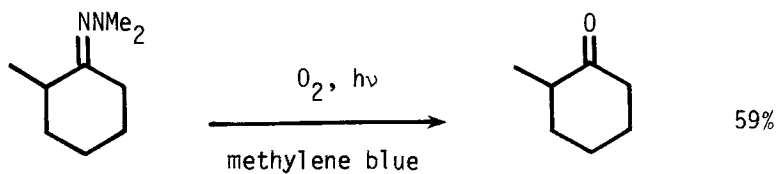
JCS Chem Comm, 751 (1977)



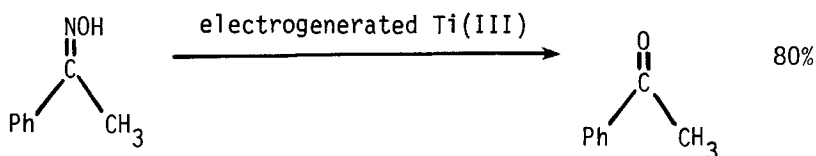
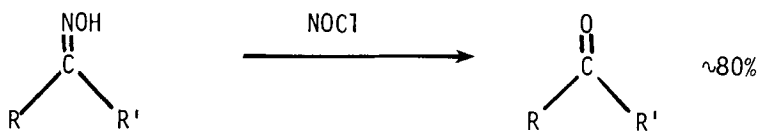
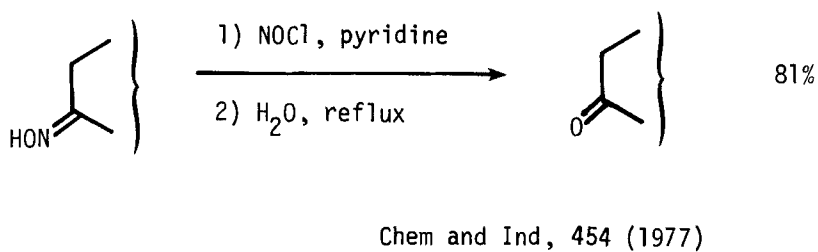
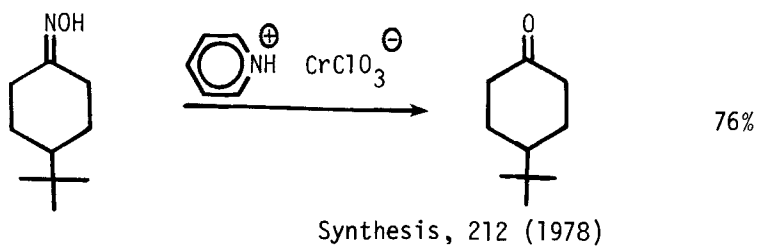
Synthesis, 273 (1979)

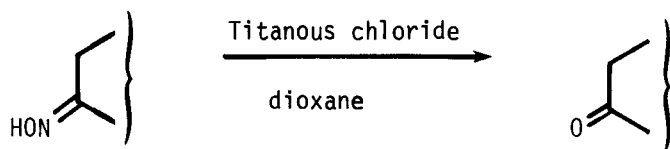
Chem Pharm 26, 3743 (1978)Synth Comm 9, 301 (1979)

Synthesis, 877 (1979)

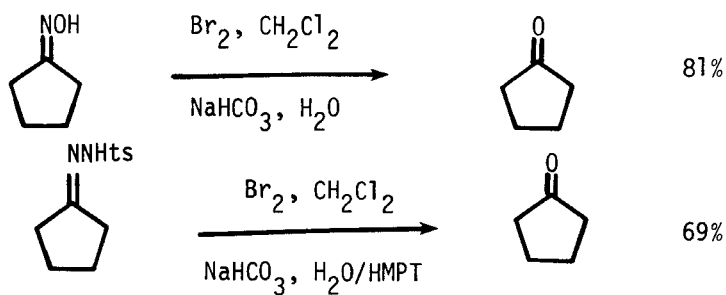


Synthesis, 893 (1977)

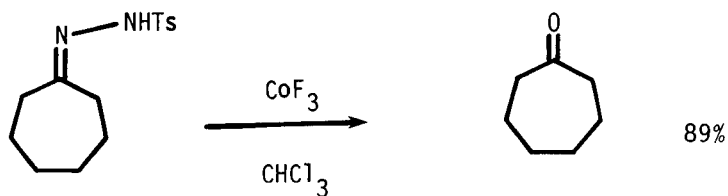




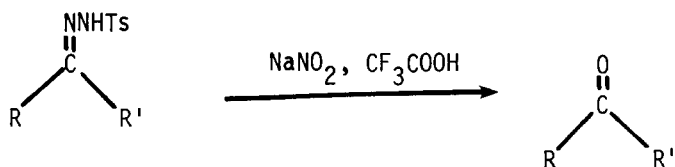
Chem and Ind, 742 (1977)



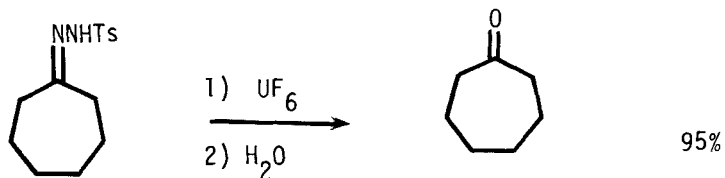
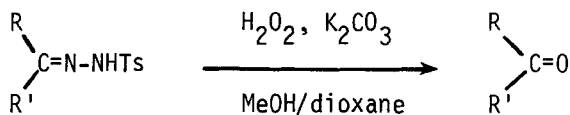
Synthesis, 113 (1979)



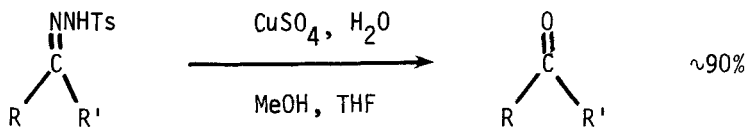
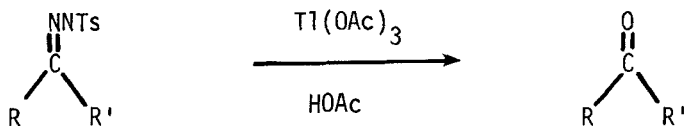
Synthesis, 308 (1979)



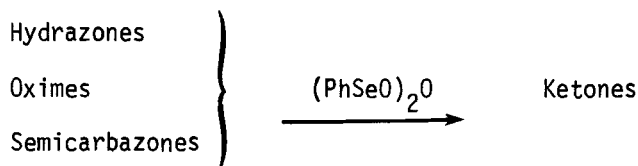
Synthesis, 207 (1979)

JACS 100, 5396 (1978)

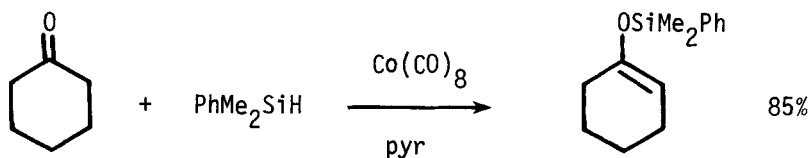
Synthesis, 919 (1978)

Gazz Chim Ital 108, 137 (1978)

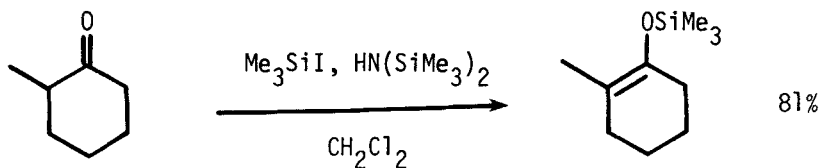
Tetr Lett, 4583 (1979)



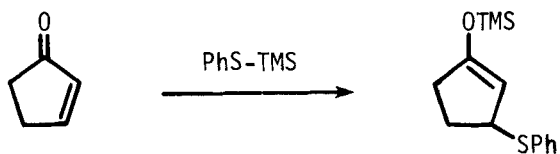
JCS Chem Comm, 445 (1977)



Tetr Lett, 2671 (1977)



Synthesis, 730 (1979)

JACS 99, 5009 (1977)

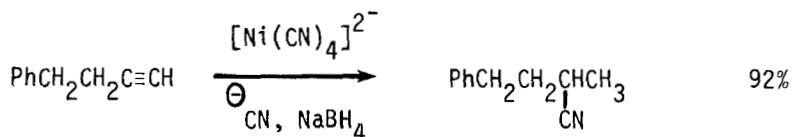
Selective formation of enolate ions to protect carbonyl groups from reduction by LiAlH_4 . Used to effect selective reductions of steroid diones and triones.

JCS Perkin I, 1075 (1977)

CHAPTER 13

PREPARATION OF NITRILES

Section 181 Nitriles from Acetylenes



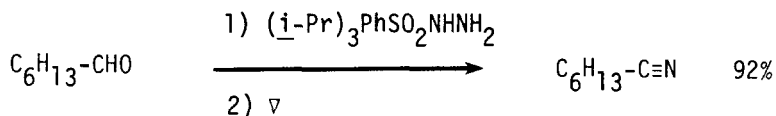
JCS Chem Comm, 1110 (1979)

Section 182 Nitriles from Carboxylic Acids and Acid Halides

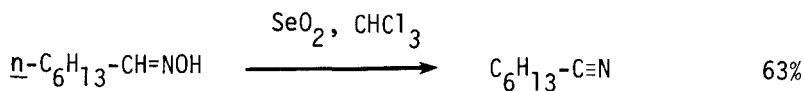
No additional examples

Section 183 Nitriles from Alcohols

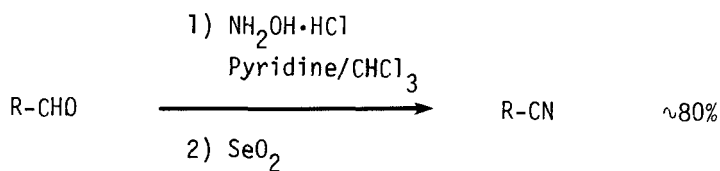
No additional examples

Section 184 Nitriles from Aldehydes

Synthesis, 112 (1979)

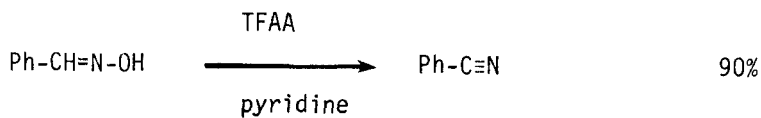


Synthesis, 703 (1978)

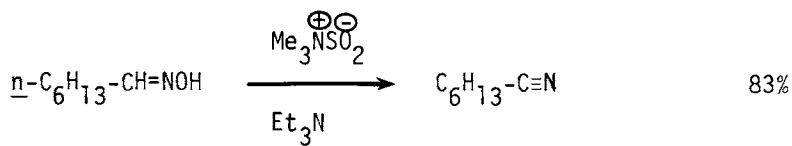


R = alkyl, aryl, heterocyclic

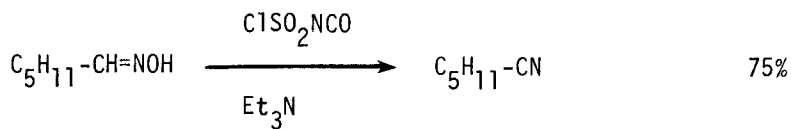
Synthesis, 722 (1979)



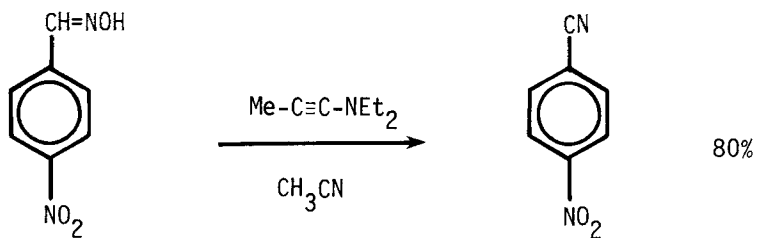
Synthesis, 56 (1979)



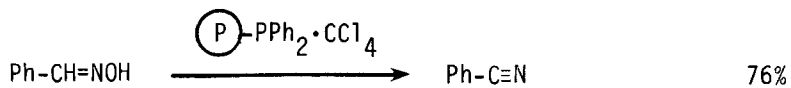
Synthesis, 702 (1978)



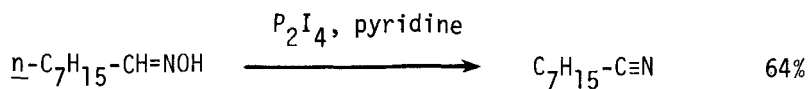
Synthesis, 227 (1979)



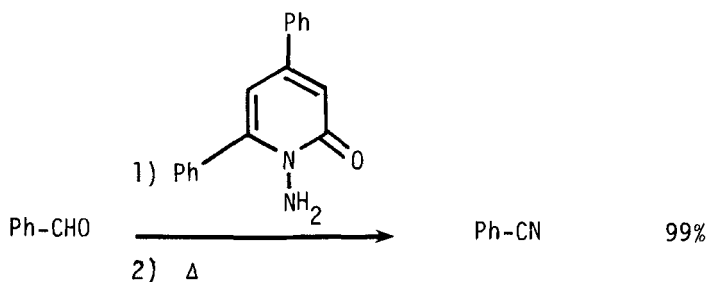
Synthesis, 338 (1977)



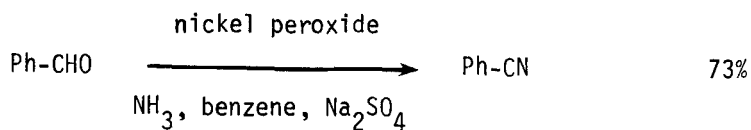
Synthesis, 41 (1977)



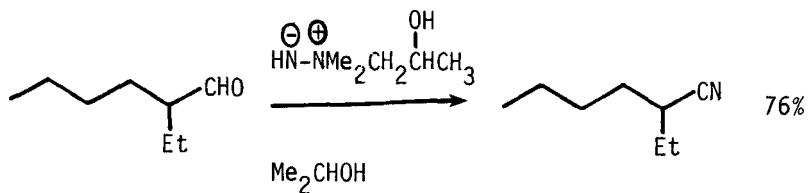
Synthesis, 905 (1978)



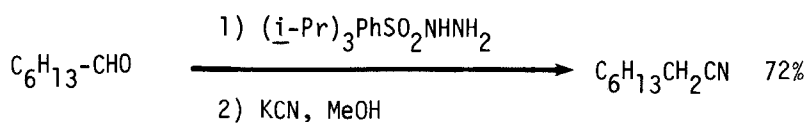
JCS Perkin I, 1957 (1979)



Synth Comm 9, 529 (1979)



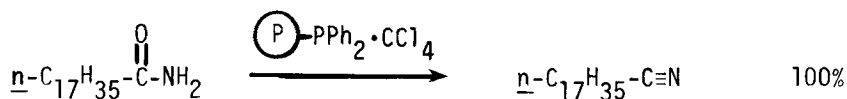
Synthesis, 301 (1978)



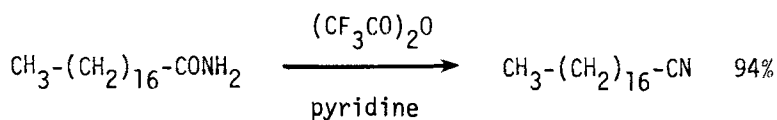
JCS Chem Comm, 280 (1977)

Section 185 Nitriles from Alkyls, Methylenes and Aryls

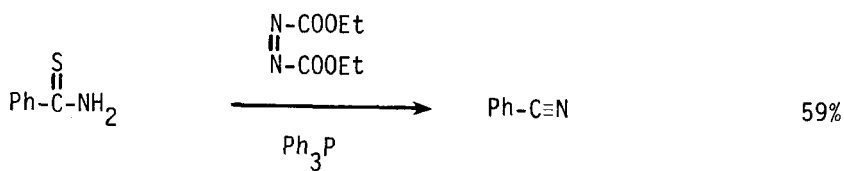
No additional examples

Section 186 Nitriles from Amides

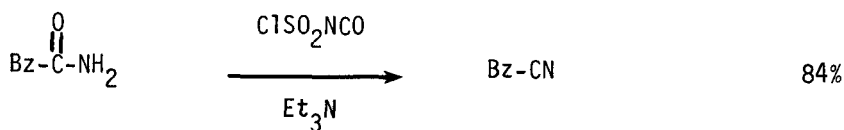
Synthesis, 41 (1977)



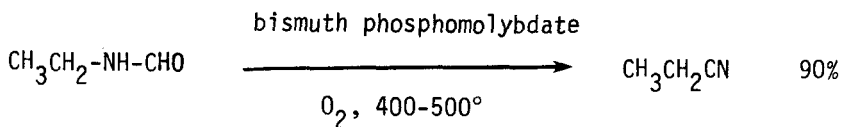
Tetr Lett, 1813 (1977)



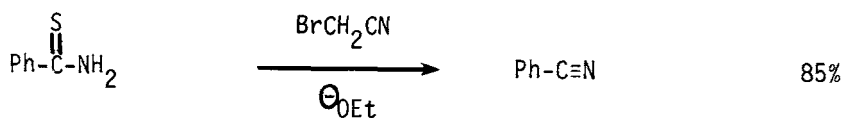
JCS Chem Comm, 220 (1977)

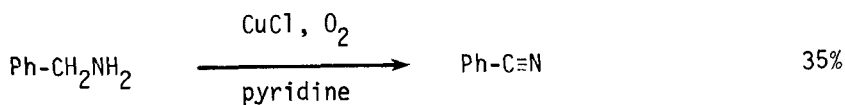
JOC 44, 3436 (1979)

Synthesis, 227 (1979)

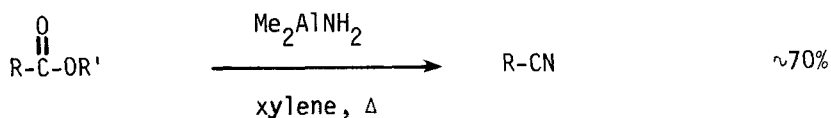


Chem & Ind, 852 (1979)

Synth Comm 9, 569 (1979)

Section 187 Nitriles from Amines

Synthesis, 245 (1977)

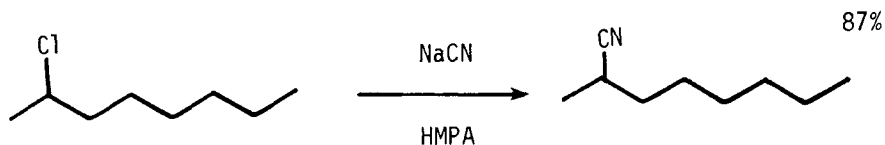
Section 188 Nitriles from Esters

R = alkyl, aryl

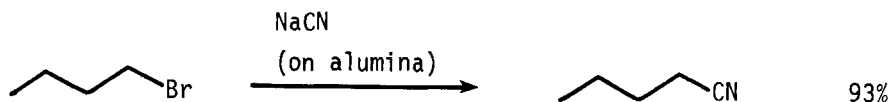
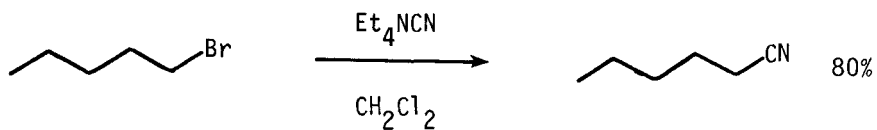
Tetr Lett, 4907 (1979)

Section 189 Nitriles from Ethers and Epoxides

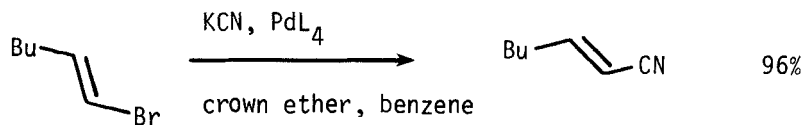
No additional examples

Section 190 Nitriles from Halides

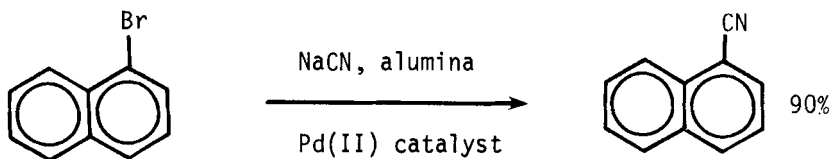
JOC 43, 1017 (1978)

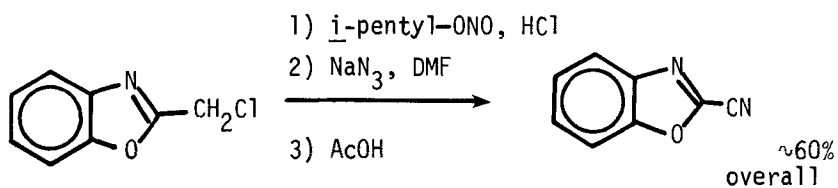
JOC 44, 2029 (1979)JOC 44, 3436 (1979)

Liebigs Ann Chem, 1946 (1978)

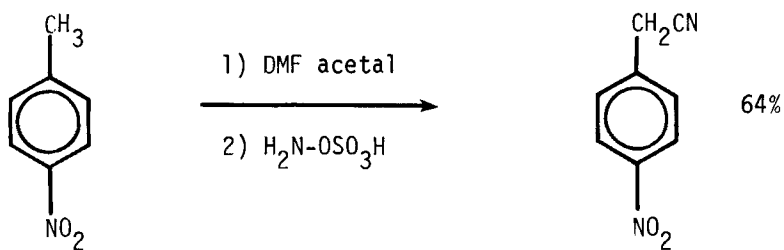


Tetr Lett, 4429 (1977)

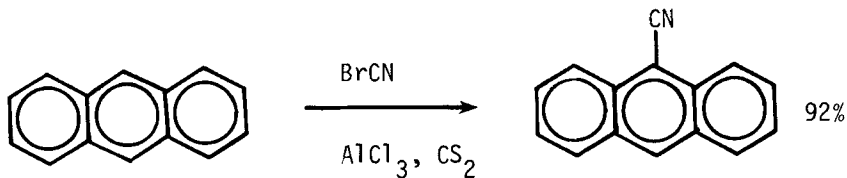
JOC 44, 4443 (1979)

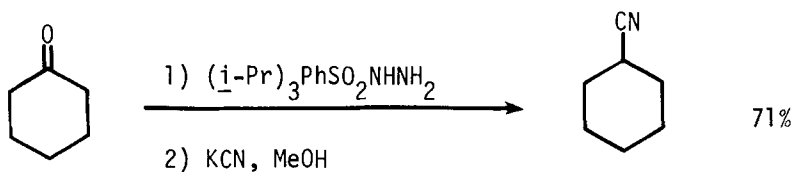


Synthesis, 102 (1979)

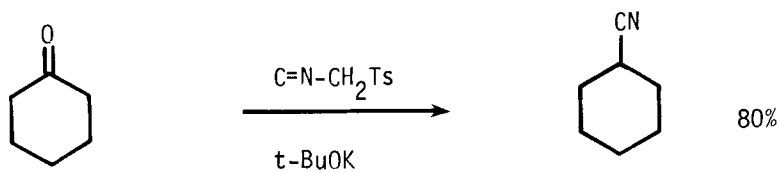
Section 191 Nitriles from Hydrides

Tetr Lett, 1361 (1979)

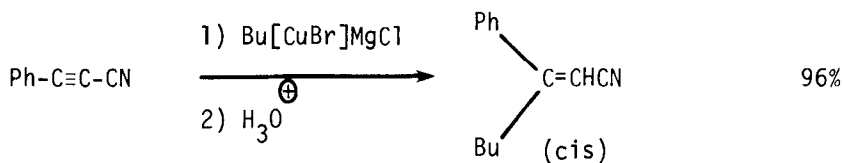
Tetrahedron 35, 2927 (1979)

Section 192 Nitriles from Ketones

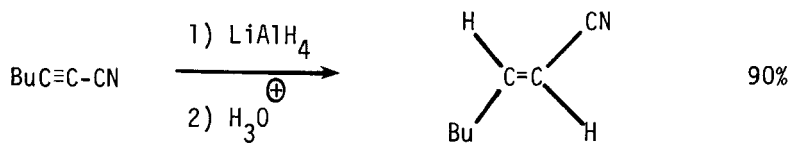
JCS Chem Comm, 280 (1977)

JOC 42, 3114 (1977)Section 193 Nitriles from Nitriles

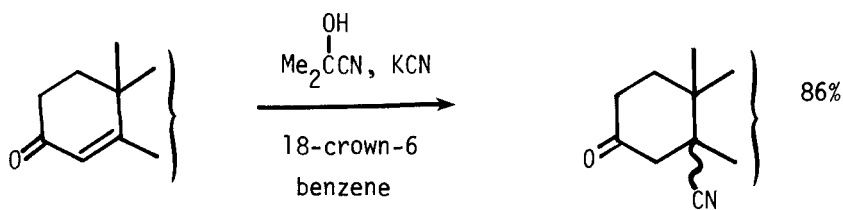
Conjugate reductions and Michael alkylations of olefinic nitriles are found in Section 74 (Alkyls from Olefins).



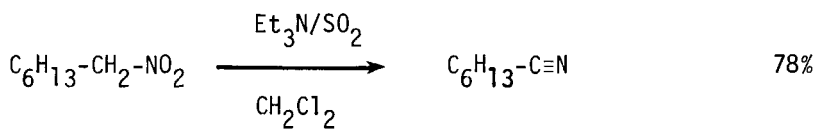
Synthesis, 454 (1978)



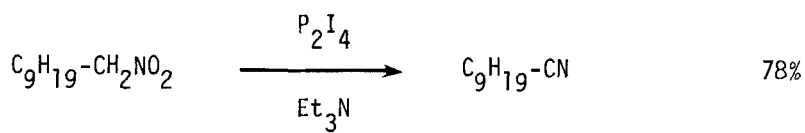
Synthesis, 430 (1979)

Section 194 Nitriles from Olefins

Tetr Lett, 1117 (1977)

Section 195 Nitriles from Miscellaneous Compounds

Synthesis, 36 (1979)

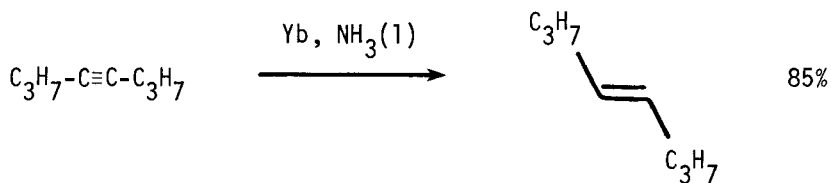


Tetr Lett, 3995 (1979)

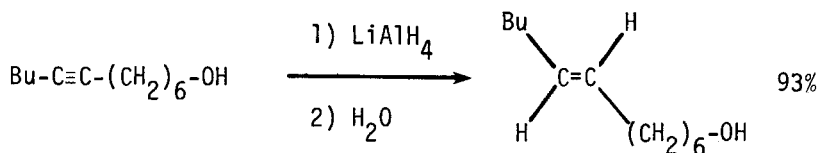
CHAPTER 14

PREPARATION OF OLEFINS

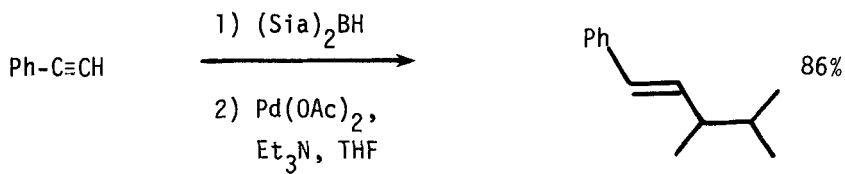
Section 196 Olefins from Acetylenes



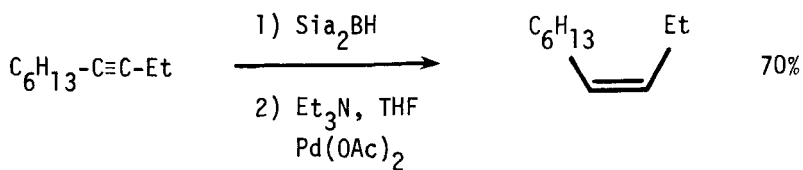
JOC 43, 4555 (1978)



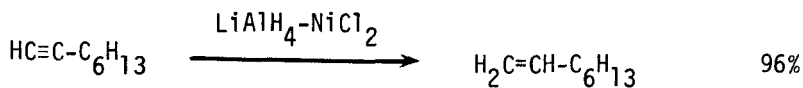
Synthesis, 561 (1977)



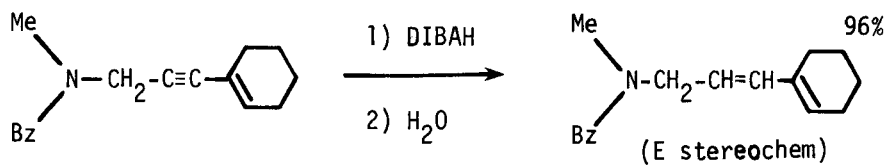
JCS Chem Comm, 852 (1977)



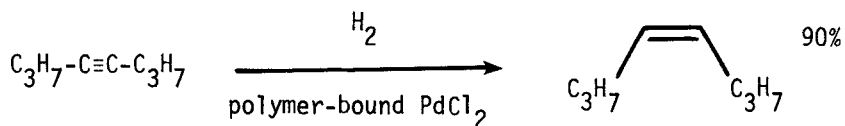
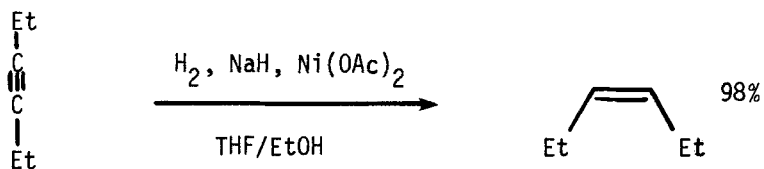
JCS Chem Comm, 702 (1978)



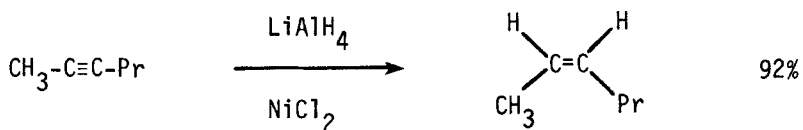
Tetr Lett, 4481 (1977)

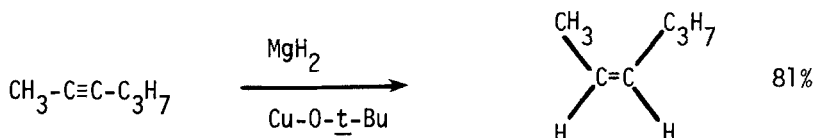
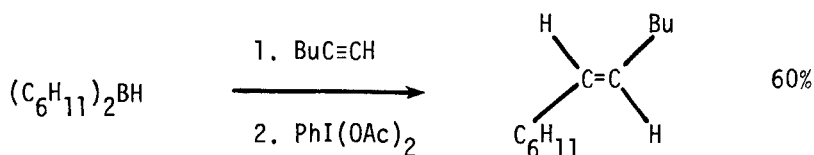


Tetr Lett, 3145 (1979)

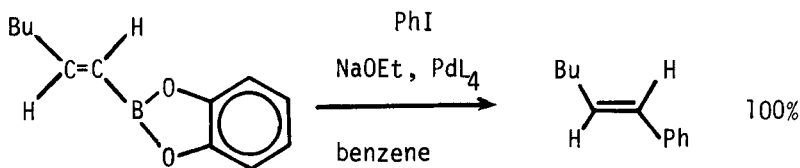
JOC 43, 4686 (1978)

Tetr Lett, 3955 (1977)

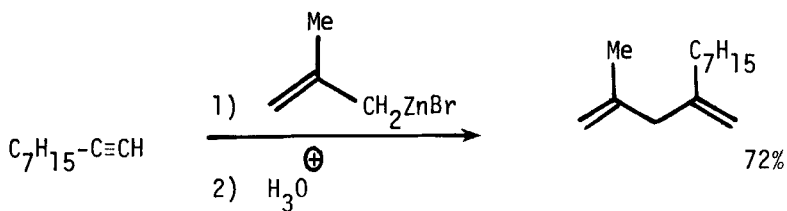
JOC 43, 2567 (1978)

JOC 43, 757 (1978)

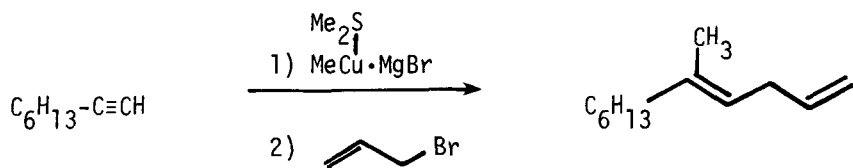
Chem Lett, 665 (1978)



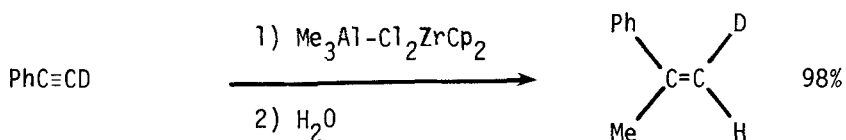
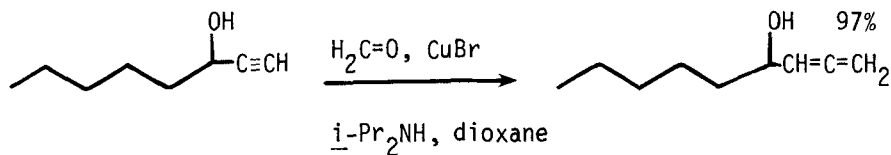
JCS Chem Comm, 866 (1979)



BSC France, 1173 (1976)



Tetr Lett, 1363 (1978)

JACS 100, 2252 (1978)

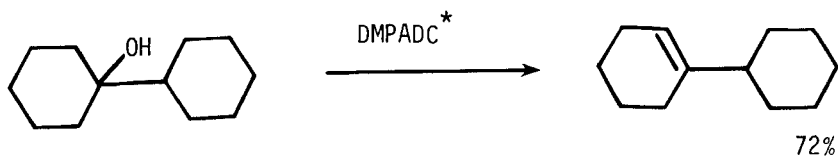
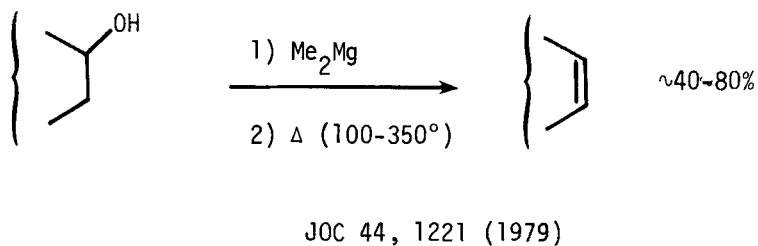
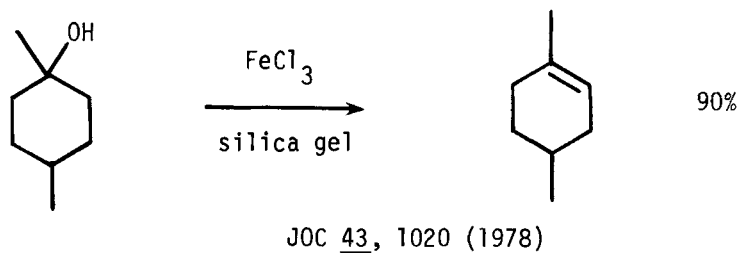
JCS Chem Comm, 859 (1979)

Review: "The Selective Hydrogenation of Triple Bonds with Organometallic Transition Metal Compounds"

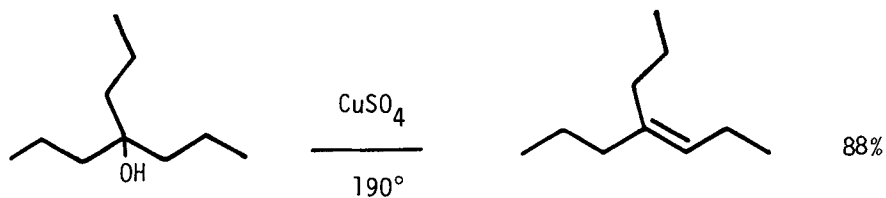
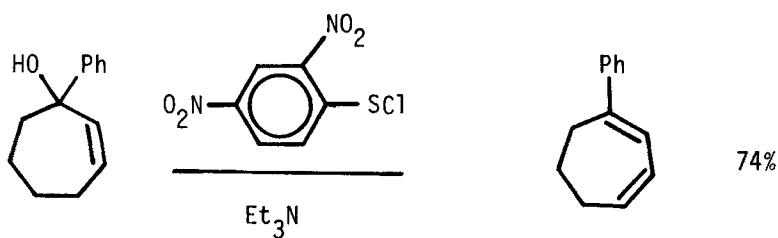
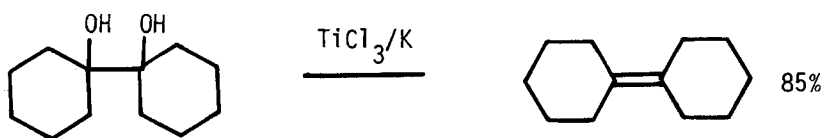
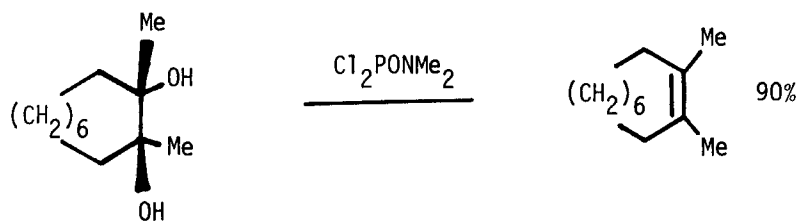
Pure and Appl Chem 50, 941 (1978)

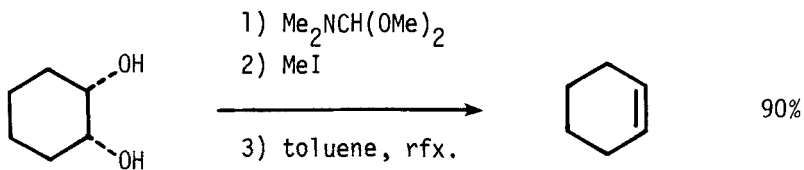
Section 197 Olefins from Carboxylic Acids and Acid Halides

No additional examples

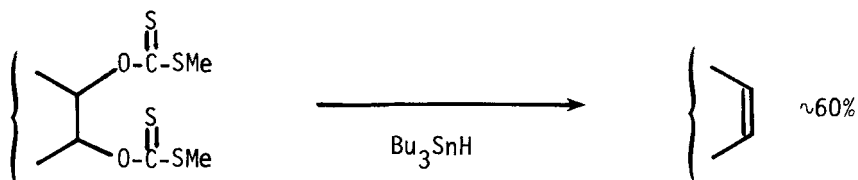
Section 198 Olefins from Alcohols* N, N - Dimethylphosphoramidic dichloride

Chem Lett, 923 (1978)

Acta Chem Scand (B) 31, 721 (1977)JACS 100, 5981 (1978)JOC 43, 3255 (1978)JOC 42, 1311 (1977)



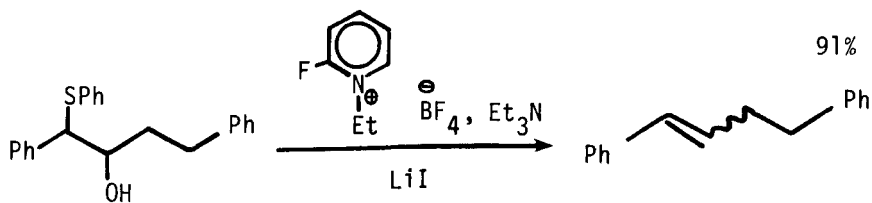
Tetr Lett, 737 (1978)



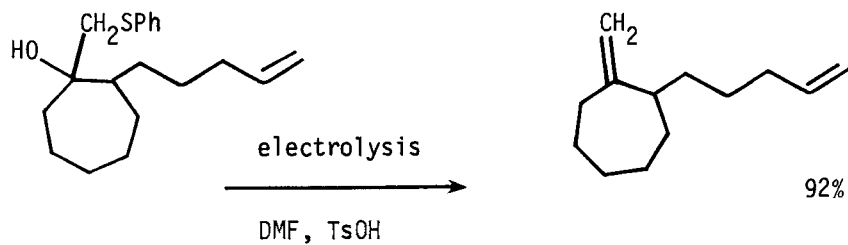
Examples using carbohydrates

JCS Chem Comm, 866 (1977)

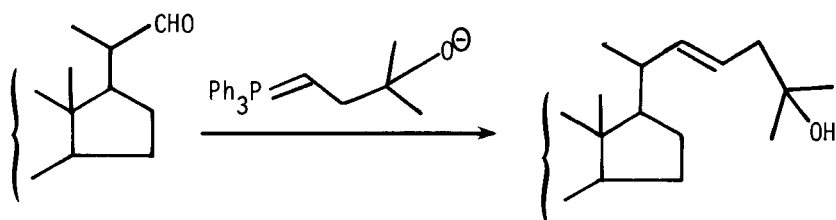
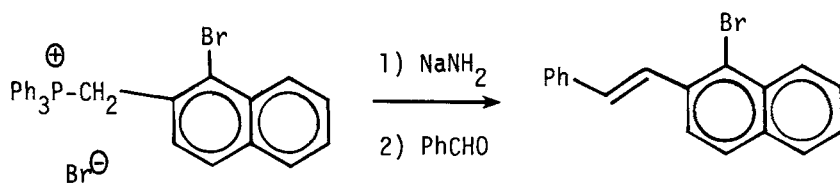
JCS Perkin I, 2378 (1979)

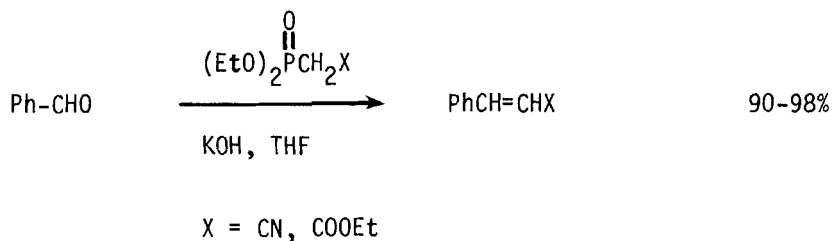


Chem Lett, 413 (1978)

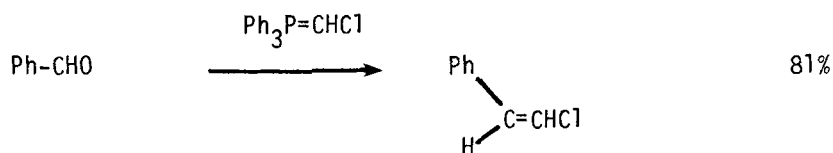


Tetr Lett, 2807 (1978)

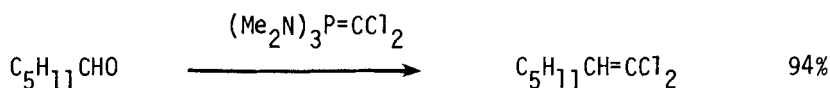
Section 199 Olefins from AldehydesJOC 43, 790 (1978)Indian J Chem 15B, 290 (1977)



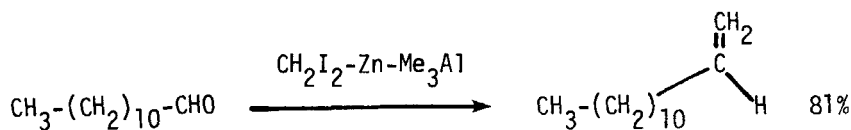
Synthesis, 884 (1979)



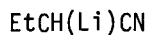
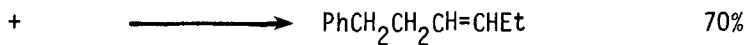
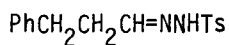
JCS Chem Comm, 446 (1978)



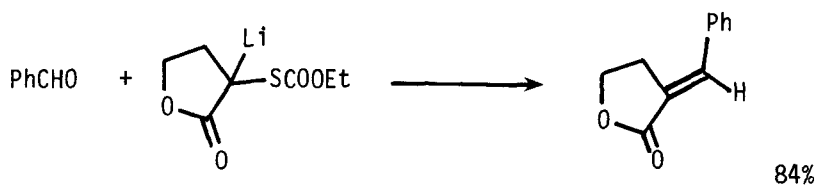
Tetr Lett, 1239 (1977)



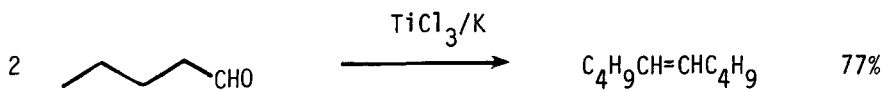
Tetr Lett, 2417 (1978)



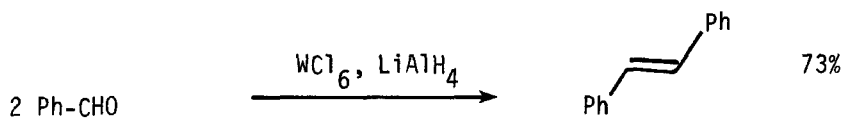
JACS 101, 249 (1979)



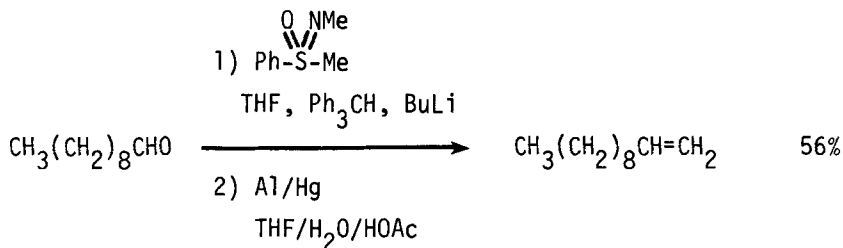
Chem Lett, 197 (1978)



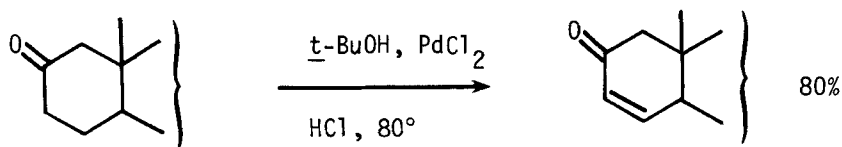
JOC 43, 3255 (1978)



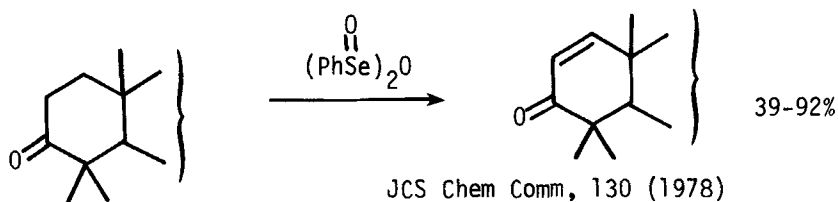
JOC 43, 2477 (1978)

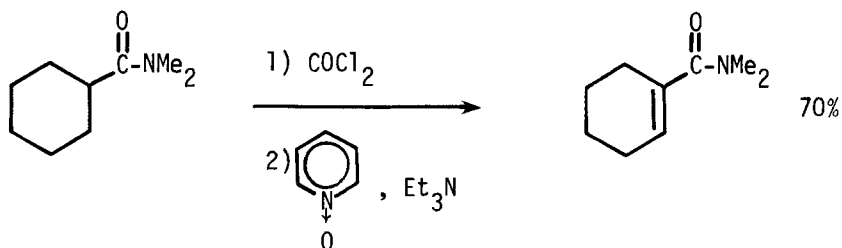
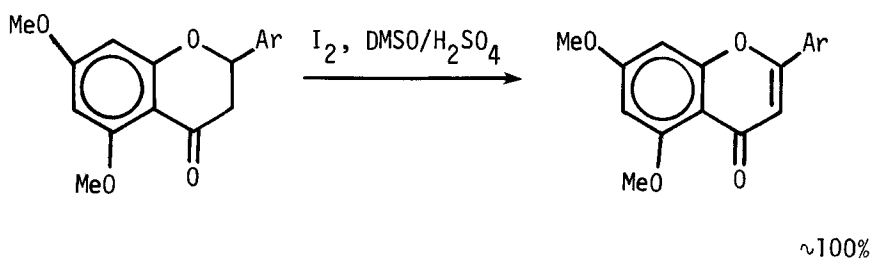
JACS 101, 3602 (1979)Section 200 Olefins from Alkyls, Methylene and Aryls

This section contains dehydrogenations to form olefins and unsaturated ketones, esters, and amides. It also includes the reduction of aromatic rings to olefins. Hydrogenation of aryls to alkanes and dehydrogenations to form aryls are included in Section 74 (Alkyls, Methylene, and Aryls from Olefins).

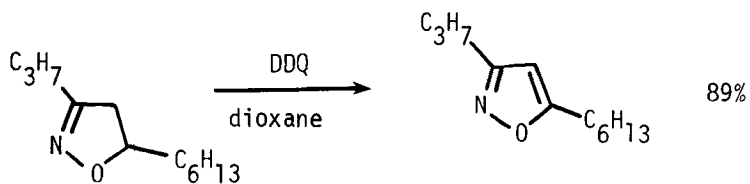


Synthesis, 773 (1977)

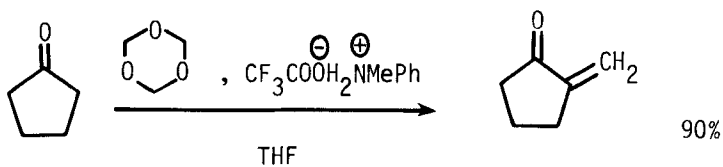


JACS 101, 4381 (1979)

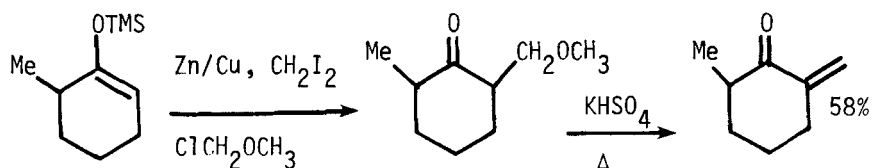
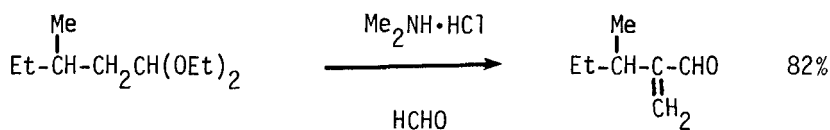
Chem & Ind, 315 (1979)



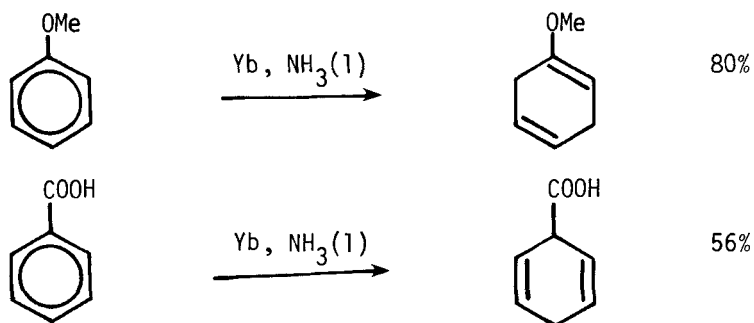
J Chem Res (S), 311 (1979)

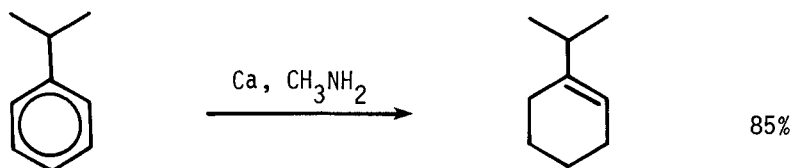


Tetr Lett, 2111 (1978)

JACS 101, 984 (1979)

J Chem Research (S), 262 (1978)

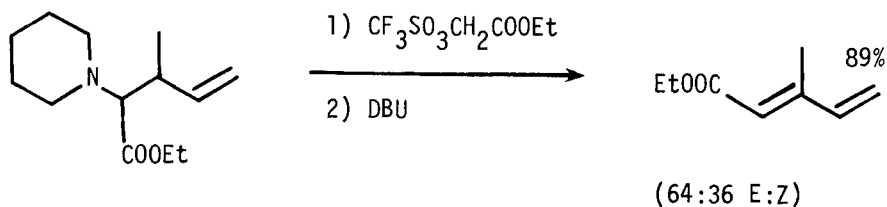
JOC 43, 4555 (1978)

JOC 44, 3737 (1979)

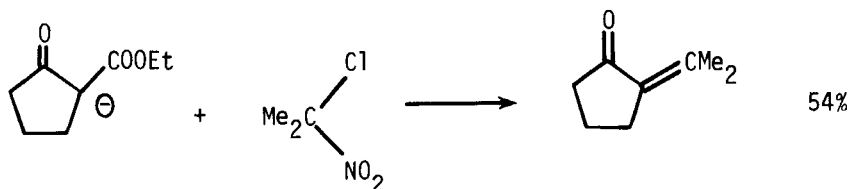
Related methods: Alkyls and Aryls from Alkyls and Aryls (Section 65) Alkyls and Aryls from Olefins (Section 74)

Section 201 Olefins from Amides

No additional examples

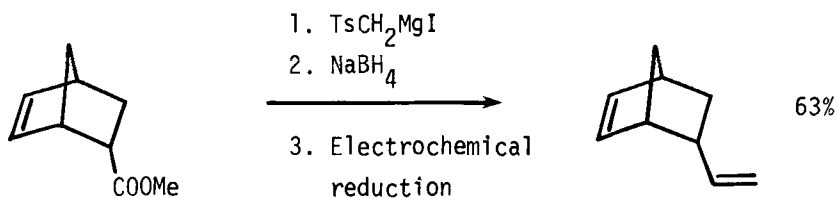
Section 202 Olefins from Amines

Tetr Lett 1241 (1977)

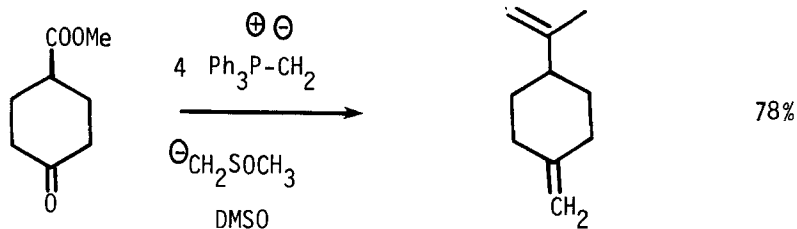
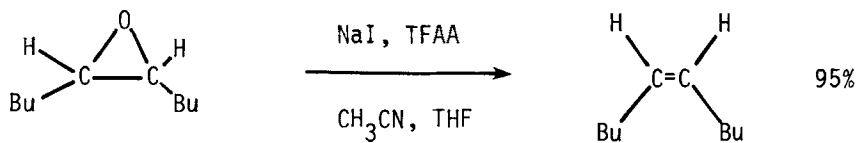
Section 203 Olefins from Esters

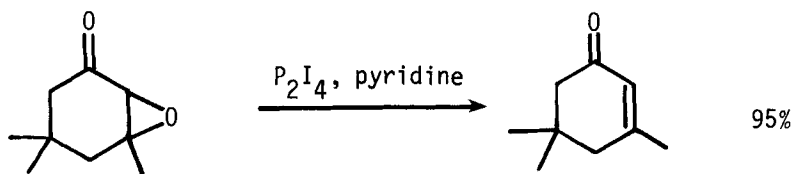
Also works with lactones.

Chem Lett, 189 (1977)

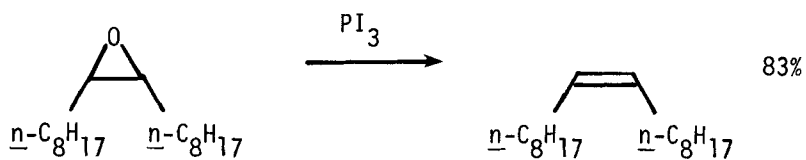


Chem Lett, 69 (1978)

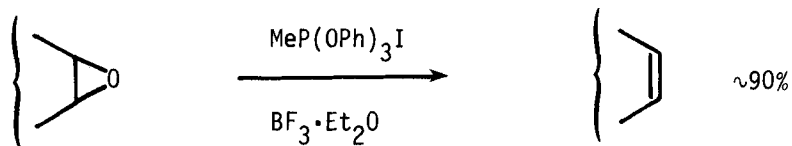
JOC 44, 3157 (1979)Section 204 Olefins from EpoxidesJOC 43, 1841 (1978)



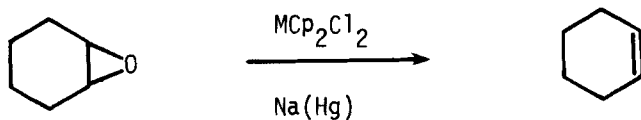
Synthesis, 905 (1978)



Nouveau J Chem 3, 705 (1979)

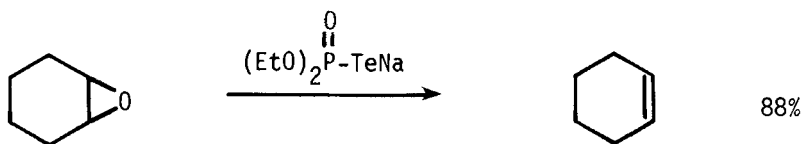


JOC 43, 2076 (1978)

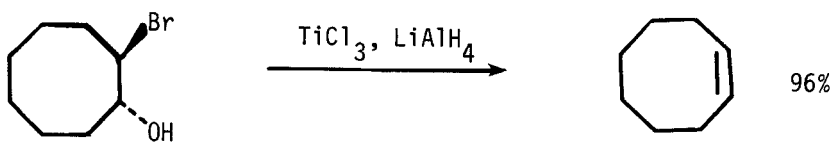
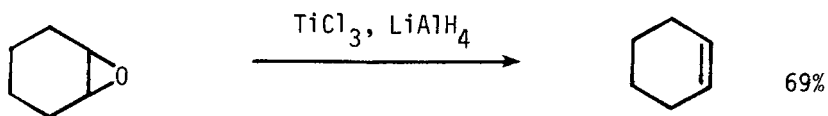
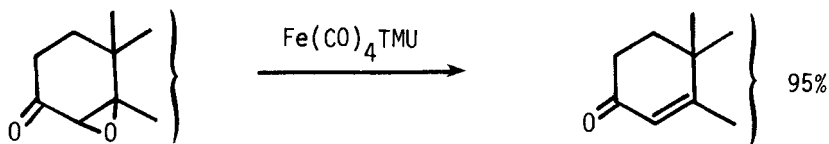


M = No, W, Ti, Zr

JCS Chem Comm, 99 (1978)

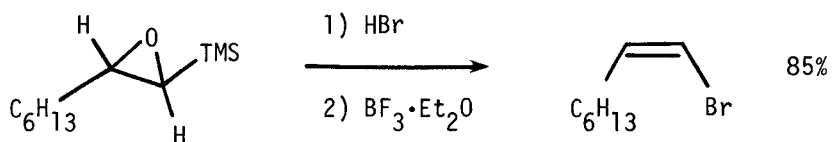
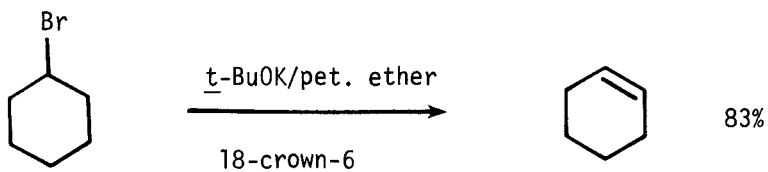


JCS Chem Comm, 658 (1977)

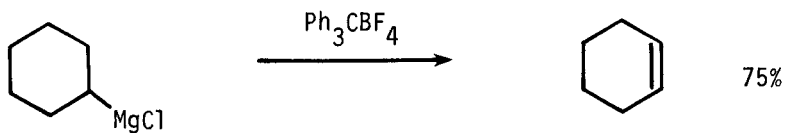
JOC 43, 3249 (1978)

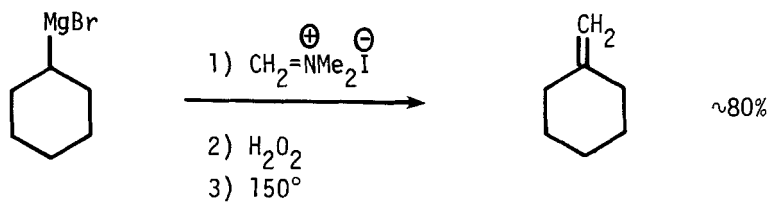
TMU = tetramethylurea

Tetr Lett, 4155 (1977)

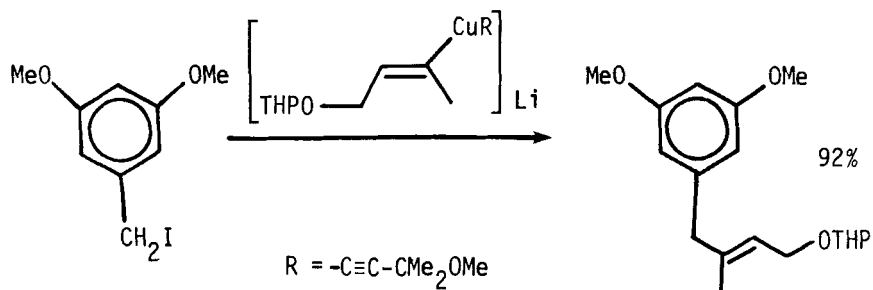
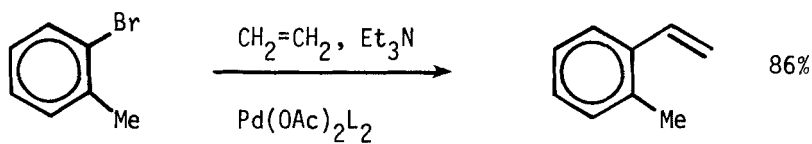
JACS 99, 1993 (1977)Section 205 Olefins from Halides and Sulfonates

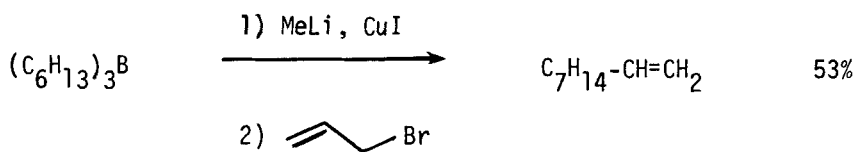
Synthesis, 372 (1979)

Angew Int Ed 16, 44 (1977)

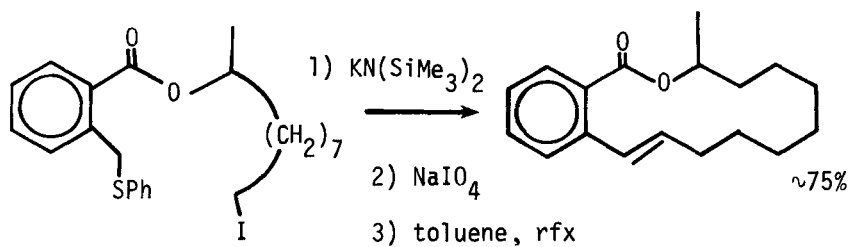
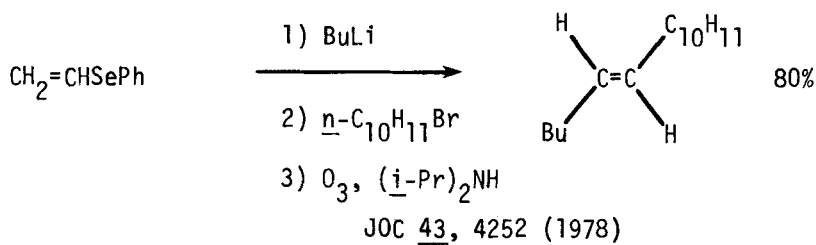


Tetr Lett, 1299 (1977)

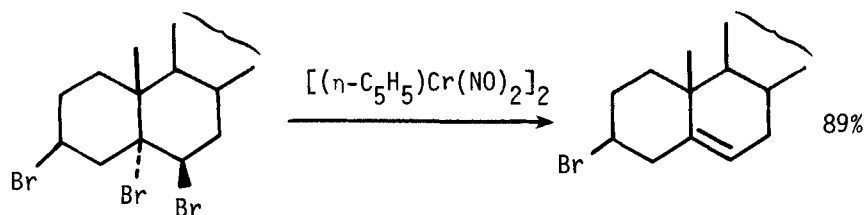
JOC 43, 3418 (1978)JOC 43, 2454 (1978)



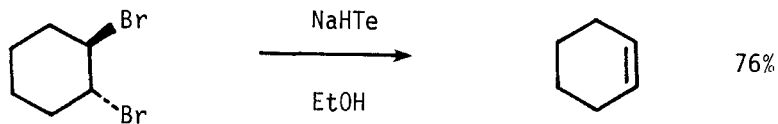
BCS Japan 50, 2199 (1977)



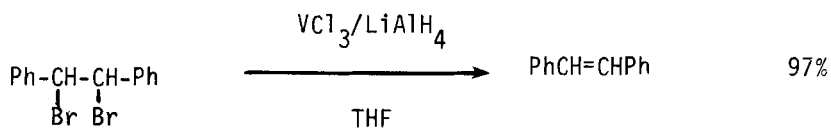
Tetr Lett, 4917 (1978)



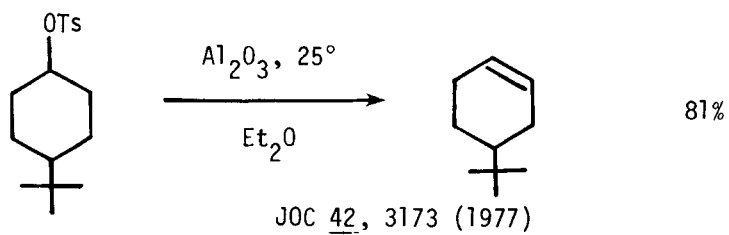
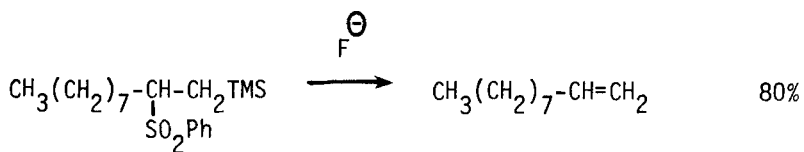
Tetr Lett, 323 (1978)



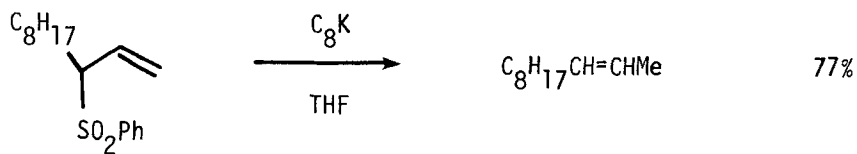
Synthesis, 311 (1978)



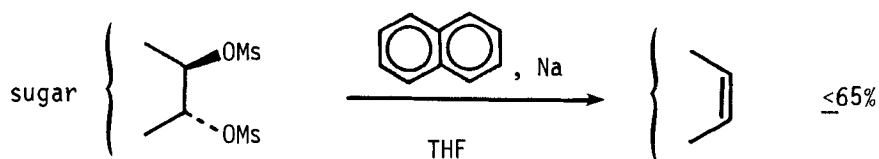
Synthesis, 170 (1977)

JOC 42, 3173 (1977)

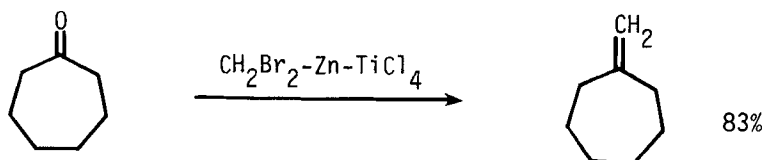
Tetr Lett, 2649 (1979)



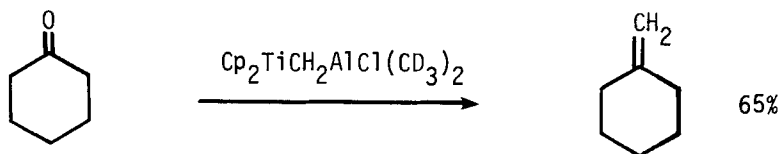
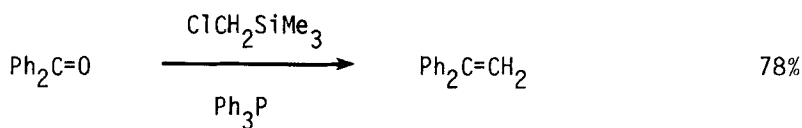
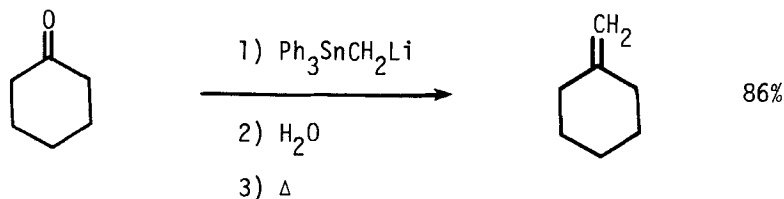
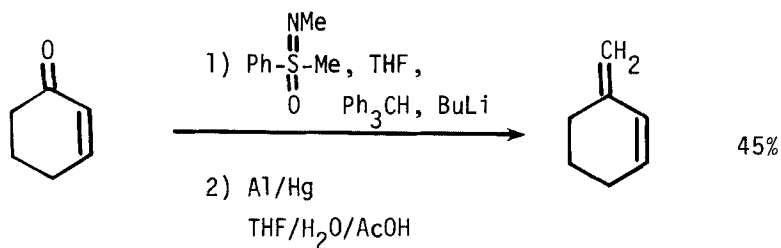
JCS Perkin I, 123 (1977)

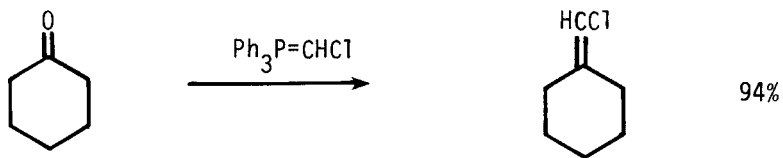
Chem Pharm 25, 2134 (1977)Section 206 Olefins from Hydrides

No additional examples

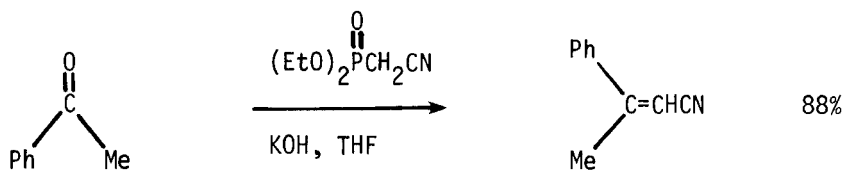
Section 207 Olefins from Ketones

Tetr Lett, 2417 (1978)

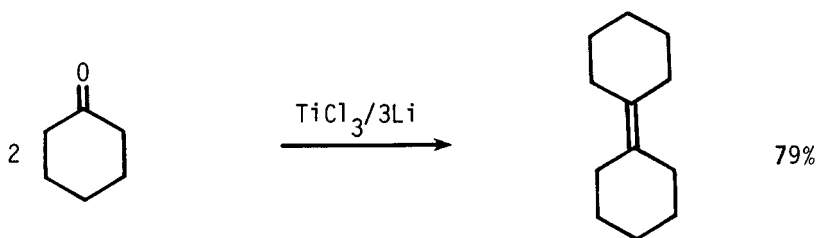
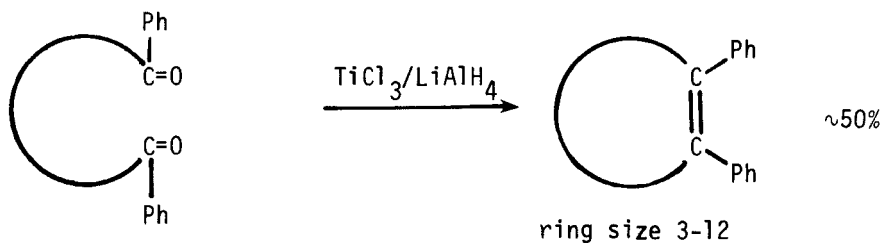
JACS 100, 3611 (1978)JOC 44, 413 (1979)Angew Int Ed 16, 862 (1977)JACS 101, 3602 (1979)

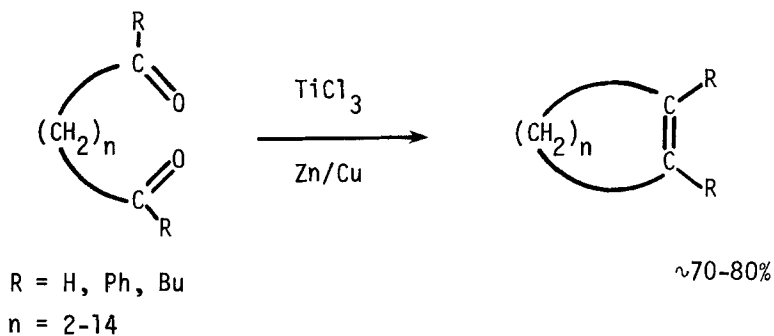
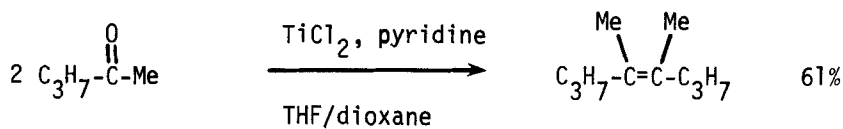


JCS Chem Comm, 446 (1978)

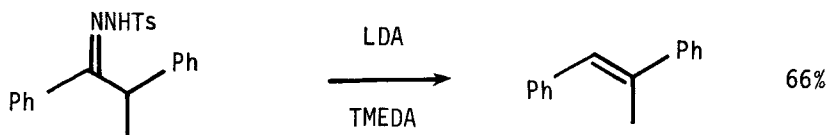
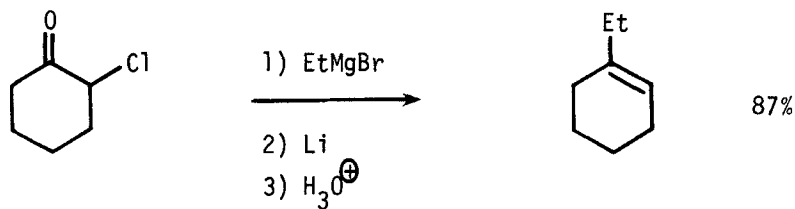


Synthesis, 884 (1979)

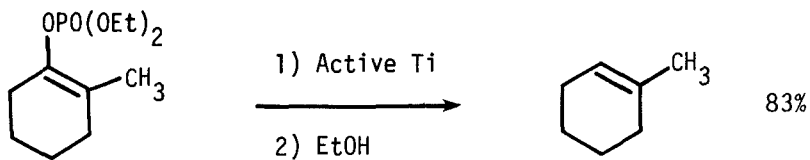
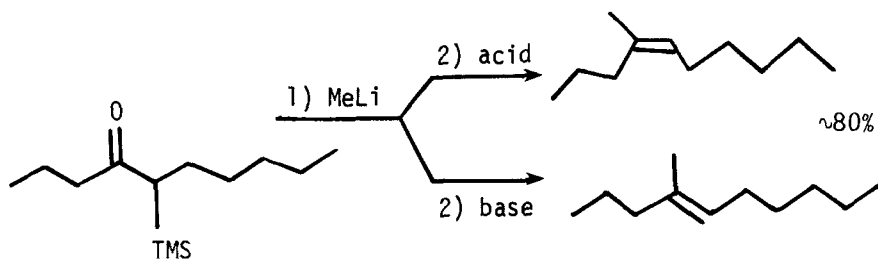
JOC 43, 3255 (1978)JOC 43, 3609 (1978)

JOC 42, 2655 (1977)

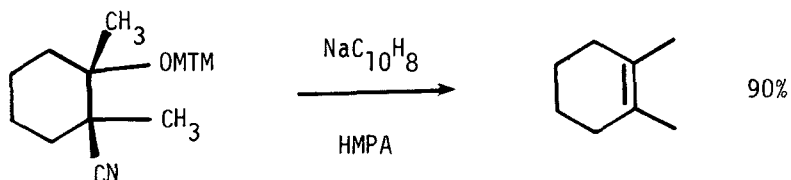
Synthesis, 553 (1977)

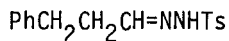
JOC 43, 1404 (1978)

JCS Chem Comm, 847 (1978)

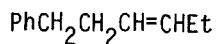
JOC 43, 2715 (1978)Bull Chem Soc Japan 52, 1760 (1979)

Related methods: Olefins from Aldehydes, Section 199.

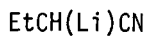
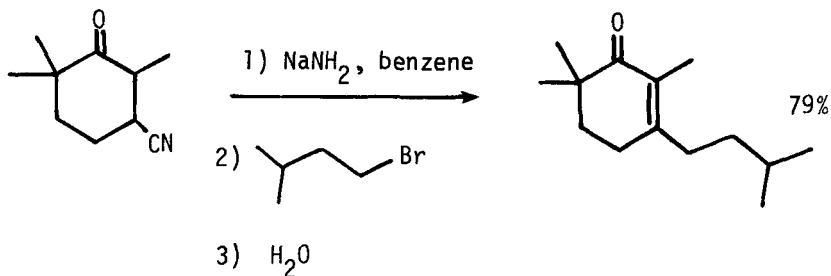
Section 208 Olefins from NitrilesJOC 44, 2994 (1979)



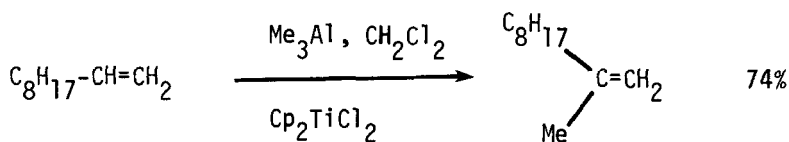
+

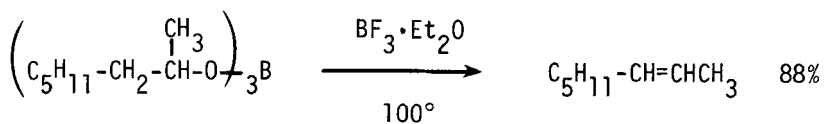
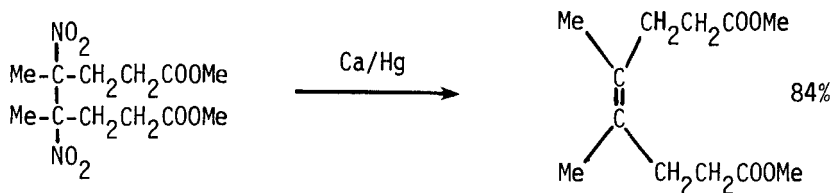
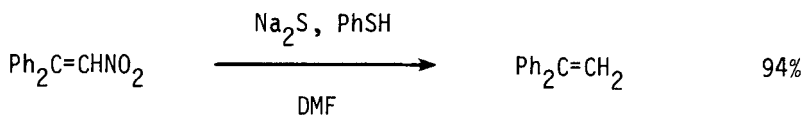
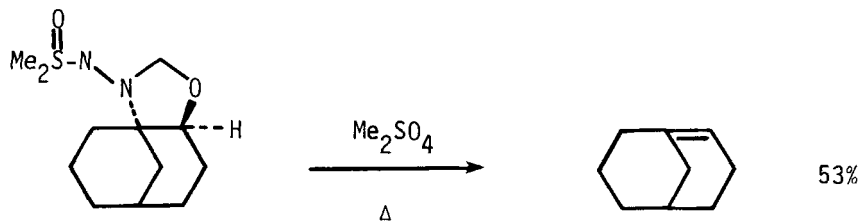


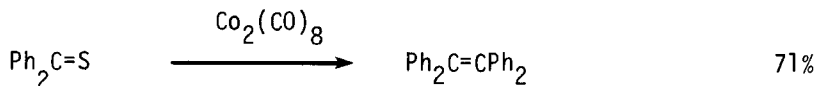
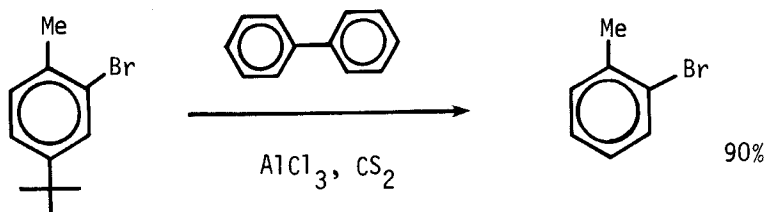
70%

JACS 101, 249 (1979)

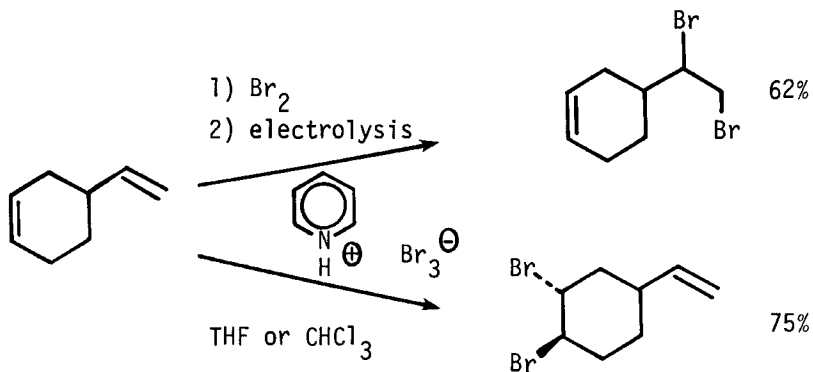
Tetr Lett, 3187 (1977)

Section 209 Olefins from OlefinsJOC 44, 3603 (1979)

Section 210 Olefins from Miscellaneous Compounds

JOC 42, 3522 (1977)Section 210A Protection of OlefinsUse of the t-butyl group to block positions on an aromatic ring.

JCS Perkin I, 176 (1979)



Synthesis, 964 and 966 (1979)

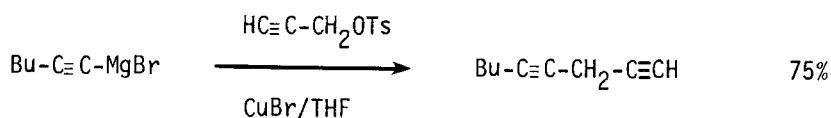
Review: "Selective Synthesis of Aromatic Compounds Using
Positional Protective Groups"

Synthesis, 921 (1979)

CHAPTER 15

PREPARATION OF DIFUNCTIONAL COMPOUNDS

Section 300 Acetylene - Acetylene

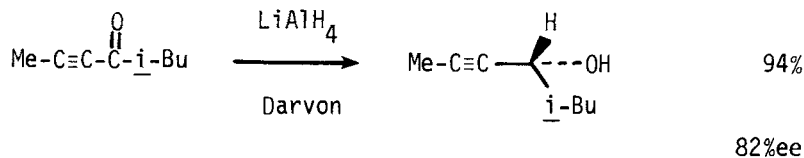


Synthesis, 292 (1979)

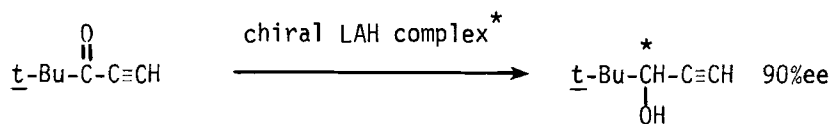
Section 301 Acetylene - Carboxylic Acid

No additional examples

Section 302 Acetylene - Alcohol

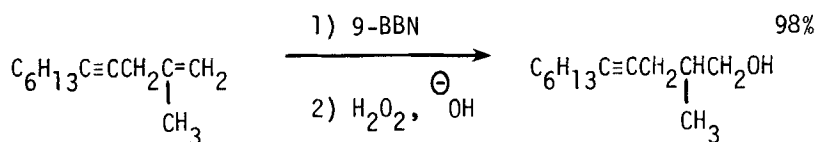


JACS 99, 8339 (1977)
340

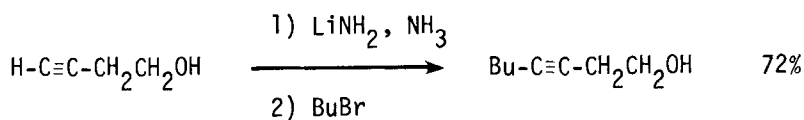


*[LiAlH₄, N-methylephedrine, 3,5-dimethylphenol]

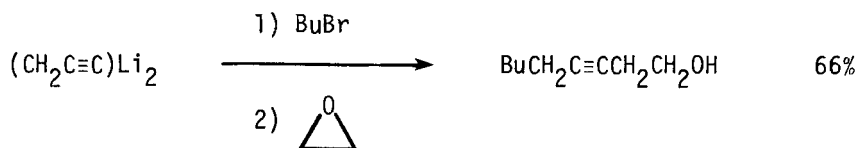
Tetr Lett, 2683 (1979)



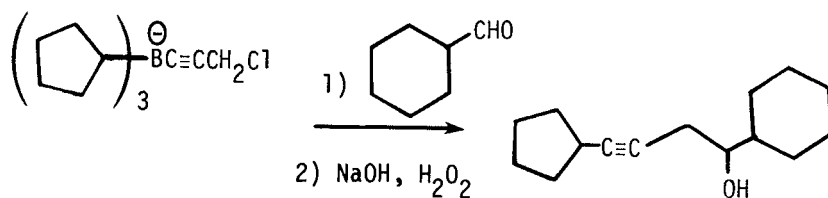
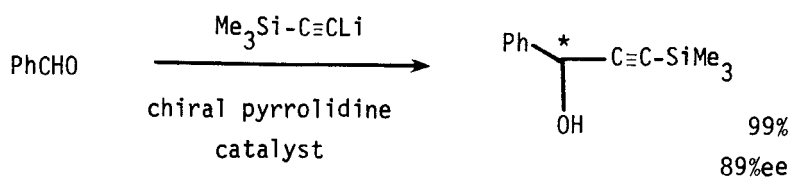
JOC 44, 2328 (1979)



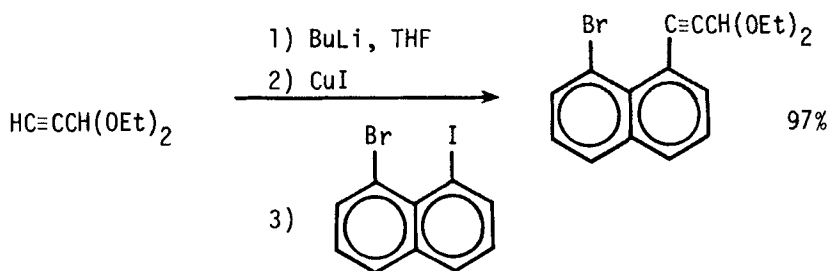
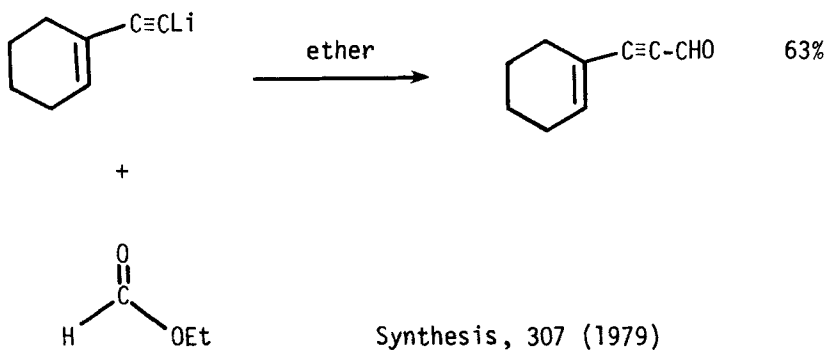
Helv Chim Acta 61, 2275 (1978)



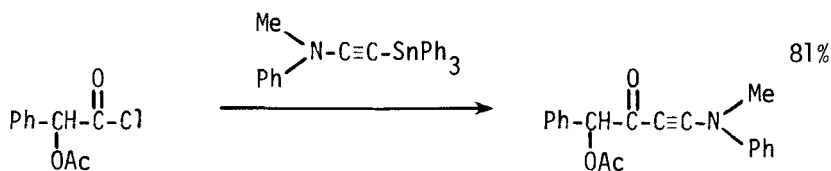
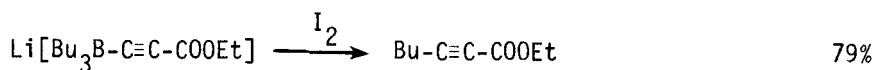
JCS Perkin I, 1218 (1979)

JACS 100, 5561 (1978)

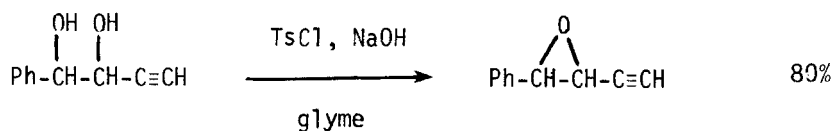
Chem Lett, 447 (1979)

Section 303 Acetylene - AldehydeJOC 42, 2626 (1977)Section 304 Acetylene - Amide

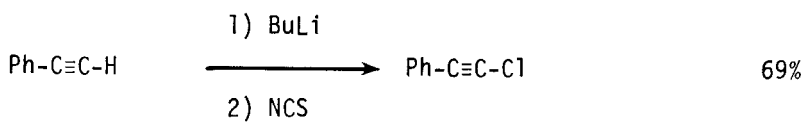
No additional examples

Section 305 Acetylene - AmineAngew Int Ed 18, 405 (1979)Section 306 Acetylene - Ester

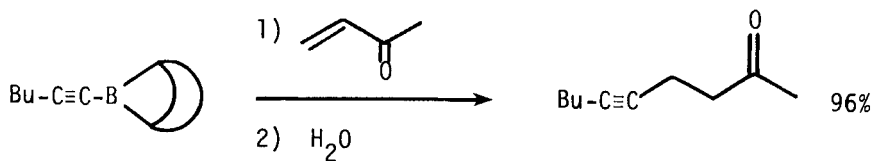
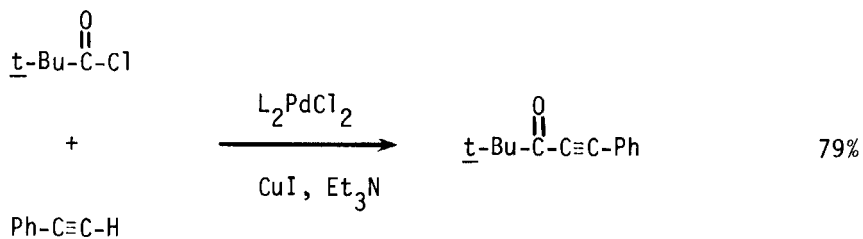
Synthesis, 679 (1977)

Section 307 Acetylene - Ether, Epoxide

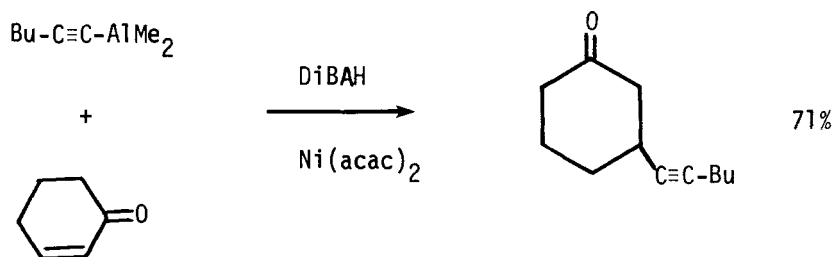
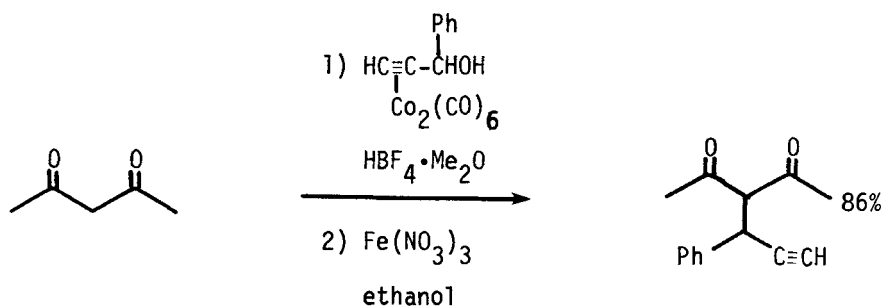
Synthesis, 706 (1977)

Section 308 Acetylene - Halide

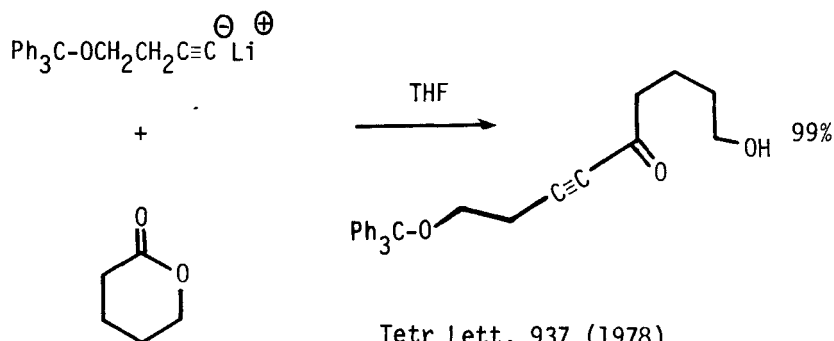
Synthesis, 296 (1979)

Section 309 Acetylene - KetoneJACS 99, 954 (1977)

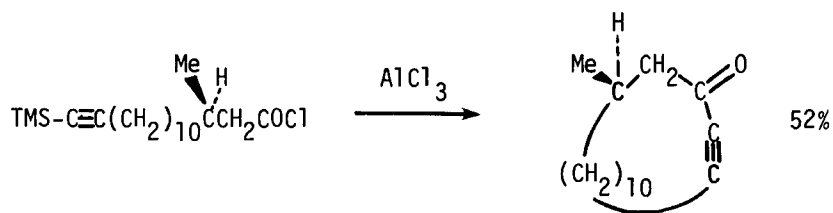
Synthesis, 777 (1977)

JACS 100, 2244(1978)

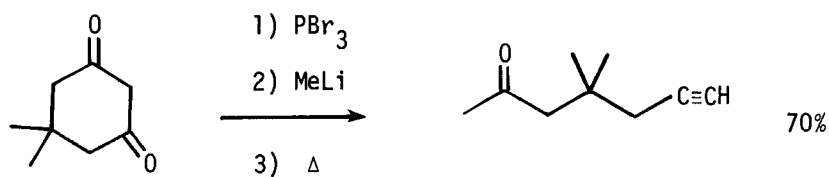
Tetr Lett, 4349 (1978)

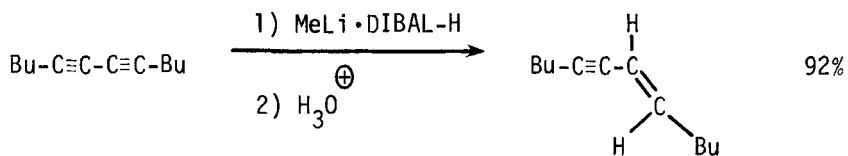


Tetr Lett, 937 (1978)

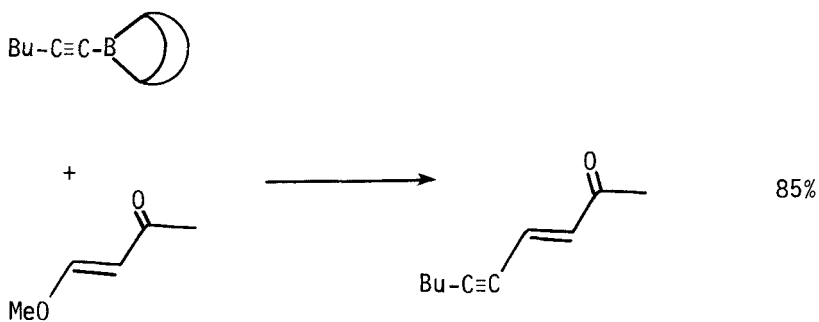


Tetr Lett, 2301 (1978)

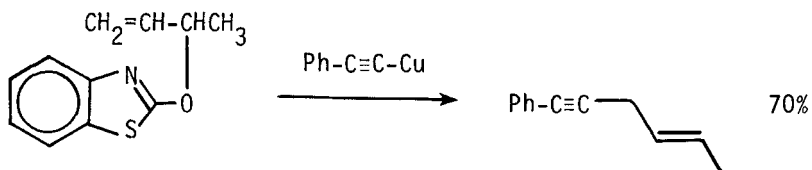
JOC 42, 2380 (1977)Section 310 Acetylene - NitrileReview: " α -Cyanoacetylenes"Russ Chem Rev 46, 374 (1977)

Section 311 Acetylene - Olefin

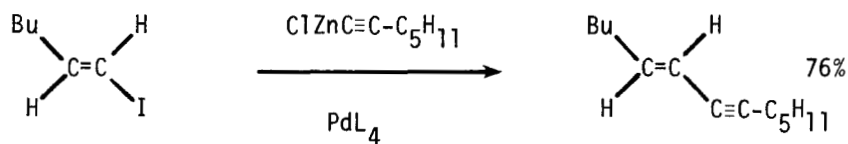
Synthesis, 52 (1977)



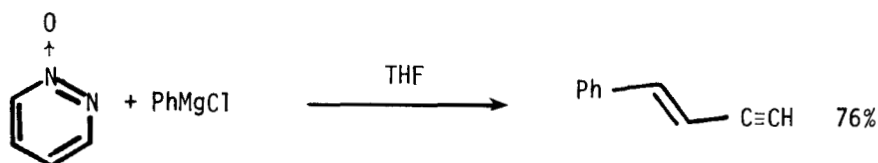
JOC 42, 3106 (1977)



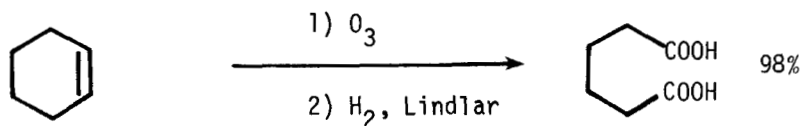
Tetr Lett, 3873 (1979)

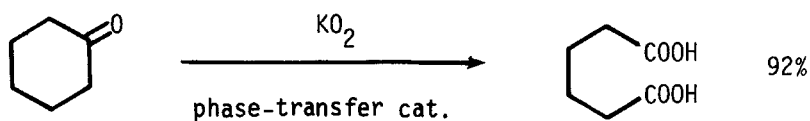


JCS Chem Comm, 683 (1977)

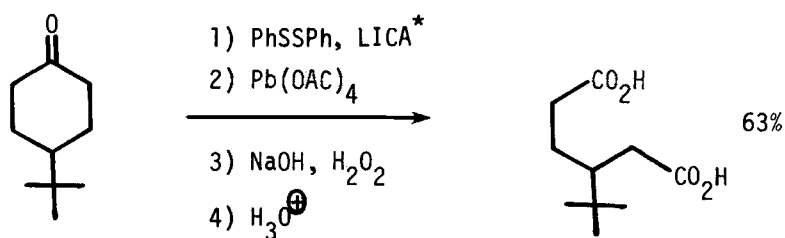


JCS Perkin I, 2136 (1979)

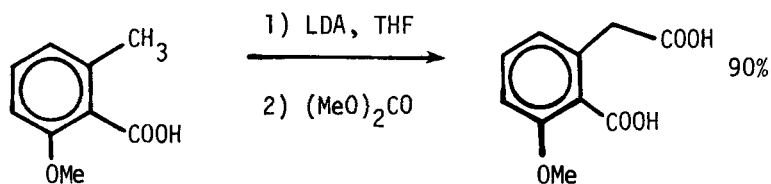
Section 312 Carboxylic Acid - Carboxylic AcidBull Akad USSR Chem 25, 1790 (1977)JOC (USSR) 14, 48 (1978)



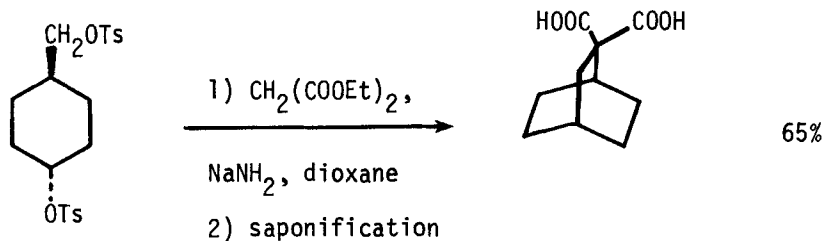
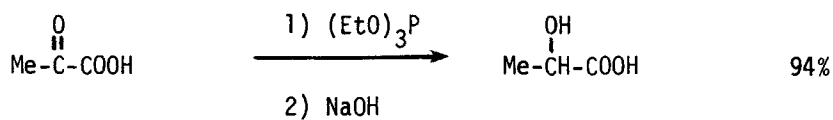
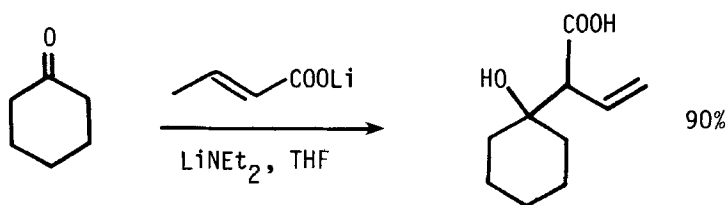
Tetr Lett, 3689 (1978)



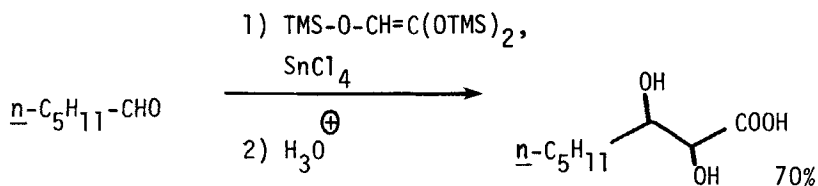
*LICA = lithium isopropylcyclohexylamide

JACS 99, 4405 (1977)

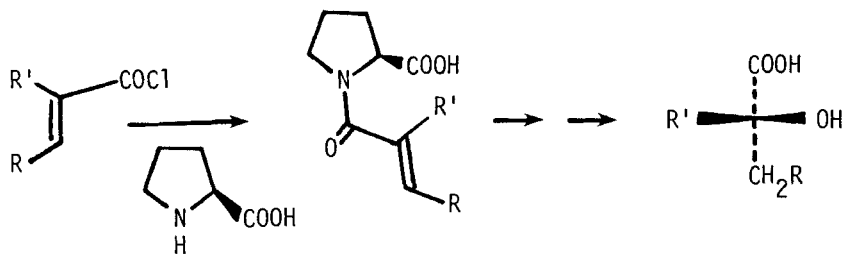
Synthesis, 245 (1977)

Synth Comm 7, 1 (1977)Section 313 Carboxylic Acid - AlcoholJOC 42, 2797 (1977)

JCS Perkin I, 1651 (1978)



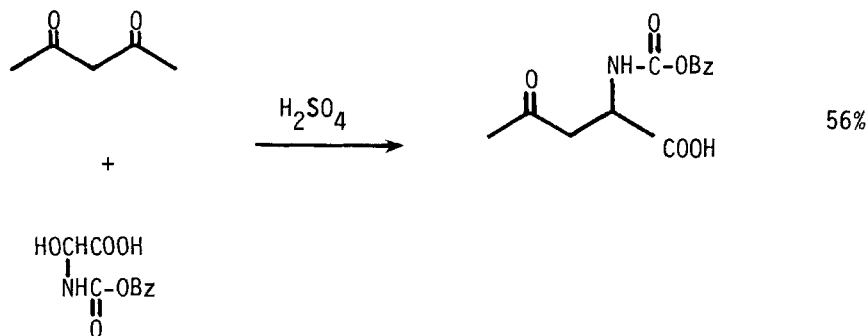
Synthesis, 27 (1979)

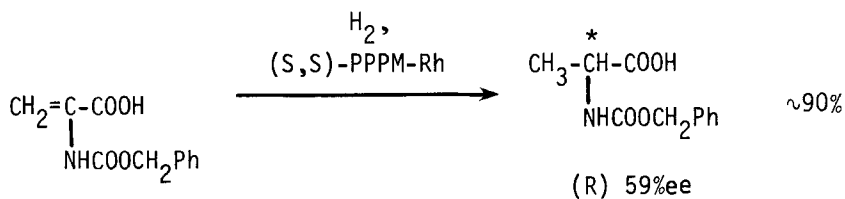


Tetr Lett, 1005 (1977)

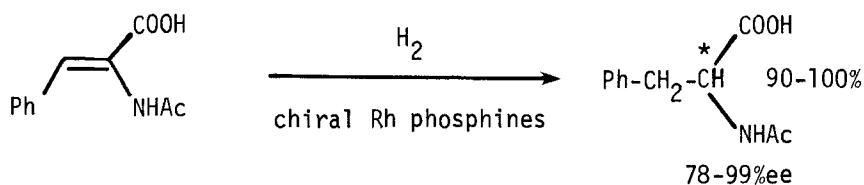
Section 314 Carboxylic Acid - Aldehyde

No additional examples

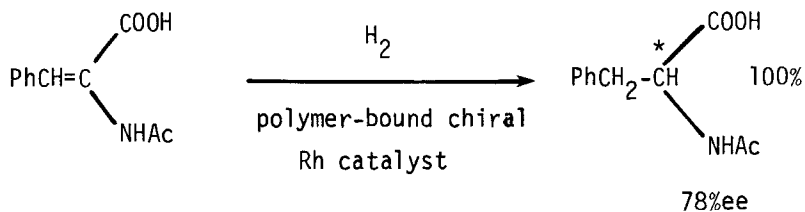
Section 315 Carboxylic Acid - AmideTetrahedron 34, 467 (1978)



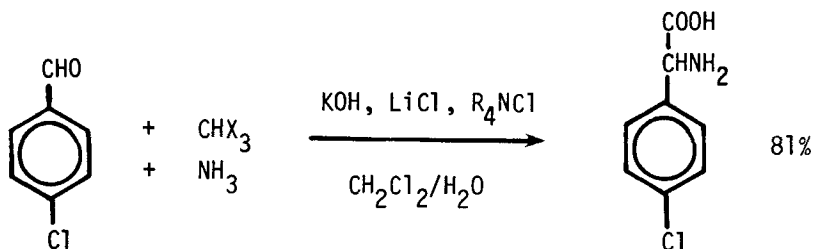
Chem Lett, 777 (1977)

JACS 99, 6262 (1977)

Tetr Lett, 3497 (1977)

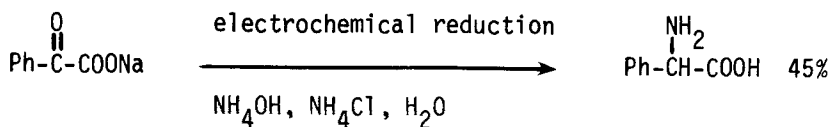
JACS 100, 5491 (1978)J Organometal 150, C14 (1978)JACS 100, 264 and 268 (1978)

Related Methods: Section 316 (Acid-Amine)
Section 344 (Amide-Ester)
Section 351 (Amine-Ester)

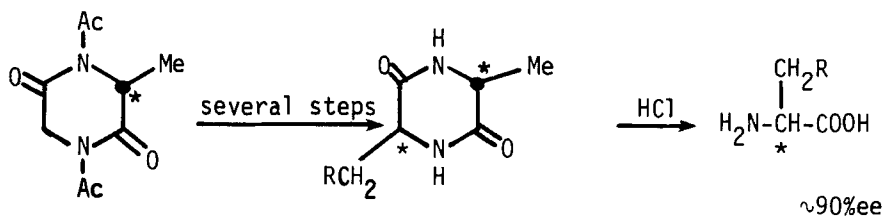
Section 316 Carboxylic Acid - Amine
$$X = \text{Cl}, \text{Br}$$

Synthesis, 852 (1977)

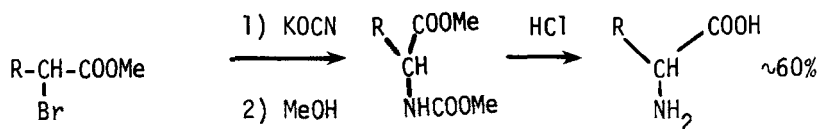
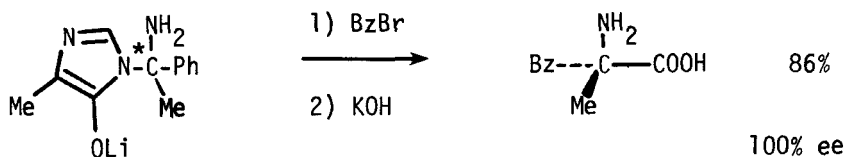
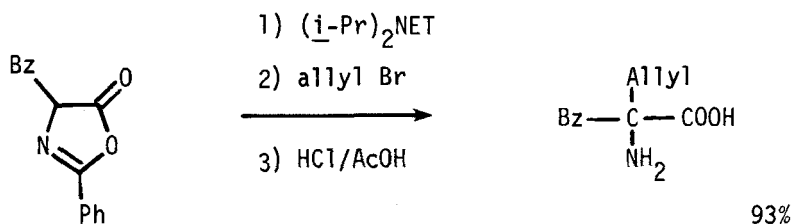
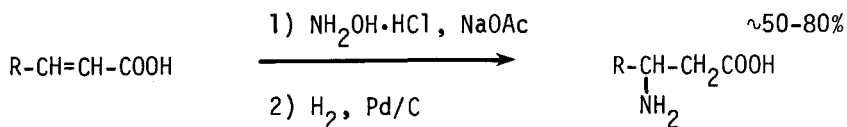
Synthesis, 26 (1979)

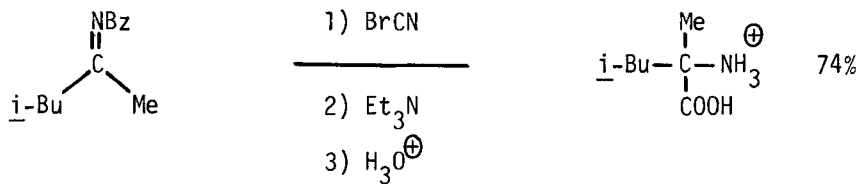
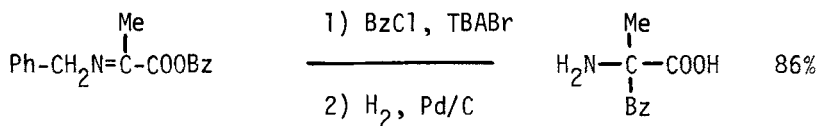


Aust J Chem 31, 73 (1978)

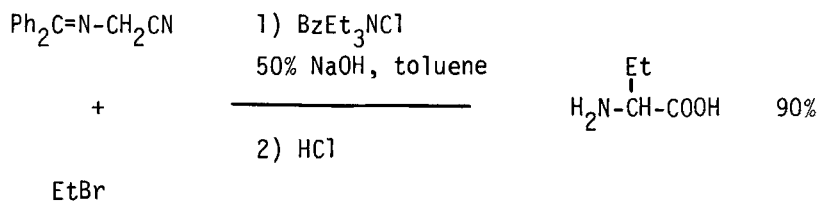


Tetr Lett, 4483 (1979)

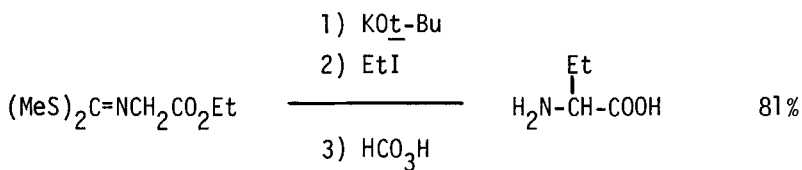
Angew Int Ed 18, 474 (1979)Angew Int Ed 17, 117 (1978)Chem Ber 112, 128 (1979)Synth Comm 9, 705 (1979)

Indian J Chem 18B, 273 (1979)

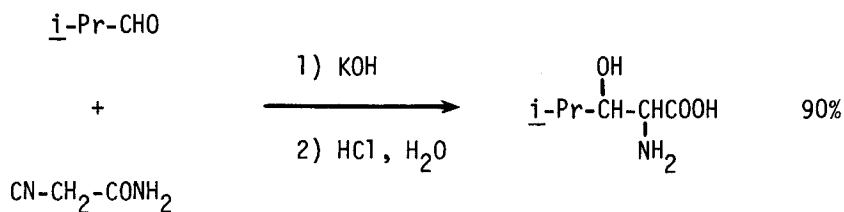
JCS Perkin I, 1730 (1977)



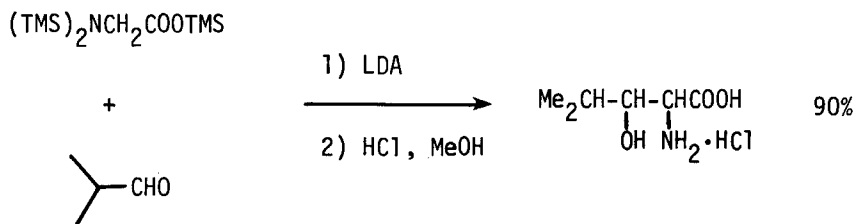
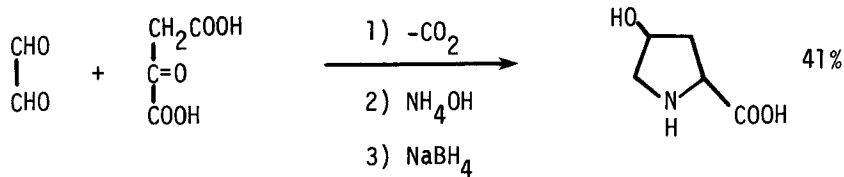
Tetr Lett, 4625 (1978)

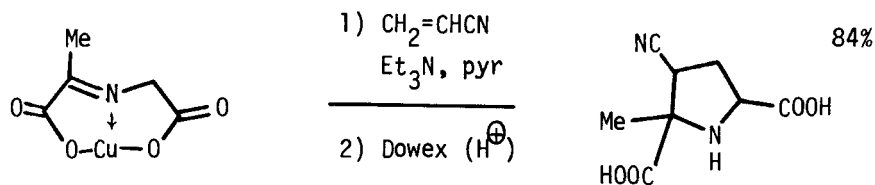


Liebigs Annalen, 2066 (1979)

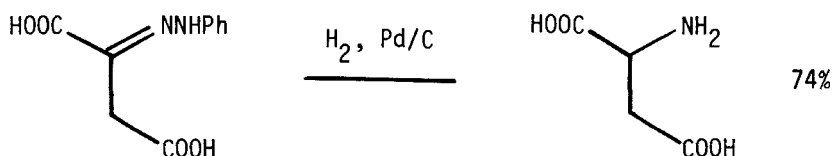


Synthesis, 216 (1979)

JOC 44, 3967 (1979)JOC 42, 3440 (1977)



Synthesis, 150 (1979)



Indian J Chem 15B, 573 (1977)

Several methods for synthesis of 6-substituted tryptophans are presented.

JOC 44, 3741 and 3748 (1979)

Asymmetric synthesis of amino acids by catalytic reduction of azalactones by substituted α -acylaminoacrylic acids.

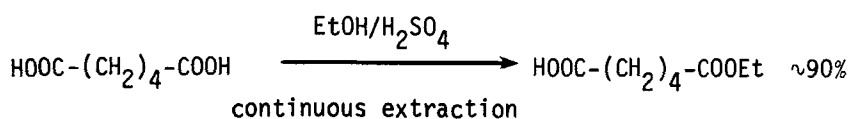
Bull Acad USSR Chem 27, 957, 1186, and 1190 (1978)

Review: "Production and Utilization of Amino Acids"

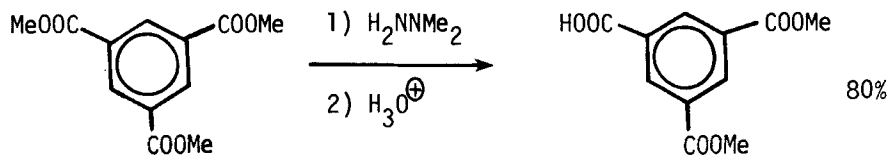
Angew Int Ed 17, 176 (1978)

Related methods: Section 315 (Acid-Amide)
Section 344 (Amide-Ester)
Section 351 (Amine-Ester)

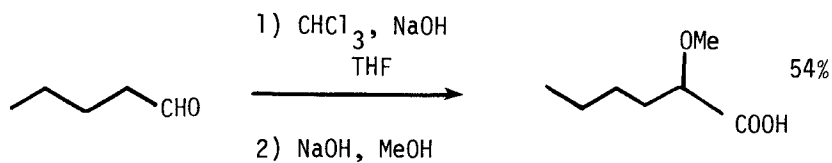
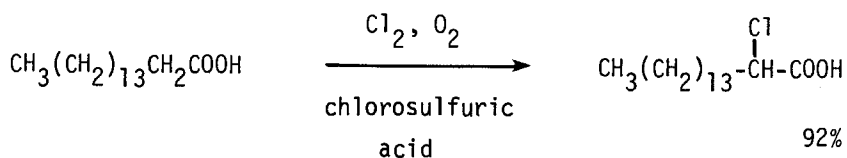
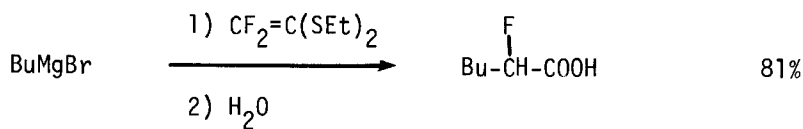
Section 317 Carboxylic Acid - Ester



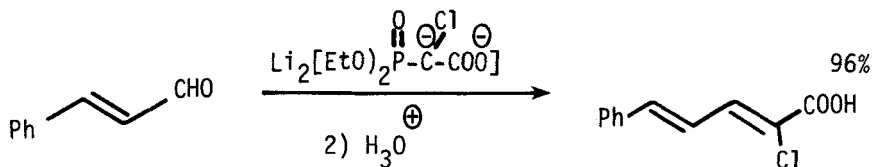
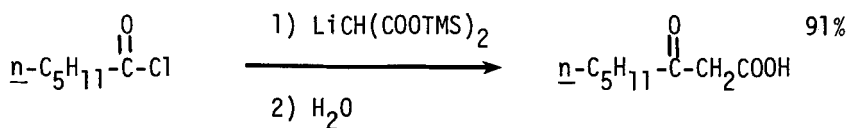
Synth Comm 9, 669 (1979)



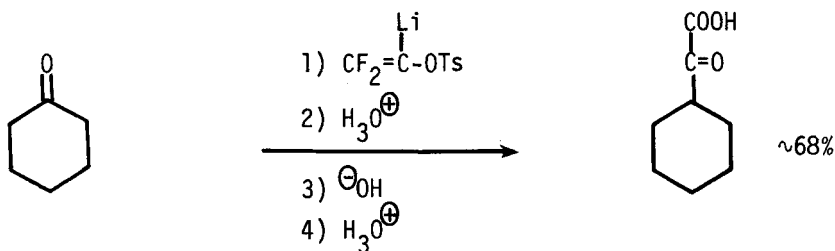
Tetr Lett, 1403 (1978)

Section 318 Carboxylic Acid - Ether, EpoxideJOC 43, 2702 (1978)Section 319 Carboxylic Acid - HalideBull Chem Soc Japan 52, 255 (1979)

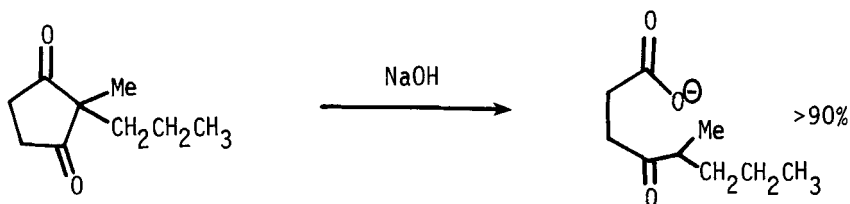
Chem Lett, 175 (1979)

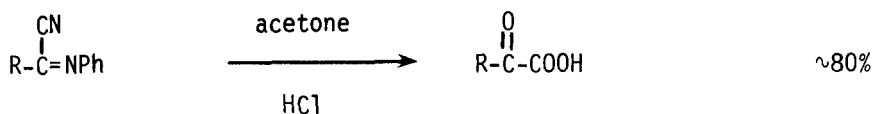
Synth Comm 8, 19 (1978)Section 320 Carboxylic Acid - Ketone

Synthesis, 787 (1979)



Tetr Lett, 4809 (1978)

J Prakt Chem 319, 213 (1977)



R = Subst. Ph, styryl

Indian J Chem 17B, 169 (1979)

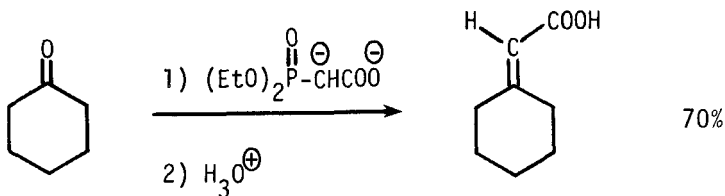
Also via: Ketoesters (Section 360)

Section 321 Carboxylic Acid - Nitrile

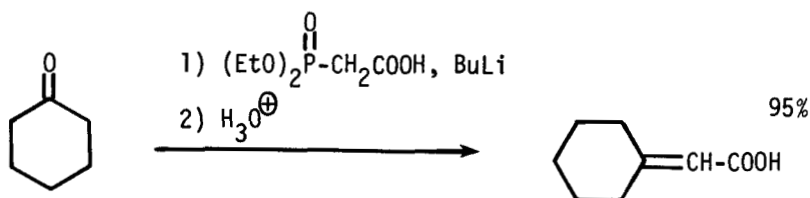
No additional examples

See also: Section 361 (Cyanoesters)

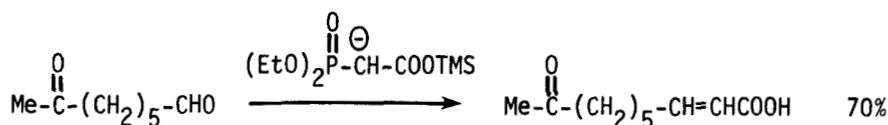
Section 322 Carboxylic Acid - Olefin



Synth Comm 8, 463 (1978)

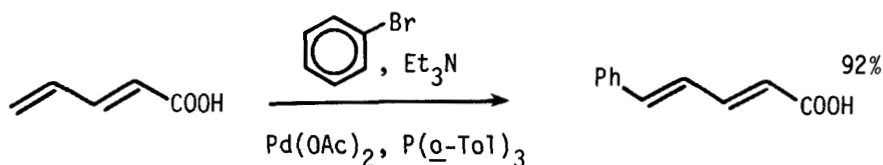


Synthesis, 133 (1978)

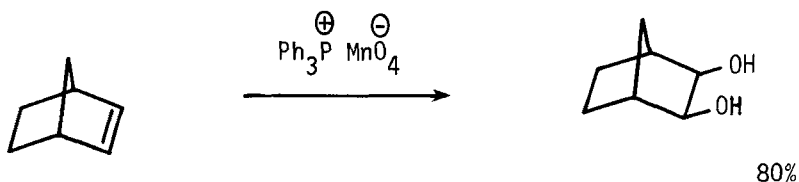
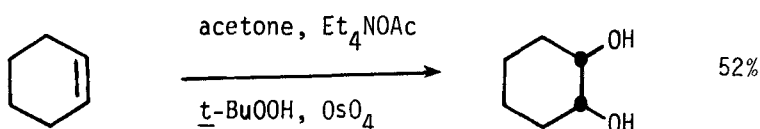
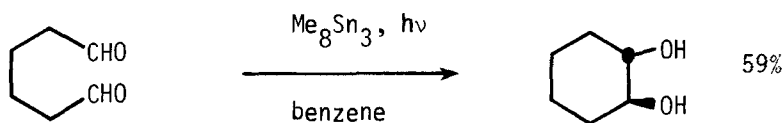


Also works with ketones.

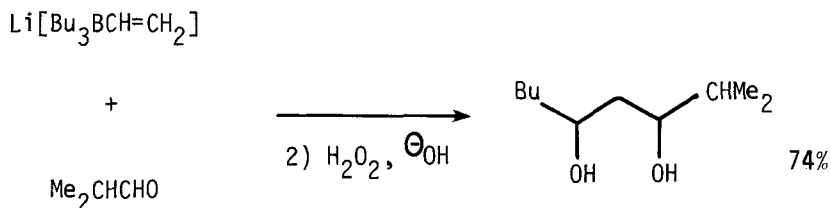
Synthesis, 131 (1978)

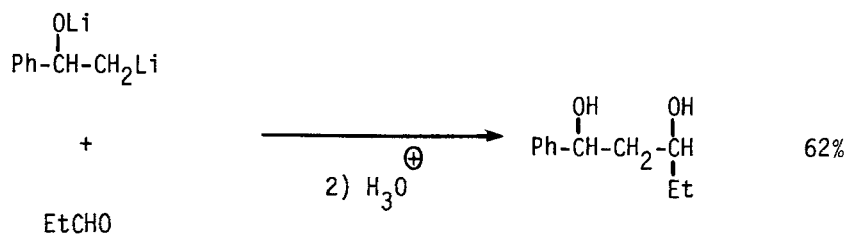
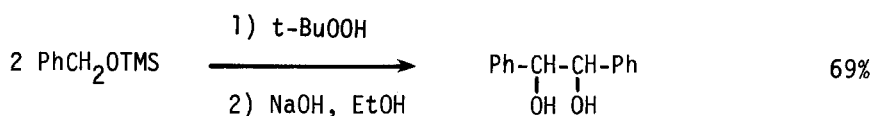
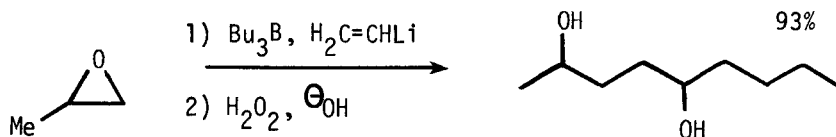
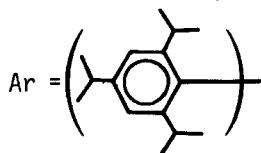
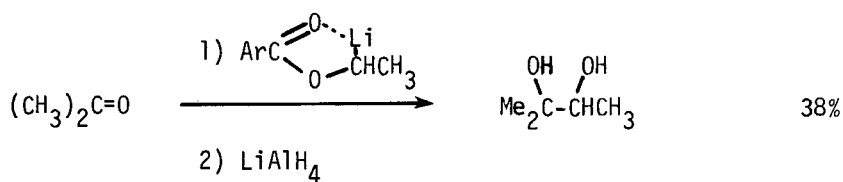
JOC 43, 5018 (1978)

Also via: Hydroxy acids (Section 313)
 Olefinic amides (Section 349)
 Olefinic esters (Section 362)
 Olefinic nitriles (Section 376)

Section 323 Alcohol - AlcoholTetrahedron 35, 1109 (1979)JOC 43, 2063 (1978)

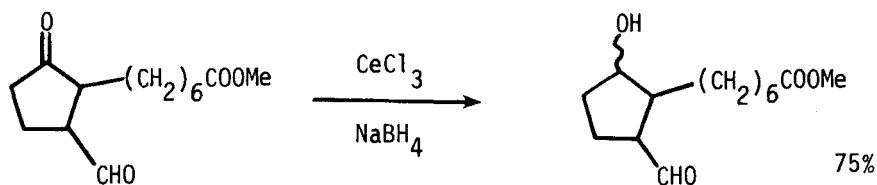
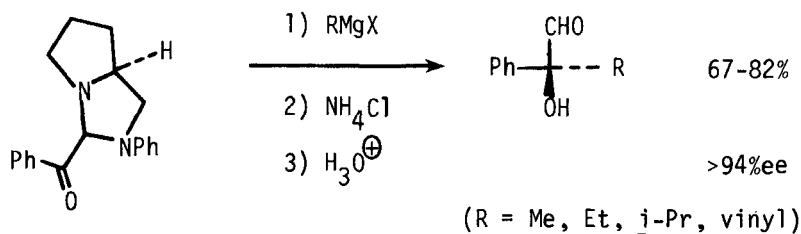
Tetr Lett, 2847 (1978)

Tetrahedron 33, 1949 (1977)

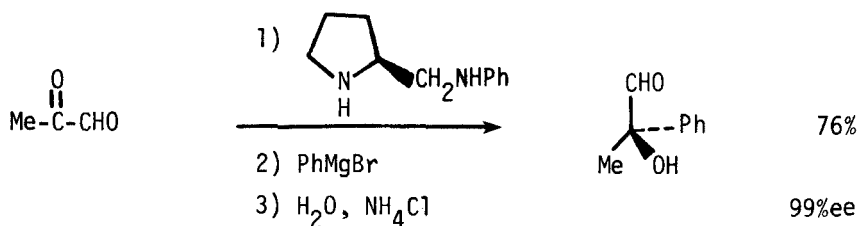
JOC 44, 4798 (1979)JOC 44, 295 (1979)Tetrahedron 33, 1945 (1977)JOC 43, 4255 (1978)

Also via: Hydroxyesters (Section 327)

Diesters (Section 357)

Section 324 Alcohol - AldehydeJACS 101, 5848 (1979)

Chem Lett, 1253 (1978)



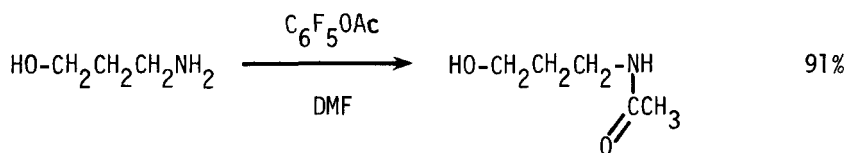
Chem Lett, 705 (1979)

Review: "Aldol Condensations"

Fortschritte der Chem Forsch 67, 1 (1976)

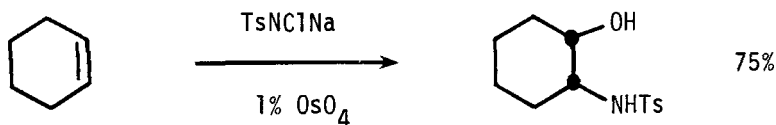
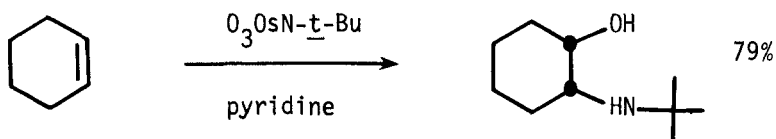
Related methods: Alcohol - Ketone (Section 330)

Section 325 Alcohol - Amide



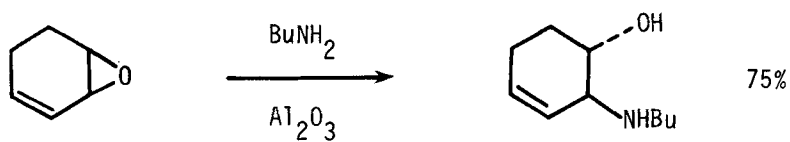
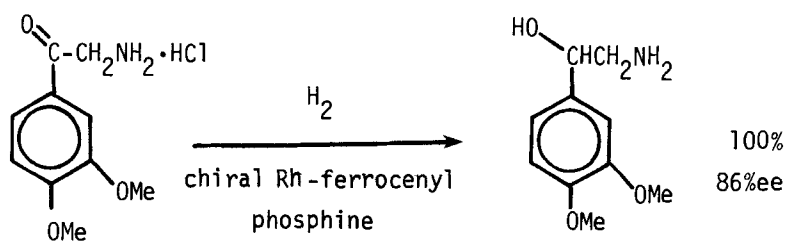
JOC 44, 654 (1979)

Section 326 Alcohol - Amine

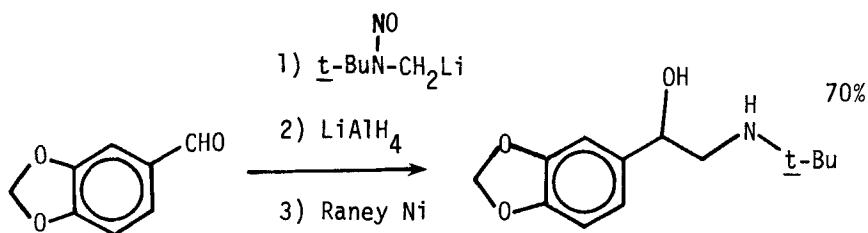


JOC 43, 2544 (1978)

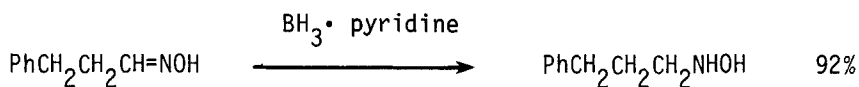
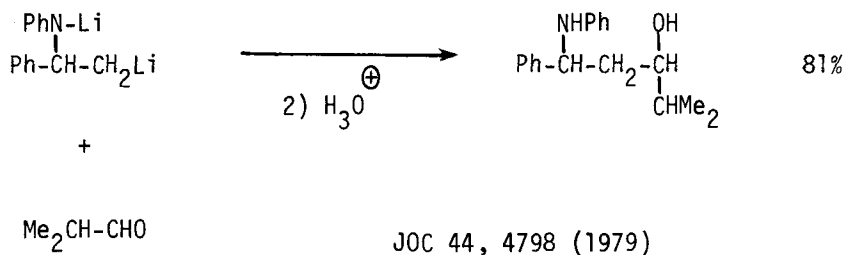
JOC 43, 2628 (1978)

JACS 99, 8208 and 8214 (1977)

Tetr Lett, 425 (1979)

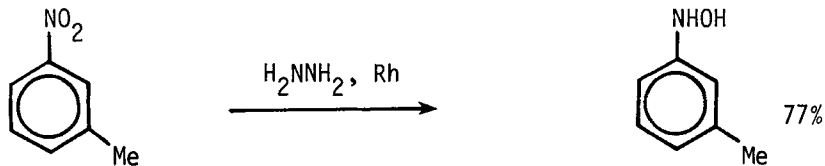


Synthesis, 423 (1979)

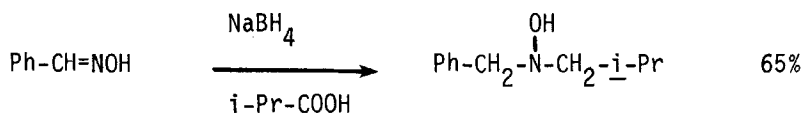


Also works with oximes of ketones.

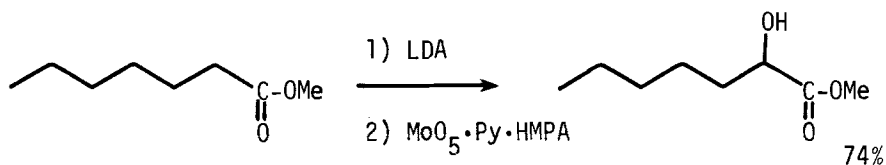
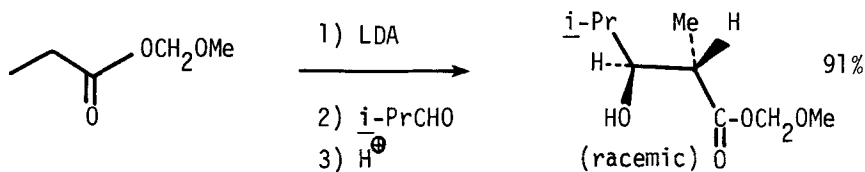
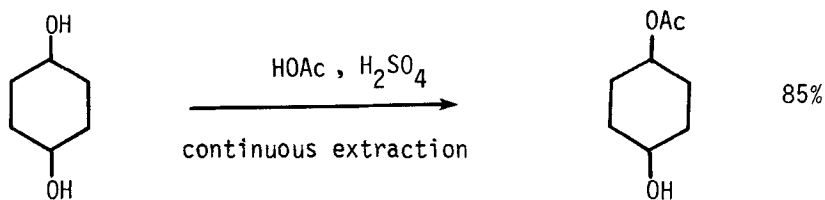
JCS Perkin I, 643 (1979)



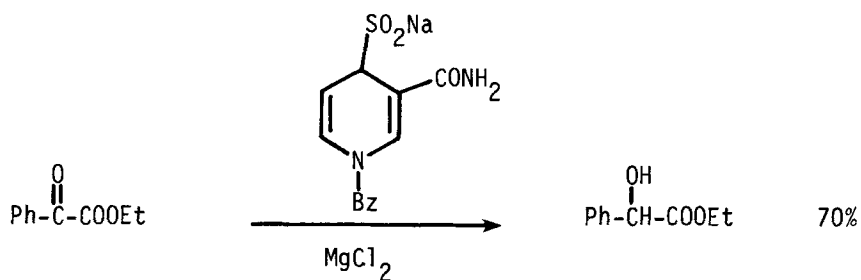
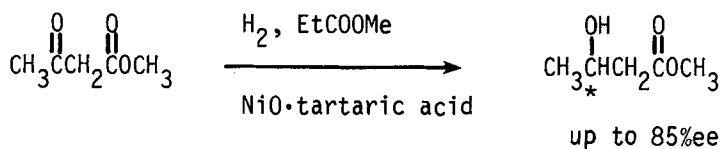
Tetrahedron 34, 213 (1978)



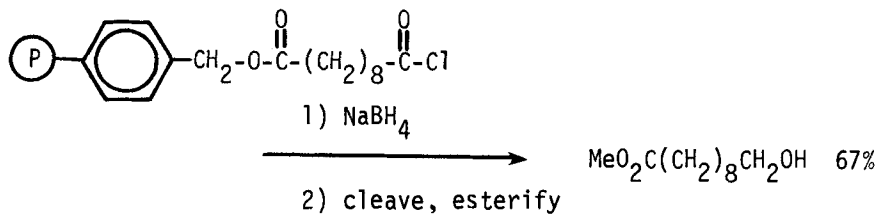
Synthesis, 856 (1977)

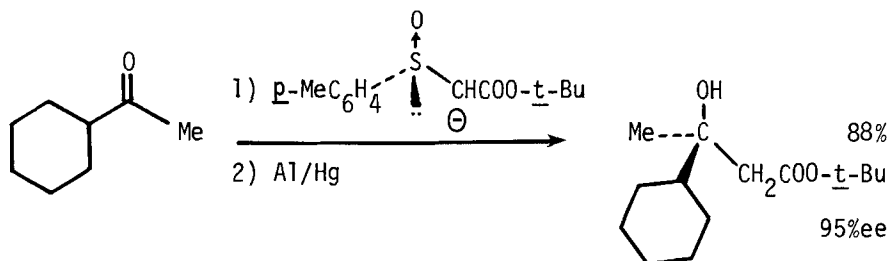
Section 327 Alcohol - EsterJOC 43, 188 (1978)JACS 101, 2501 (1979)

Tetr Lett, 1971 (1979)

Bull Chem Soc Japan 52, 1237 (1979)

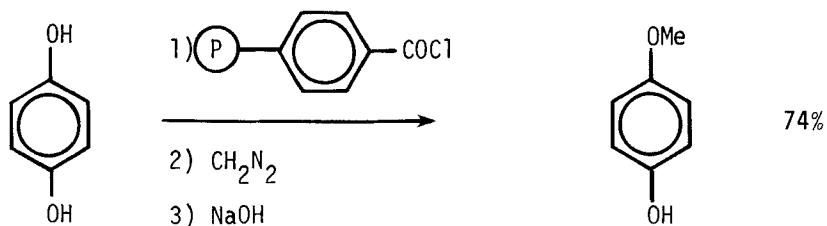
Chem Lett, 1131 (1977)

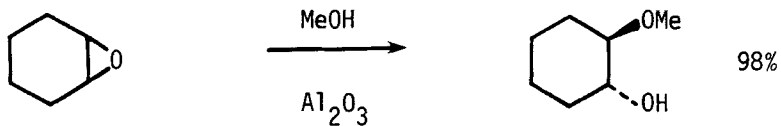
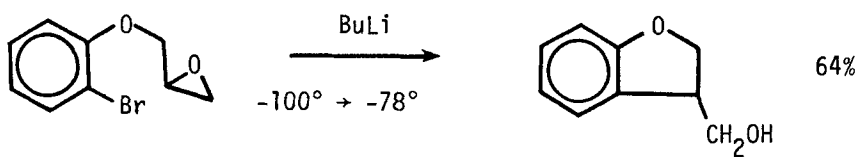
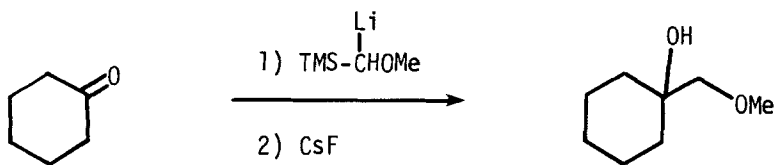
Can J Chem 56, 1562 (1978)



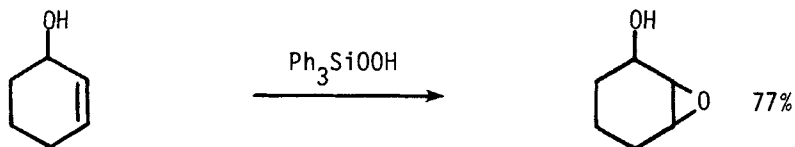
JCS Chem Comm, 162 (1977)

Also via: Hydroxyacids (Section 313)

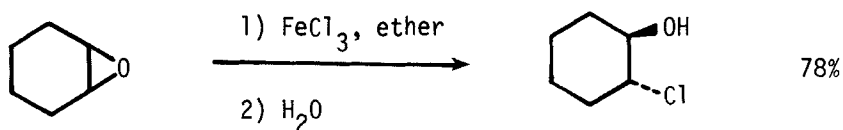
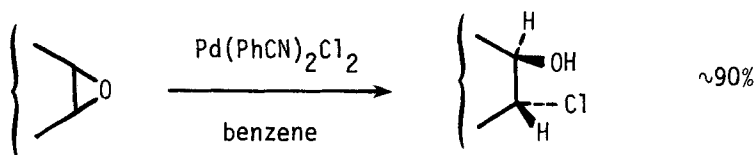
Section 328 Alcohol - Ether, EpoxideCan J Chem 55, 3351 (1977)

JACS 99, 8208 and 8214 (1977)JOC 43, 3800 (1978)

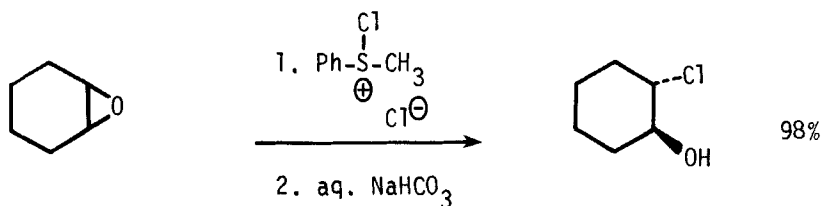
JCS Chem Comm, 822 (1979)



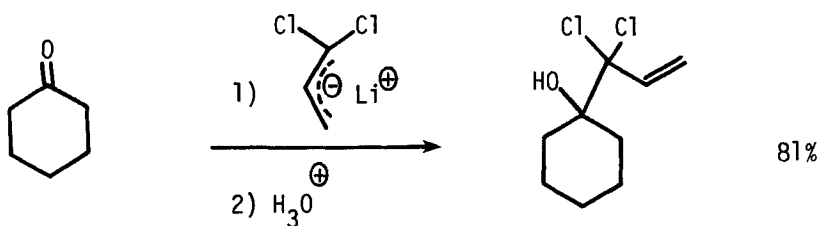
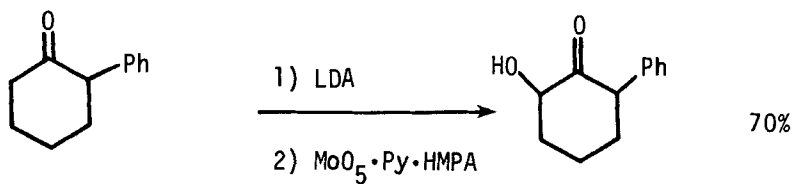
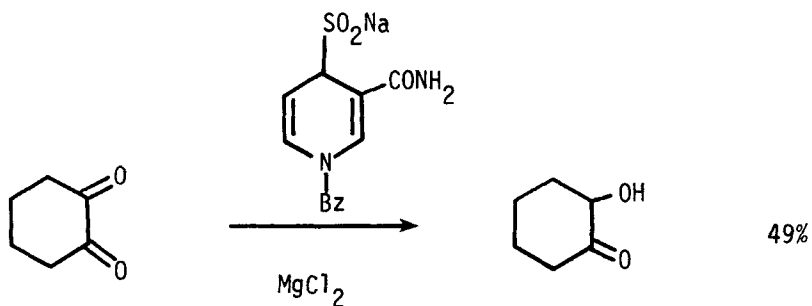
Tetr Lett, 4337 (1979)

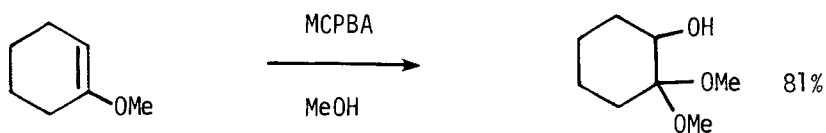
Section 329 Alcohol - HalideJOC 42, 343 (1977)

Several examples using steroids.

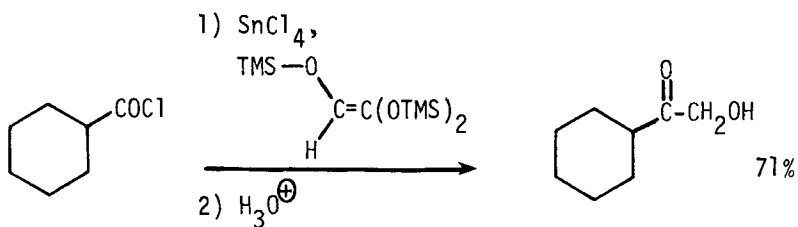
JOC 44, 1569 (1979)

Chem Lett, 995 (1977)

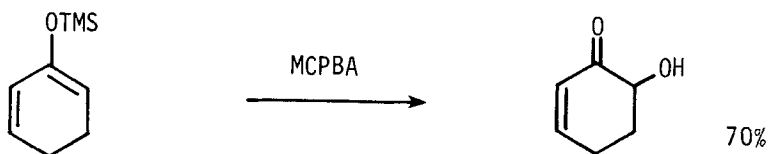
JACS 99, 5317 (1977)Section 330 Alcohol - KetoneJOC 43, 188 (1978)Bull Chem Soc Japan 52, 1237 (1979)



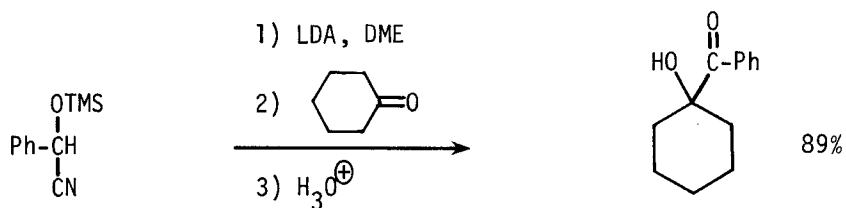
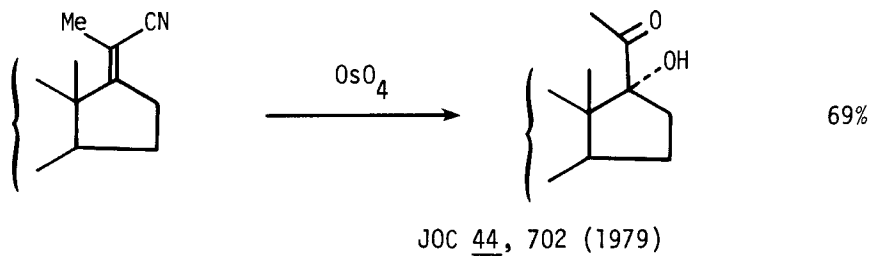
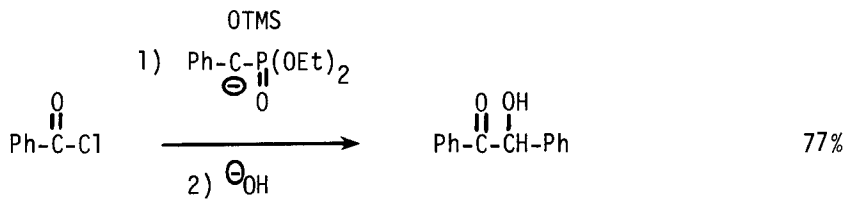
Synthesis, 578 (1977)



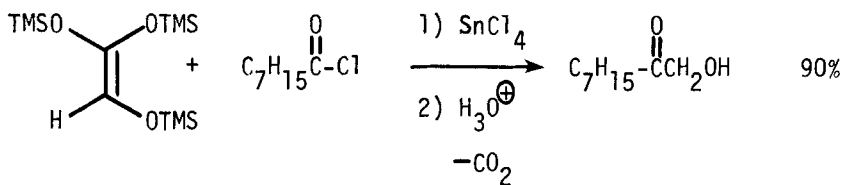
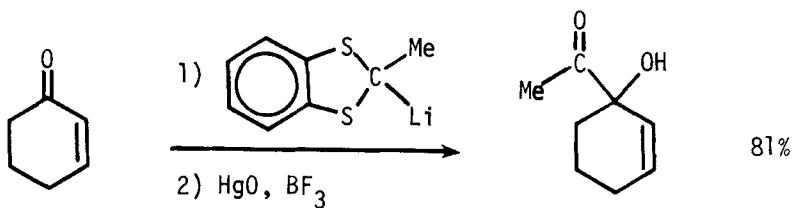
Tetr Lett, 2749 (1978)



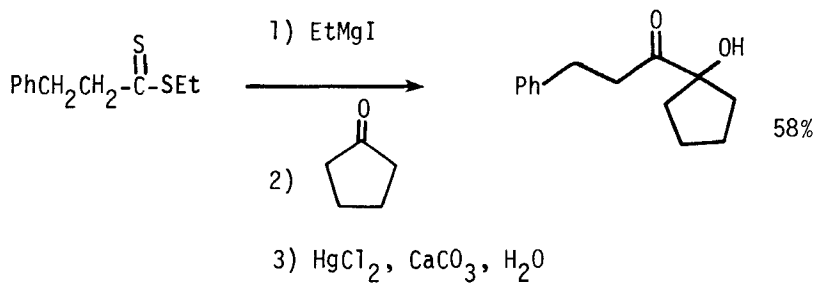
JOC 43, 1599 (1978)

Chem Ber 112, 2062 (1979)

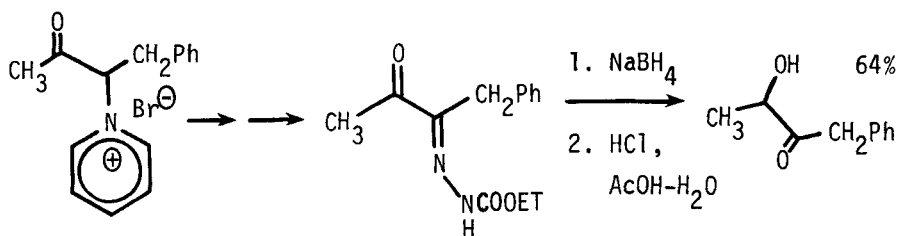
Chem Lett, 519 (1979)

JOC 44, 4617 (1979)

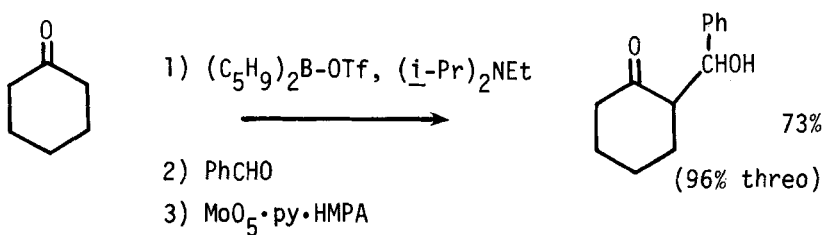
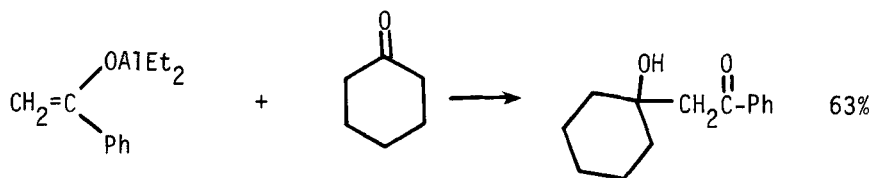
Tetr Lett, 2345 (1978)



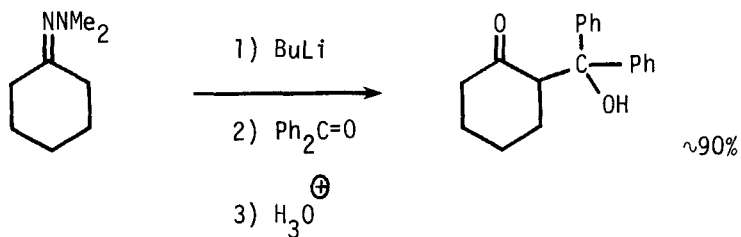
Tetr Lett, 4657 (1978)

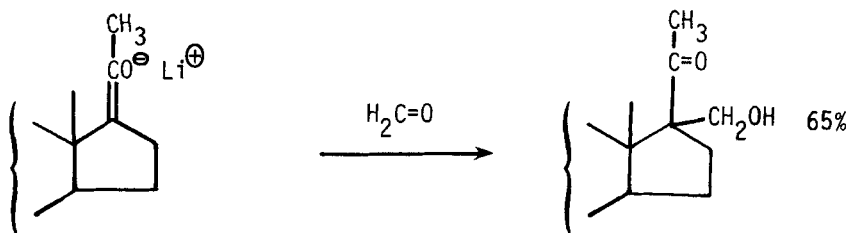


Chem Lett, 245 (1977)

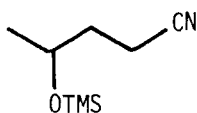
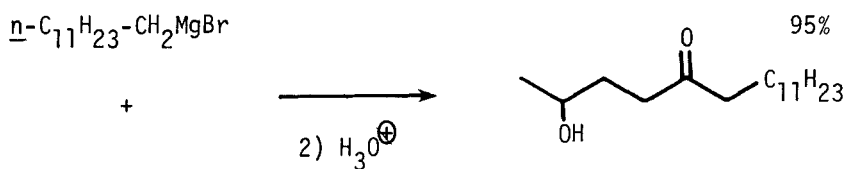
JACS 101, 6120 (1979)

Chem Lett, 379 (1979)

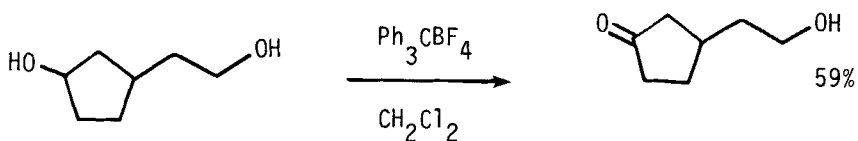
Chem Ber 111 1362 (1978)

Steroids 34, 597 (1979)

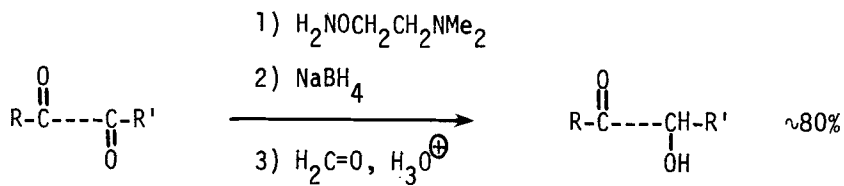
Review: "Aldol Condensations"

Fortschritte der Chem Forsch 67, 1 (1976)

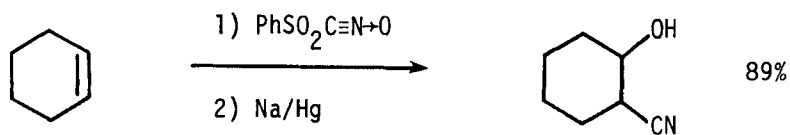
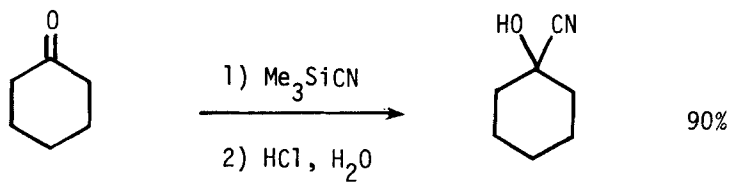
Synthesis, 221 (1978)



Tetr Lett, 2771 (1978)



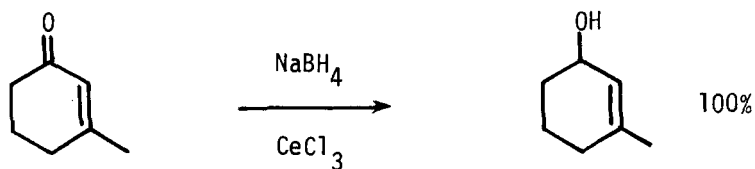
Synthesis, 466 (1977)

Section 331 Alcohol - NitrileJACS 101, 1319 (1979)

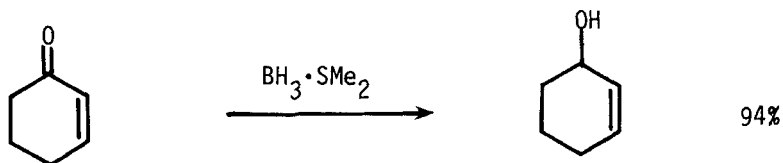
Tetr Lett, 3773 (1978)

Section 332 Alcohol - Olefin

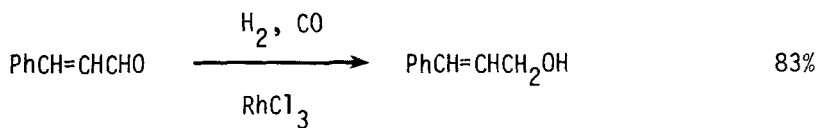
Allylic and benzylic hydroxylation ($C=C-CH \rightarrow C=C-C-OH$, etc.) is listed in Section 41 (Alcohols and Phenols from Hydrides).



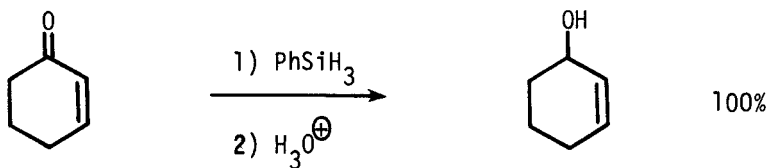
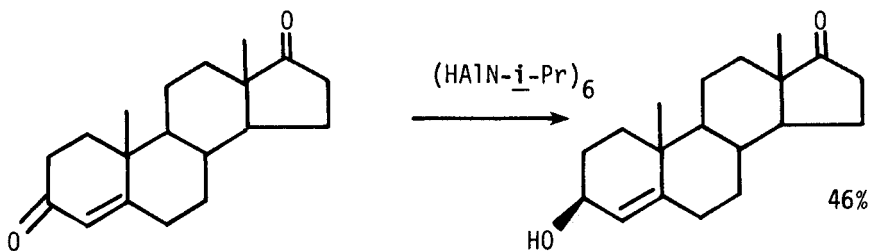
JACS 100, 2226 (1978)



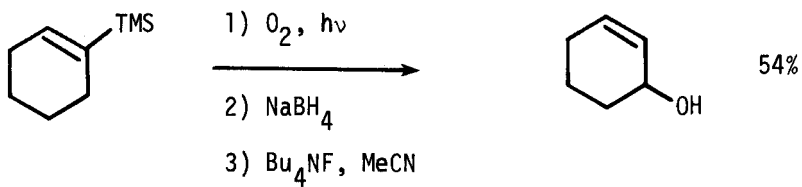
JOC 43, 1829 (1978)

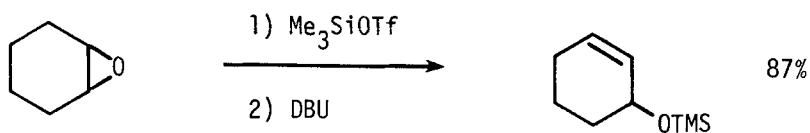
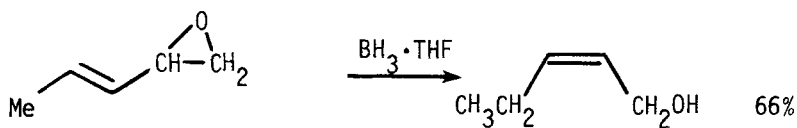


BCS Japan 50, 2148 (1977)

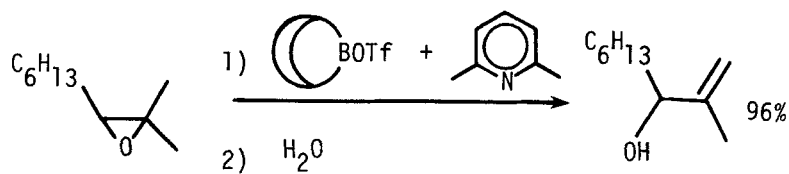
Bull Akad USSR Chem 26, 995 (1977)

Tetr Lett, 2369 (1977)

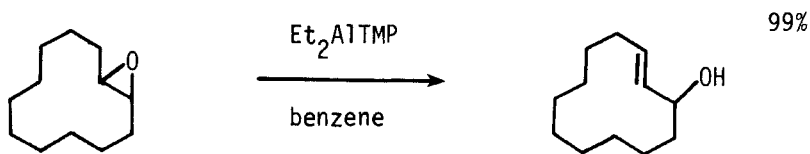
JACS 101, 4420 (1979)

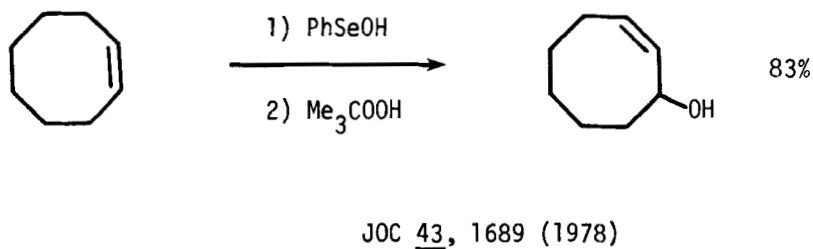
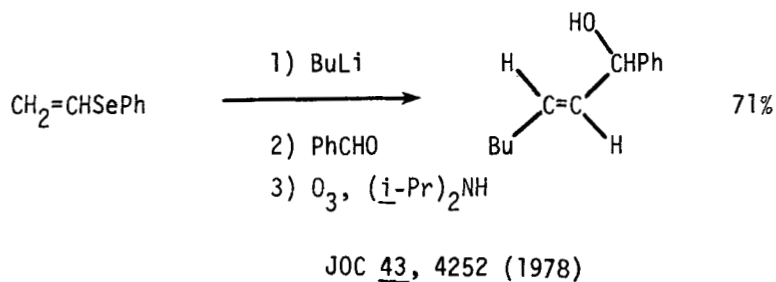
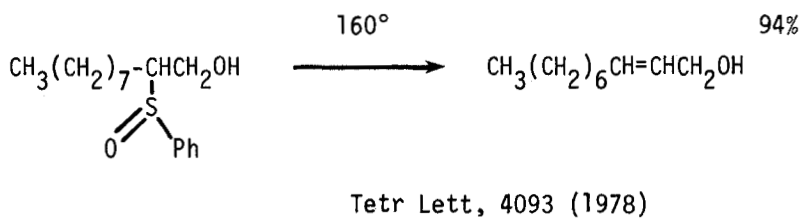
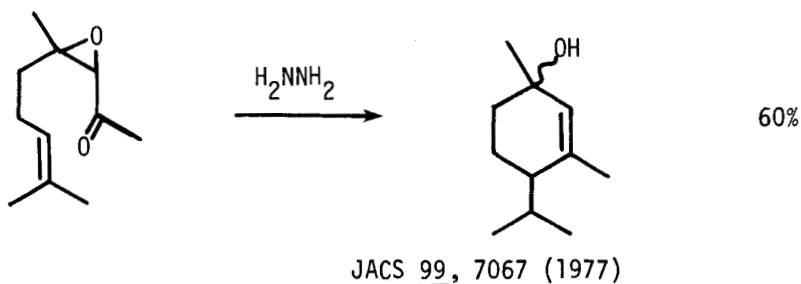
JACS 101, 2738 (1979)

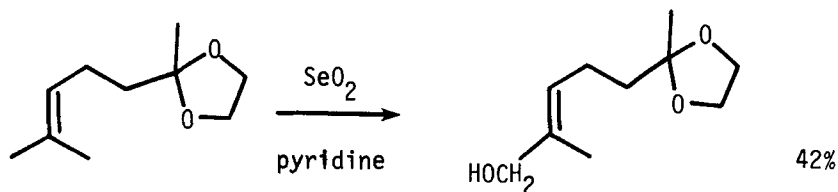
Synthesis, 62 (1979)



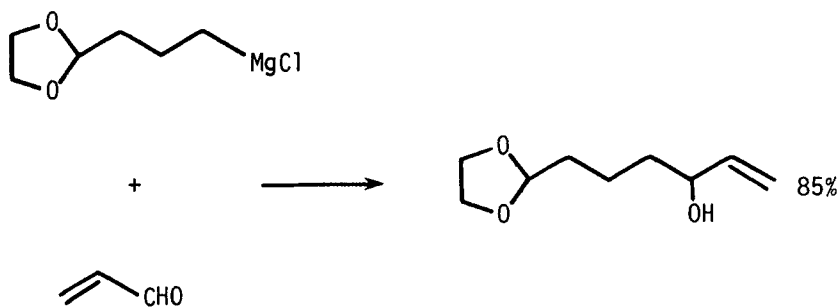
Chem Lett, 1215 (1977)

Bull Chem Soc Japan 52, 1705 (1979)

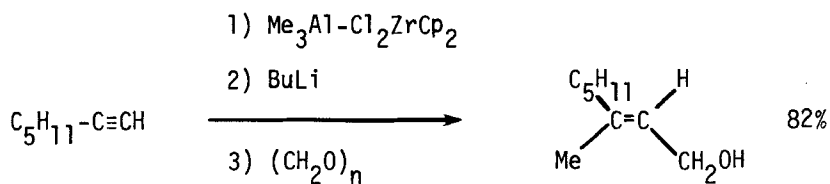




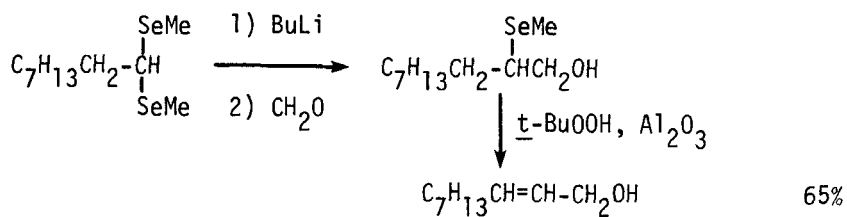
Synthesis, 215 (1978)



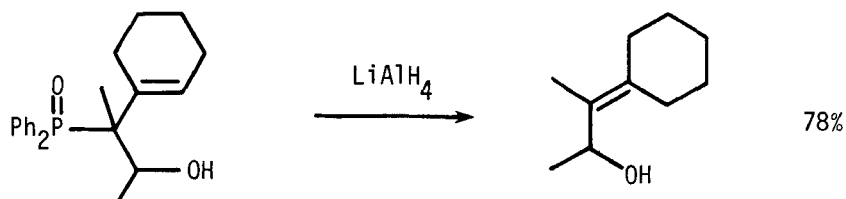
JCS Perkin I, 2353 (1977)



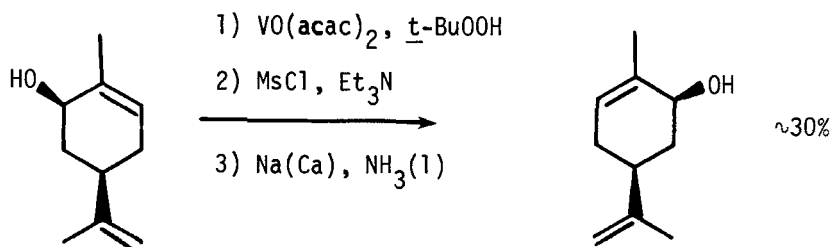
Tetr Lett, 2357 (1978)

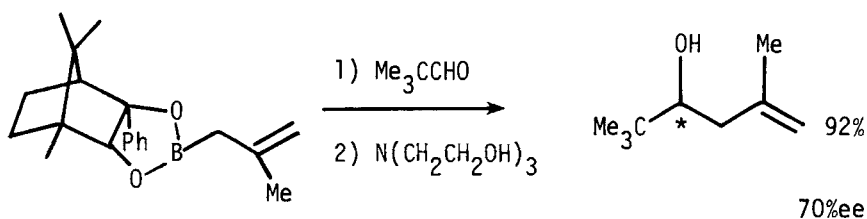
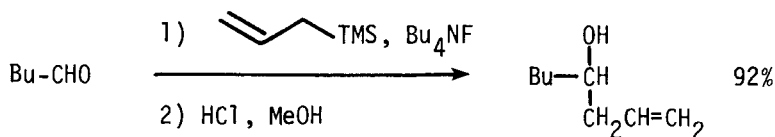
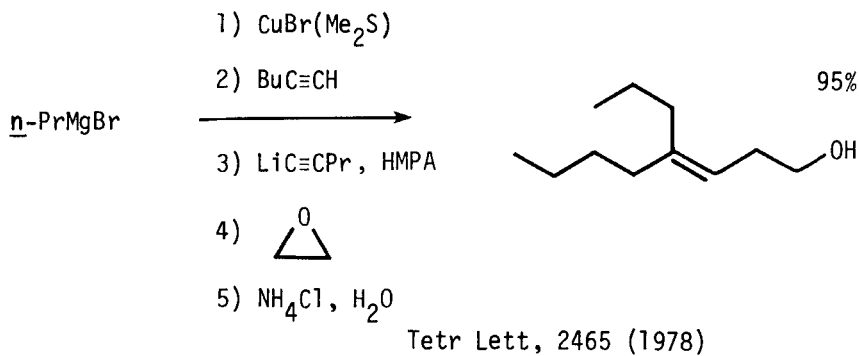


Tetr Lett, 1145 (1978)



Tetr Lett, 4089 (1978)

Bull Chem Soc Japan 52, 1757 (1979)



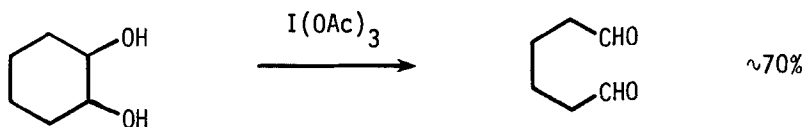
Angew Int Ed 17, 768 (1978)

Review: "Simple Enols"

Chem Rev 79, 515 (1979)

Also via: Acetylenes - Alcohols (Section 302)

Section 333 Aldehyde - Aldehyde

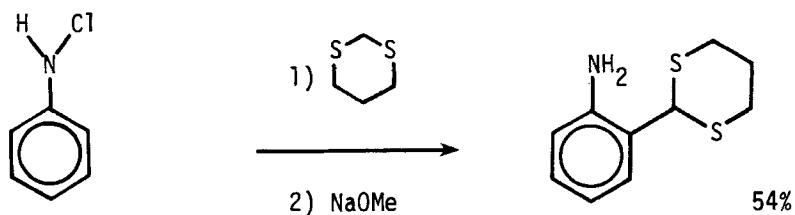


JCS Perkin I, 1483 (1978)

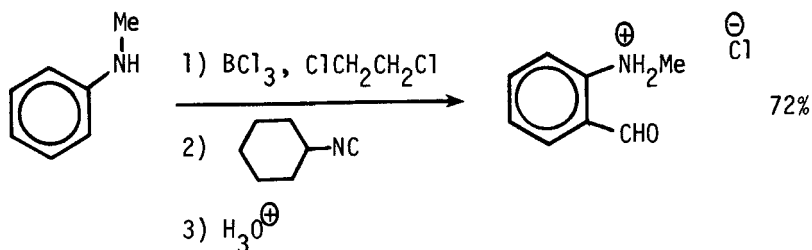
Section 334 Aldehyde - Amide

No additional examples

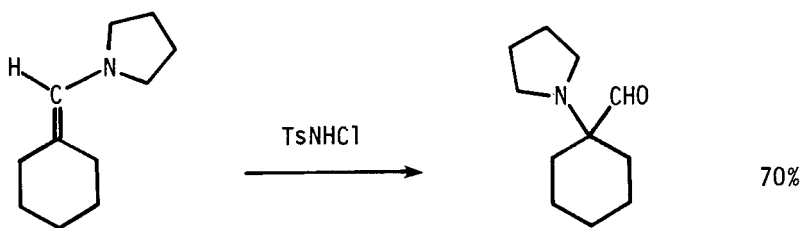
Section 335 Aldehyde - Amine



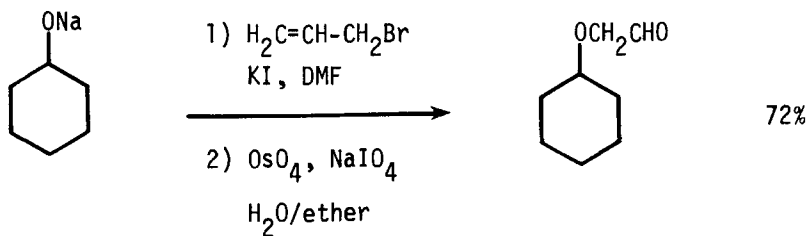
JACS 100, 7600 (1978)



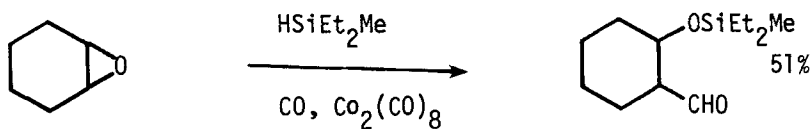
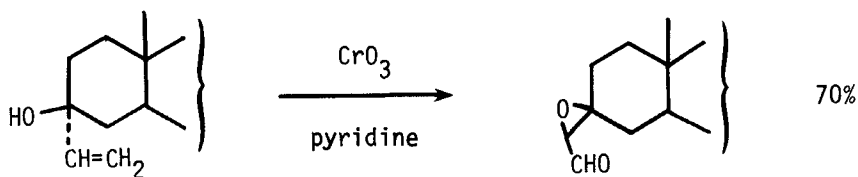
Synthesis, 99 (1979)

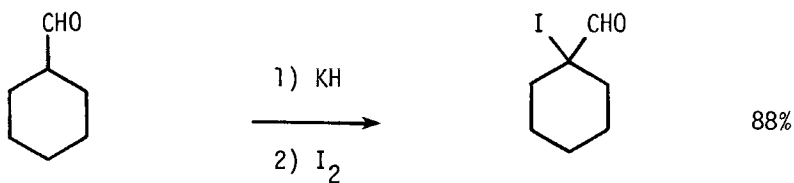
Angew Int Ed 18, 933 (1979)Section 336 Aldehyde - Ester

No additional examples

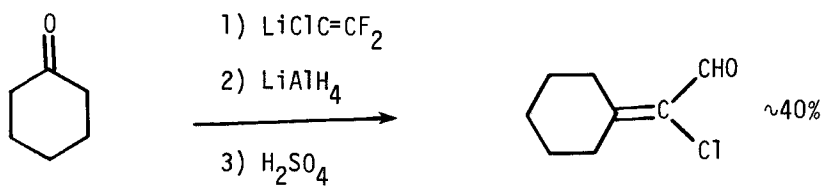
Section 337 Aldehyde - Ether, Epoxide

Synthesis, 202 (1979)

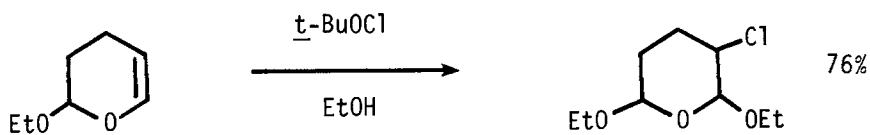
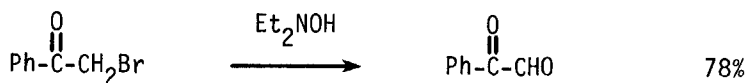
Angew Int Ed 16, 789 (1977)JOC 42, 813 (1977)

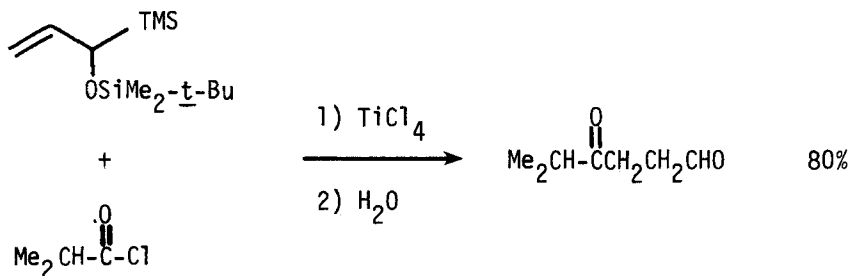
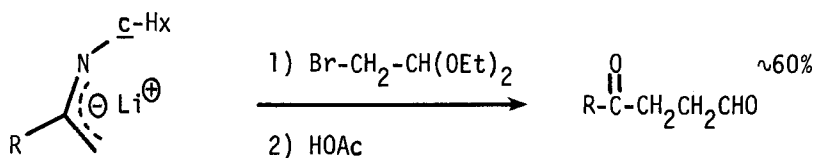
Section 338 Aldehyde - Halide

Tetr Lett, 2817 (1979)

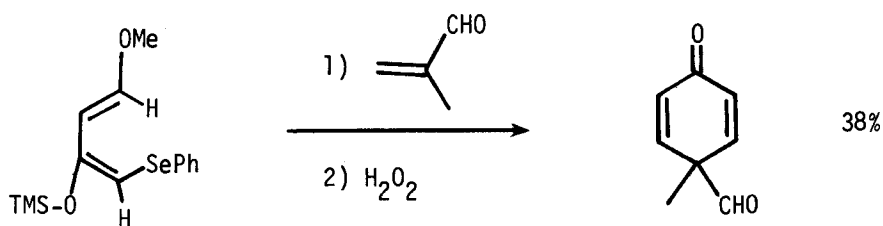


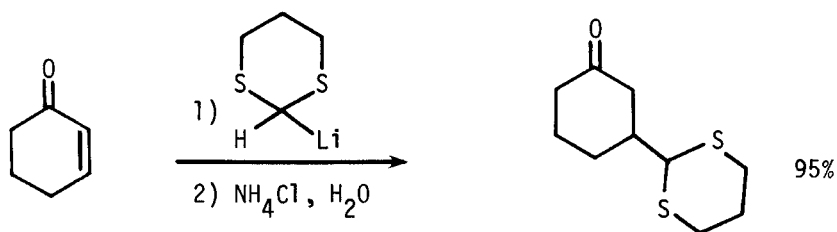
Synthesis, 458 (1978)

JOC 42, 1057 (1977)Section 339 Aldehyde - KetoneJOC 42, 754 (1977)

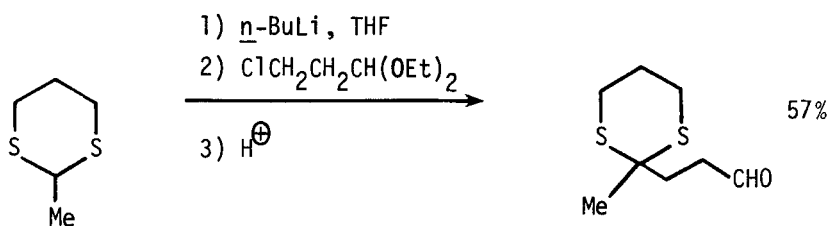
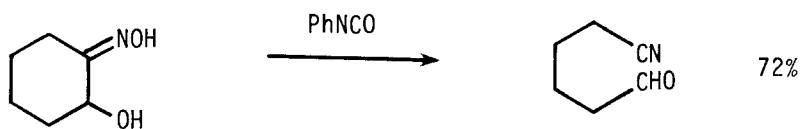
JOC 43, 2551 (1978)

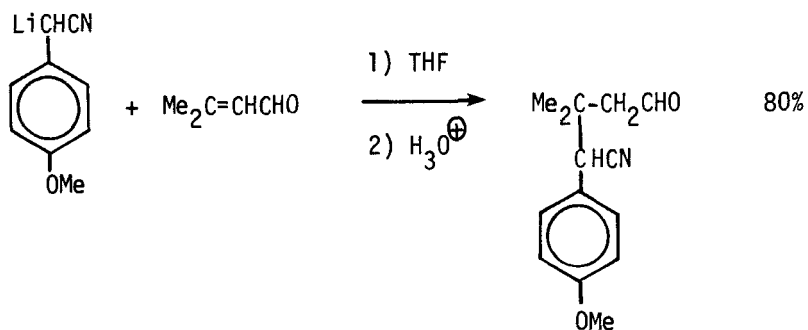
R = alkyl, Ph

Tetrahedron 35, 1745 (1979)JOC 42, 1819 (1977)

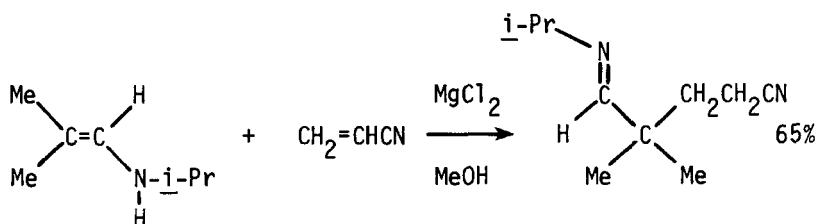


JCS Chem Comm, 100 (1979)

Synth Comm 9, 147 (1979)Section 340 Aldehyde - NitrileIndian J Chem 18B, 175 (1979)



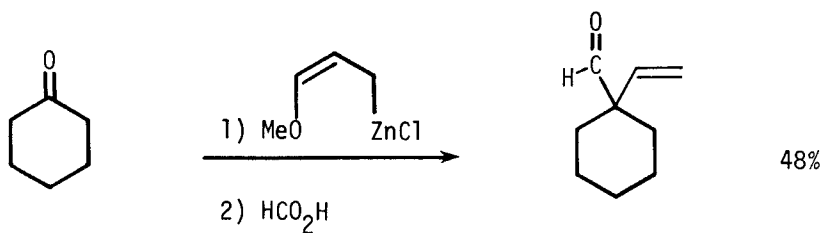
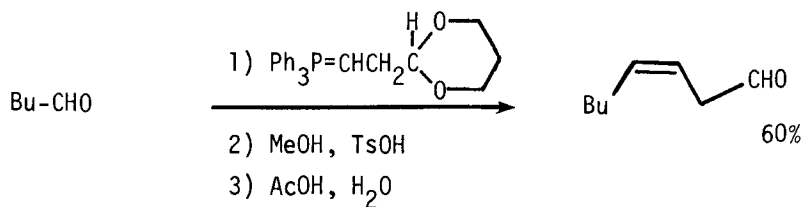
JCS Chem Comm, 779 (1979)



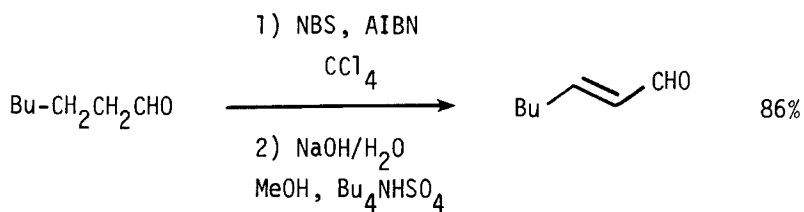
JCS Chem Comm, 565 (1977)

Section 341 Aldehyde - Olefin

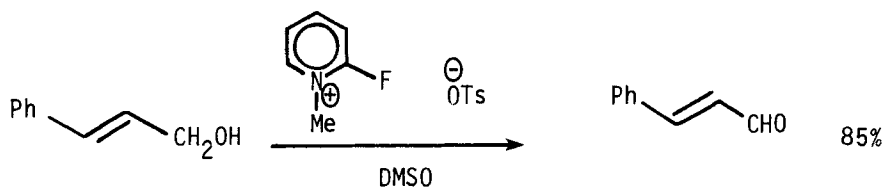
For the oxidation of allylic alcohols to olefinic aldehydes see also Section 48 (Aldehydes from Alcohols).

JACS 99, 5453 (1977)

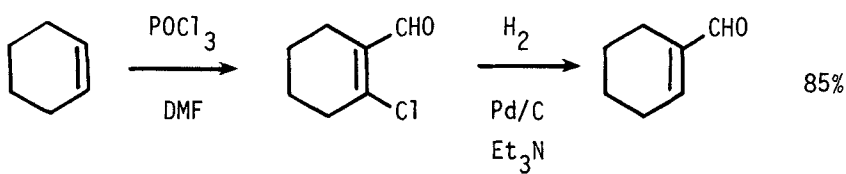
Synthesis, 132 (1979)



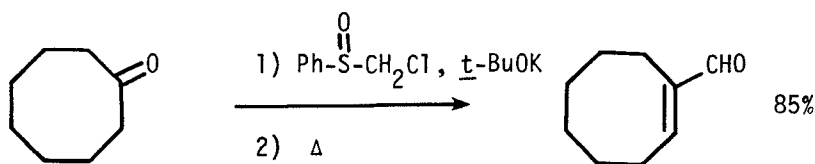
Synthesis, 507 (1979)



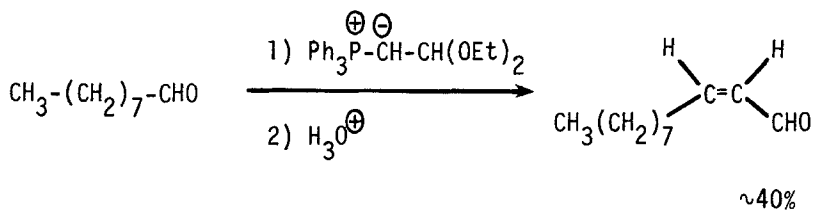
Chem Lett, 369 (1978)

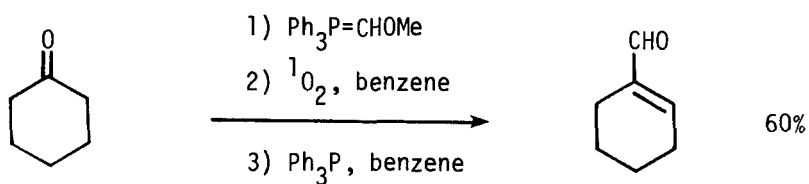


Tetr Lett, 2027 (1977)

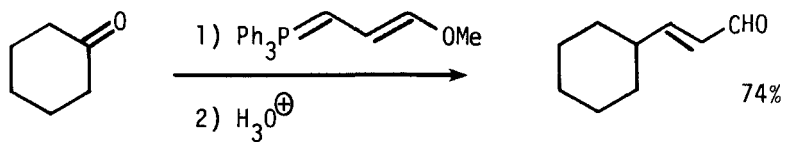


Tetr Lett, 1377 (1977)

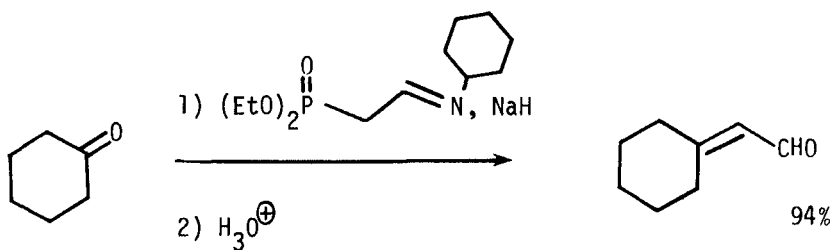
Angew Int Ed 18, 687 (1979)



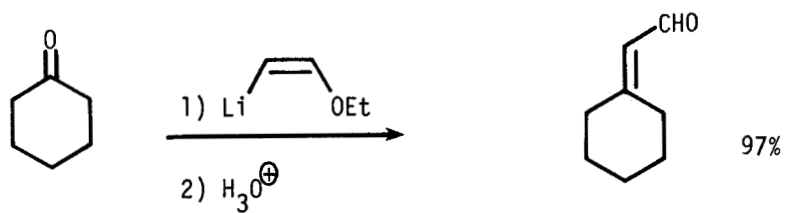
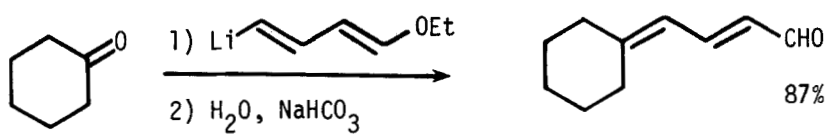
Synthesis, 67 (1978)



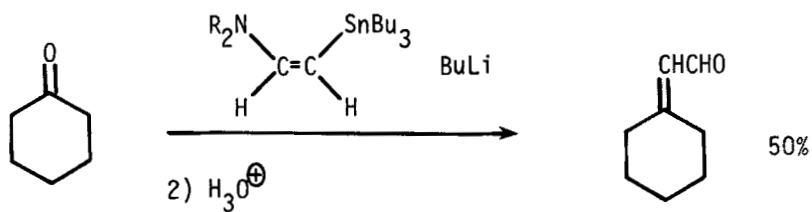
Tetr Lett, 3875 (1977)



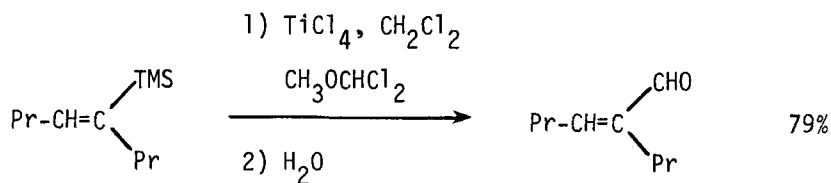
JOC 43, 3788 (1978)

JACS 99, 7365 (1977)

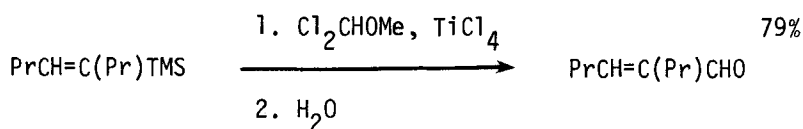
Tetr Lett, 717 (1978)



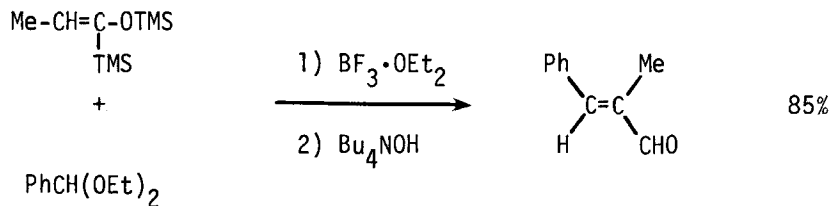
Tetr Lett, 3589 (1977)

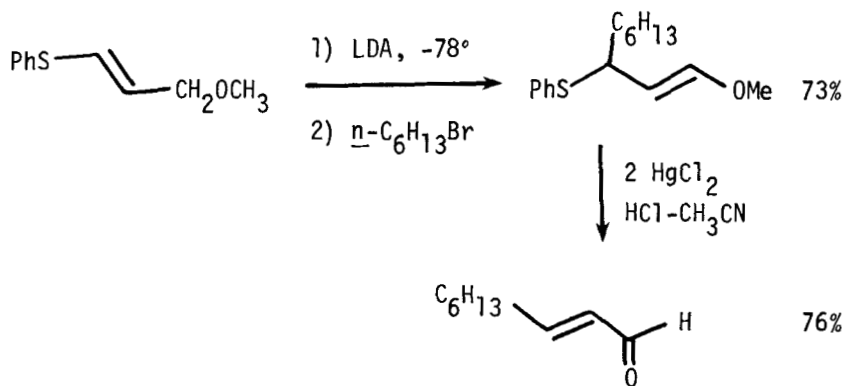


Synthesis, 721 (1977)

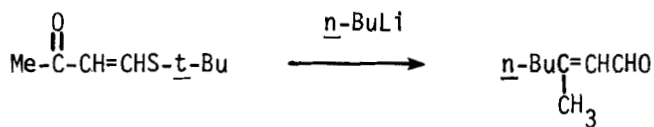


Chem Lett, 859 (1978)

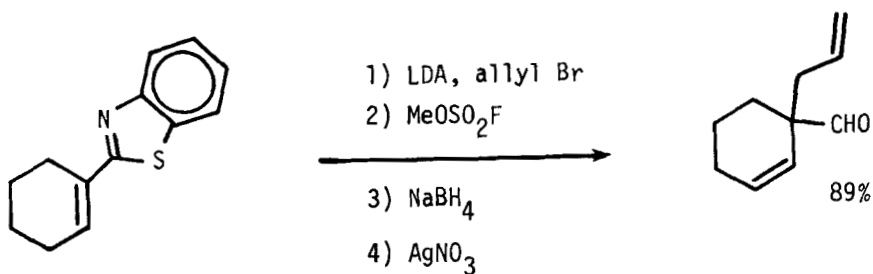
JACS 99, 5827 (1977)



Chem Lett, 345 (1977)

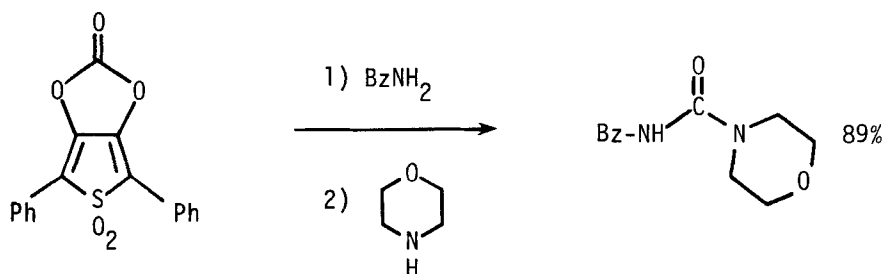


Tetr Lett, 2809 (1979)

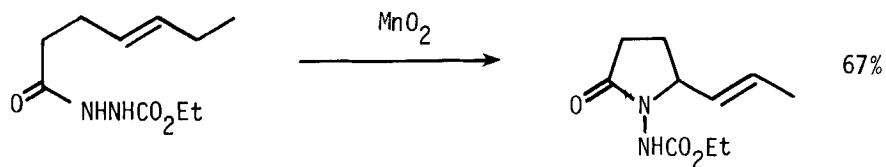


Tetr Lett, 5 and 9 (1978)

Also via: β -Hydroxyaldehydes (Section 324)

Section 342 Amide - Amide

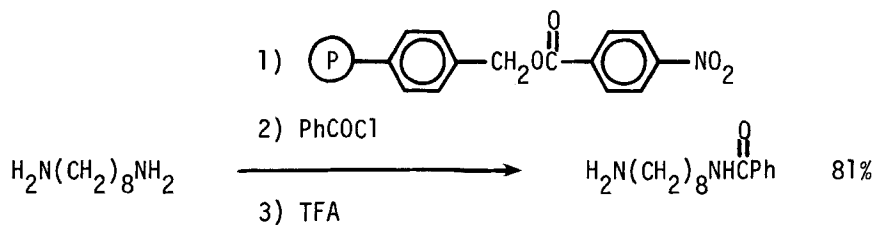
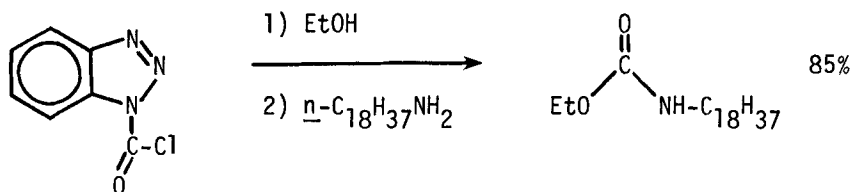
Several additional examples.

Chem Ber 112, 727 (1979)

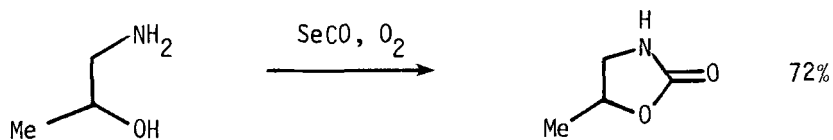
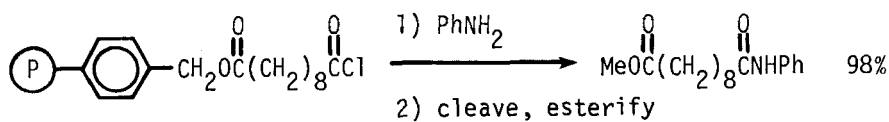
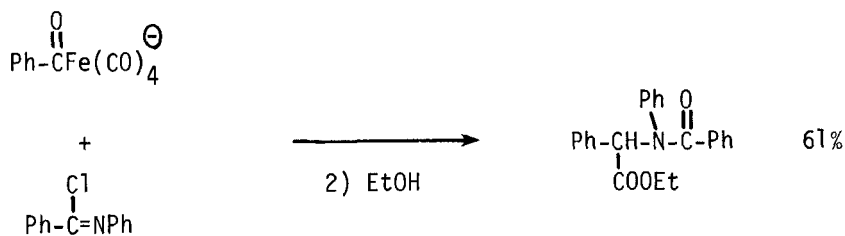
Tetr Lett, 4185 (1979)

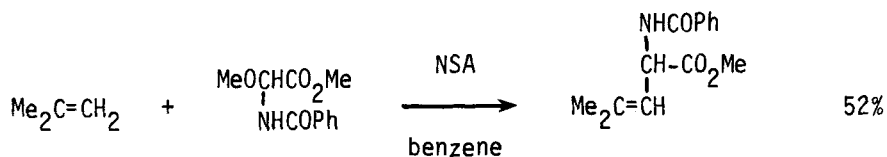
Also via: Dicarboxylic acids (Section 312)

Diamines (Section 350)

Section 343 Amide - AmineIsrael J Chem 17, 248 (1979)Section 344 Amide - Ester

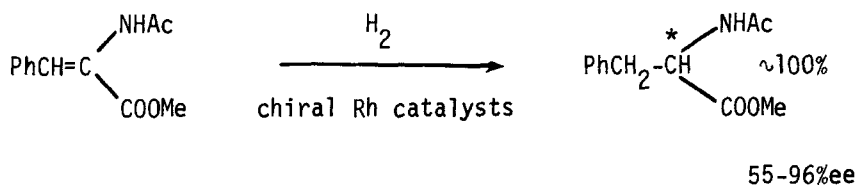
Synthesis, 704 (1977)

Angew Int Ed 18, 692 (1979)Can J Chem 56, 1562 (1978)JACS 101, 4245 (1979)



(NSA = naphthalenesulfonic acid)

Tetrahedron 33, 1533 (1977)



JACS 99, 5946 (1977)

Tetr Lett, 1119 (1978)

Tetr Lett, 1635 (1978)

Chem Lett, 39 (1979)

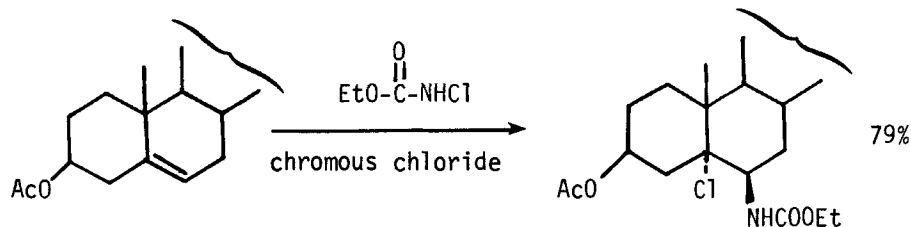
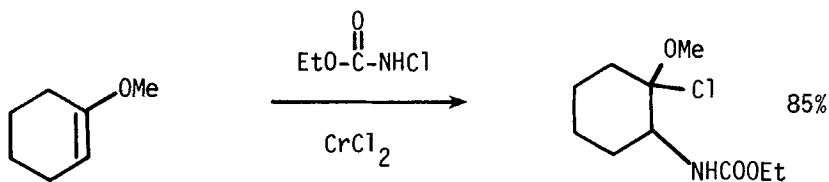
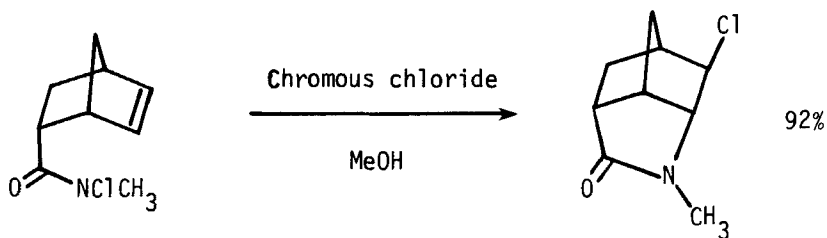
Related methods: Section 315 (Acid-Amide)

Section 316 (Acid-Amine)

Section 351 (Amine-Ester)

Section 345 Amide - Epoxide

No additional examples

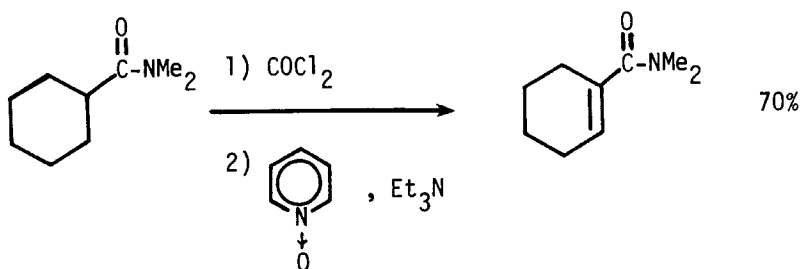
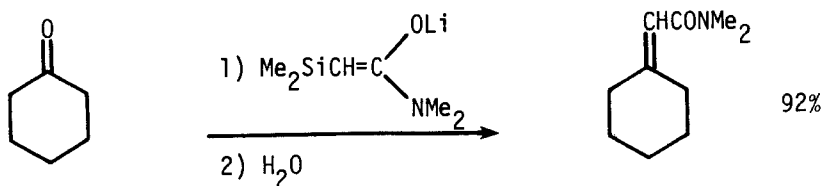
Section 346 Amide - HalideCan J Chem 55, 700 (1977)Can J Chem 56, 119 (1978)JOC 43, 3750 (1978)

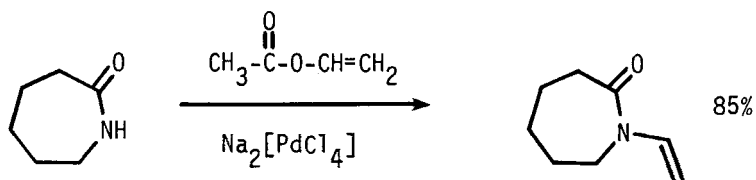
Section 347 Amide - Ketone

No additional examples

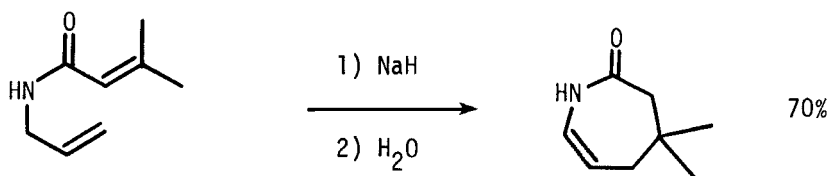
Section 348 Amide - Nitrile

No additional examples

Section 349 Amide - OlefinJACS 101, 4381 (1979)JOC 43, 1947 (1978)



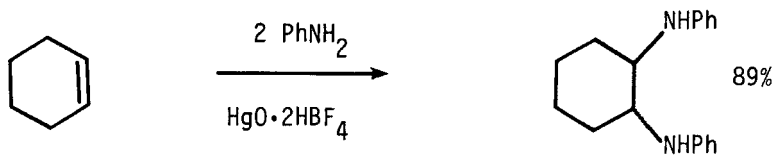
Angew Int Ed 18, 533 (1979)



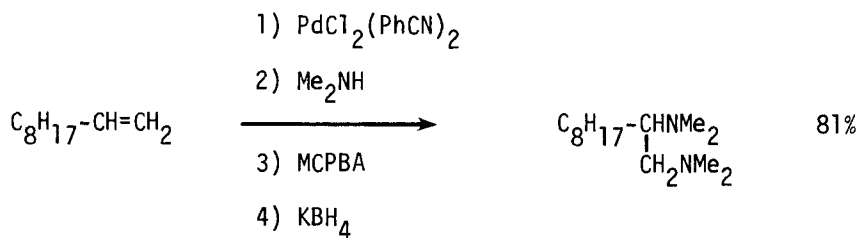
Tetr Lett, 2289 (1977)

Also via: Olefinic acids (Section 322)

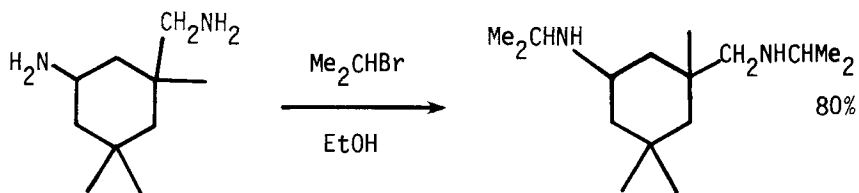
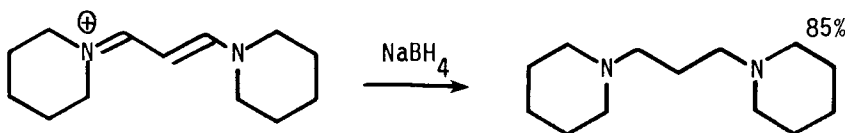
Section 350 Amine - Amine

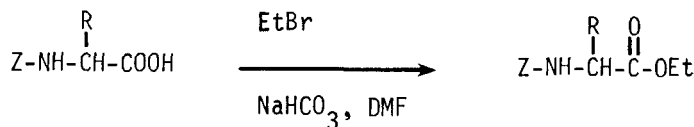
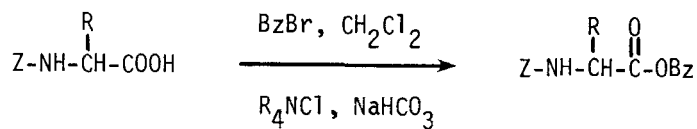


Synthesis, 962 (1979)

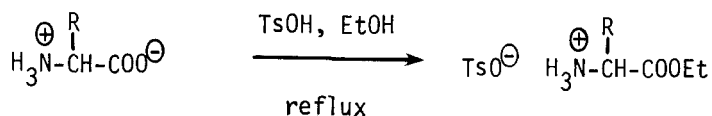
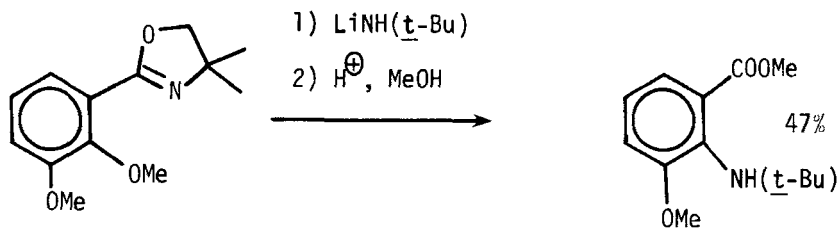


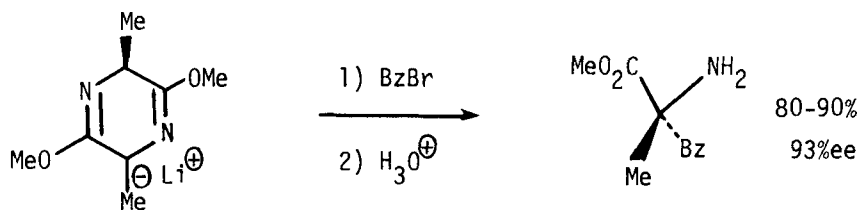
Tetr Lett, 163 (1978)

J Prakt Chem 321, 680 (1979)Chem Ber 110, 1259 (1977)

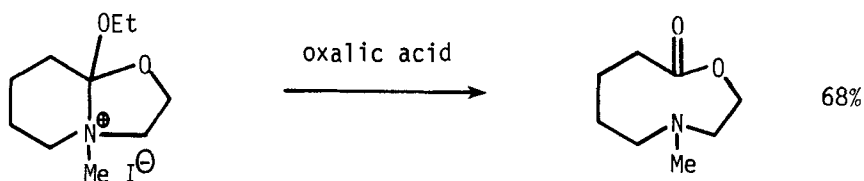
Section 351 Amine - Ester

Synthesis, 957 and 961 (1979)

Bull Chem Soc Japan 52, 1879 (1979)JOC 42, 2653 (1977)



Angew Int Ed 18, 863 (1979)

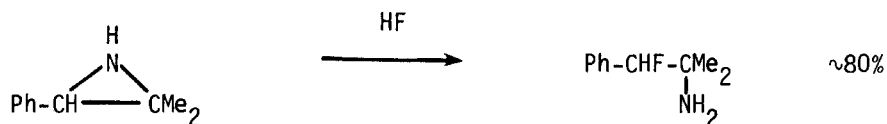


Tetr Lett, 809 (1979)

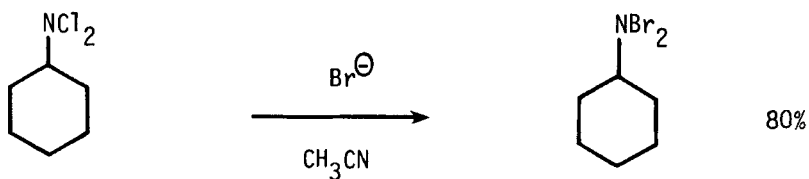
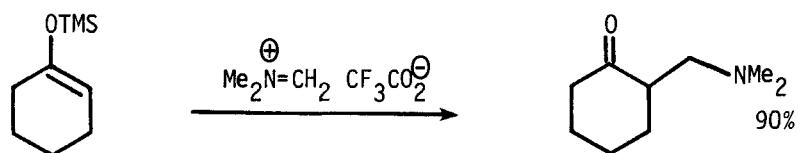
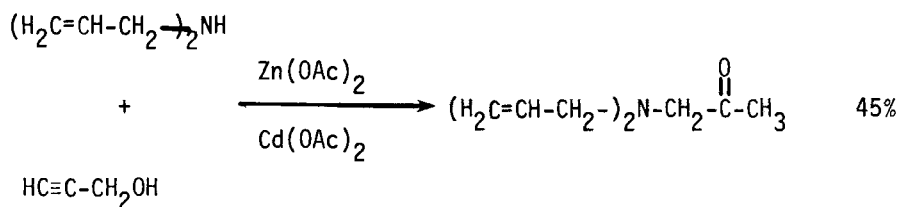
Related methods: Section 315 (Acid-Amide)
 Section 316 (Acid-Amine)
 Section 344 (Amide-Ester)

Section 352 Amine - Ether

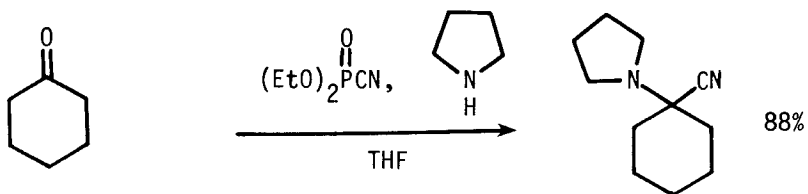
No additional examples

Section 353 Amine - Halide

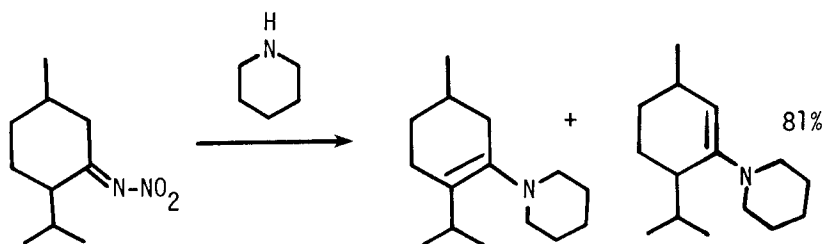
Tetr Lett, 3247 (1978)

Synth Comm 8, 549 (1978)Section 354 Amine - KetoneTetrahedron 35, 613 (1979)

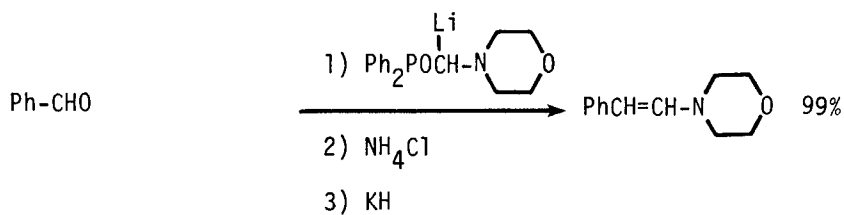
Tetr Lett, 3523 (1979)

Section 355 Amine - Nitrile

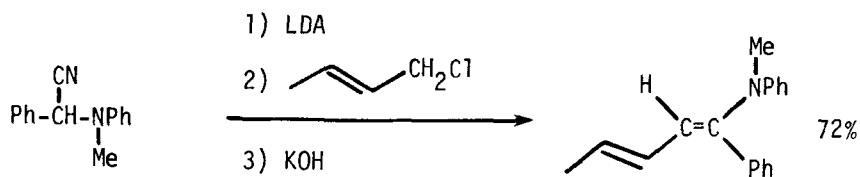
Tetr Lett, 4663 (1979)

Section 356 Amine - Olefin

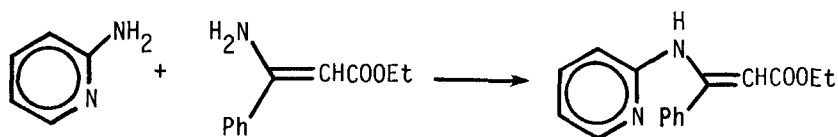
Synthesis, 830 (1979)



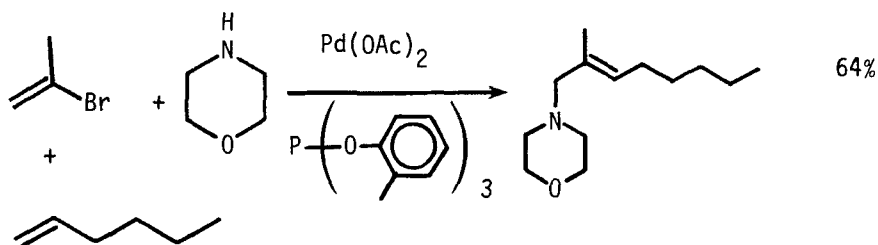
Tetr Lett, 2433 (1979)



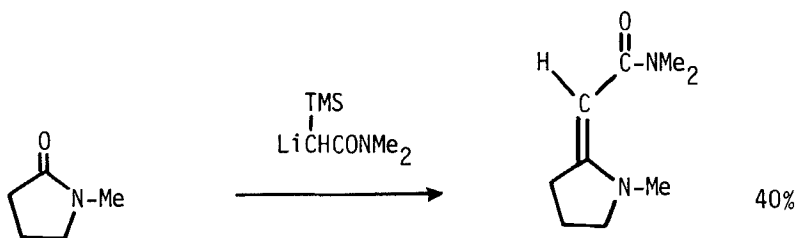
Synthesis, 127 (1979)



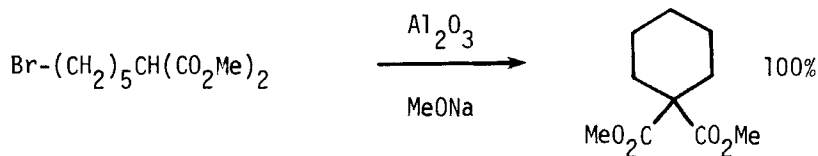
J Het Chem 14, 1419 (1977)



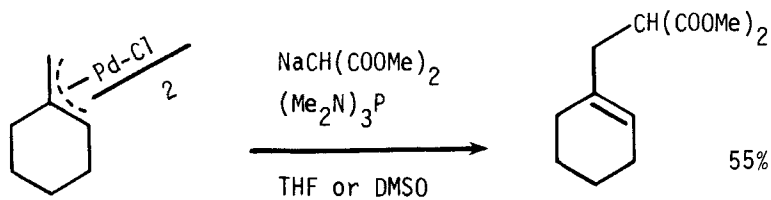
JOC 43, 3898 (1978)

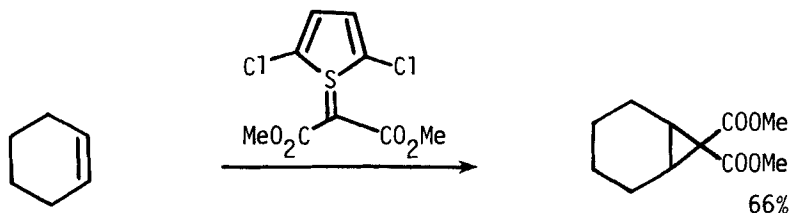


Tetr Lett, 709 (1978)

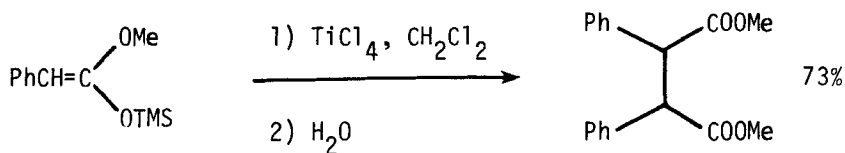
Section 357 Ester - Ester

JCS Chem Comm, 522 (1979)

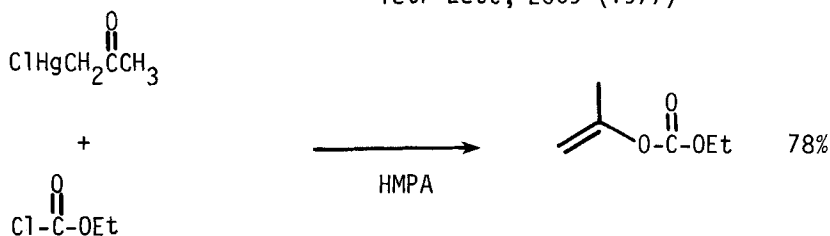
JACS 100, 3416 (1978)



JCS Chem Comm, 641 (1978)



Tetr Lett, 2009 (1977)



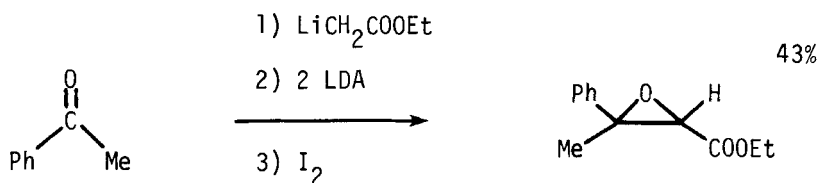
Tetr Lett, 3737 (1978)

Also via: Dicarboxylic acids (Section 312)

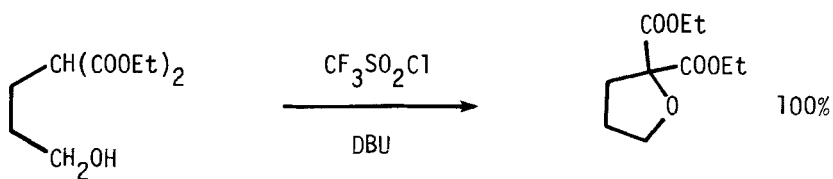
Hydroxyesters (Section 327)

Diols (Section 323)

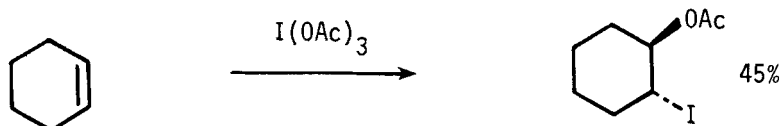
Section 358 Ester - Ether, Epoxide



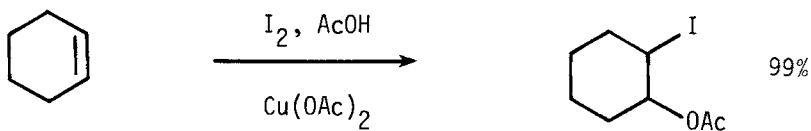
Tetr Lett, 4575 (1977)



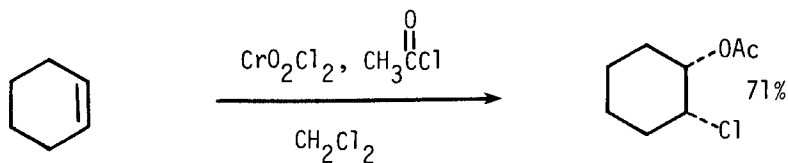
Tetr Lett, 3645 (1979)

Section 359 Ester - Halide

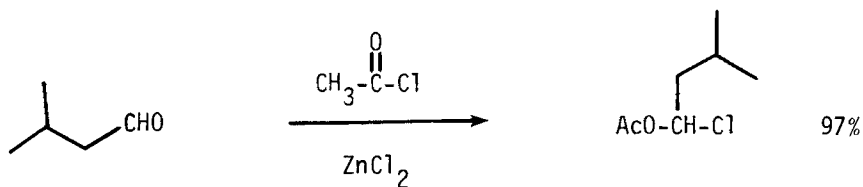
JCS Perkin I, 2231 (1977)



Synthesis, 402 (1978)

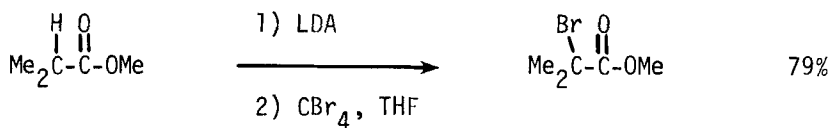
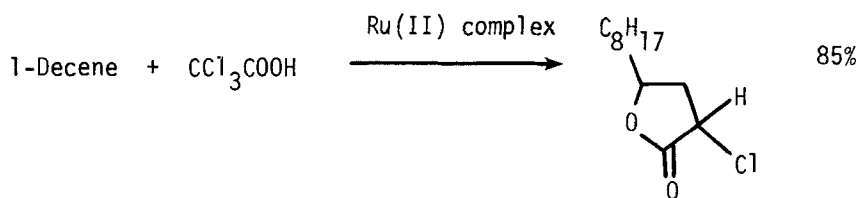


Tetr Lett, 3523 (1977)

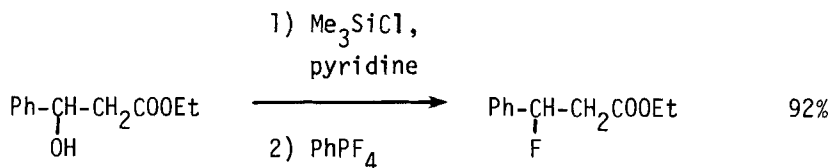


Helv Chim Acta 61, 2047, 2059,
2165, 2381 (1978)

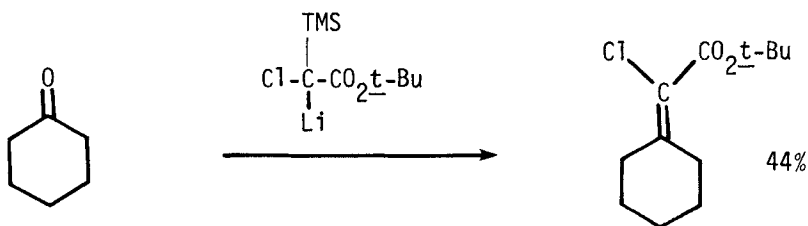
Synthesis, 593 (1978)

JOC 43, 3687 (1978)

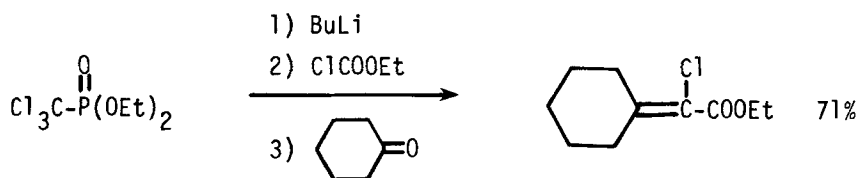
Chem Lett, 363 (1978)



Tetr Lett, 4507 (1978)



Tetr Lett, 515 (1978)



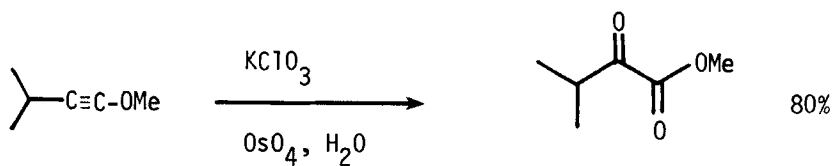
Synthesis, 31 (1978)

Review: "Synthesis and Synthetic Utility of Halolactones"

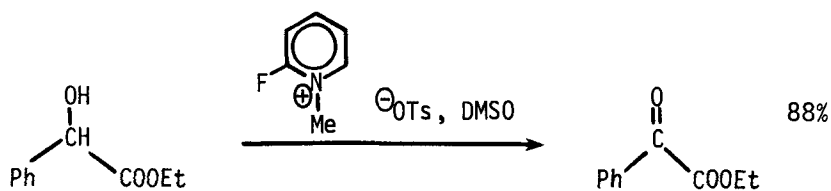
Chem Soc Rev 8, 171 (1979)

Also via: Haloacids (Section 319)
Halohydrins (Section 329)

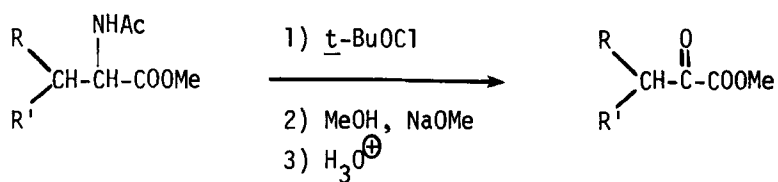
Section 360 Ester - Ketone



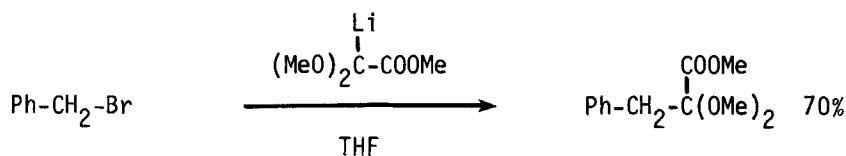
JOC 43, 4245 (1978)



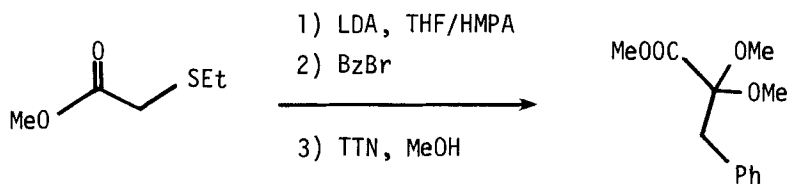
Chem Lett, 369 (1978)



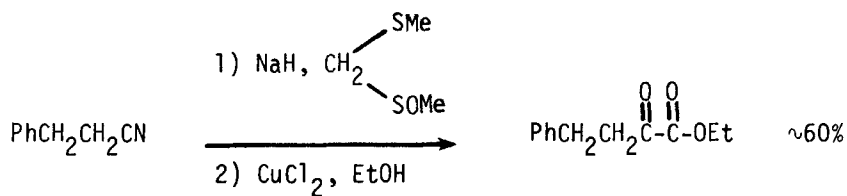
R, R' = H, alkyl

Chem Ber 111, 3136 (1978)

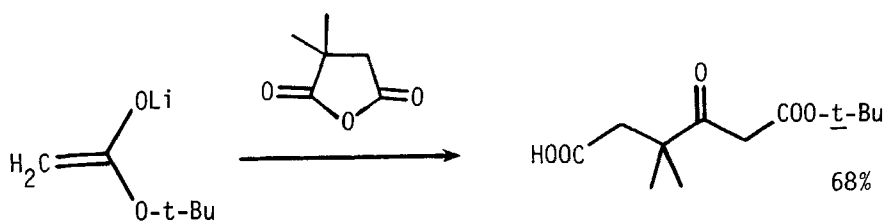
Synthesis, 33 (1979)

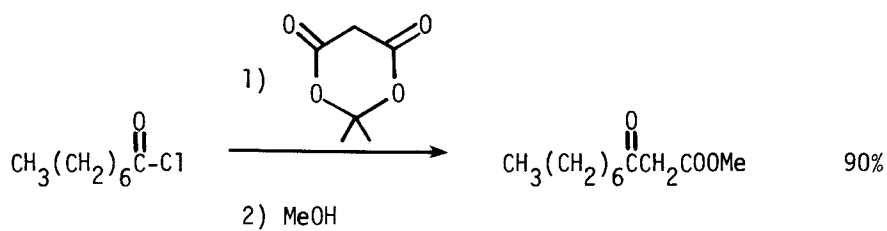
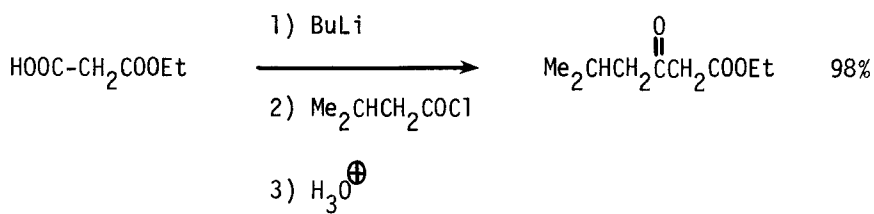
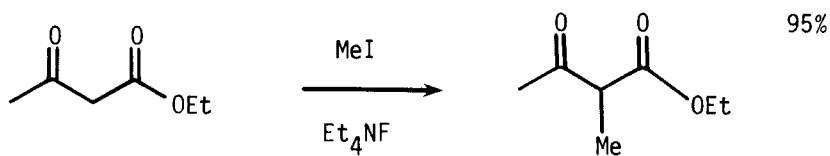


Tetr Lett, 4115 (1978)

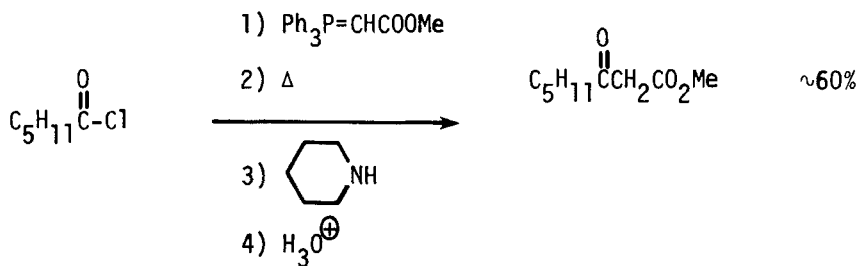


Tetr Lett, 375 (1978)

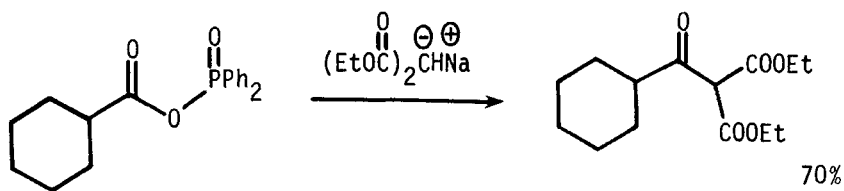
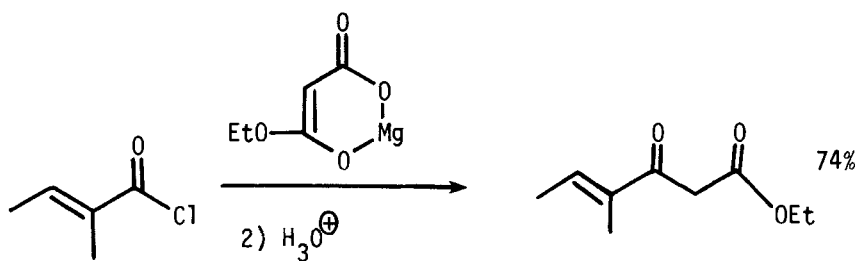
Angew Int Ed 18, 632 (1979)

JOC 43, 2087 (1978)JOC 44, 310 (1979)

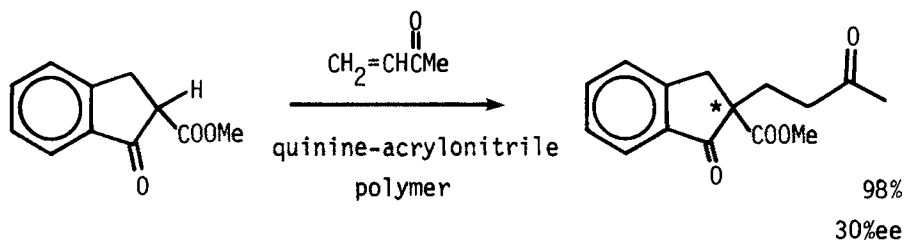
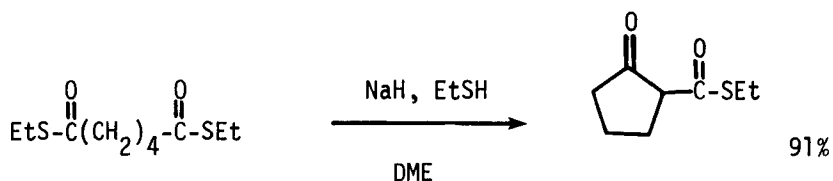
JCS Chem Comm, 64 (1977)



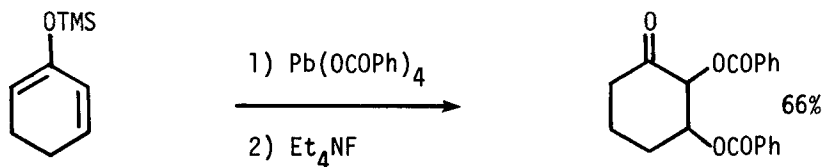
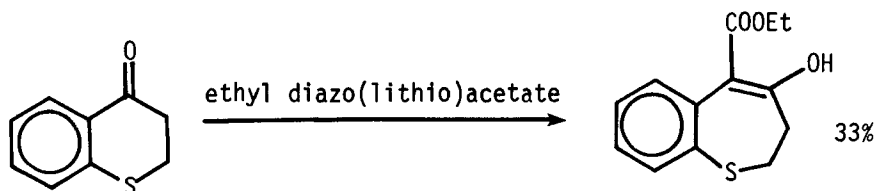
Liebigs Ann, 282 (1977)

Synth Comm 8, 59 (1978)

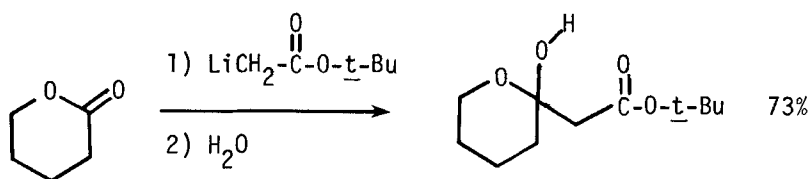
Synthesis, 142 (1978)

JACS 100, 7071 (1978)

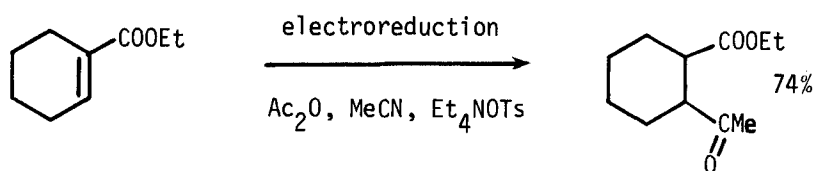
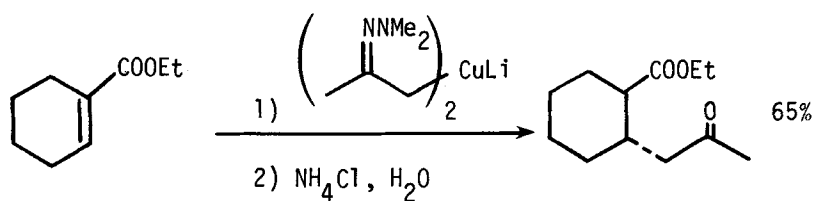
Tetr Lett, 1193 (1979)

JOC 42, 1051 (1977)

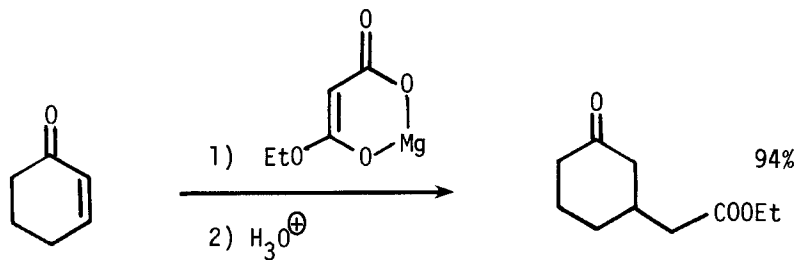
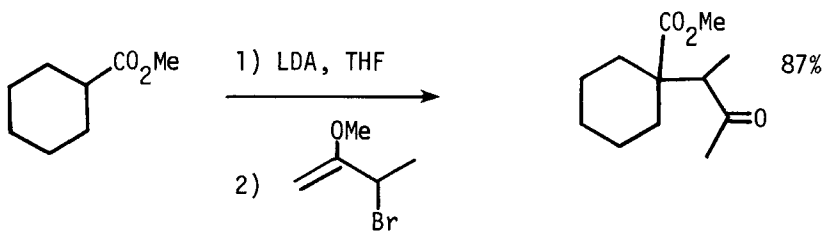
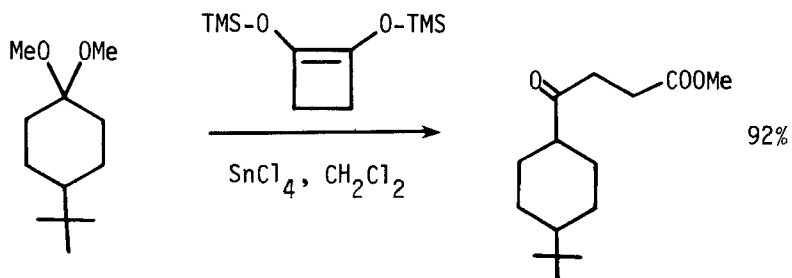
JCS Perkin I, 1822 (1977)

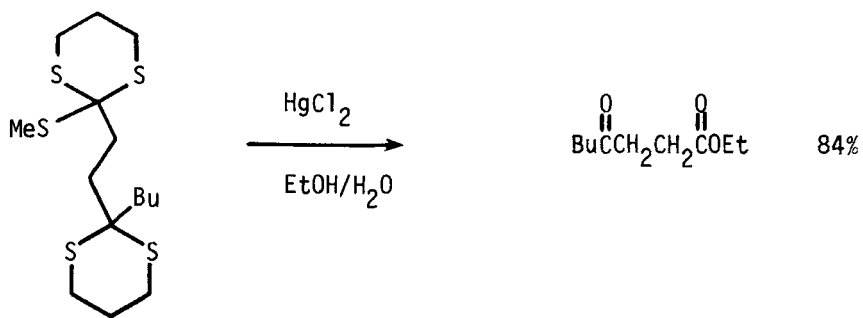
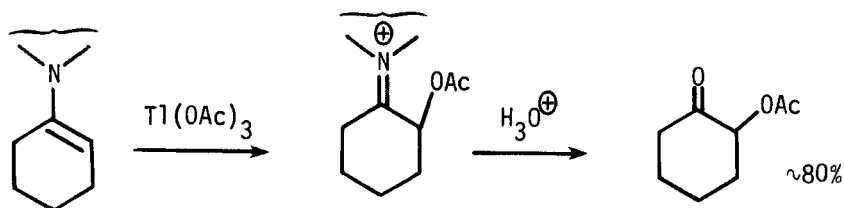


Tetr Lett, 4323 (1978)

JACS 99, 7396 (1977)

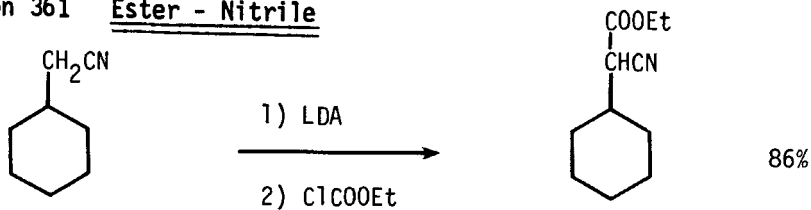
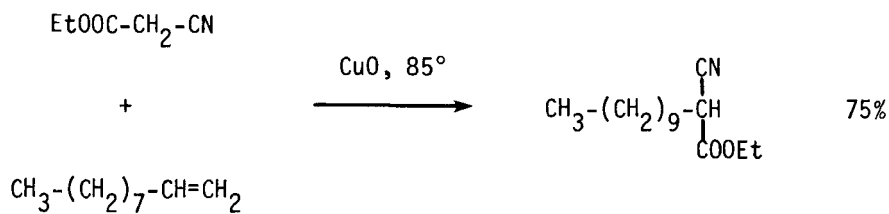
Tetr Lett, 4597 (1978)

Synth Comm 8, 53 (1978)JOC 43, 4650 (1978)JOC 42, 4166 (1977)

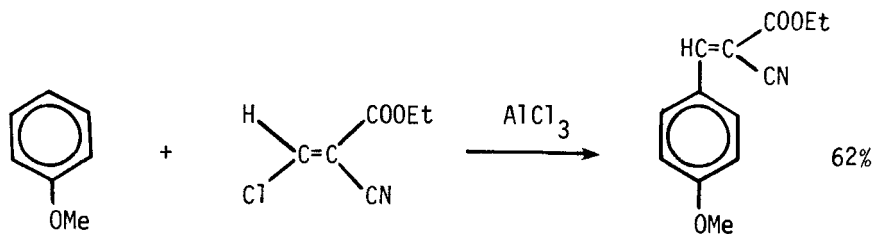
Synth Comm 8, 279 (1978)

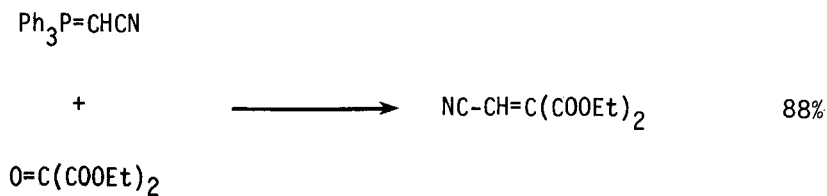
Tetr Lett, 23 (1977)

Also via: Ketoacids (Section 320)
Hydroxyketones (Section 330)

Section 361 Ester - NitrileJOC 42, 2009 (1977)

Synthesis, 454 (1977)

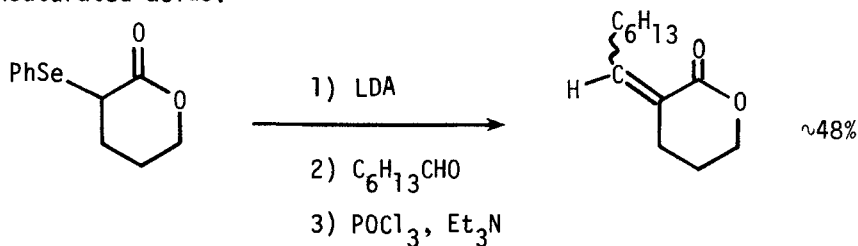
Chem Ber 110, 86 (1977)



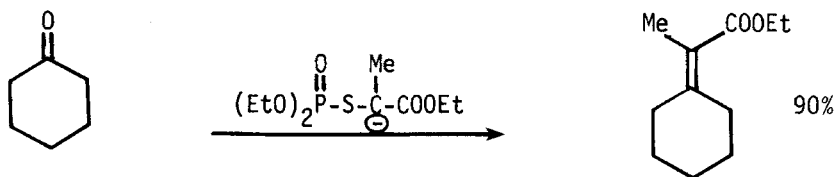
Synthesis, 626 (1977)

Section 362 Ester - Olefin

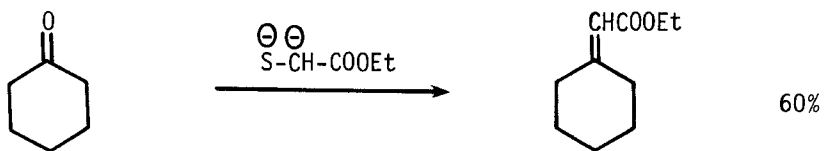
This section contains syntheses of enol esters and esters of unsaturated acids.



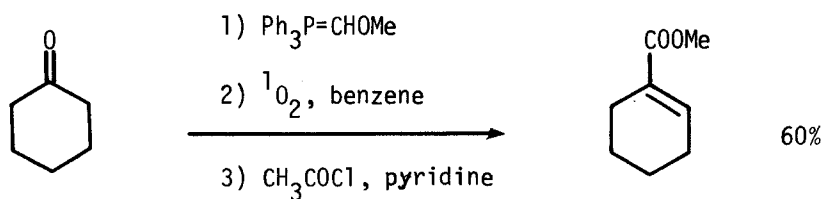
Tetr Lett, 2693 (1978)



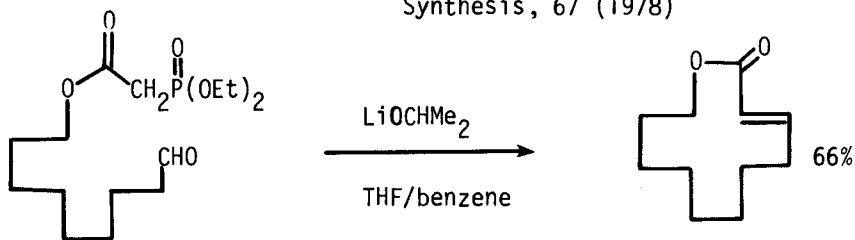
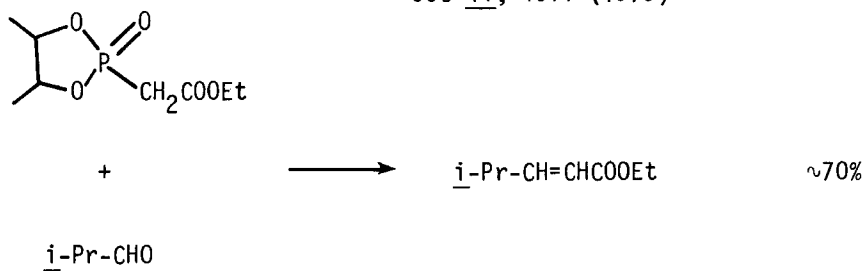
Chem Lett, 1039 (1979)

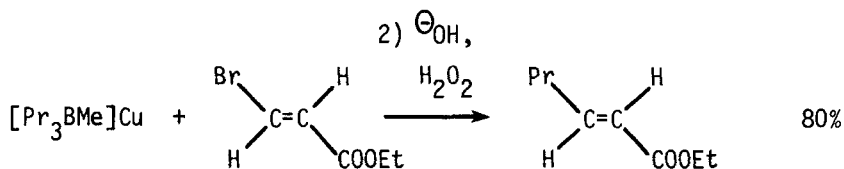


Chem Lett, 471 (1977)

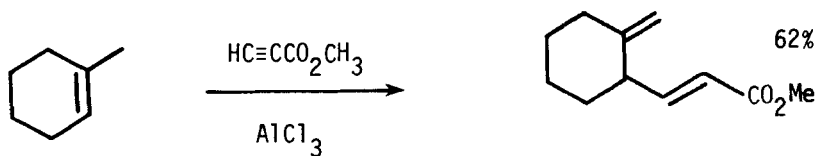
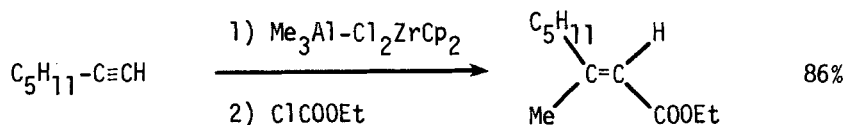


Synthesis, 67 (1978)

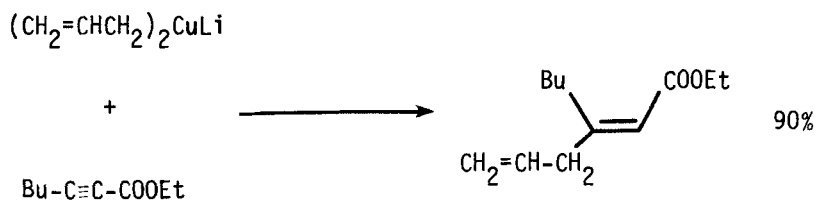
JOC 44, 4010 (1979)JOC 44, 4011 (1979)Tetrahedron 34, 997 (1978)



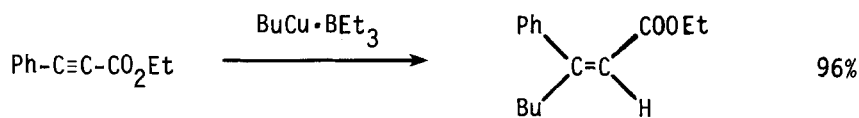
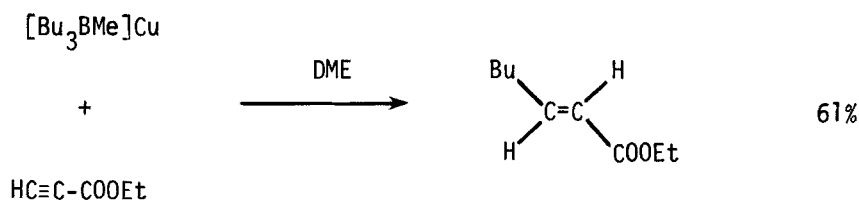
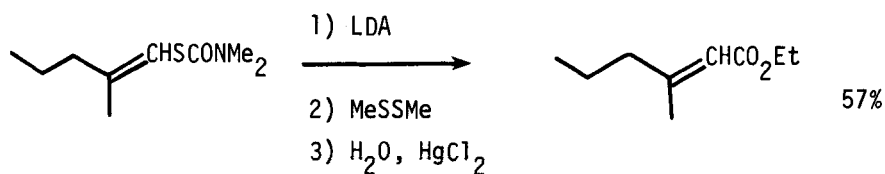
Tetr Lett, 3369 (1977)

JACS 101, 5283 (1979)

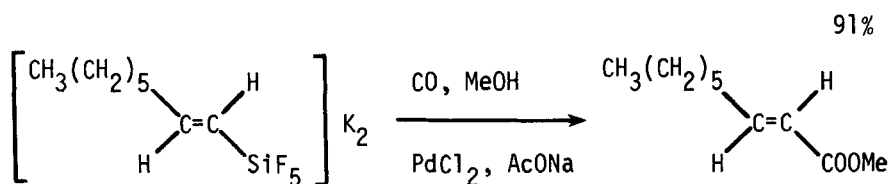
Tetr Lett, 2357 (1978)



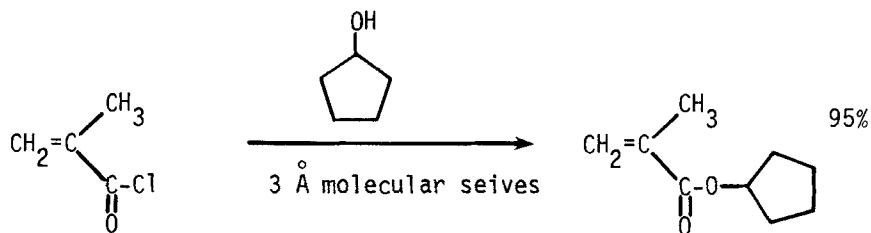
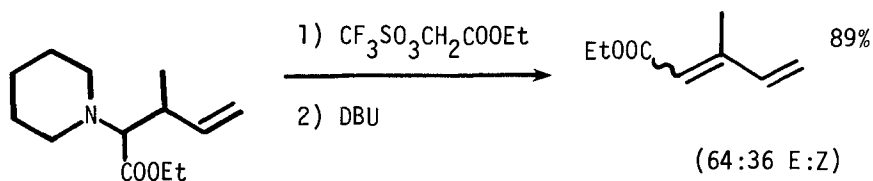
Tetr Lett, 1811 (1979)

JOC 44, 1744 (1979)BCS Japan 50, 3431 (1977)

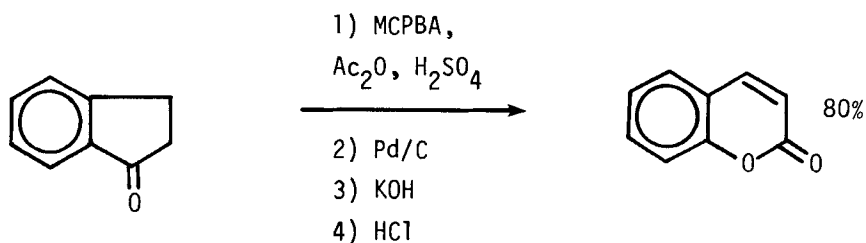
Tetr Lett, 2895 (1978)

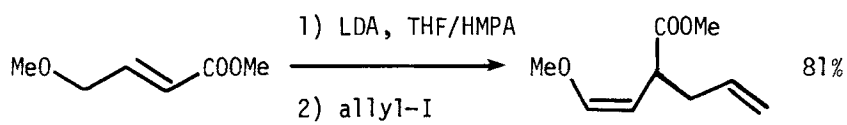
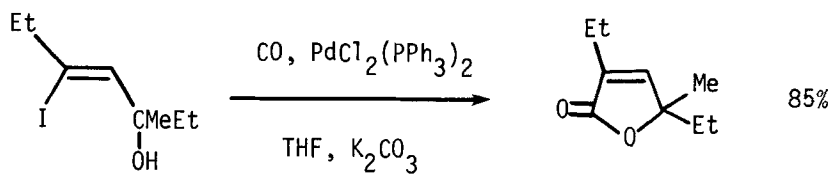


Tetr Lett, 619 (1979)

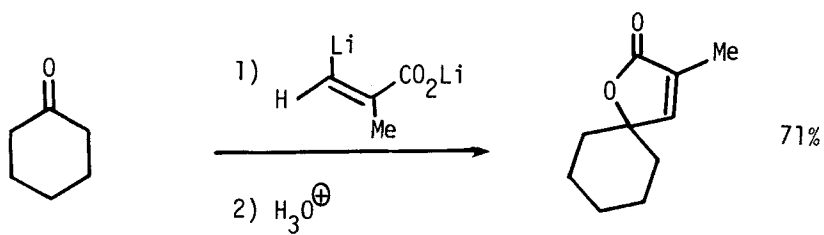
JOC 42, 3965 (1977)

Tetr Lett, 1241 (1977)

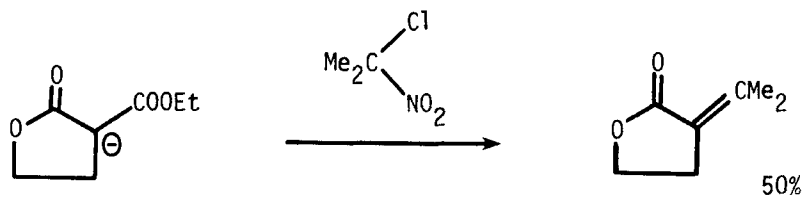
Indian J Chem 15B, 214 (1977)

Synth Comm 7, 189 (1977)

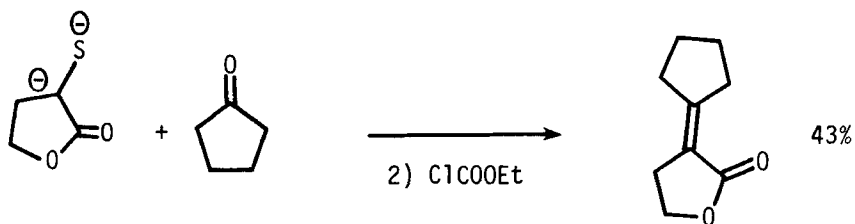
Tetr Lett, 133 (1979)



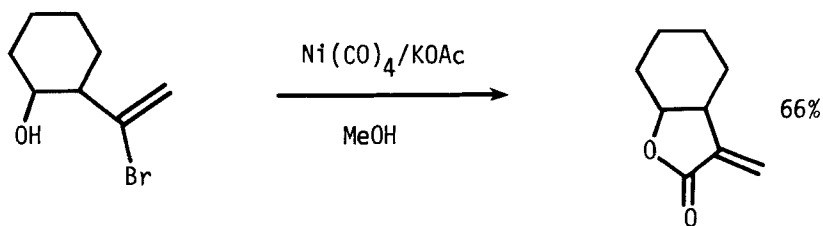
Tetr Lett, 5167 (1978)



Chem Lett, 189 (1977)



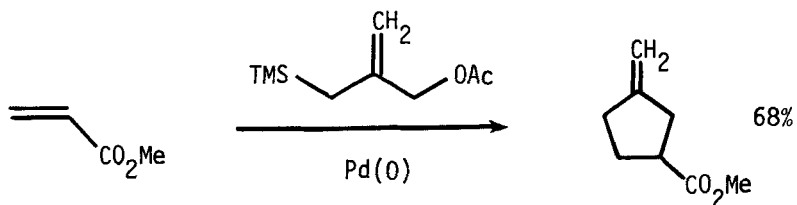
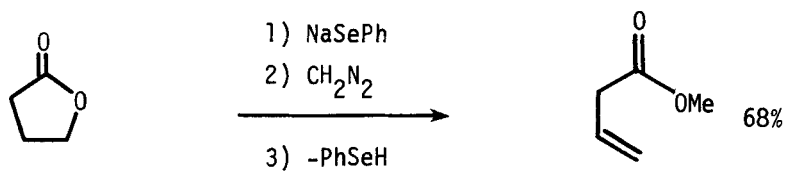
Chem Lett, 653 (1978)



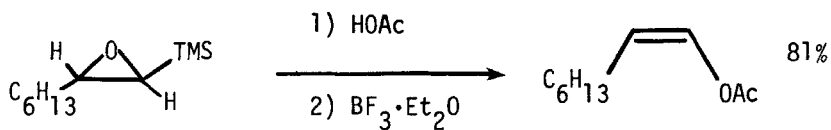
Chem Lett, 773 (1978)

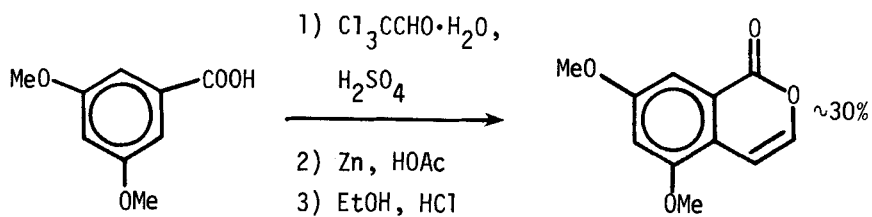
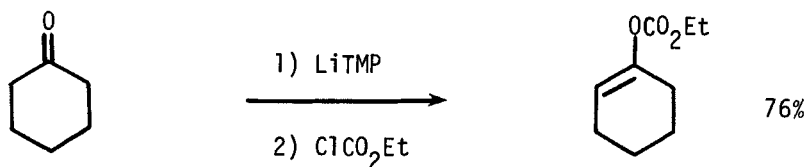
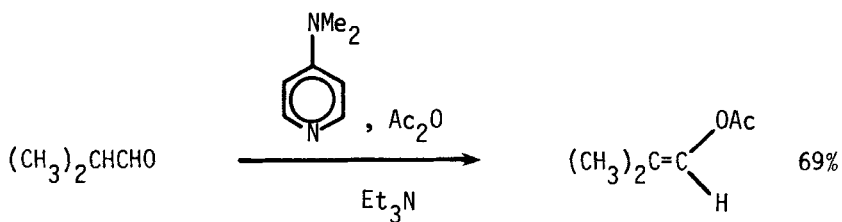
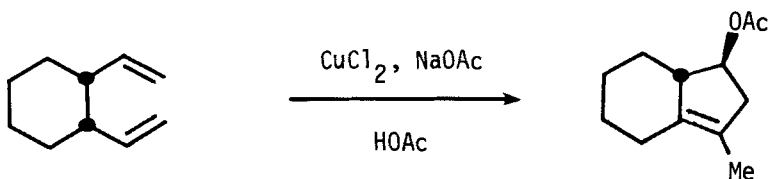
Review: "Recent Methods for the Synthesis of Conjugated Lactones"

Aldrichimica Acta 10, 64 (1977)

JACS 101, 6429 (1979)

Tetr Lett, 4361 and 4369 (1977)

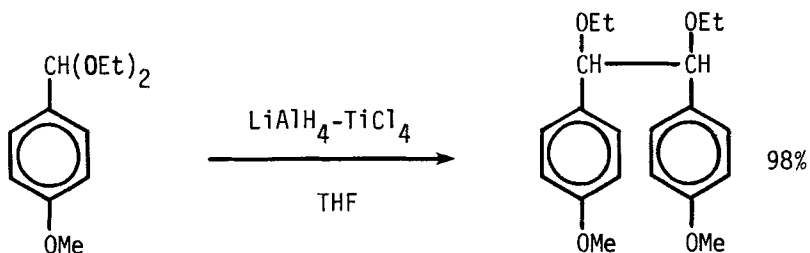
JACS 99, 1993 (1977)

Indian J Chem 15B, 103 (1977)JOC 43, 2073 (1978)Synth Comm 9, 157 (1979)Angew Int Ed 18, 866 (1979)

Also via: Acetylenic esters (Section 306)
Olefinic acids (Section 322)
 β -Hydroxyesters (Section 327)

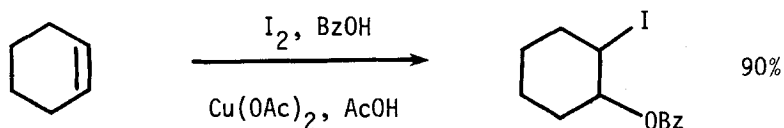
Section 363 Ether - Ether

See Section 60A (Protection of Aldehydes) and Section 180A (Protection of Ketones) for reactions involving the formation of acetals and ketals.

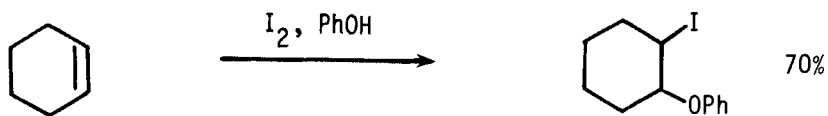


BCS Japan 51, 2059 (1978)

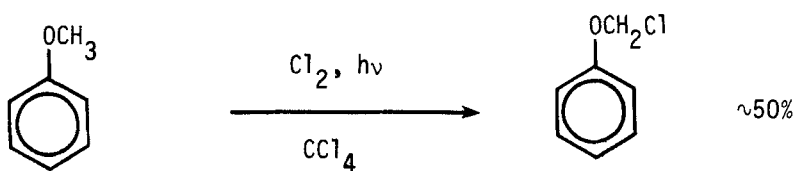
Section 364 Ether - Halide



Synthesis, 402 (1978)

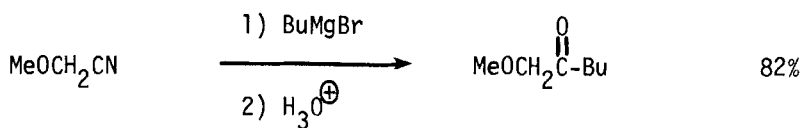


Synthesis, 67 (1979)

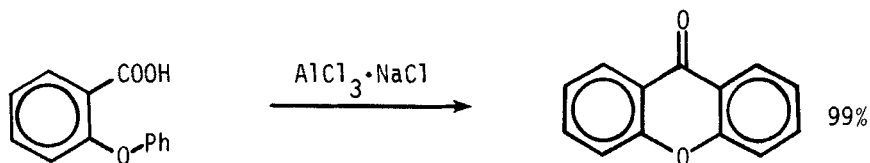


Chem and Ind, 127 (1977)

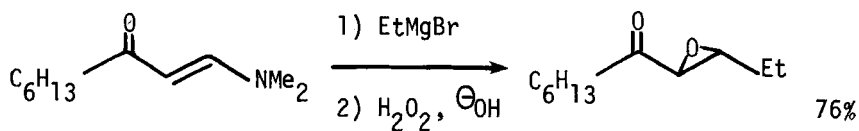
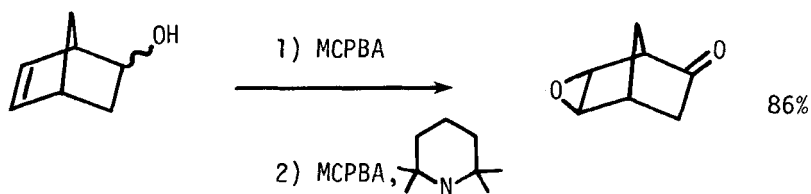
Section 365 Ether, Epoxide - Ketone



Tetr Lett, 23 (1977)



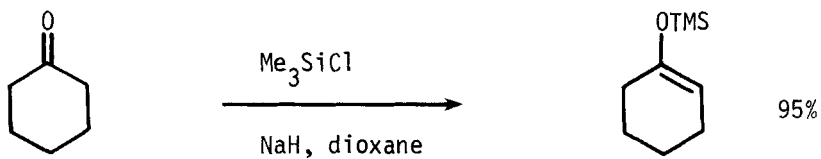
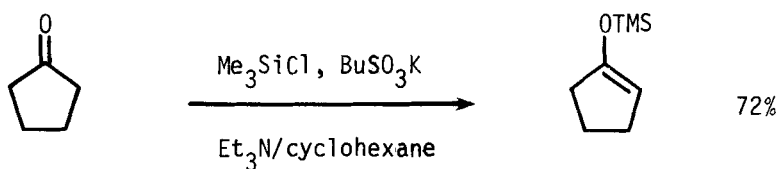
JOC 44, 3724 (1979)

JOC (USSR) 13, 1062 (1977)JOC 42, 2077 (1977)Section 366 Ether, Epoxide - Nitrile

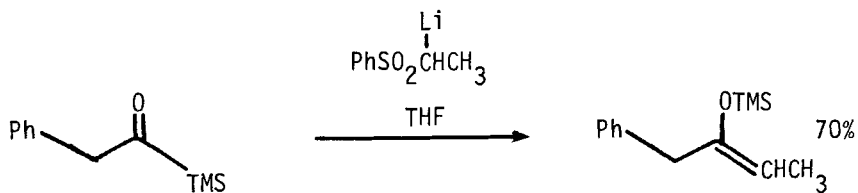
No additional examples

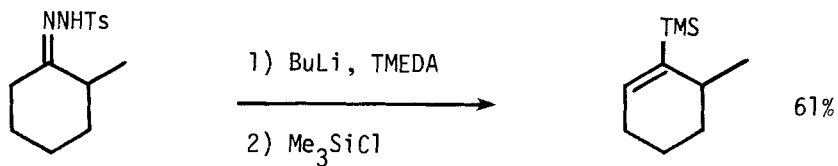
Section 367 Ether - Olefin

Related methods: Protection of Ketones (Section 180A).

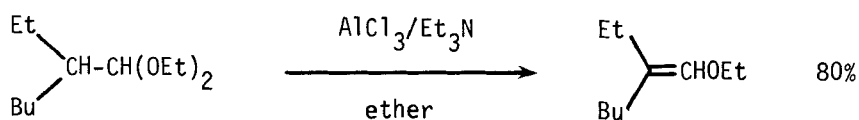
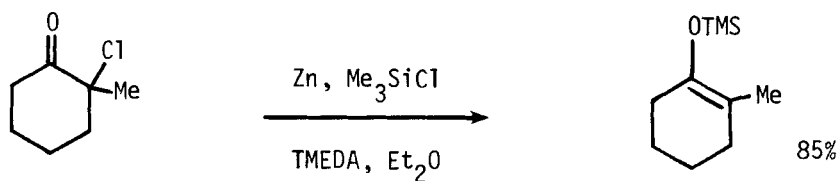
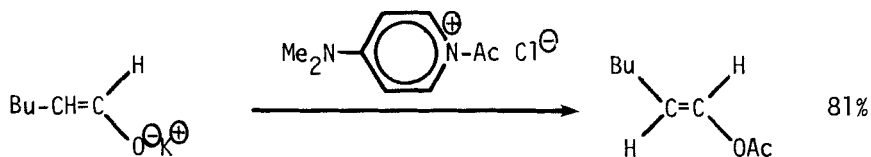
JOC 43, 3861 (1978)

Synthesis, 34 (1979)

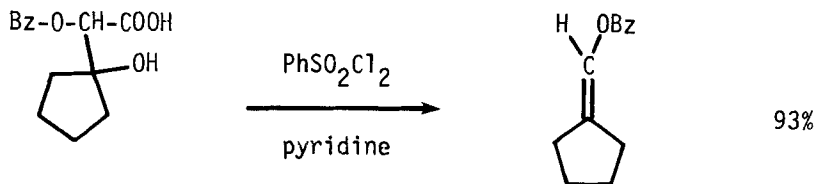
JACS 101, 2225 (1979)



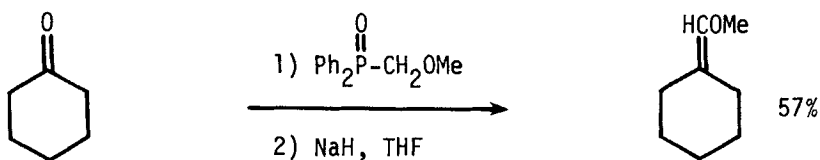
Tetr Lett, 159 (1977)

Helv Chim Acta 62, 1451 (1979)Synth Comm 7, 327 (1977)

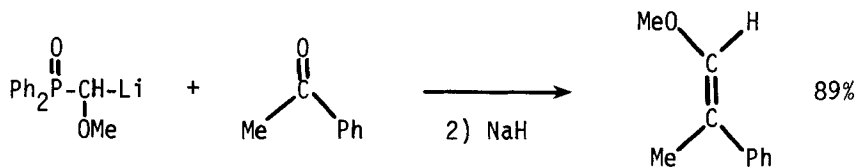
Synthesis, 504 (1979)



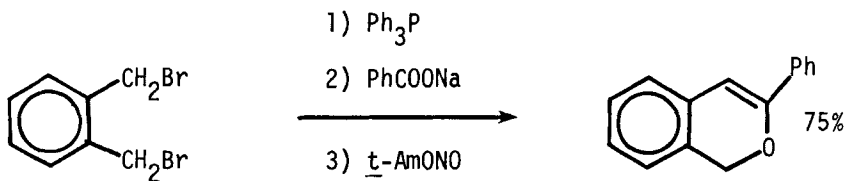
Synthesis, 388 (1979)



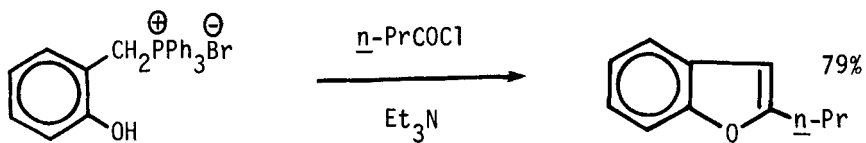
JCS Chem Comm, 314 (1977)



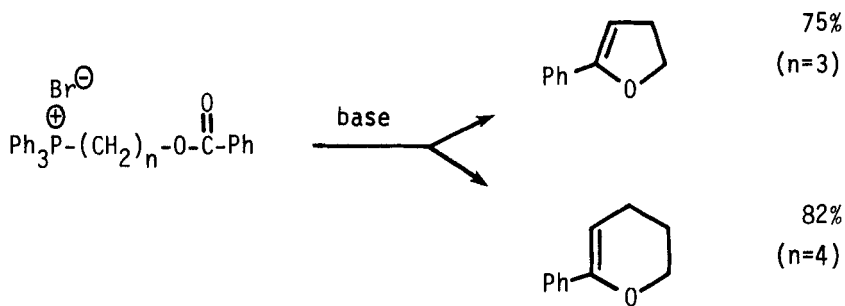
JCS Perkin I, 3099 (1979)



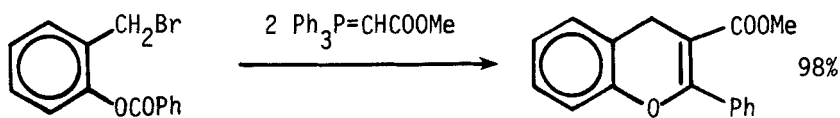
Tetr Lett, 2149 (1979)



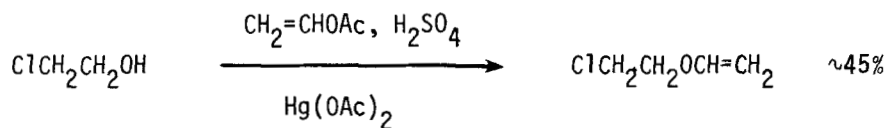
Tetr Lett, 2145 (1979)



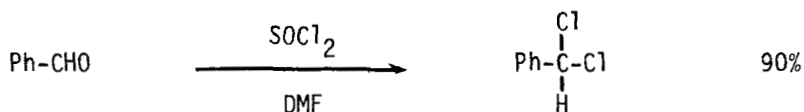
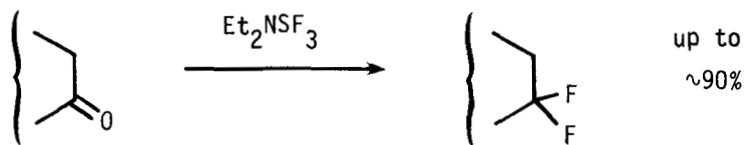
Tetr Lett, 5 (1979)



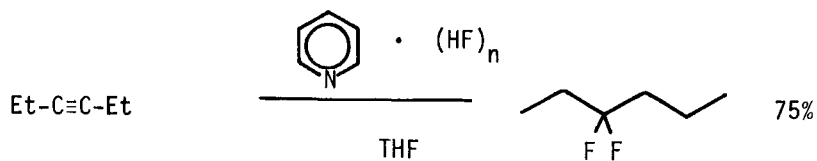
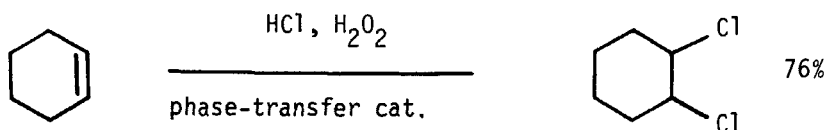
Tetr Lett, 2995 (1979)

JOC (USSR) 13, 606 (1977)Section 368 Halide - Halide

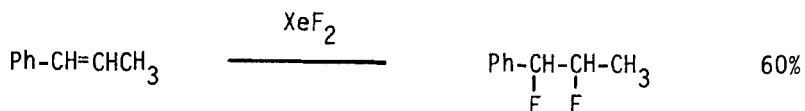
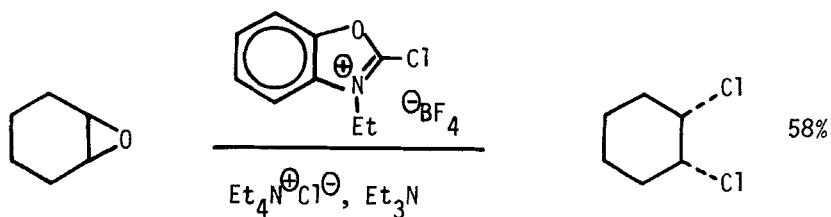
Halocyclopropanations are found in Section 74 (Alkyls from Olefins).

JOC 43, 4367 (1978)

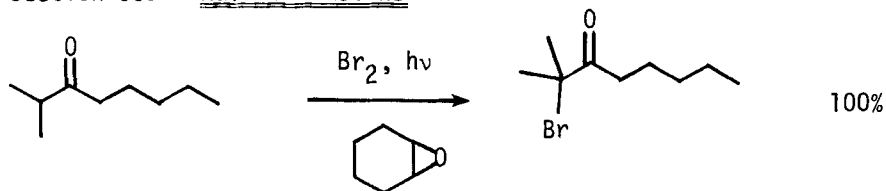
JCS Perkin I, 1354 (1979)

JOC 44, 3872 (1979)

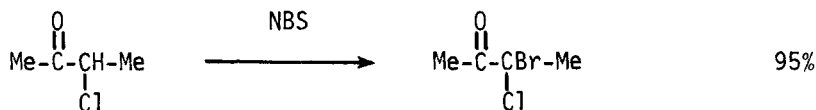
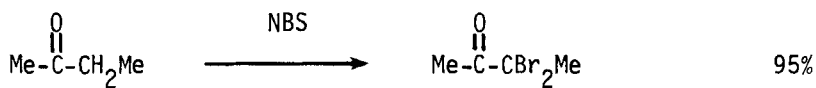
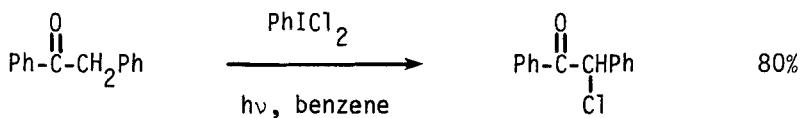
Synthesis, 676 (1977)

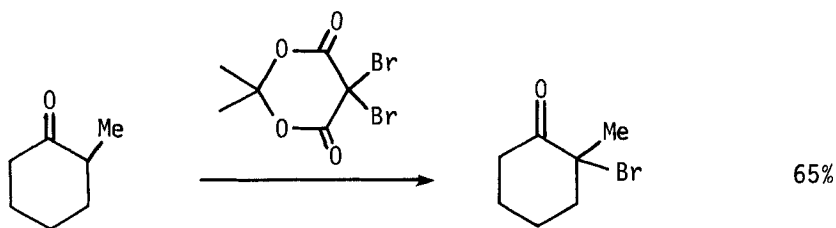
JOC 42, 1559 (1977)

Chem Lett, 1013 (1977)

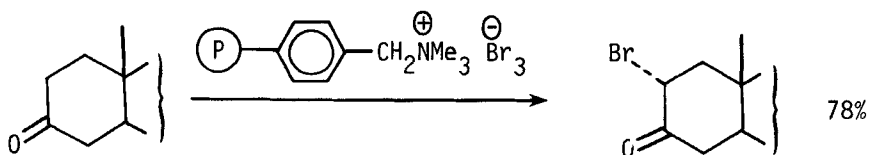
Section 369 Halide - Ketone

JCS Perkin I, 501 (1977)

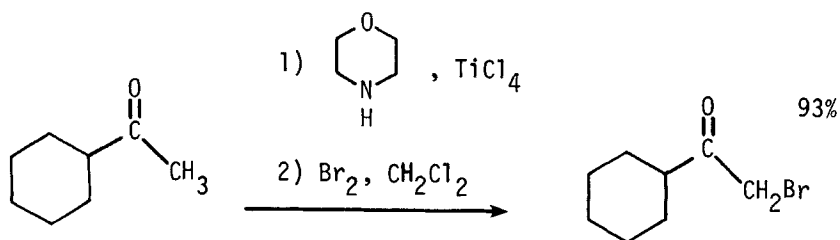
JOC 42, 3527 (1977)JOC (USSR) 14, 1414 (1978)

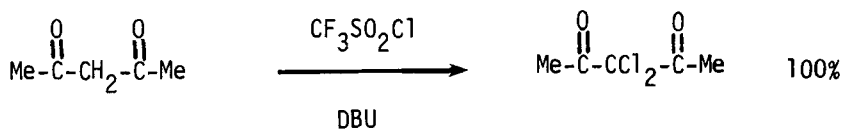


Synthesis, 140 (1978)

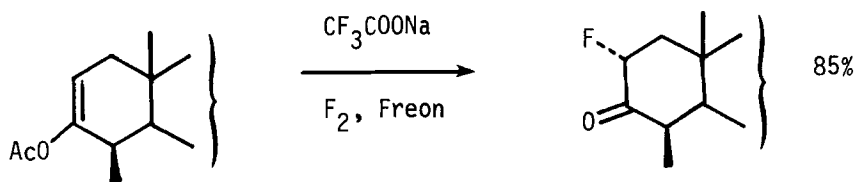


Synthesis, 64 (1979)

Acta Chem Scand B32, 646 (1979)

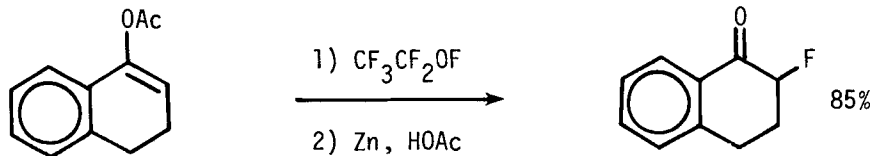
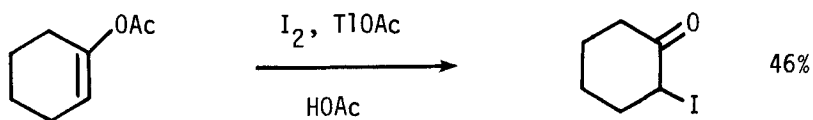


Tetr Lett, 3643 (1979)

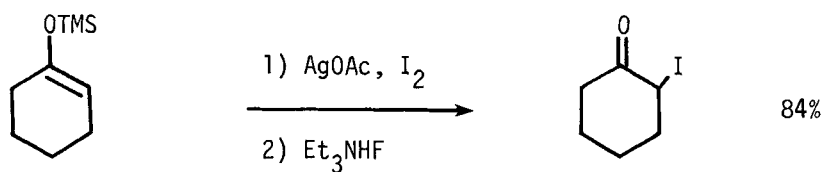
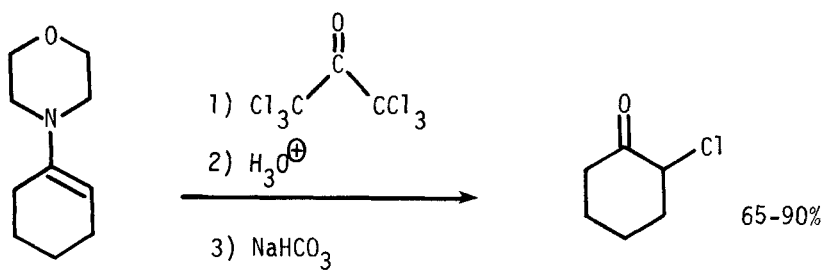


JCS Chem Comm, 479 (1979)

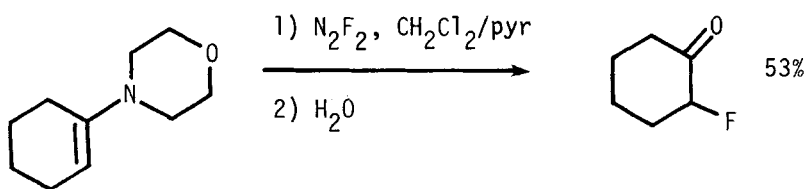
Tetr Lett, 725 (1979)

JACS 101, 2782 (1979)

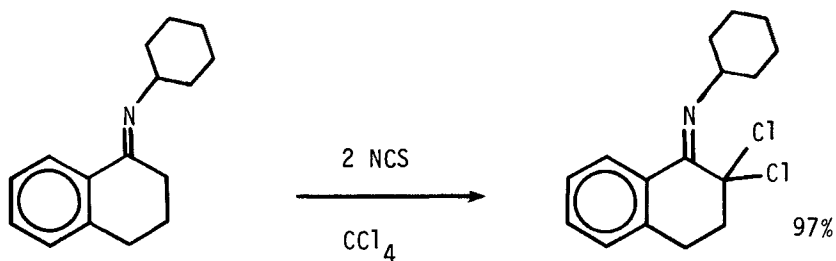
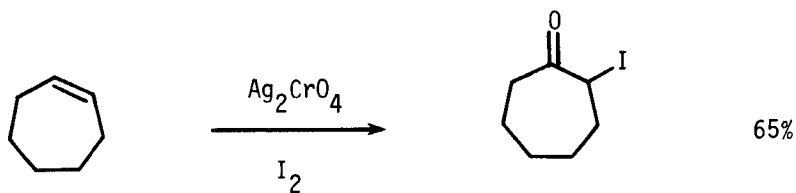
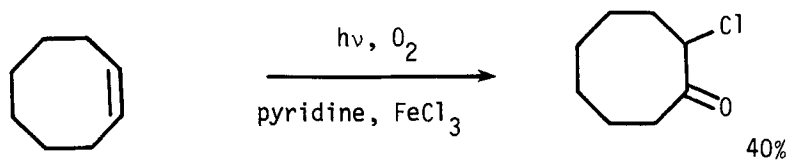
JCS Perkin I, 126 (1978)

JOC 44, 1731 (1979)JACS 99, 6672 (1977)

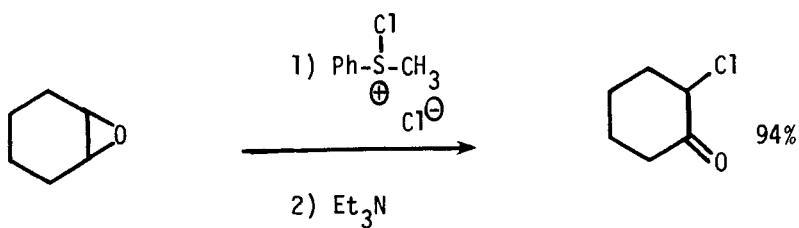
Tetr Lett, 759 (1977)



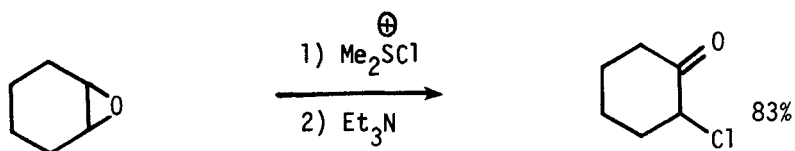
Tetr Lett, 2797 (1977)

Synth Comm 8, 75 (1978)JOC 42, 4268 (1977)

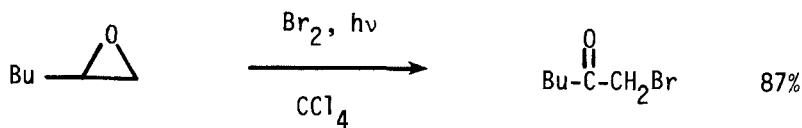
Chem Lett, 161 (1978)



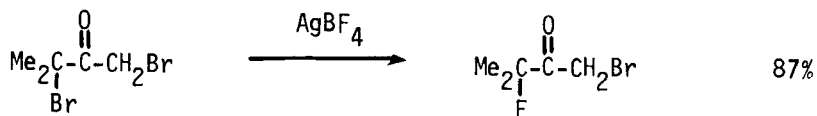
Chem Lett, 995 (1977)



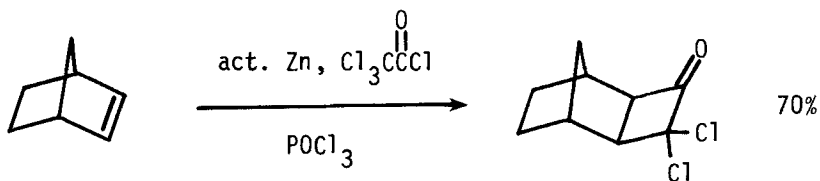
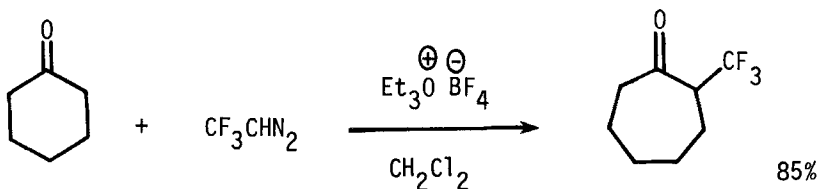
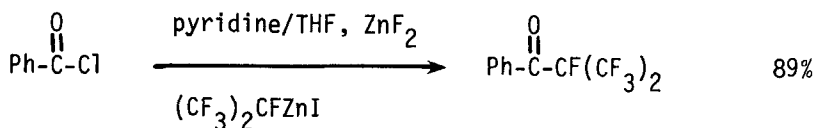
Tetr Lett, 3653 (1979)



Synthesis, 139 (1978)

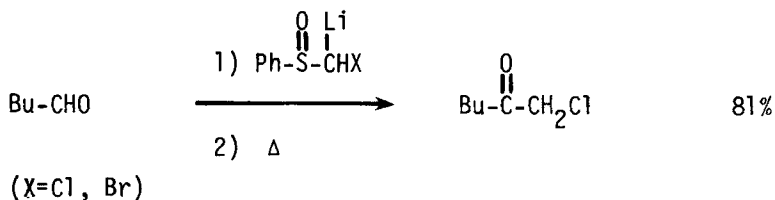


Tetr Lett, 3357 (1979)

JOC 43, 2879 (1978)JOC 42, 459 (1977)

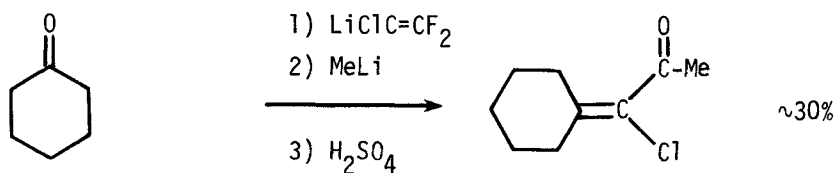
Also works with anhydrides.

Chem Lett, 81 (1977)

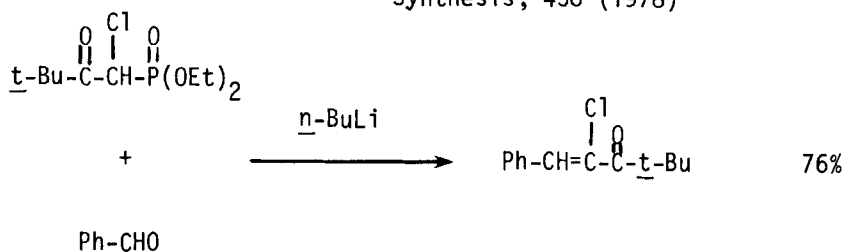


Tetr Lett, 1225 (1977)

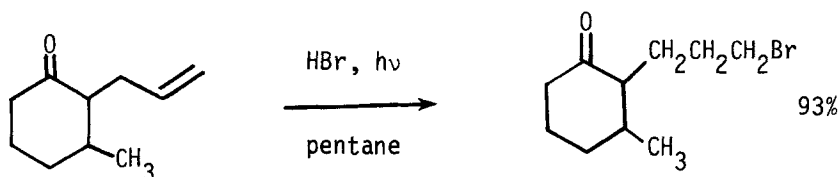
Chem Lett, 209 (1979)



Synthesis, 458 (1978)

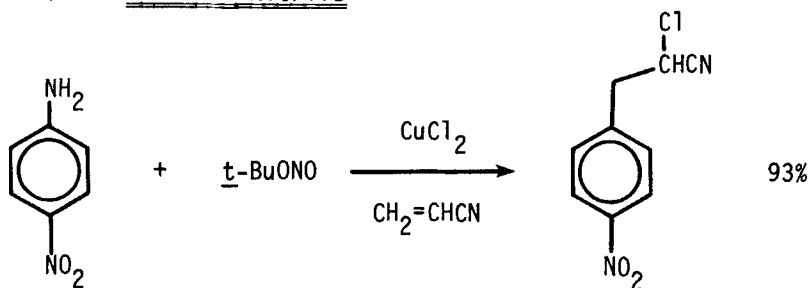
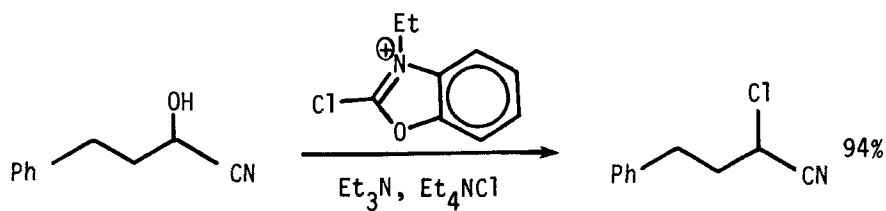


Synthesis, 29 (1978)



Synthesis of several additional vinyl ketones and their conversion to ω -bromoketones are also presented.

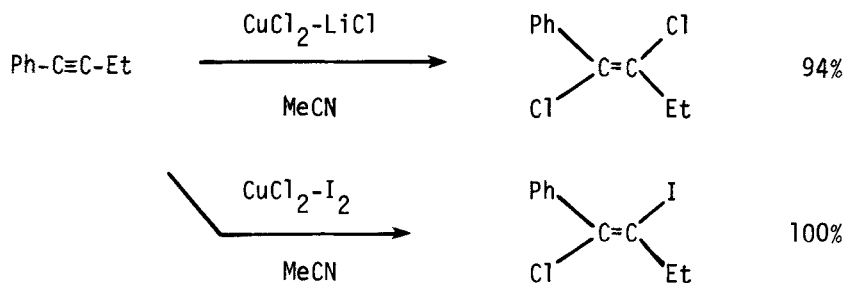
JOC 42, 1709 (1977)

Section 370 Halide - NitrileJOC 42, 2431 (1977)

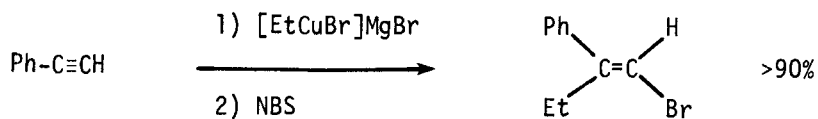
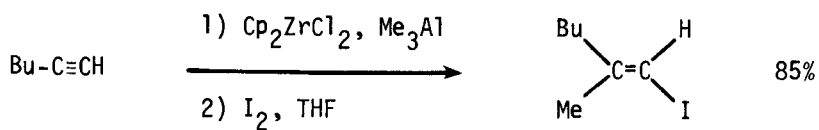
Chem Lett, 1117 (1979)

Review: "Preparation and Reactions of Chloro-derivatives of Nitriles"

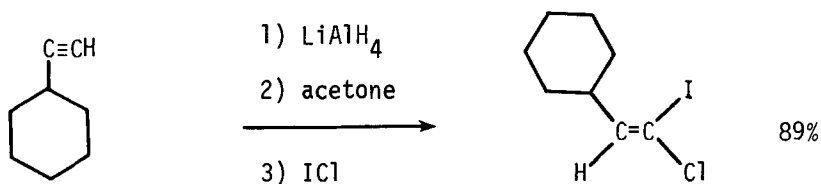
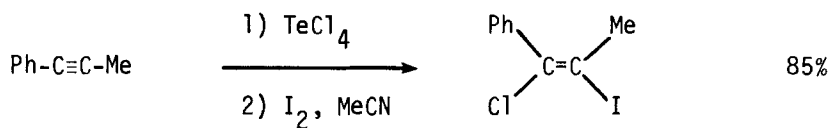
Russ Chem Rev 48, 282 (1979)

Section 371 Halide - Olefin

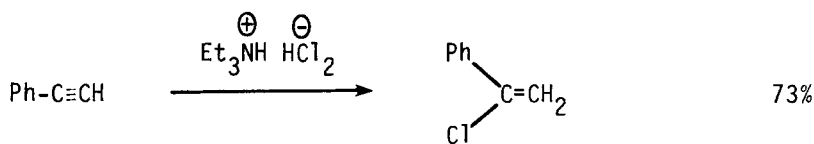
JCS Perkin I, 676 (1977)

Rec Trav Chim 96, 168 (1977)

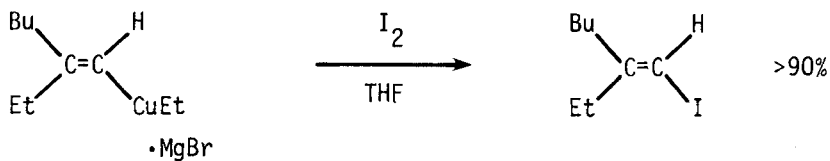
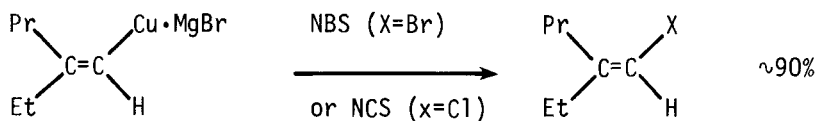
Synthesis, 501 (1979)

JACS 101, 5101 (1979)

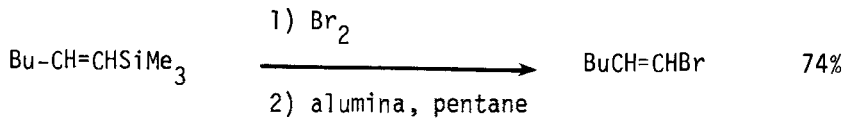
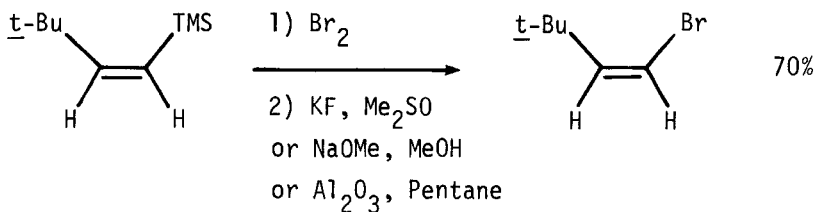
Chem Lett, 1357 (1979)

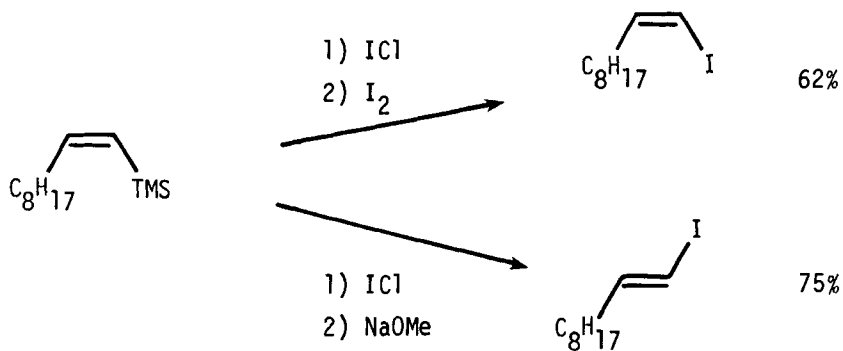


JCS Perkin I, 1797 (1977)

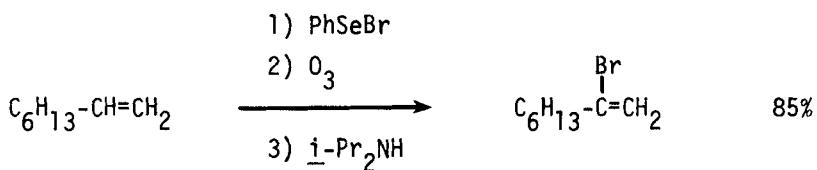
Rec Trav 96, 168 (1977)

Tetr Lett, 3545 (1977)

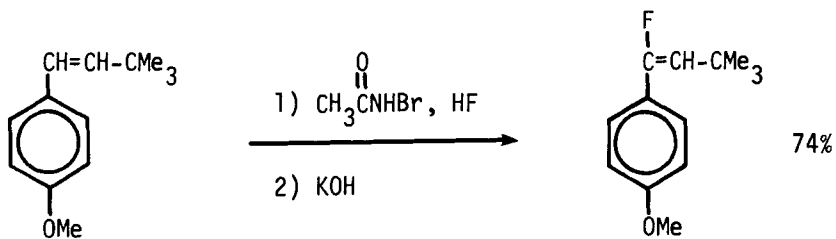
Synth Comm 7, 475 (1977)JOC 43, 4424 (1978)



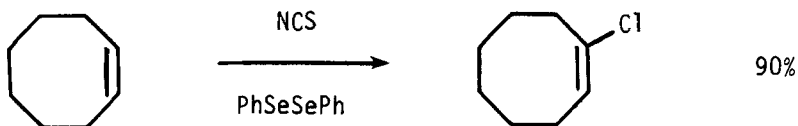
Tetr Lett, 1073 (1979)



Tetr Lett, 3909 (1977)

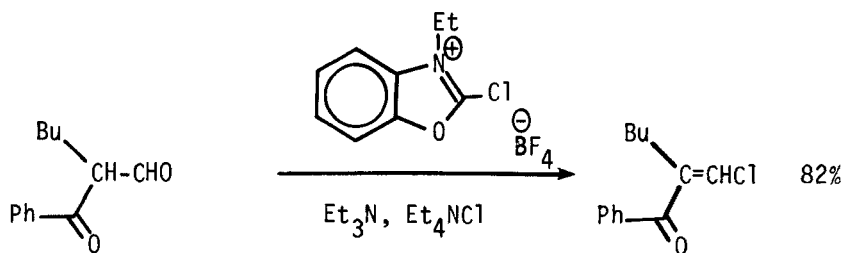


Synthesis, 217 (1978)

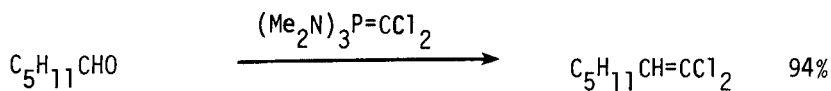


Several other cases give allylic chlorides.

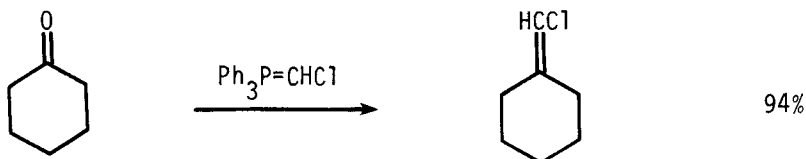
JOC 44, 4204 (1979)



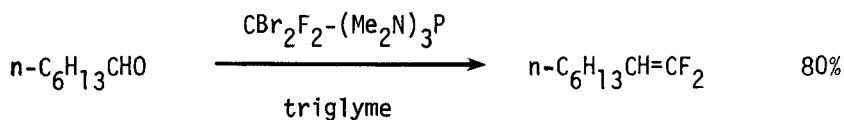
Chem Lett, 465 (1978)



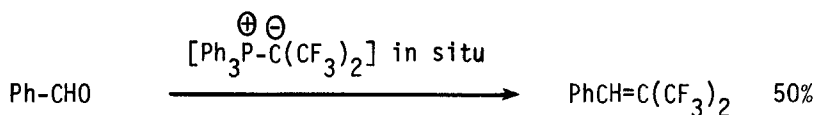
Tetr Lett, 1239 (1977)



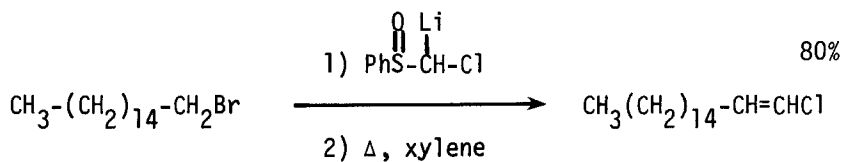
JCS Chem Comm, 446 (1978)



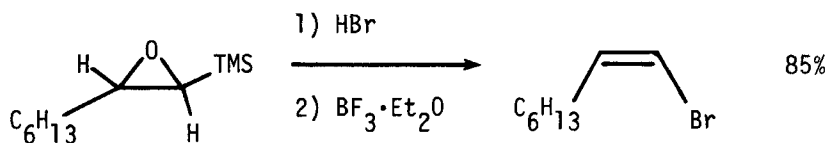
Chem Lett, 983 (1979)

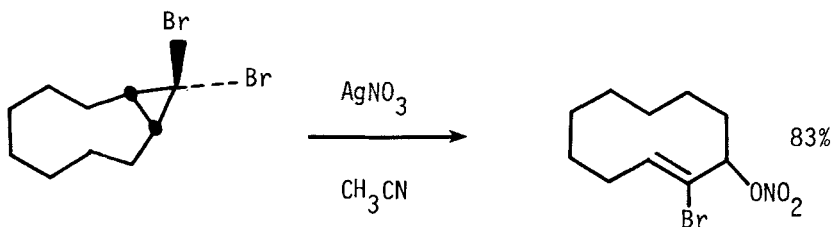
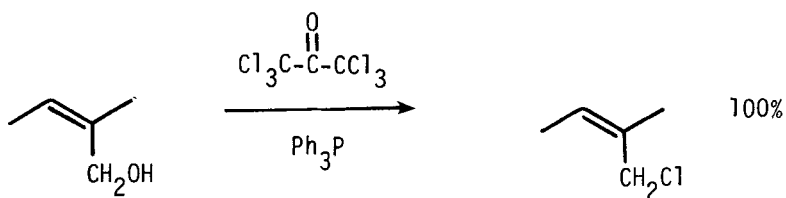
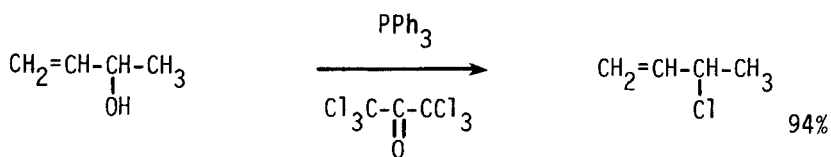


Tetr Lett, 3397 (1979)

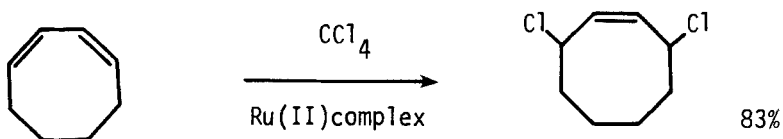


Tetr Lett, 617 (1979)

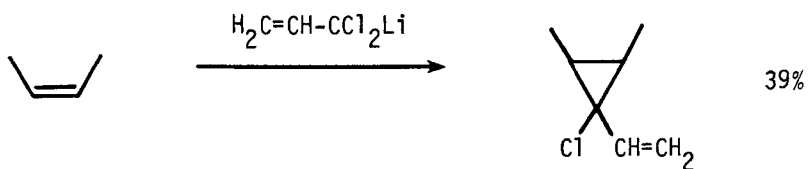
JACS 99, 1993 (1977)

JOC 42, 418 (1977)JOC 44, 359 (1979)

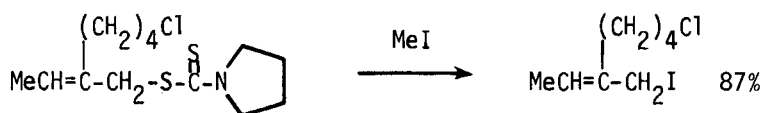
Tetr Lett, 2999 (1977)



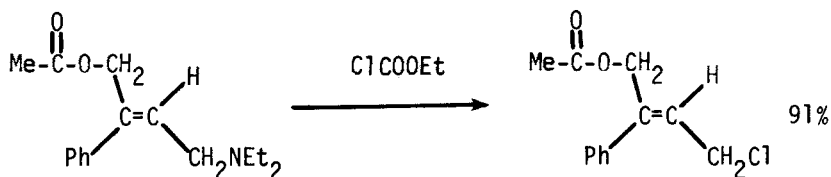
Chem Lett, 115 (1978)



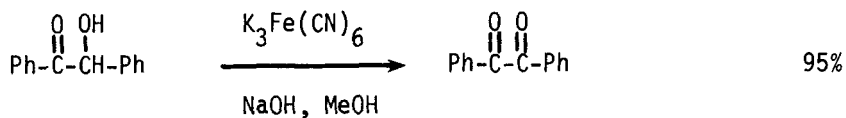
Synthesis, 425 (1979)



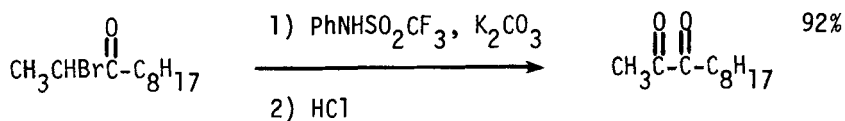
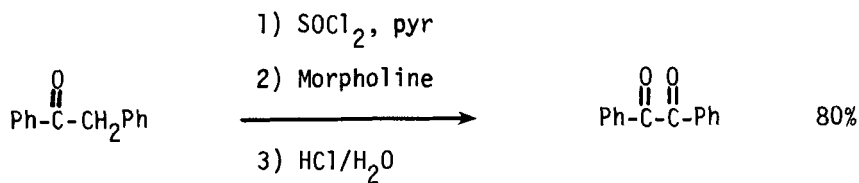
Synthesis, 370 (1978)



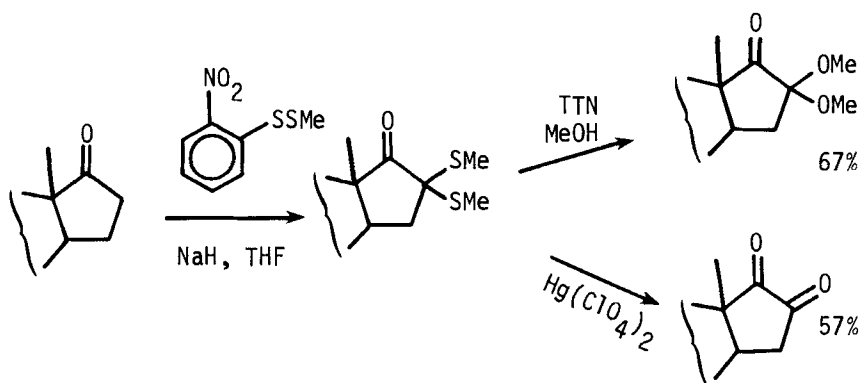
Synthesis, 786 (1977)

Section 372 Ketone - Ketone

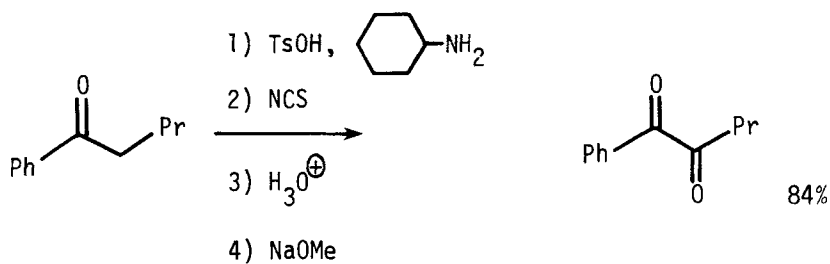
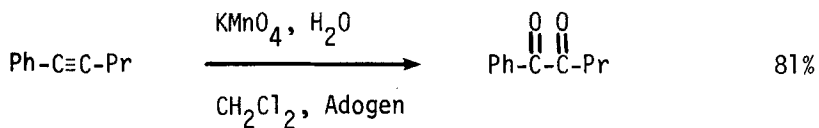
Chem and Ind, 741 (1977)

JOC 44, 1835 (1979)

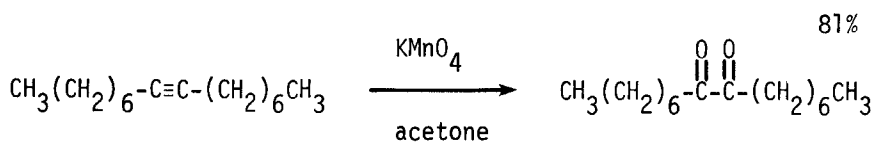
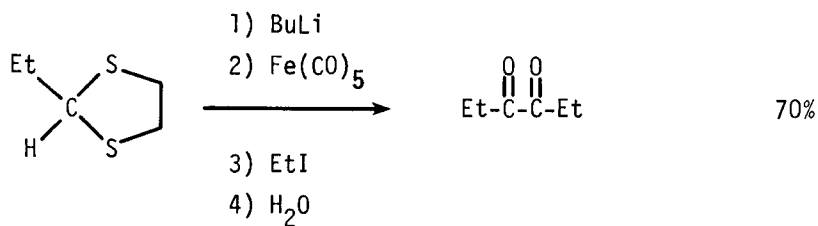
Tetr Lett, 695 (1977)



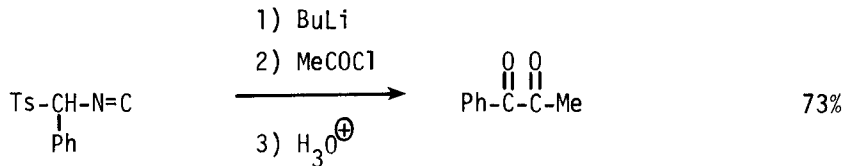
Tetr Lett, 5021 (1978)

JOC 43, 2933 (1978)

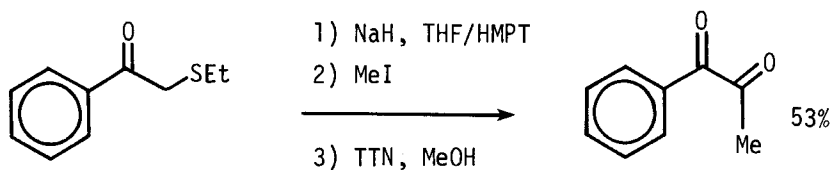
Synthesis, 462 (1978)

JOC 44, 1574 (1979)

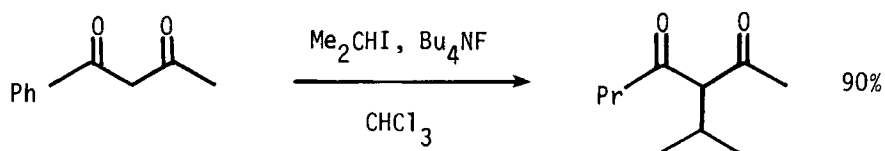
JCS Chem Comm, 691 (1977)



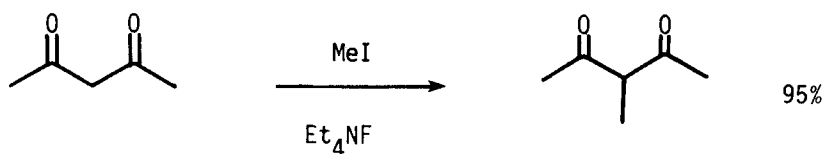
Tetr Lett, 4233 (1977)



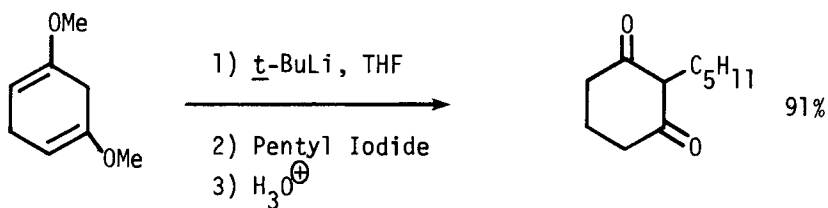
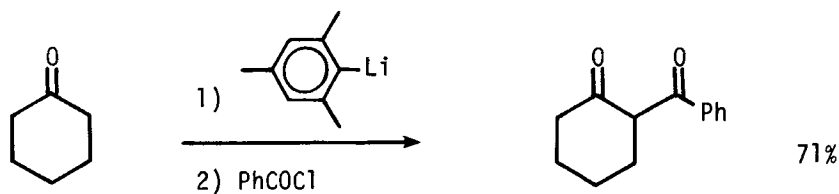
Tetr Lett, 4115 (1978)



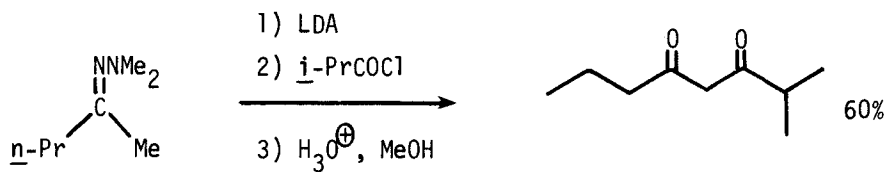
JCS Perkin I, 1743 (1977)



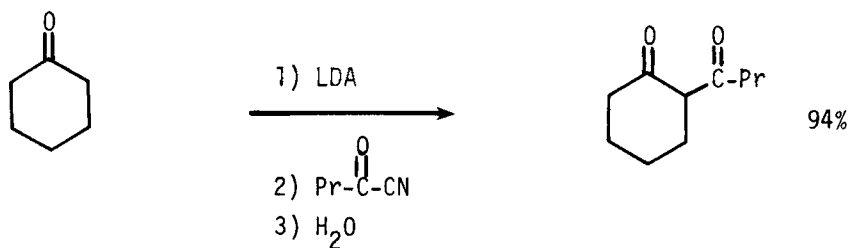
JCS Chem Comm, 64 (1977)

JOC 42, 3755 (1977)

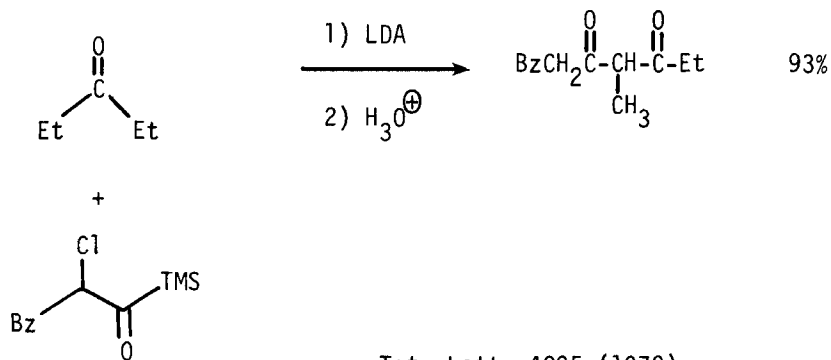
Tetr Lett, 1187 (1977)



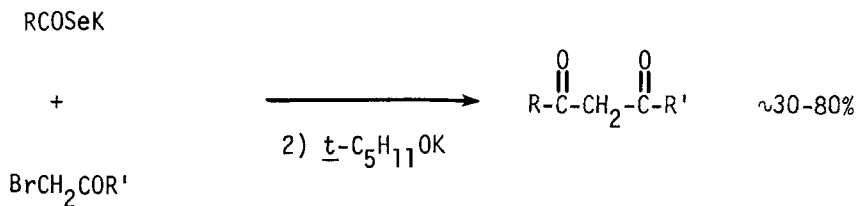
Tetr Lett, 2853 (1978)



Tetr Lett, 1339 (1979)

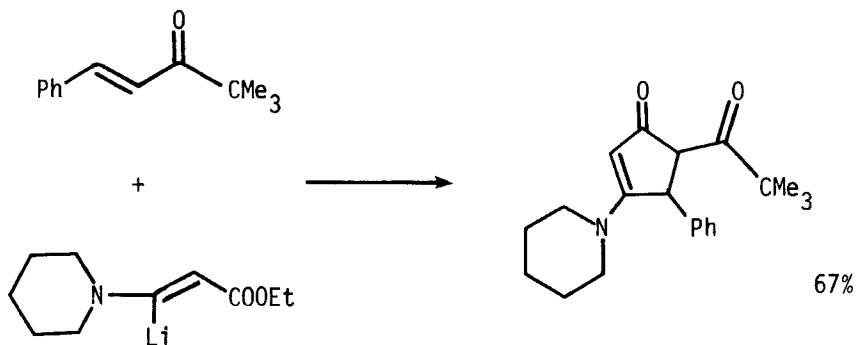


Tetr Lett, 4095 (1979)

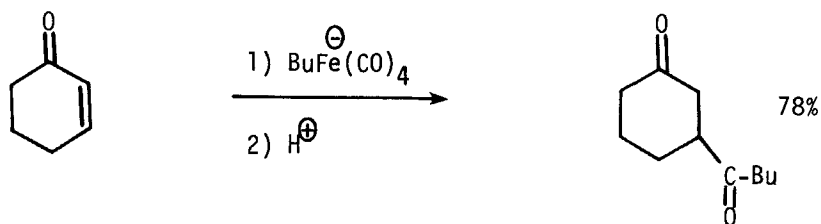


R, R' = subst. Ph, alkyl

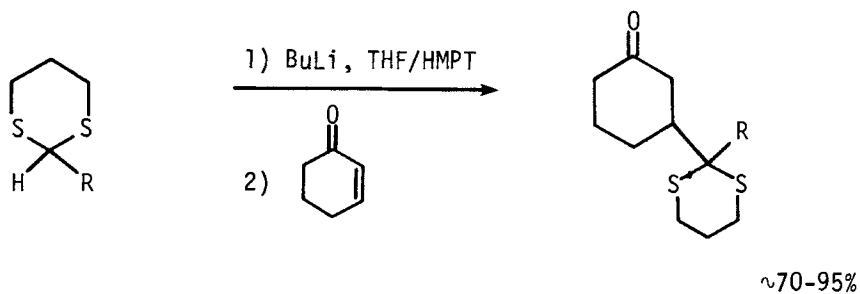
Chem Lett, 1007 (1978)



Angew Int Ed 17, 204 (1978)

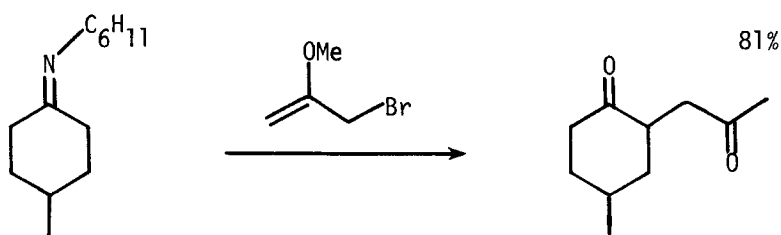


JACS 99, 5222 (1977)

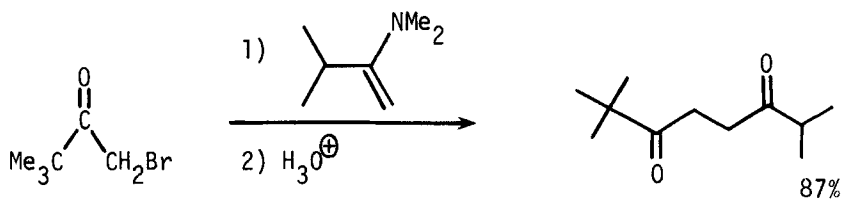


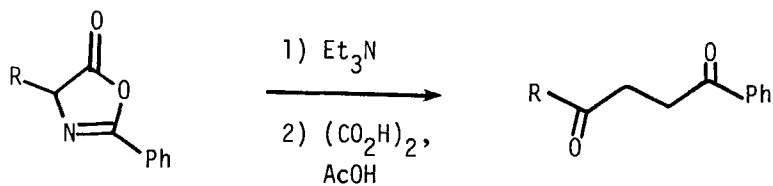
Tetr Lett, 3549 (1977)

Tetr Lett, 2695 (1979)



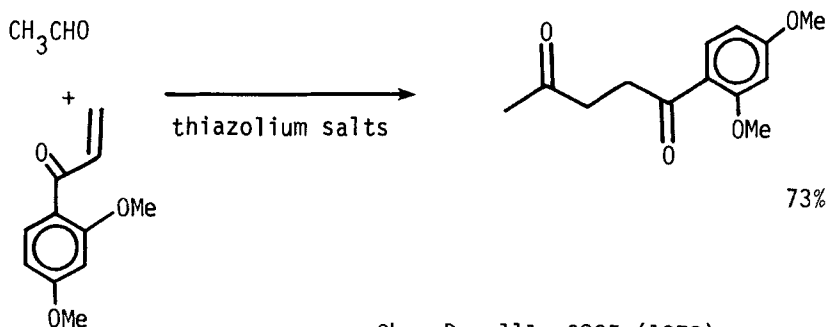
Can be used to form cyclopentenones

JOC 42, 2545 (1977)Acta Chem Scand (B) 30, 1000 (1976)



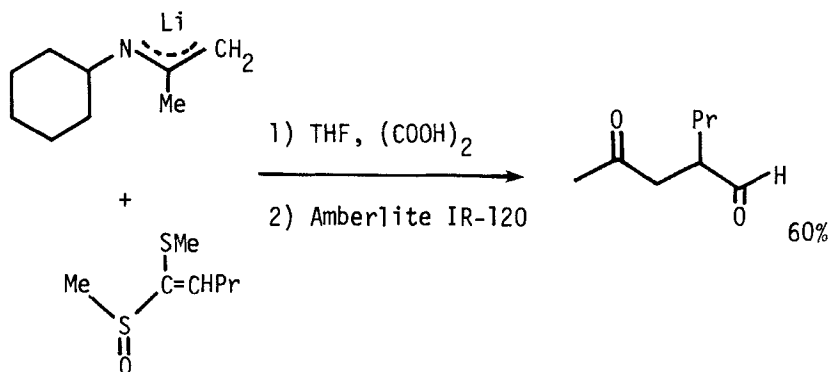
$\text{HC}\equiv\text{C}-\text{COPh}$

Chem Ber 112, 3221 (1979)

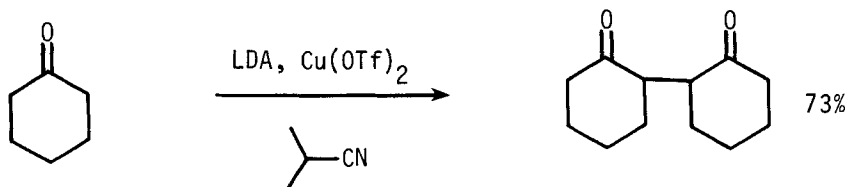


Chem Ber 111, 2825 (1978)

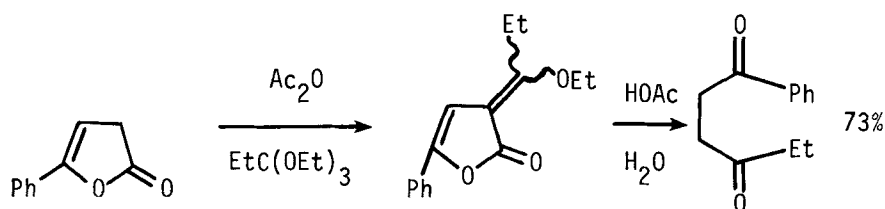
Chem Ber 112, 84 (1979)



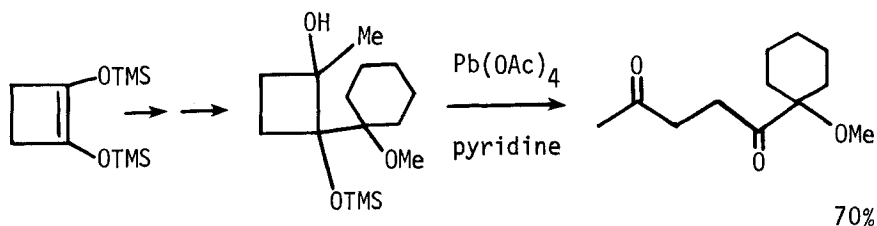
J Chem Research (S), 68 (1978)



Tetr Lett, 3741 (1977)



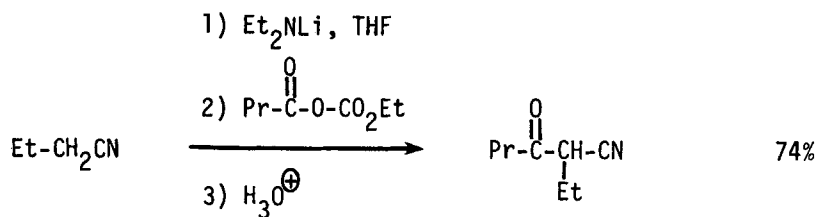
Chem Lett, 171 (1977)



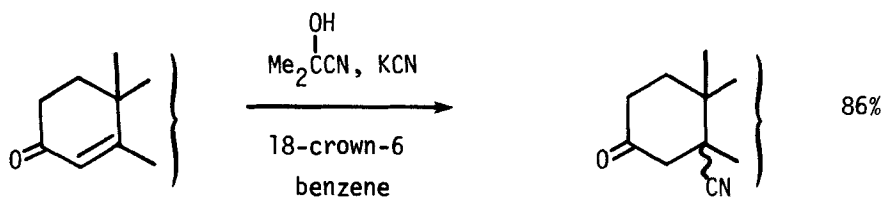
Chem Lett, 1433 (1978)

Review: "Synthesis of Polyketide-type Aromatic Natural Products by Biogenetically Modeled Routes"

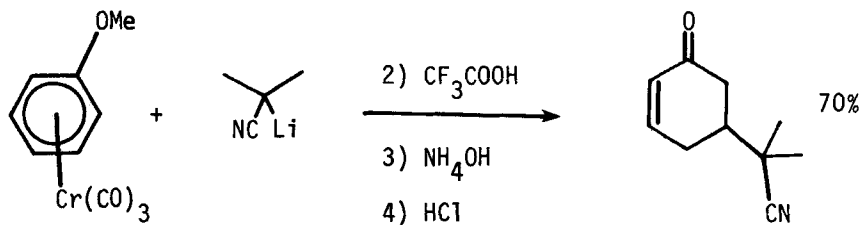
Tetrahedron 33, 2159 (1977)

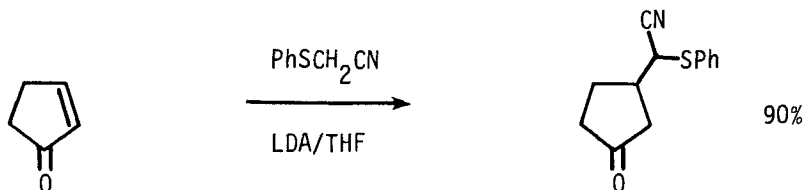
Section 373 Ketone - Nitrile

Tetr Lett, 1585 (1979)

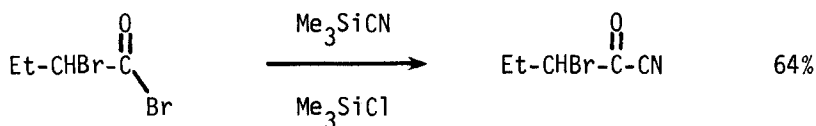


Tetr Lett, 1117 (1977)

JOC 44, 3275 (1979)



Tetr Lett, 1121 (1979)



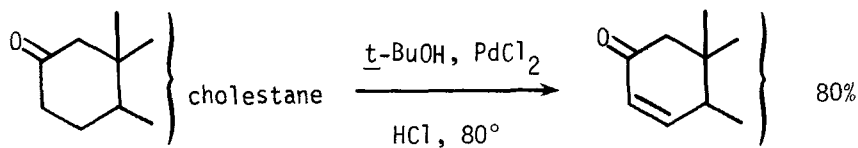
Synthesis, 204 (1979)

Section 374 Ketone - Olefin

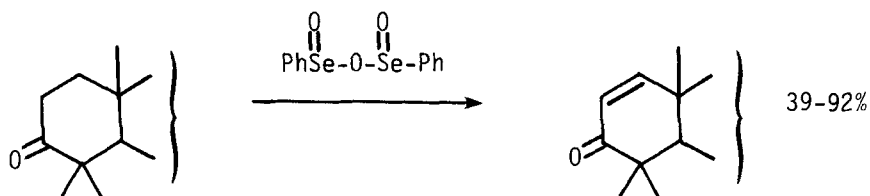
For the oxidation of allylic alcohols to olefinic ketones, see Section 168 (Ketones from Alcohols and Phenols).

For the oxidation of allylic methylene groups ($\text{C}=\text{C}-\text{CH}_2 \rightarrow \text{C}=\text{C}-\text{CO}$), see Section 170, Vol. 1 and 2 (Ketones from Alkyls and Methylene).

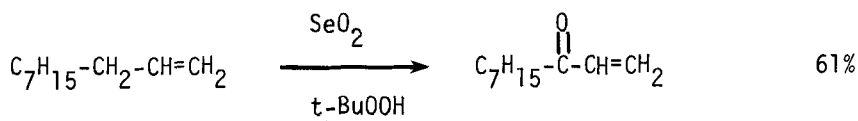
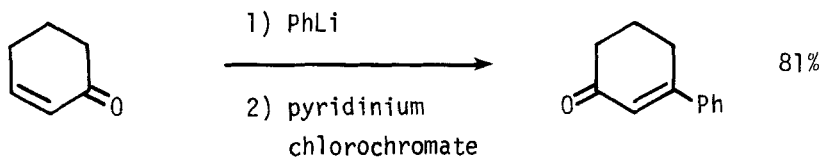
For the alkylation of olefinic ketones, see also Section 177, Vol. 1 and 2 (Ketones from Ketones) and Section 74 (Alkyls from Olefins), Vols. 3 and 4 for conjugate alkylations.

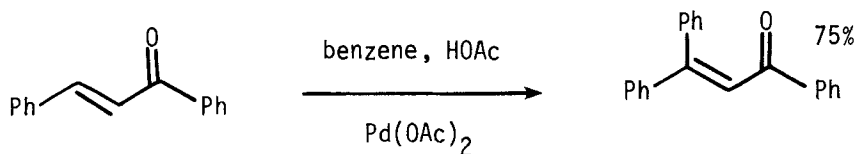
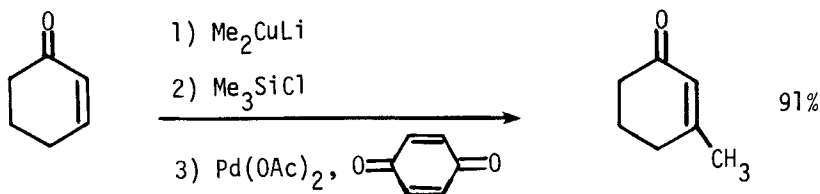
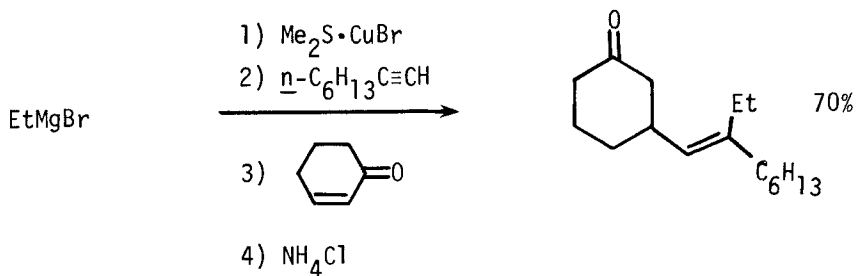
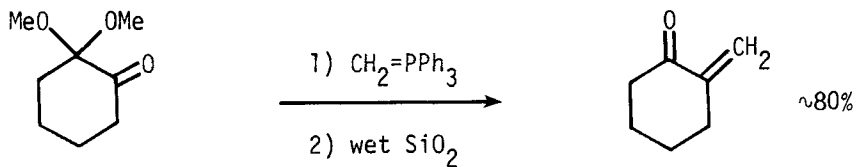


Synthesis, 773 (1977)

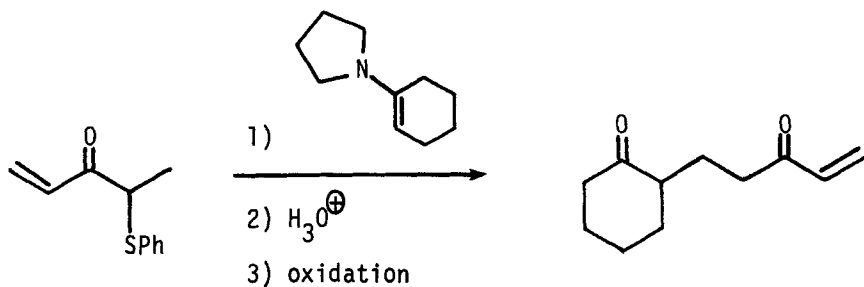


JCS Chem Comm, 130 (1978)

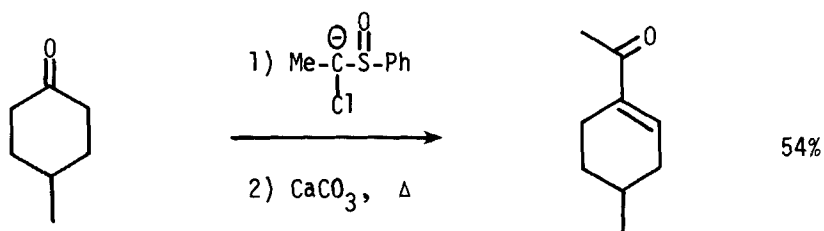
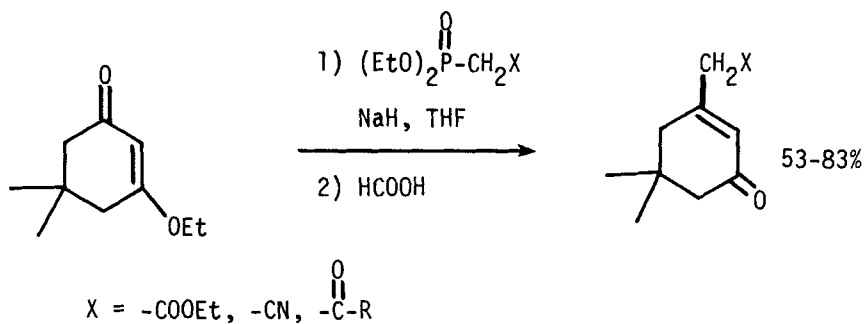
JACS 99, 5526 (1977)JOC 42, 682 (1977)

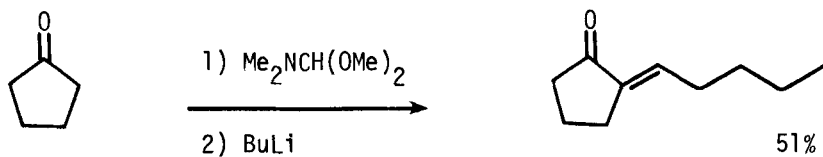
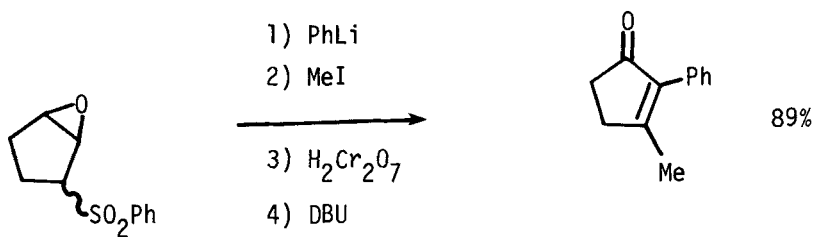
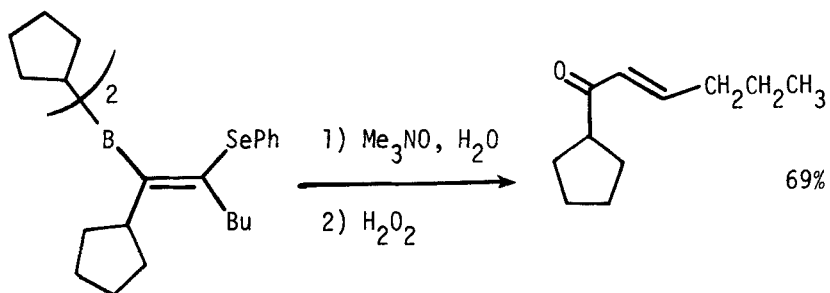
JOC 43, 724 (1978)JOC 43, 1011 (1978)JACS 99, 253 (1977)

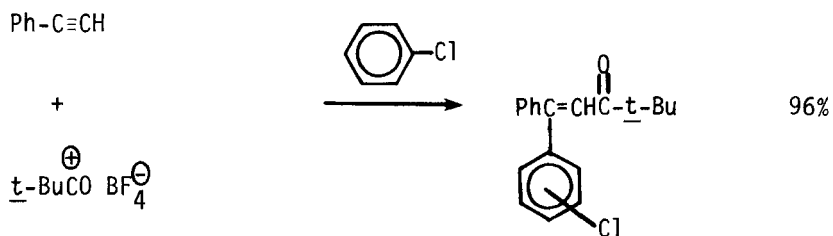
Tetr Lett, 3505 (1977)



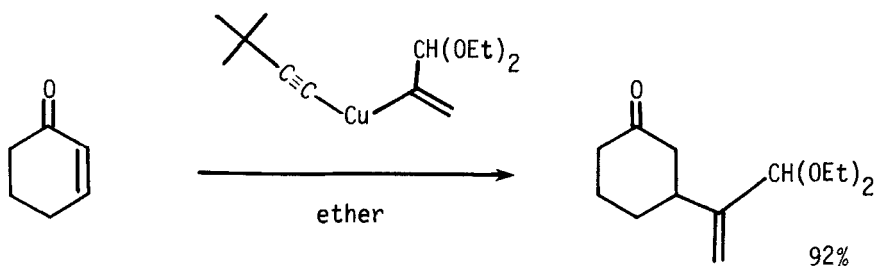
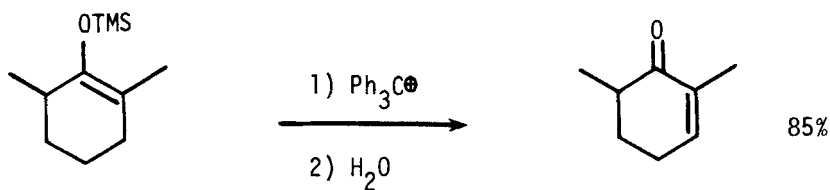
JCS Chem Comm, 821 (1978)

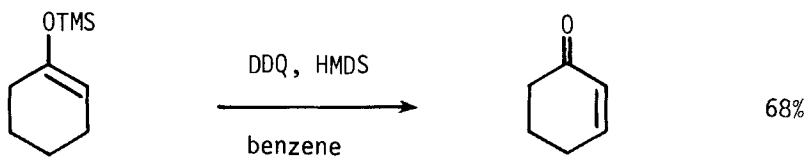
JOC 44, 450 (1979)JOC 43, 1817 (1978)

JOC 43, 4248 (1978)JACS 100, 346 (1978)Can J Chem 56, 2786 (1978)

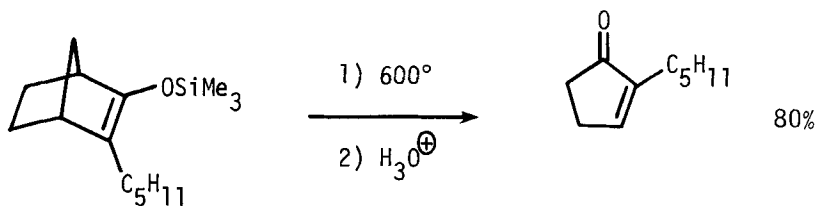


Synthesis, 324 (1977)

JOC 42, 1581 (1977)JOC 42, 3961 (1977)

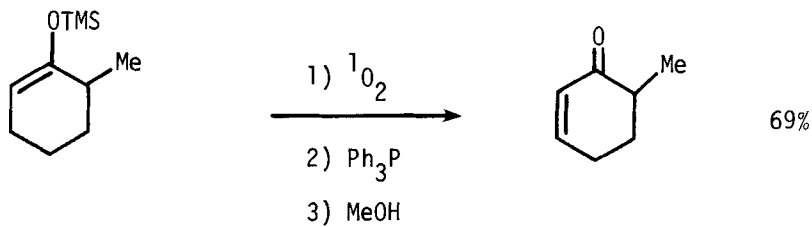
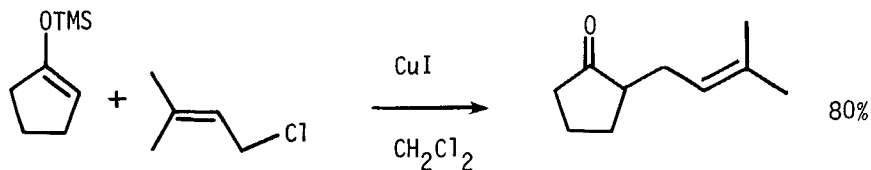


Tetr Lett, 3455 (1978)

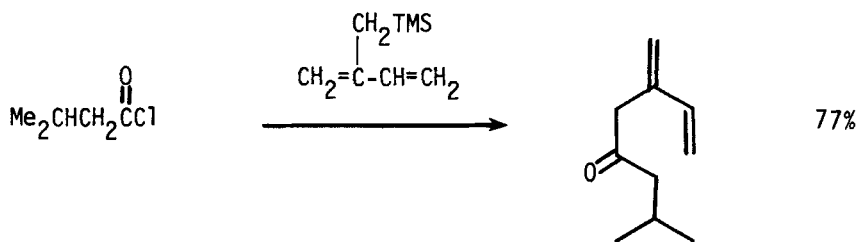


(from alkylation of norbornanone)

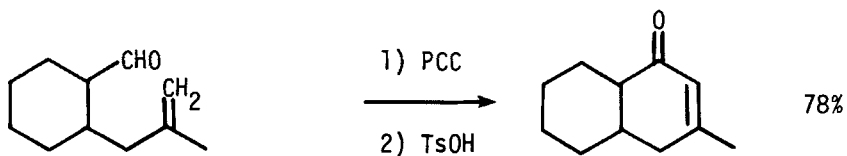
Tetr Lett, 3945 (1979)

Angew Int Ed 16, 413 (1977)

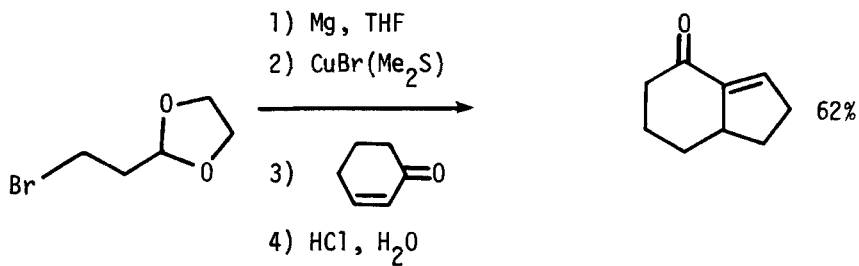
Tetr Lett, 4971 (1979)



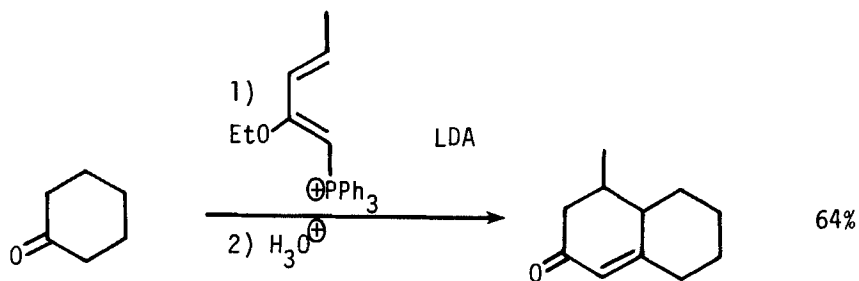
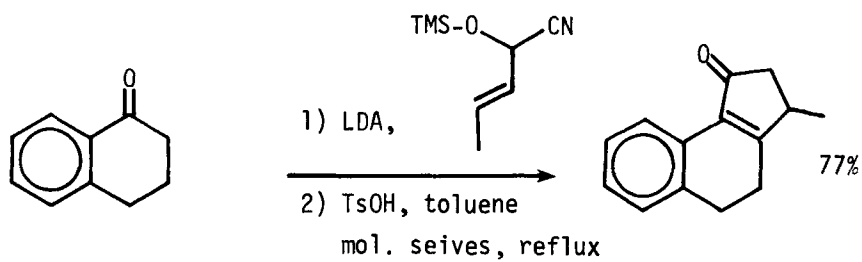
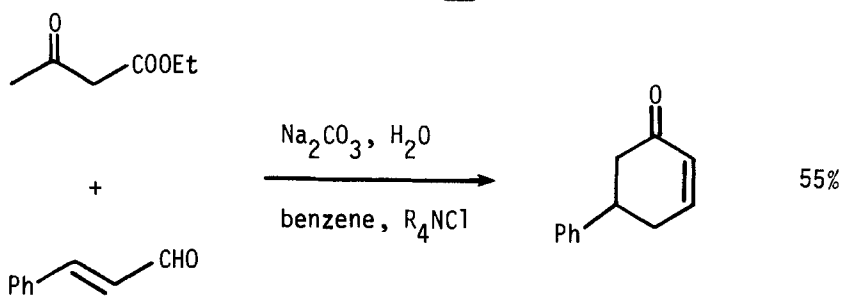
Tetr Lett, 429 (1979)



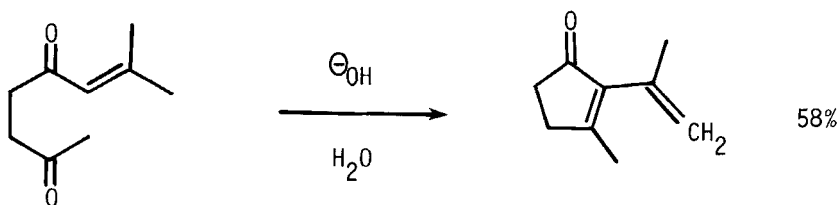
Tetr Lett, 2461 (1978)



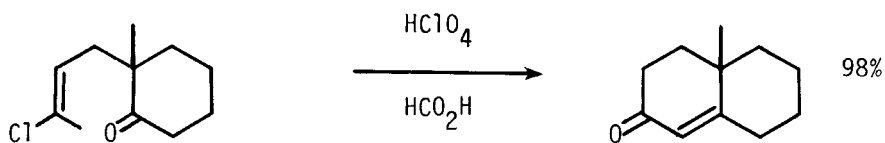
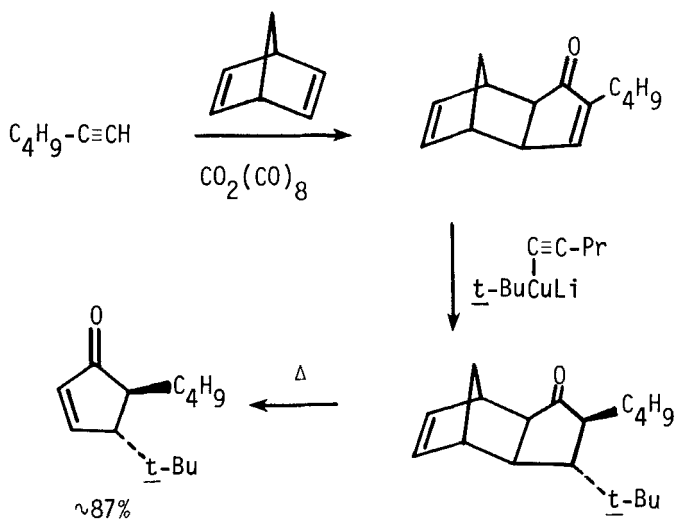
Tetr Lett, 4217 (1978)

JOC 43, 4673 (1978)JOC 44, 462 (1979)

Synthesis, 107 (1979)

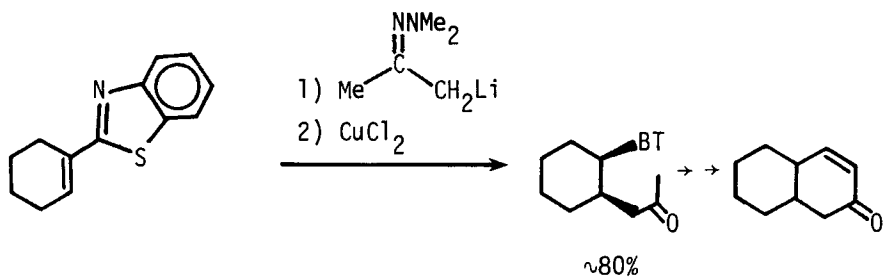


Synthesis, 187 (1979)

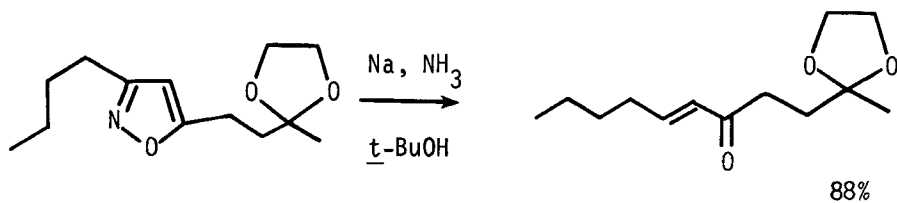
Bull Chem Soc Japan 52, 2978 (1979)Synth Comm 9, 41 (1979)

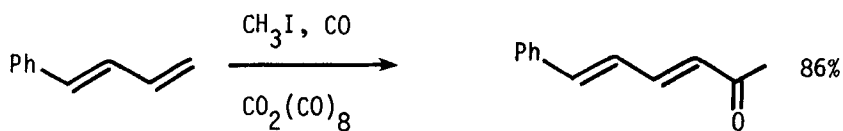


Tetr Lett, 5 (1978)

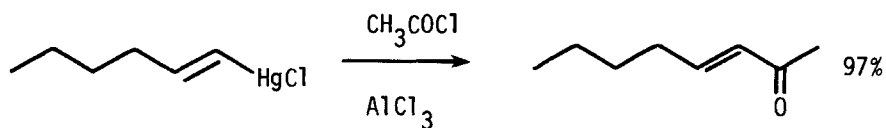
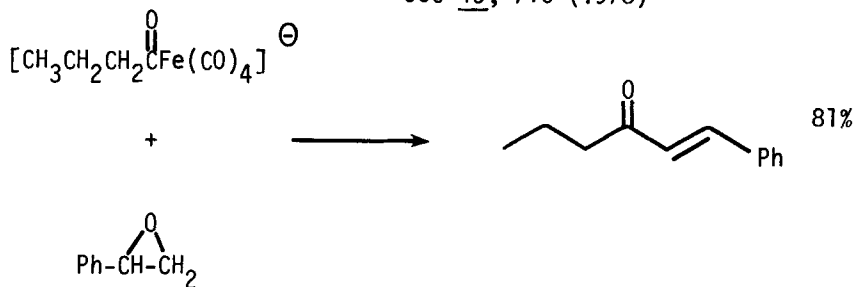


Tetr Lett, 13 (1978)

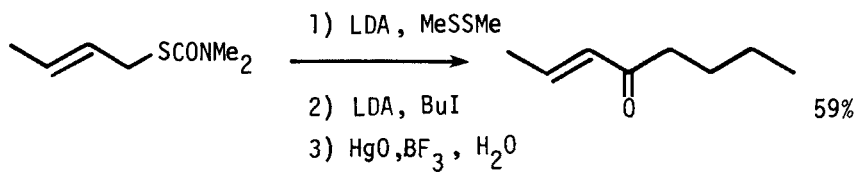
JOC 44, 105 (1979)



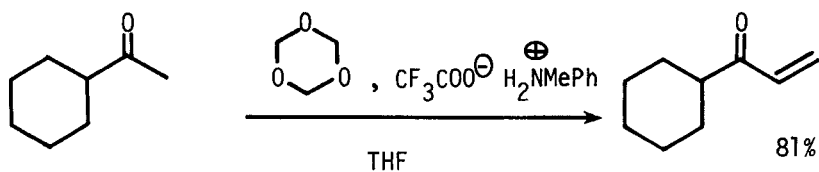
Tetr Lett, 2665 (1979)

JOC 43, 710 (1978)

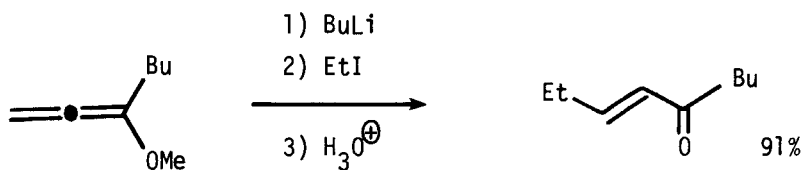
Chem Lett, 1067 (1979)



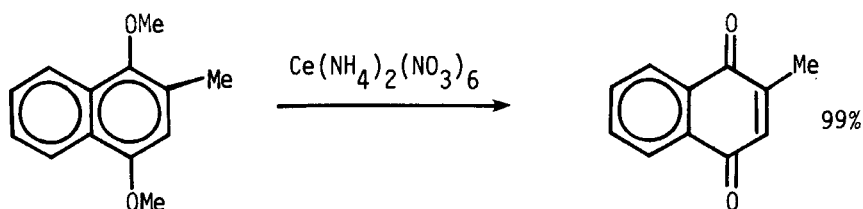
Tetr Lett, 2895 (1978)



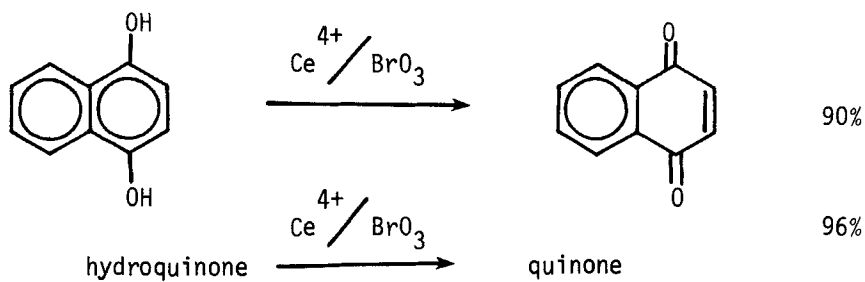
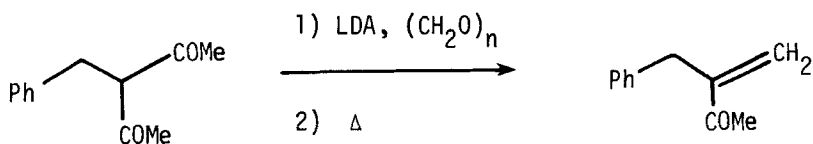
Tetr Lett, 2955 (1978)



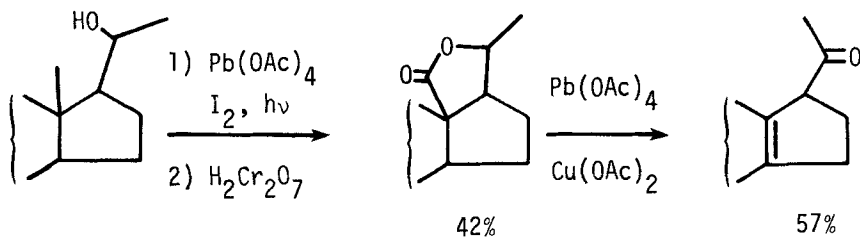
Tetr Lett, 1137 (1978)



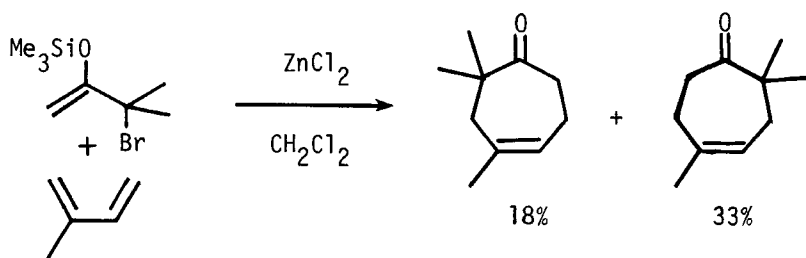
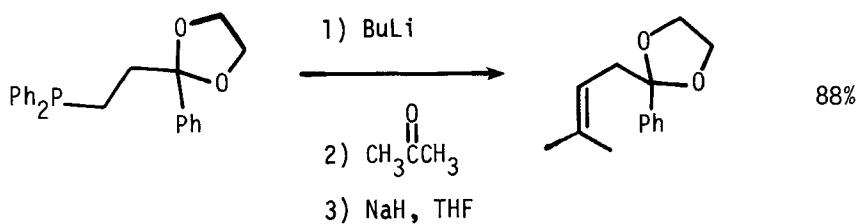
Synthesis, 521 (1979)

Synth Comm 9, 237 (1979)

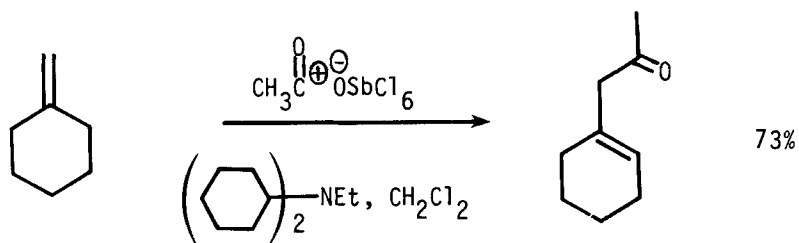
Tetr Lett, 3753 (1978)



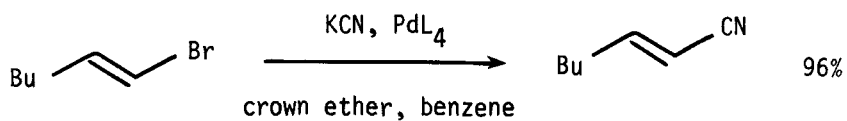
Tetr Lett, 3403 (1977)

Angew Int Ed 18, 163 (1979)

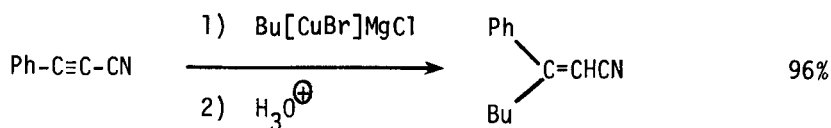
JCS Chem Comm, 988 (1978)

JACS 99, 6008 (1977)Section 375 Nitrile - Nitrile

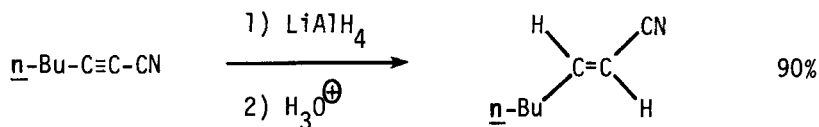
No additional examples

Section 376 Nitrile - Olefin

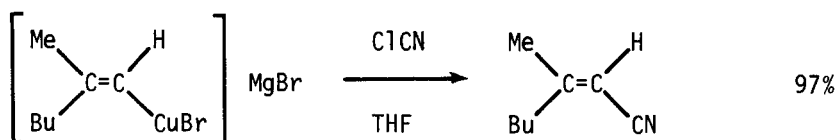
Tetr Lett, 4429 (1977)



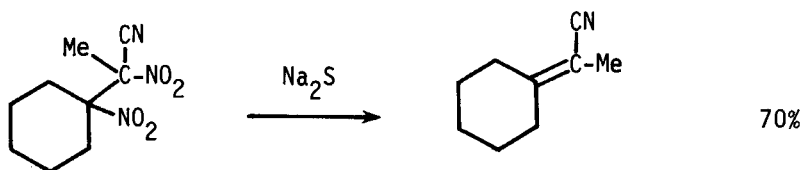
Synthesis, 454 (1978)



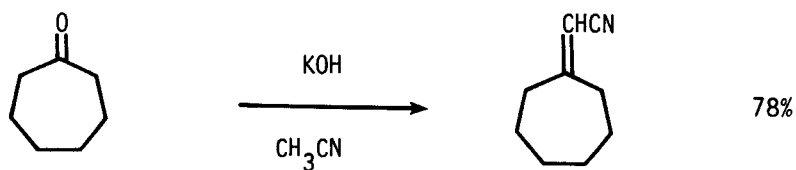
Synthesis, 430 (1979)



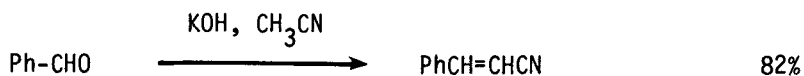
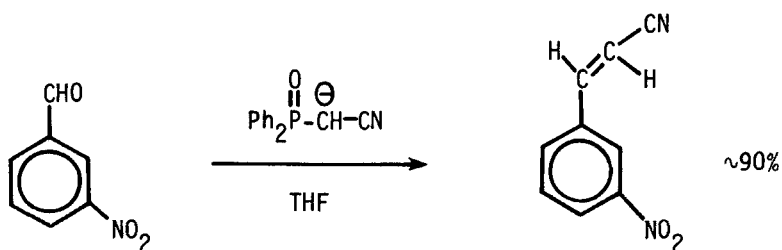
Synthesis, 784 (1977)



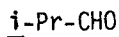
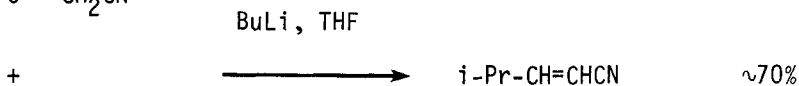
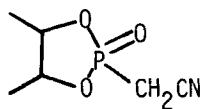
Tetr Lett, 763 (1978)



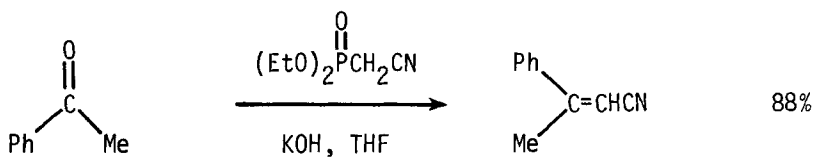
Synthesis, 629 (1977)

JOC 44, 4640 (1979)

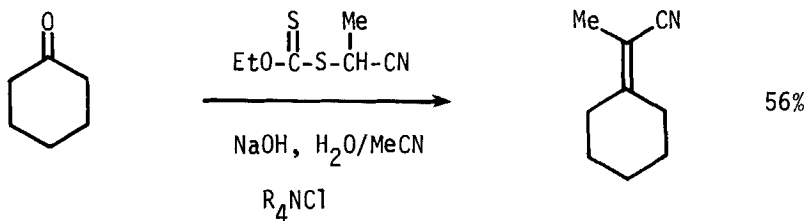
Synthesis, 126 (1977)



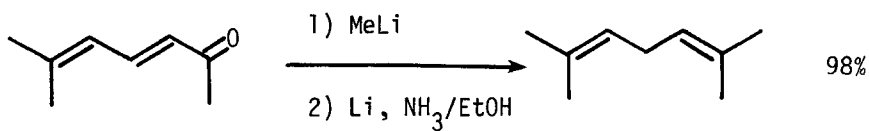
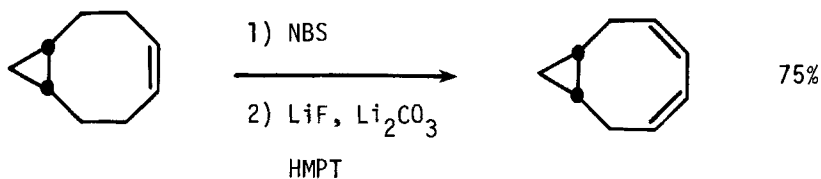
Tetrahedron 34, 997 (1978)



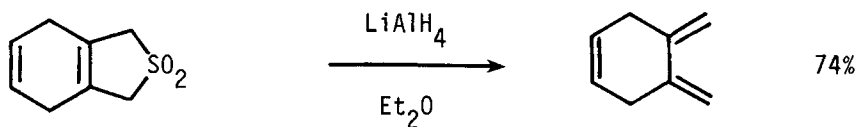
Synthesis, 884 (1979)



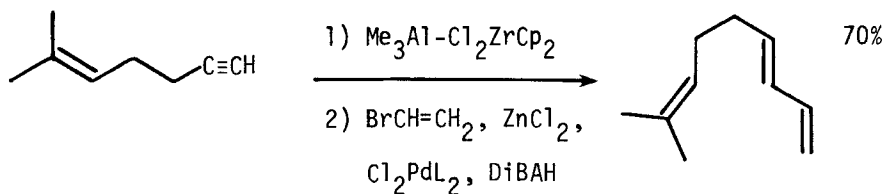
Synthesis, 890 (1979)

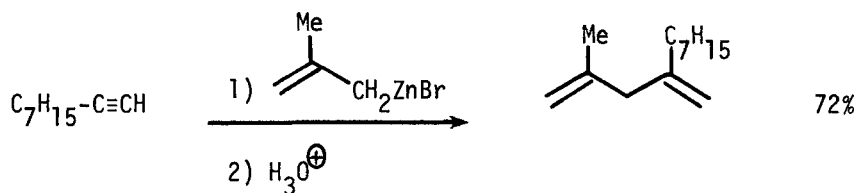
Section 377 Olefin - OlefinJOC 44, 1159 (1979)

Synthesis, 279 (1977)

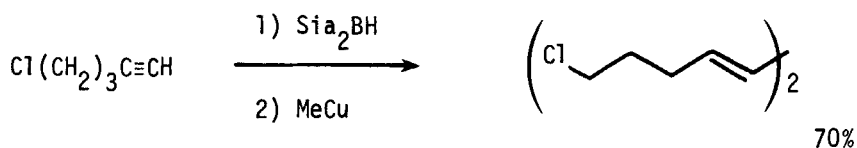
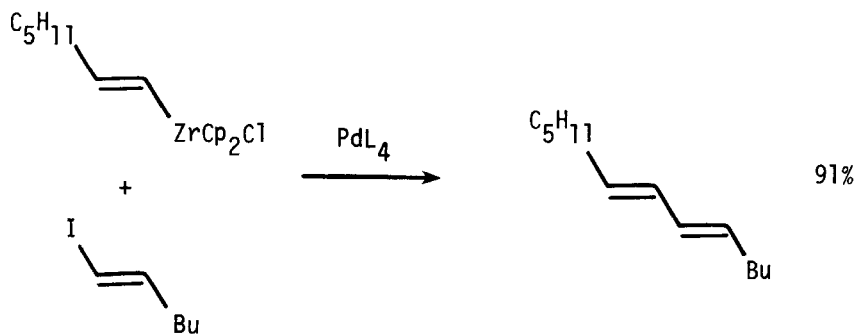


Tetr Lett, 947 (1977)

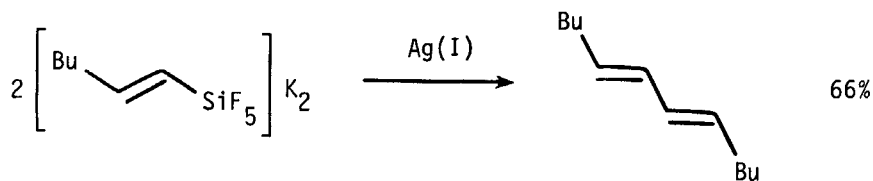
JACS 100, 2256 (1978)



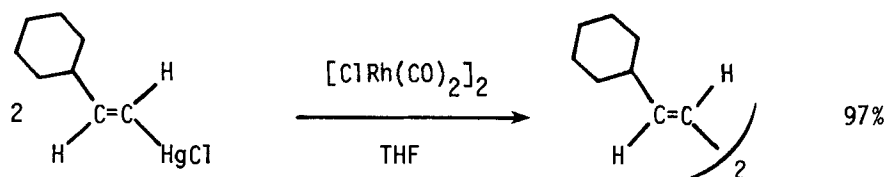
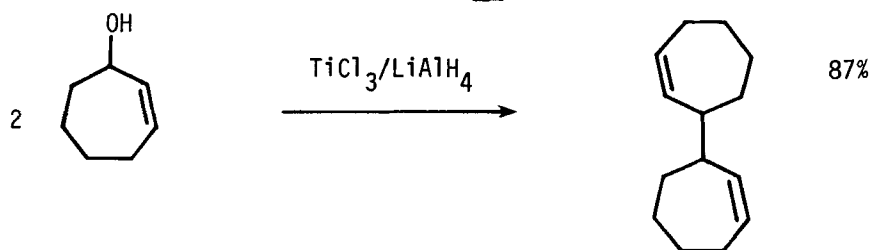
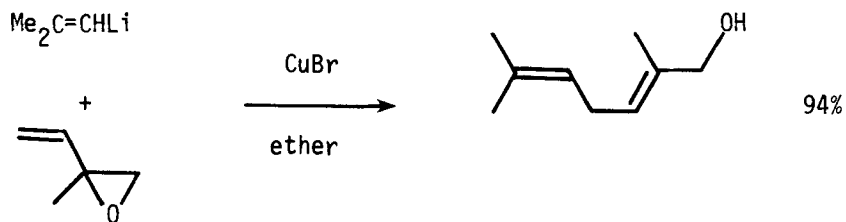
BSC France, 1173 (1976)

JACS 99, 5652 (1977)

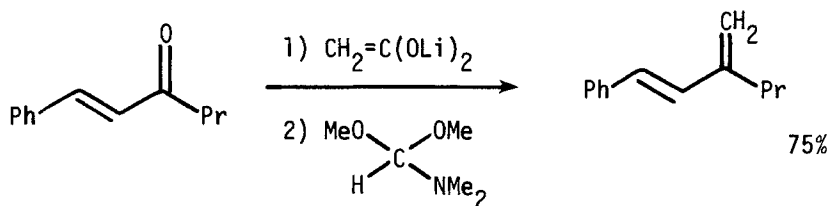
Tetr Lett, 1027 (1978)



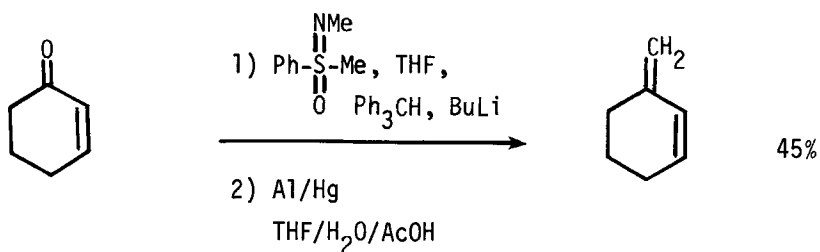
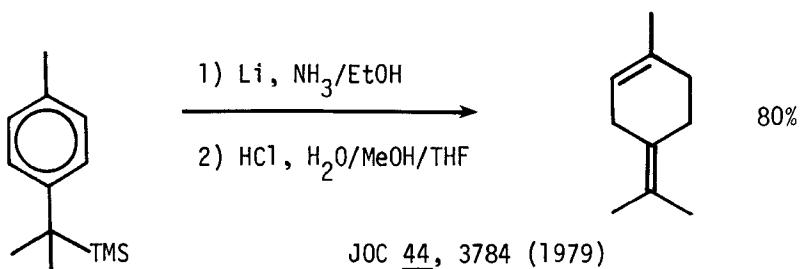
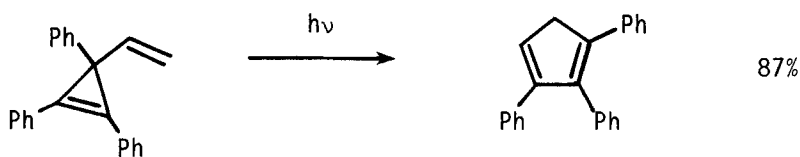
Tetr Lett, 1137 (1979)

JOC 42, 1680 (1977)JOC 43, 3249 (1978)

Synthesis, 528 (1978)



Tetr Lett, 2953 (1978)

JACS 101, 3602 (1979)JOC 44, 3784 (1979)JACS 99, 2342 (1977)

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