

COMPENDIUM OF ORGANIC SYNTHETIC METHODS

VOLUME 5

Leroy G. Wade, Jr.

Compendium of Organic Synthetic Methods

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Volume 5

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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 5, presents the functional group transformations and difunctional compound preparations of 1980, 1981, and 1982. 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 Harrison's request stated in Volume 2 of the *Compendium*: The synthetic literature would become 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. Rosalie Jaramillo for her patience and dedication in the preparation of the camera-ready copy; to Dr. James McKearin, Dr. Forrest Sheffy, and Ron Wilde for proofreading the manuscript with great care and offering hundreds of helpful suggestions; and to my wife Betsy for her patience, help and moral support throughout the preparation of this *Compendium*.

LEROY G. WADE, JR.

Fort Collins, Colorado
November 1983

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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
AIBN	Azobisisobutyronitrile
Am	Amyl
Ar	Aryl
9-BBN	9-borabicyclo[3.3.1]nonane
BOC (<i>t</i> -Boc)	<i>t</i> -Butyloxycarbonyl
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
ee	Enantiomeric excess
Et	Ethyl
Hex	Hexyl
HMPA, HMPT	Hexamethylphosphoramide (hexamethylphosphoric triamide)
$h\nu$	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
MTM	Methylthiomethyl
MVK	Methyl vinyl ketone
NBS	N-bromosuccinimide

Ni	Raney nickel
Ⓟ	Polymeric backbone
PCC	Pyridinium chlorochromate
Ph	Phenyl
PPA	Polyphosphoric acid
PPE	Polyphosphate ester
Pr	Propyl
PTC	Phase-transfer catalysis
Py, Pyr	Pyridine
RT	Room temperature
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
Tol	Tolyl
Ts	<i>p</i> -Toluenesulfonyl
Z	Benzyloxycarbonyl
Δ	Heat

Sections—heavy type
Pages—light type

FROM

PROTECTION

Sect. Pg.

Carboxylic acids	30A	20
Alcohols, phenols	45A	79
Aldehydes	60A	119
Amides	90A	190
Amines	105A	216
Esters	120A	255
Ketones	180A	343
Olefins	210A	398

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
301	312											Carboxylic acid
400	409											Alcohol
302	313	323										Aldehyde
400	410	422										Amide
303	324		333									Amine
402	427		457									Ester
315		325	342									Ether, epoxide
412		428	466									Halide
305	316	326	343		350							Ketone
402	412	429	468		473							Nitrile
306	327		336	344	351	357						Olefin
403	432		458	468	473	481						
307	328		345		352	358						
403	435		469		475	483						
308	319	329	338	353		359	364	368				
404	414	438	458	476		483	497	503				
309	320	330	339	347	354	360	365	369	372			
404	416	439	460	470	476	486	498	506	516			
310	321	331	340	355		361	366	373		375		
406	417	449	462	478		491	500	524		540		
311	322	332	341	349	356	362	367	371	374	376	377	
407	419	450	462	472	478	491	501	511	525	540	543	

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

INTRODUCTION

Relationship between Volume 5 and Previous Volumes. *Compendium of Organic Synthetic Methods, Volume 5* presents over 1000 examples of published methods for the preparation of monofunctional compounds, updating the 6000 in Volumes 1 through 4. In addition, Volume 5 contains over 1000 additional examples of preparations of difunctional compounds and various functional groups, updating the sections introduced in Volume 2. The same systems of section and chapter numbering are used in all five volumes.

Classification and Organization of Reactions Forming Monofunctional Compounds. 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 appearing in both starting material and product, or by 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. Conjugate reduction and alkylation of unsaturated ketones, aldehydes, esters, acids, and nitriles have 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 involving additions across double bonds are found in section 74, Alkyls from Olefins.

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

$\text{RCH}=\text{CHCOOH} \rightarrow \text{RCH}=\text{CH}_2$	(hydrides from carboxylic acids)
$\text{RCH}=\text{CH}_2 \rightarrow \text{RCH}=\text{CHCOOH}$	(carboxylic acids from hydrides)
$\text{ArH} \rightarrow \text{ArCOOH}$	(carboxylic acids from hydrides)
$\text{ArH} \rightarrow \text{ArOAc}$	(esters from hydrides)
$\text{RCHO} \rightarrow \text{RH}$	(hydrides from aldehydes)
$\text{RCH}=\text{CHCHO} \rightarrow \text{RCH}=\text{CH}_2$	(hydrides from aldehydes)
$\text{RCHO} \rightarrow \text{RCH}_3$	(alkyls from aldehydes)
$\text{R}_2\text{CH}_2 \rightarrow \text{R}_2\text{CO}$	(ketones from methylenes)
$\text{RCH}_2\text{COR} \rightarrow \text{R}_2\text{CHCOR}$	(ketones from ketones)
$\text{RCH}=\text{CH}_2 \rightarrow \text{RCH}_2\text{CH}_3$	(alkyls from olefins)
$\text{RBr} + \text{RC}\equiv\text{CH} \rightarrow \text{RC}\equiv\text{CR}$	(acetylenes from halides; also (acetylenes from acetylenes)
$\text{ROH} + \text{RCOOH} \rightarrow \text{RCOOR}$	(esters from alcohols; also esters from carboxylic acids)
$\text{RCH}=\text{CHCHO} \rightarrow \text{R}_2\text{CHCH}_2\text{CHO}$	(alkyls from olefins)
$\text{RCH}=\text{CHCN} \rightarrow \text{RCH}_2\text{CH}_2\text{CN}$	(alkyls from olefins)

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, lying 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 simple reactions. When a member of these groups is the desired product or starting material, the other member should, of course, also be consulted on 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. This book does not attempt to provide experimental conditions or precautions, under the assumption that the reader will study the original literature before attempting a reaction. Not to do so would be hazardous, as well as foolish. The original papers 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.

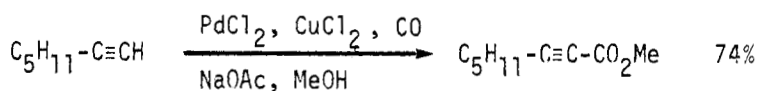
Many literature preparations of difunctional compounds are extensions of the methods applicable to monofunctional compounds. Thus the reaction $\text{RCI} \rightarrow \text{ROH}$ can clearly be extended to the preparation of diols by using the corresponding dichloro compound as a starting material. Such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

The user should bear in mind that the pairs of functional groups alcohol, ester; carboxylic acids, ester; amine, amide; and carboxylic acid, amide can be interconverted by simple 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).

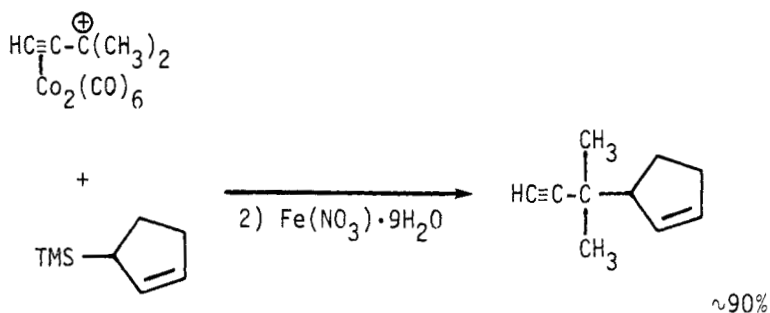
CHAPTER 1

PREPARATION OF ACETYLENES

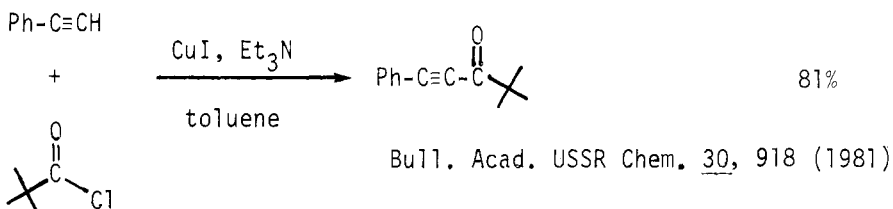
Section 1 Acetylenes from Acetylenes



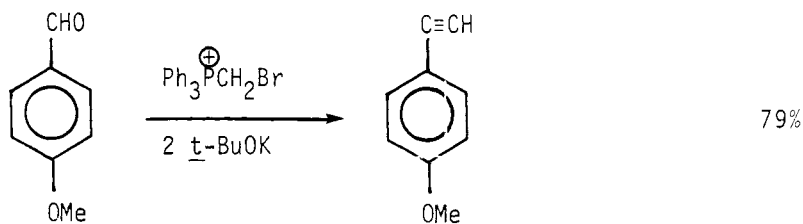
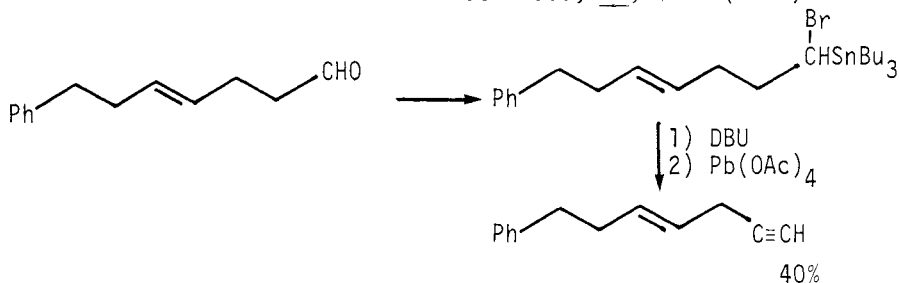
Tetr Lett, 21, 849 (1980)

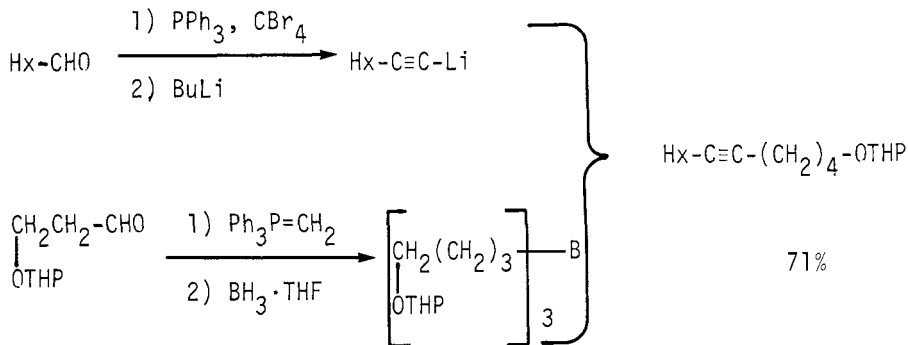


Tetr Lett, 21, 1595 (1980)

Section 2 Acetylenes from Acid DerivativesSection 3 Acetylenes from Alcohols

No additional examples

Section 4 Acetylenes from AldehydesTetr Lett, 21, 4021 (1980)Tetr Lett, 23, 4607 (1982)

Chem Ber, 115, 828 (1982)Section 5 Acetylenes from Alkyls, Methylenes, and Aryls

No examples

Section 6 Acetylenes from Amides

No additional examples

Section 7 Acetylenes from Amines

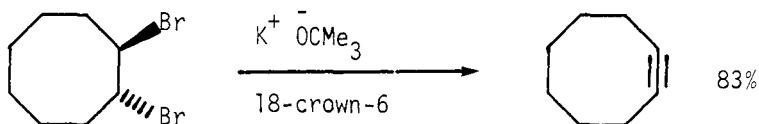
No additional examples

Section 8 Acetylenes from Esters

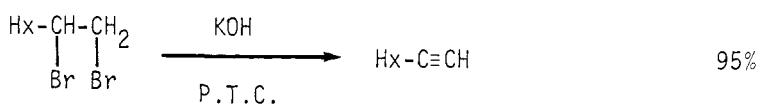
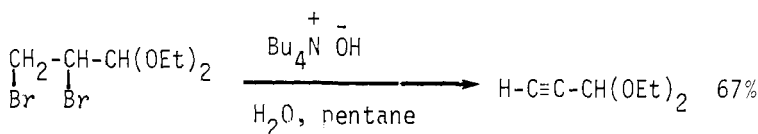
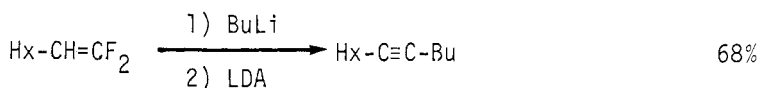
No additional examples

Section 9 Acetylenes from Halides

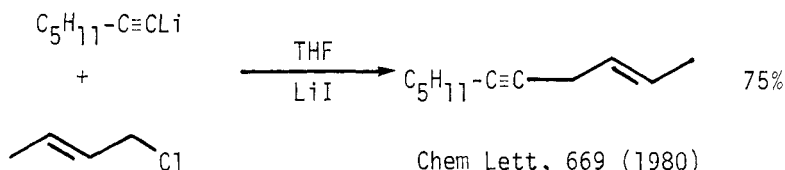
No examples

Section 10 Acetylenes from Halides

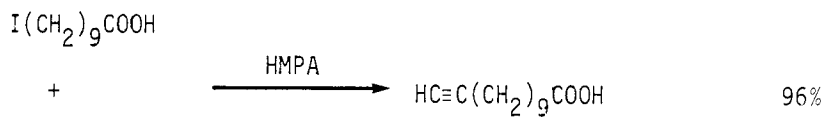
Liebigs Ann. Chem, 1 (1980)

Tetrahedron, 37, 1653 (1981)Org Syn, 59, 10 (1980)

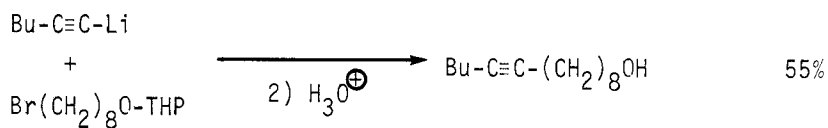
Chem Lett, 935 (1980)



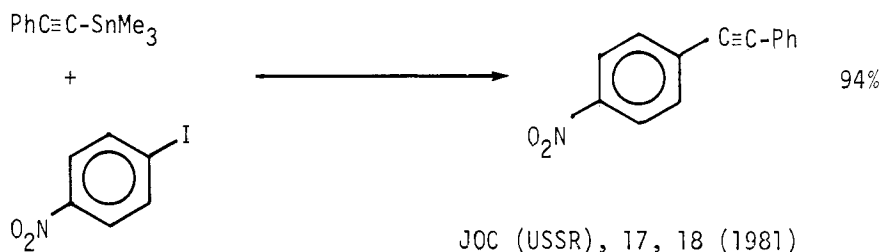
Chem Lett, 669 (1980)



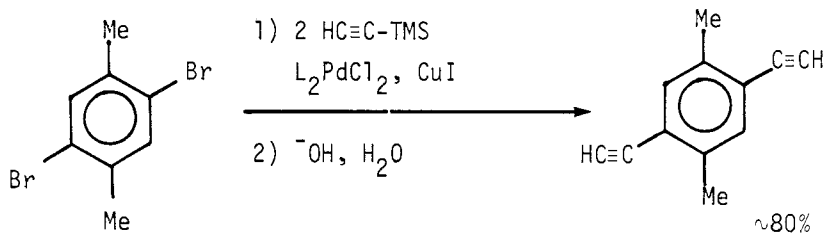
Synth Comm, 10, 653 (1980)



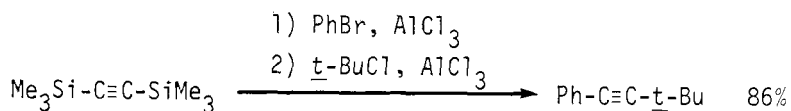
JOC (USSR), 16, 1728 (1980)



JOC (USSR), 17, 18 (1981)



Synthesis, 627 (1980)

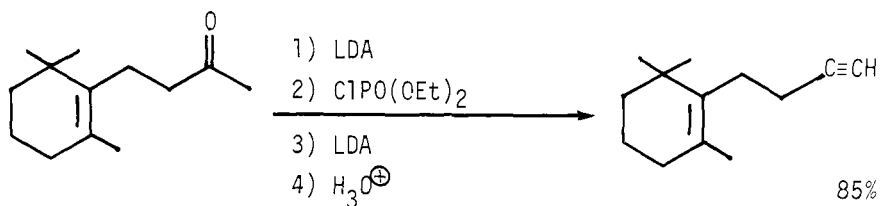
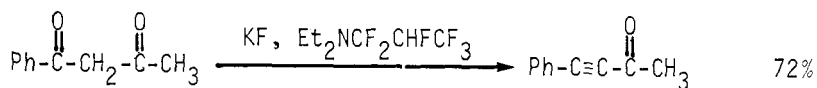


JCS Chem Comm, 959 (1982)

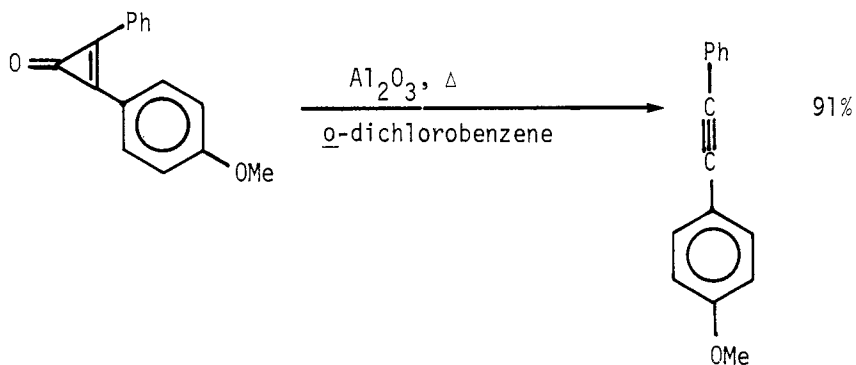
Section 11 Acetylenes from Hydrides

no examples

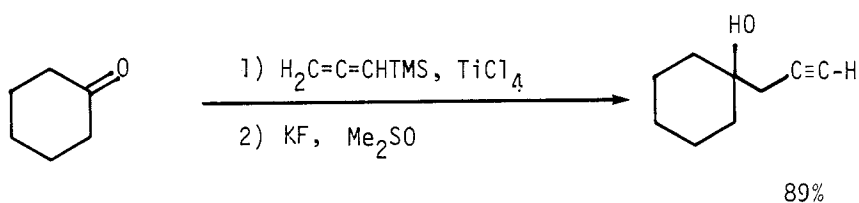
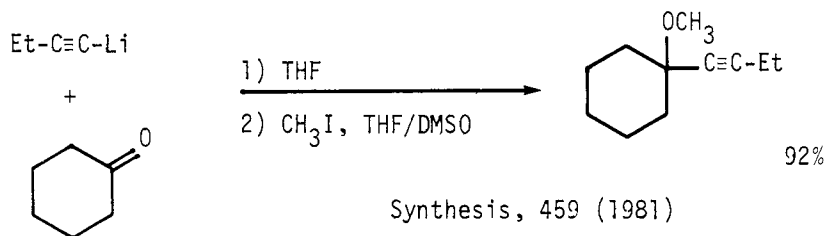
For examples of the reaction $\text{RC}\equiv\text{CH} + \text{RC}\equiv\text{C}-\text{C}\equiv\text{CR}'$ see section 300
(Acetylene - Acetylene)

Section 12 Acetylenes from KetonesJOC, 45, 2526 (1980)

Chem Lett, 1327 (1980)



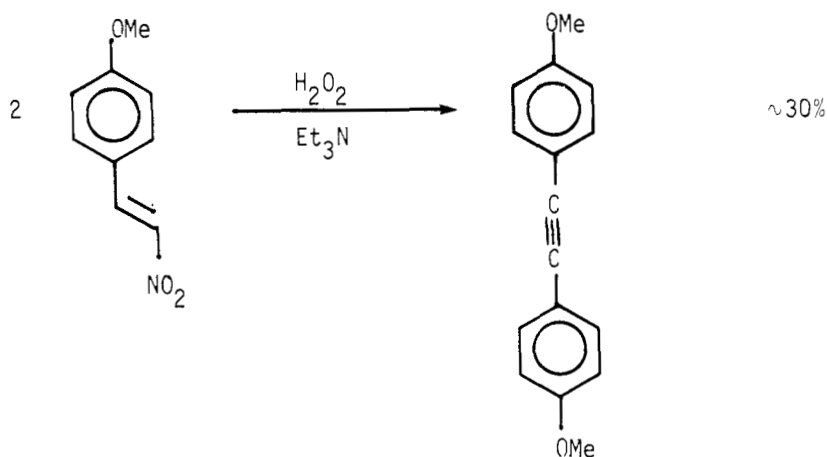
Synthesis, 285 (1981)

JOC, 45, 3925 (1980)

Synthesis, 459 (1981)

Section 13 Acetylenes from Nitriles

no examples

Section 14 Acetylenes from OlefinsTetr Lett, 22, 2301 (1981)Section 15 Acetylenes from Miscellaneous Compounds

Review: "Heterocyclic Rearrangements: New Cumulenes and Acetylenes"

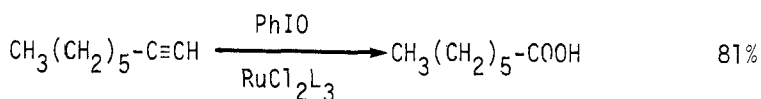
Bull Soc Chim Belges, 91, 997 (1982)Section 15A Protection of Acetylenes

no additional examples

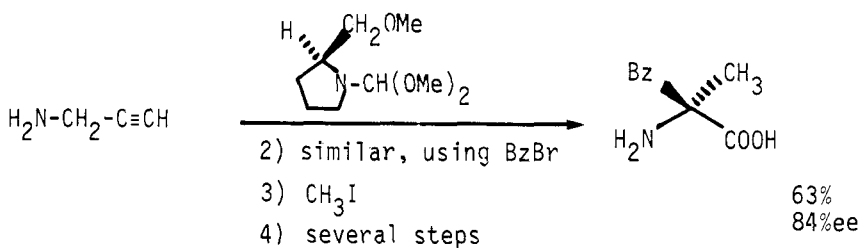
CHAPTER 2

PREPARATION OF CARBOXYLIC ACIDS, ACID HALIDES, AND ANHYDRIDES

Section 16 Carboxylic Acids from Acetylenes

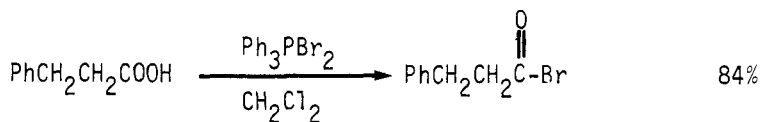


Helv Chim Acta, 64, 2531 (1981)

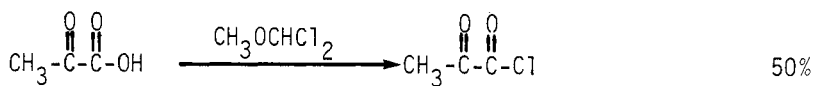
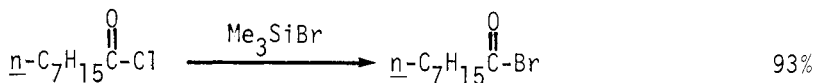


Angew Chem Int Ed, 19, 725 (1980)

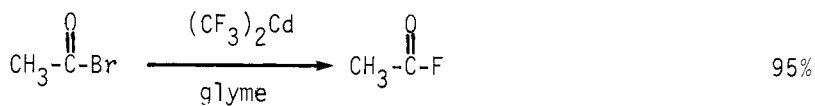
Section 17 Carboxylic Acids from Acid Halides from Carboxylic Acids



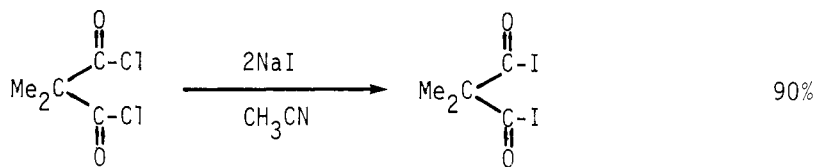
Synthesis, 684 (1982)

Org Syn, 61, 1 (1983)

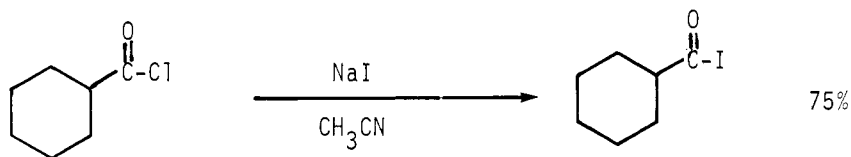
Synthesis, 216 (1981)



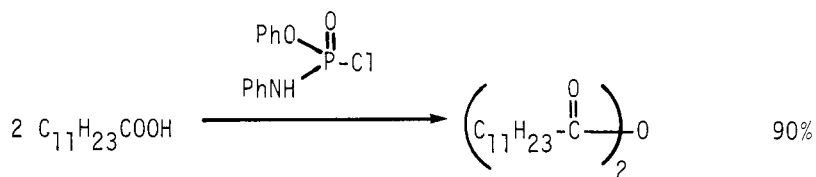
JCS Chem Comm, 670 (1980)



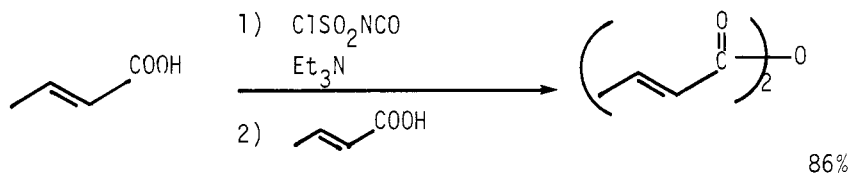
Synthesis, 237 (1982)



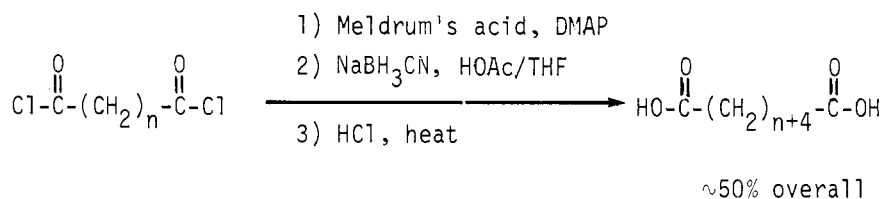
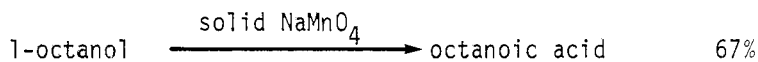
Synthesis, 715 (1981)

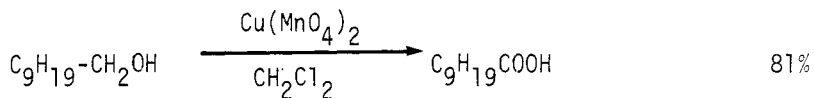
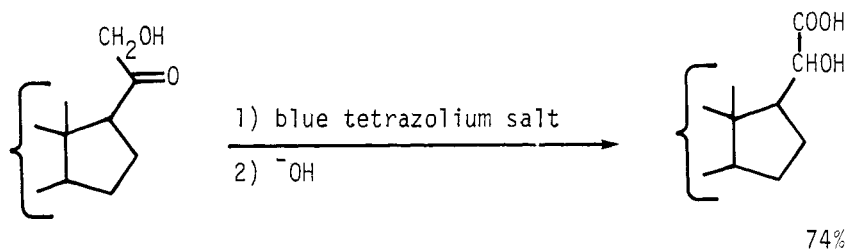


Synthesis, 218 (1981)

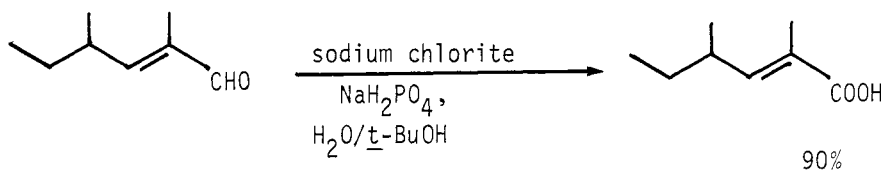
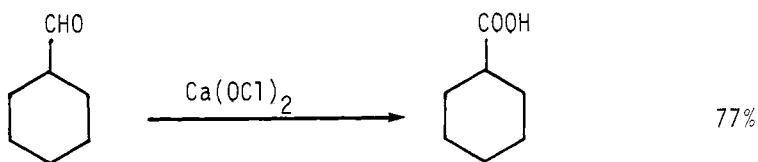


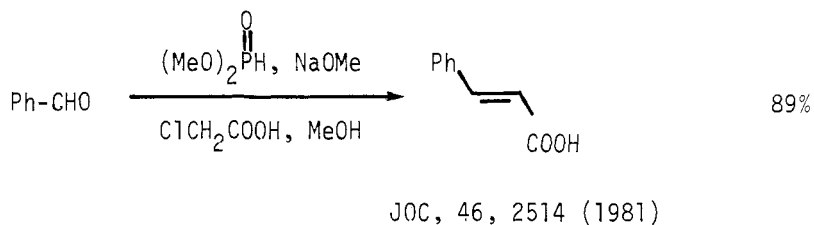
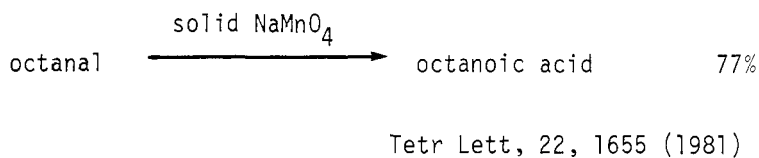
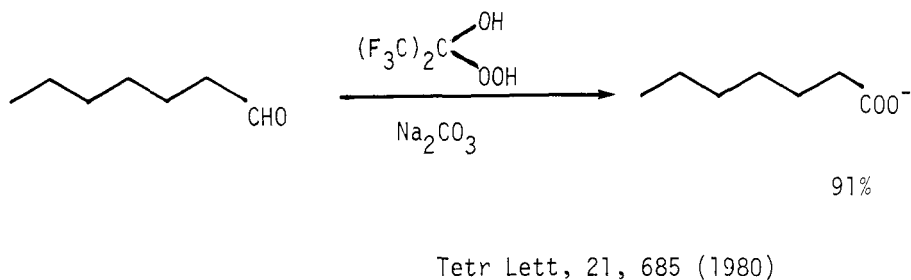
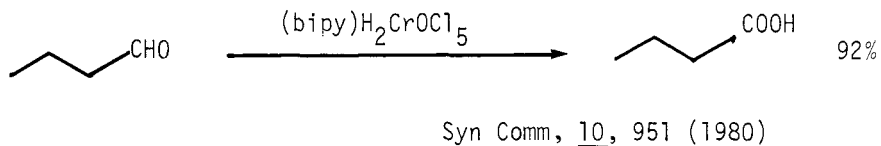
Synthesis, 506 (1982)

Synth Comm, 12, 19 (1982)Section 18 Carboxylic Acids from AlcoholsTetr Lett, 22, 1655 (1981)

JOC, 47, 2790 (1982)

Synthesis, 739 (1980)

Section 19 Carboxylic Acids from AldehydesTetrahedron, 37, 2091 (1981)Tetr Lett, 23, 3131 (1982)

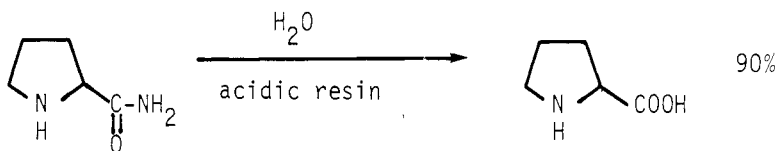
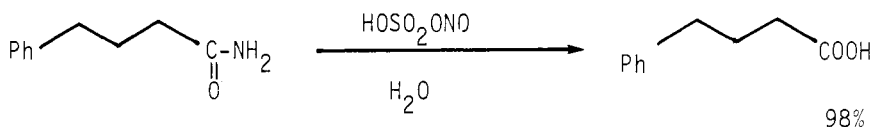
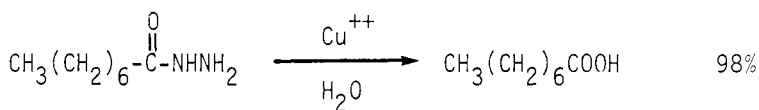
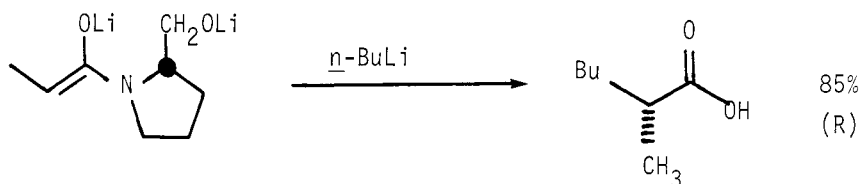


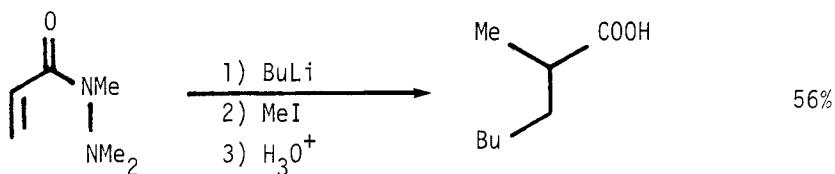
Related methods: Carboxylic Acids from Ketones (Section 27).

Also via: Esters - Section 109).

Section 20 Carboxylic Acids from Alkyls

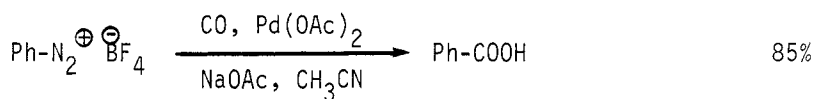
no additional examples

Section 21 Carboxylic Acids from AmidesJOC, 46, 5351 (1981)Org Prep Proc Int, 14, 357 (1982)Tetrahedron, 36, 1311 (1980)Tetrahedron Lett, 21, 4233 (1980)



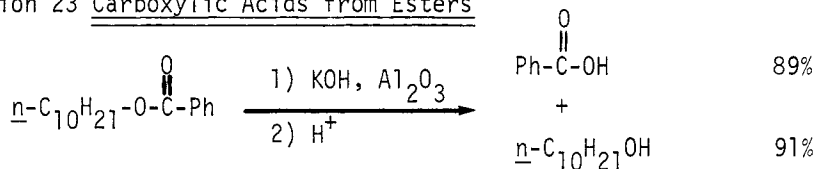
Synth Comm, 10, 837 (1980)

Section 22 Carboxylic Acids from Amines

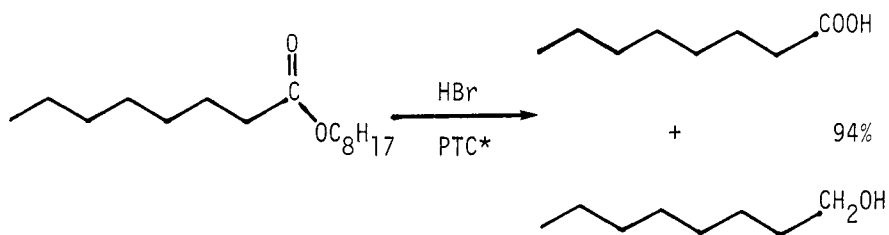


JOC, 45, 2365 (1980)

Section 23 Carboxylic Acids from Esters

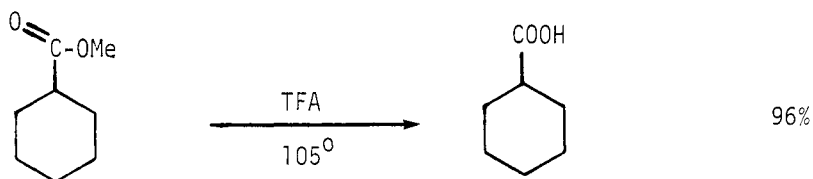
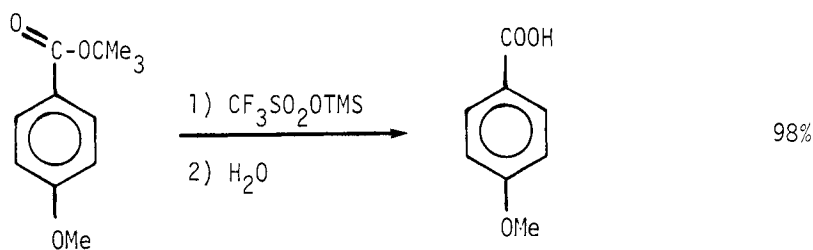


Synth Comm, 11, 413 (1981)

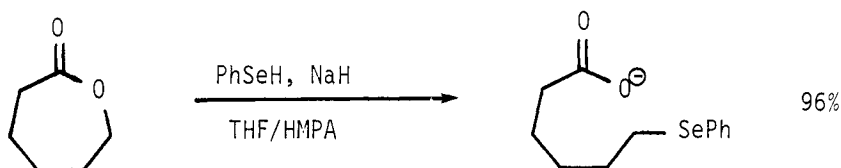


*hexadecyltributylphosphonium bromide

JOC, 47, 154 (1982)

Synth Comm, 12, 855 (1982)

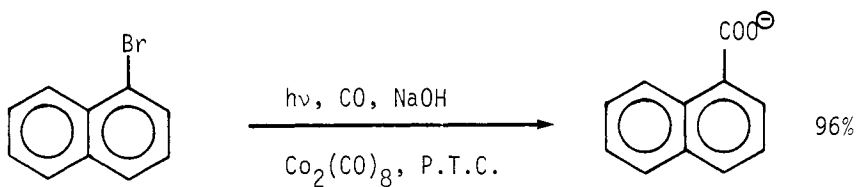
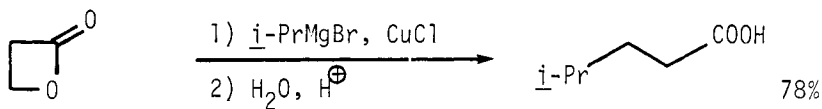
Synthesis, 545 (1980)

JOC, 46, 2605 (1981)

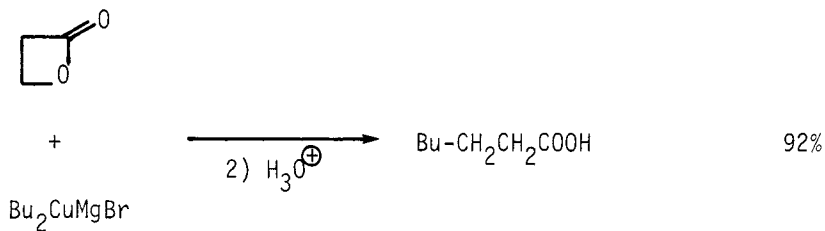
Other reactions useful for the hydrolysis of esters may be found in Section 30A (Protection of Carboxylic Acids).

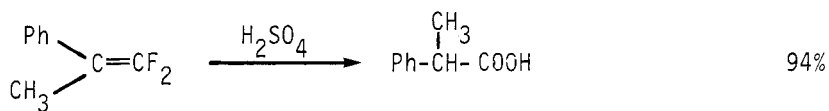
Section 24 Carboxylic Acids from Ethers

No additional examples

Section 25 Carboxylic Acids from Alkyl HalidesTetr Lett, 22, 1013 (1981)Bull Chem Soc Japan, 55, 3555 (1982)

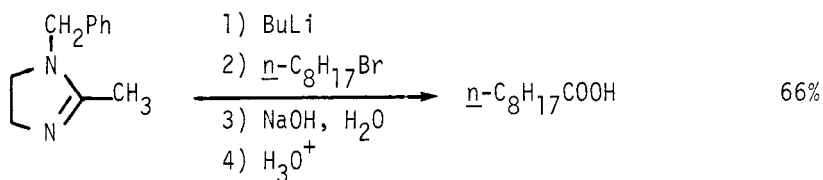
Chem Lett, 571 (1980)

Tetr Lett, 21, 935 (1980)Tetr Lett, 21, 2181 (1980)



94%

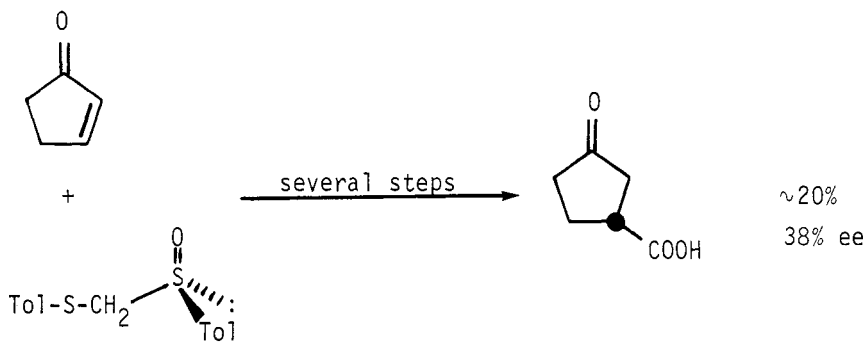
Chem Lett, 651 (1980)



66%

Tetr Lett, 22, 261 (1981)

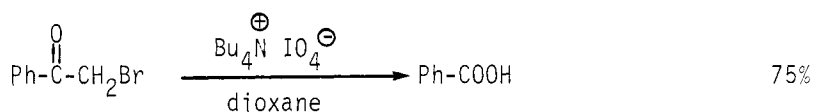
Also via: Esters - Section 115

Section 26 Carboxylic Acids from Hydrides

~20%

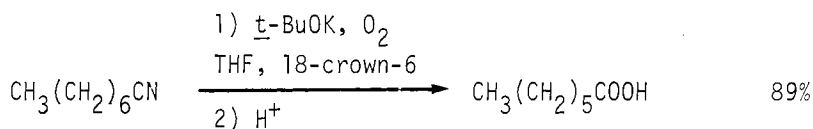
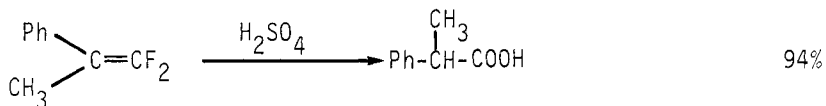
38% ee

Synthesis, 74 (1981)

Section 27 Carboxylic Acids from KetonesTetr Lett, 22, 2595 (1981)

Synthesis, 563 (1980)

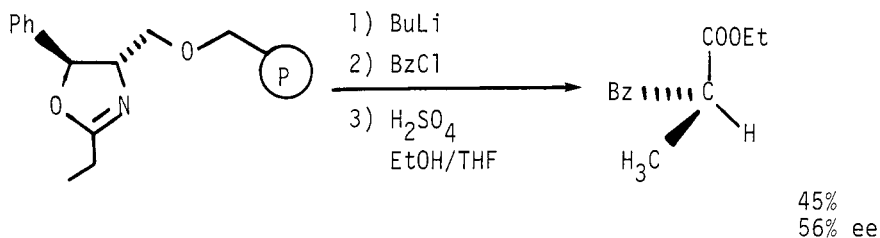
Also via: Esters - Section 117.

Section 28 Carboxylic Acids from NitrilesJOC, 45, 3630 (1980)Section 29 Carboxylic Acids from Olefins

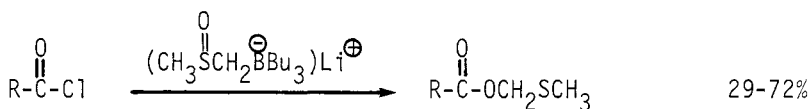
Chem Lett, 651 (1980)

Section 30 Carboxylic Acids from Miscellaneous Compounds

Use of polymer-bound oxazolines for the synthesis of chiral carboxylic acids:

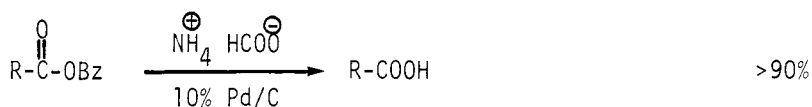


JOC, 46, 3097 (1981)

Section 30A Protection of Carboxylic Acids

R = alkyl, subst. Ph, -CH₂OPh

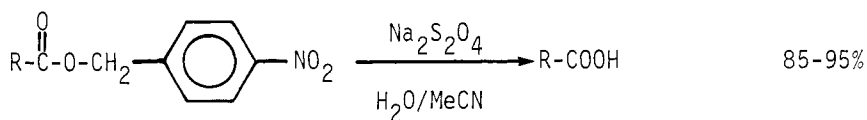
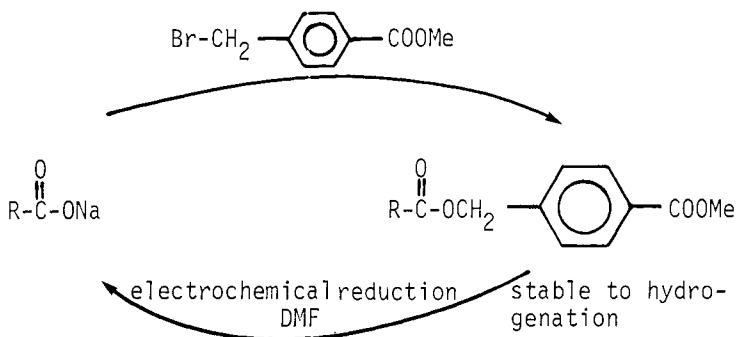
Tetr Lett, 23, 4539 (1982)



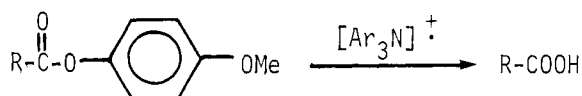
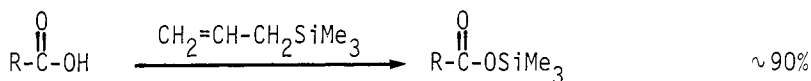
Synthesis, 929 (1980)

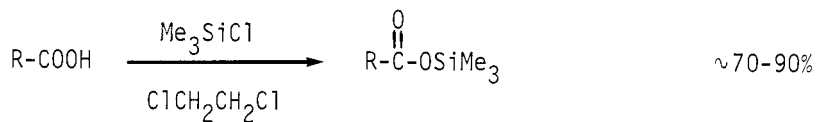
H₂/K₃[Co(CN)₅] removes benzyl ester protecting groups from amino acids and peptides in 83-94% yields.

Z. Chem, 188 (1981)

Synth Comm, 12, 219 (1982)

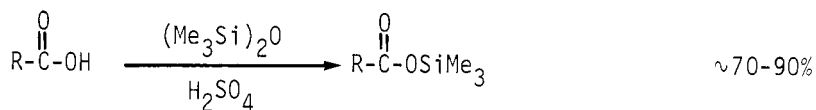
JCS Chem Comm, 1083 (1980)

Angew Chem Int Ed, 21, 780 (1982)Tetr Lett, 21, 835 (1980)

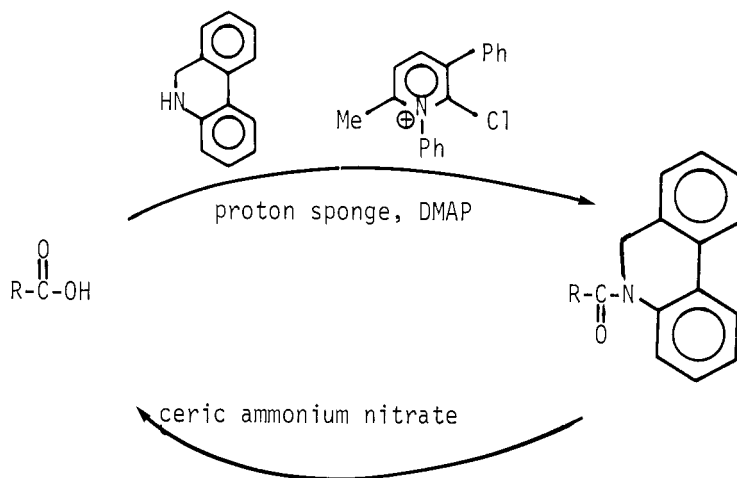


R = alkyl, vinyl, allyl, acetylenic, etc.

Synthesis, 626 (1980)

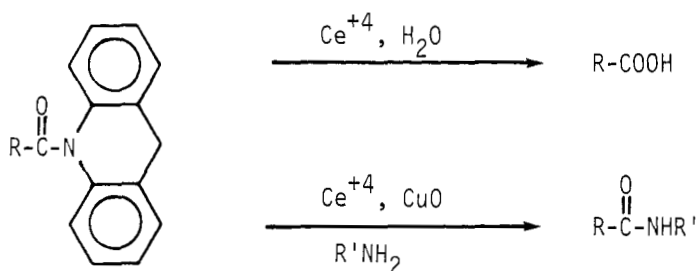


Chem Lett, 1475 (1980)

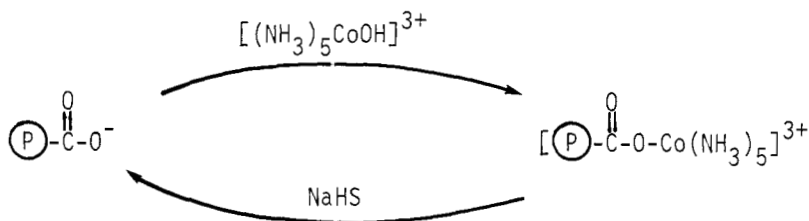


Chem Lett, 1551 (1981)

The 5,6-dihydrophenanthridine protecting group may be activated and removed by oxidation:



Chem Lett, 991 (1982)



Used as a C-terminal protecting group in peptide synthesis.

JACS, 104, 3910 (1982)

Review: "Recent developments in Methods for the Esterification and Protection of the Carboxyl Group"

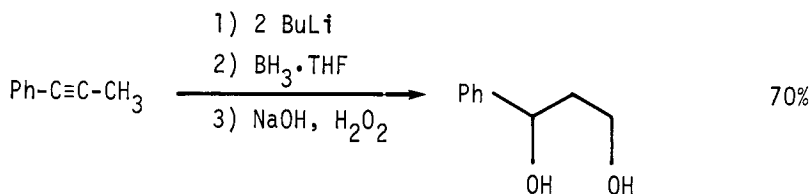
Tetrahedron, 36, 2409 (1980)

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

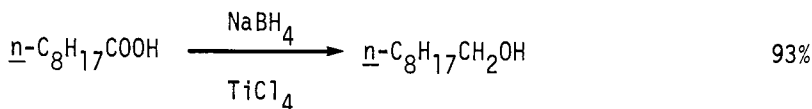
PREPARATION OF ALCOHOLS AND PHENOLS

Section 31 Alcohols from Acetylenes

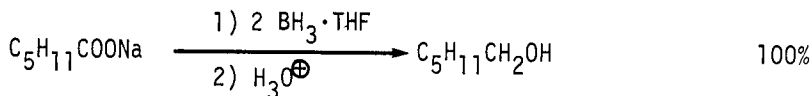


Tetrahedron, 36, 299 (1980)

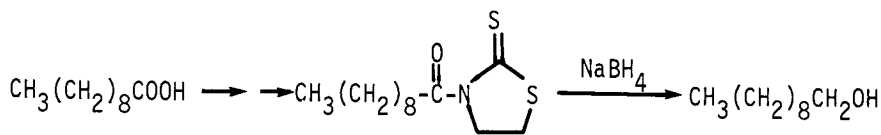
Section 32 Alcohols from Carboxylic Acids



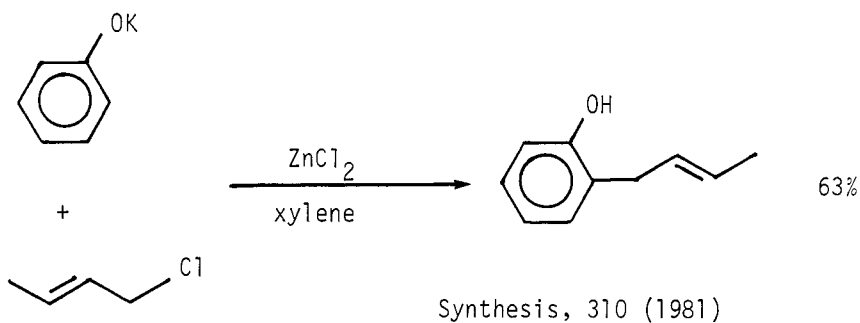
Synthesis, 695 (1980)



Tetr Lett, 23, 2475 (1982)

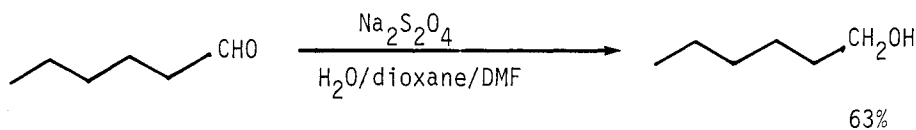


JCS Perkin I, 2470 (1980) 98%

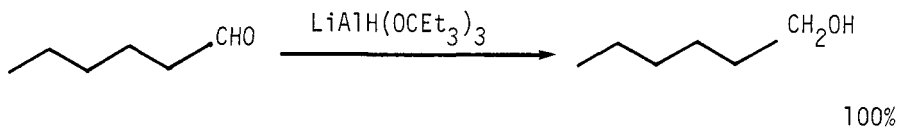
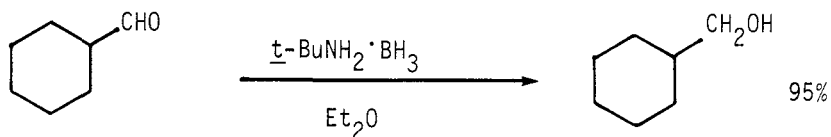
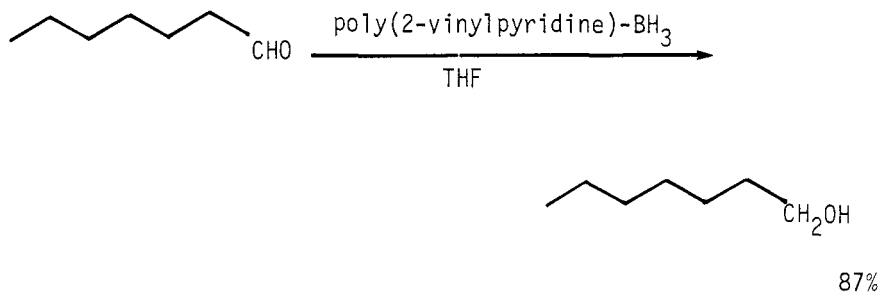
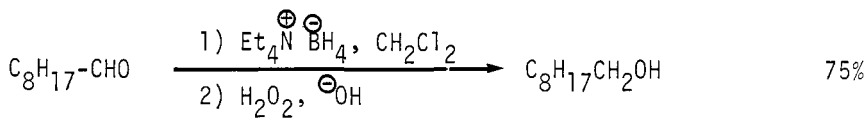
Section 33 Phenols from PhenolsSection 34 Alcohols from Aldehydes

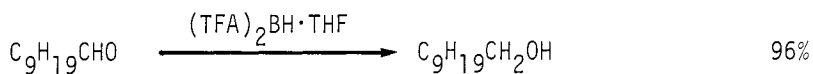
The following reaction types are included in this section:

- A. Reductions of aldehydes to alcohols.
- B. Nucleophilic additions to aldehydes, forming alcohols.
- C. Coupling of aldehydes to give diols.

Section 34A: Reductions of Aldehydes to Alcohols

JOC, 45, 4126 (1980)

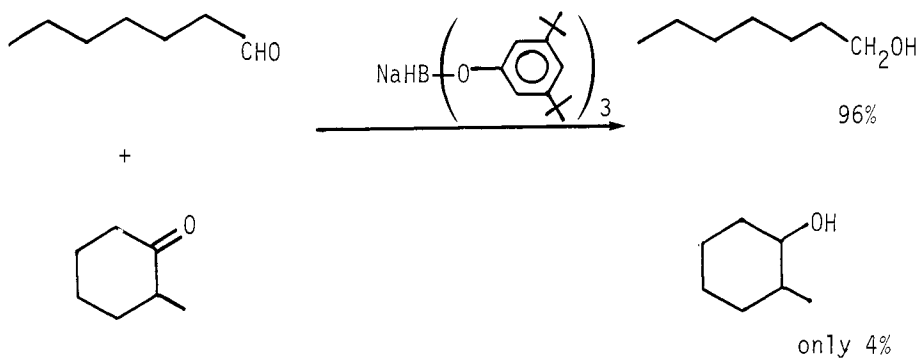
JOC, 46, 4628 (1981)Tetr Lett, 21, 693 and 697 (1980)JOC, 45, 2724 (1980)Tetr Lett, 21, 3963 (1980)

JOC, 46, 355 (1981)

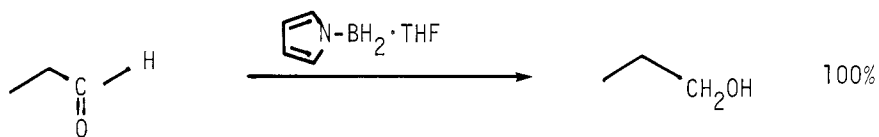
Reduces conjugated aldehydes in the presence of non-conjugated ones.

Tetr Lett, 22, 4077 (1981)

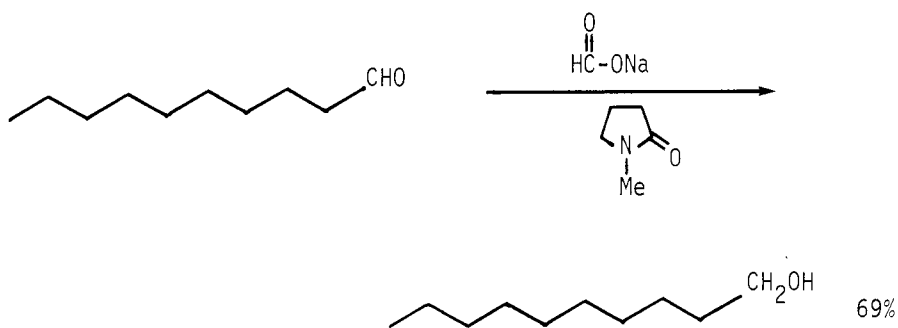
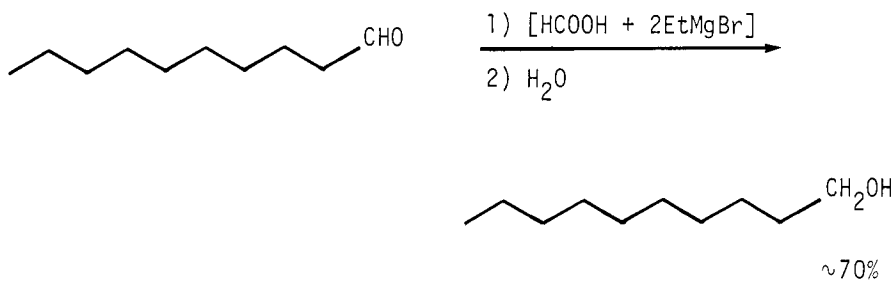
Aldehydes may be reduced in the presence of ketones:

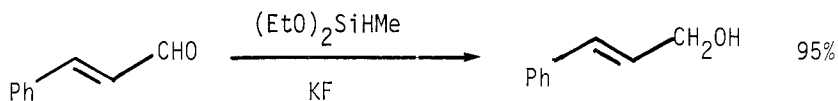


Chem Lett, 461 (1981)

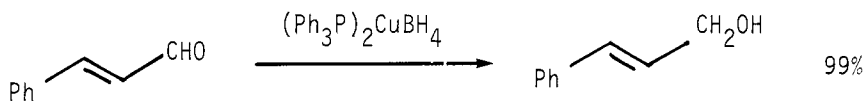
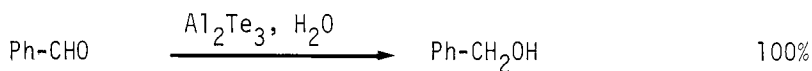


Synthesis, 214 (1981)

JOC, 46, 3367 (1981)Tetr Lett, 22, 621 (1981)

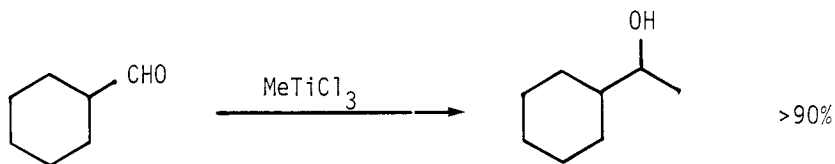
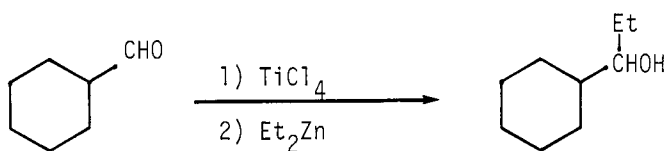
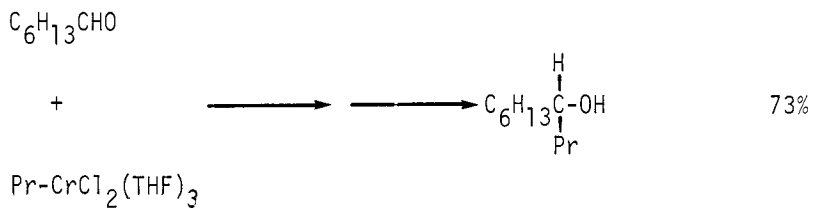


JCS Chem Comm, 121 (1981)

Tetr Lett, 22, 675 (1981)Angew Chem Int Ed, 19, 1008 and
1009 (1980)34B: Nucleophilic Additions to Aldehydes, Forming Alcohols

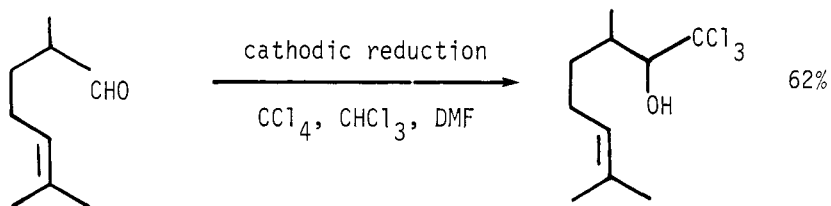
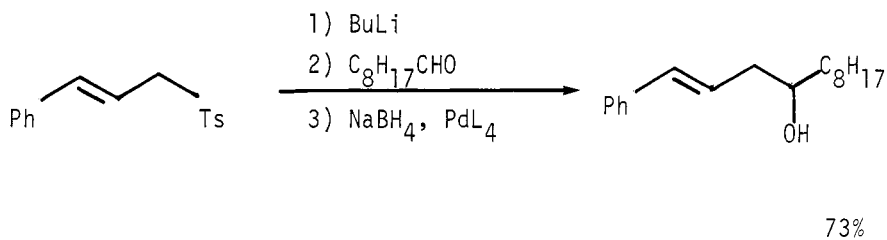
Aldol reactions are listed in:

Section 324 (Aldehyde-Alcohol) and
Section 330 (Ketone-Alcohol)

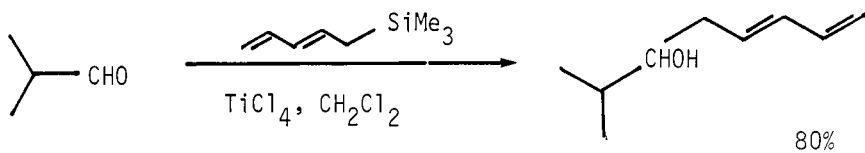
Angew Chem Int Ed, 19, 1011 (1980)Synth Comm, 11, 261 (1981)

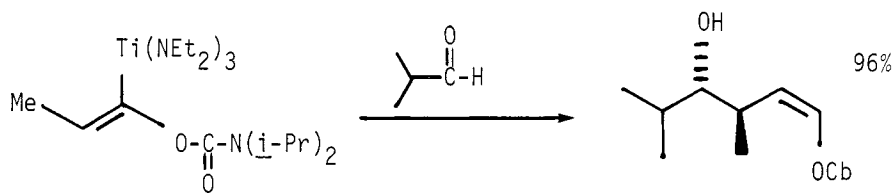
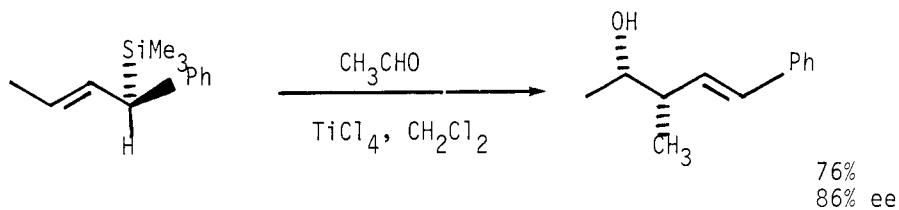
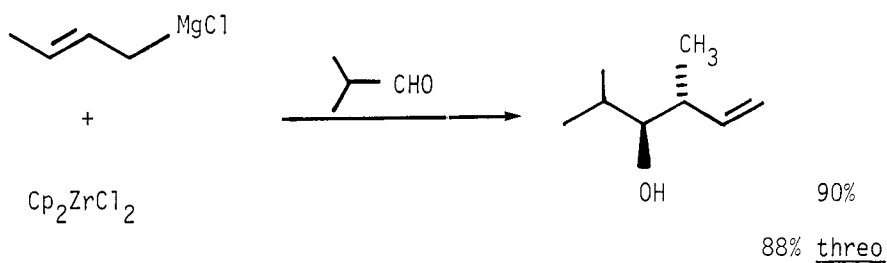
Ketones are relatively unreactive.

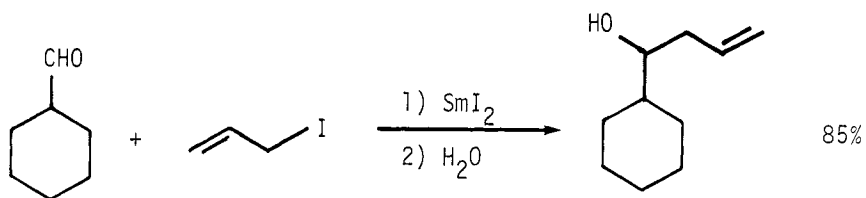
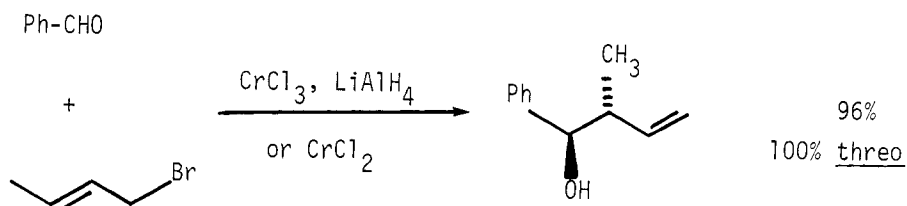
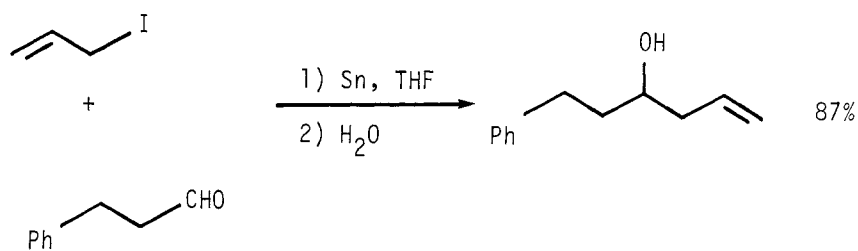
Angew Chem Int Ed, 21, 144 (1982)

Tetr Lett, 23, 1609 (1982)

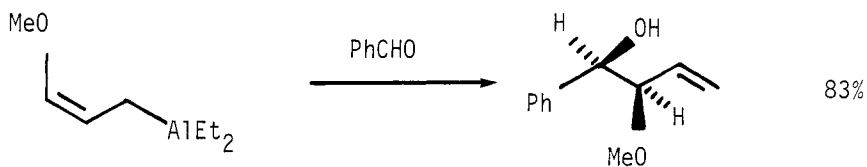
Chem Lett, 1331 (1982)

Organometallics, 1, 1651 (1982)

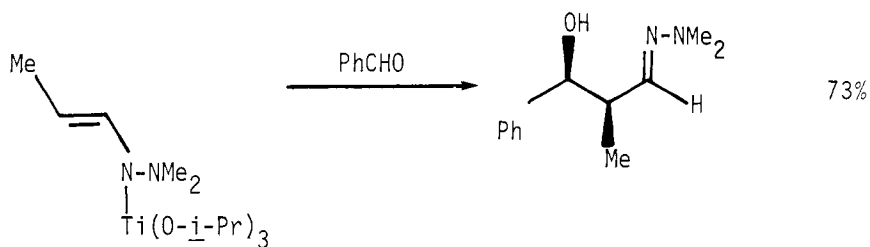
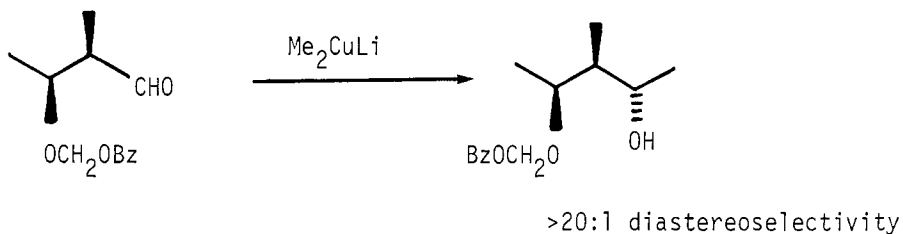
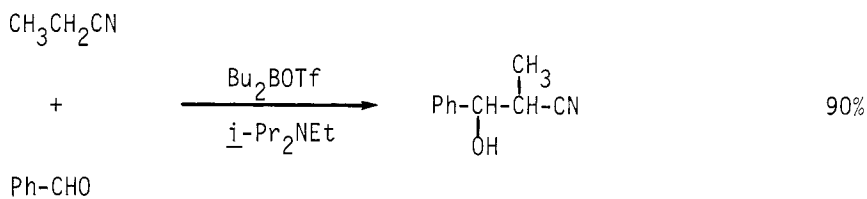
Angew Chem Int Ed, 21, 372 (1982)JACS, 104, 4963 (1982)Tetr Lett, 22, 2895 (1981)

Tetr Lett, 23, 3497 (1982)Tetr Lett, 22, 1037 (1981)

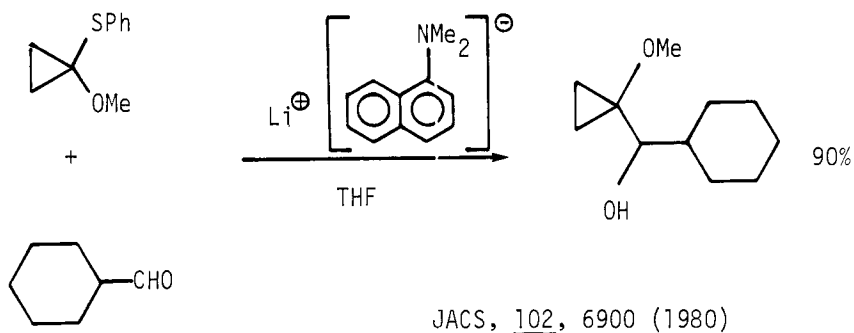
Chem Lett, 1527 (1981)



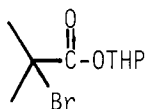
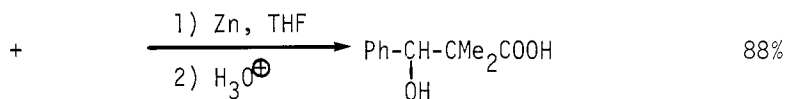
JCS Chem Comm, 845 (1982)

Angew Chem Int Ed, 21, 864 (1982)Tetr Lett, 21, 1031 and 1035 (1980)

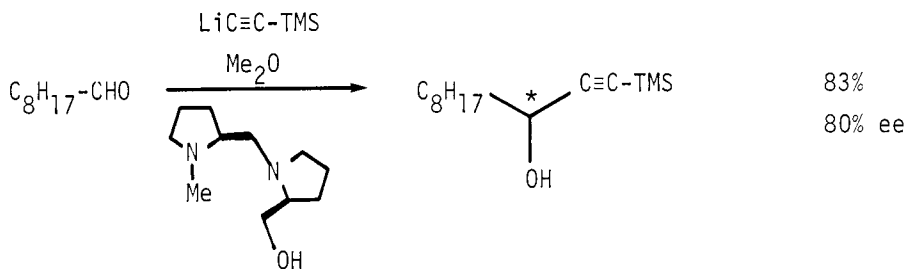
Chem Lett, 1401 (1982)



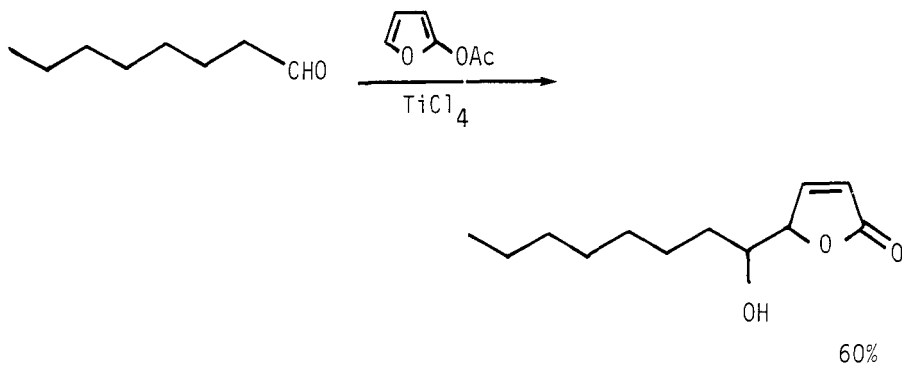
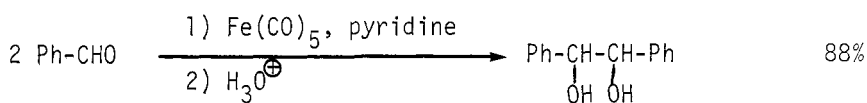
PhCHO



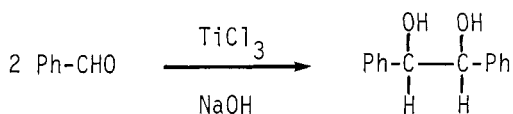
Bull Soc Chim France II, 145 (1980)



Chem Lett, 255 (1980)

Tetr Lett, 22, 3269 (1981)34C: Coupling of Aldehydes to Give Diols

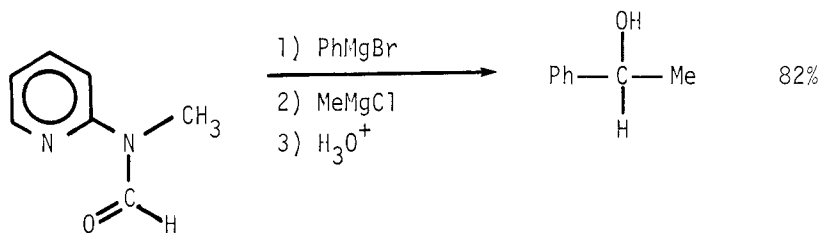
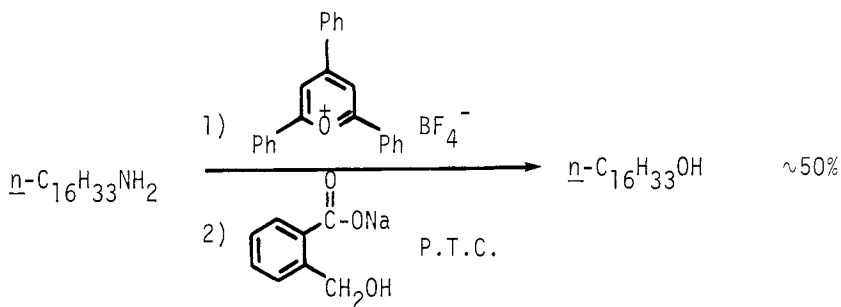
Chem Lett, 1141 (1980)

Tetr Lett, 23, 3517 (1982)

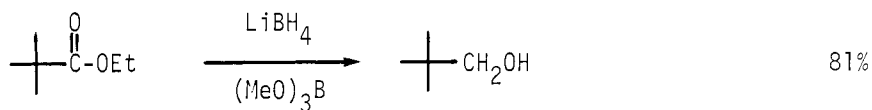
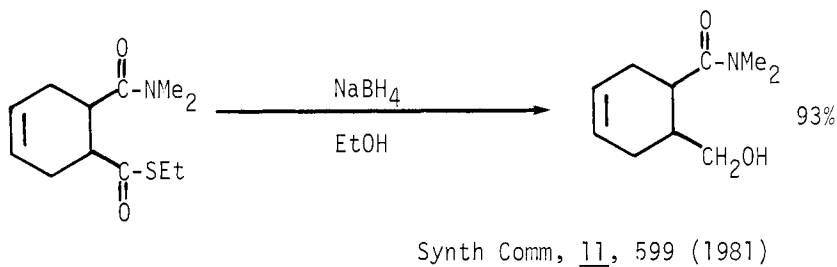
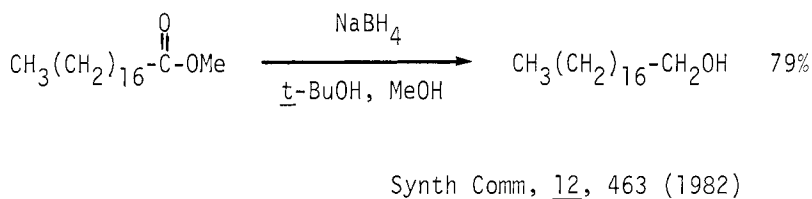
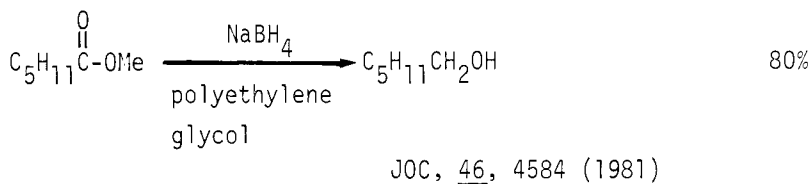
Related methods: Alcohols from Ketones (Section 42)

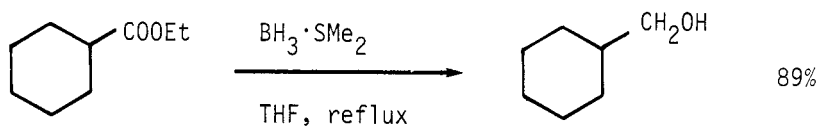
Section 35 Alcohols and Phenols from Alkyls, Methylene and Aryls

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

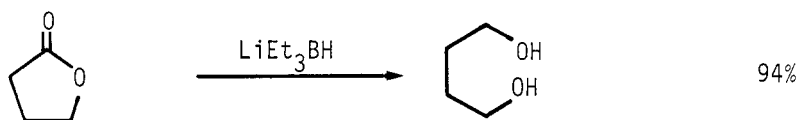
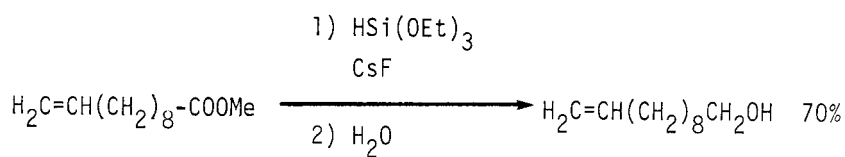
Section 36 Alcohols from AmidesJOC, 45, 1 (1980)Tetr Lett, 22, 1085 (1981)Section 37 Alcohols from Amines

J.C.S. Perkin I, 1492 (1981)

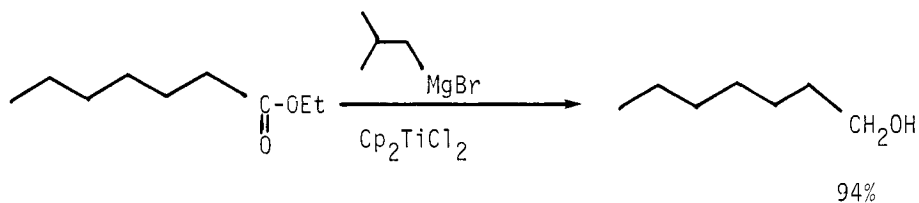
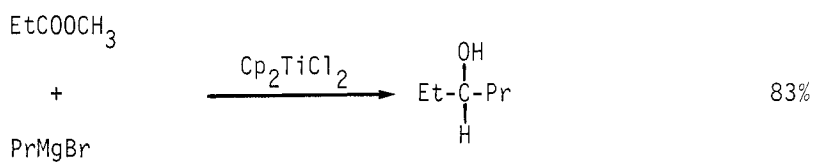
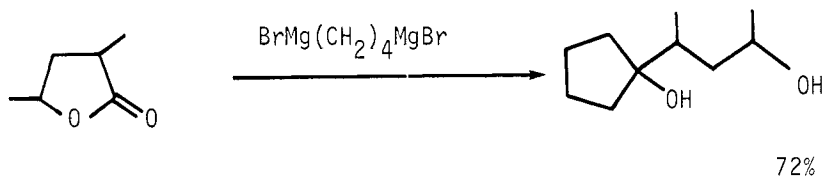
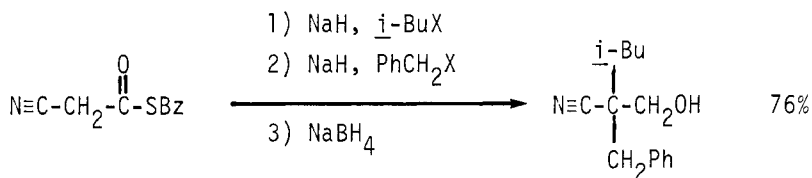
Section 38 Alcohols from EstersJOC, 47, 1604 (1982)



Synthesis, 439 (1981)

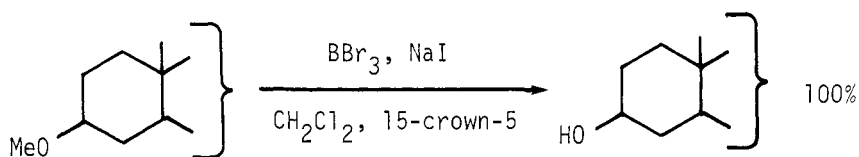
JOC, 47, 3153 (1982)JOC, 45, 1 (1980)

Synthesis, 558 (1981)

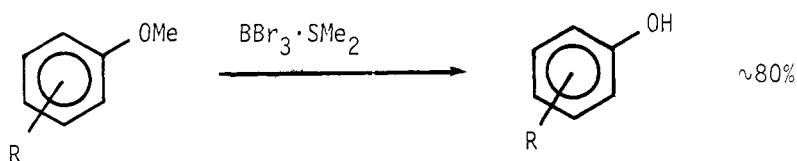
Tetr Lett, 21, 2171 and 2175 (1980)Tetr Lett, 21, 2171 and 2175 (1980)JOC, 45, 1828 (1980)Tetr Lett, 23, 3151 (1982)

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

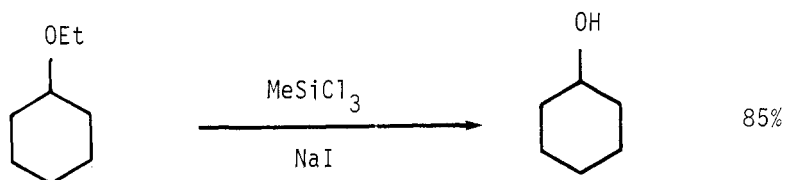
Section 39 Alcohols and Phenols from Ethers and Epoxides



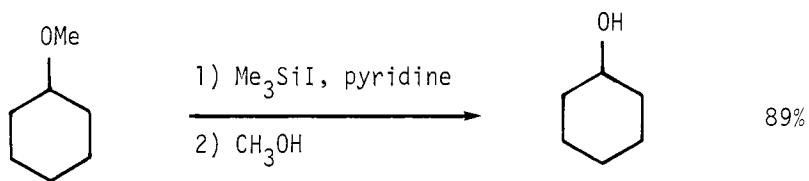
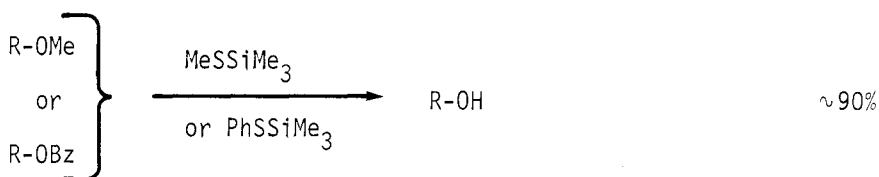
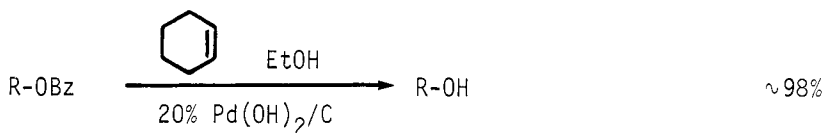
Tetr Lett, 22, 4239 (1981)



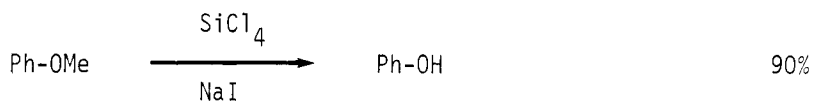
Tetr Lett, 21, 3731 (1980)



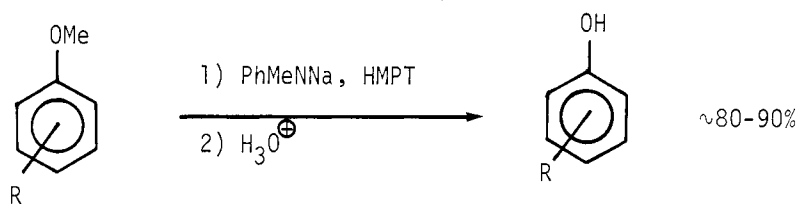
Angew Int Ed, 20, 690 (1981)

Org Syn, 59, 35 (1980)Tetr Lett, 21, 2305 (1980)

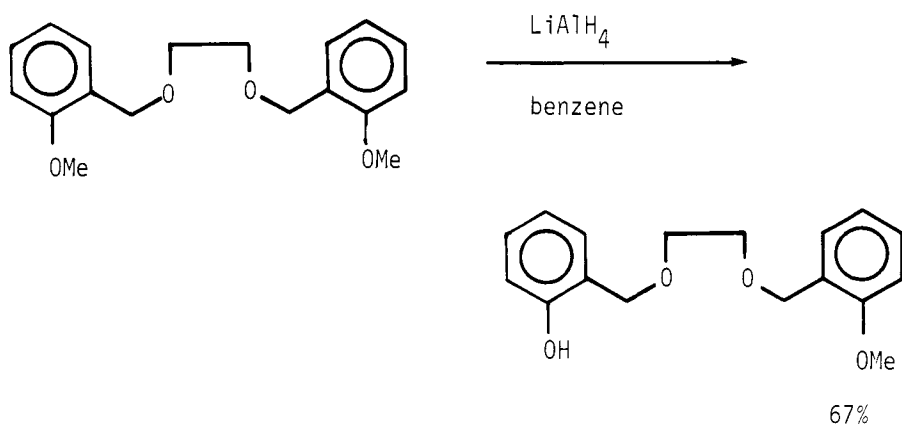
Synthesis, 396 (1981)



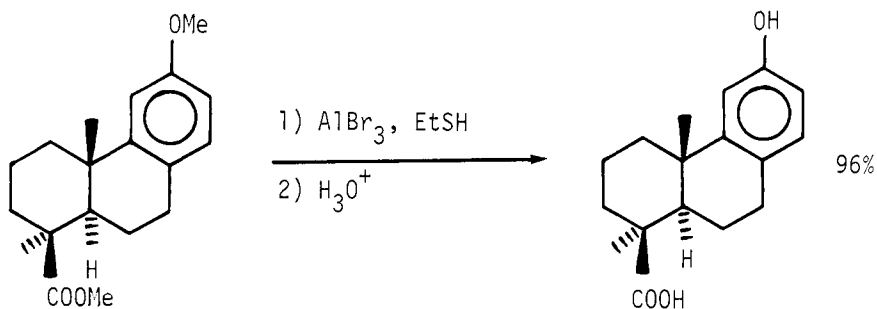
Synthesis, 1048 (1982)



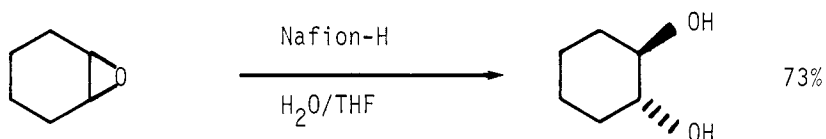
Synthesis, 638 (1980)



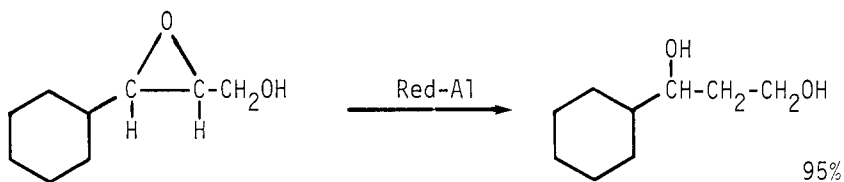
JCS Chem Comm, 507 (1980)

JOC, 46, 1991 (1981)

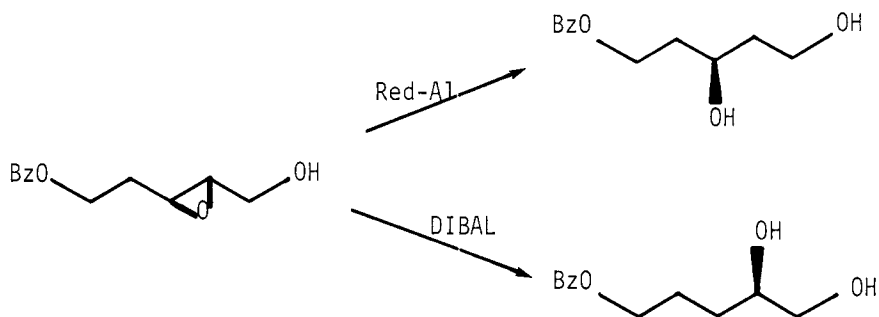
Additional examples of ether cleavages may be found in Section 45A (Protection of Alcohols and Phenols).



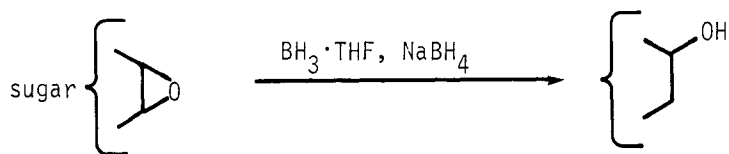
Synthesis, 280 (1981)



Tetr Lett, 23, 4541 (1982)

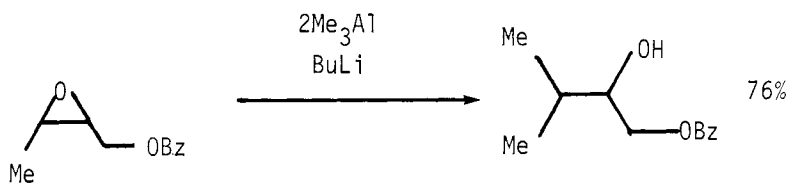


Tetr Lett, 23, 2719 (1982)

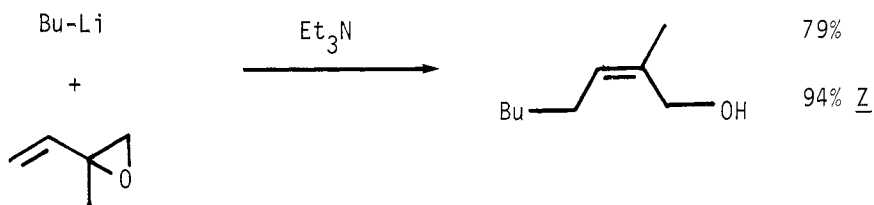


Can be accomplished in the presence of OTs, ketal, and acetal groups.

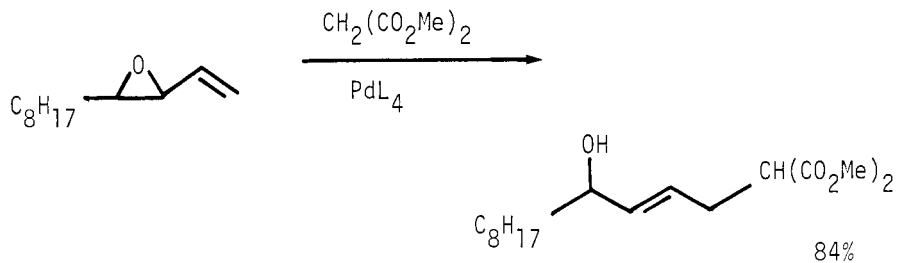
JOC, 45, 3836 (1980)



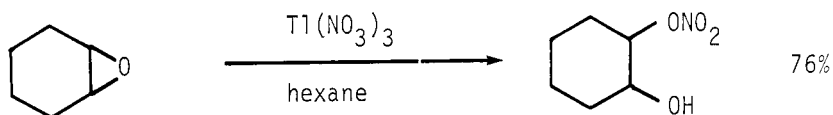
Angew Chem Int Ed, 21, 71 (1982)



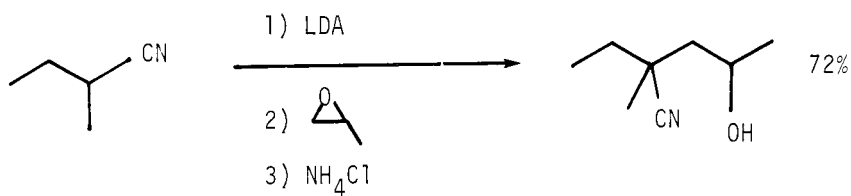
Tetr Lett, 22, 577 (1981)



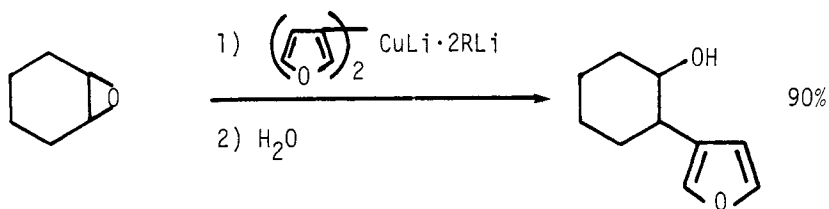
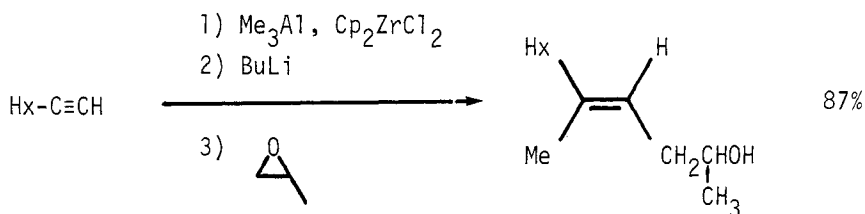
Tetr Lett, 22, 2575 (1981)



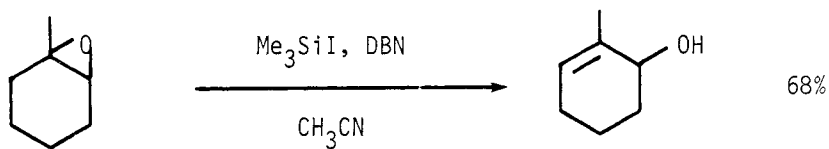
Tetr Lett, 21, 1149 (1980)

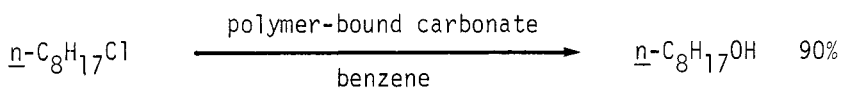


Synth Comm, 10, 49 (1980)

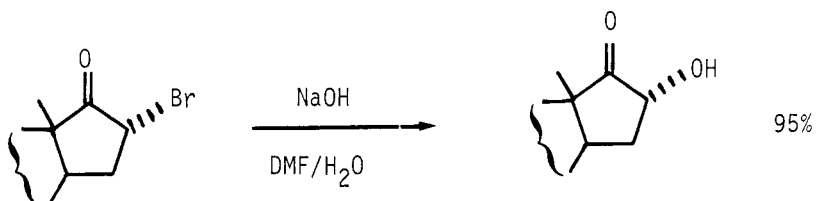
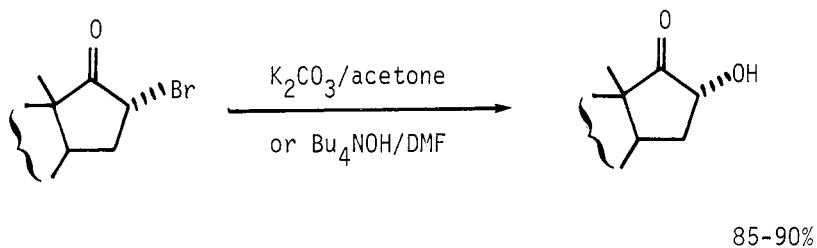
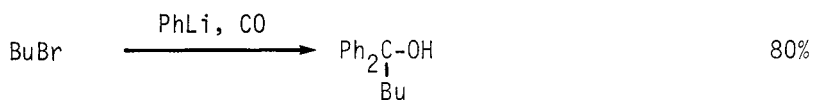
Tetr Lett, 21, 4365 (1980)

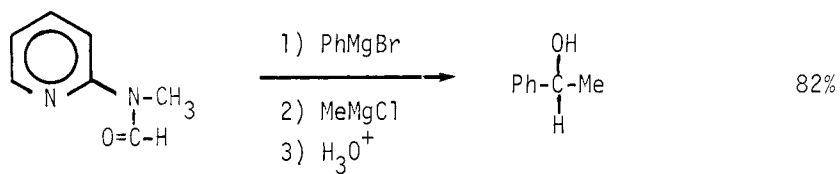
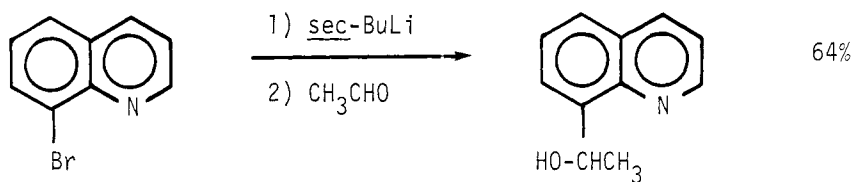
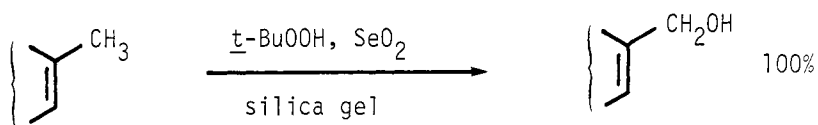
Synthesis, 1034 (1980)

JOC, 45, 2579 (1980)

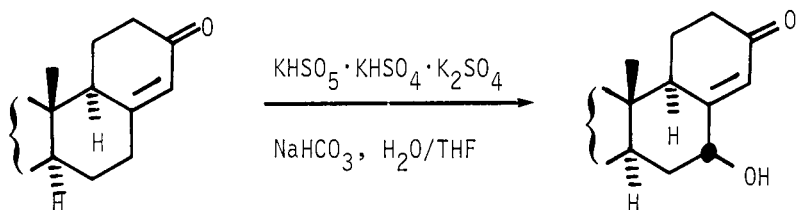
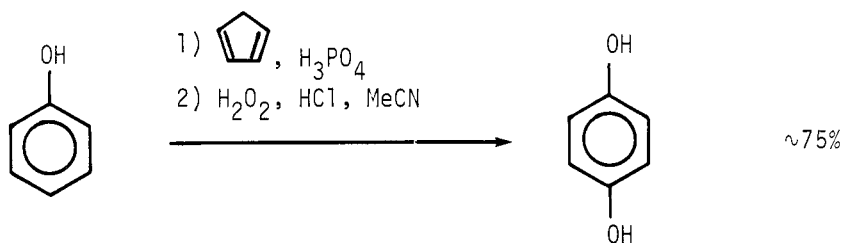
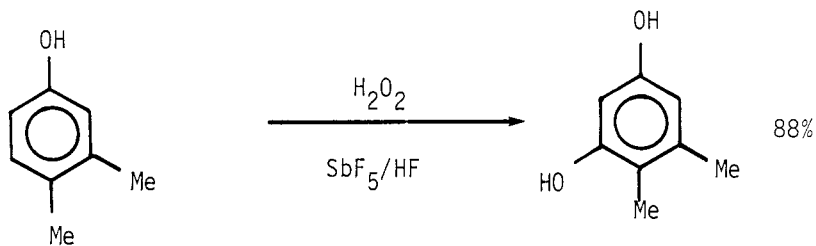
Section 40 Alcohols from Halides

Synthesis, 793 (1981)

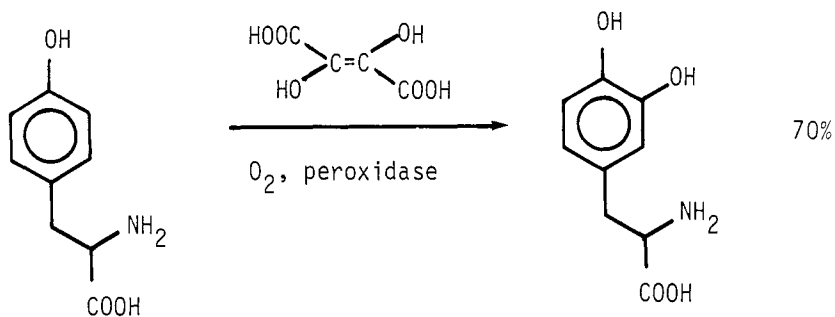
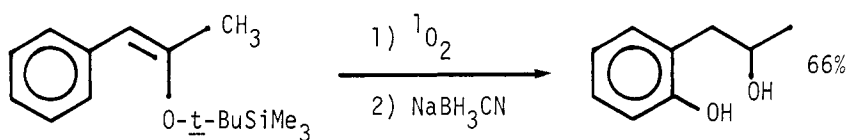
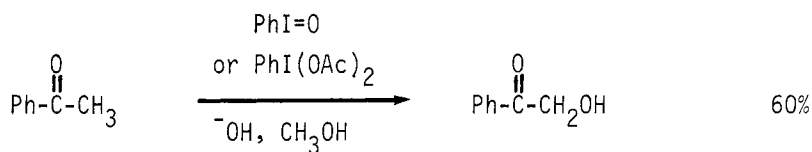
JOC, 47, 4024 (1982)Steroids, 39, 345 (1982)JOC, 46, 4625 (1981)

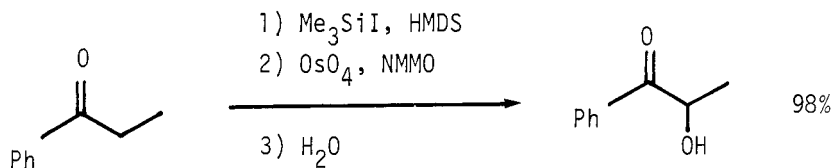
Tetr Lett, 22, 1085 (1981)JOC, 45, 1514 (1980)Section 41 Alcohols and Phenols from Hydrides

Chem Lett, 1703 (1981)

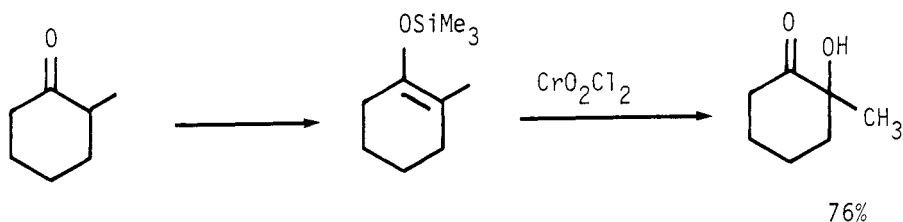
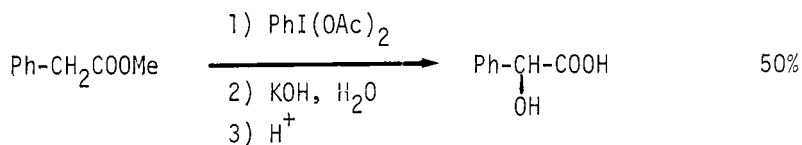
Tetr Lett, 22, 4201 (1981)Tetr Lett, 22, 2337 (1981)

JCS Chem Comm, 1128 (1980)

JACS, 103, 6263 (1981)Tetr Lett, 23, 1717 (1982)Tetr Lett, 22, 1283 (1981)



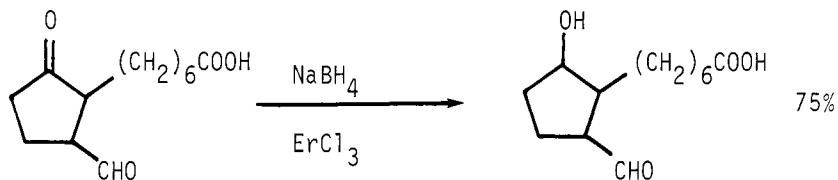
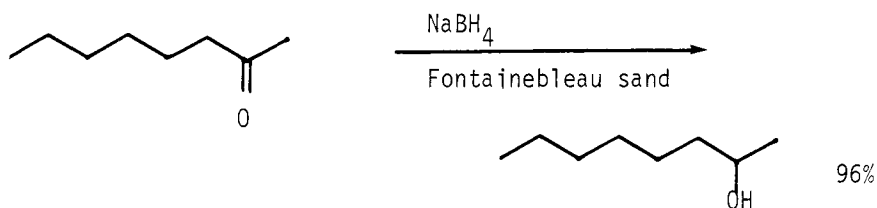
Tetr Lett, 22, 607 (1981)

Tetr Lett, 23, 2917 (1982)Tetr Lett, 22, 2747 (1981)

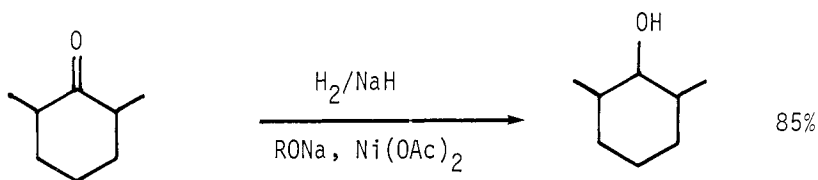
Section 42 Alcohols from Ketones

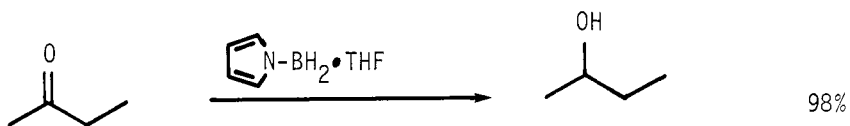
The following reaction types are included in this section:

- A. Reductions of ketones to alcohols.
- B. Nucleophilic additions to ketones, forming alcohols.
- C. Coupling of ketones to give diols.

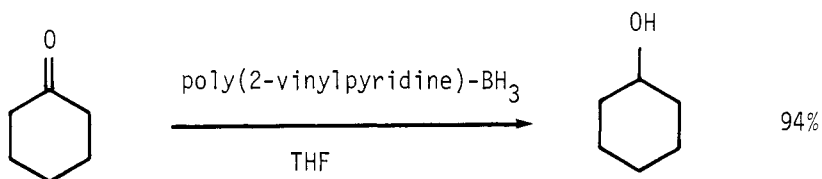
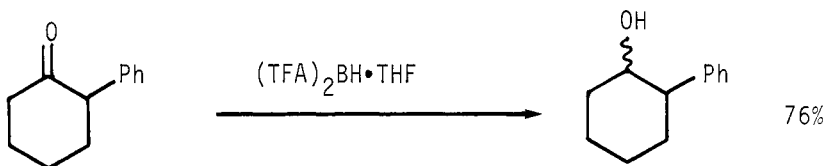
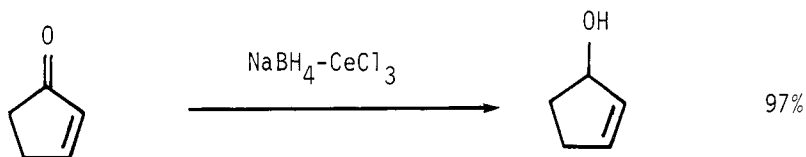
42A: Reductions of Ketones to AlcoholsTetr Lett, 22, 4077 (1981)

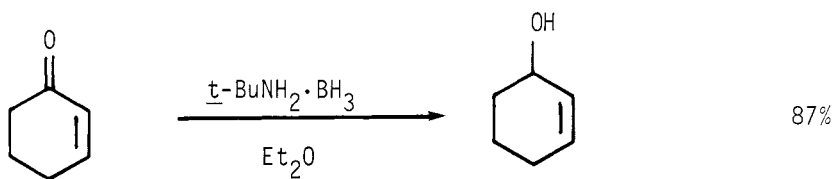
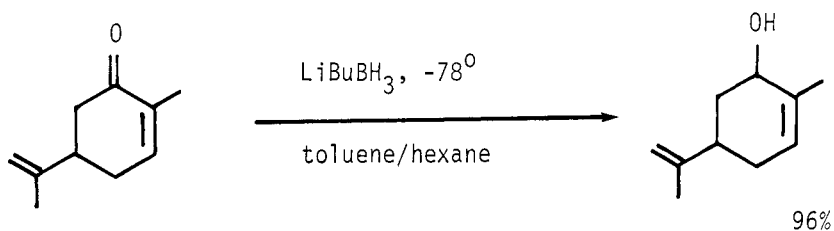
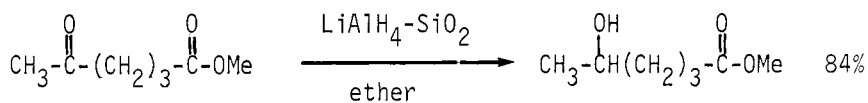
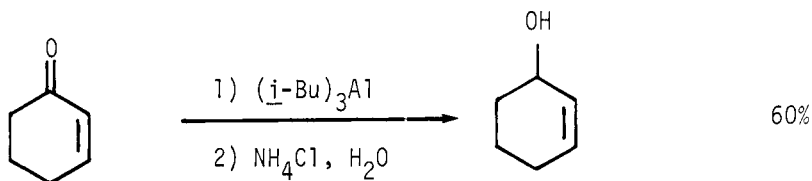
JCS Chem Comm, 1066 (1981)

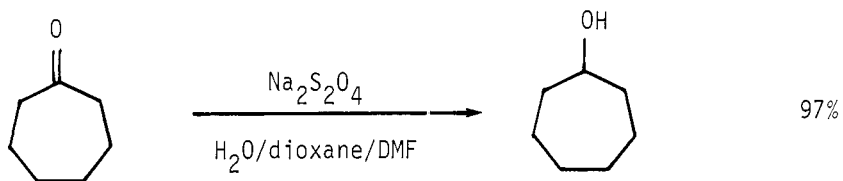
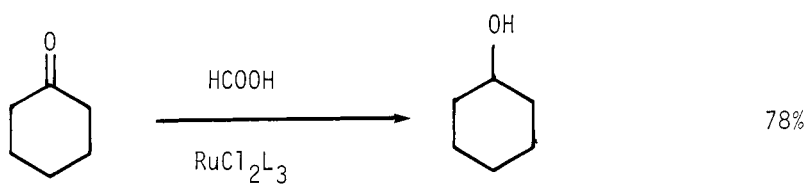
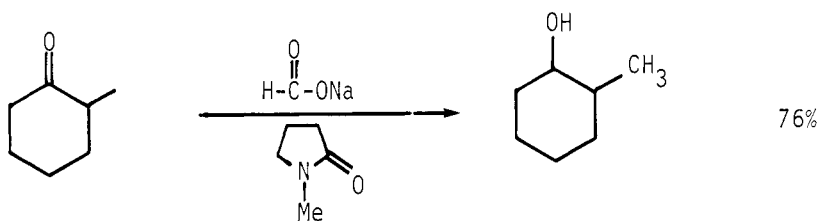
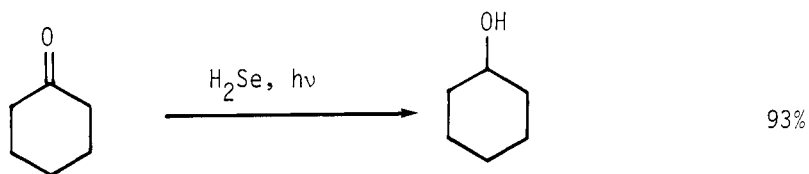
JOC, 45, 1946 (1980)

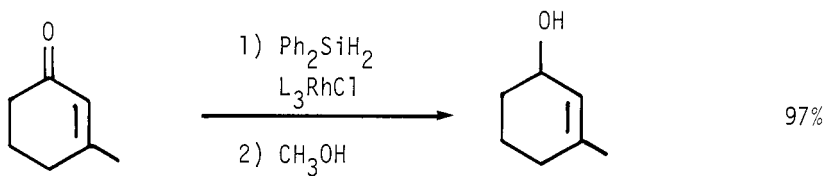
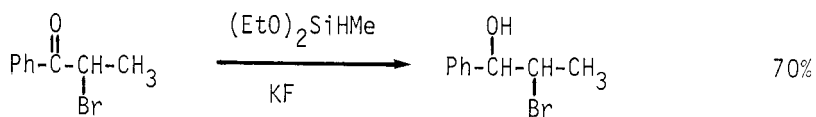


Synthesis, 214 (1981)

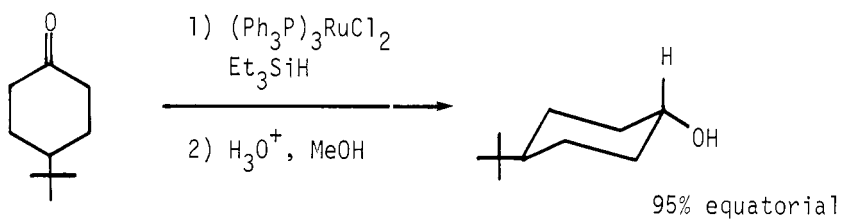
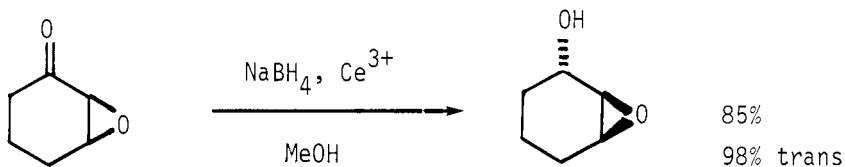
JOC, 45, 2724 (1980)JOC, 46, 355 (1981)JACS, 103, 5454 (1981)

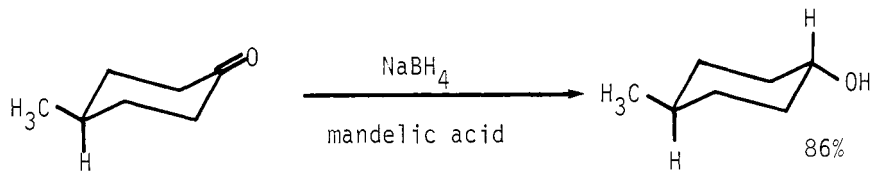
Tetr Lett, 21, 693 and 697 (1980)JOC, 47, 3311 (1982)Tetr Lett, 23, 4585 (1982)JOC, 47, 4640 (1982)

JOC, 45, 4126 (1980)Bull Chem Soc Jpn, 55, 2441 (1982)JOC, 46, 3367 (1981)Angew Chem Int Ed, 19, 1008 and 1009 (1980)

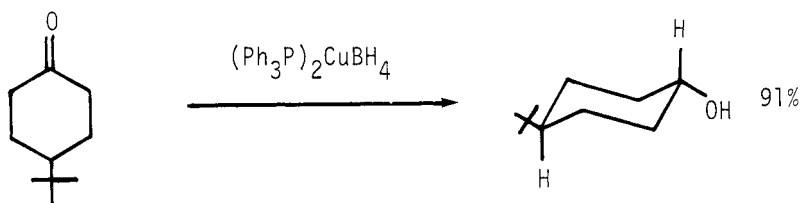
Organometallics, 1, 1390 (1982)

JCS Chem Comm, 121 (1981).

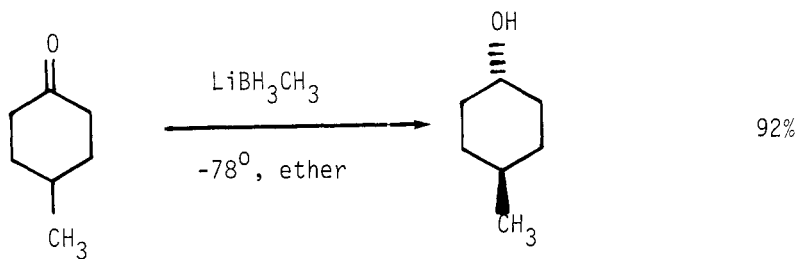
JOC, 47, 2469 (1982)Synth Comm, 10, 623 (1980)



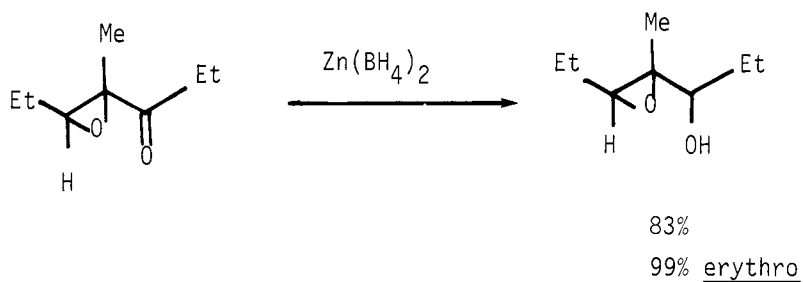
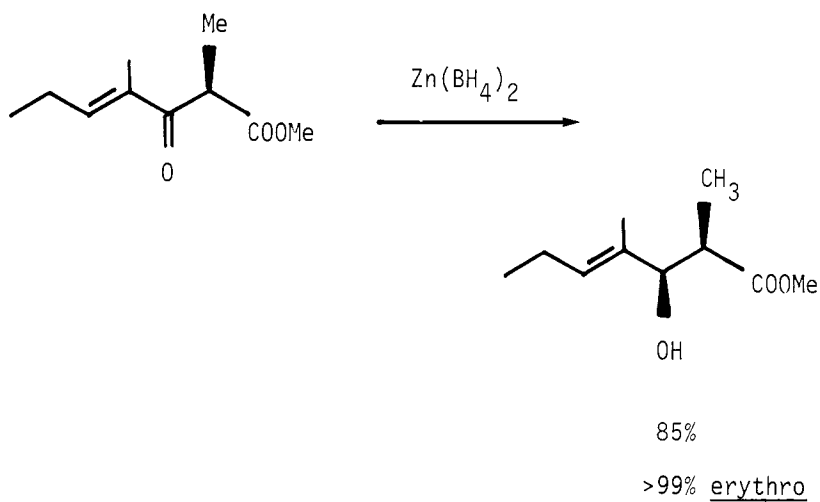
Ind J. Chem, 21B, 212 (1982)

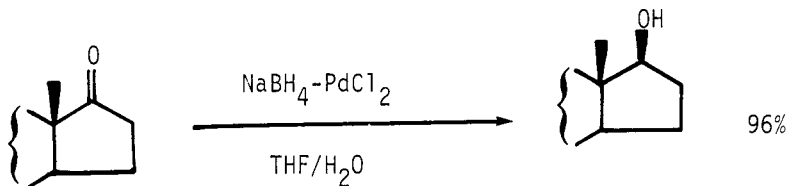


Tetr Lett, 22, 675 (1981)

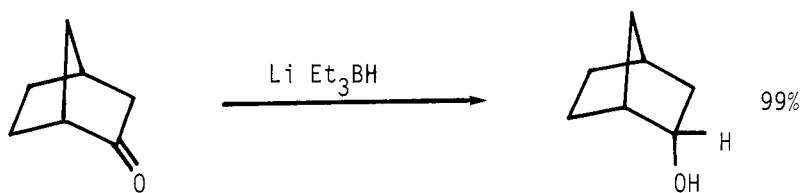


Synth Comm, 12, 723 (1982)

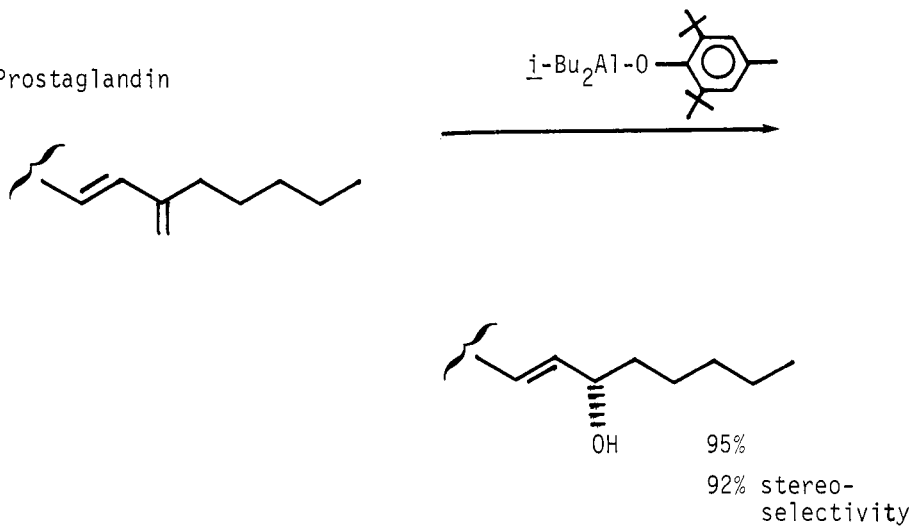
Tetr Lett, 22, 4723 (1981)Tetr Lett, 21, 1641 (1980)

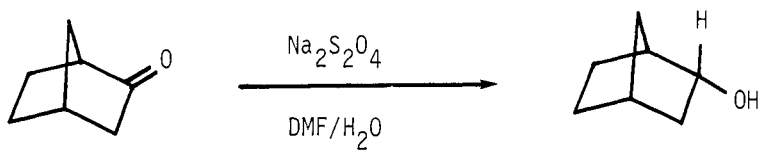


Chem Lett, 1029 (1981)

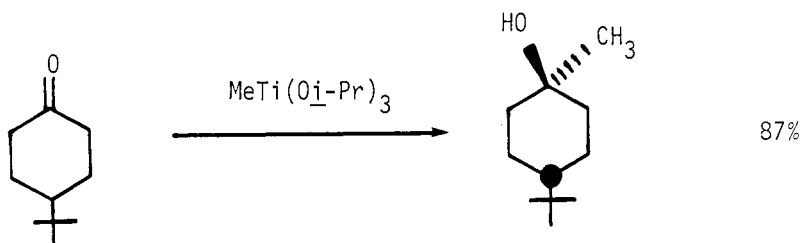
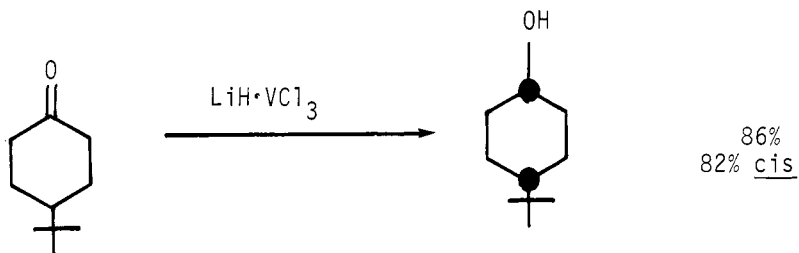
JOC, 45, 1 (1980)

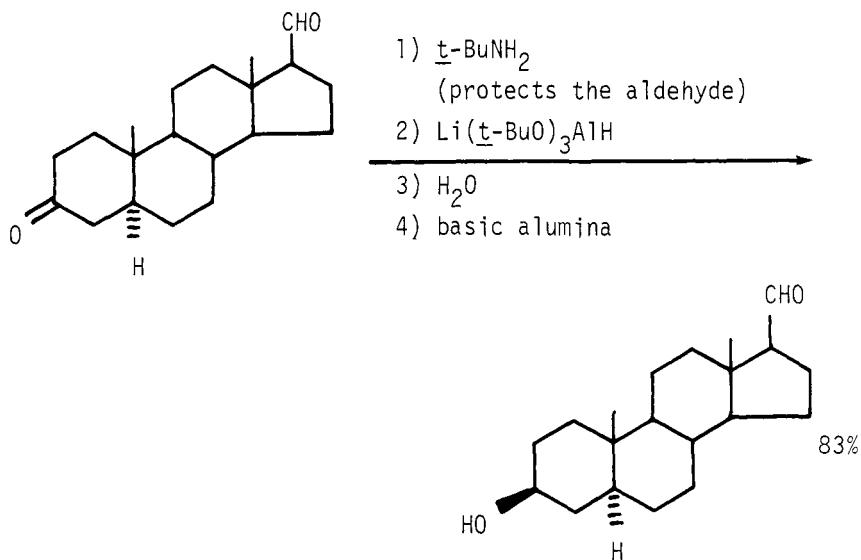
Prostaglandin

Bull Chem Soc Jpn, 54, 3033 (1981)



75% yield

85% endoTetr Lett, 22, 179 (1981)Helv Chim Acta, 63, 2451 (1980)JOC, 45, 1041 (1980)

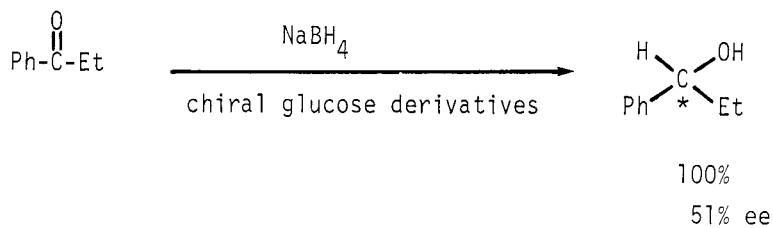
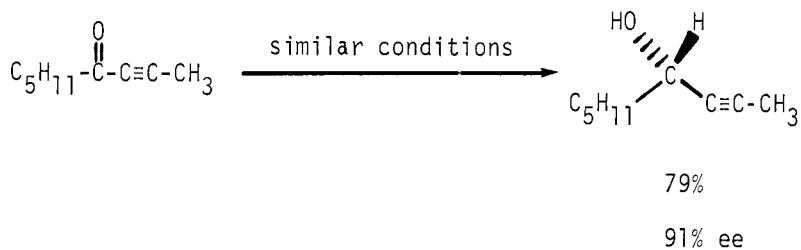
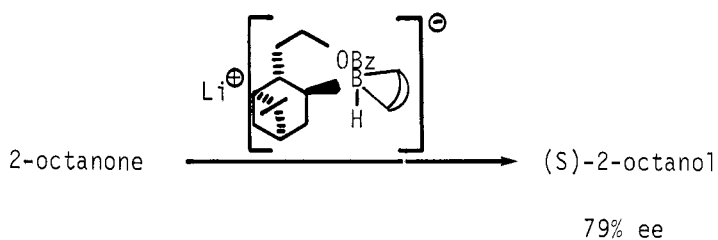


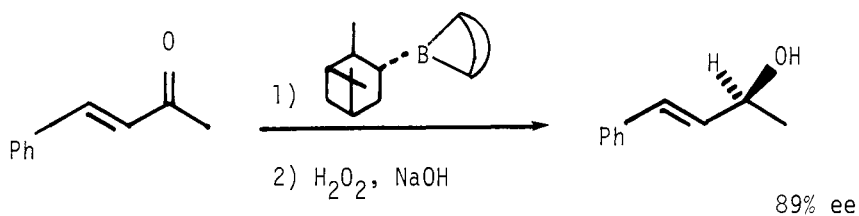
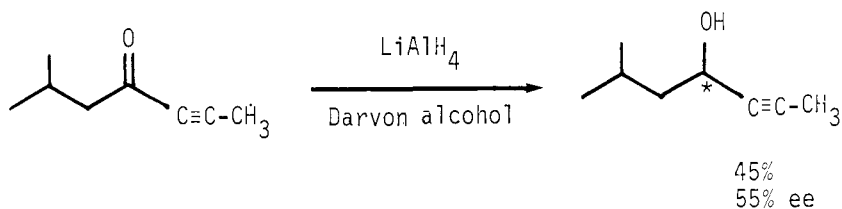
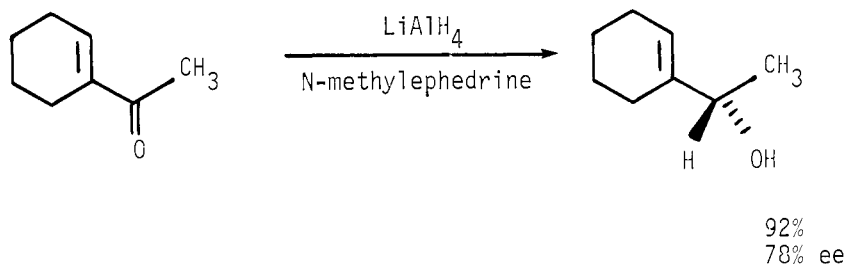
Tetrahedron, 38, 1827 (1982)

Potassium tri(R,S-s-butyl)borohydride reduces 3-oxo steroids to the axial alcohols, without affecting the 17- and 20-ketone groups.

Use of a chiral hydrosilane-rhodium phosphine reagent allows greater stereoselectivity of 17 α -alcohol formation than with other methods.

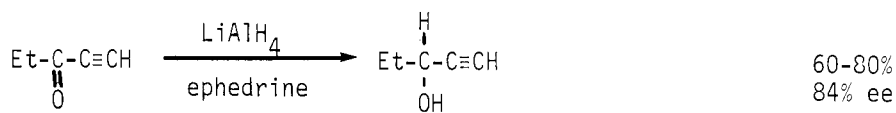
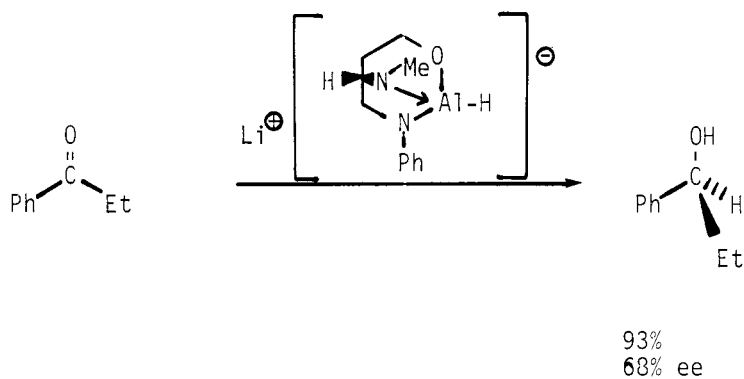
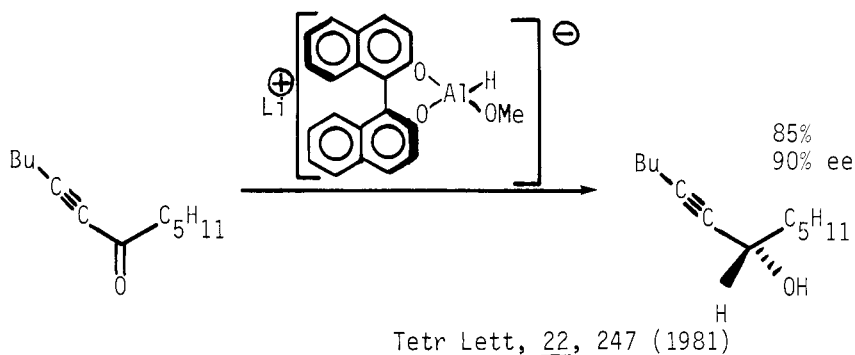
JCS Chem Comm, 1238 and 1239 (1982)

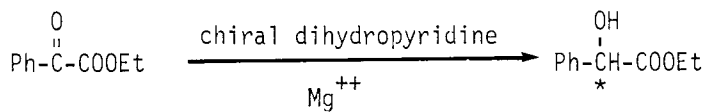
JOC, 45, 4229 (1980)JOC, 45, 4231 (1980)Bull Chem Soc Jpn, 54, 1424 (1981)JOC, 47, 2496 (1982)JOC, 47, 2814 (1982)

JOC, 47, 1606 (1982)JOC, 45, 582 (1980)

JCS Chem Comm, 1026 (1980)

Chem Lett, 981 (1980)

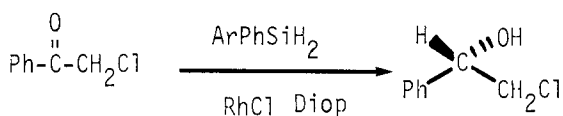
Tetr Lett, 21, 1735 and 1739 (1980)Tetr Lett, 23, 4111 (1982)



80%
83% ee

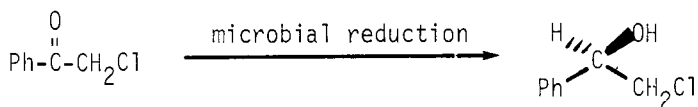
JACS, 103, 2091 (1981)

JACS, 103, 4613 (1981)



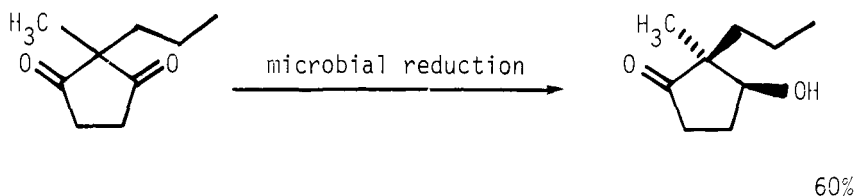
63% ee

J Chem Research(S), 320 (1980)



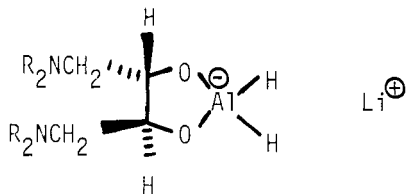
80%
100% ee

JOC, 45, 3352 (1980)



JOC, 47, 2320 (1982)

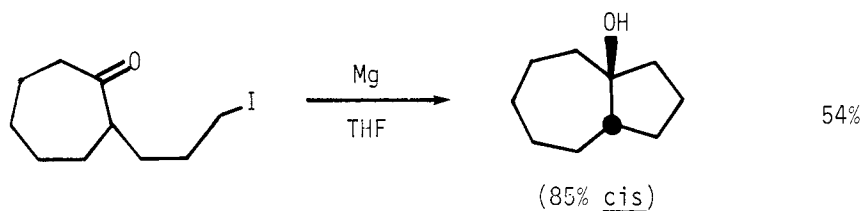
Use of LiAlH_4 -aminodiol complexes to reduce ketones asymmetrically. The chiral aminodiol is synthesized from tartaric acid.



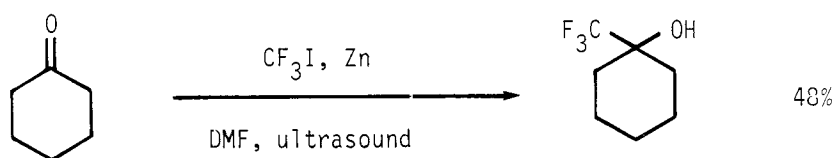
Chem Ber, 113, 1691 (1980)

42B: Nucleophilic Additions to Ketones, Forming Alcohols

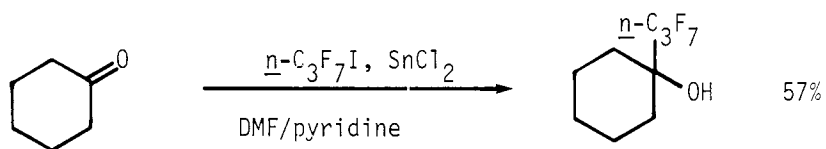
Aldol reactions are listed in Section 330 (Ketone-Alcohol).



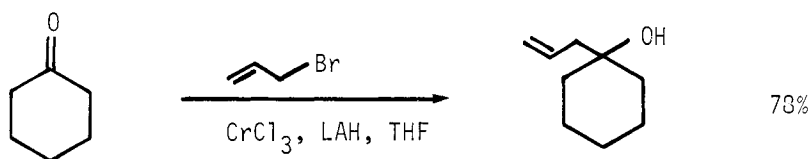
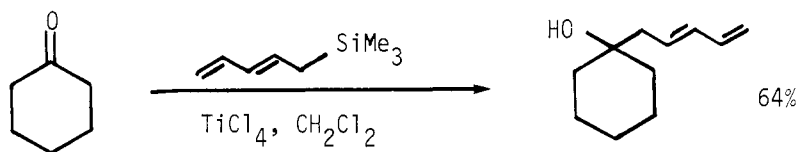
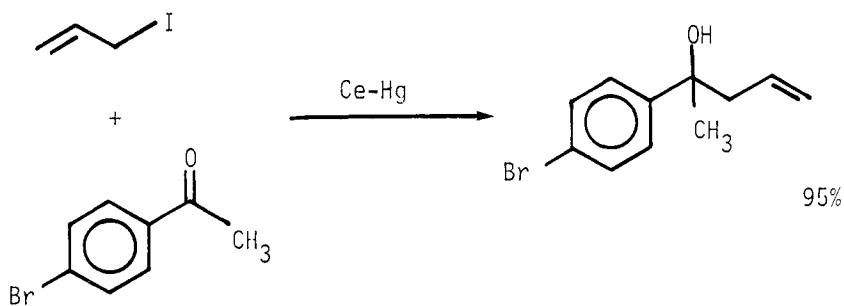
JOC, 47, 5368 (1982)

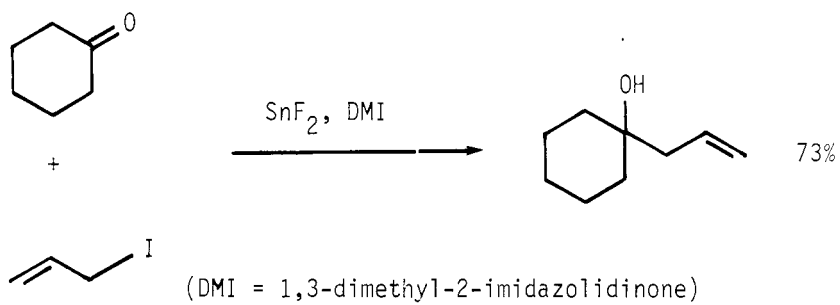


Chem Lett, 1679 (1981)

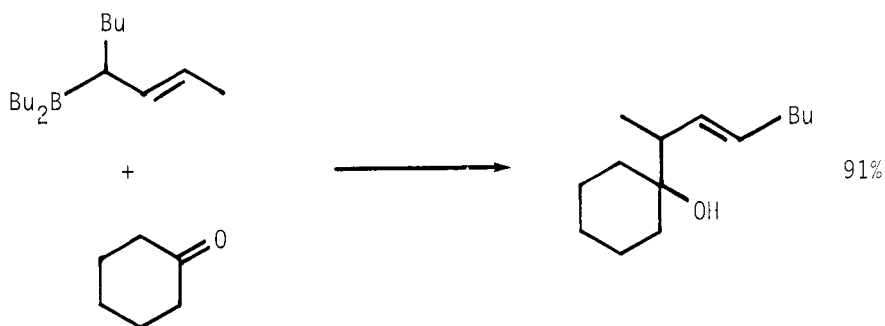


Chem Lett, 1337 (1981)

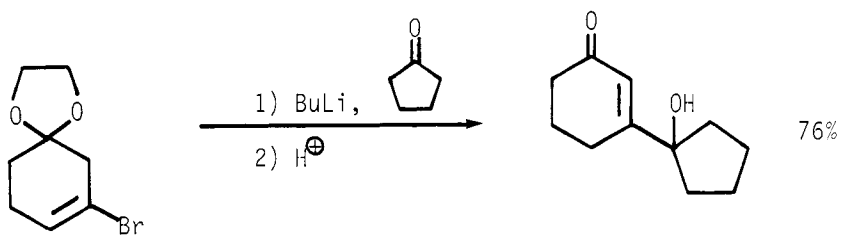
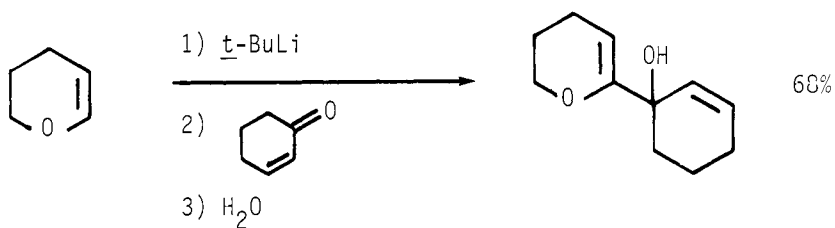
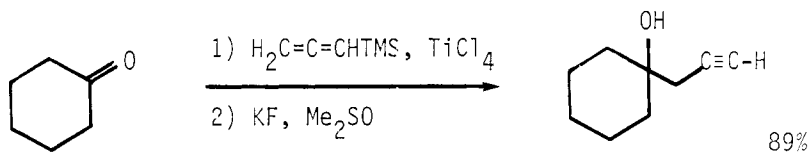
BCS Japan, 55, 561 (1982)Organometallics, 1, 1651 (1982)Tetr Lett, 22, 4985 (1981)

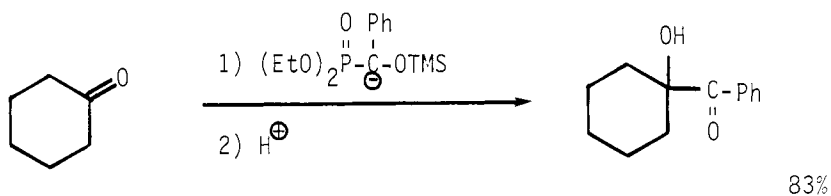
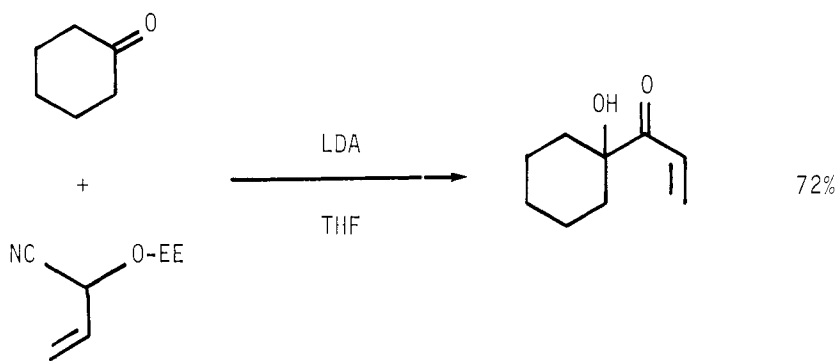


Chem Lett, 1507 (1980)



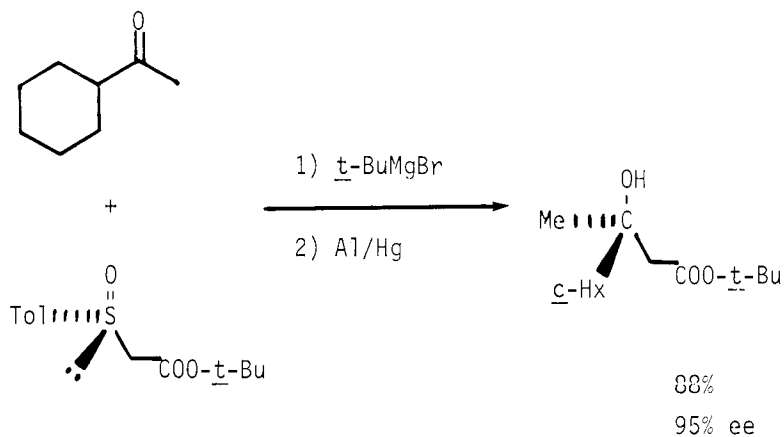
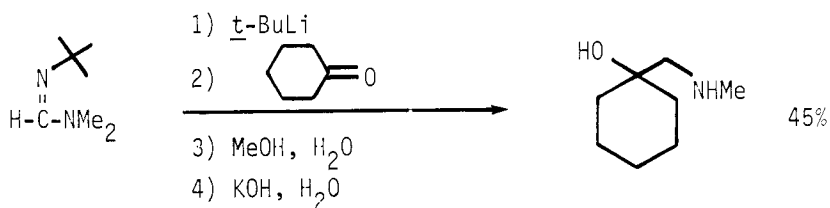
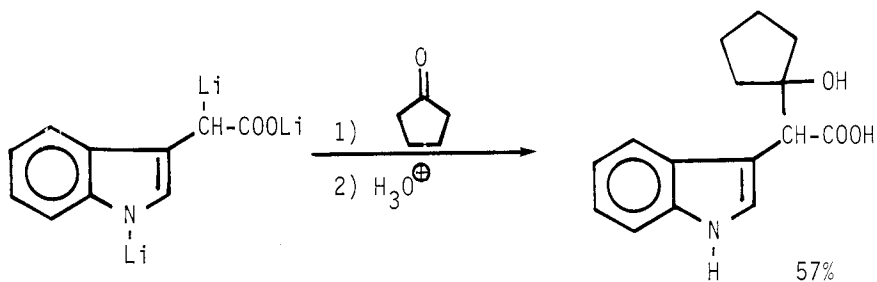
Chem Lett, 993 (1980)

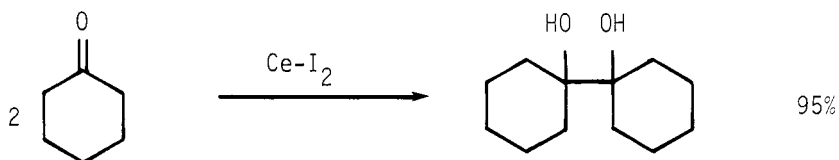
JOC, 47, 2825 (1982)Tetrahedron, 37, 3997 (1981)JOC, 45, 3925 (1980)

Tetr Lett, 21, 1017 (1980)

(EE = ethoxyethyl)

JOC, 45, 395 (1980)

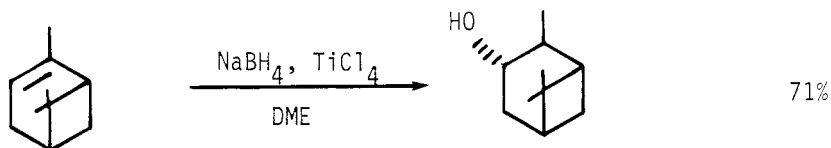
Tetrahedron, 36, 227 (1980)JACS, 102, 7125 (1980)JCC, 45, 447 (1980)

42C: Coupling of Ketones to Give DiolsTetr Lett, 23, 1353 (1982)

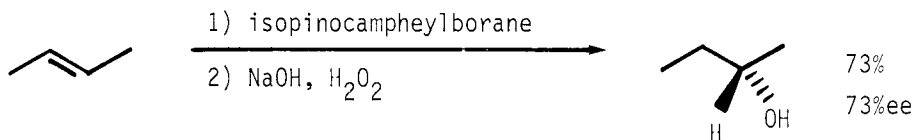
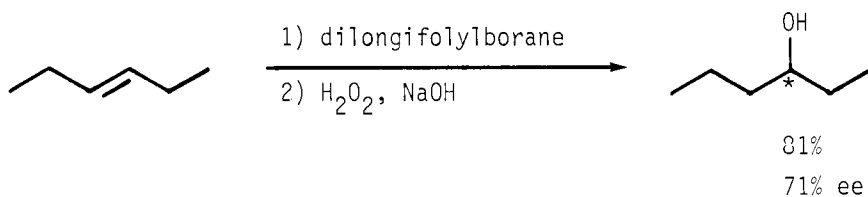
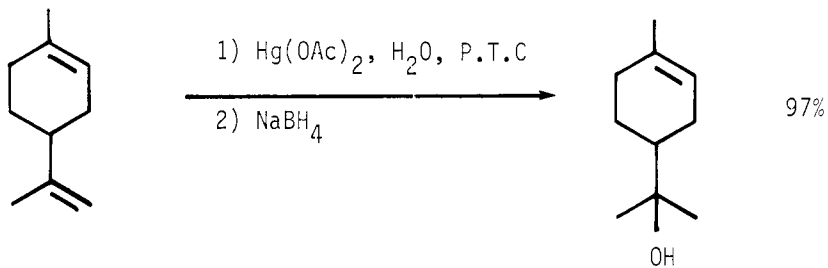
Related methods: Alcohols from Aldehydes (Section 34)

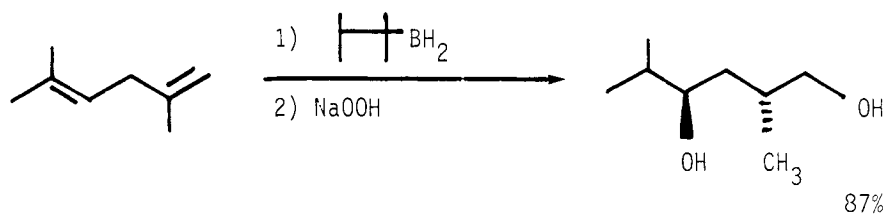
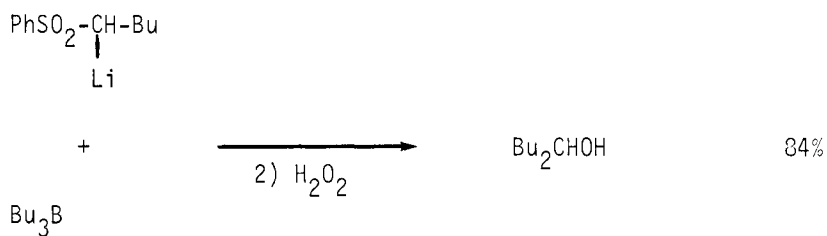
Section 43 Alcohols and Phenols from Nitriles

No Additional Examples.

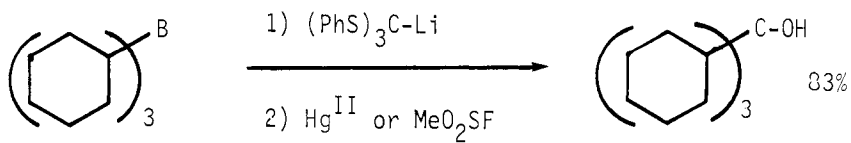
Section 44 Alcohols from OlefinsFor the preparation of diols from olefins see Section 323
(Alcohol-Alcohol)

JCS Chem Comm, 414 (1980)

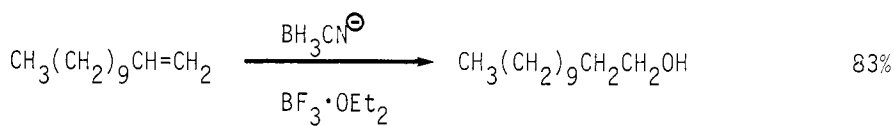
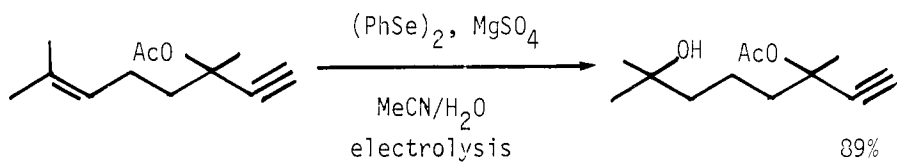
JOC, 46, 2988 (1981)JOC, 46, 2988 (1981)JACS, 102, 7798 (1980)

JACS, 102, 7385 (1980)

Bull Soc Chim France II, 99 (1981)



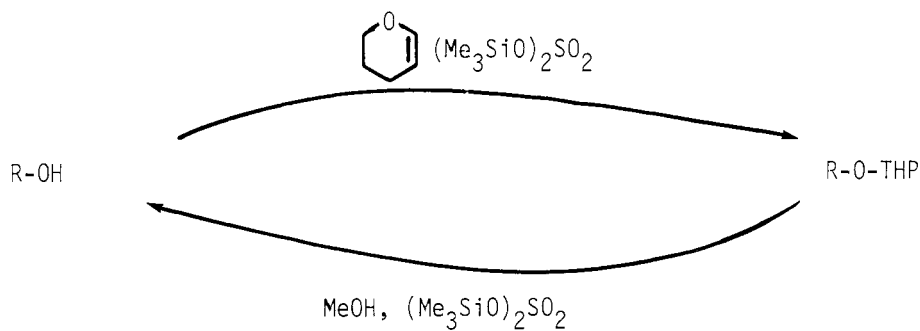
JCS Chem Comm, 1149 (1981)

JOC, 46, 5214 (1981)JACS, 103, 4606 (1981)

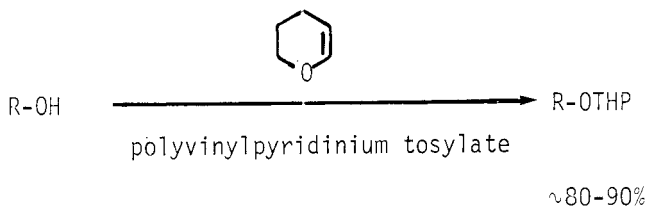
Section 45 Alcohols from Miscellaneous Compounds

No Additional Examples

For conversions of boranes to alcohols, see Section 44

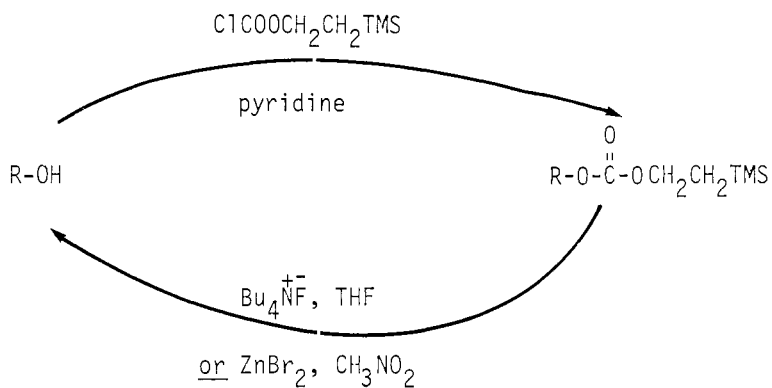
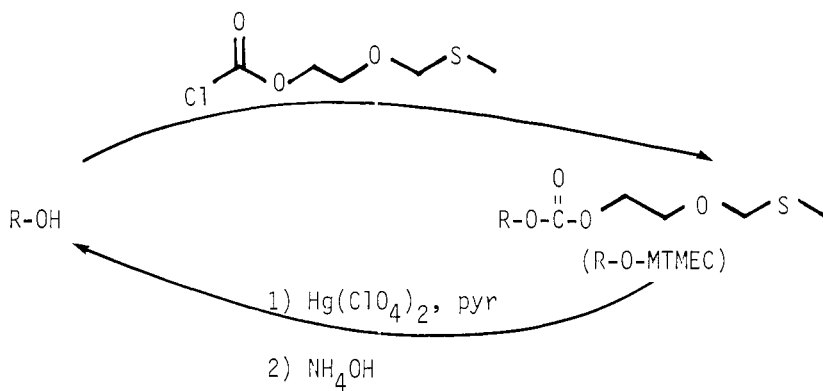
Section 45A Protection of Alcohols and Phenols

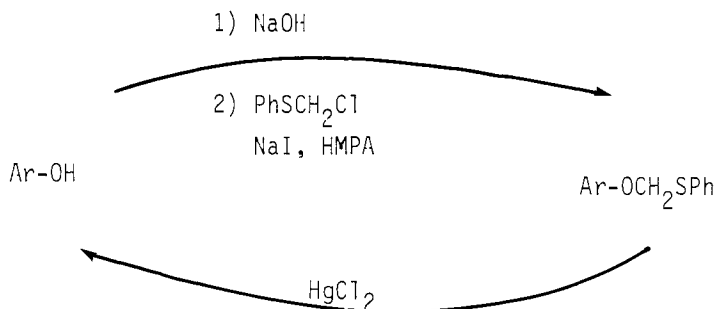
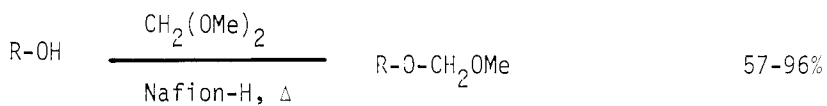
Synthesis, 899 (1981)



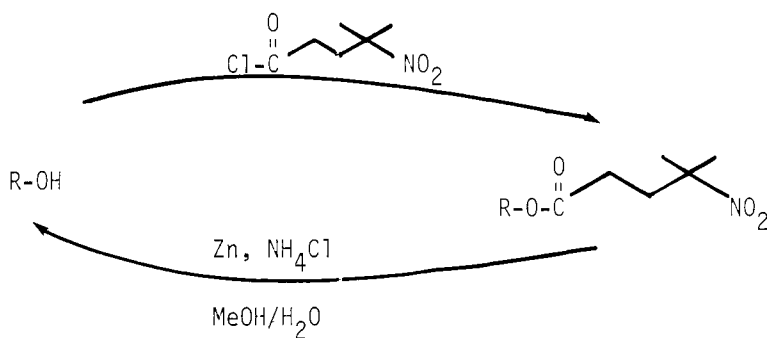
R = 1°, 2°, 3° alkyl, benzyl, etc.

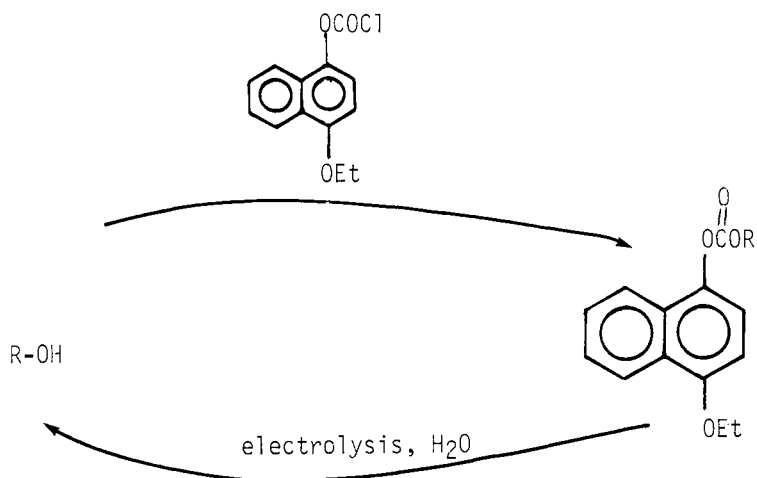
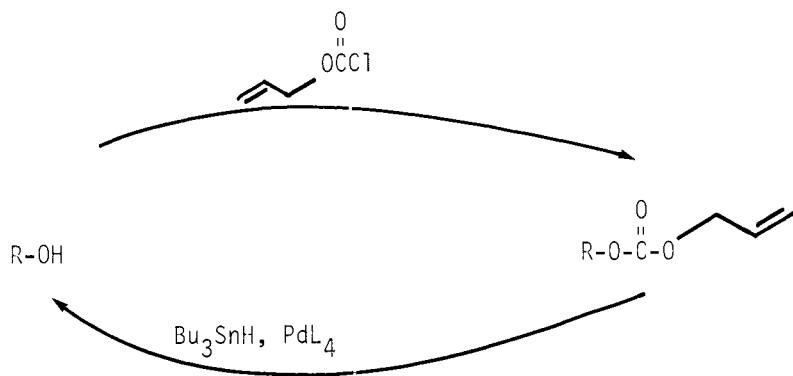
JOC, 46, 5044 (1981)

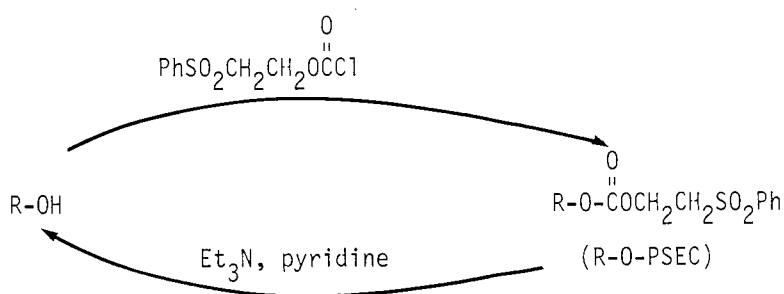
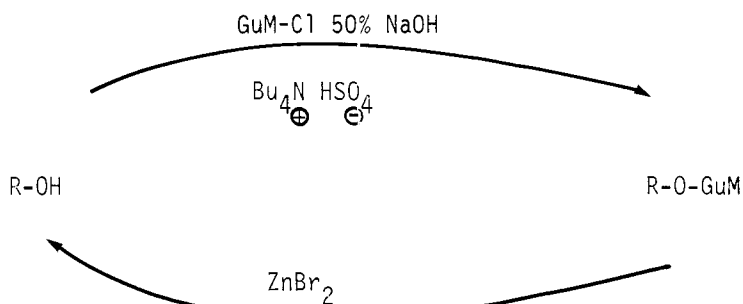
Tetr Lett, 22, 969 (1981)Tetr Lett, 22, 1933 (1981)

Synth Comm, 10, 911 (1980)

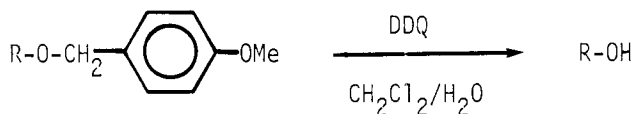
Synthesis, 471 (1981)

Synth Comm, 10, 469 (1980)

Tetr Lett, 22, 3719 (1981)Tetr Lett, 22, 3591 (1981)

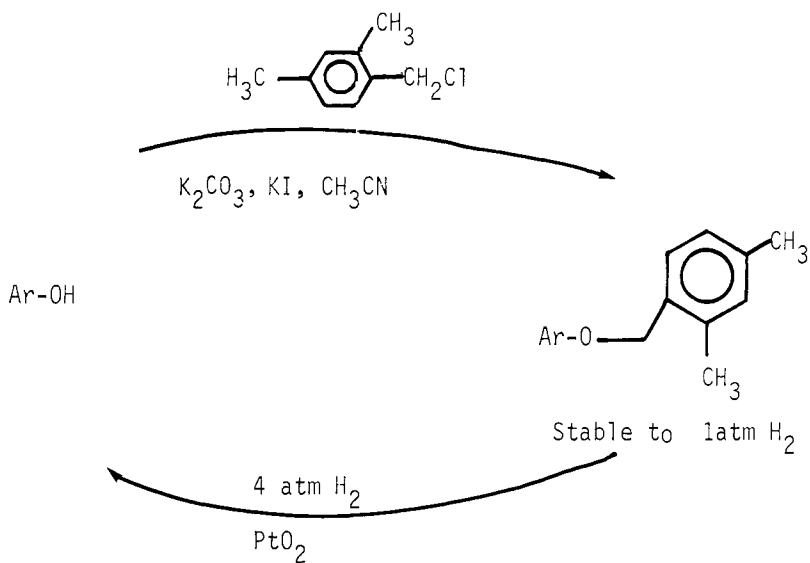
Tetr Lett, 22, 3667 (1981)

(GuM = guiacylmethyl)

Tetr Lett, 22, 1973 (1981)

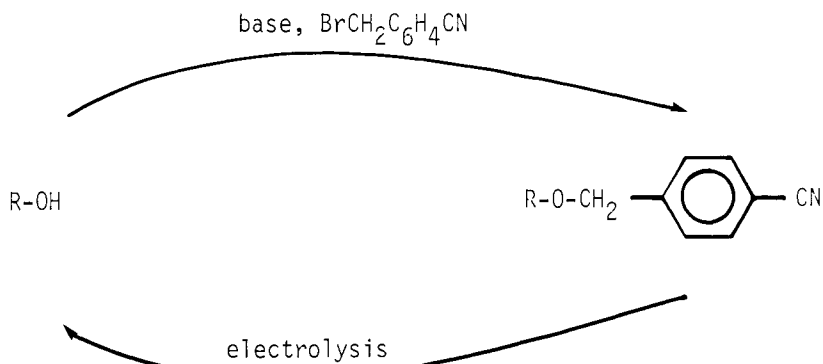
Isopropylidene, THP, MEM, TMS, Bz, etc. groups are unaffected.

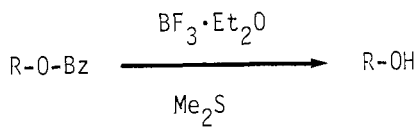
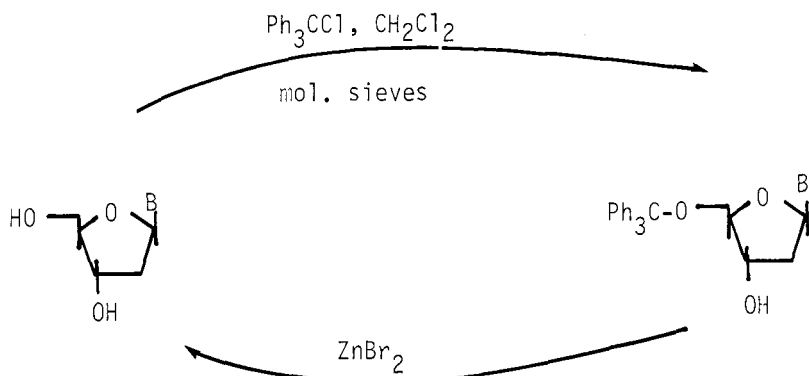
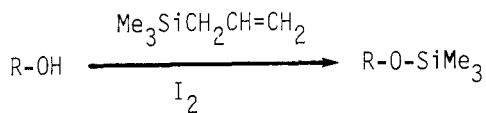
Tetr Lett, 23, 885 and 889 (1982)



Ar = subst. Ph

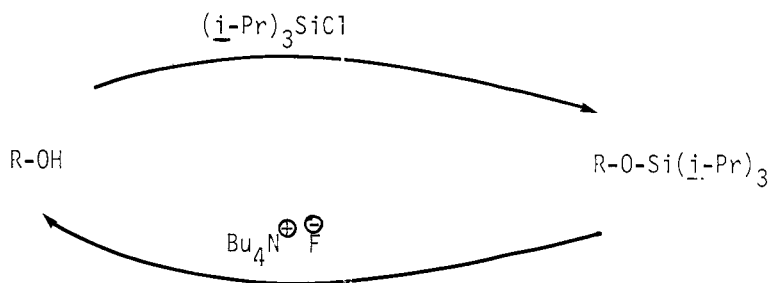
Synthesis, 987 (1982)

Chem Ber, 114, 946 (1981)

Chem Pharm Bull, 28, 3662 (1980)Tetr Lett, 21, 2603 (1980)Tetr Lett, 21, 3243 (1980)

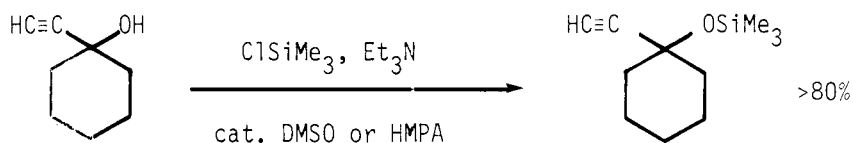
>90%

Chem Lett, 85 (1981)

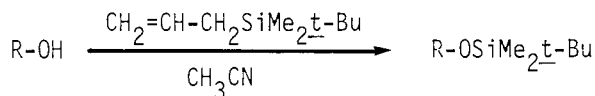
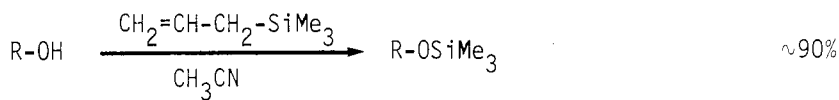


(More stable to H^+ than t-butyldimethylsilyl)

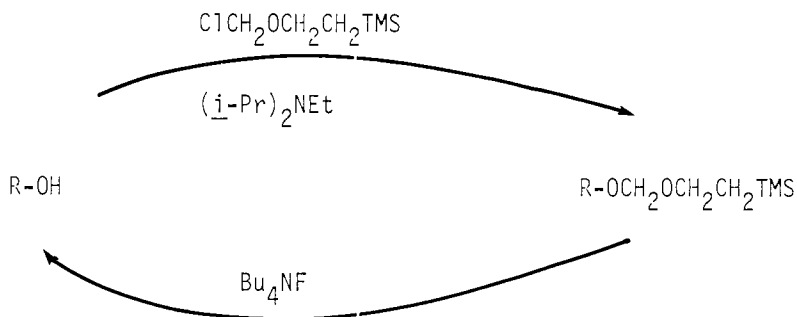
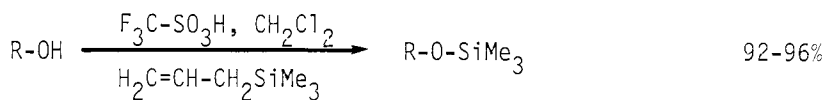
JOC, 45, 4797 (1980)



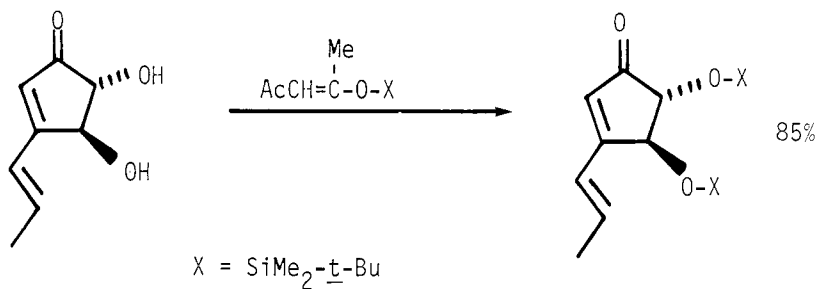
Rec Trav Chim Pays-Bas, 99, 70 (1980)

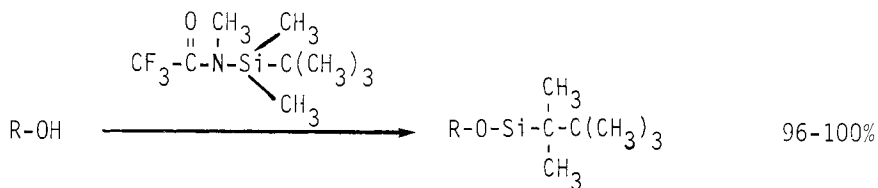
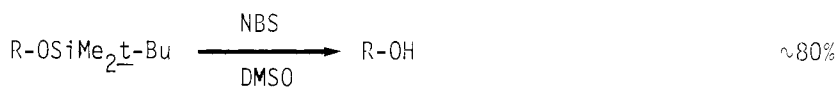


Tetr Lett, 21, 835 (1980)

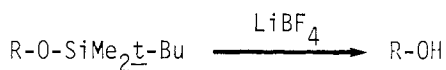
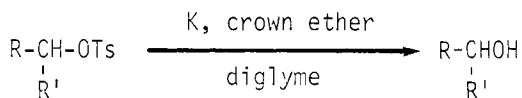
Tetr Lett, 21, 3343 (1980)

Synthesis, 745 (1981)

Tetr Lett, 22, 1299 and 1303 (1981)

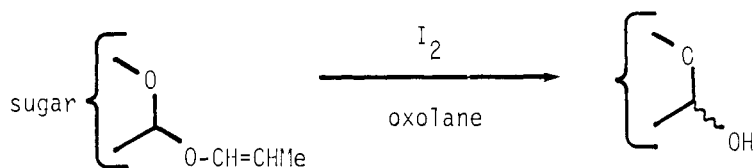
JOC, 47, 3336 (1982)

Synthesis, 234 (1980)

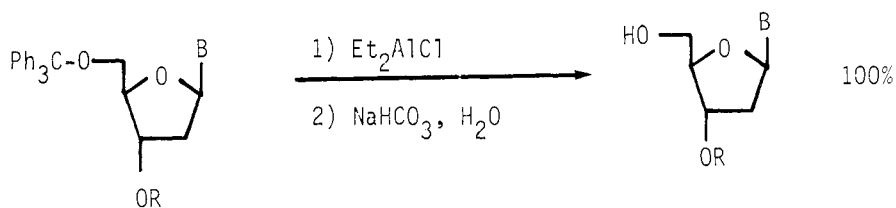
Tetr Lett, 21, 35 (1980)Chem Pharm Bull, 30, 3173 (1982)

Use of the levulinoyl group as an OH-protecting group in the synthesis of oligosaccharides. Removed by hydrazine.

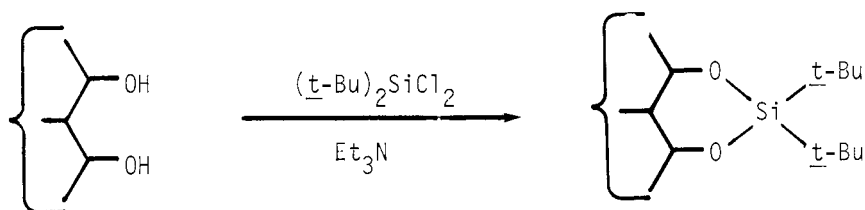
Rec Trav Chim Pays-Bas, 100, 65 (1981)



JCS Chem Comm, 1274 (1982)



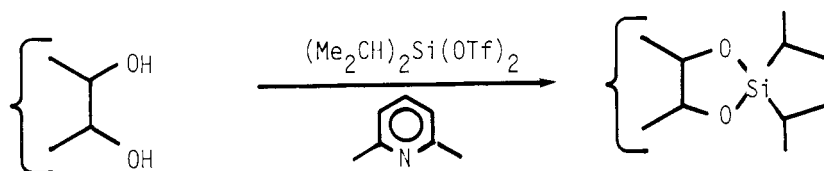
Tetr Lett, 23, 2641 (1982)



Removed using pyridinium hydrofluoride.

~50-80%

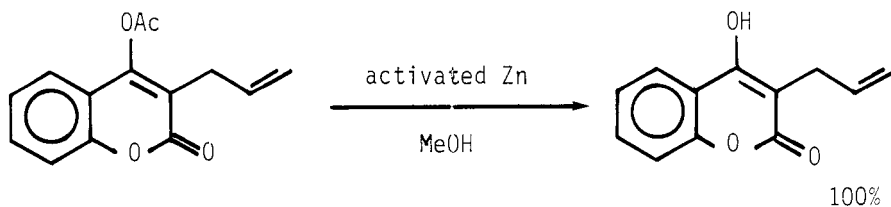
Tetr Lett, 22, 4999 (1981)



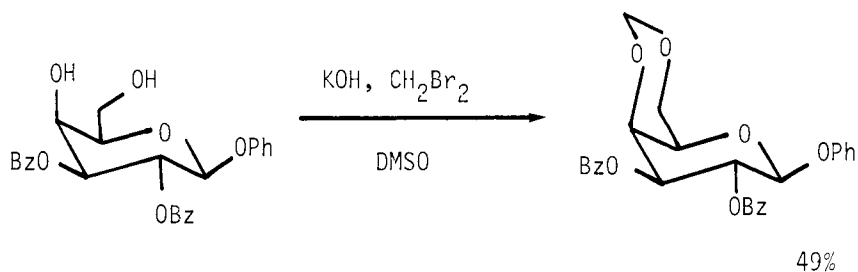
Protects 1,2-, 1,3-, and 1,4-diols.

Deprotected by 48% aqueous HF in CH_3CN .

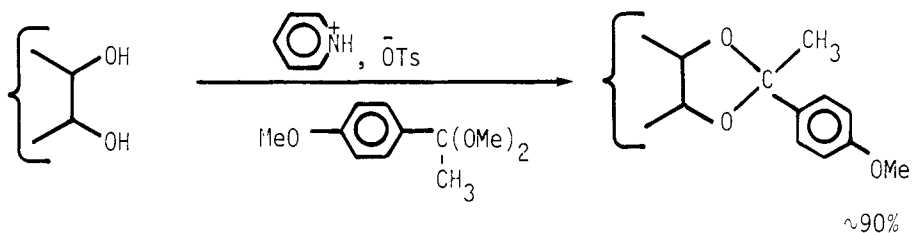
Tetr Lett, 23, 4871 (1982)



Tetr Lett, 22, 335, (1981)



Synthesis, 421 (1982)



Removed using SnCl_4 , followed by ^-OH .

JOC, 46, 2419 (1981)

Related Methods:

Ethers from Alcohols - Section 123

Alcohols from Ethers - Section 39

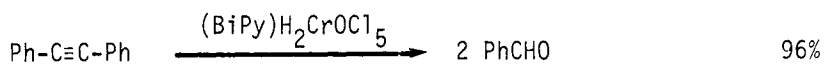
Esters from Alcohols - Section 108

Alcohols from Esters - Section 38

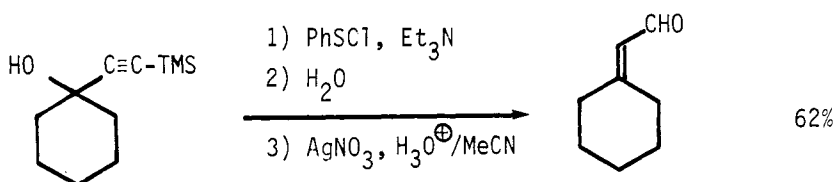
CHAPTER 4

PREPARATION OF ALDEHYDES

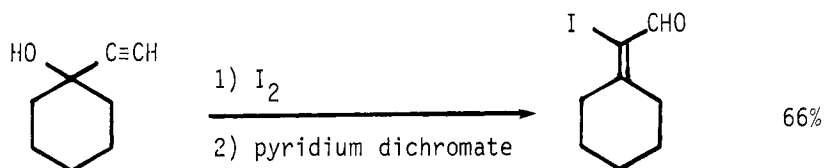
Section 46 Aldehydes from Acetylenes



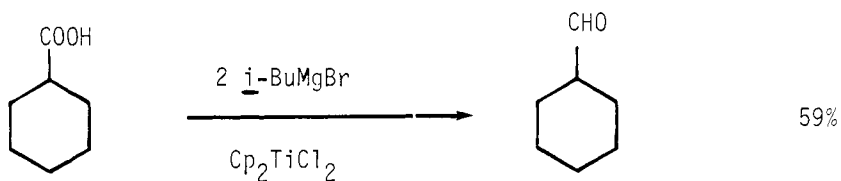
Org Prep Proc Int, 14, 362 (1982)



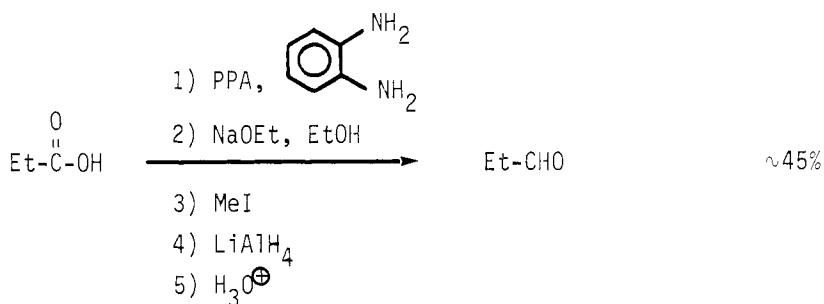
Tetr Lett, 22, 2021 (1981)



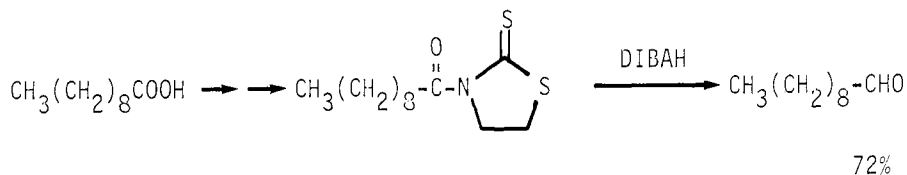
Tetr Lett, 22, 1041 (1981)

Section 47 Aldehydes from Carboxylic Acids and Acid Halides

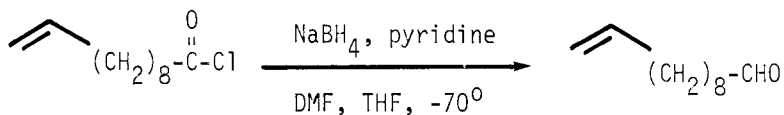
Synthesis, 871 (1981)



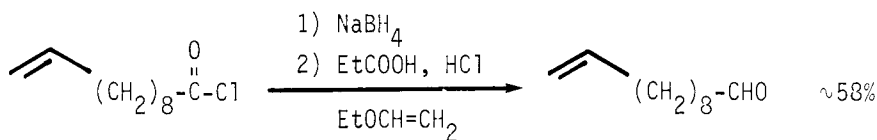
Synthesis, 303 (1981)



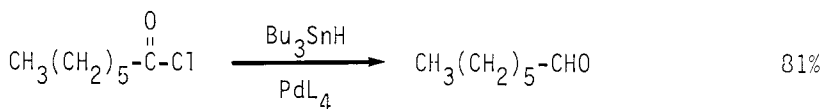
JCS Perkin I, 2470 (1980)



Synth Comm, 12, 839 (1982)

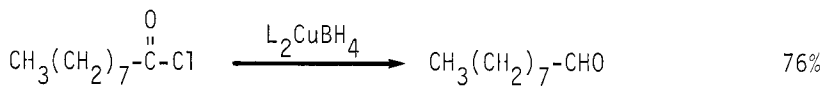


Tetr Lett, 22, 11 (1981)

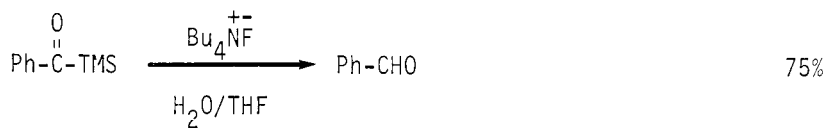
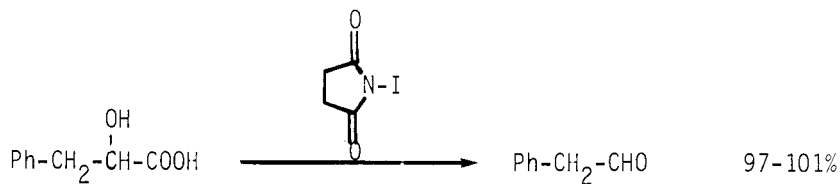
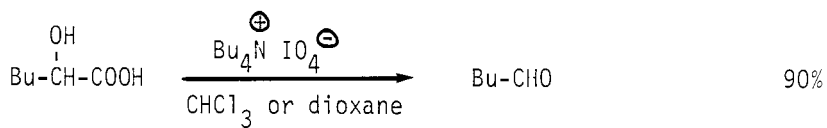


JCS Chem Comm, 432 (1980)

JOC, 46, 4439 (1981)

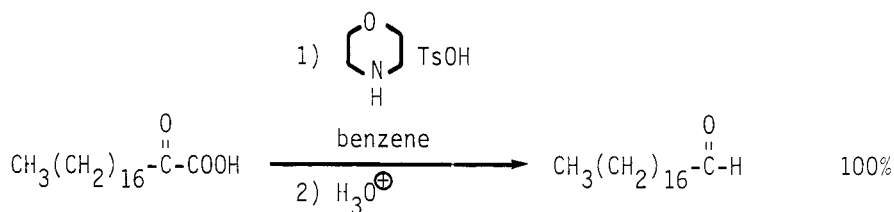
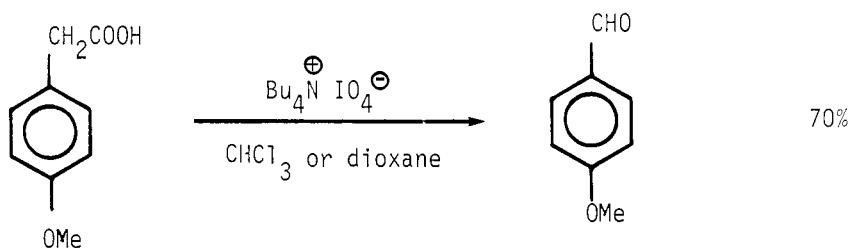


JOC, 45, 3449 (1980)

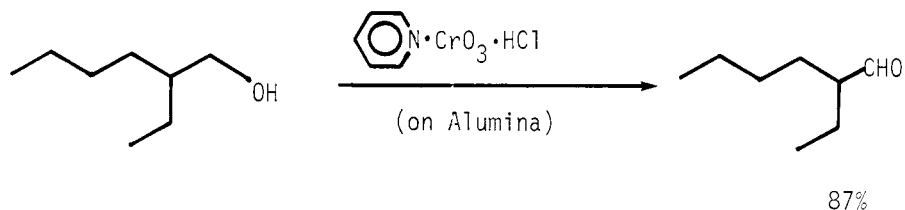
Tetr Lett, 22, 1881 (1981)JOC, 47, 3006 (1982)

Synthesis, 563 (1980)

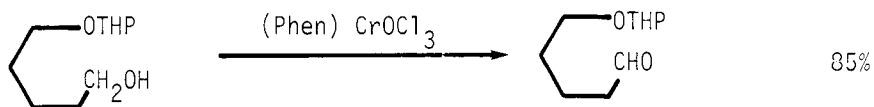
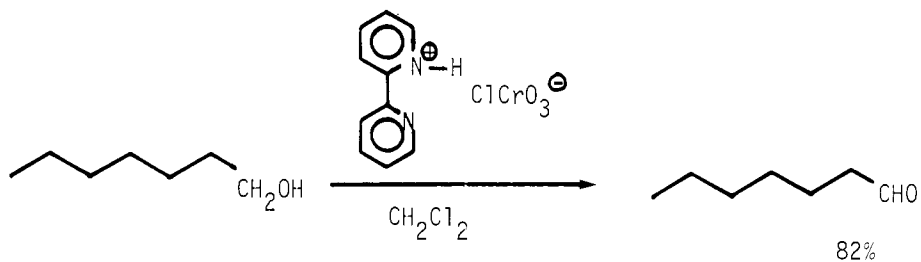
Tetr Lett, 21, 2655 (1980)

Tetr Lett, 23, 459 (1982)

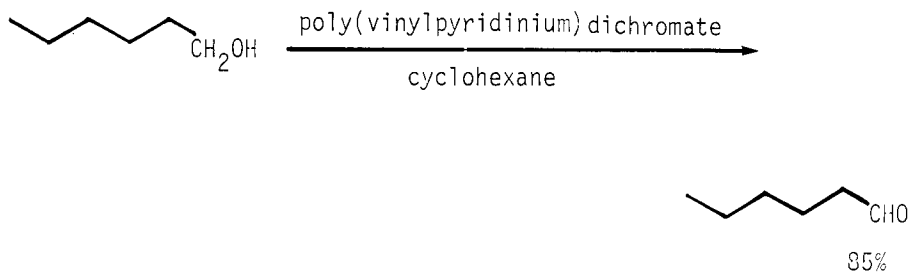
Synthesis, 563 (1980)

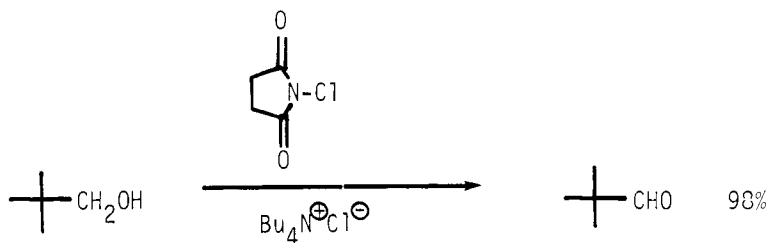
Tetr Lett, 21, 2655 (1980)Section 48 Aldehydes from Alcohols

Synthesis, 223 (1980)

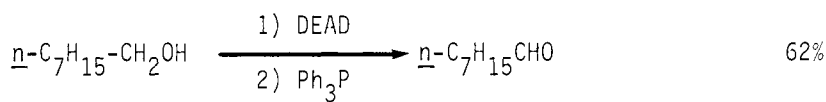
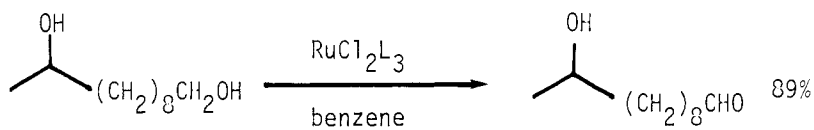
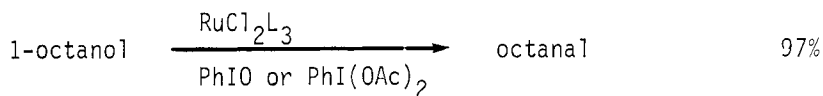
Tetr Lett, 21, 1583 (1980)

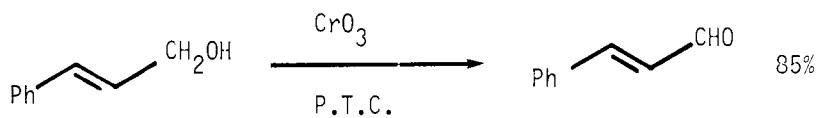
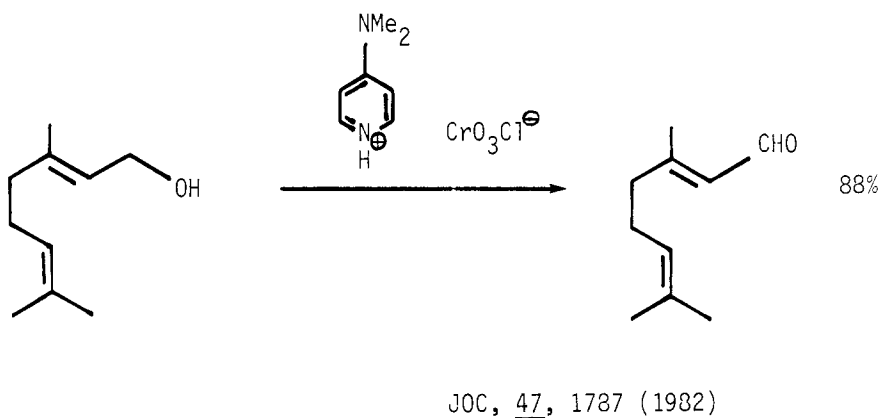
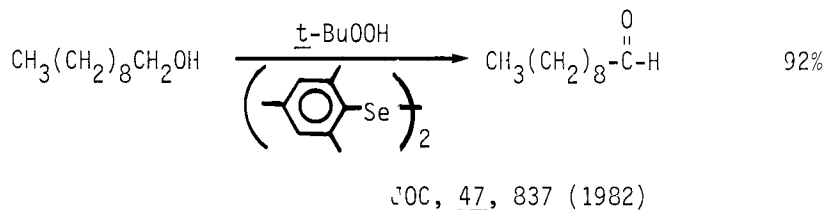
Synthesis, 691 (1980)

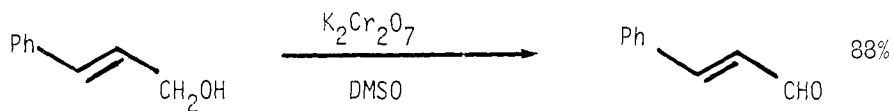
JOC, 46, 1728 (1981)



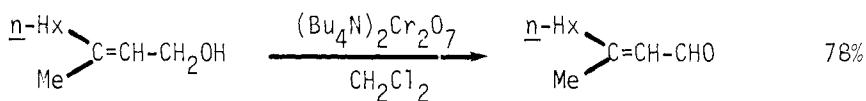
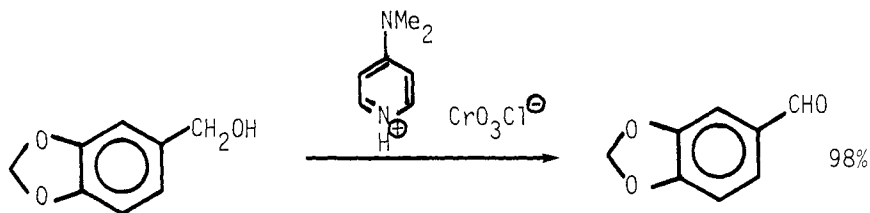
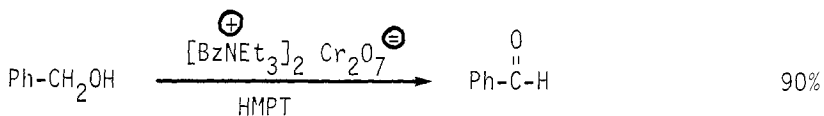
Synthesis, 394 (1981)

Tetr Lett, 22, 2295 (1981)Tetr Lett, 22, 1605 (1981)Tetr Lett, 22, 2361 (1981)

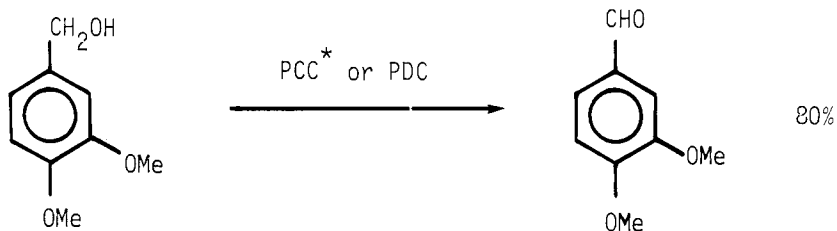




Synthesis, 646 (1980)

Synth Comm, 10, 75 (1980)JOC, 47, 1787 (1982)

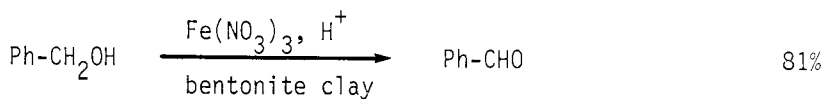
Synthesis, 1091 (1982)



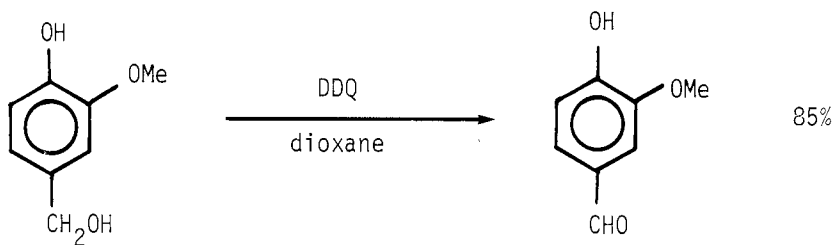
*PCC = pyridinium chlorochromate

PDC = pyridinium dichromate

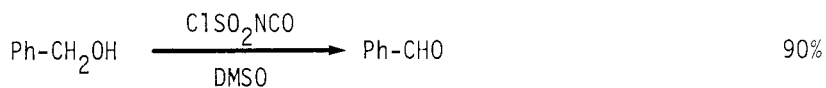
JCS Perkin I, 1967 (1982)



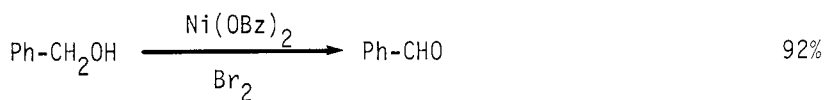
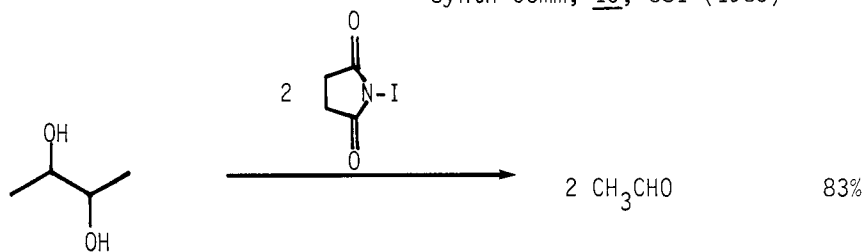
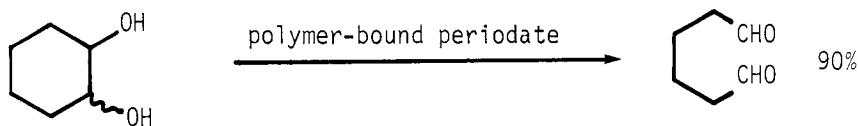
Synthesis, 849 (1980)



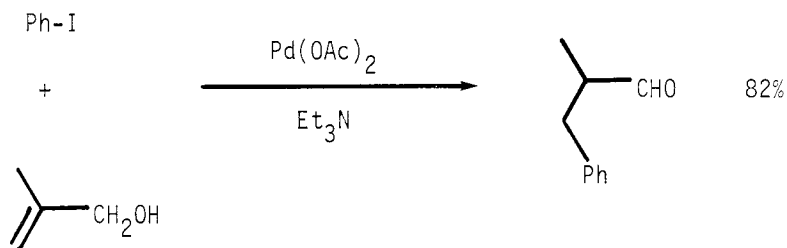
JOC, 45, 1596 (1980)



Synthesis, 141 (1980)

Synth Comm, 10, 881 (1980)JOC, 46, 1927 (1981)

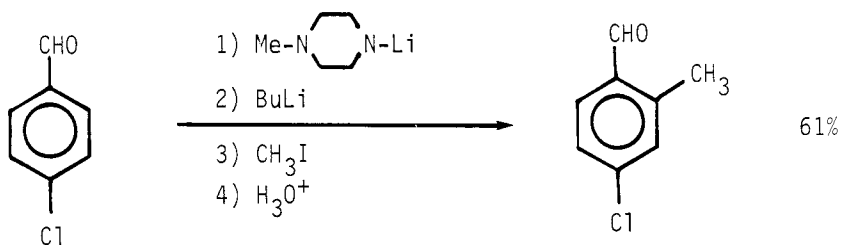
JCS Perkin I, 509 (1982)

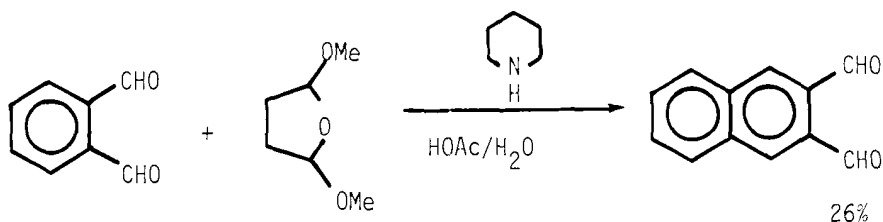
Org Syn, 61, 82 (1983)

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).

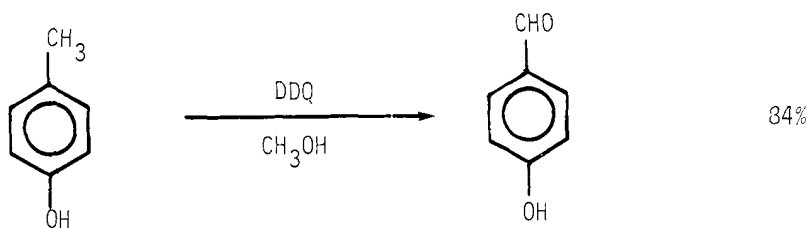
Tetr Lett, 23, 3979 (1982)



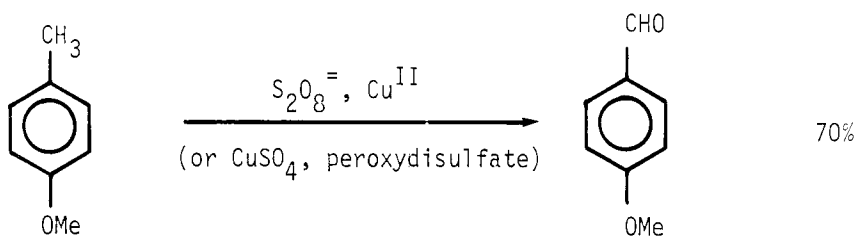
Synthesis, 677 (1980)

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

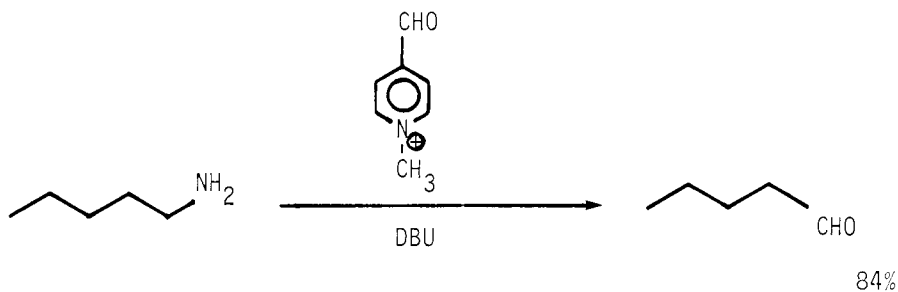
Section 50 Aldehydes from Alkyls

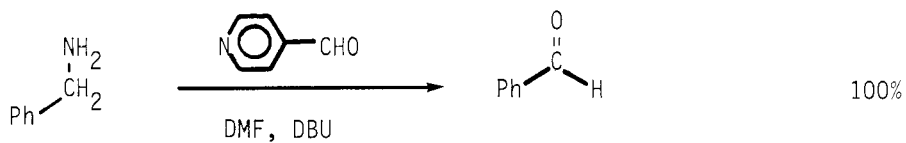


Org Prep Proc Int, 12, 201 (1980)

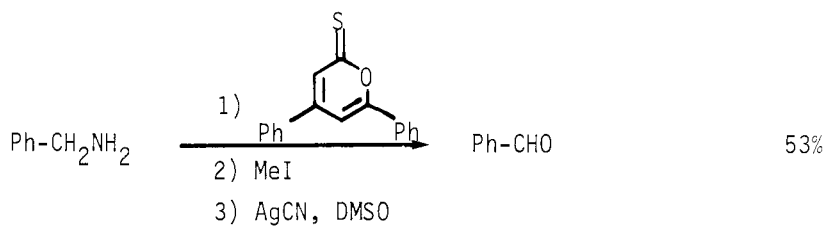
Indian J Chem, 20B, 153 (1981)Section 51 Aldehydes from Amides

No Additional Examples.

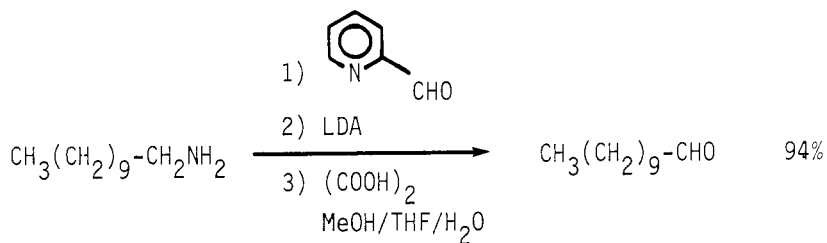
Section 52 Aldehydes from AminesJACS, 104, 4446 (1982)

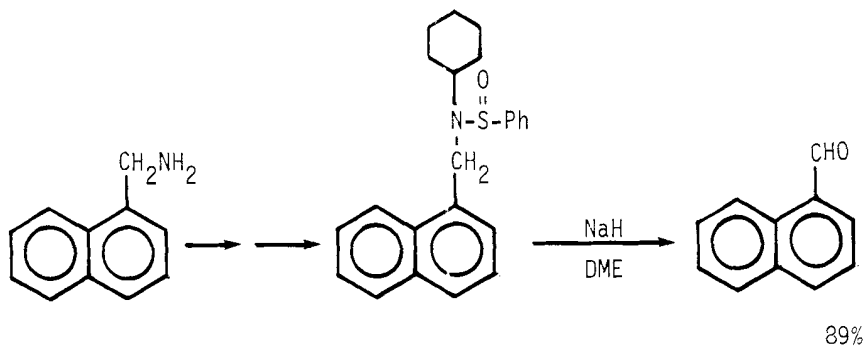
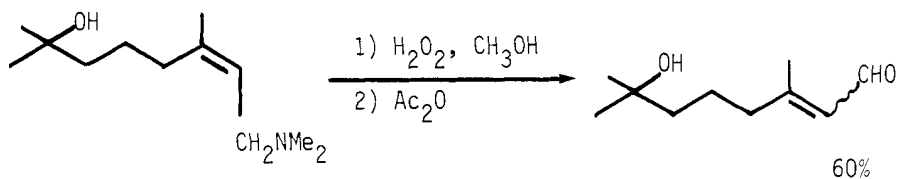


Synthesis, 756 (1982)

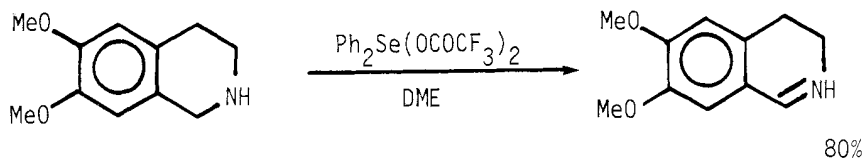


Synthesis, 711 (1981)

JOC, 46, 1937 (1981)

JOC, 46, 4617 (1981)

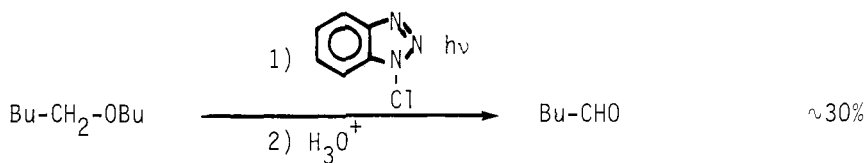
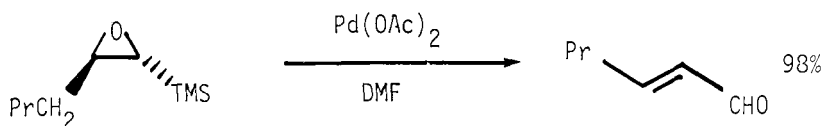
Chem Lett, 1987 (1982)

JACS, 103, 4642 (1981)

Related methods: Section 172 (Ketones from Amines).

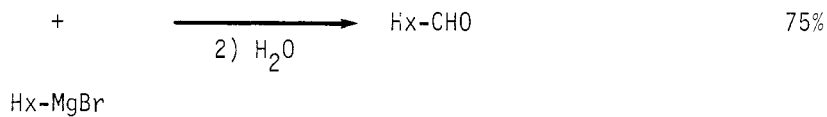
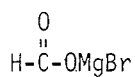
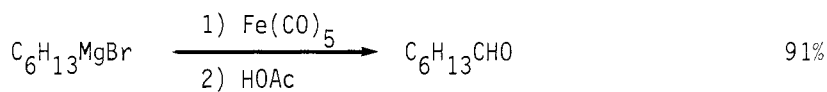
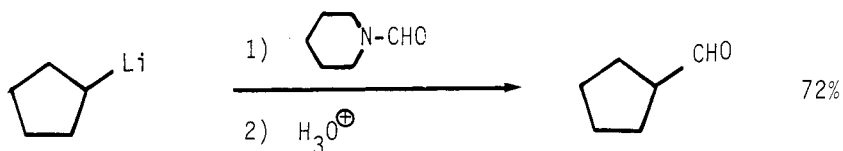
Section 53 Aldehydes from Esters

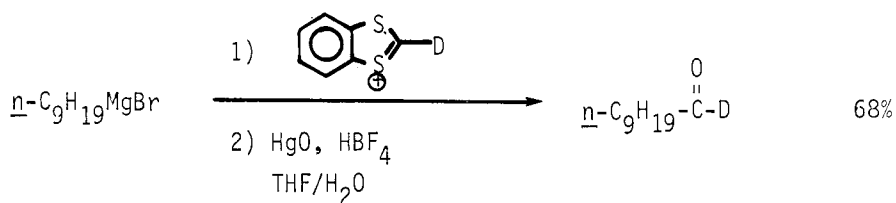
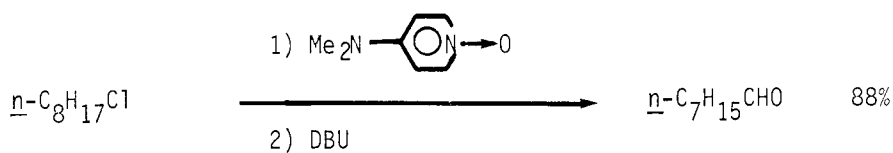
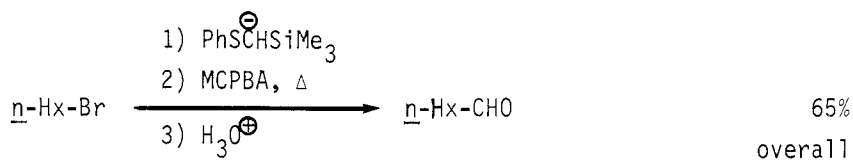
No Additional Examples.

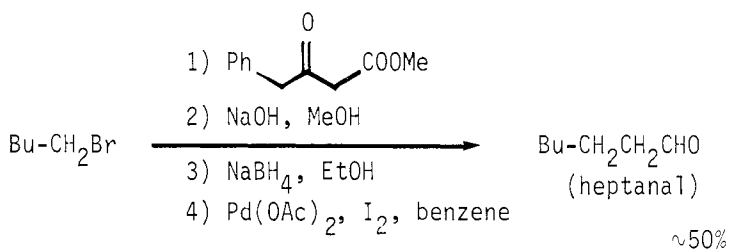
Section 54 Aldehydes from EthersAust J Chem, 32, 2787 (1979)

Chem Lett, 1997 (1982)

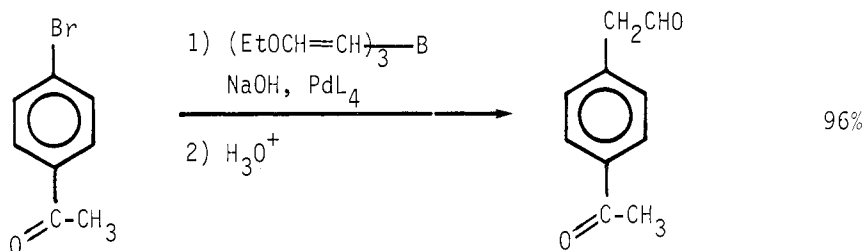
Related methods: Section 174 (Ketones from Ethers and Epoxides).

Section 55 Aldehydes from HalidesTetr Lett, 21, 2869 (1980)Bull Chem Soc Japan, 55, 1663 (1982)Angew Int Ed, 20, 878 (1981)

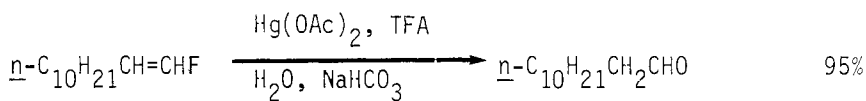
Tetr Lett, 22, 1821 (1981)Bull Chem Soc Japan, 54, 2221 (1981)Tetr Lett, 21, 1677 (1980)



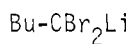
Indian J Chem, 21B, 408 (1982)



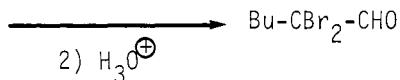
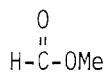
JOC, 47, 2117 (1982)



Chem Lett, 651 (1980)



+



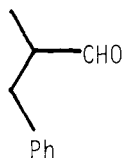
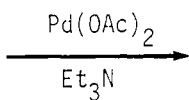
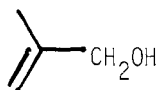
78%

may also be used to form α -monohalo aldehydes

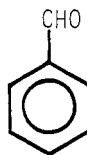
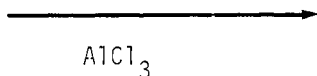
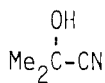
Synthesis, 644 (1980)



+



82%

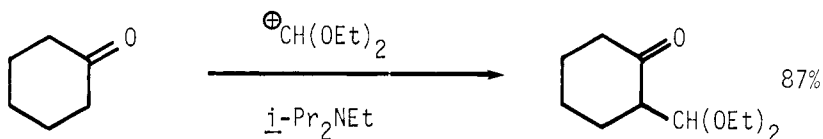
Org Syn, 61, 82 (1983)Section 56 Aldehydes from Hydrides

50%

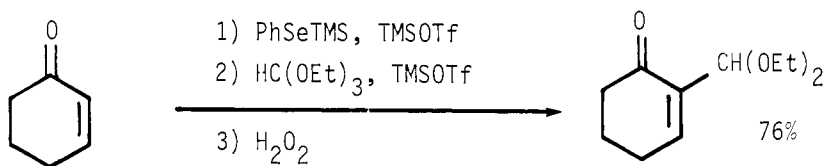
Synth Comm, 12, 485 (1982)

Review: "The Reimer-Tiemann Reaction:

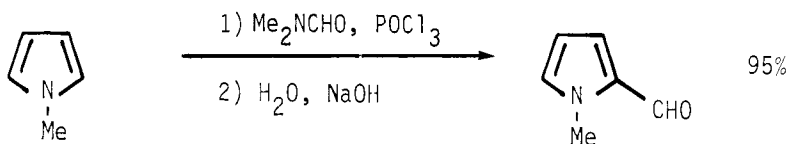
Org React, 28, 1 (1982)



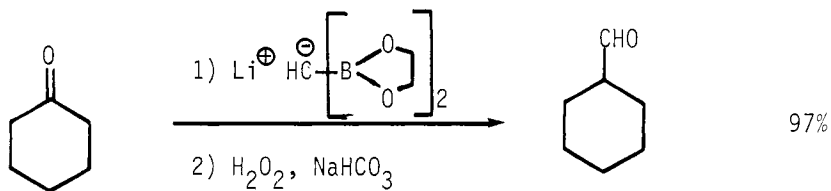
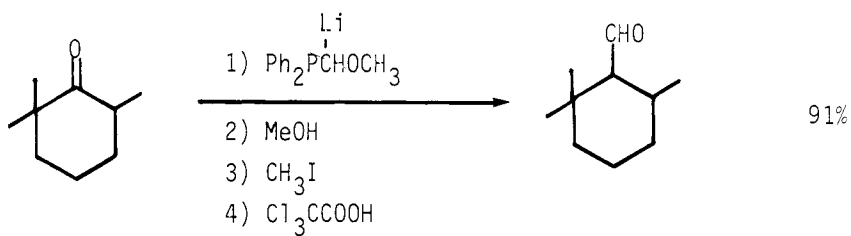
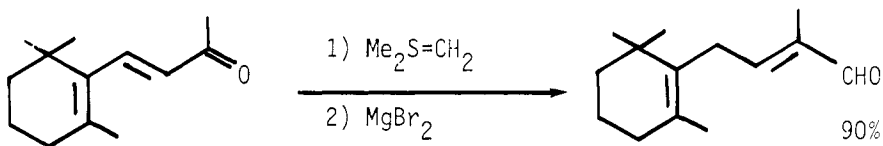
JOC, 46, 2557 (1981)

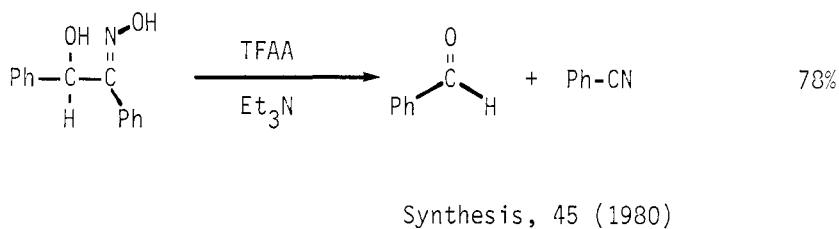
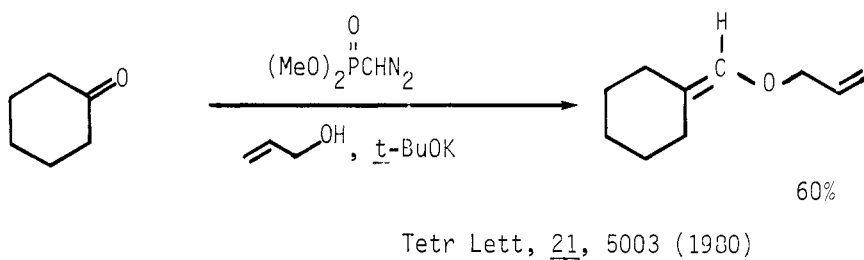
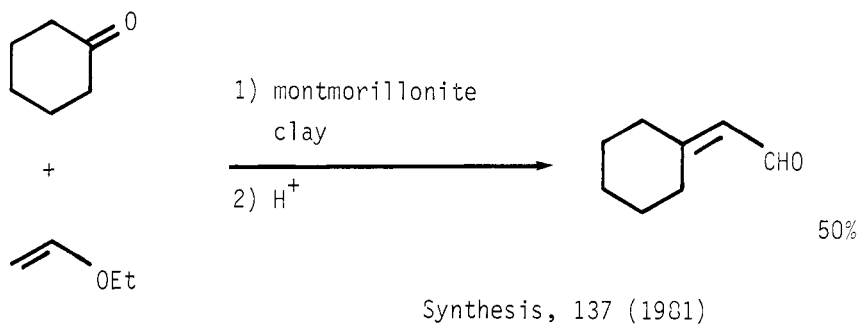


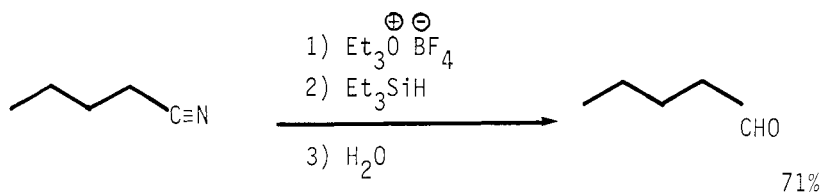
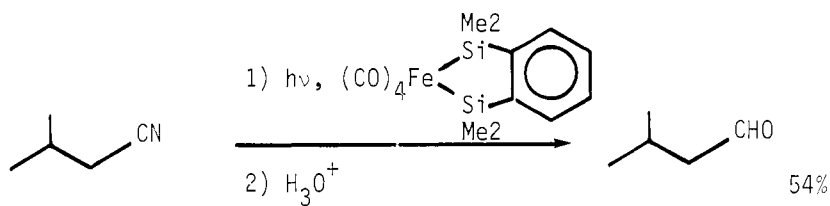
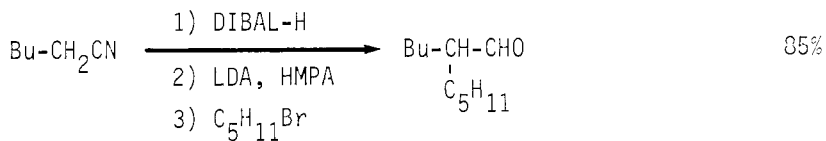
Tetr Lett, 22, 1809 (1981)

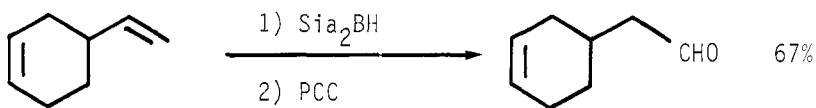


Org Prep Proc Int, 13, 97 (1981)

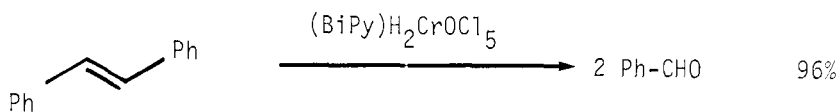
Section 57 Aldehydes from KetonesJOC, 45, 1091 (1980)Tetr Lett, 21, 3535 (1980)Helv Chim Acta, 63, 1665 (1980)



Section 58 Aldehydes from NitrilesJOC, 46, 602 (1981)JOC, 46, 3372 (1981)JOC, 46, 5250 (1981)

Section 59 Aldehydes from Olefins

Synthesis, 151 (1980)

Org Prop Proc Int, 14, 362 (1982)

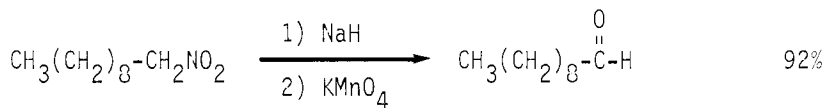
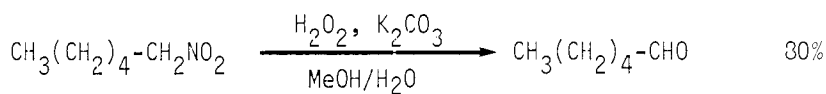
Review: "Ozonolysis -- A Modern Method in the Chemistry of Olefins"

Russ Chem Rev, 50, 636 (1981)

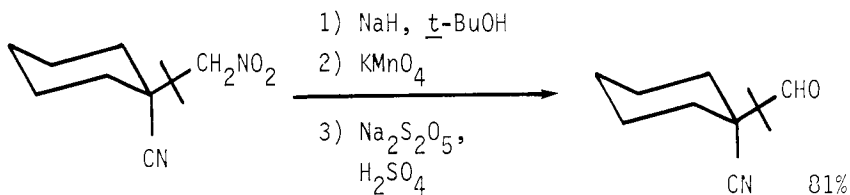
Review: "Asymmetric Hydroformylation"

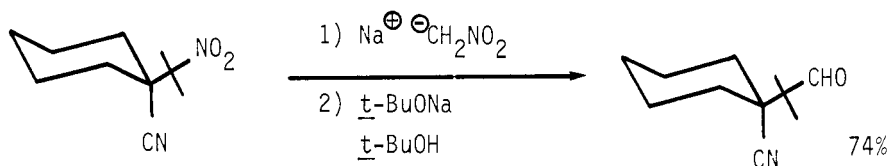
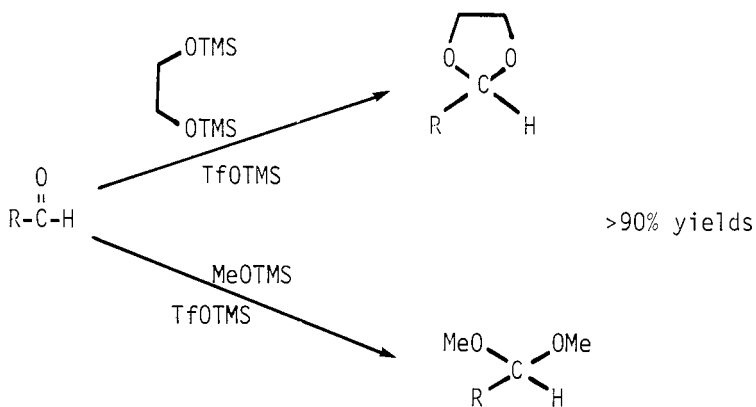
Topics in Current Chem, 105, 77 (1982)

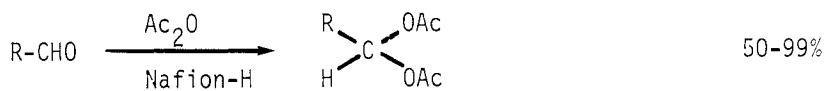
Related methods: Section 179 (Ketones from Olefins)

Section 60 Aldehydes from Miscellaneous CompoundsJOC, 47, 4534 (1982)

Synthesis, 44 and 662 (1980)

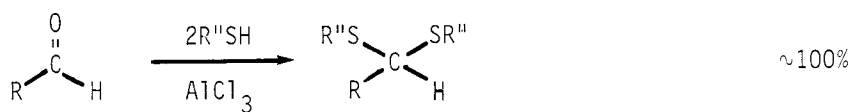
JOC, 47, 4534 (1982)

JOC, 46, 1037 (1981)Section 60A Protection of AldehydesTetr Lett, 21, 1357 (1980)



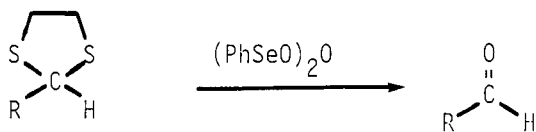
R = alkyl, aryl, heterocyclic

Synthesis, 962 (1982)

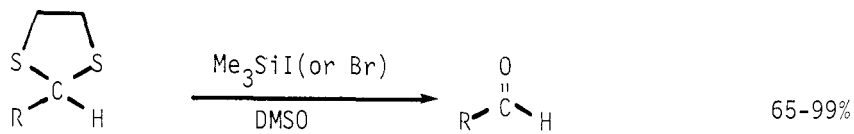


R'' = alkyl, dithiol

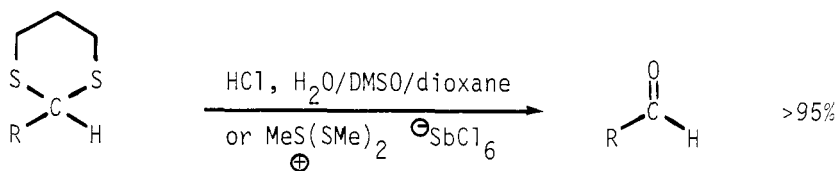
Tetr Lett, 21, 4225 (1980)



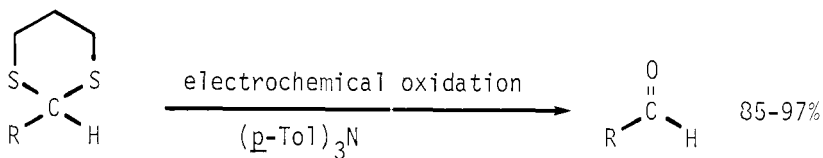
JCS Perkin I, 1654 (1980)

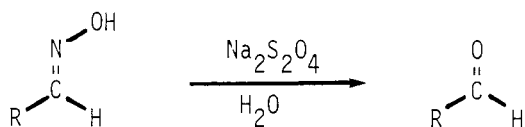
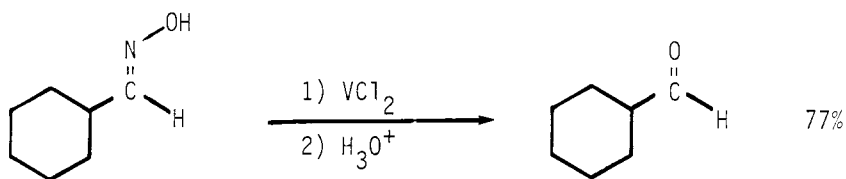


Synthesis, 965 (1982)

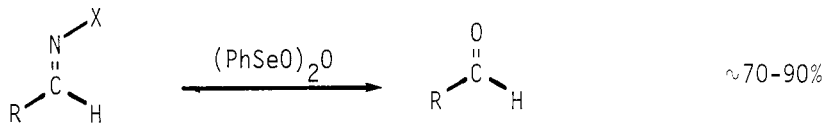


Synthesis, 679 (1982)

Tetr Lett, 21, 511 (1980)

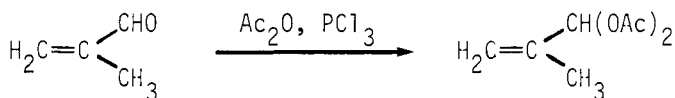
Aust J Chem, 32, 201 (1979)

Synthesis, 220 (1980)

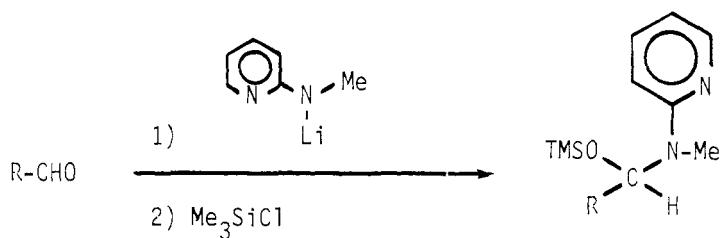


X = OH, NPh

JCS Perkin I, 1212 (1980)



Synthesis, 824 (1981)



Stable to $R'Li$ and $R'MgX$. Deprotection occurs during the normal workup.

Tetr Lett, 22, 4213 (1981)

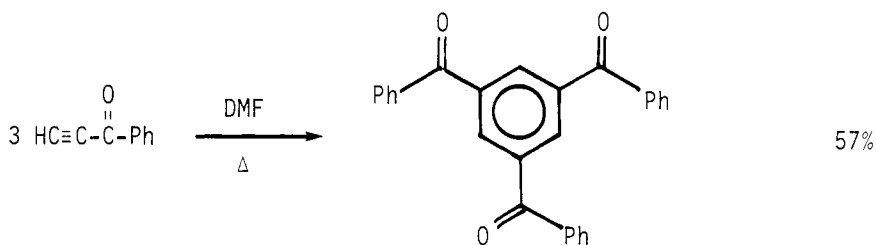
See Section 367 (Ether - Olefin) for the formation of enol ethers. Many of the methods in Section 180A (Protection of Ketones) are also applicable to aldehydes.

CHAPTER 5

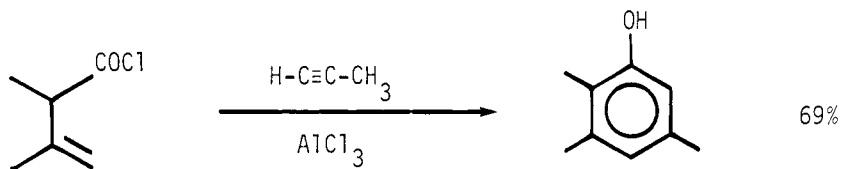
PREPARATION OF ALKYL, METHYLENES, AND ARYL

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

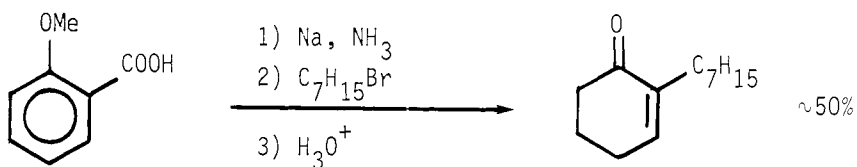
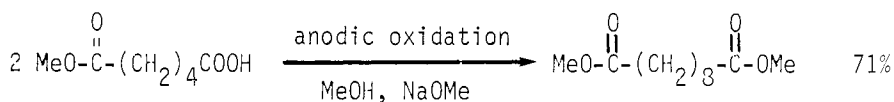
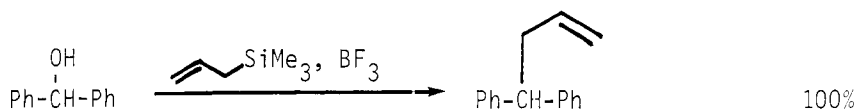
Section 61 Aryls from Acetylenes

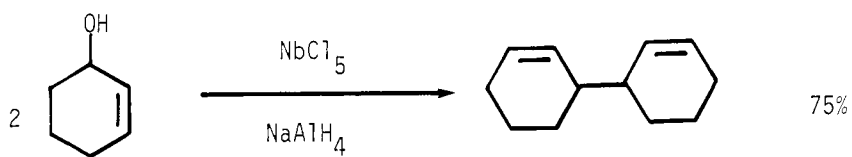


Synthesis, 29 (1980)

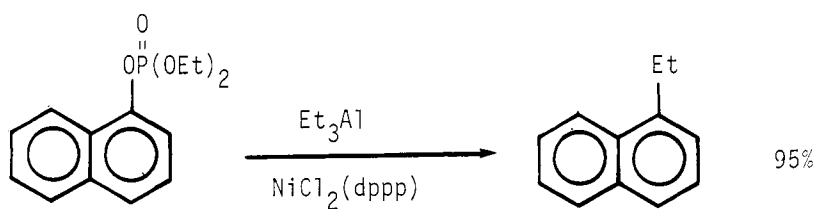
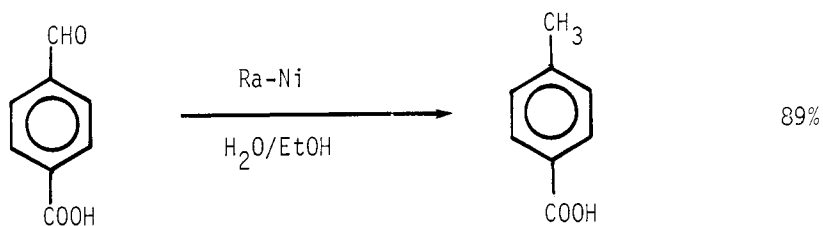


Tetr Lett, 23, 4923 (1982)

Section 62 Alkyls and Methylenes from Carboxylic AcidsOrg Syn, 61, 59 (1983)Org Syn, 60, 1 (1981)Section 63 Alkyls from AlcoholsJOC, 47, 2125 (1982)

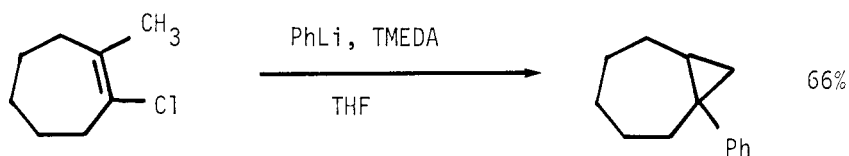


Chem Lett, 157 (1982)

Tetr Lett, 22, 4449 (1981)Section 64 Alkyls from AldehydesTetr Lett, 21, 2637 (1980)

Related methods: Alkyls, Methylene, and Aryls from Ketones
(Section 72)

Section 65 Alkyls and Aryls from Alkyls and Aryls



JACS, 102, 6519 (1980)

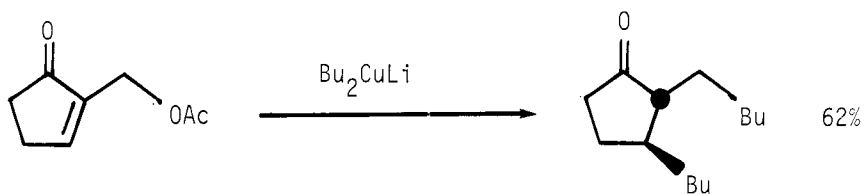
Section 66 Alkyls, Methylene, and Aryls from Amides

No Additional Examples.

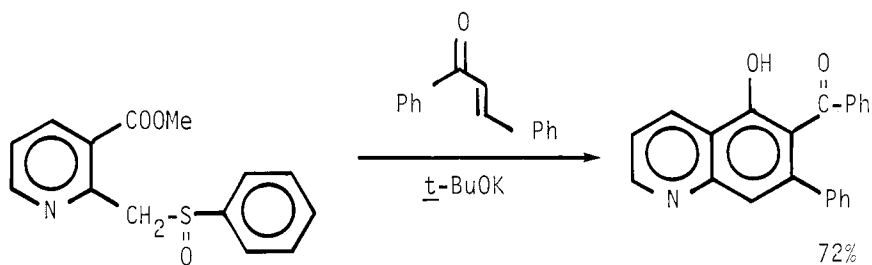
Section 67 Alkyls, Methylene, and Aryls from Amines

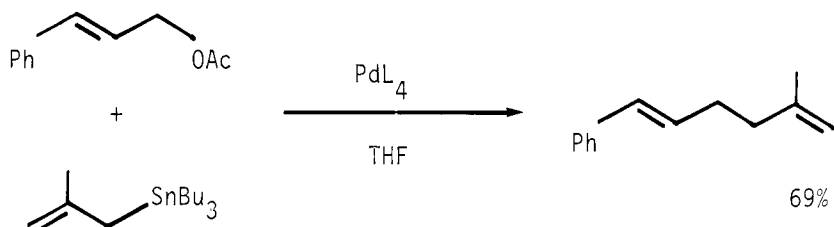
No Additional Examples.

Section 68 Alkyls, Methylene, and Aryls from Esters

Tetr Lett, 21, 3237 (1980)

JCS Chem Comm, 30 (1981)

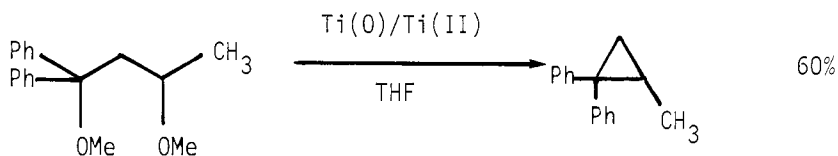
Tetr Lett, 22, 5097 (1981)



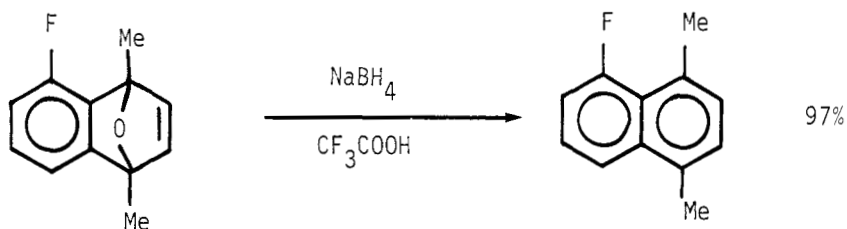
Tetr Lett, 21, 2591, 2595, and 2599
(1980)

Section 69 Alkyls and Aryls from Ethers

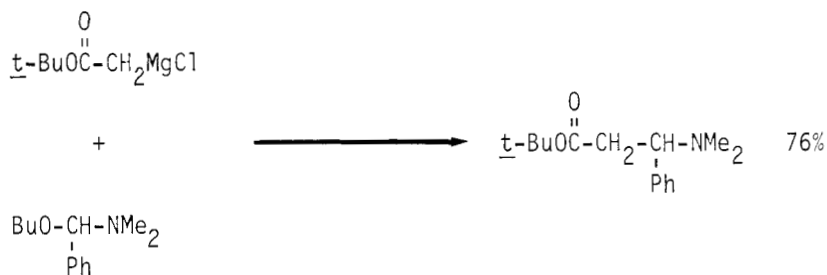
The conversion $\text{ROR} \rightarrow \text{RR}'$ ($\text{R}' = \text{alkyl, aryl}$) is included in this section.



JACS, 102, 426 (1980)



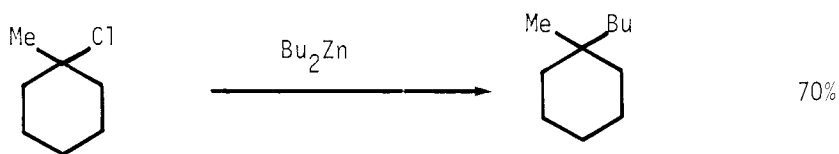
Synthesis, 143 (1982)



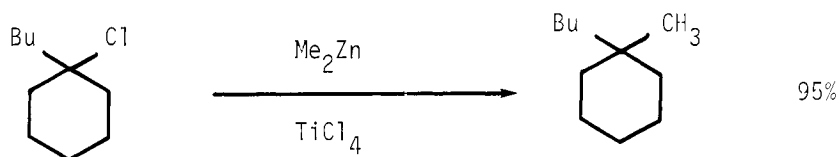
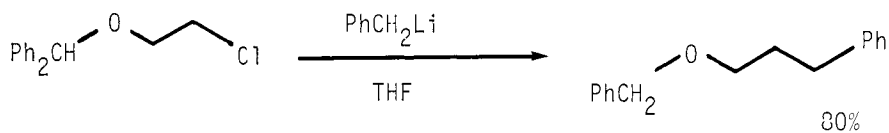
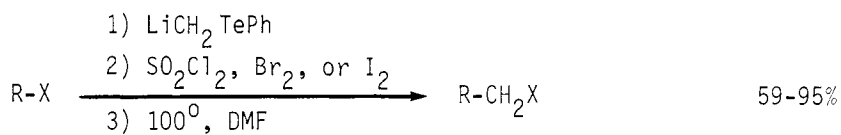
Bull Soc Chim France II, 395 (1982)

Section 70 Alkyls and Aryls from Halides

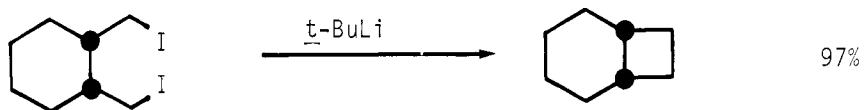
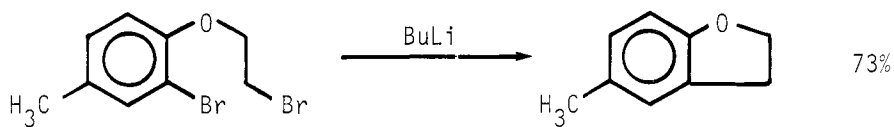
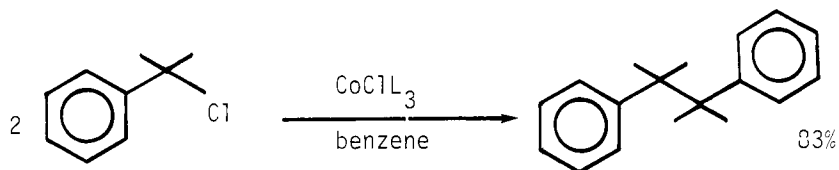
The replacement of halogen by alkyl or aryl groups is included in this section. For the conversion $\text{RX} \rightarrow \text{RH}$ ($\text{X} = \text{halo}$) see Section 160 (Hydrides from Halides and Sulfonates).



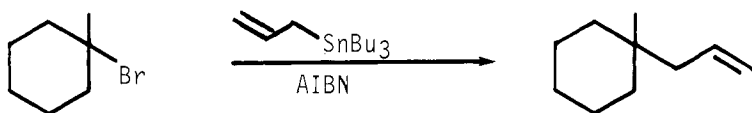
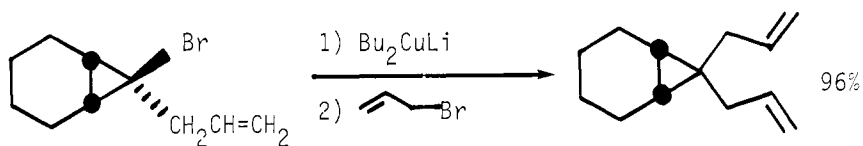
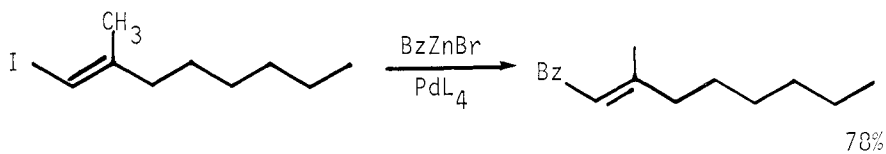
JCS Chem Comm, 1202 (1980)

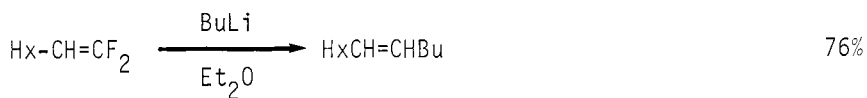
Angew Chem Int Ed, 19, 900 and 901 (1980)JOC, 47, 3008 (1982) $\text{R} = 1^\circ \text{ alkyl}$

Chem Lett, 1081 (1982)

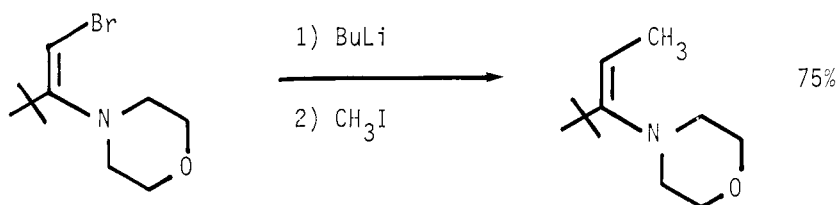
Tetr Lett, 23, 5123 (1982)JOC, 46, 1384 (1981)(Also works with 1° and 2° benzyl chlorides.)

Chem Lett, 1277 (1981)

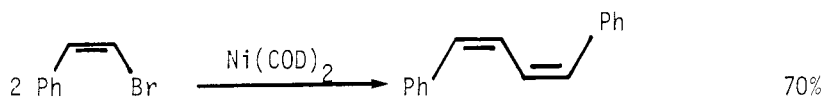
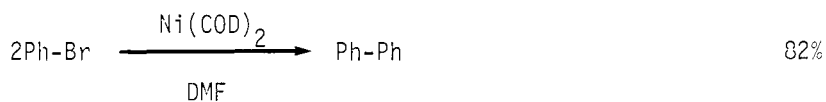
JACS, 104, 5829 (1982)Bull Chem Soc Japan, 52, 3632 (1979)Tetr Lett, 22, 2715 (1981)

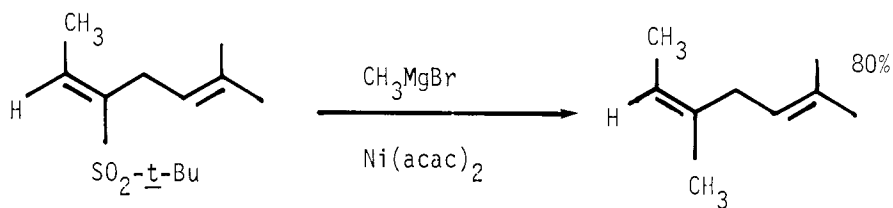
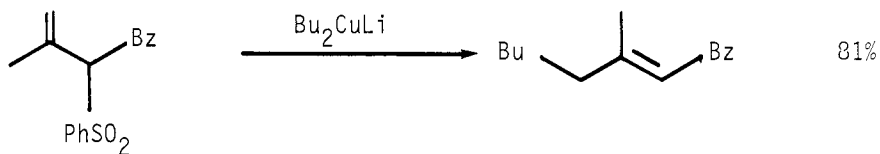


Chem Lett, 935 (1980)

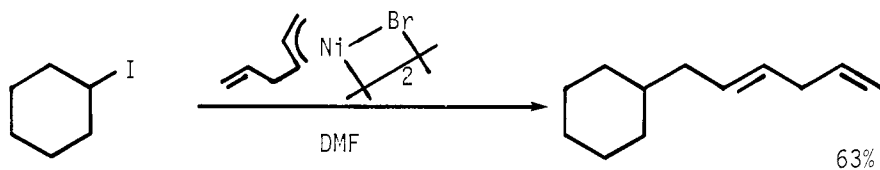


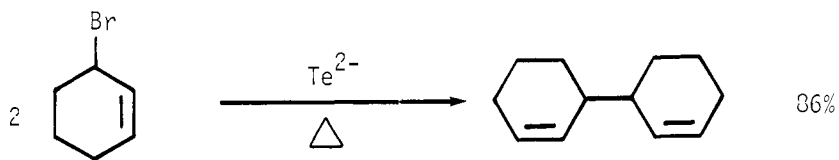
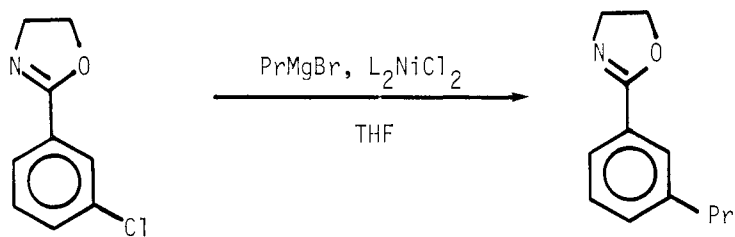
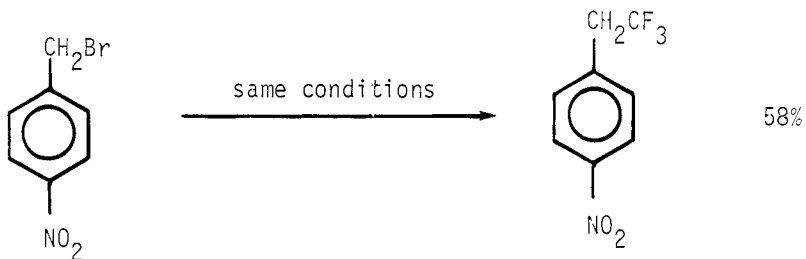
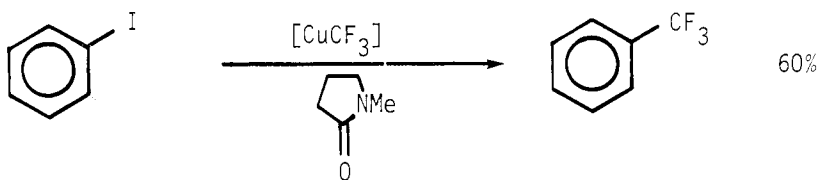
Bull Soc Chim France II, 297 (1982)

JACS, 103, 6460 (1981)

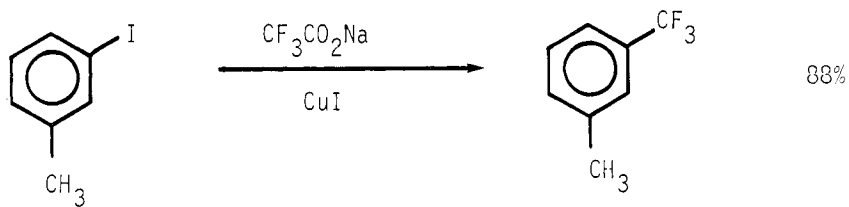
Tetr Lett, 23, 2469 (1982)

JCS Chem Comm, 434 (1980)

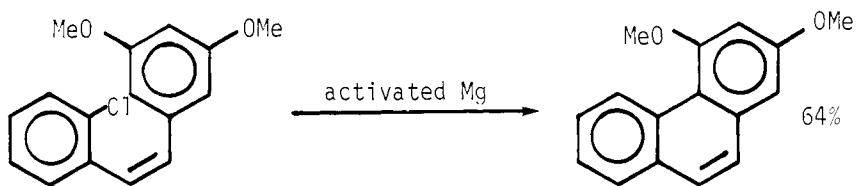
Organometallics, 1, 259 (1982)

JOC, 47, 1641 (1982)JOC, 47, 4319 (1982)

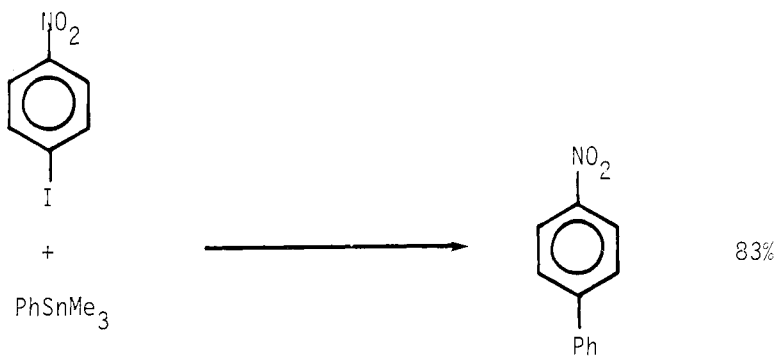
Synthesis, 932 (1980)

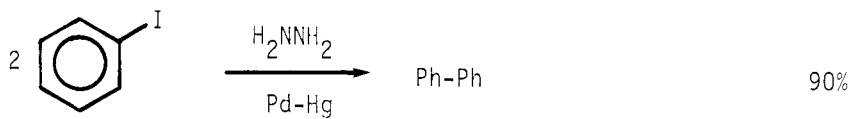


Chem Lett, 1719 (1981)

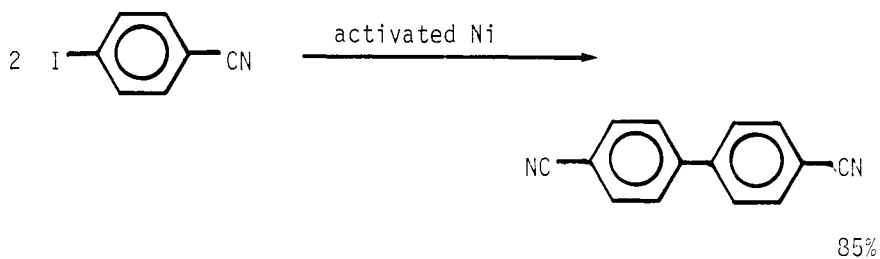


JCS Perkin I, 3007 (1982)

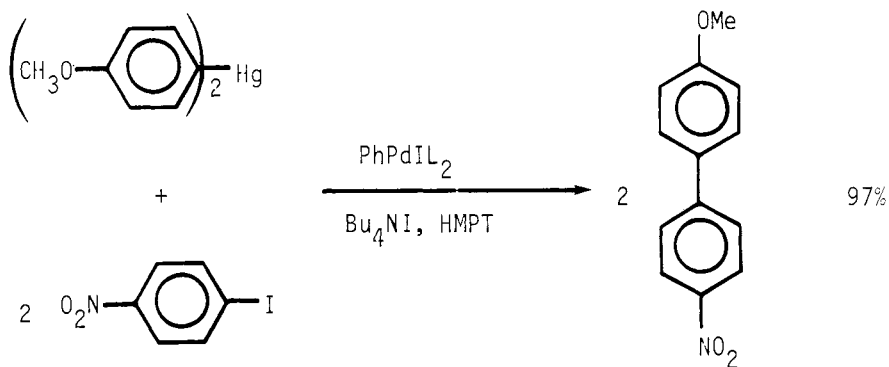
JOC (USSR), 17, 18 (1981)



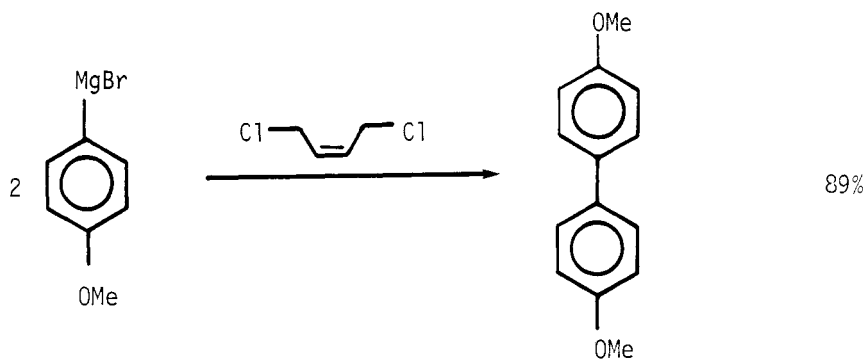
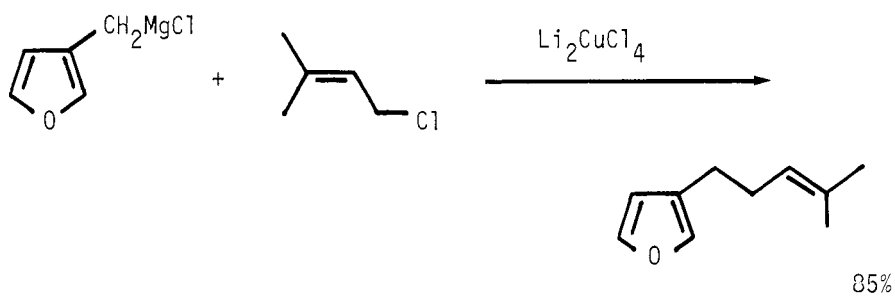
Bull Chem Soc Japan, 53, 1767 (1980)

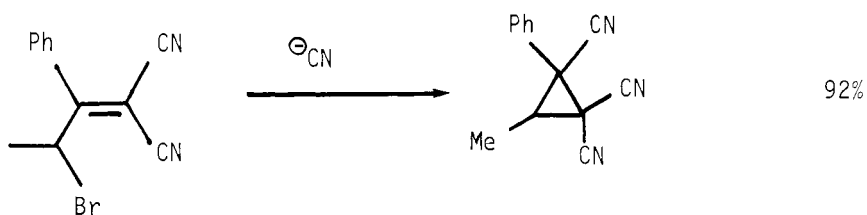


Tetr Lett, 23, 4215 (1982)

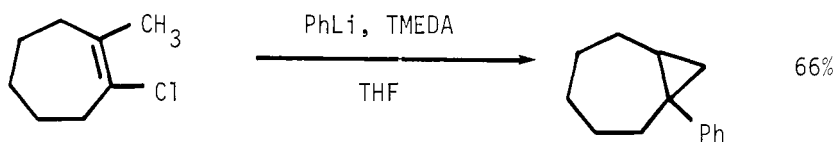


Bull Acad USSR Chem, 30, 1993 (1982)

JOC, 46, 2194 (1981)Tetr Lett, 23, 3115 (1982)



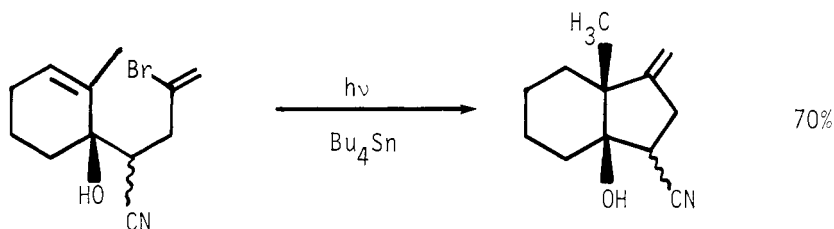
Acta Chem Scand B, 34, 289 (1980)



JACS, 102, 6519 (1980)

Review: "The synthesis of substituted cyclopropanes and cyclopropenes by the reductive cyclization of polychloroalkanes."

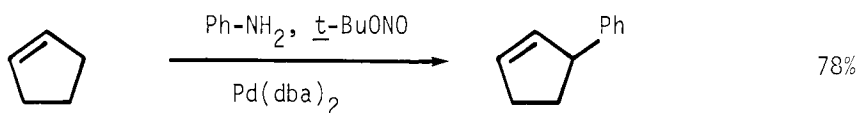
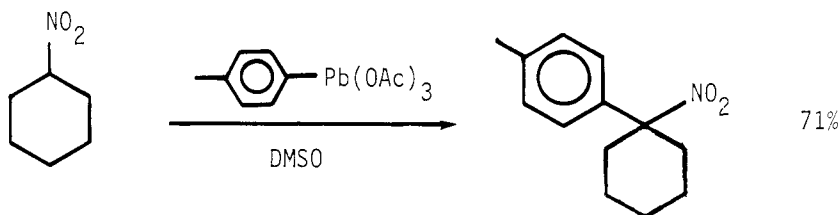
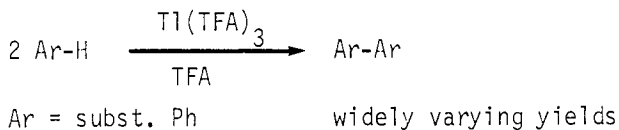
Russ Chem Rev, 51, 363 (1982)

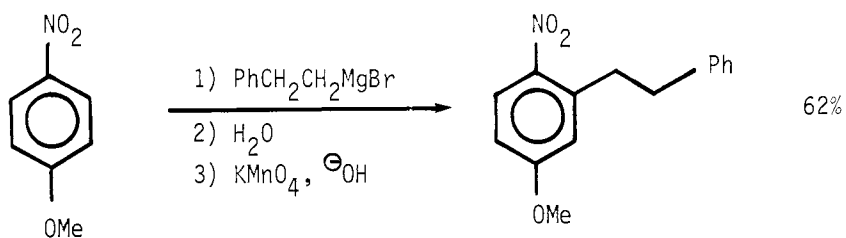
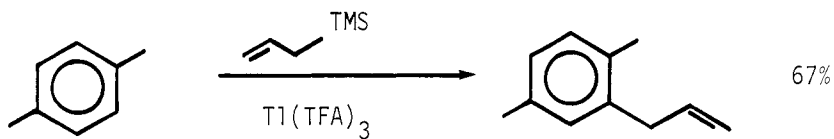
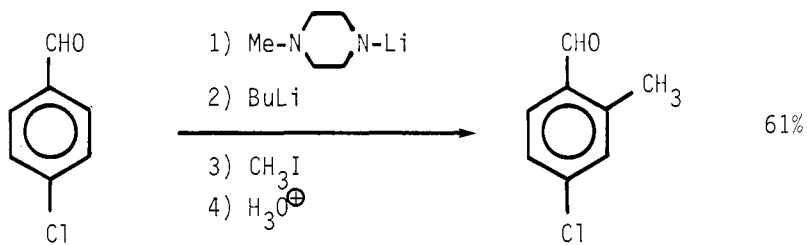


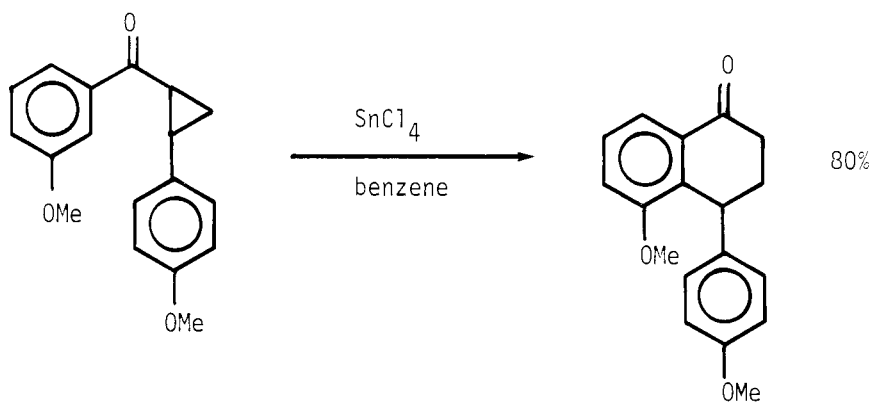
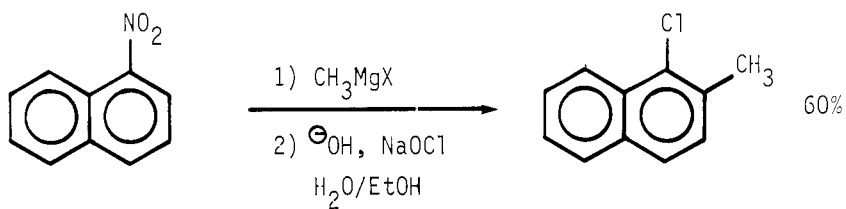
JACS, 104, 2321 (1982)

Section 71 Alkyls and Aryls from Hydrides

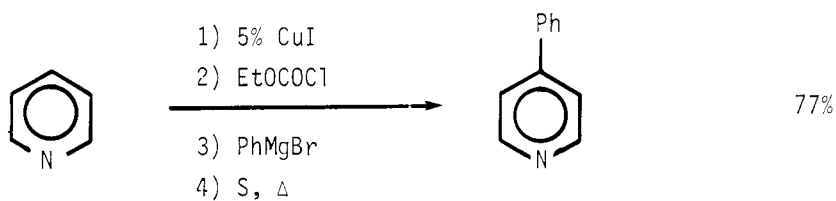
This section lists examples of the reaction $RH \rightarrow RR'$ ($R, R' =$ alkyl or aryl). For the reaction $C=CH \rightarrow C=CR$ ($R =$ alkyl or aryl) see Section 209 (Olefins from Olefins). For alkylations of ketones and esters, see Section 177 (Ketones from Ketones) and Section 113 (Esters from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

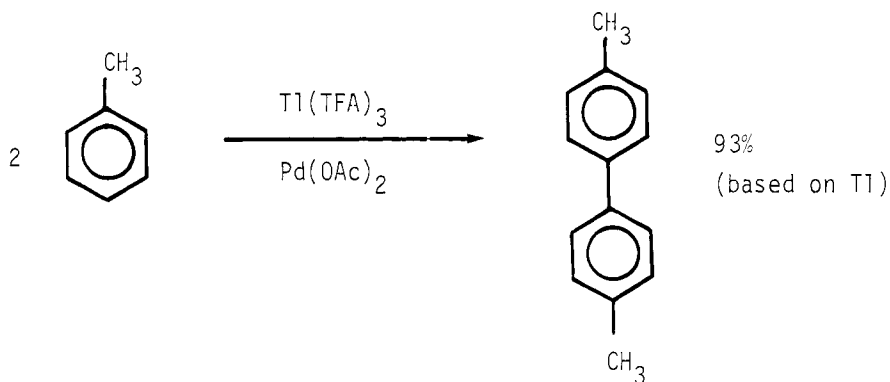
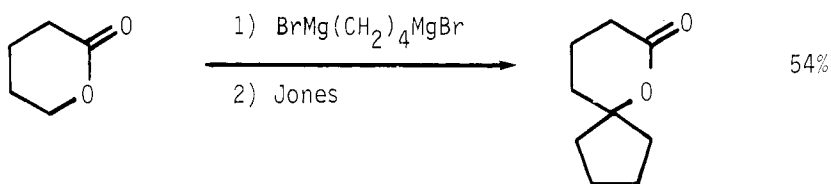
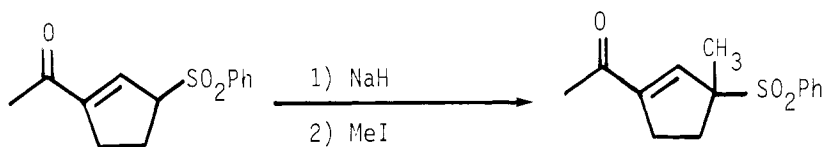
JOC, 46, 4885 (1981)Tetr Lett, 22, 703 (1981)JACS, 102, 6504 (1980)

JOC, 45, 522 (1980)Tetr Lett, 22, 4491 (1981)Tetr Lett, 23, 3979 (1982)

Tetr Lett, 21, 1887 (1980)

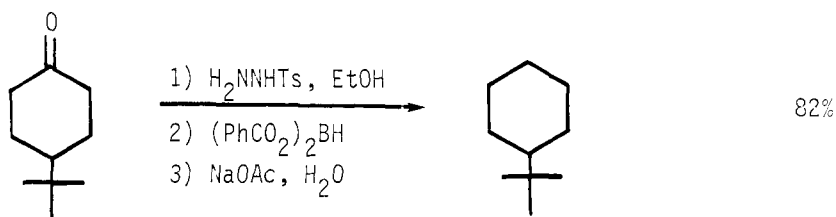
Synthesis, 616 (1980)

JOC, 47, 4315 (1982)

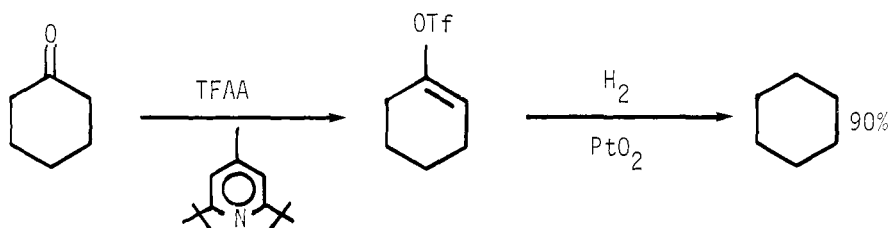
Tetr Lett, 22, 3793 (1981)JOC, 45, 1828 (1980)JACS, 102, 1602 (1980)

Section 72 Alkyls, Methylenes, and Aryls from Ketones

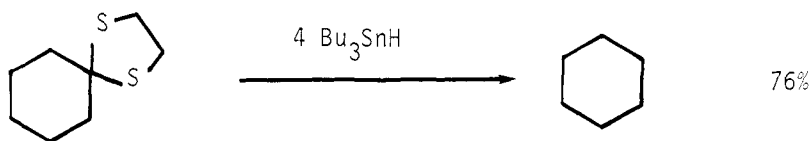
The conversions $R_2CO \rightarrow RR$, R_2CH_2 , R_2CHR' , etc. are listed in this section.



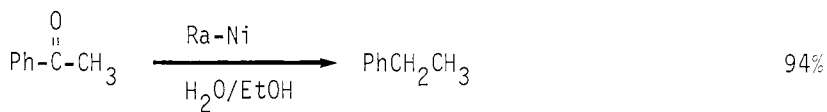
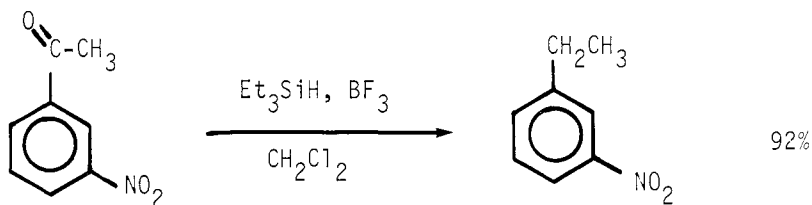
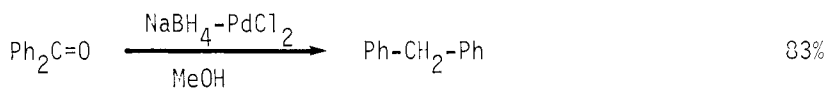
JOC, 46, 1217 (1981)



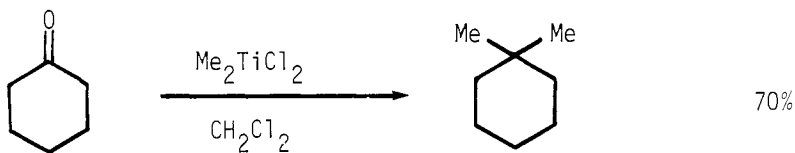
Tetr Lett, 23, 117 (1982)



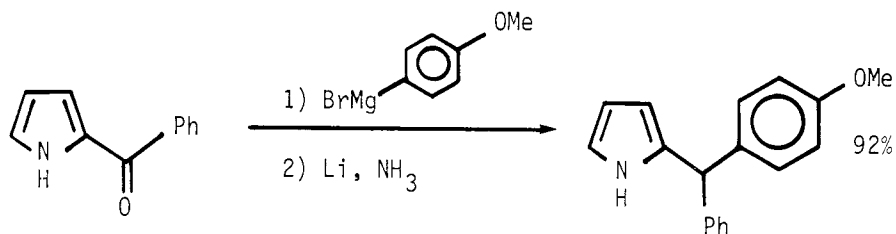
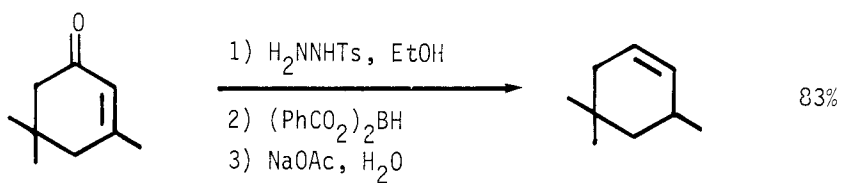
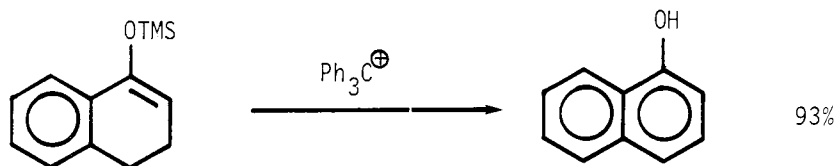
JOC, 45, 3393 (1980)

Tetr Lett, 21, 2637 (1980)Org Syn, 60, 108 (1981)

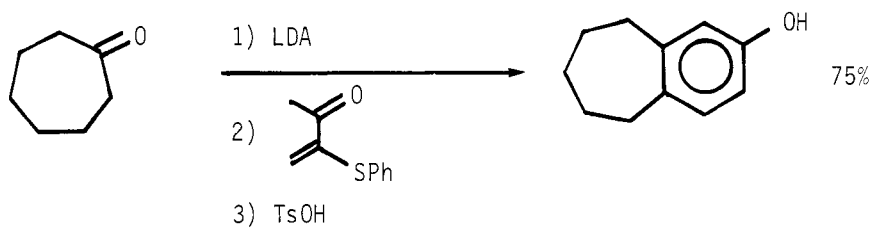
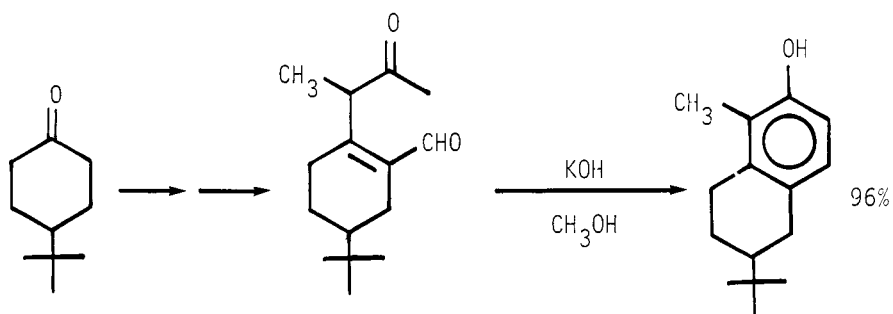
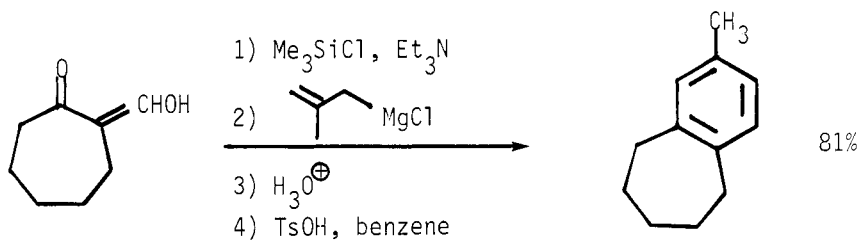
Chem Lett, 1029 (1981)

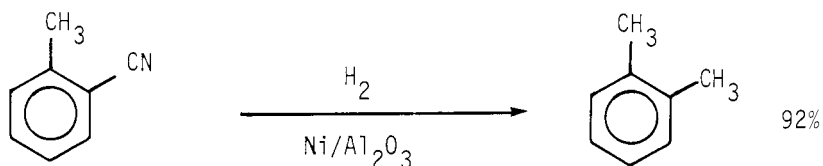


JCS Chem Comm, 237 (1981)

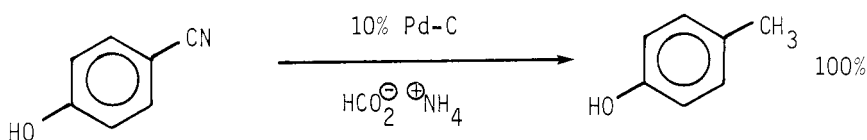
JOC, 46, 5060 (1981)JOC, 46, 1217 (1981)

Liebigs Ann Chem, 533 (1980)

JOC, 47, 1200 (1982)Tetr Lett, 23, 2023 (1982)JOC, 47, 3163 (1982)

Section 73 Alkyls, Methylene, and Aryls from Nitriles

Synthesis, 802 (1980)

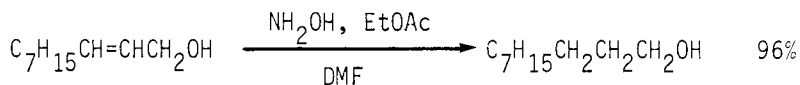
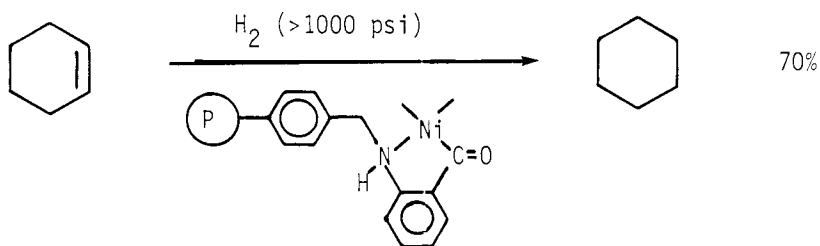
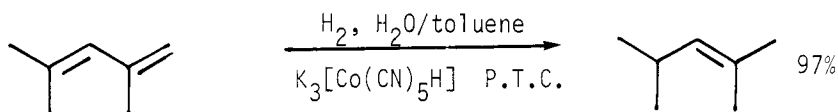


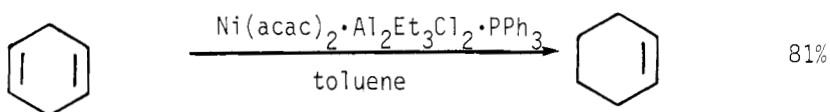
Synthesis, 1036 (1982)

Section 74 Alkyls, Methylene, and Aryls from Olefins

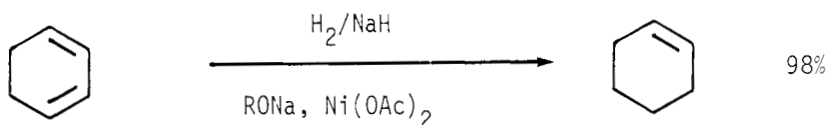
The following reaction types are included in this section:

- A. Hydrogenation of olefins (and aryls).
- B. Formation of 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.

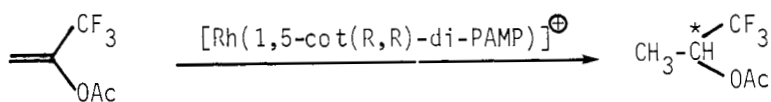
74A: Hydrogenation of Olefins (and aryls)Synth Comm, 12, 287 (1982)JOC, 45, 1418 (1980)JOC, 45, 3860 (1980)



Bull Chem Soc Japan, 55, 343 (1982)



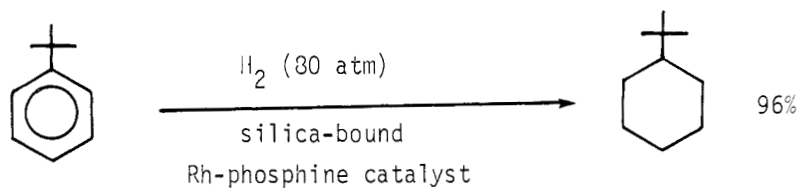
JOC, 45, 1937 (1980)



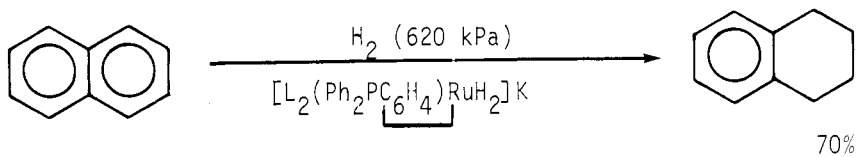
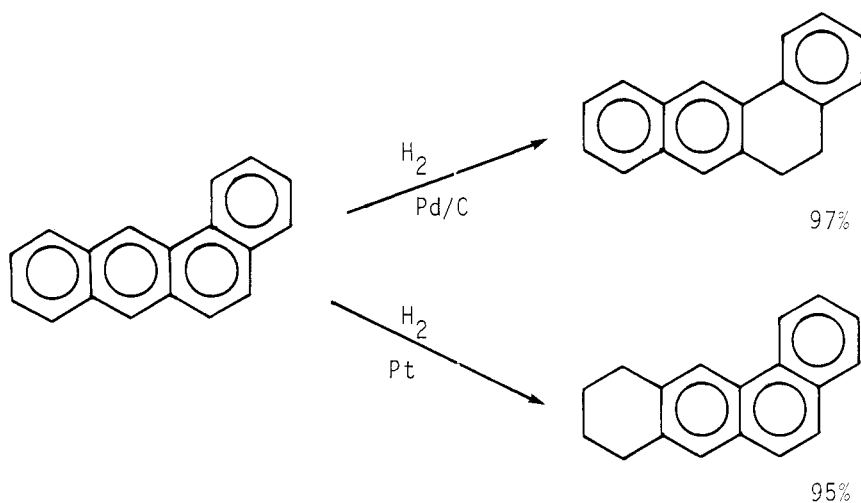
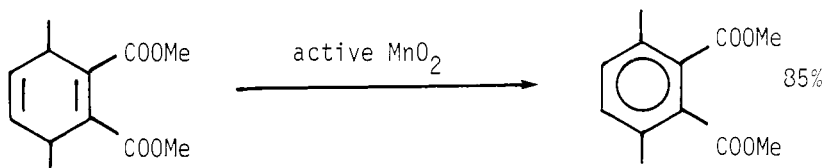
100%

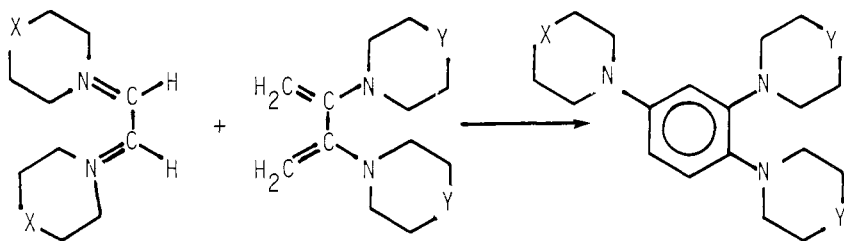
77% ee (S)

JOC, 45, 2362 (1980)



Chem Lett, 603 (1982)

JACS, 102, 5948 (1980)JOC, 45, 2797 (1980)74B: Formation of ArylsSynth Comm, 12, 637 (1982)



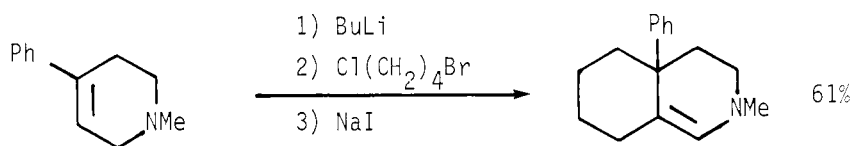
X = O, CH₂, NMe

Y = O, CH₂

46-70%

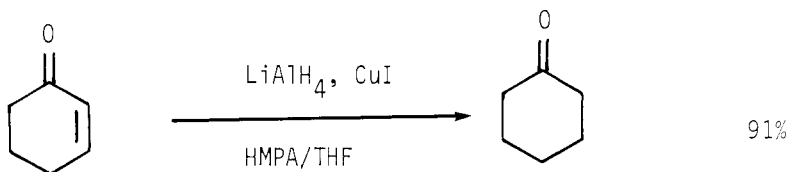
Tetr Lett, 21, 889 (1980)

74C: Alkylations and Arylations of Olefins

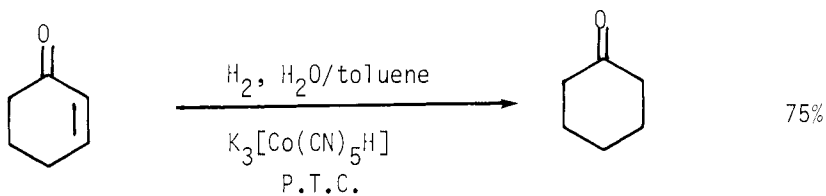
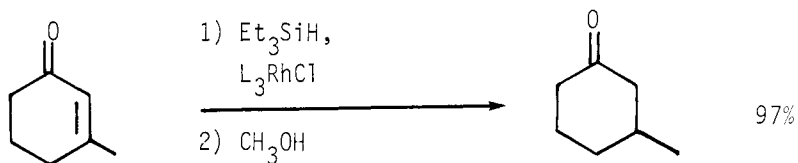
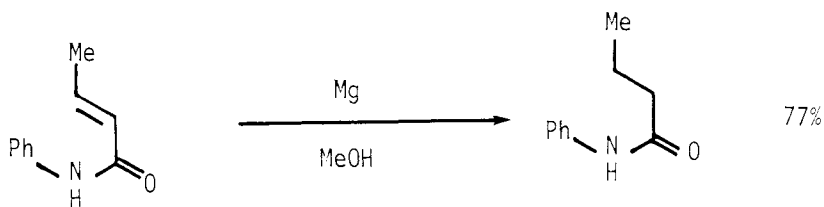


JACS, 102, 5955 (1980)

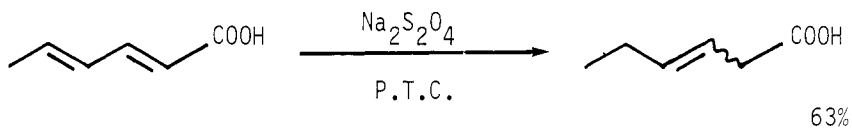
74D: Conjugate Reductions



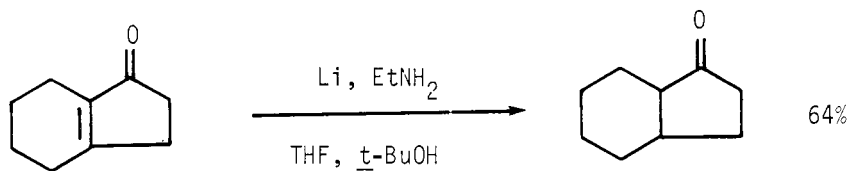
JCS Chem Comm, 1013 (1980)

JOC, 45, 3860 (1980)Organometallics, 1, 1390 (1982)

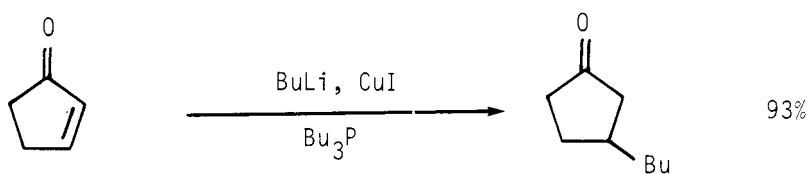
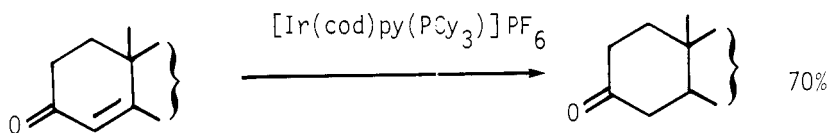
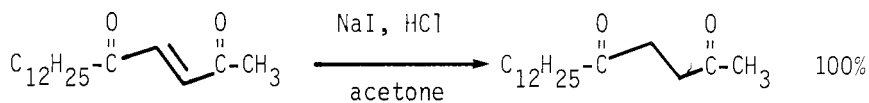
JCS Perkin I, 2912 (1981)



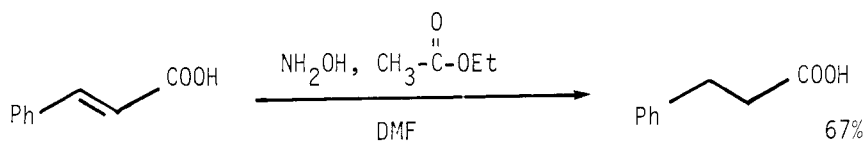
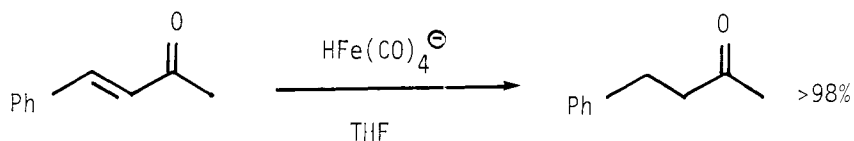
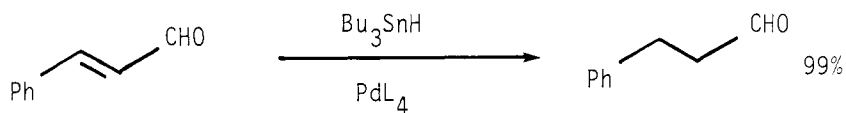
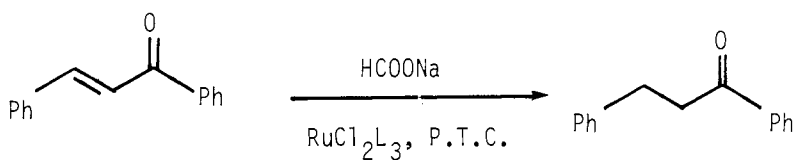
Chem Lett, 715 (1982)

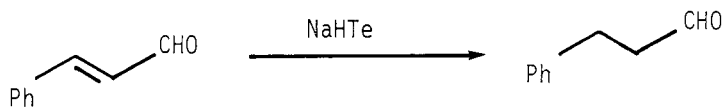


Synthesis, 400 (1980)

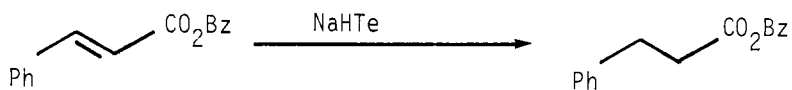
Tetr Lett, 21, 1247 (1980)Tetr Lett, 22, 303 (1981)

Synthesis, 245 (1980)

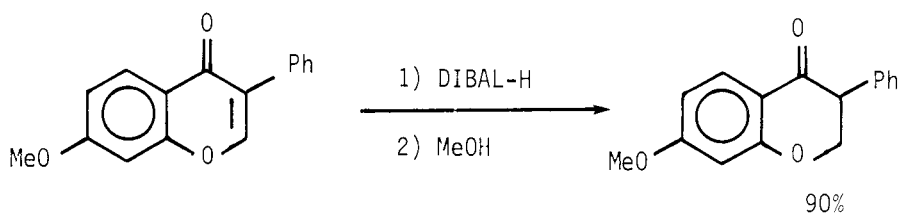
Synth Comm, 12, 287 (1982)Bull Chem Soc Japan, 55, 1329 (1982)Tetr Lett, 23, 477 (1982)Tetr Lett, 22, 1709 (1981)



> 99%

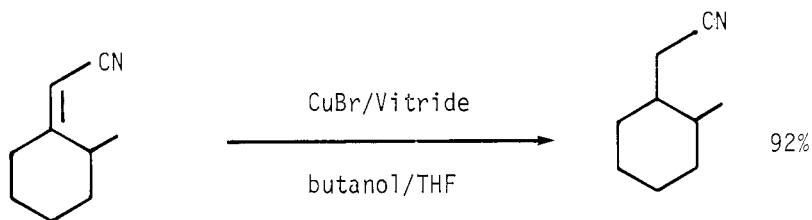


Chem Lett, 847 (1980)



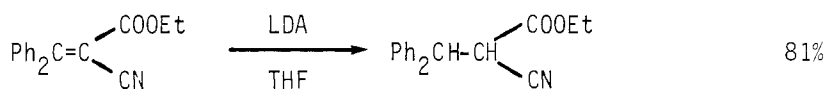
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Synthesis, 574 (1981)

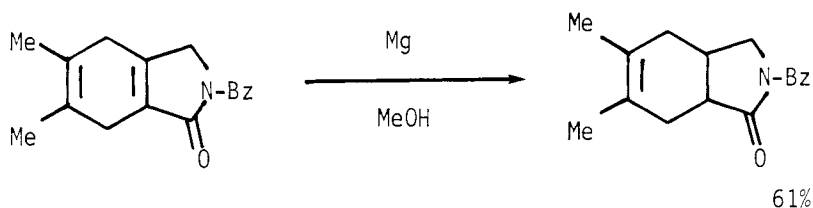
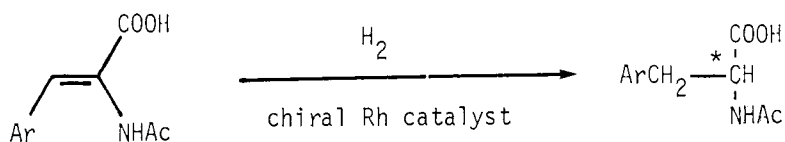


92%

JOC, 45, 167 (1980)



JCS Perkin I, 1267 (1980)

Tetr Lett, 21, 2915 (1980)

Ar = subst. Ph

>90%

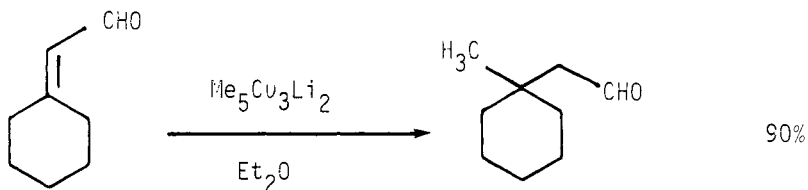
>90% ee

Chem Ber, 113, 2323 (1980)JOC, 45, 5187 (1980)Chem Lett, 7 (1980)JACS, 102, 988 (1980)

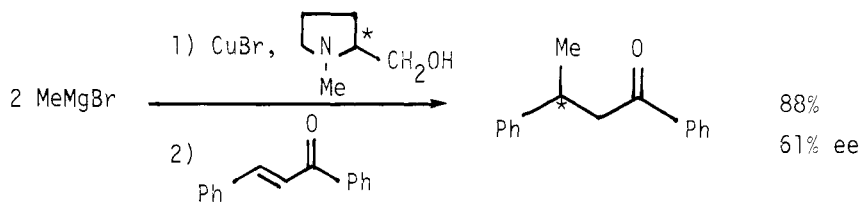
Synthesis, 76 (1981)

JOC, 46, 2954 and 2960 (1981)JACS, 103, 2273 (1981)

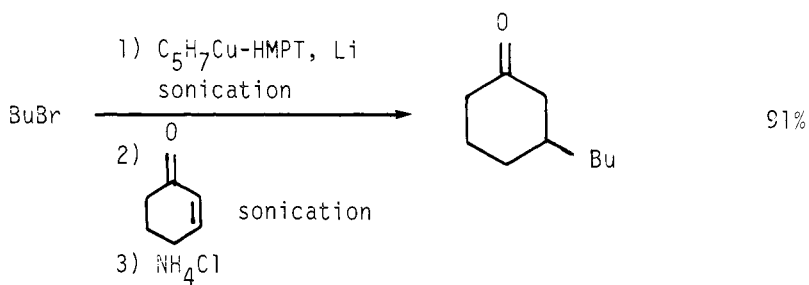
J Chem Res (S), 117 (1982)

74E: Conjugate Alkylations

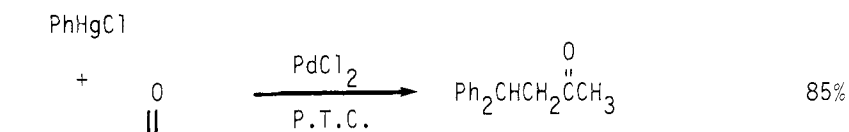
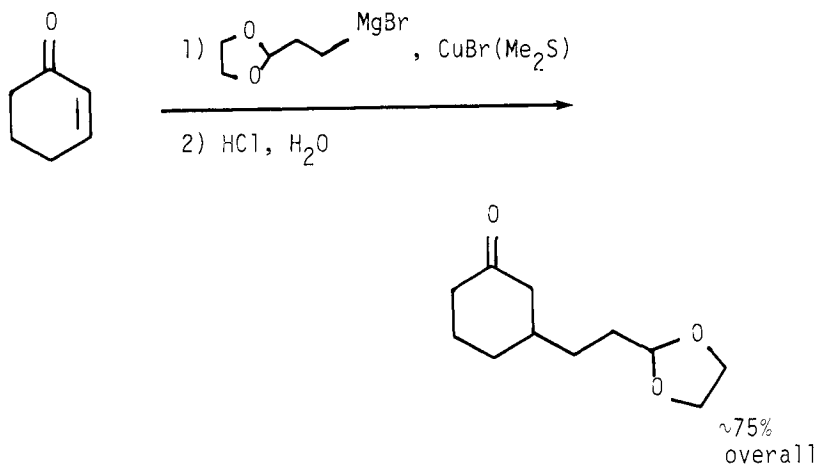
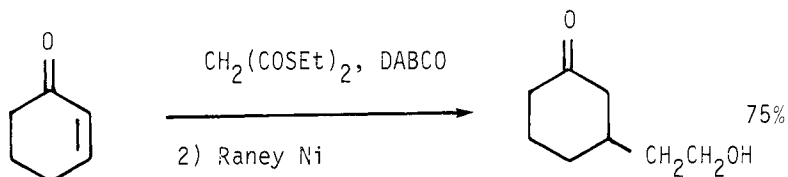
JCS Chem Comm, 643 (1981)
JOC, 47, 2572 (1982)

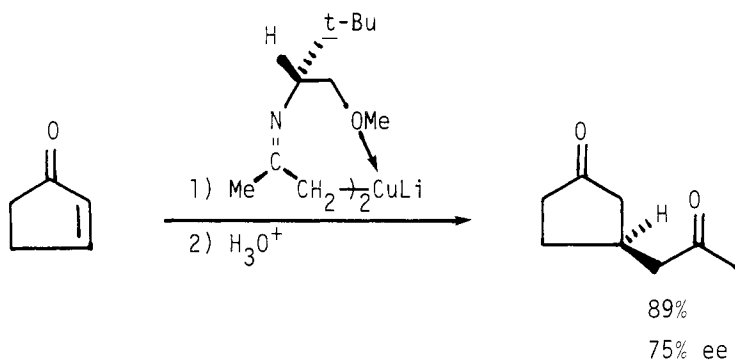
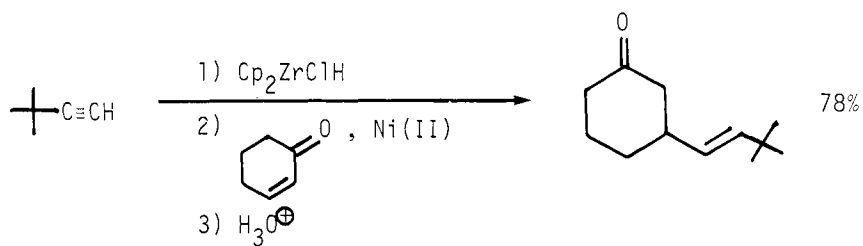
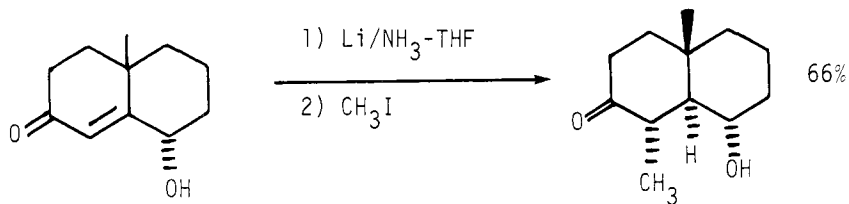


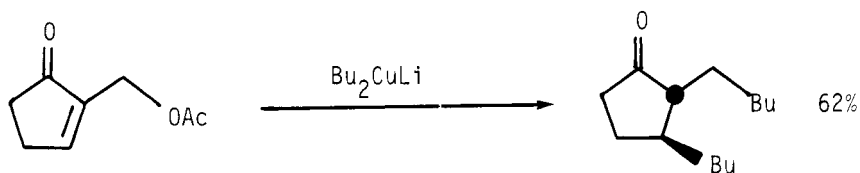
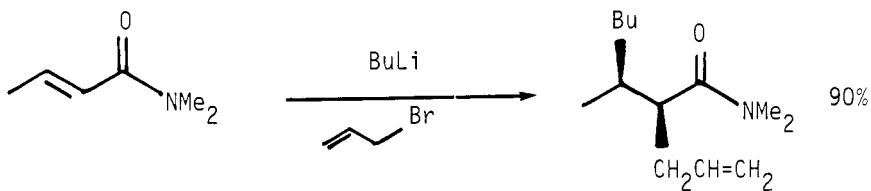
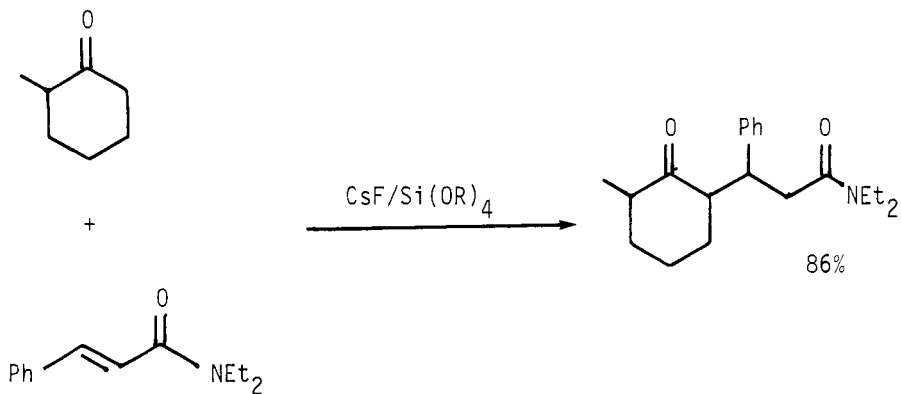
Chem Lett, 45 (1980)

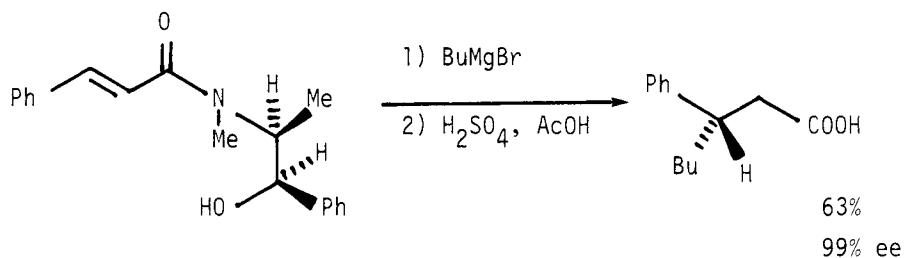


JOC, 47, 3805 (1982)

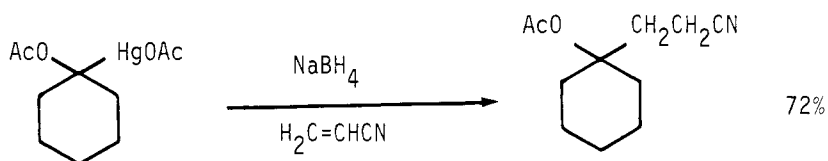
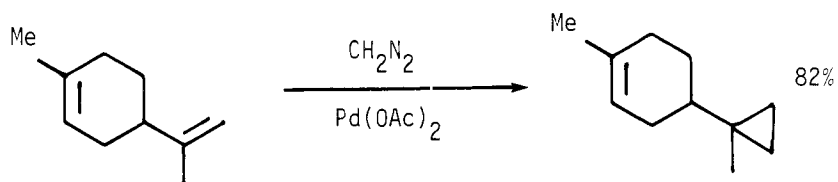
Tetrahedron, 37, 2941 (1981)JCC, 47, 5045 (1982)Can J Chem, 60, 94 (1982)

Tetr Lett, 23, 3711 (1982)JACS, 102, 1334 (1980)JACS, 102, 1218 and 1219 (1980)

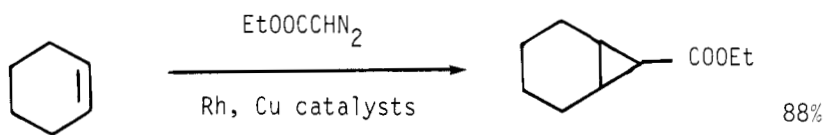
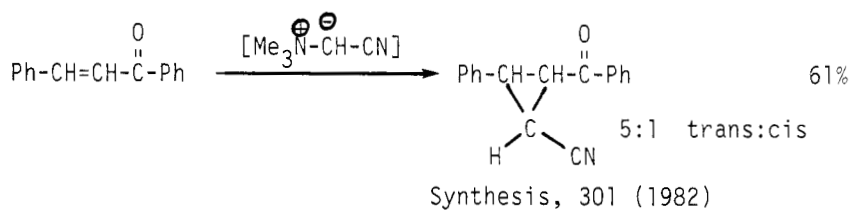
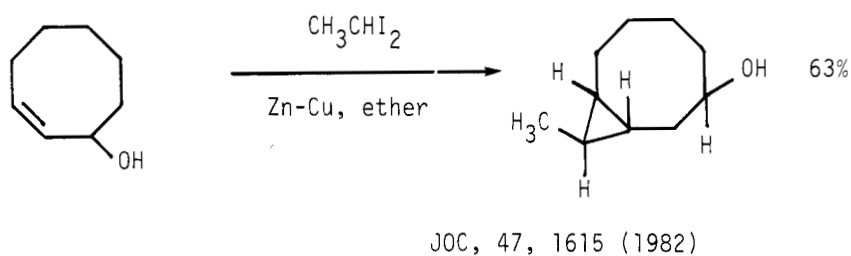
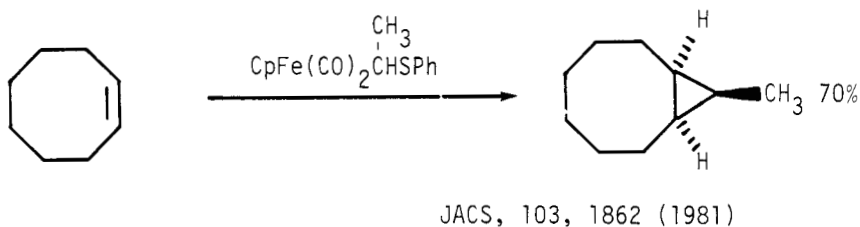
Tetr Lett, 21, 3237 (1980)Tetr Lett, 21, 4823 (1980)Tetr Lett, 23, 5531 (1982)



Chem Lett, 913 (1981)

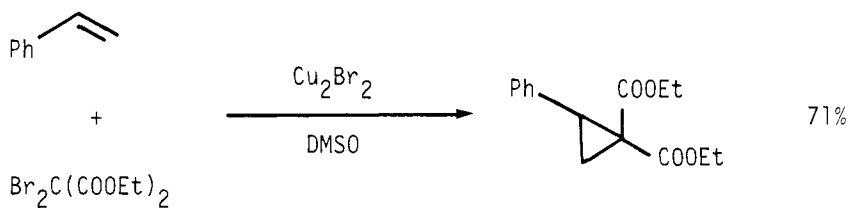
Angew Chem Int Ed, 21, 130 (1982)74F: Cyclopropanations

Synthesis, 714 (1981)

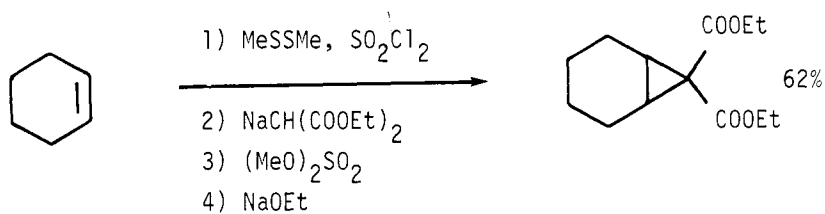


JOC, 45, 695 and 1538 (1980)

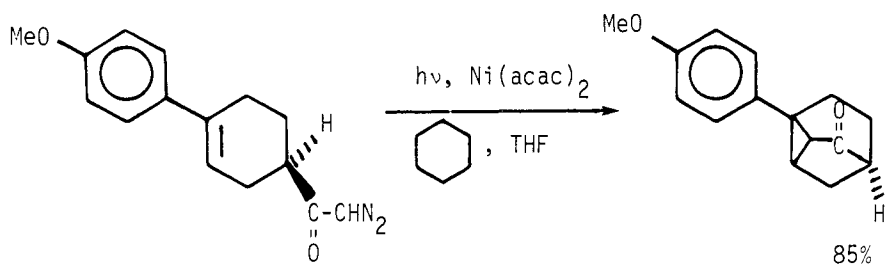
Tetr Lett, 22, 1783 (1981)



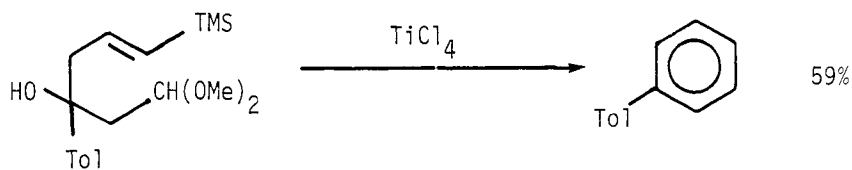
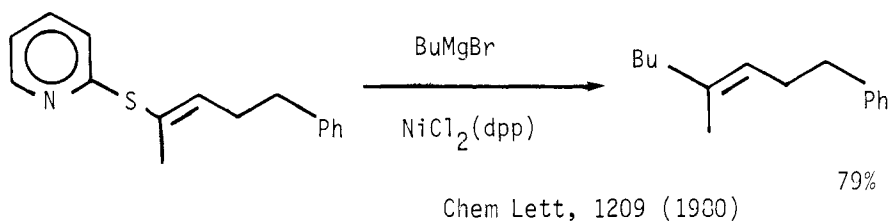
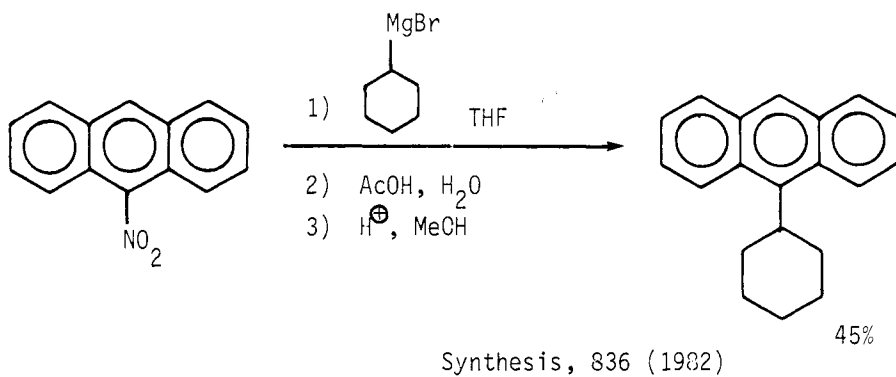
Bull Chem Soc Japan, 54, 2539 (1981)

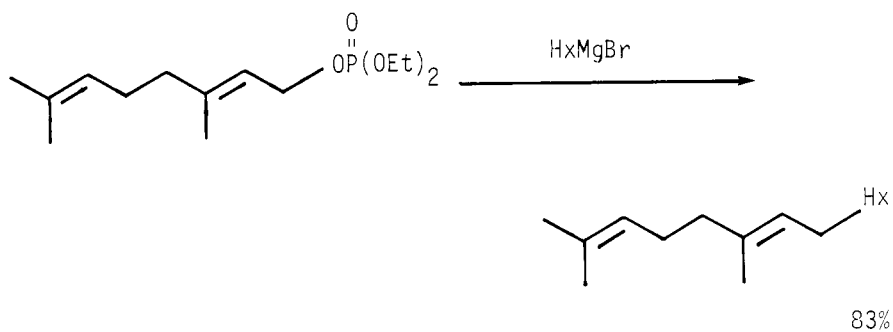


Synthesis, 690 (1980)



Indian J Chem, 20B, 911 (1981)

Section 75 Alkyls and Methylene from Miscellaneous CompoundsTetr Lett, 22, 3335 (1981)



JCS Chem Comm, 265 (1982)

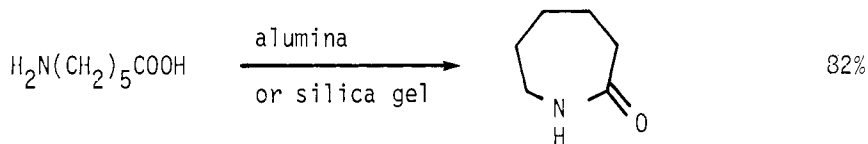
CHAPTER 6

PREPARATION OF AMIDES

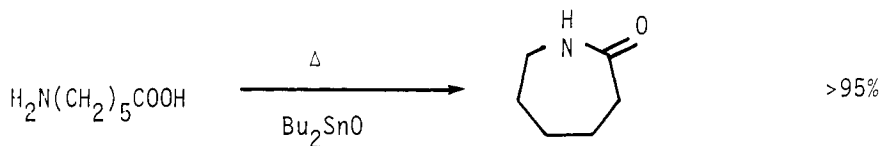
Section 76 Amides from Acetylenes

No additional examples

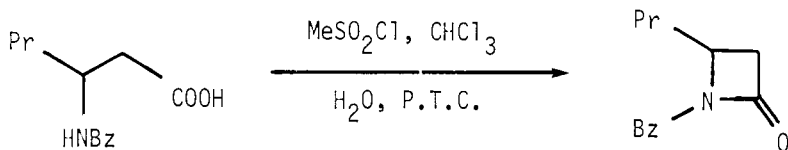
Section 77 Amides from Carboxylic Acids, Acid Halides, and Anhydrides



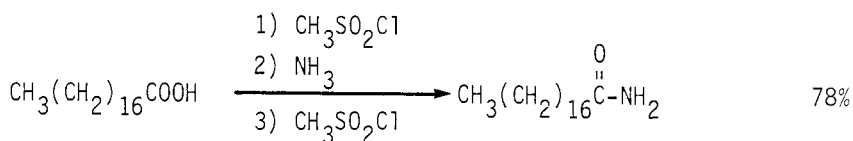
Tetr Lett, 21, 2443 (1980)



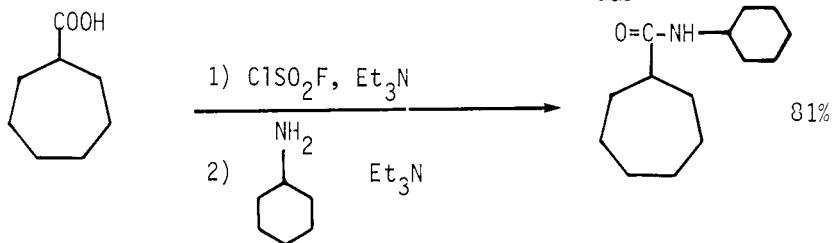
JACS, 102, 7578 (1980)



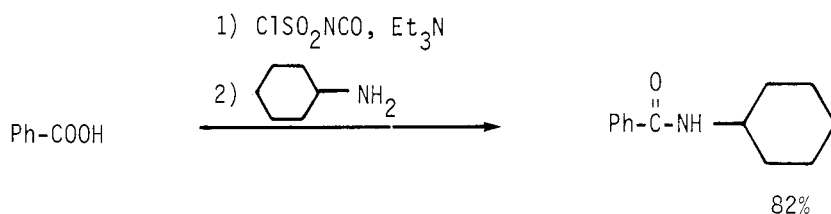
Chem Lett, 443 (1981)



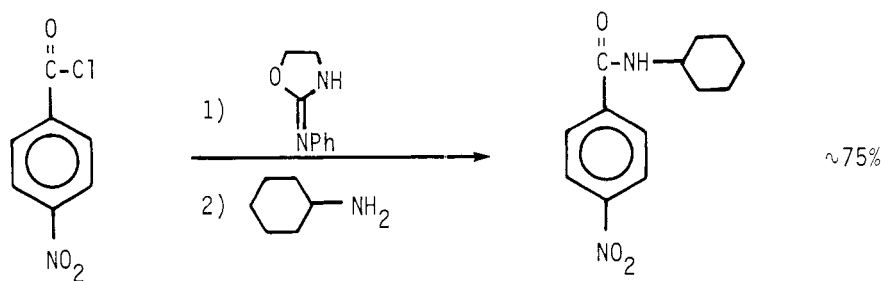
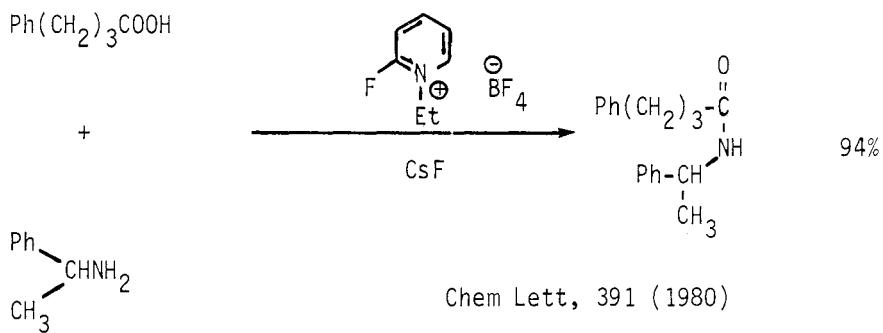
Org Prep Proc Int, 14, 396 (1982)



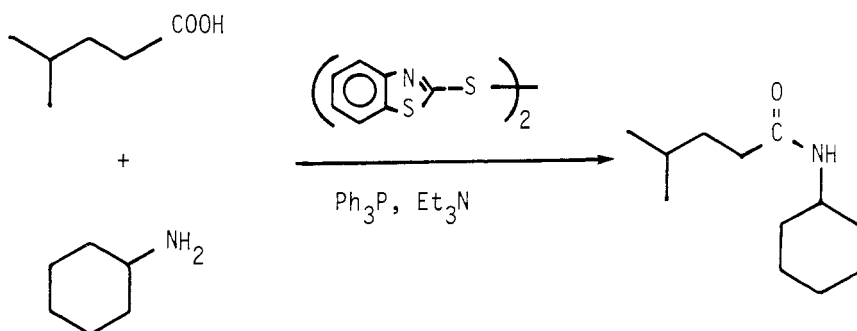
Synthesis, 661 (1980)



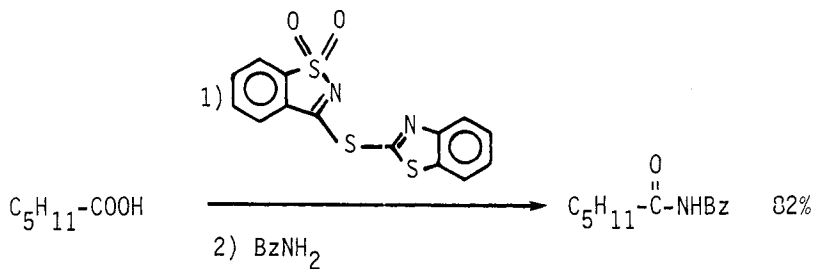
Synthesis, 506 (1982)



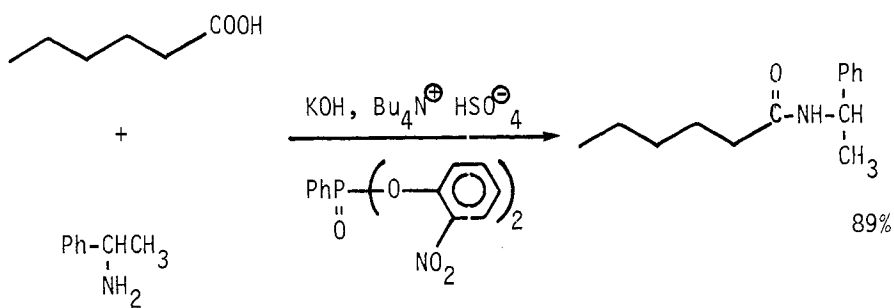
Bull Soc Chim France II, 167 (1982)



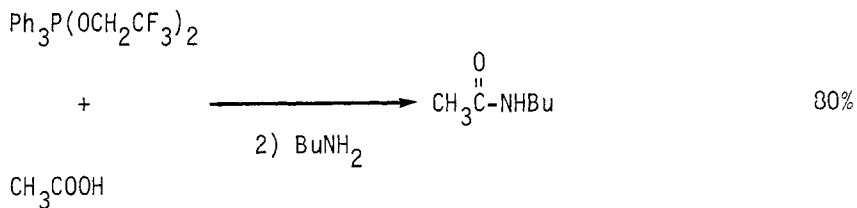
Synthesis, 287 (1981)



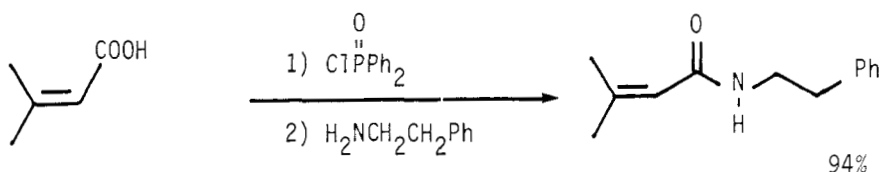
Synthesis, 933 (1982)



Chem Lett, 285 (1981)



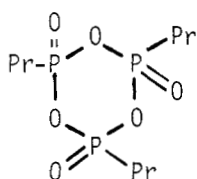
JOC, 45, 5052 (1980)



Synthesis, 385 (1980)

Ph-O-P(=O)(NPh)Cl may be used as a carbonyl-activating group for the synthesis of amides and anhydrides from carboxylic acids. Yields are >90%

Synthesis, 288 (1982)



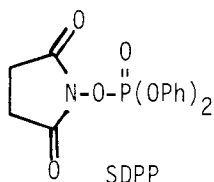
can be used to replace DCC as a coupling agent in peptide synthesis. No sparingly soluble secondary products are formed.

Angew Chem Int Ed, 19, 133 (1980)

Diphenyl phosphorazidate (DPPA) and diethyl phosphorocyanidate (DEPC) can serve as coupling reagents for solid-phase peptide synthesis in DMF.

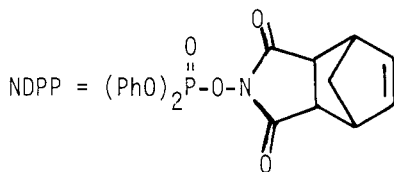
Chem Pharm Bull, 28, 3064 (1980)

Use of SDPP in place of DCC for preparation of active esters in peptide synthesis.



Tetr Lett, 21, 1467 (1980)

Use of NDPP as an activating reagent in the mixed anhydride method of peptide synthesis.



JCS Chem Comm, 1029 (1980)

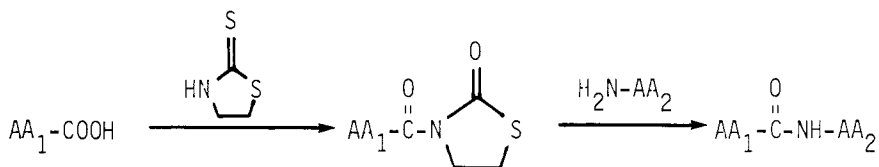
Use of polymeric N-hydroxysuccinimide (NHS) as a coupling agent in peptide synthesis. Yields are ~90% with little racemization.

Acta Chem Scand B, 33, 311 (1979)

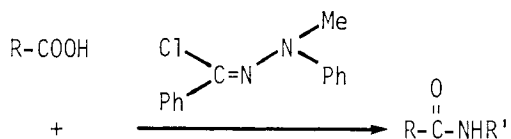
Use of phenyltetrazolinethione/isocyanide as an activating group for peptide formation. Yields are 60-84%, without racemization.

Angew Chem Int Ed, 21, 143 (1982)

Use of thiazoline-2-thione as a carbonyl-activating reagent for peptide synthesis.



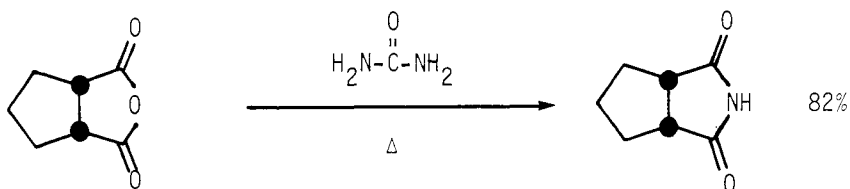
Chem Pharm Bull, 28, 3140 (1980)



$\text{R}'\text{-NH}_2$

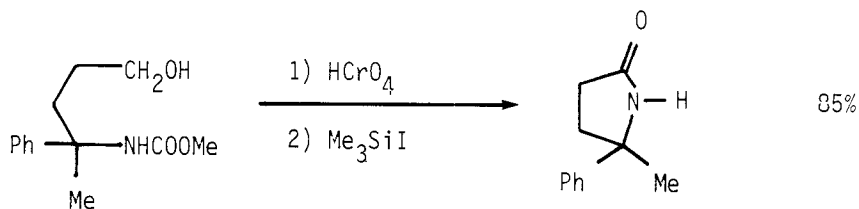
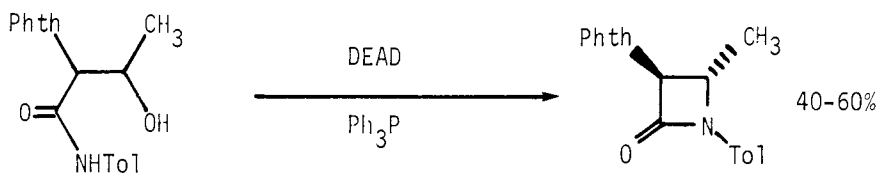
Allows peptide synthesis using unprotected amino acids.

JACS, 102, 4537 (1980)

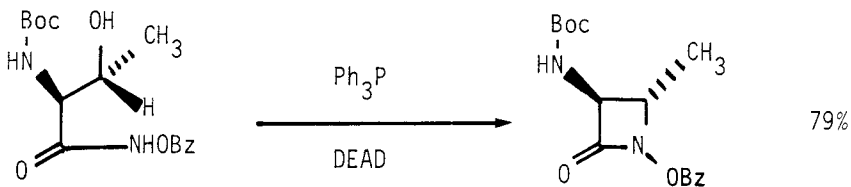


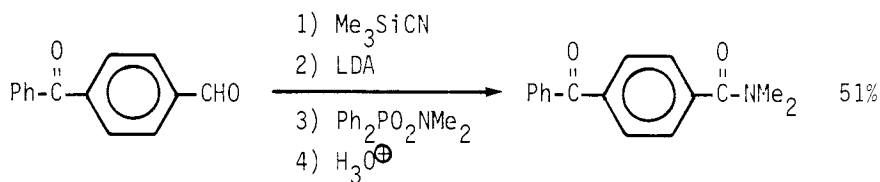
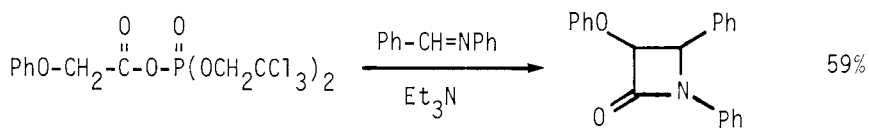
Synth Comm, 11, 447 (1981)

Related methods: Amides from Amines (Section 82)

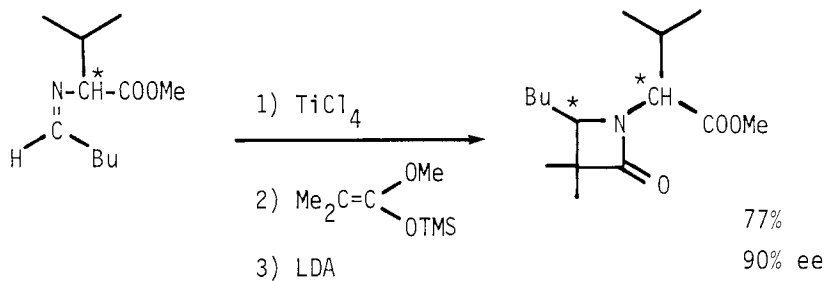
Section 78 Amides from AlcoholsJOC, 46, 1616 (1981)

Phth = phthalimido

JOC, 46, 1229 (1981)JACS, 102, 7026 (1980)

Section 79 Amides from AldehydesTetr Lett, 23, 3255 (1982)

Synthesis, 1053 (1982)

Tetr Lett, 21, 2077 and 2081 (1980)

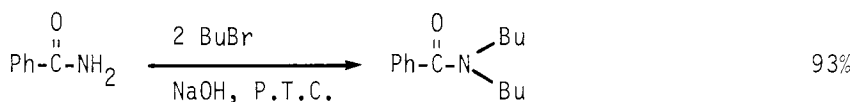
Synthesis, 545 (1981)

Section 80 Amides from Alkyls, Methylenes and Aryls

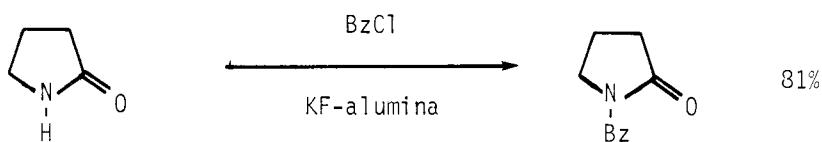
No additional examples

Section 81 Amides from Amides

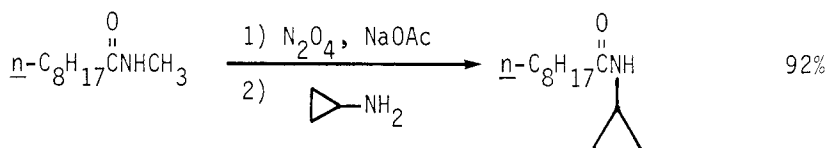
Conjugate reductions of unsaturated amides are listed in Section 74 (Alkyls from Olefins).



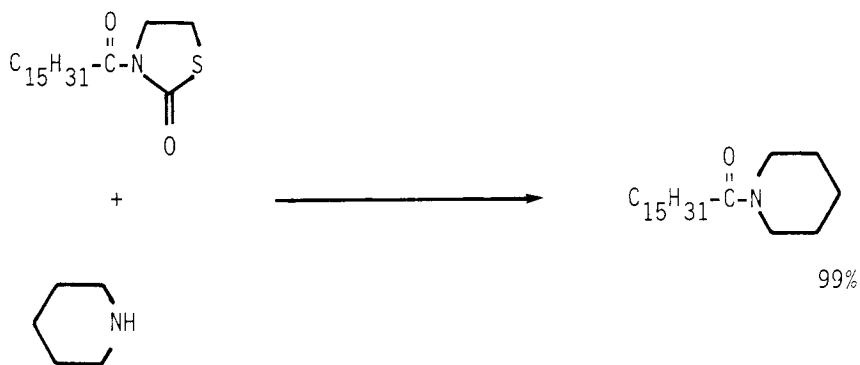
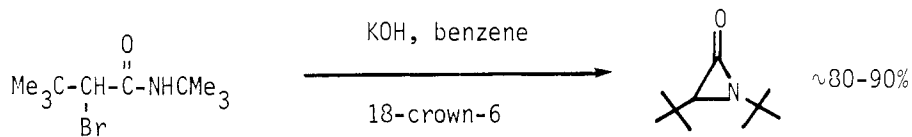
Synthesis, 1005 (1981)



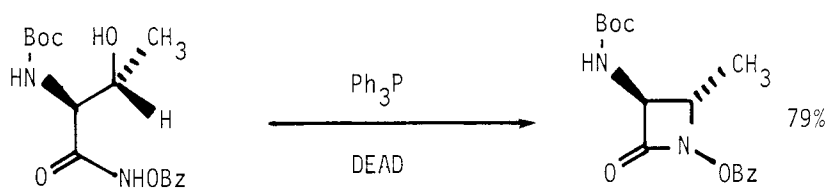
Chem Lett, 1143 (1981)

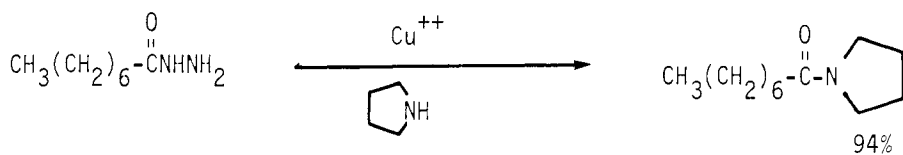
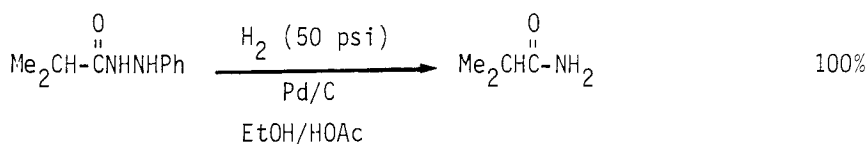
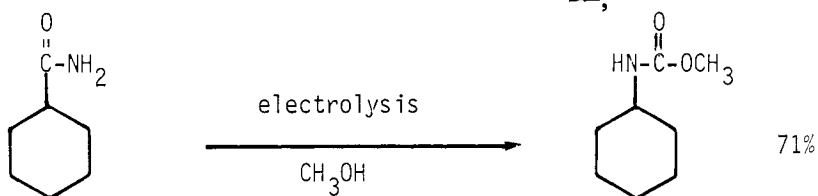


Tetr Lett, 23, 1127 (1982)

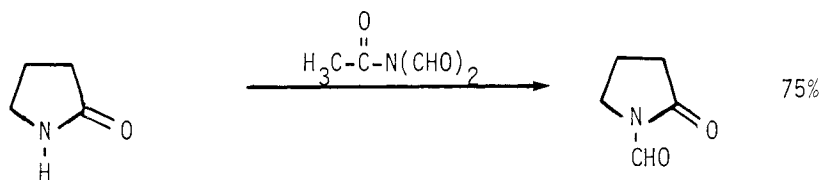
Tetr Lett, 21, 841 (1980)

Synthesis, 586 (1982)

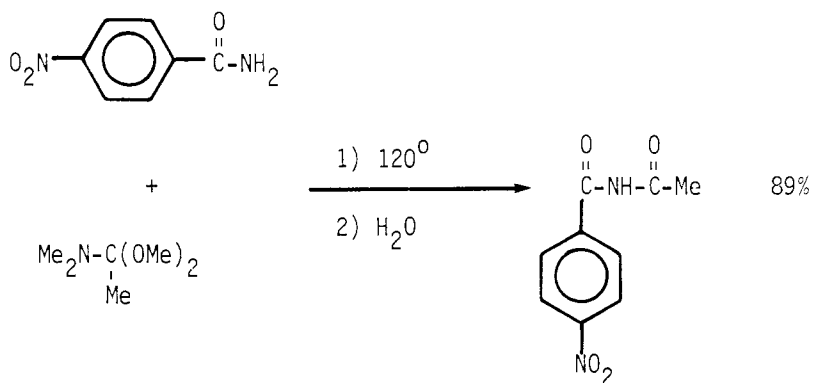
JACS, 102, 7026 (1980)

Tetrahedron, 36, 1311 (1980)Synth Comm, 10, 253 (1980)

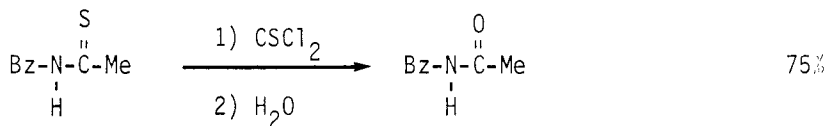
Chem Lett, 565 (1982)



Synthesis, 264 (1982)

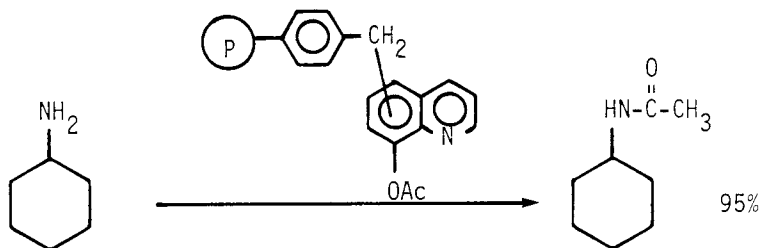


Synthesis, 119 (1980)

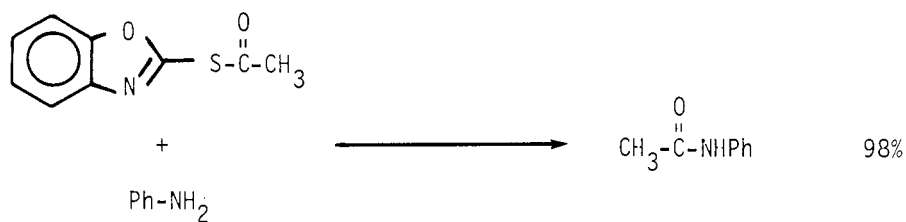


Indian J Chem, 19B, 211 (1980)

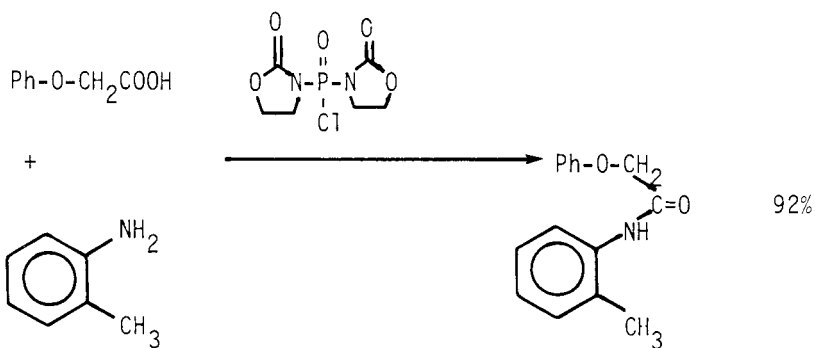
Section 82 Amides from Amines



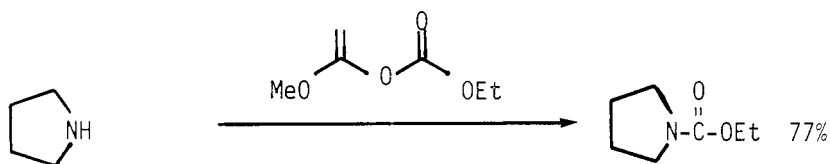
Synth Comm, 12, 709 (1982)



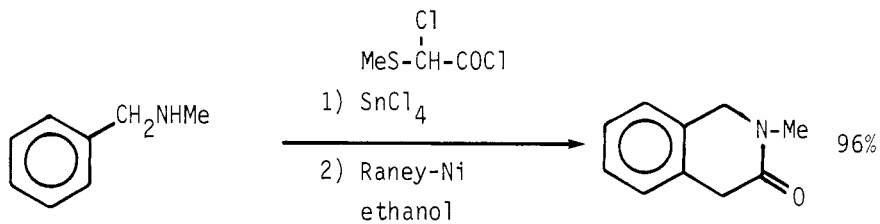
Synthesis, 991 (1981)



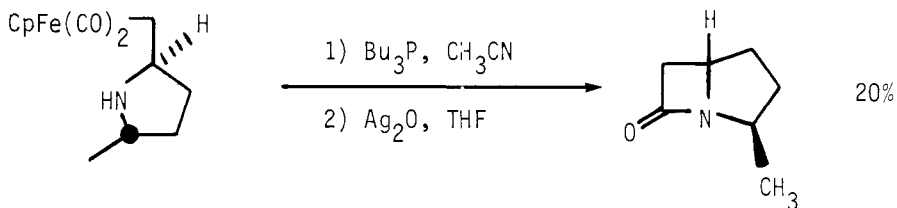
Synthesis, 547 (1980)



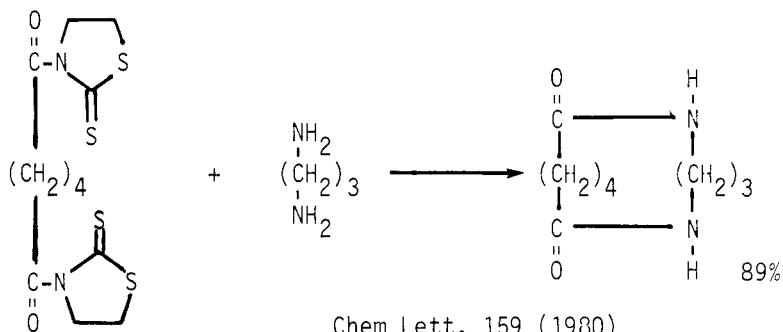
JOC, 45, 4519 (1980)



Synthesis, 534 (1981)

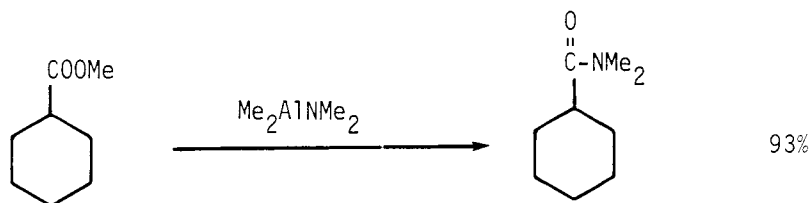
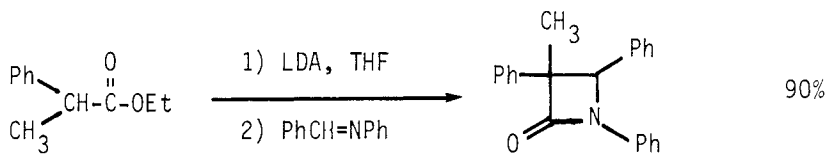
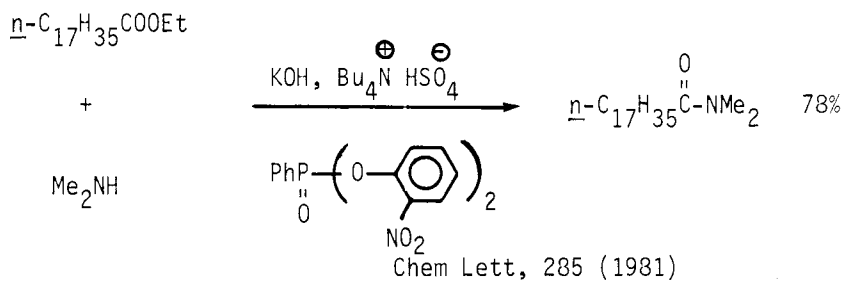


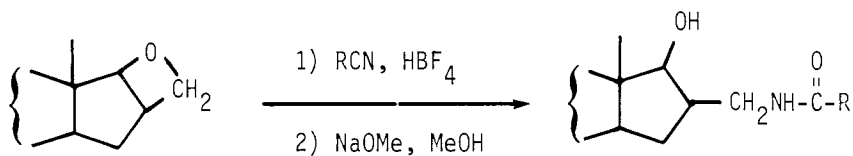
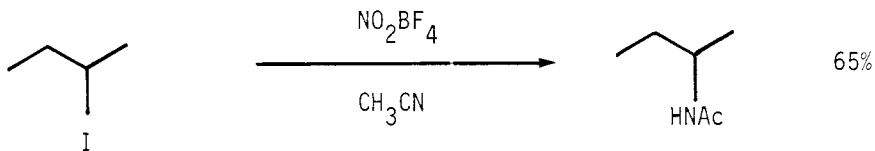
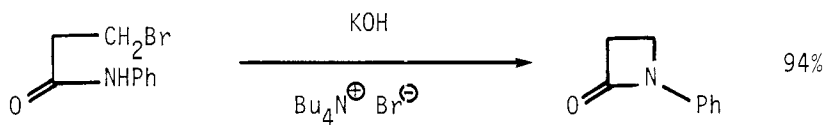
JOC, 45, 1984 (1980)

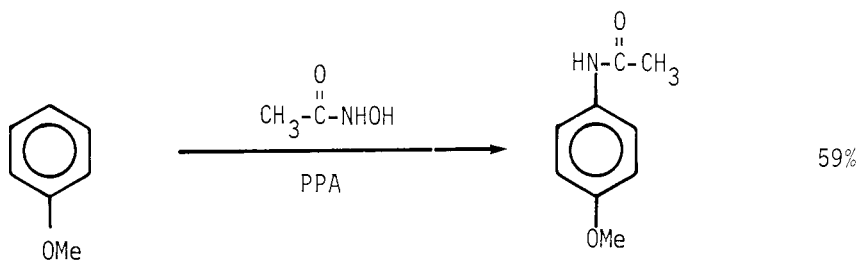
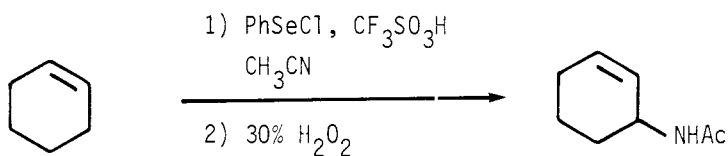
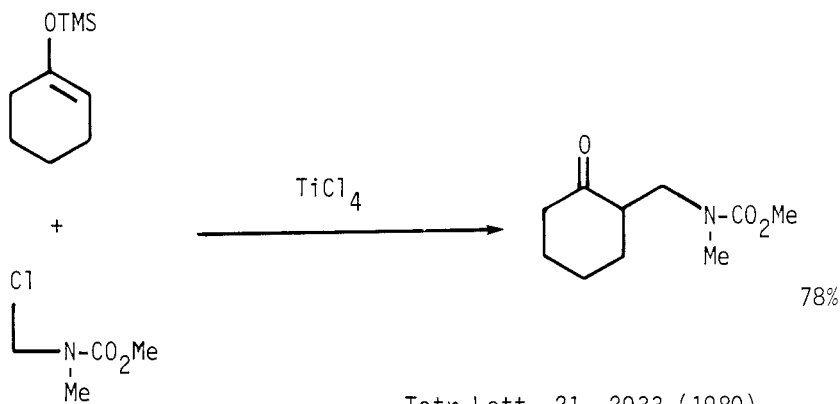


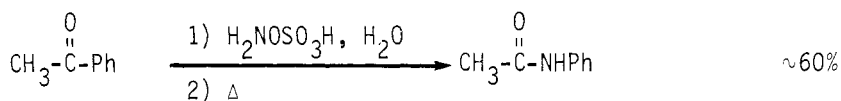
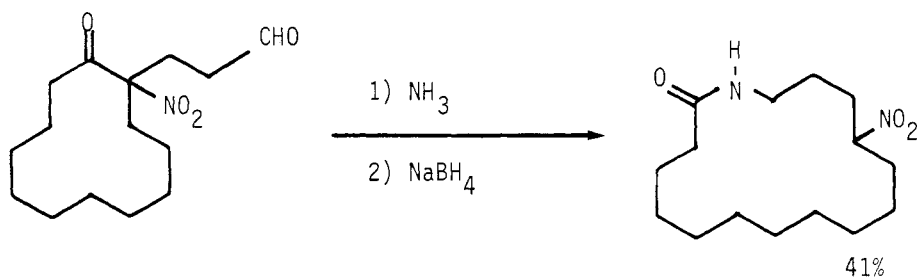
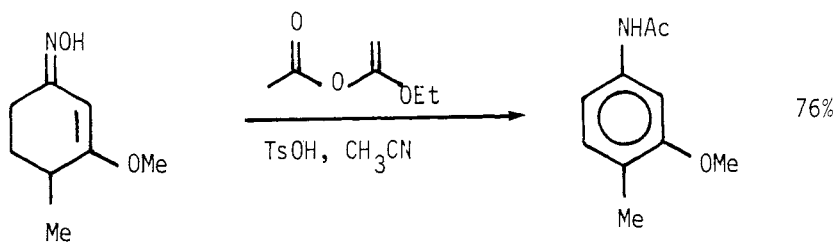
Chem Lett, 159 (1980)

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

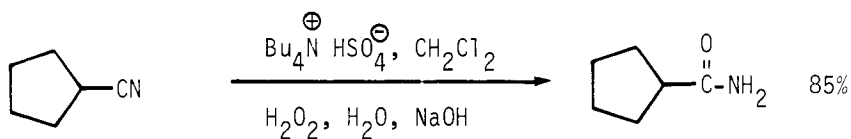
Section 83 Amides from EstersOrg Syn, 59, 49 (1980)JOC, 45, 3413 (1980)

Section 84 Amides from Ethers and EpoxidesTetr Lett, 22, 341 (1981)Section 85 Amides from HalidesJOC, 45, 165 (1980)Chem Pharm Bull, 29, 1063 (1981)

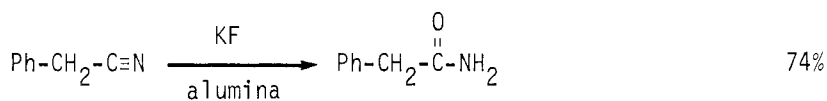
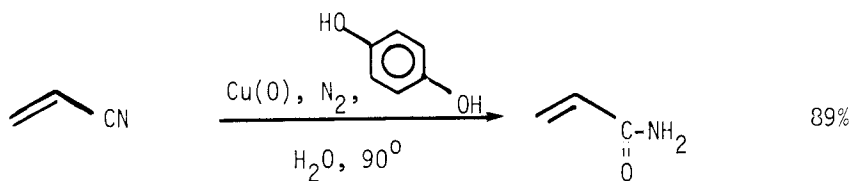
Section 86 Amides from HydridesJOC, 46, 4304 (1981)JOC, 46, 4727 (1981)Tetr Lett, 21, 2033 (1980)

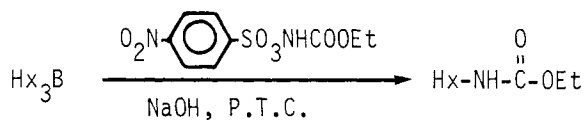
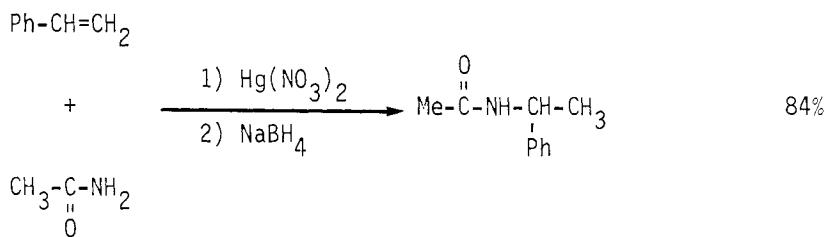
Section 87 Amides from KetonesJOC (USSR), 17, 2284 (1982)Helv Chim Acta, 65, 2299 (1982)

Synthesis, 483 and 887 (1980)

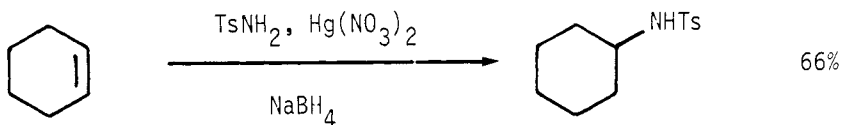
Section 88 Amides from Nitriles

Synthesis, 243 (1980)

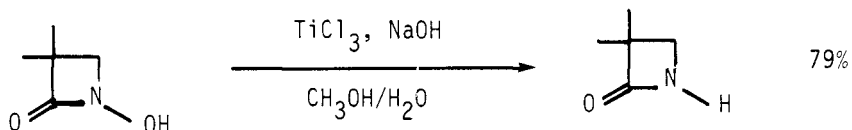
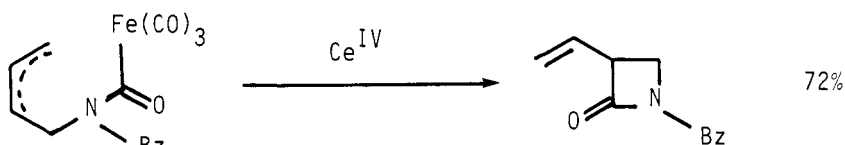
Synth Comm, 12, 177 (1982)JOC, 47, 4812 (1982)

Section 89 Amides from OlefinsSynth Comm, 11, 475 (1981)

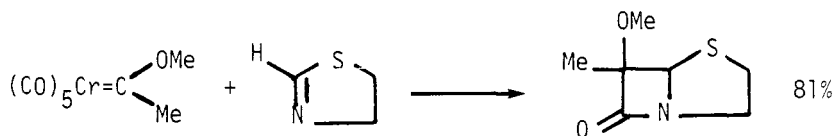
JCS Chem Comm, 670 (1981)



JCS Chem Comm, 1178 (1981)

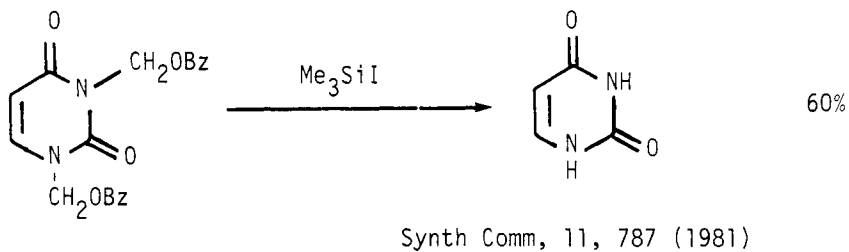
Section 90 Amides from Miscellaneous CompoundsJOC, 45, 410 (1980)

JCS Chem Comm, 297 (1980)

JACS, 104, 5538 (1982)

Review: "Prominent Aspects of Electroorganic Synthesis in β -lactam Chemistry."

Bull Soc Chim Belges, 91, 951 (1982)

Section 90A Protection of Amides

A study of N-acyl protecting groups for deoxynucleosides, including substituted phenylacetyl, phenoxyacetyl, and benzoyl protecting groups.

Tetrahedron, 37, 363 (1981)

The N-acyl protecting groups in nucleoside derivatives can be selectively removed by treatment with ZnBr_2 in the presence of alcohols to give O-protected nucleosides.

Tetr Lett, 22, 3761 (1981)

CHAPTER 7

PREPARATION OF AMINES

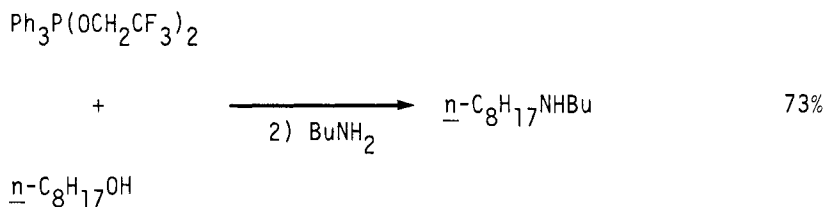
Section 91 Amines from Acetylenes

No additional examples

Section 92 Amines from Carboxylic Acids and Acid Halides

No additional examples

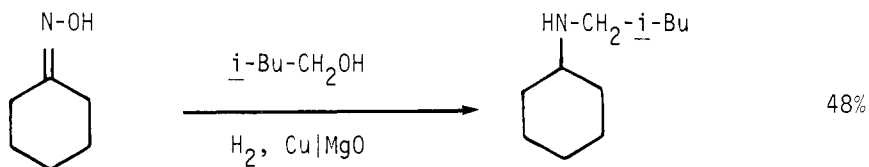
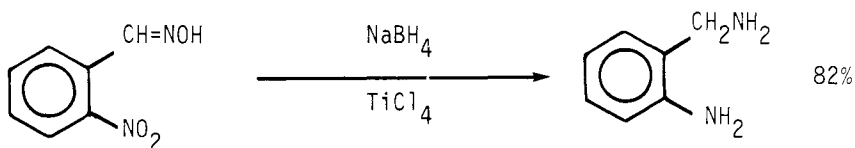
Section 93 Amines from Alcohols



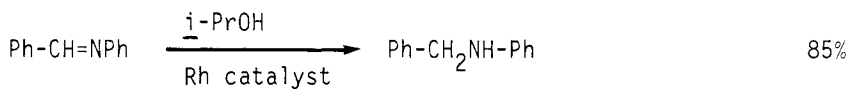
JOC, 45, 5052 (1980)

Review: "Catalytic Amination of Alcohols, Aldehydes, and Ketones"

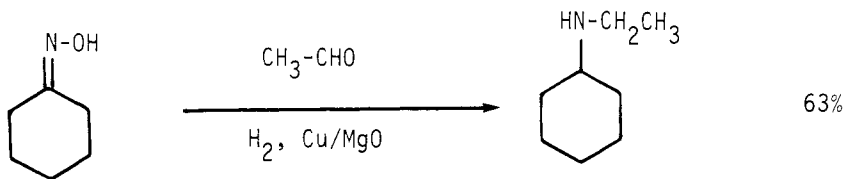
Russ Chem Rev, 49, 14 (1980)

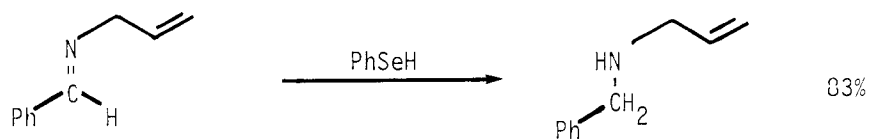
Doklady Chem, 244, 69 (1979)Section 94 Amines from Aldehydes

Synthesis, 695 (1980)

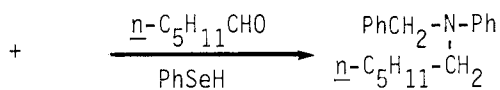
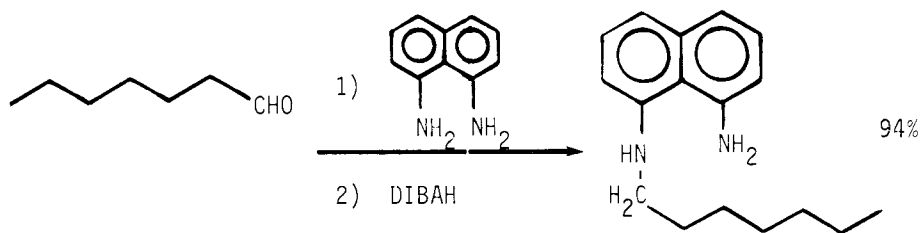
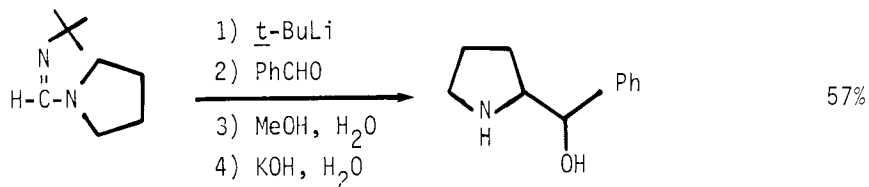


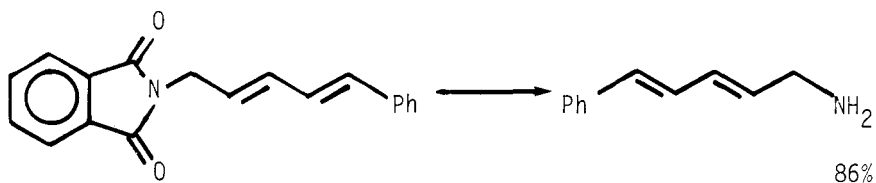
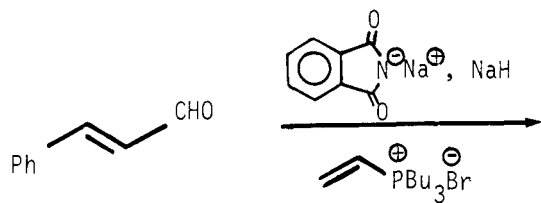
Synthesis, 442 (1981)

Doklady Chem, 244, 69 (1979)



PhCHO

PhNH₂Tetr Lett, 21, 3385 (1980)JACS, 103, 4186 (1981)JACS, 102, 7125 (1980)



JOC, 46, 3119 (1981)

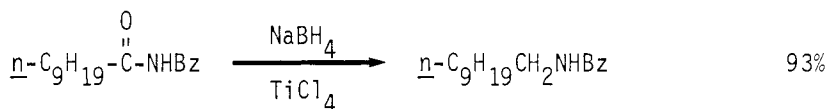
Review: "Catalytic Amination of Alcohols, Aldehydes, and Ketones"

Russ Chem Rev, 49, 14 (1980)

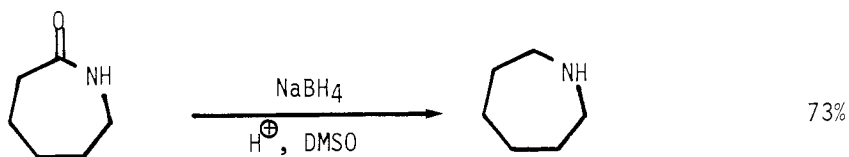
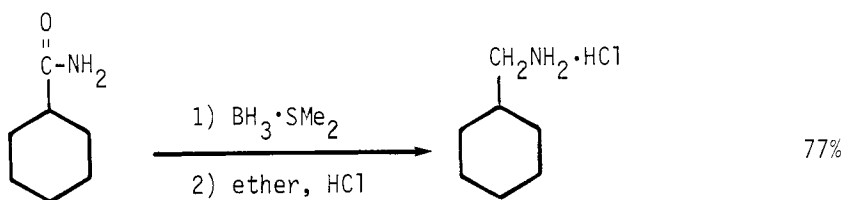
Related methods: Amines from Ketones (Section 102)

Section 95 Amines from Alkyls, Methylene, and Aryls

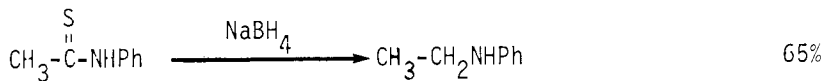
No examples.

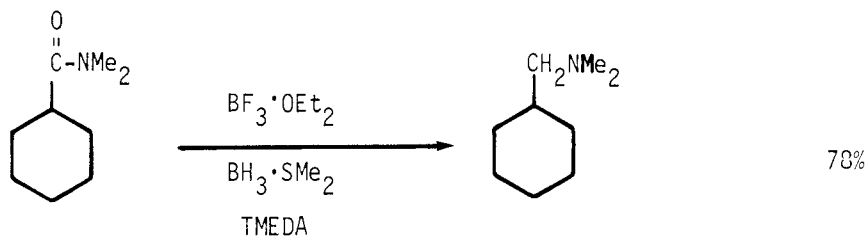
Section 96 Amines from Amides

Synthesis, 695 (1980)

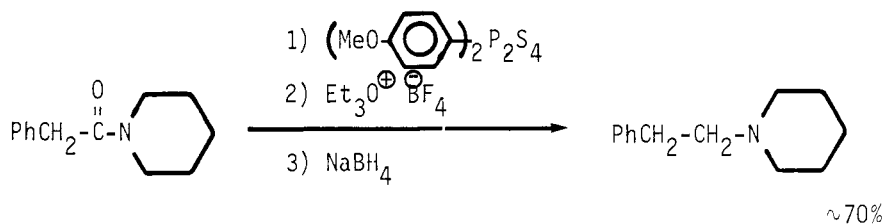
JOC, 46, 2579 (1981)

Synthesis, 439 (1981)

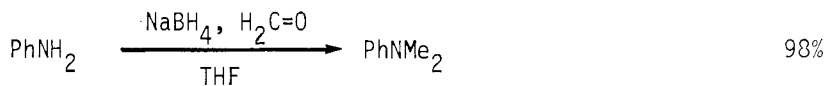
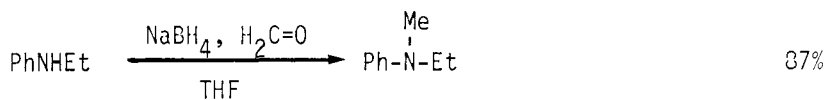
JOC, 46, 3730 (1981)



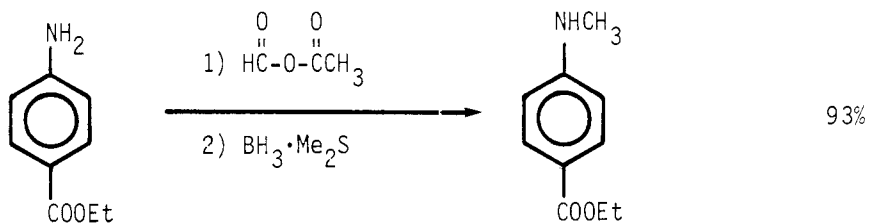
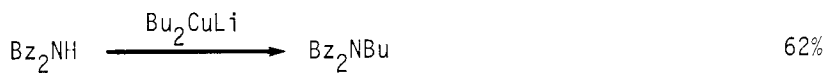
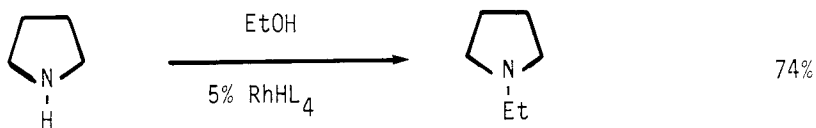
Synthesis, 996 (1981)

Tetr Lett, 21, 4061 (1980)

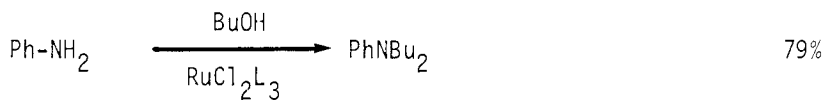
Related methods: Protection of Amines (Section 105A)

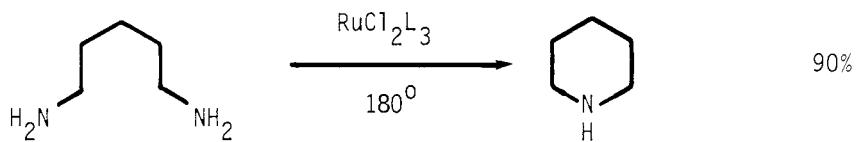
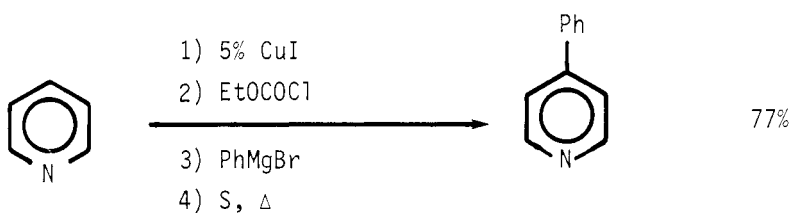
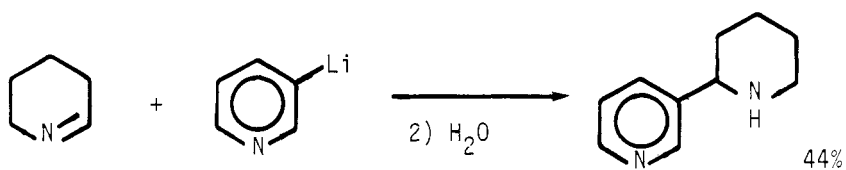
Section 97 Amines from Amines

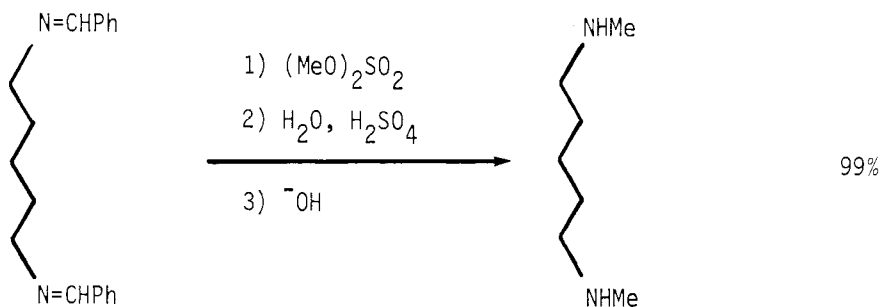
Synthesis, 743 (1980)

Tetr Lett, 23, 3315 (1982)JOC, 45, 2739 (1980)

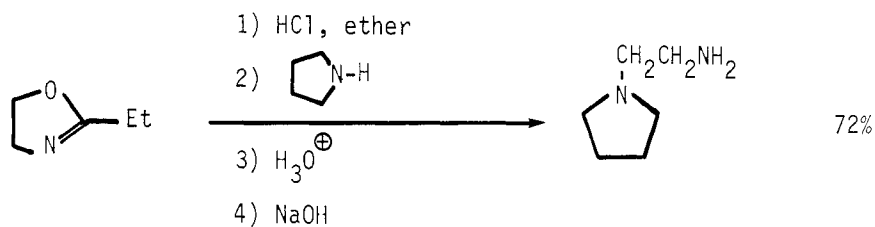
JCS Chem Comm, 611 (1981)

Tetr Lett, 22, 2667 (1981)

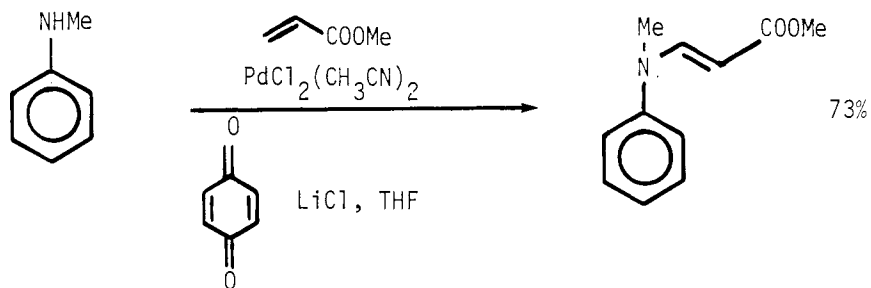
JOC, 46, 1759 (1981)JOC, 47, 4315 (1982)JOC, 45, 1515 (1980)

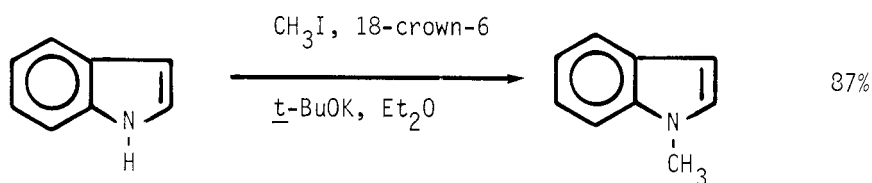


Synthesis, 303 (1980)



Synthesis, 541 (1981)

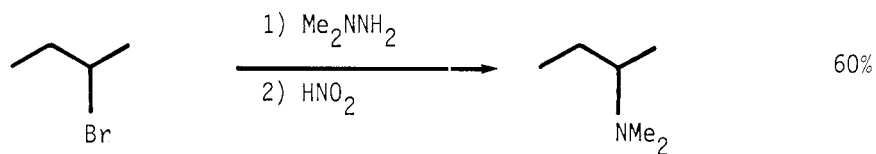
JOC, 46, 2561 (1981)

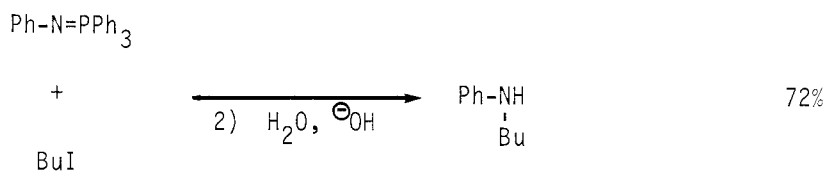
JOC, 45, 3172 (1980)Section 98 Amines from Esters

No additional examples.

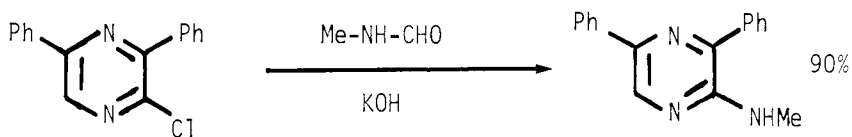
Section 99 Amines from Ethers

No additional examples.

Section 100 Amines from HalidesSynth Comm, 12, 801 (1982)

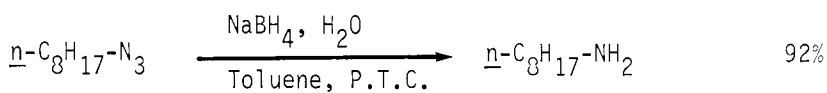


Synthesis, 295 (1980)

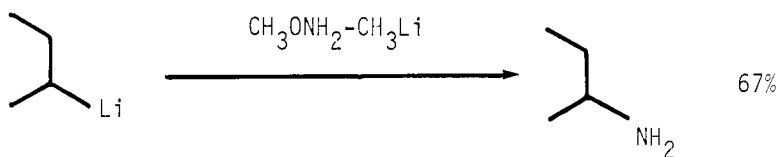


90%

Synthesis, 39 (1980)

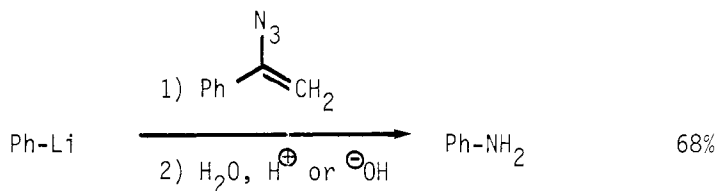


(from the halide)

JOC, 47, 4327 (1982)

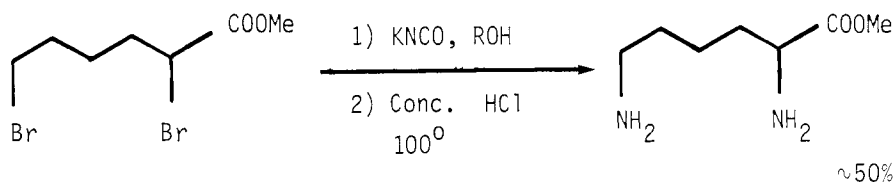
(isolated as the benzamide)

JOC, 47, 2822 (1982)

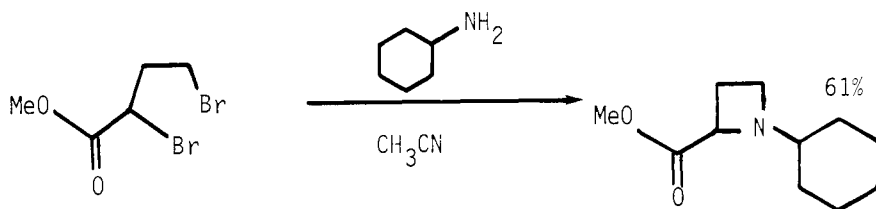


Many aromatic and heterocyclic examples.

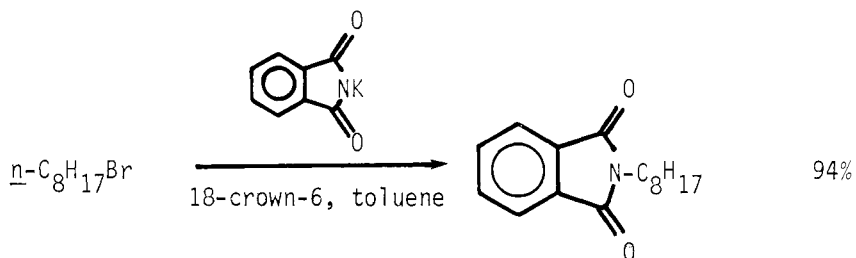
Tetr Lett, 23, 699 (1982)



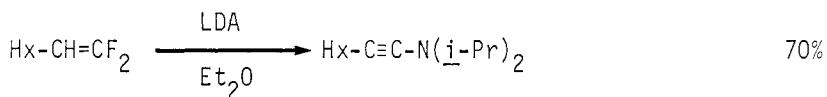
Chem Ber, 114, 173 (1981)



JOC, 46, 2991 (1981)

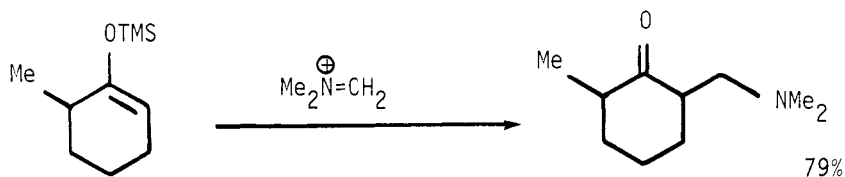


Bull Chem Soc Japan, 55, 1671 (1982)

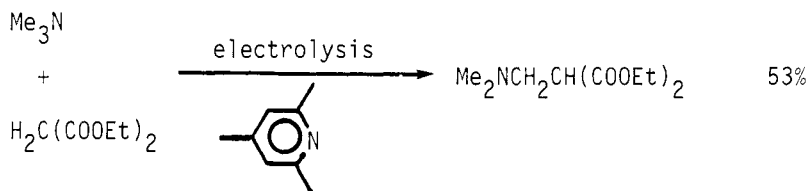


Chem Lett, 935 (1980)

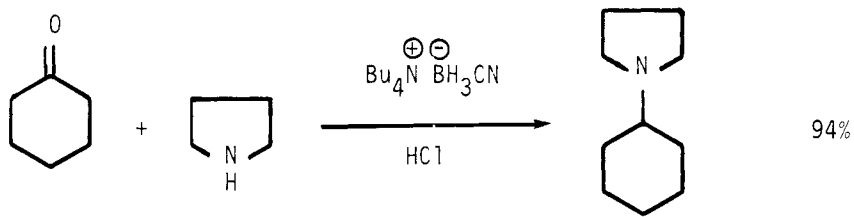
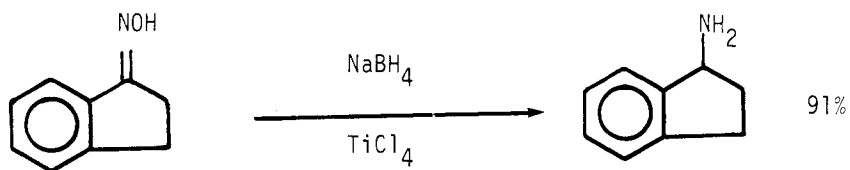
Section 101 Amines from Hydrides



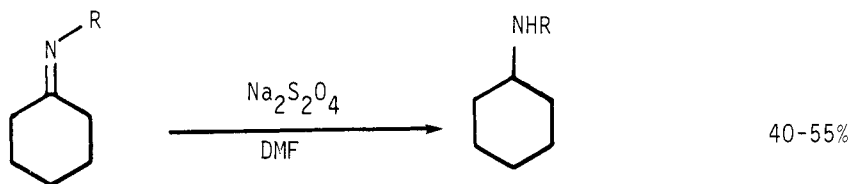
Tetr Lett, 21, 805 (1980)

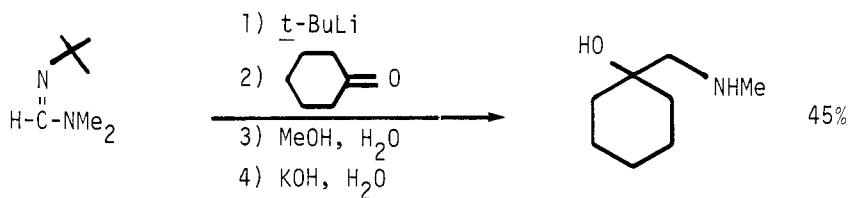
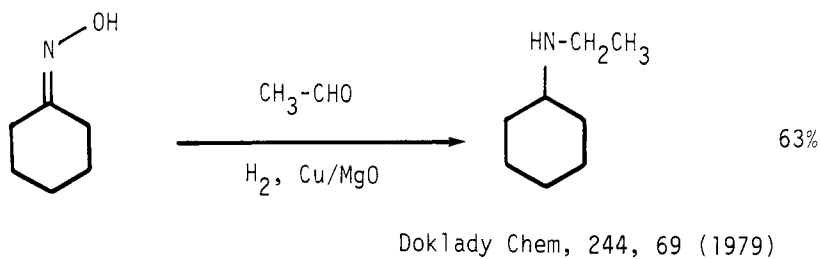
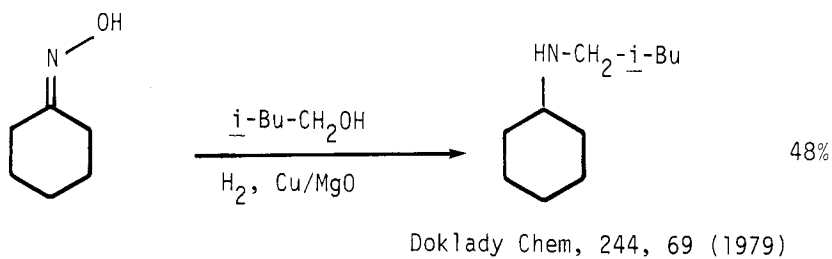
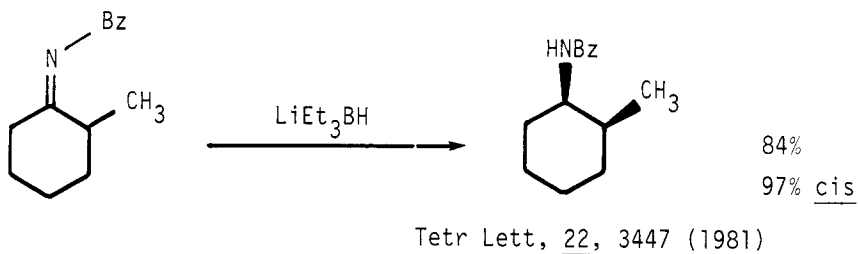


Tetrahedron, 37, 2297 (1981)

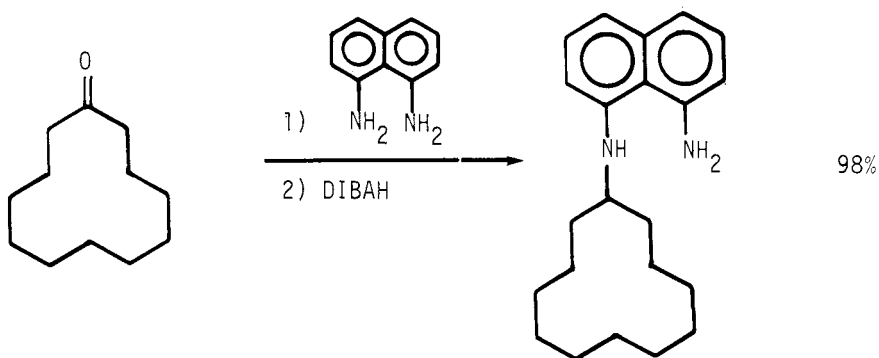
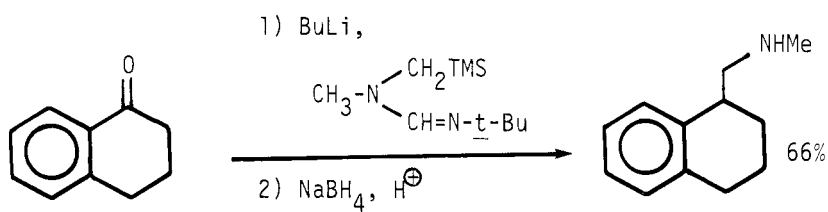
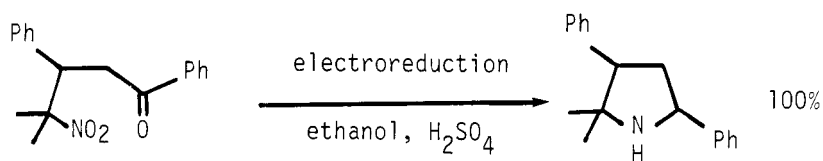
Section 102 Amines from KetonesJOC, 46, 3571 (1981)

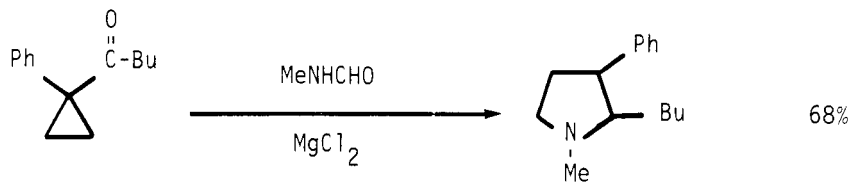
Synthesis, 695 (1980)

R = Bz, c-HxAust J Chem, 32, 201 (1979)

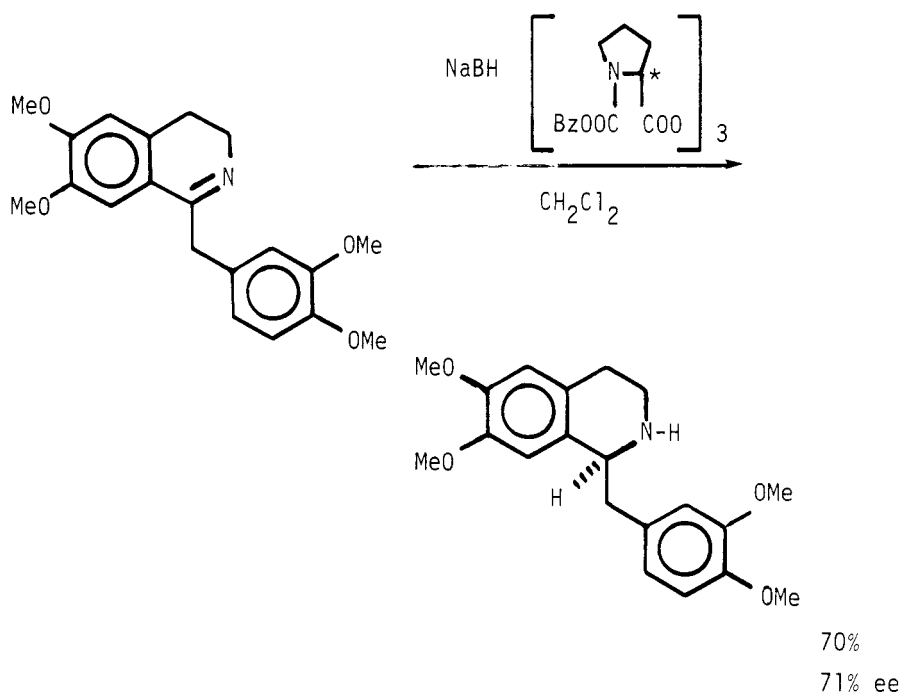


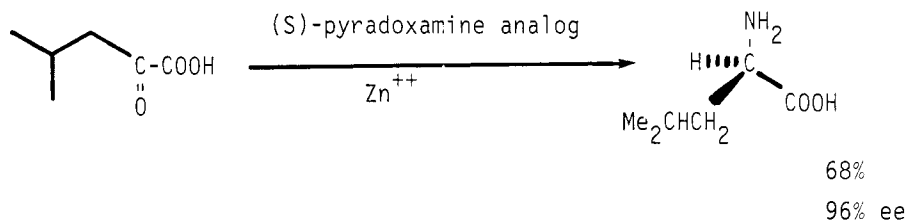
JACS, 102, 7125 (1980)

JACS, 103, 4186 (1981)JACS, 104, 877 (1982)Tetr Lett, 22, 3961 (1981)



JCS Perkin I, 700 (1981)

Tetr Lett, 22, 3869 (1981)



Chem Lett, 1765 and 1769 (1982)

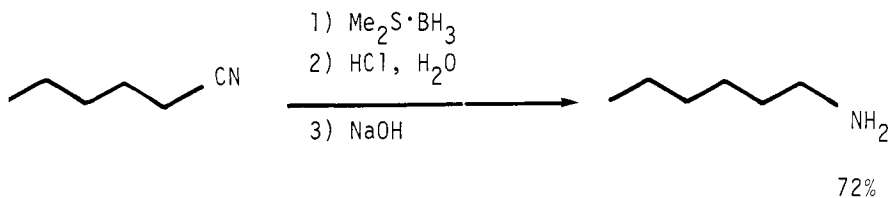
Review: "Catalytic Amination of Alcohols, Aldehydes, and Ketones"

Russ Chem Rev, 49, 14 (1980)

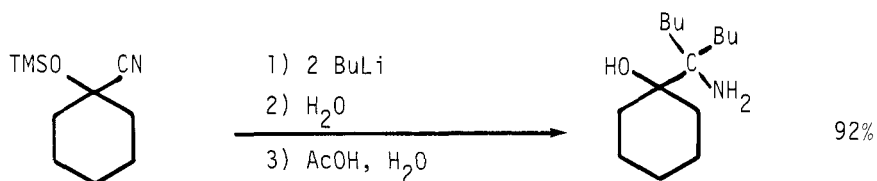
Review: "The Friedländer Synthesis of Quinolines"

Org React, 28, 37 (1982)

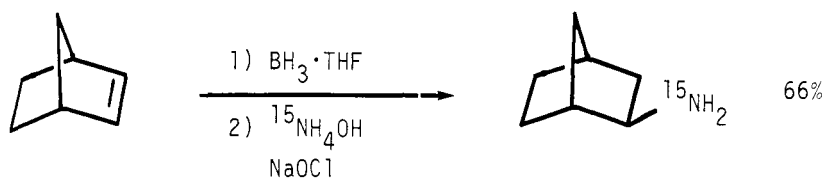
Related methods: Amines from Aldehydes (Section 94)

Section 103 Amines from Nitriles

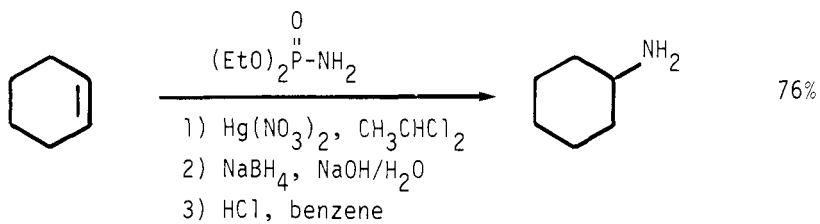
Synthesis, 605 (1981)



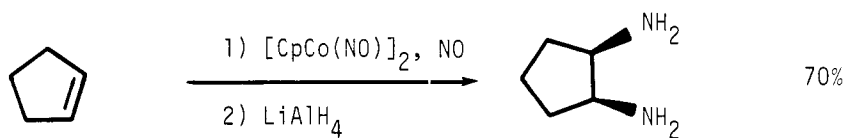
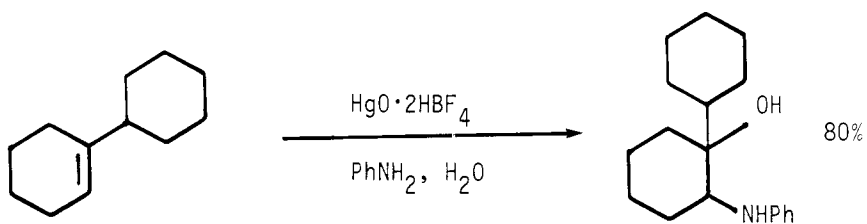
Synthesis, 270 (1981)

Section 104 Amines from Olefins

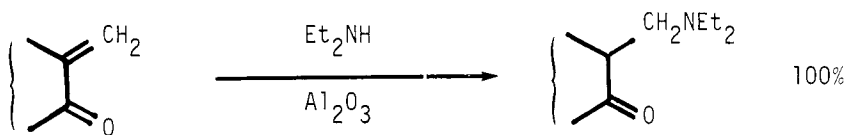
JCS Chem Comm, 62 (1982)

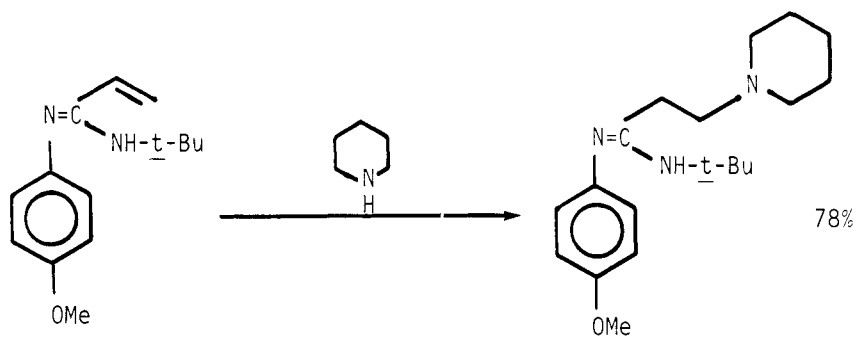
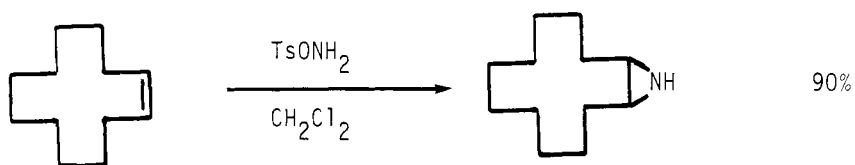
JOC, 46, 4296 (1981)

Synthesis, 918 (1982)

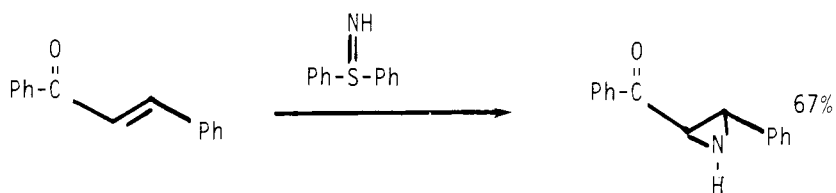
JACS, 102, 5676 (1980)

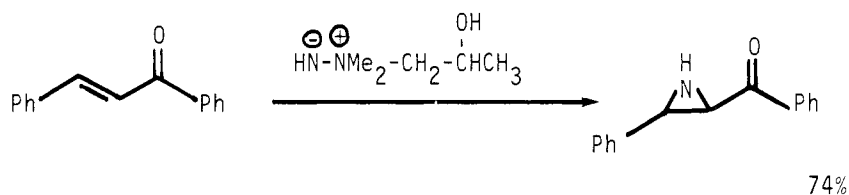
Synthesis, 376 (1981)

Tetr Lett, 21, 809 (1980)

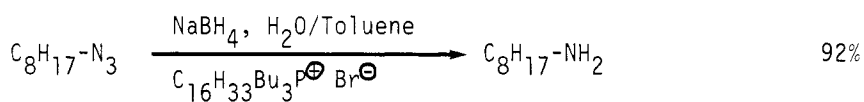
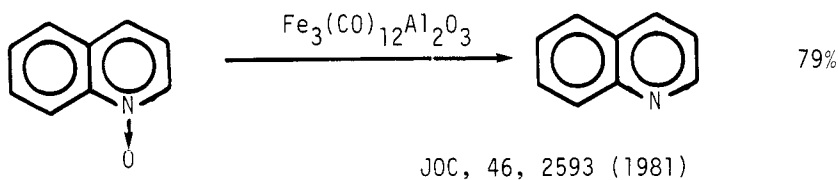
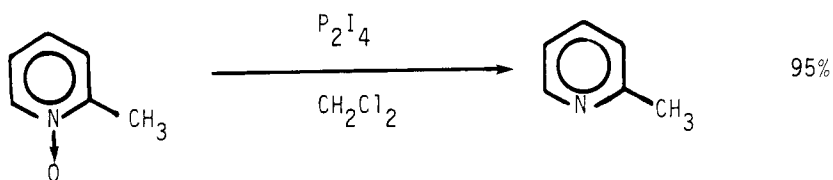
Tetrahedron, 37, 2895 (1981)

JCS Chem Comm, 560 (1980)

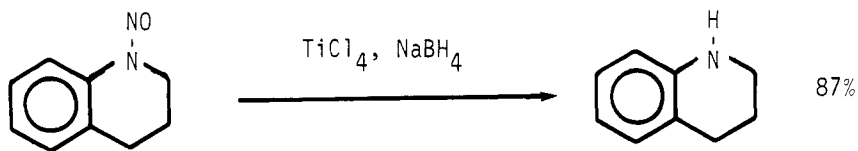
Tetrahedron, 36, 73 (1980)



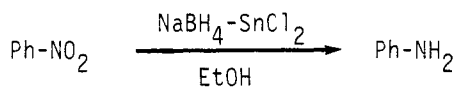
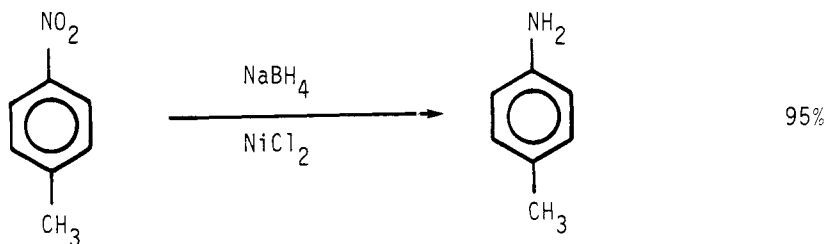
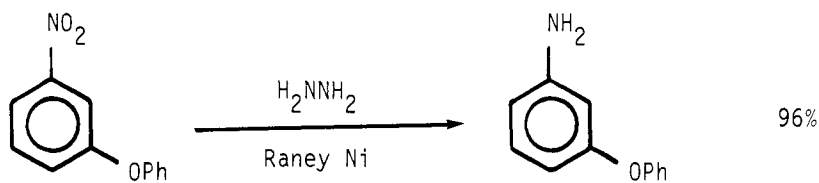
Synthesis, 650 (1980)

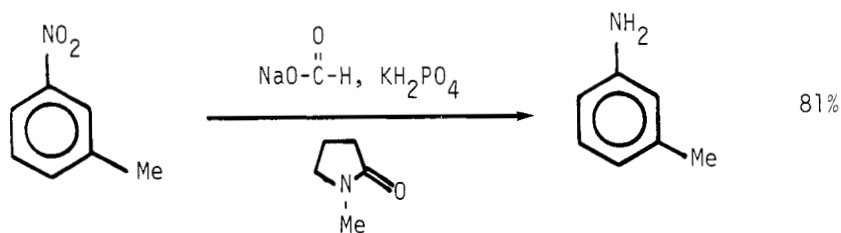
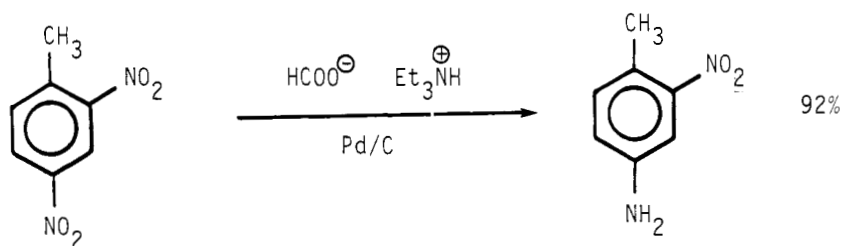
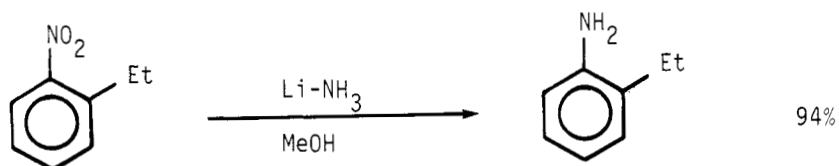
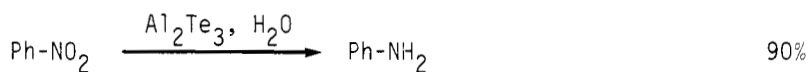
Section 105 Amines from Miscellaneous CompoundsJOC, 47, 4327 (1982)JOC, 46, 2593 (1981)

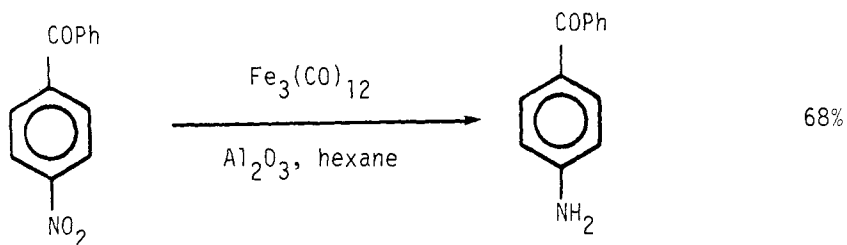
Chem Lett, 459 (1980)



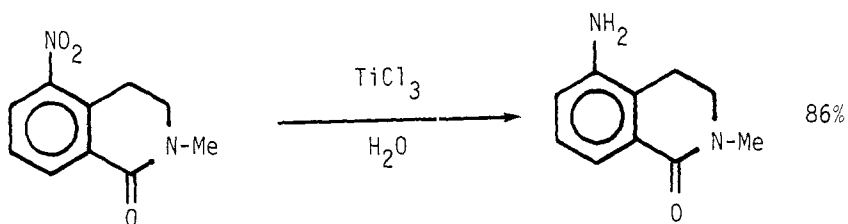
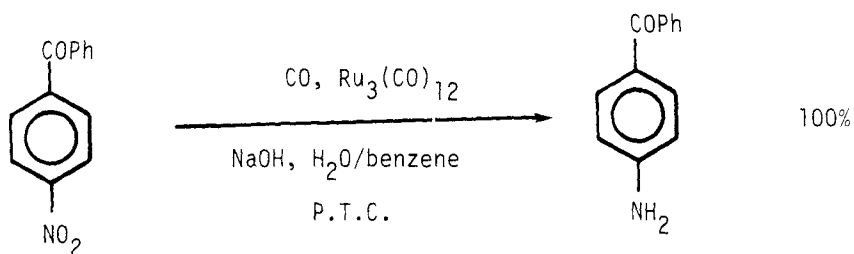
Synthesis, 741 (1980)

Chem Pharm Bull, 29, 1443 (1981)Chem Pharm Bull, 29, 1159 (1981)Tetr Lett, 23, 147 (1982)

Synth Comm, 11, 925 (1981)JOC, 45, 4992 (1980)Synth Comm, 12, 293 (1982)Angew Chem Int Ed, 19, 1008 and 1010 (1980)



JCS Chem Comm, 821 (1980)

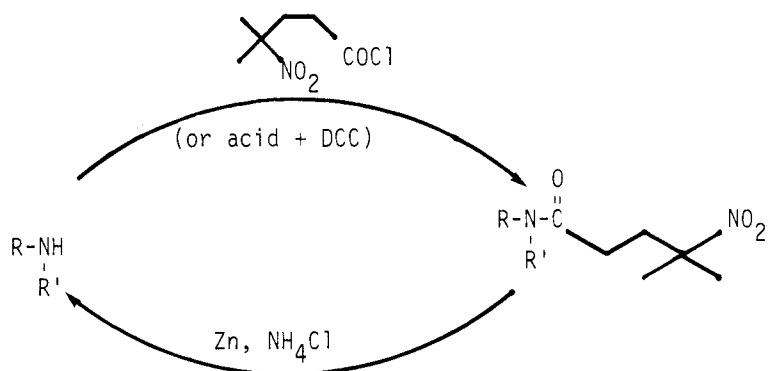
Chem Pharm Bull, 28, 2515 (1980)Tetr Lett, 21, 2603 (1980)

Review: "Dihydropyridine Equivalents as Intermediates for the
Synthesis of Alkaloids"

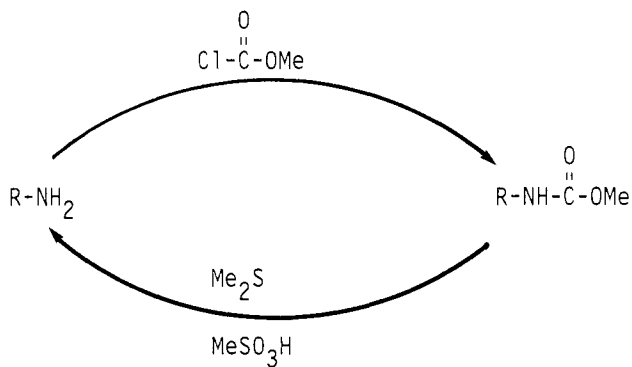
Bull Soc Chim Belges, 91, 985 (1982)

Section 105A Protection of Amines

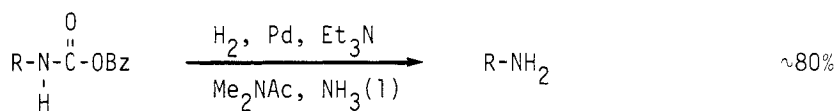
Related methods: Amides from Amines (Section 82); Amines from Amides (Section 96)



Synth Comm, 10, 469 (1980)

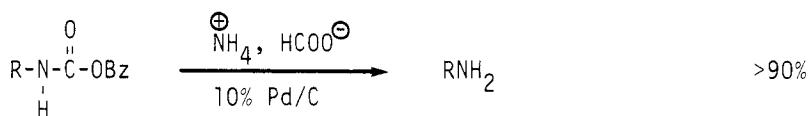


Chem Lett, 705 (1980)

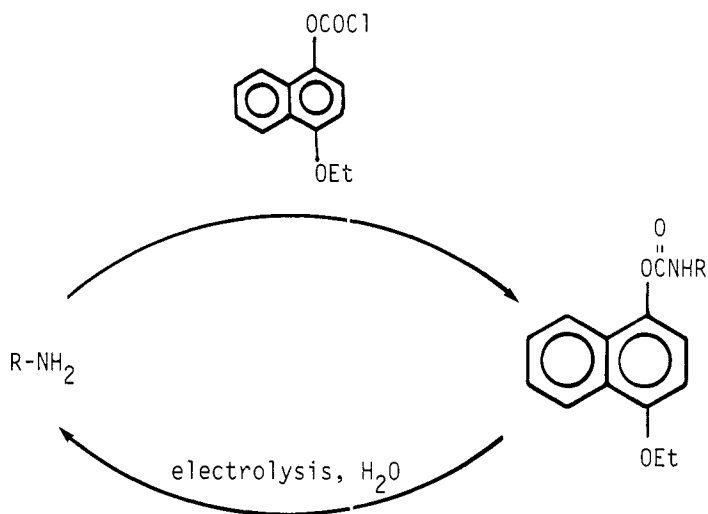


R may contain a wide variety of other functional and protecting groups.

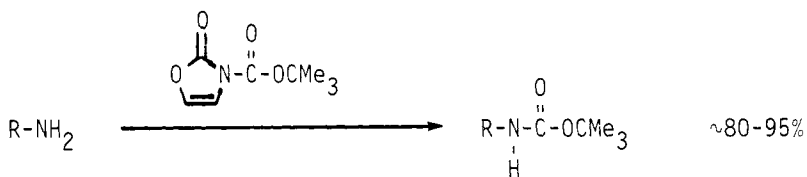
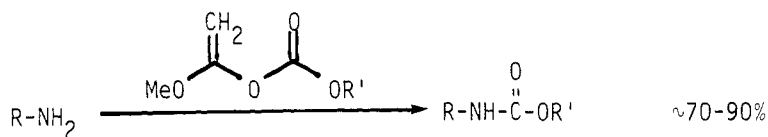
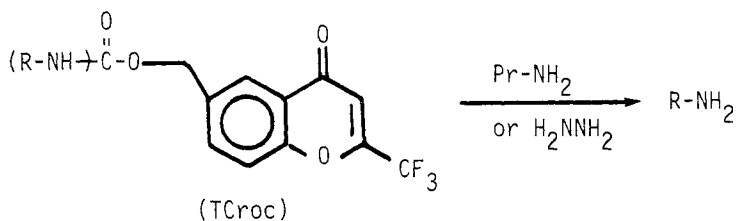
Org Syn, 59, 159 (1980)



Synthesis, 929 (1980)

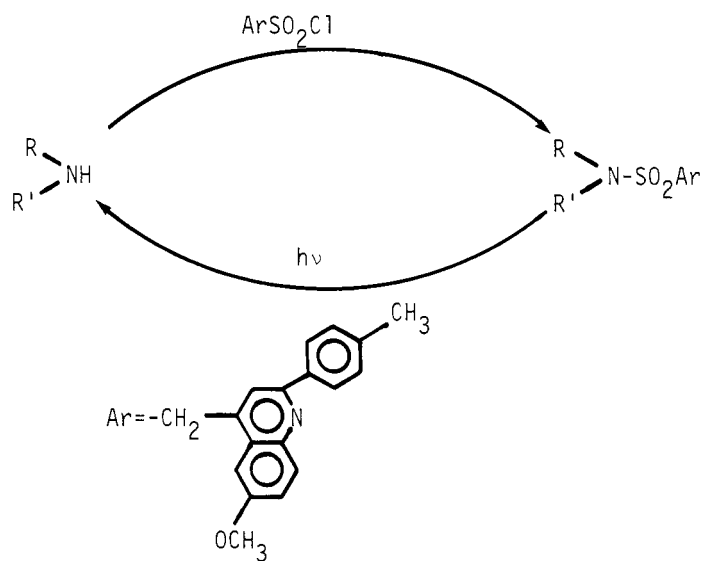
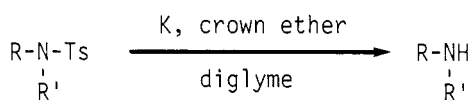
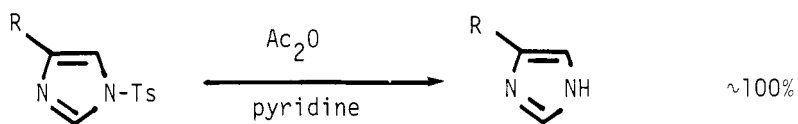


Tetr Lett, 22, 3719 (1981)

Tetr Lett, 21, 3065 (1980) $R' = \text{t-Bu, Bz, } -CH_2CH_2TMS$ JOC, 47, 2697 (1982)

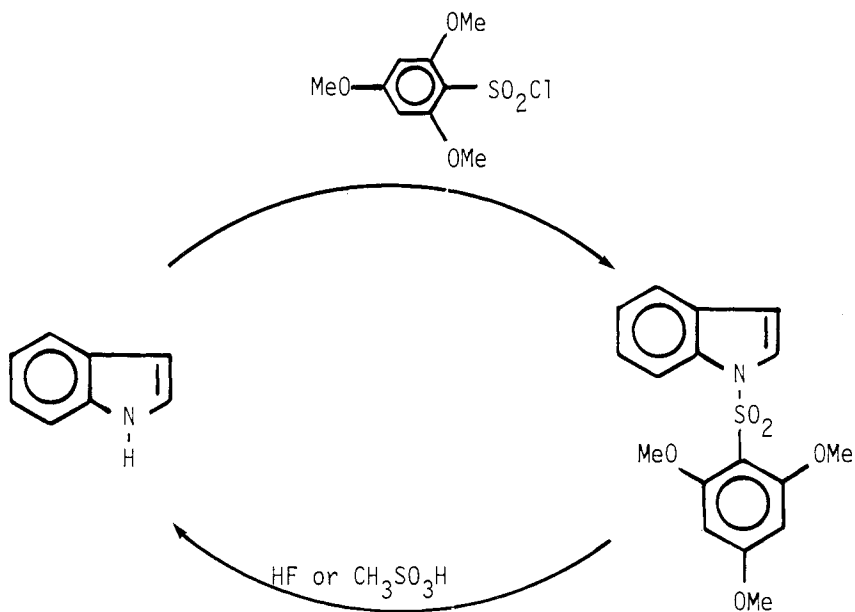
Used as an amine-protecting group in peptide synthesis.

JOC, 46, 4971 (1981)

Tetr Lett, 23, 3843 (1982)Chem Pharm Bull, 30, 3178 (1982)JOC, 45, 547 (1980)

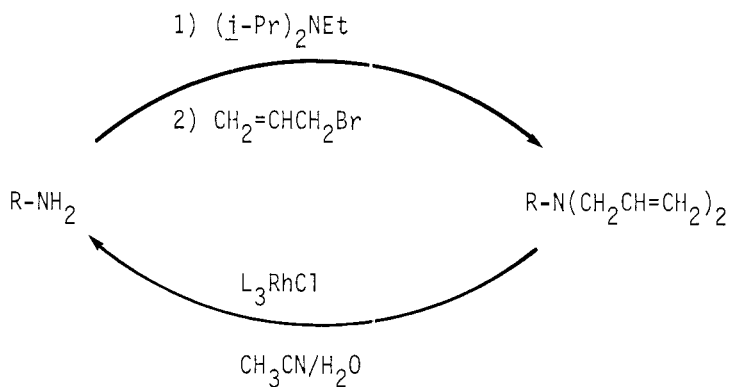
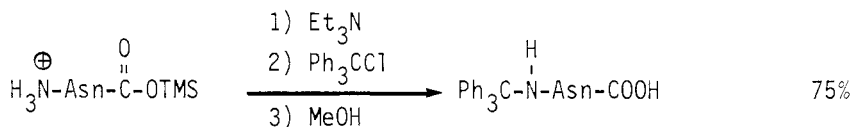
Use of various multisubstituted benzenesulfonyl protecting groups for the guanidino function of arginine. Removed by TFA-thioanisole.

Chem Pharm Bull, 29, 2825 (1981)

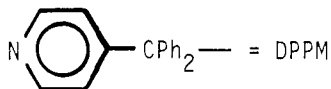


Used for tryptophan in peptide synthesis.

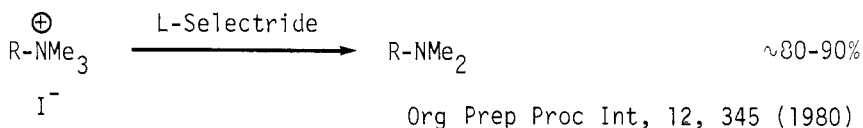
Chem Pharm Bull, 30, 2825 (1982)

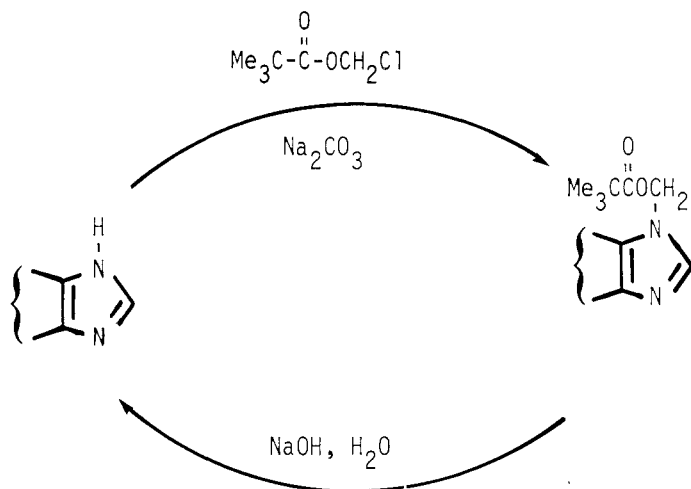
Tetr Lett, 22, 1483 (1981)JOC, 47, 1324 (1982)

The DPPM group is used to protect histidine in peptide synthesis. It is stable to acid, but cleaved by Zn/HOAc or electrolytic reduction.

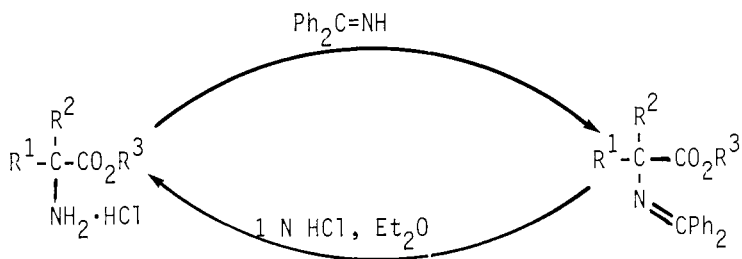


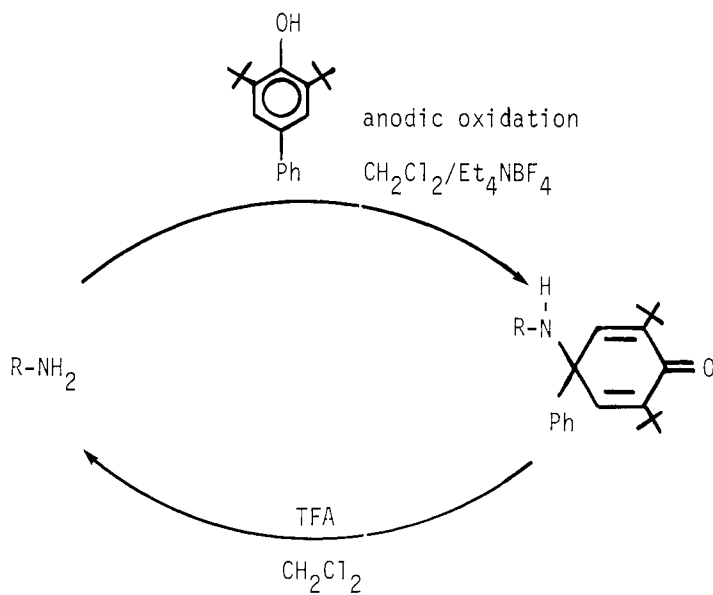
JCS Perkin I, 522 (1981)



JOC, 45, 1711 (1980)

Use of the ϵ -phenylacetyl protecting group for lysine in peptide synthesis. Deprotected by a penicillin aminohydrolase enzyme.

Coll Czech Chem Comm, 46, 1983 (1981)JOC, 47, 2663 (1982)



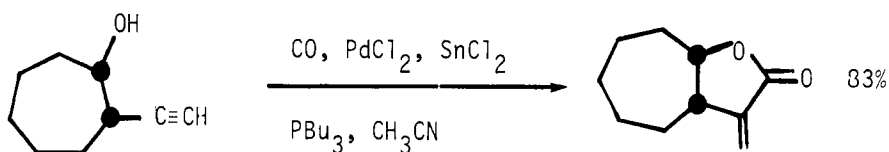
Used for amino acid esters.

Angew Chem Int Ed, 19, 712 (1980)

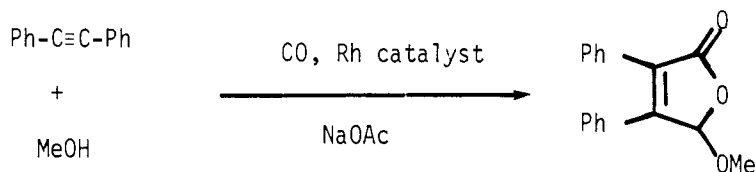
CHAPTER 8

PREPARATION OF ESTERS

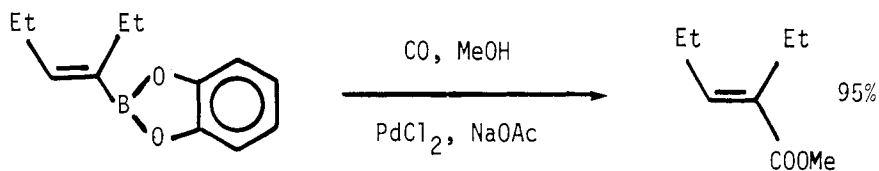
Section 106 Esters from Acetylenes



JACS, 103, 7520 (1981)



Chem Lett, 993 (1981)

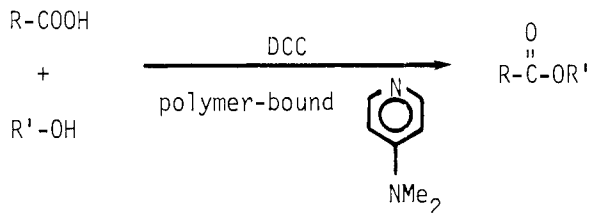


Chem Lett, 879 (1981)

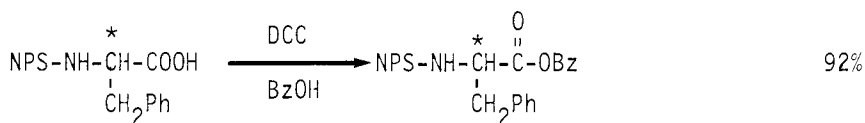
Section 107 Esters from Carboxylic Acids, Acid Halides, and
Anhydrides

The following types of reactions are found in this section:

1. Esters from the reaction of alcohols with carboxylic acids, acid halides, and anhydrides.
2. Lactones from hydroxy acids.
3. Esters from carboxylic acids and halides, sulfoxides, and miscellaneous compounds.

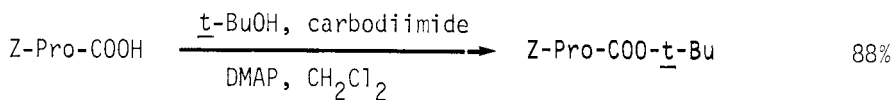


Bull Chem Soc Japan, 54, 631 (1981)

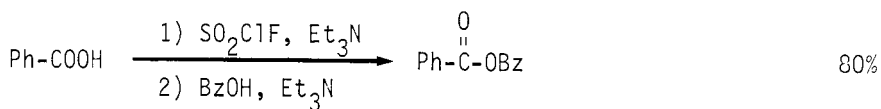


No racemization.

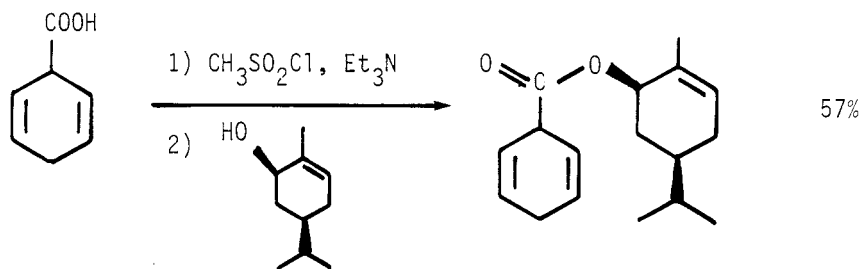
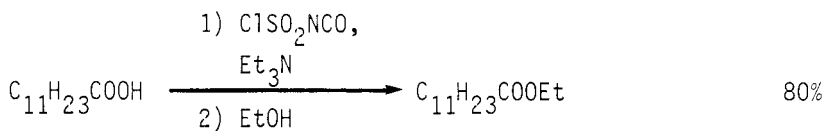
JCS Chem Comm, 1132 (1982)



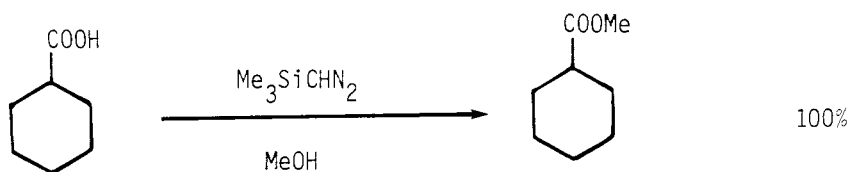
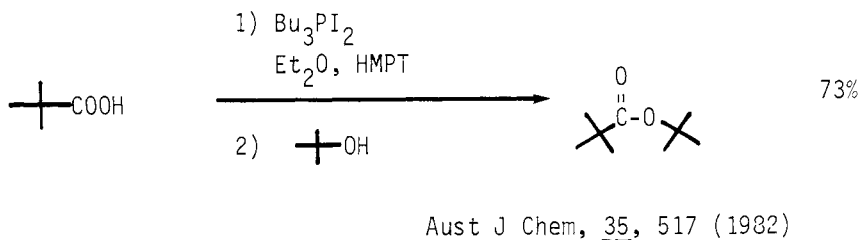
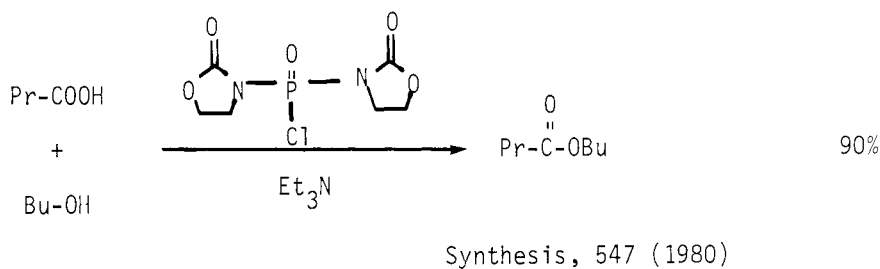
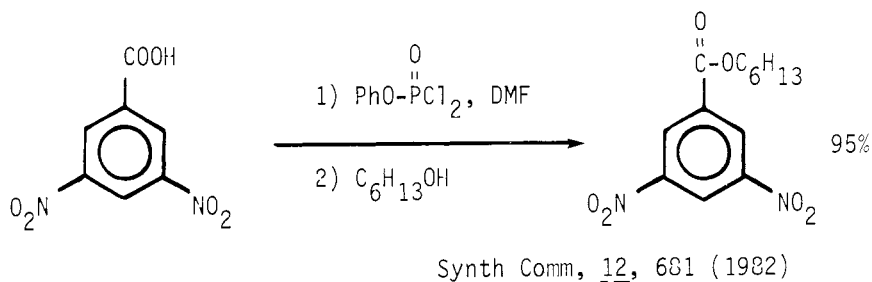
No racemization.

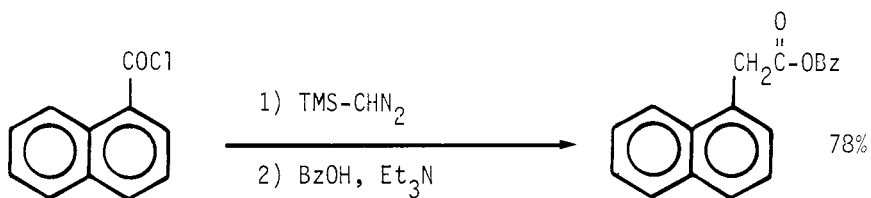
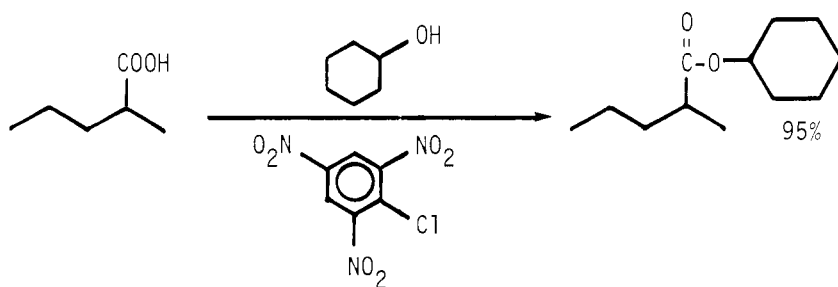
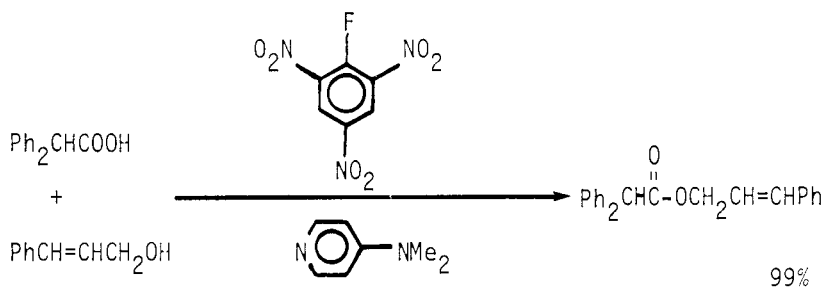
JOC, 47, 1962 (1982)

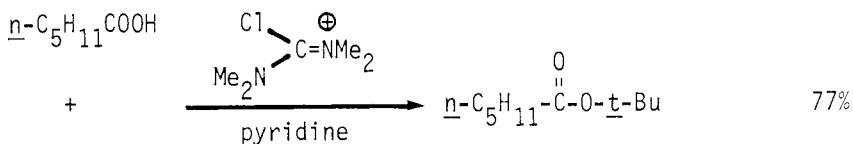
Synthesis, 790 (1981)

Synth Comm, 12, 727 (1982)

Synthesis, 506 (1982)

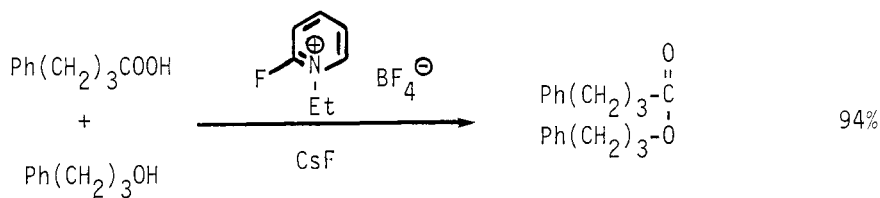


Chem Pharm Bull, 29, 3249 (1981)Tetr Lett, 21, 4461 (1980)Bull Chem Soc Japan, 54, 1470 (1981)Synth Comm, 11, 121 (1981)

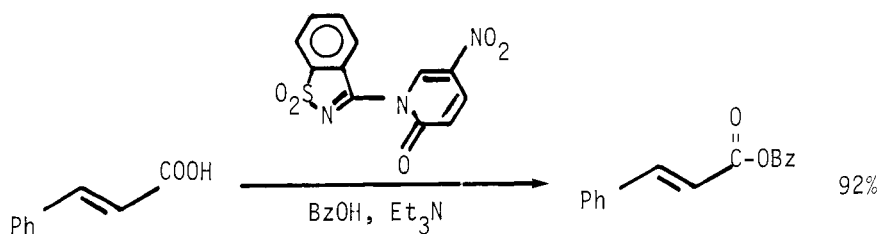


t-BuOH

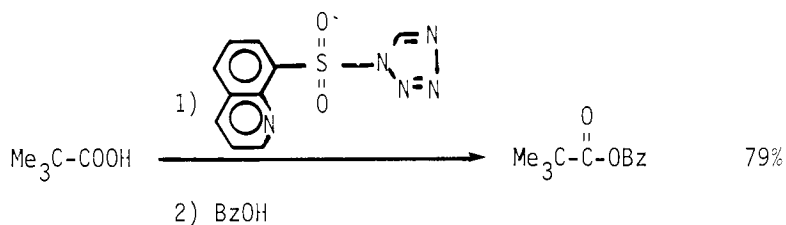
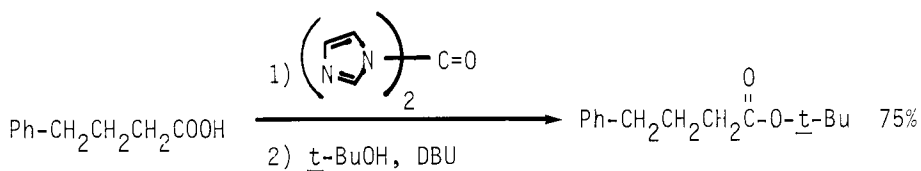
Chem Lett, 1891 (1982)



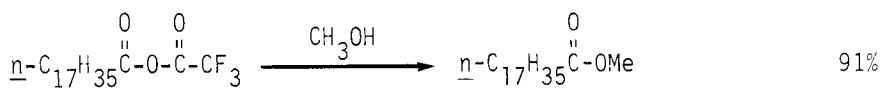
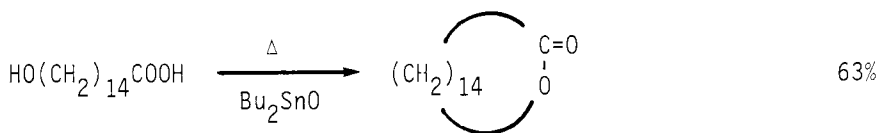
Chem Lett, 391 (1980)

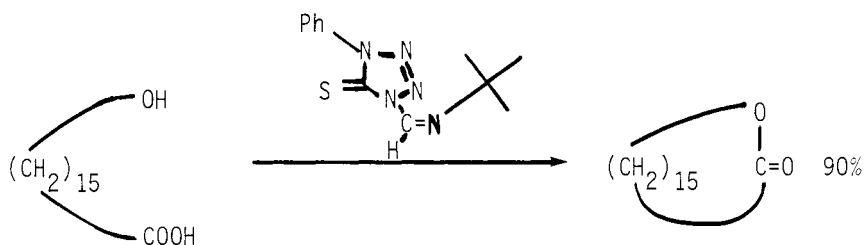


Chem Lett, 1161 (1980)

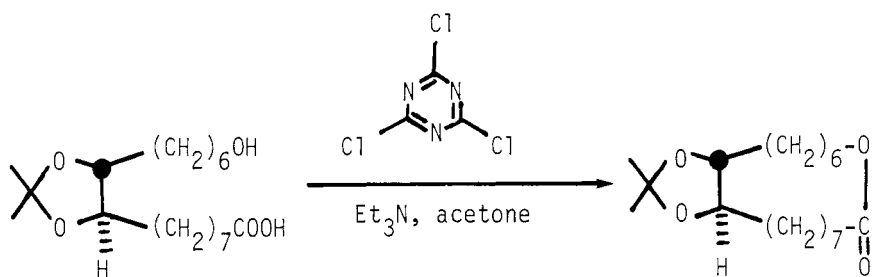
Chem Pharm Bull, 30, 2633 (1982)

Synthesis, 833 (1982)

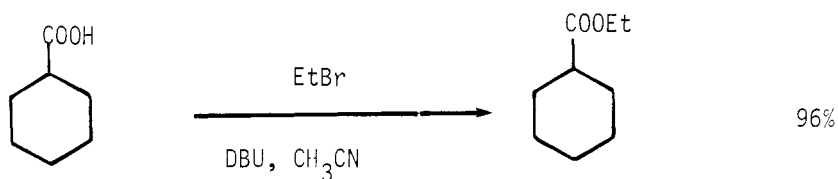
Can J Chem, 59, 2617 (1981)JACS, 102, 7578 (1980)



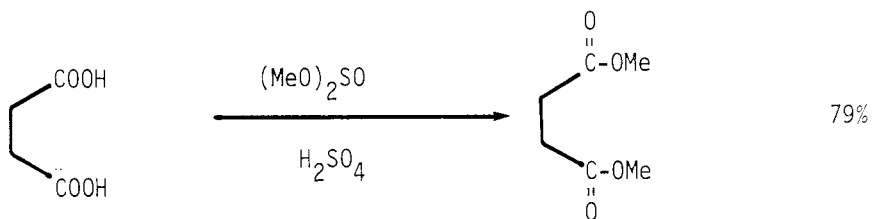
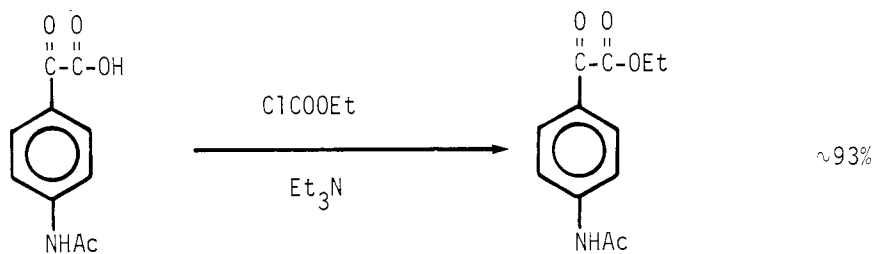
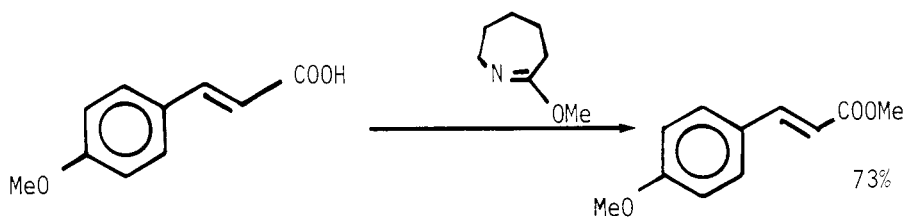
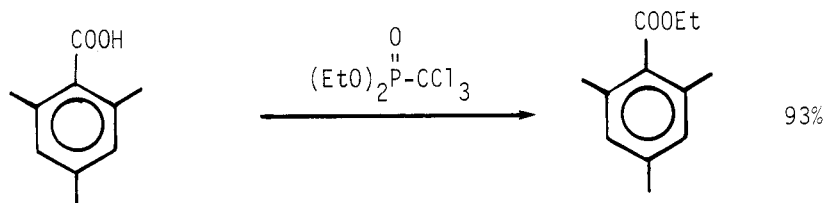
Angew Chem Int Ed, 20, 771 (1981)



Tetr Lett, 21, 1893 (1980) 86%



Org Prep Proc Int, 12, 225 (1980)

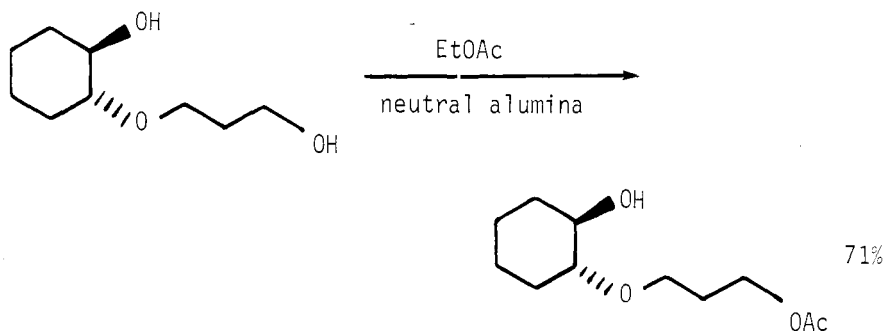
Indian J Chem, 21B, 259 (1982)Tetr. Lett, 21, 4997 (1980)Synth Comm, 12, 453 (1982)Tetrahedron, 38, 1457 (1982)

Review: "Recent Developments in Methods for the Esterification and Protection of the Carboxyl Group"

Tetrahedron, 36, 2409 (1980)

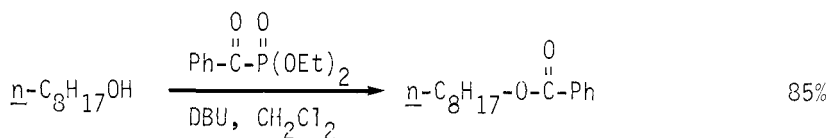
Further examples of the reaction $\text{RCOOH} + \text{ROH} \rightarrow \text{RCOOR}$ are included in Section 108 (Esters from Alcohols and Phenols) and Section 10A (Protection of Carboxylic Acids).

Section 108 Esters from Alcohols and Phenols

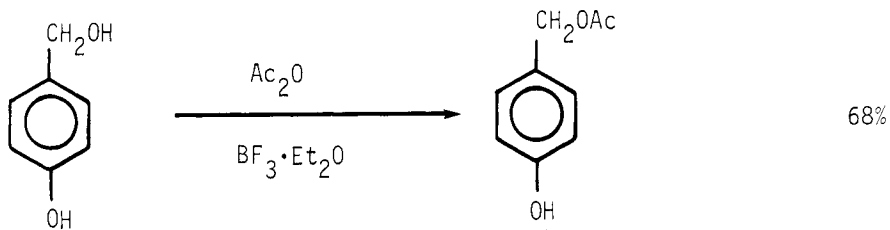
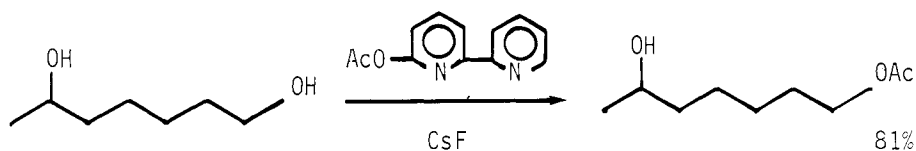


Synthesis, 789 (1981)

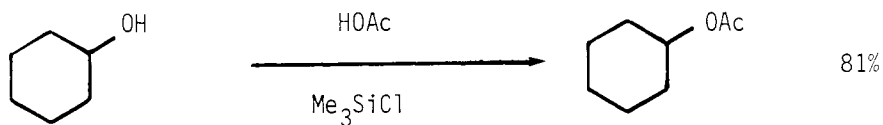
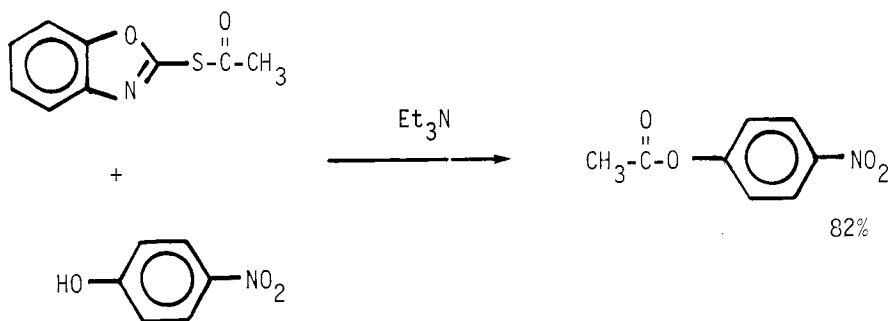
Tetr Lett, 22, 5003 and 5007 (1981)



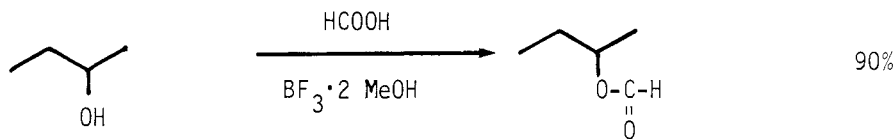
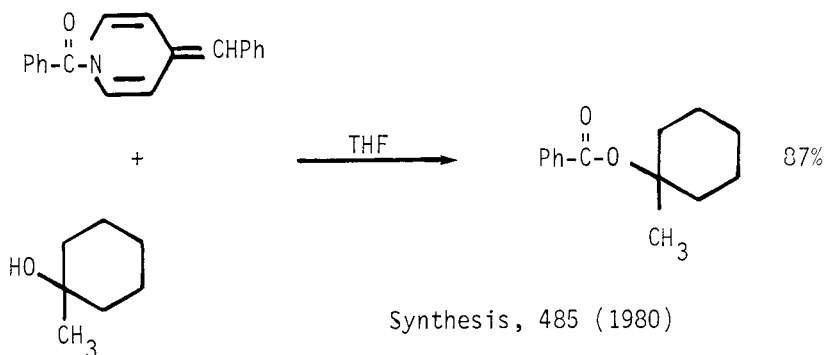
Tetr Lett, 22, 3617 (1981)

Chem Pharm Bull, 29, 3202 (1981)

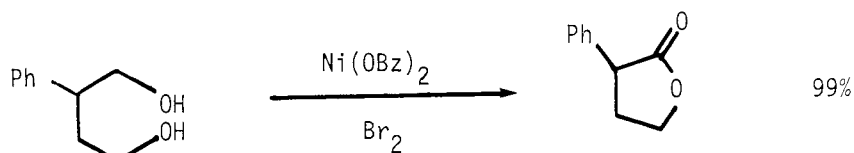
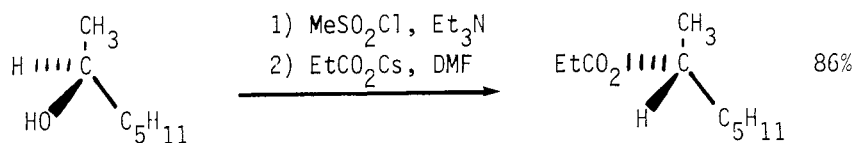
Chem Lett, 563 (1981)

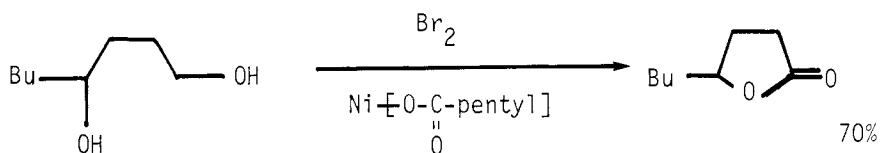
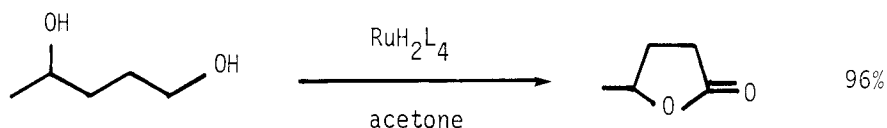
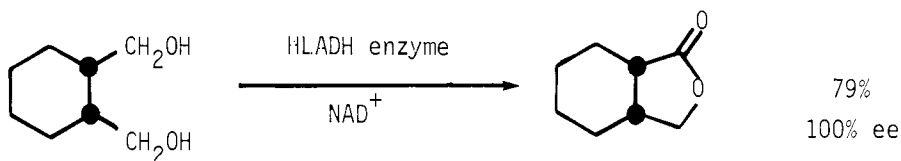
Bull Chem Soc Japan, 54, 1267 (1981)

Synthesis, 991 (1981)

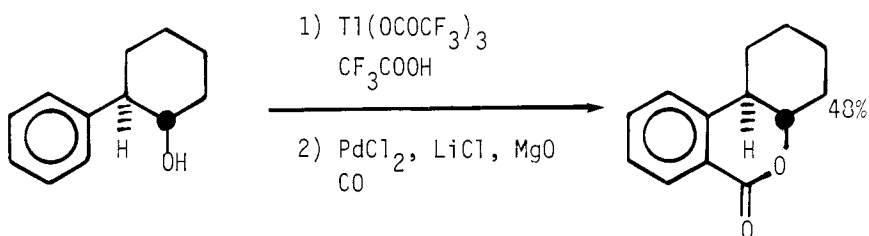
Org Prep Proc Int, 14, 177 (1982)

Synthesis, 485 (1980)

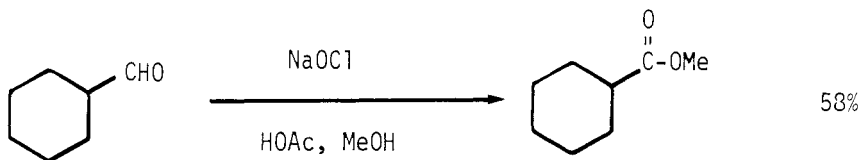
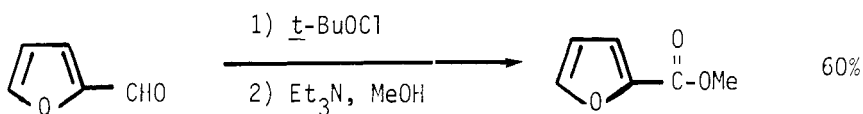
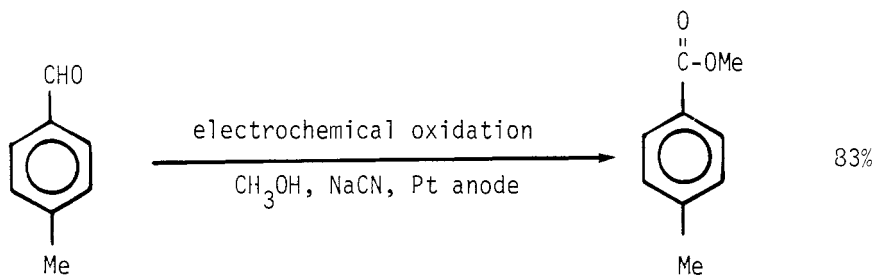
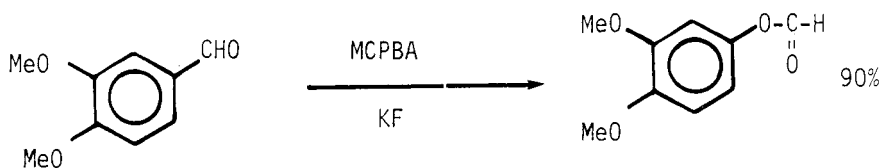
Synth Comm, 10, 881 (1980)JOC, 46, 4321 (1981)

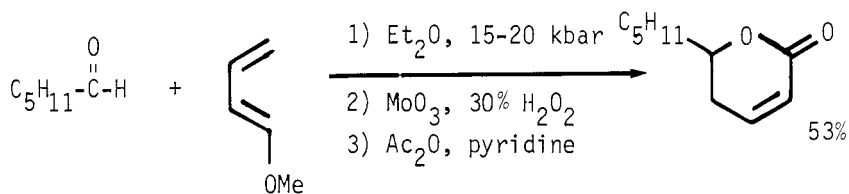
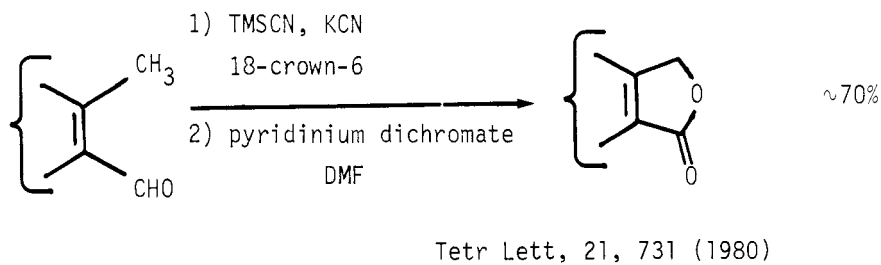
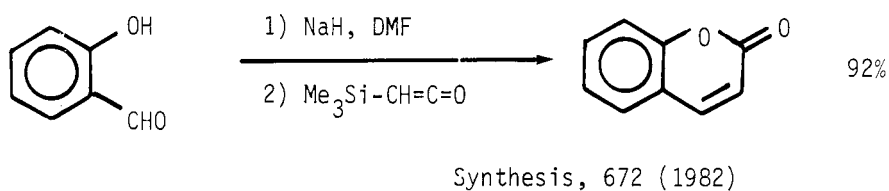
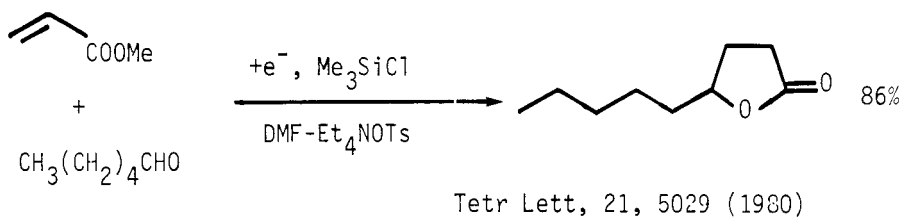
JOC, 46, 4806 (1981)Tetr Lett, 22, 5327 (1981)

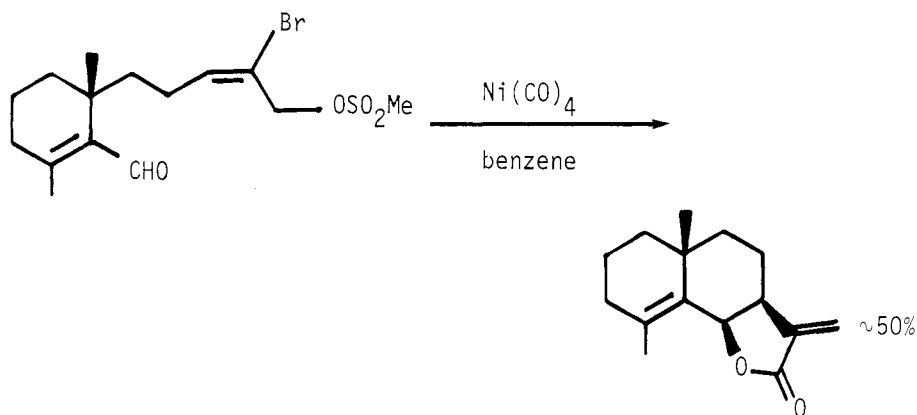
JCS Chem Comm, 515 (1980)

JACS, 104, 4659 (1982)JACS, 104, 1900 (1982)

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 AldehydesTetr Lett, 23, 4647 (1982)JOC, 47, 1360 (1982)Bull Chem Soc Japan, 55, 335 (1982)Tetr Lett, 22, 3895 (1981)





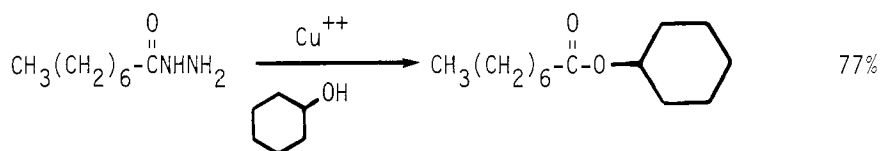
JACS, 103, 3945 (1981)

Related methods: Esters from Ketones (Section 117)

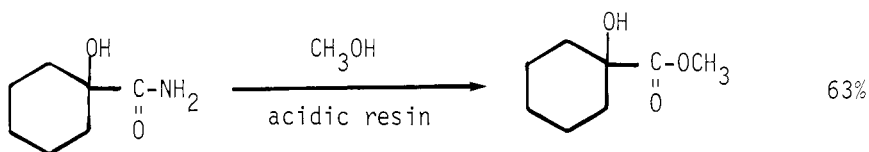
Section 110 Esters from Alkyls, Methylene and Aryls

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 Amides



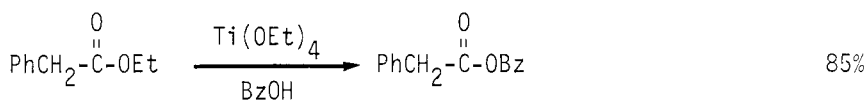
Tetrahedron, 36, 1311 (1980)

JOC, 46, 5351 (1981)Section 112 Esters from Amines

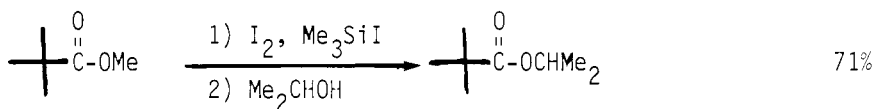
No additional examples.

Section 113 Esters from Esters

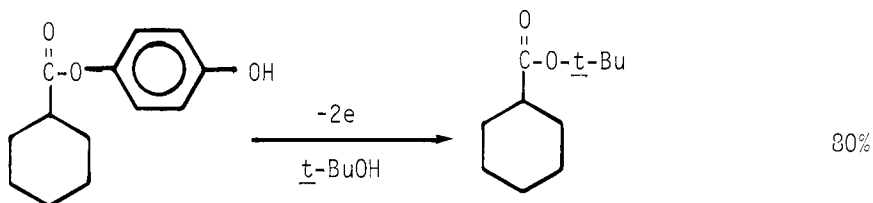
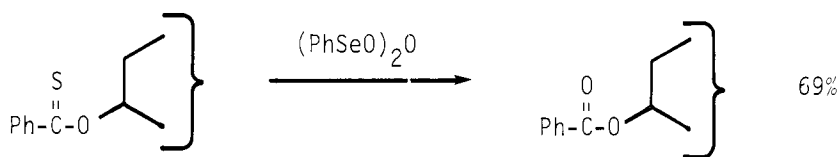
Conjugate reductions and conjugate alkylations of unsaturated esters are found in Section 74 (Alkyls from Olefins).



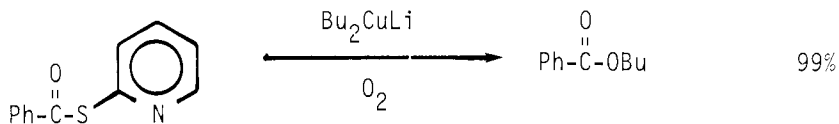
Synthesis, 138 (1982)



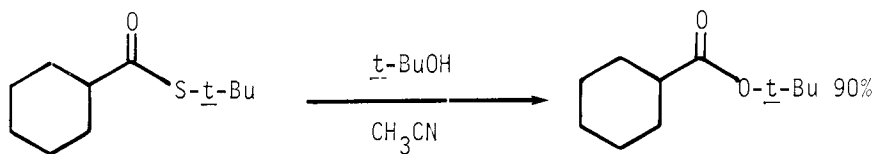
Synthesis, 142 (1981)

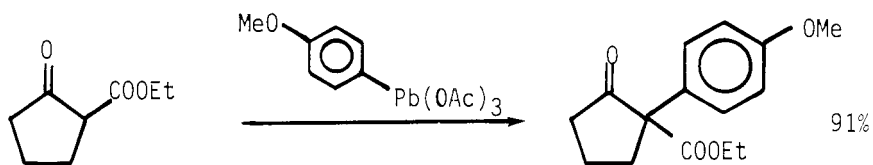
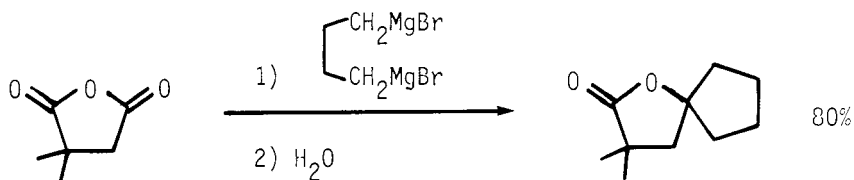
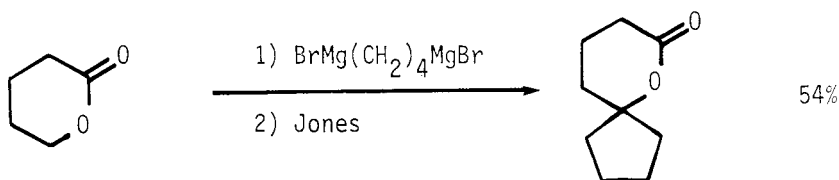
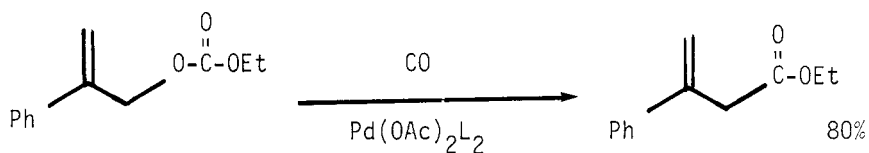
Tetr Lett, 22, 3715 (1981)

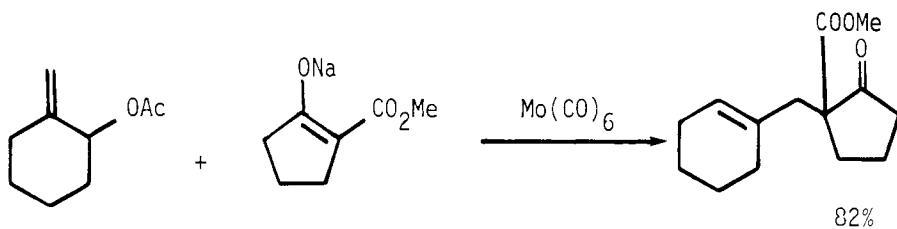
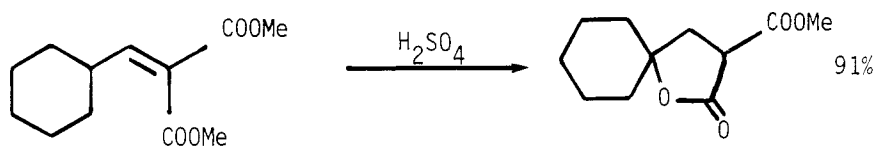
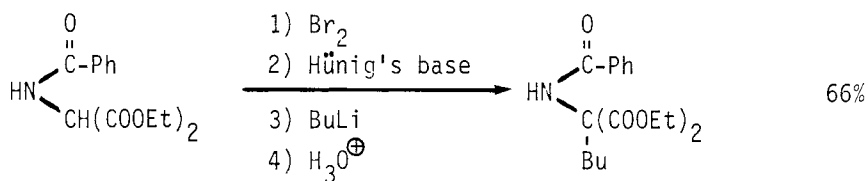
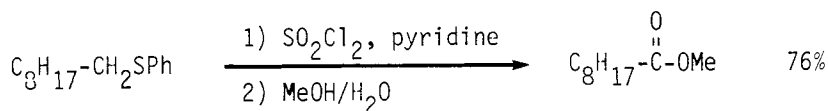
JCS Perkin I, 1650 (1980)



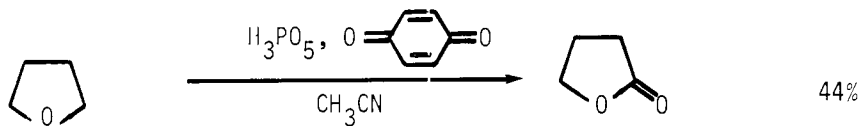
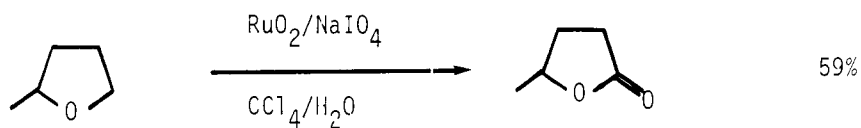
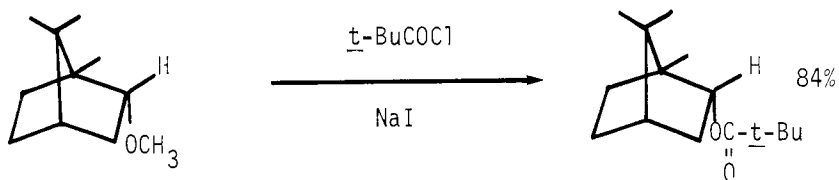
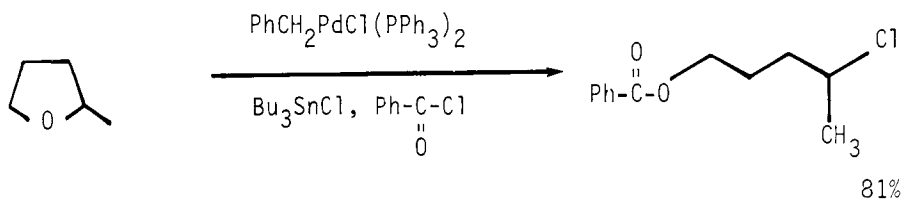
JCS Chem Comm, 1231 (1981)

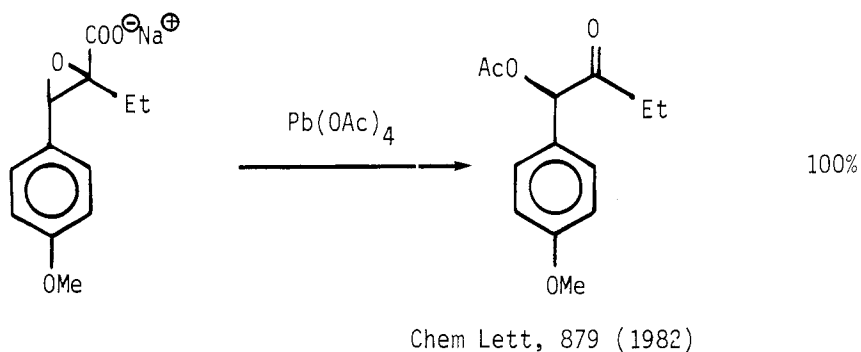
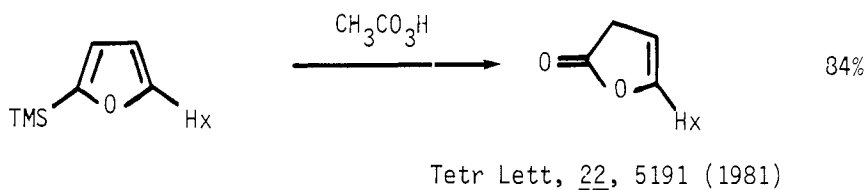
Org Syn, 61, 48 (1983)

Aust J Chem, 33, 113 (1980)Tetr Lett, 21, 4167 (1980)JOC, 45, 1828 (1980)Tetr Lett, 23, 5189 (1982)

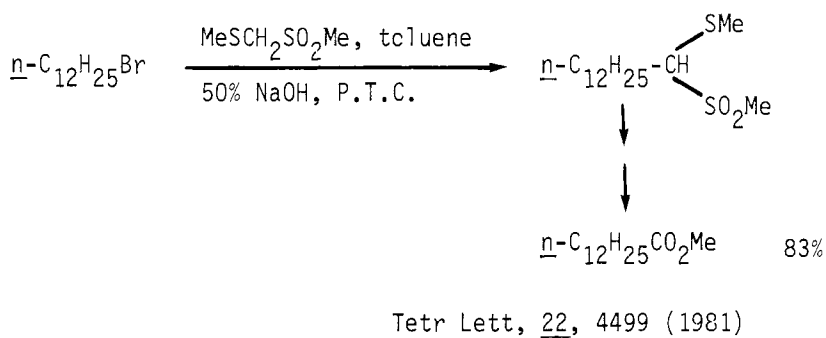
JACS, 104, 5543 (1982)Synth Comm, 11, 35 (1981)Angew Chem Int Ed, 21, 203 (1982)Section 114 Esters from Ethers and Epoxides

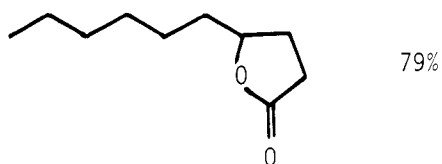
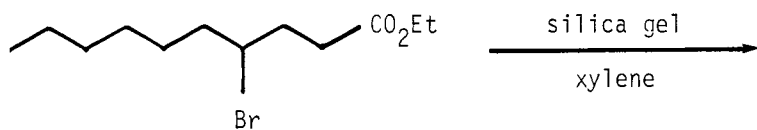
JCS Chem Comm, 857 (1982)

JOC, 45, 1320 (1980)Synth Comm, 10, 205 (1980)Tetr Lett, 23, 681 (1982)JOC, 47, 1215 (1982)



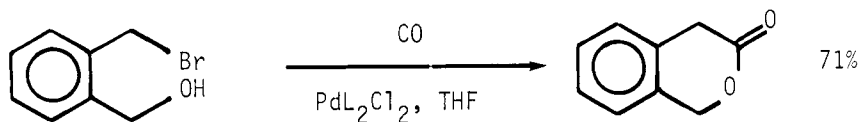
Section 115 Esters from Halides



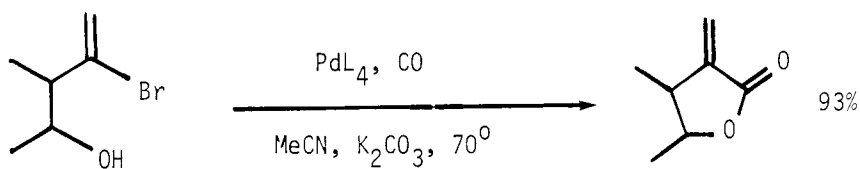


79%

Chem Lett, 1909 (1982)

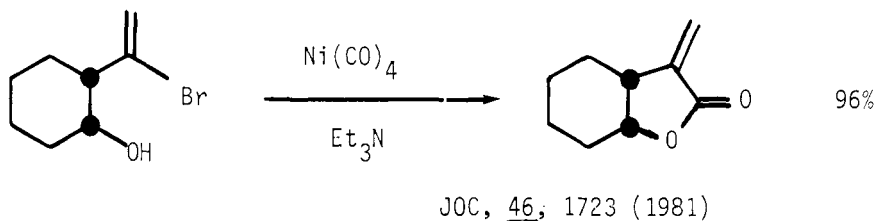


71%

JACS, 102, 4193 (1980)

93%

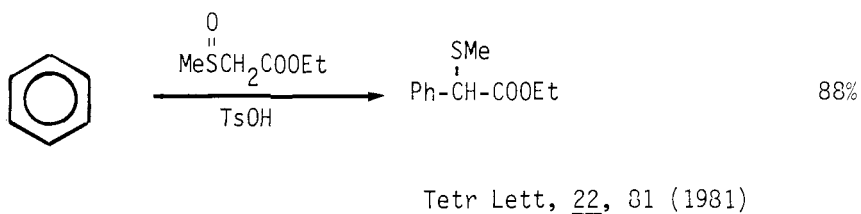
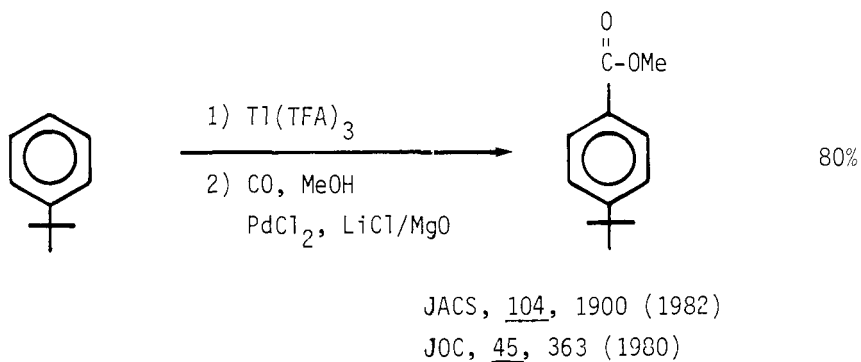
JOC, 47, 3630 (1982)

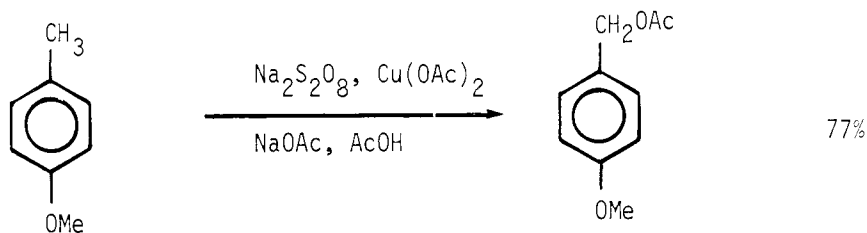


Related methods: Carboxylic Acids from Halides (Section 25)

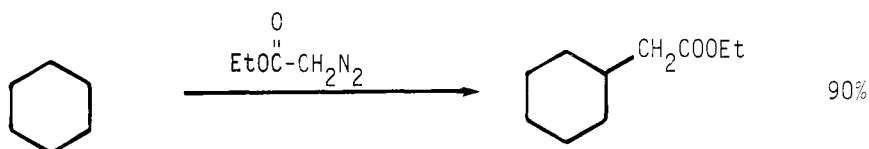
Section 116 Esters from Hydrides

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

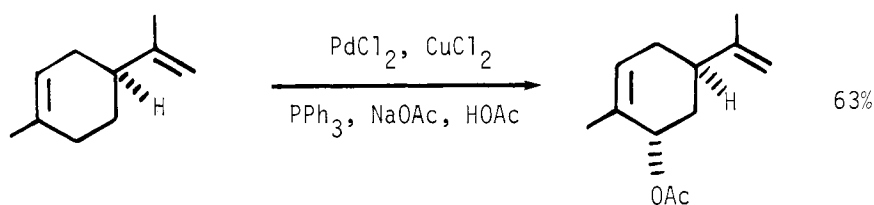
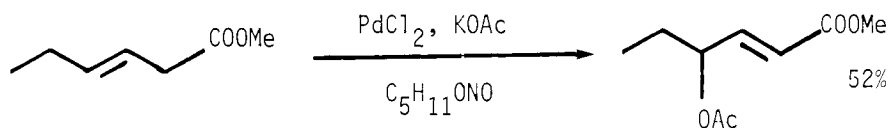


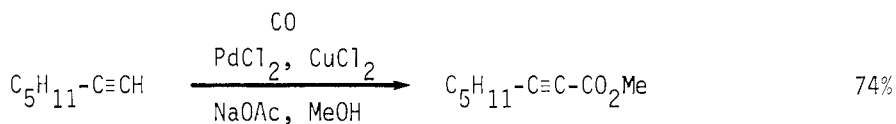
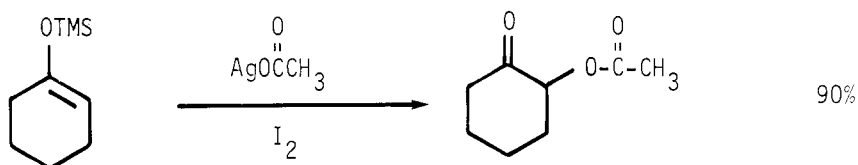
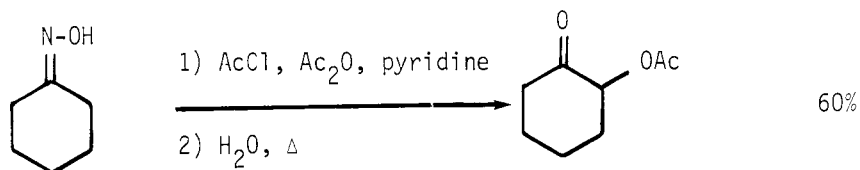


Synthesis, 477 (1980)

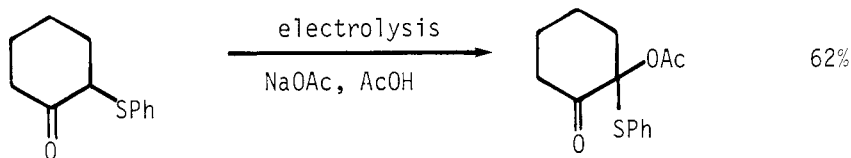


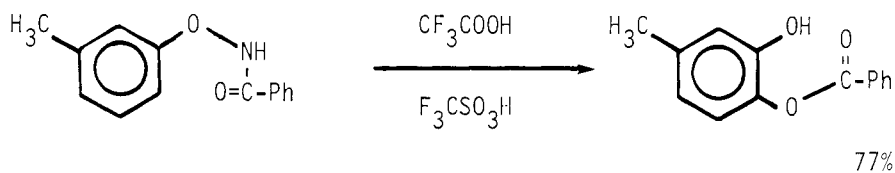
JCS Chem Comm, 688 (1981)

Angew Chem Int Ed, 21, 366 (1982)Tetr Lett, 22, 131 (1981)

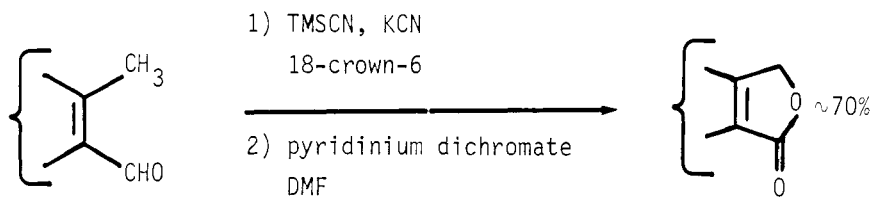
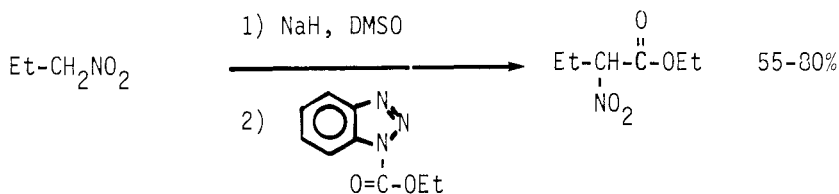
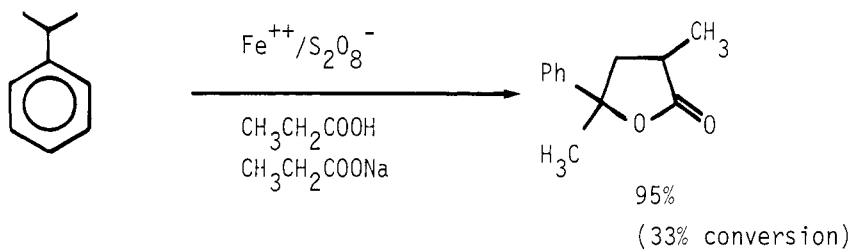
Tetr Lett, 21, 849 (1980)JOC, 46, 2717 (1981)

Synthesis, 223 (1981)

Tetr Lett, 21, 2557 (1980)

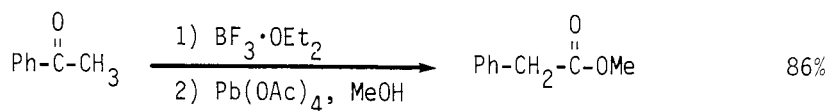


Synthesis, 461 (1980)

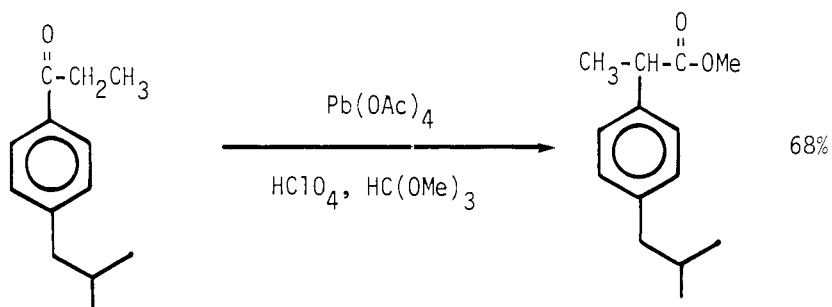
Tetr Lett, 21, 731 (1980)Angew Chem Int Ed, 21, 139 (1982)Tetrahedron, 36, 3559 (1980)

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

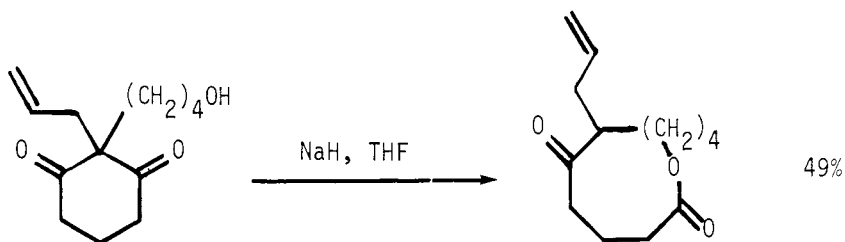
Section 117 Esters from Ketones



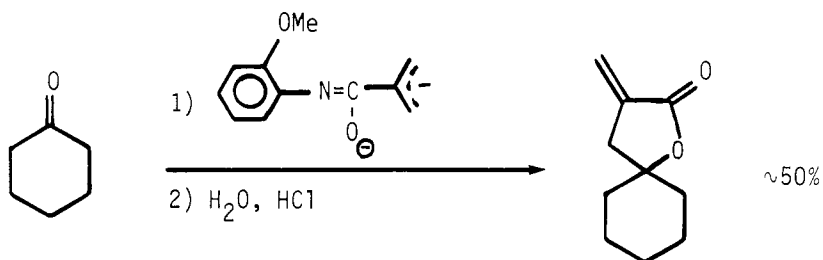
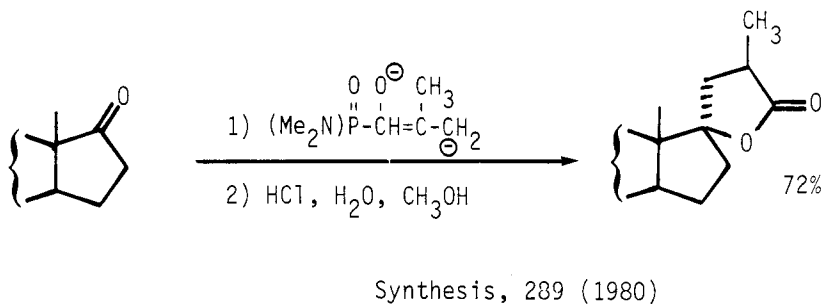
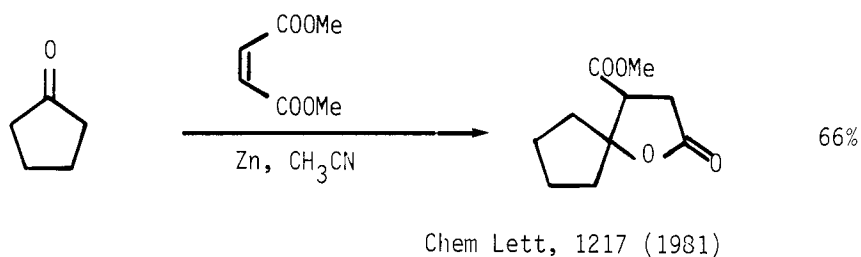
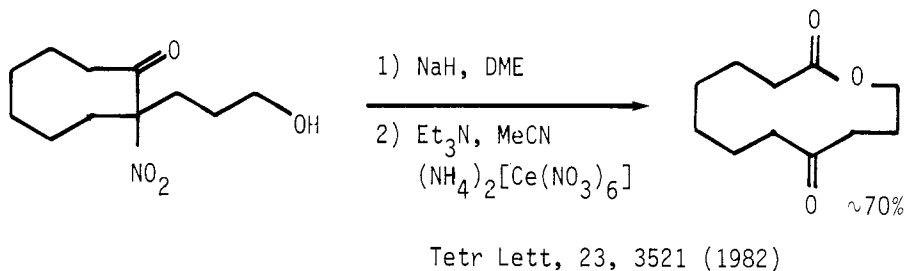
Synthesis, 126 (1981)

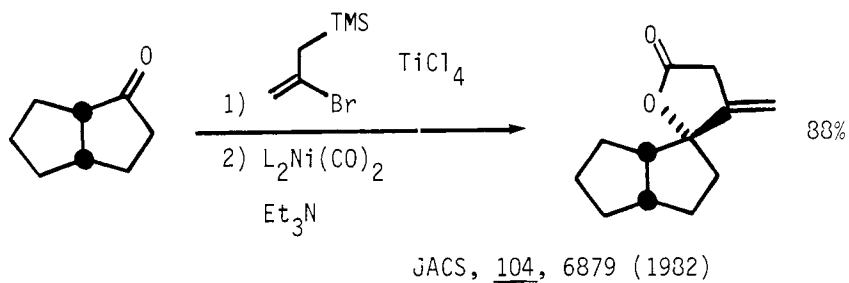


Synthesis, 456 (1982)



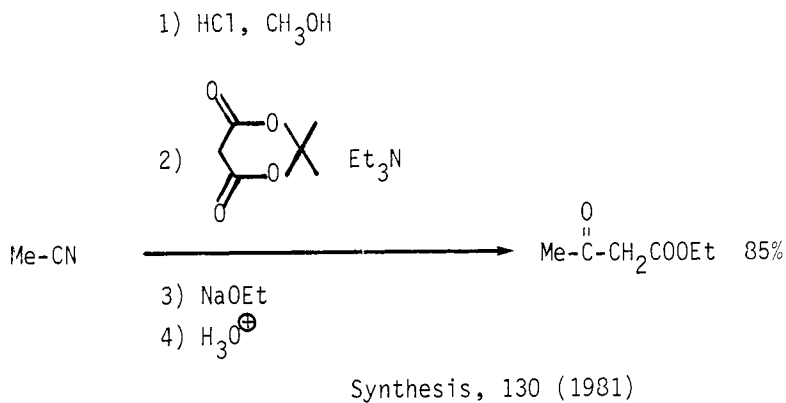
JOC, 46, 1914 (1981)

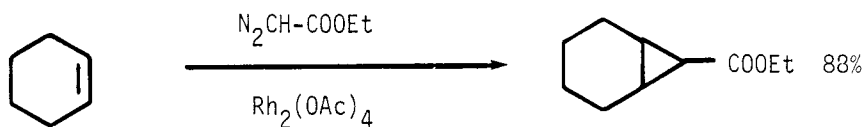




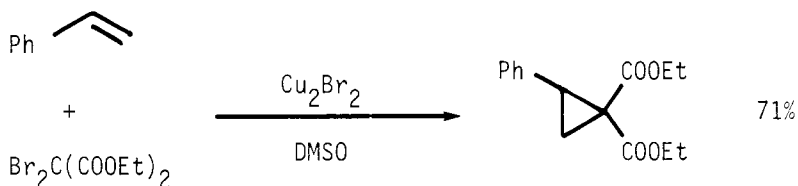
Also via Carboxylic Acids, Section 27

Section 118 Esters from Nitriles

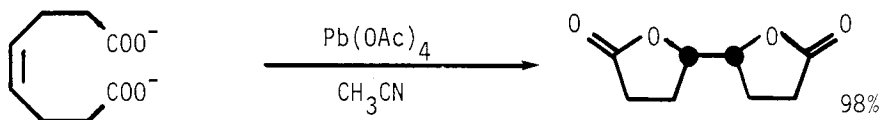


Section 119 Esters from Olefins

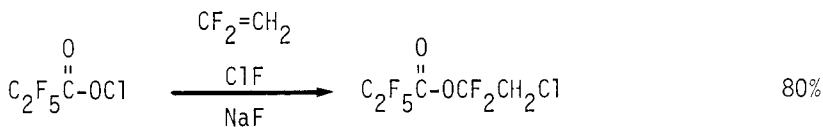
Tetr Lett, 22, 1783 (1981)
 JOC, 45, 695 and 1538 (1980)



Bull Chem Soc Japan, 54, 2539 (1981)



Tetr Lett, 21, 1819 (1980)

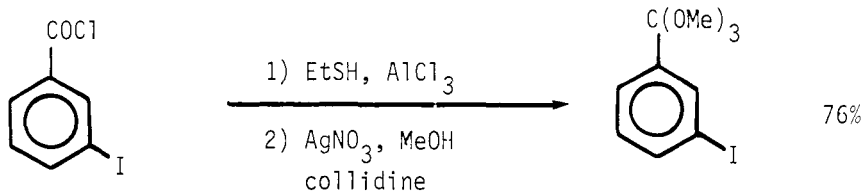


JOC, 45, 1214 (1980)

Also via Alcohols, Section 44

Section 120 Esters from Miscellaneous Compounds

No additional examples.

Section 120A Protection of Esters

JOC, 45, 740 (1980)

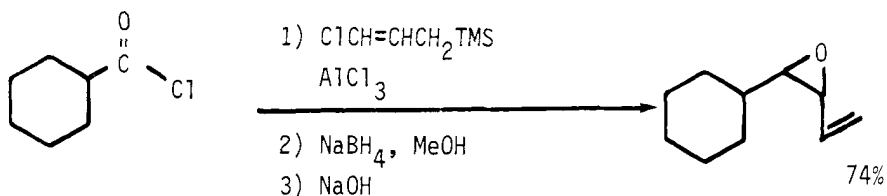
CHAPTER 9

PREPARATION OF ETHERS AND EPOXIDES

Section 121 Ethers and Epoxides from Acetylenes

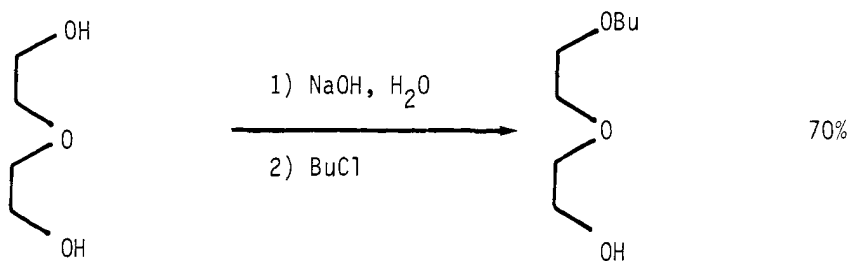
No examples.

Section 122 Epoxides from Acid Halides

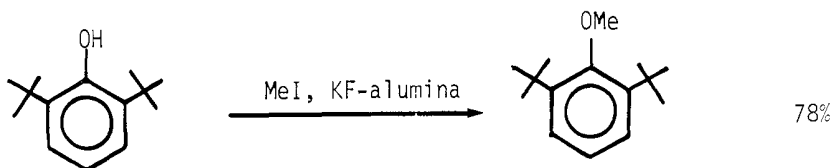
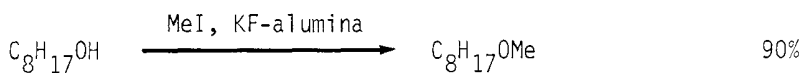
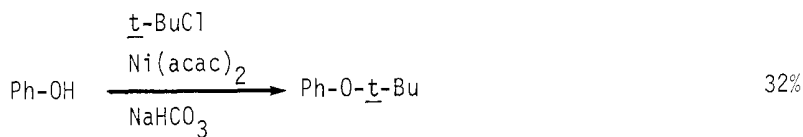


Tetr Lett, 21, 4369 (1980)

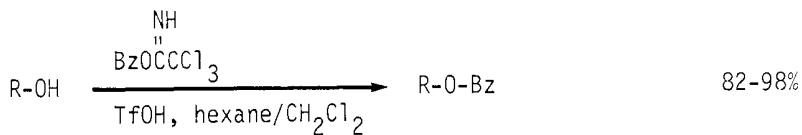
Section 123 Ethers and Epoxides from Alcohols and Phenols



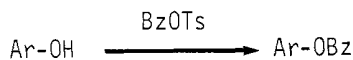
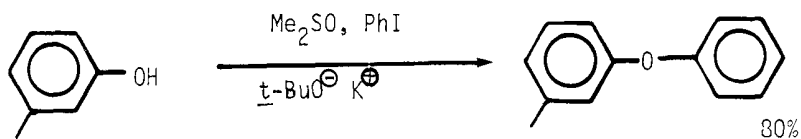
JOC, 45, 1095 (1980)

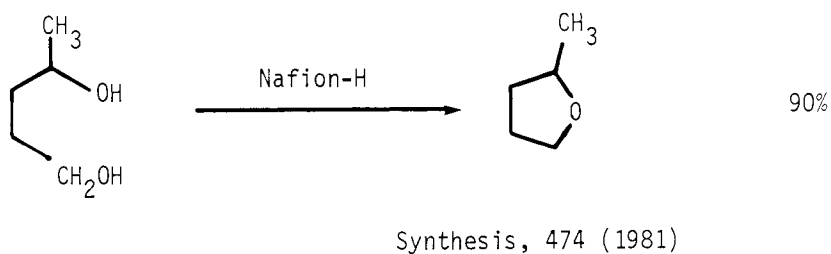
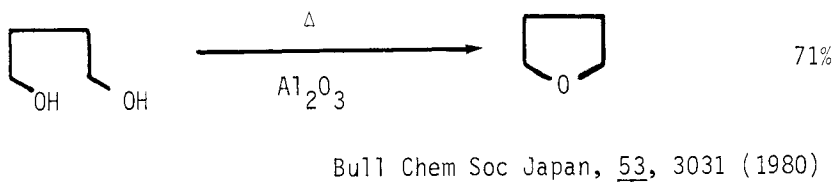
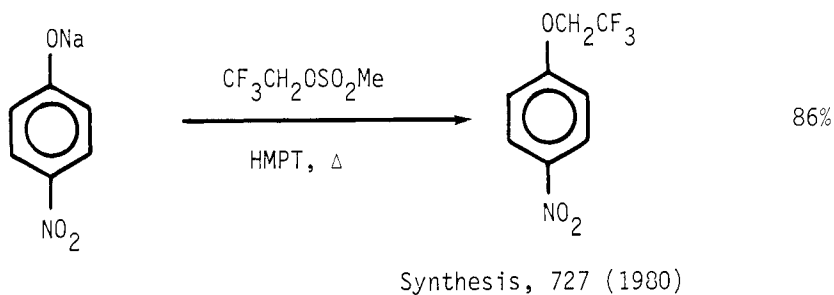
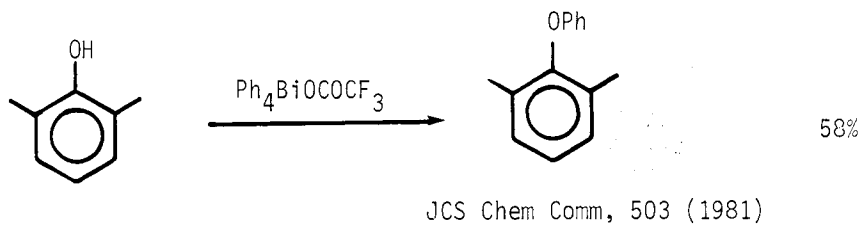
Bull Chem Soc Japan, 55, 2504 (1982)

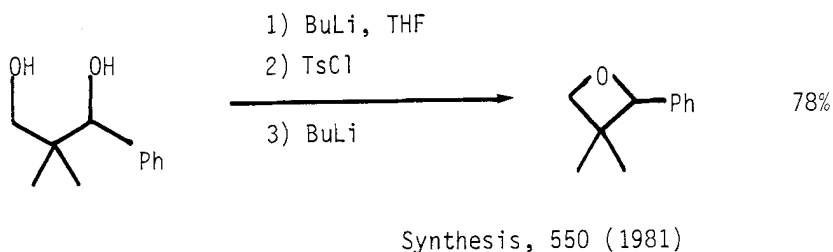
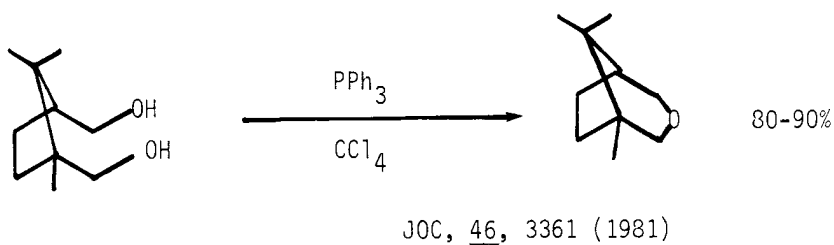
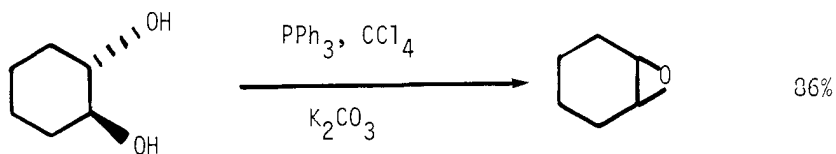
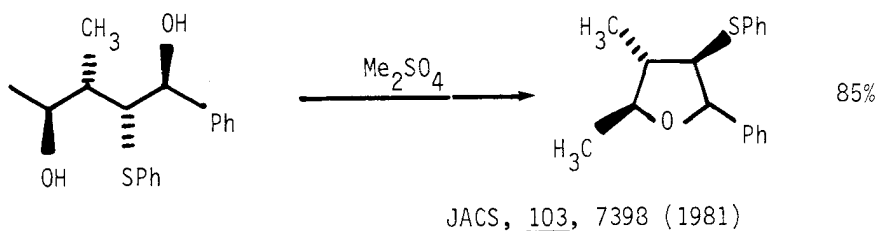
Synthesis, 186 (1982)

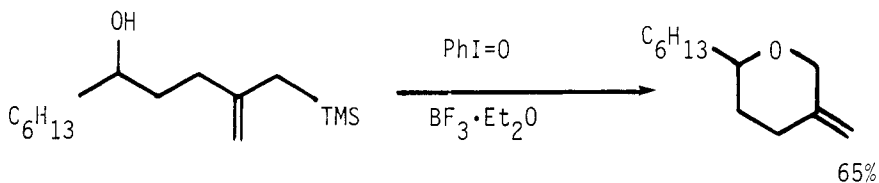


JCS Chem Comm, 1240 (1981)

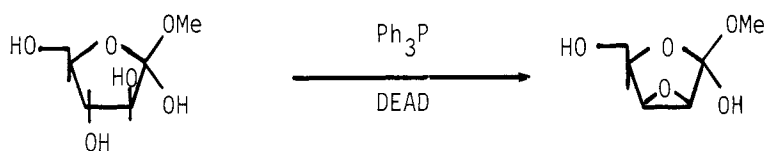
Synth Comm, 11, 853 (1981)JOC, 47, 4374 (1982)





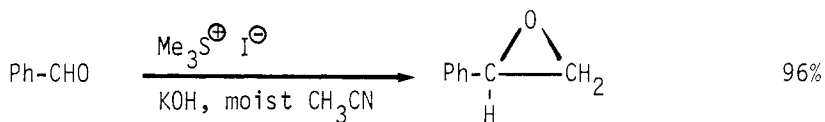
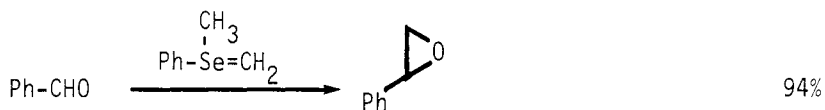


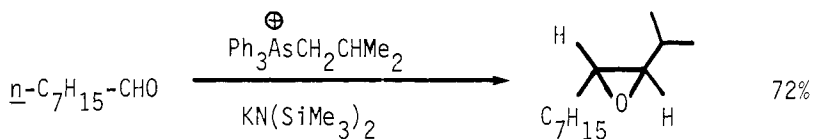
JCS Chem Comm, 1108 (1982)



JCS Chem Comm, 784 (1980)

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

Section 124 Epoxides from AldehydesTetr Lett, 23, 5283 (1982)Angew Chem Int Ed, 20, 671 (1981)

JACS, 103, 1283 (1981)

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

Section 125 Ethers and Epoxides from Alkyls, Methylenes and Aryls

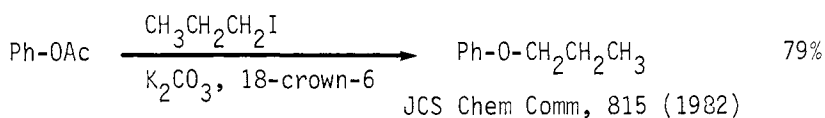
No examples of the preparation of ethers and epoxides by replacement of alkyl, methylene, and aryl groups occur in the literature. For the conversion of $\text{RH} \rightarrow \text{ROR}'$ ($\text{R}, \text{R}' = \text{alkyl}$) see Section 131 (Ethers from Hydrides)

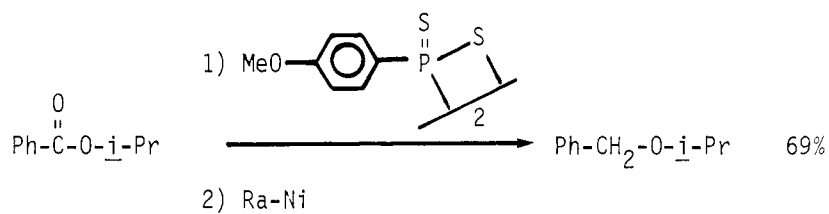
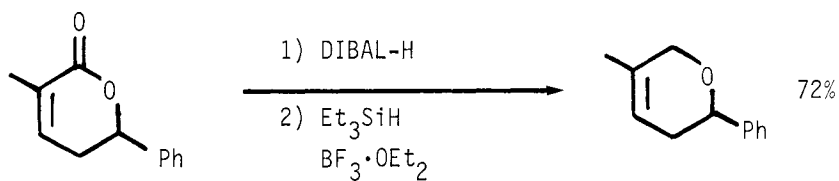
Section 126 Ethers and Epoxides from Amides

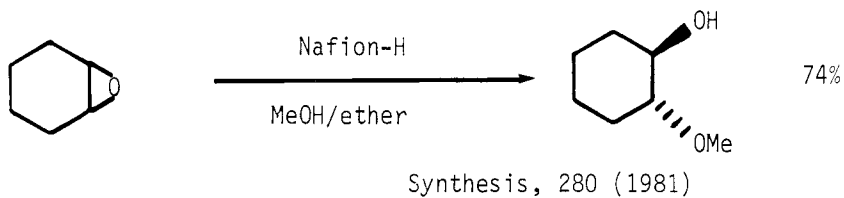
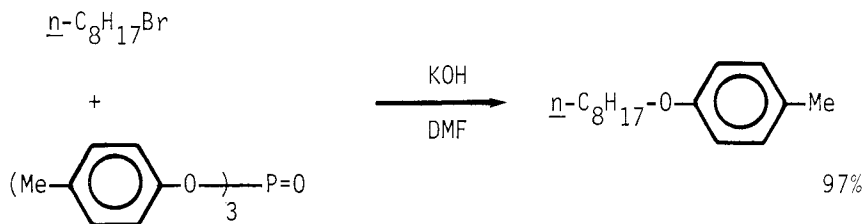
No additional examples.

Section 127 Ethers and Epoxides from Amines

No additional examples.

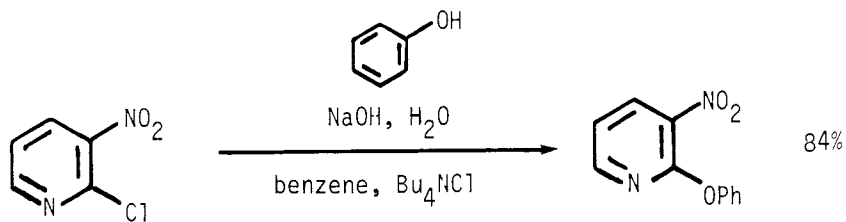
Section 128 Ethers from Esters

JOC, 46, 832 (1981)JOC, 46, 2417 (1981)

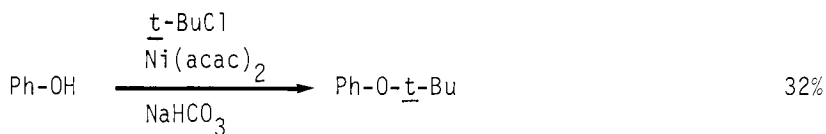
Section 129 Ethers from EpoxidesSection 130 Ethers from Halides

Also can be used to form diaryl ethers.

Synthesis, 828 (1982)

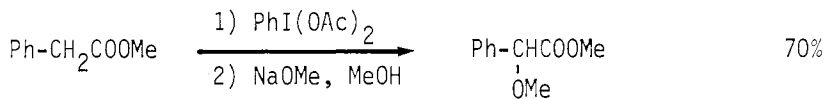
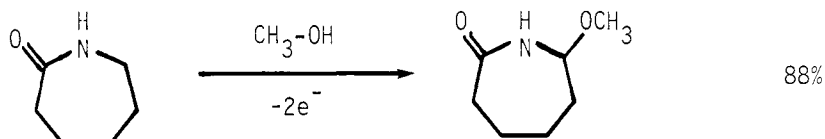


Synthesis, 921 (1980)

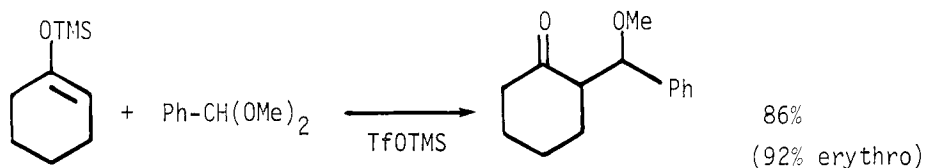


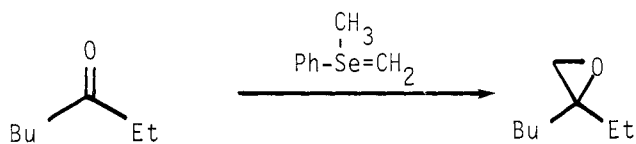
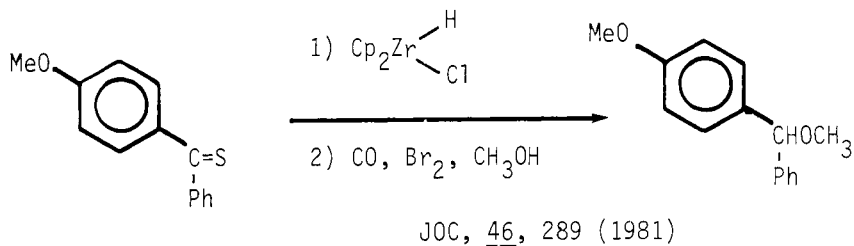
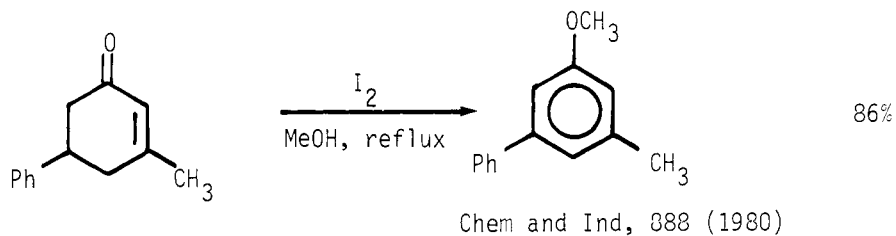
Synthesis, 186 (1982)

Related methods: Ethers from Alcohols (Section 123)

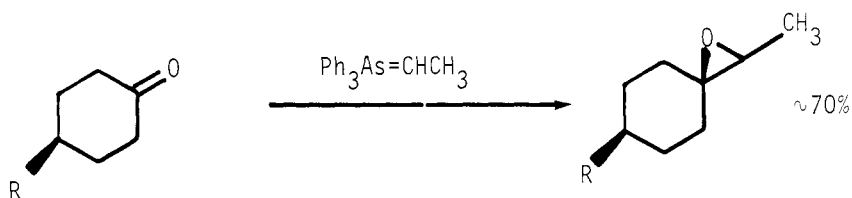
Section 131 Ethers from HydridesTetr Lett, 22, 2747 (1981)

Synthesis, 315 (1980)

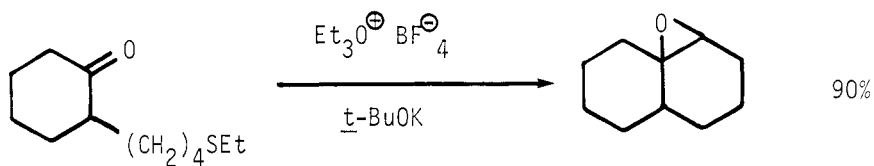
Tetr Lett, 21, 2527 (1980)JACS, 102, 3248 (1980)

Section 132 Ethers and Epoxides from Ketones

Angew Chem Int Ed, 20, 671 (1981)



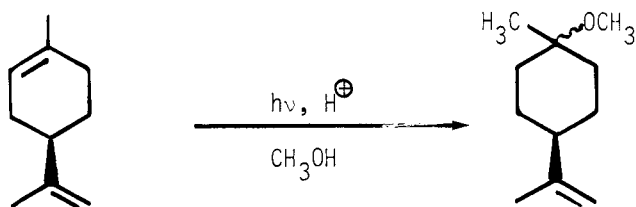
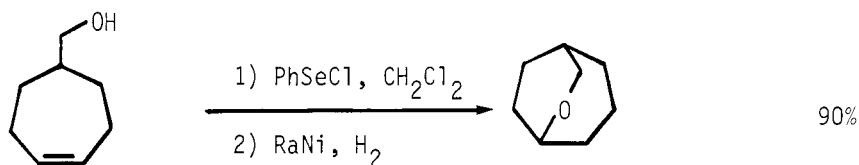
JACS, 103, 1203 (1981)

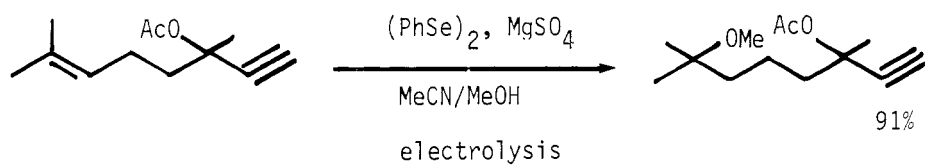
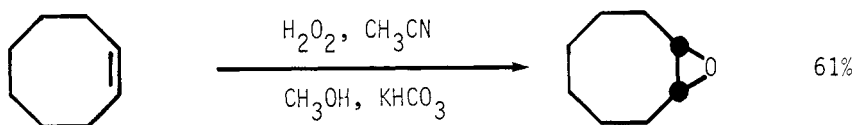
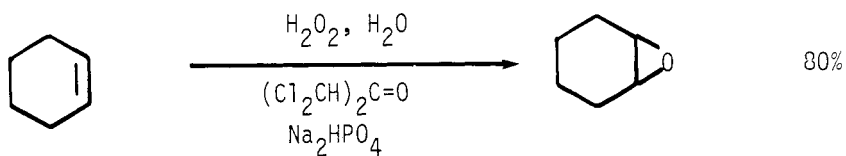
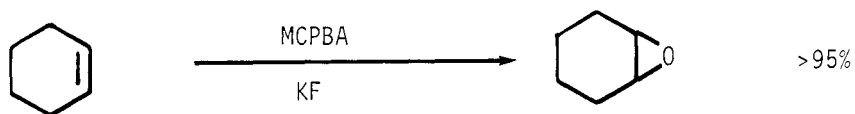
Tetr Lett, 21, 4807 and 4811 (1980)

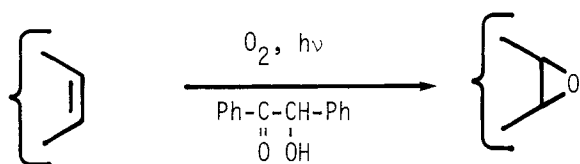
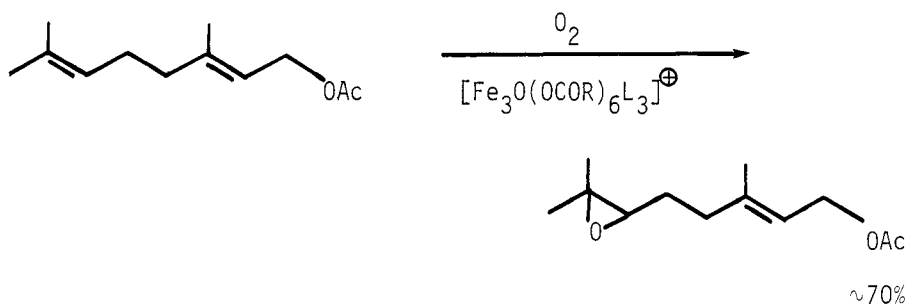
Related methods: Epoxides from Aldehydes (Section 124)

Section 133 Ethers and Epoxides from Nitriles

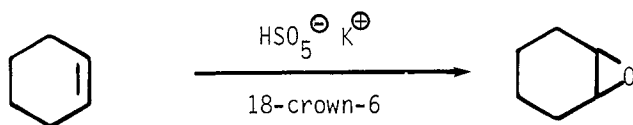
No additional examples.

Section 134 Ethers and Epoxides from OlefinsOrg Syn, 61, 112 (1983)JACS, 102, 3784 (1980)

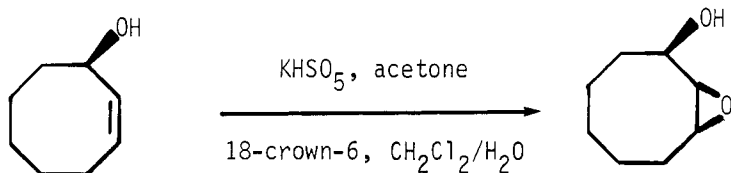
JACS, 103, 4606 (1981)Org Syn, 60, 63 (1981)Tetr Lett, 22, 2089 (1981)Tetr Lett, 22, 3895 (1981)

JACS, 103, 2049 (1981)

~70%

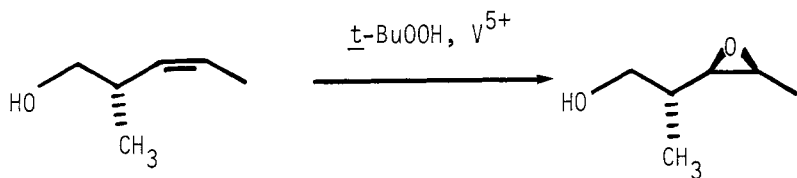
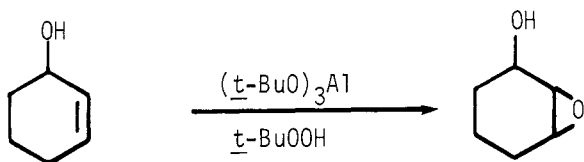
JACS, 104, 6450 (1982)

98%

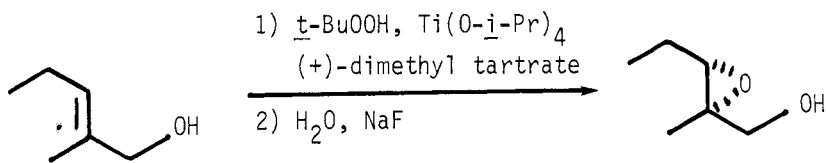
JOC, 45, 4758 (1980)

91%

JOC, 47, 2670 (1982)

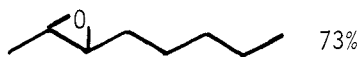
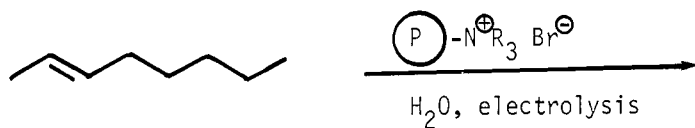
JACS, 103, 7690 (1981)

72%

Tetr Lett, 21, 1657 (1980)

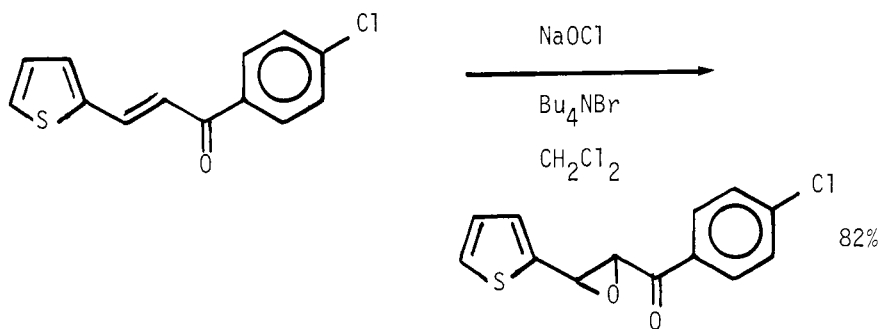
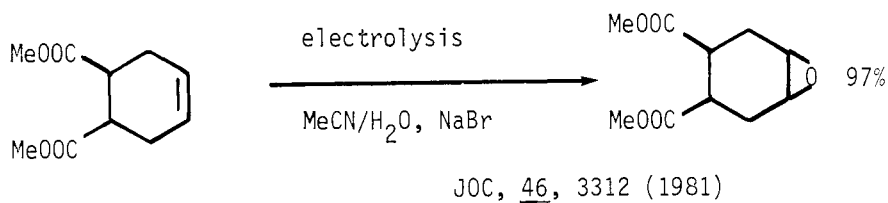
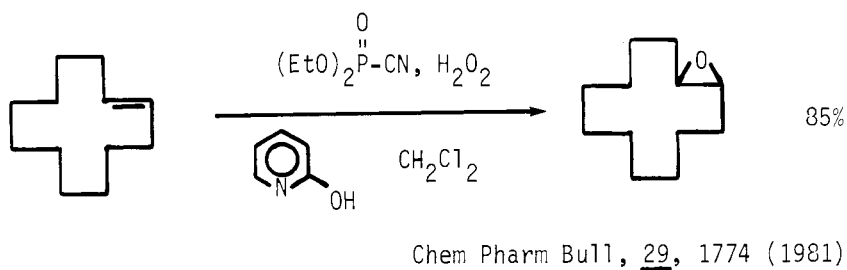
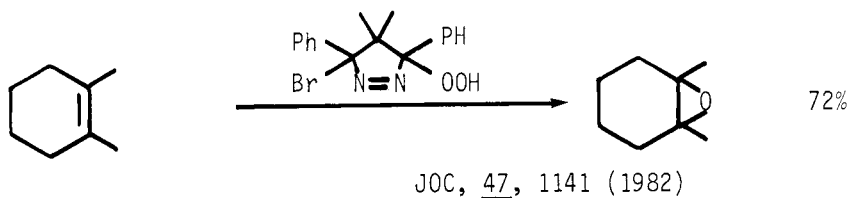
79%

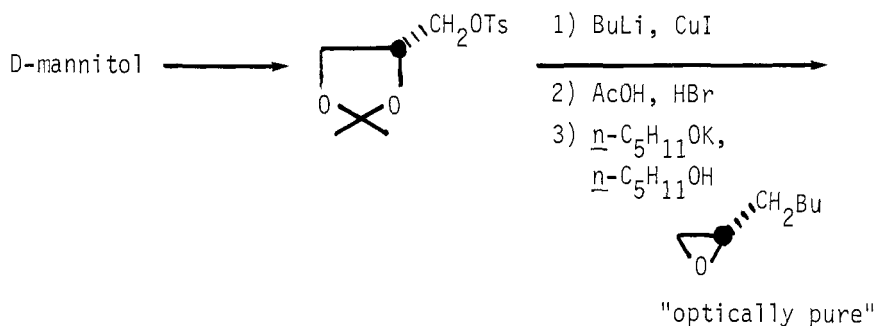
95% ee

JACS, 102, 5974 (1980)JACS, 103, 464 (1981)

73%

JOC, 47, 3575 (1982)

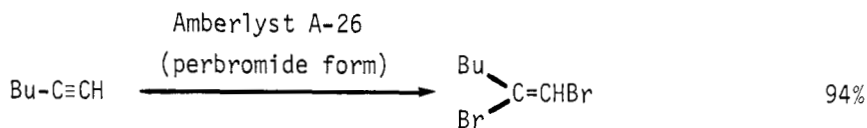


Section 135 Ethers and Epoxides from Miscellaneous CompoundsAngew Chem Int Ed, 19, 198 (1980)

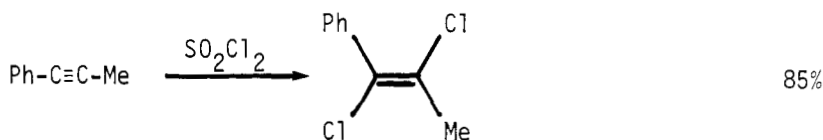
CHAPTER 10

PREPARATION OF HALIDES AND SULFONATES

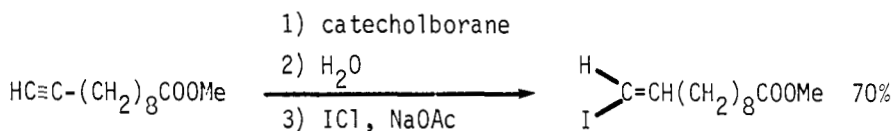
Section 136 Halides from Acetylenes



Synthesis, 143 (1980)

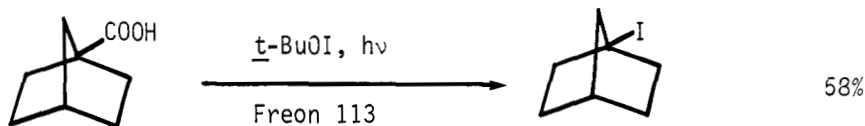


Bull Chem Soc Japan, 54, 2843 (1981)

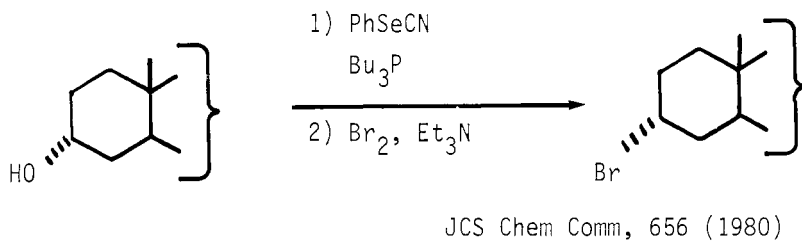
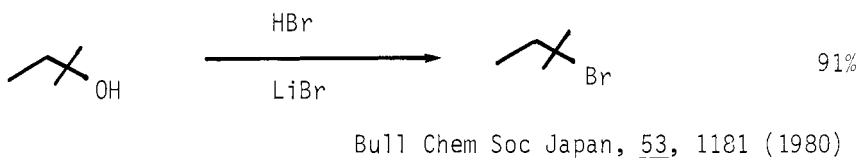
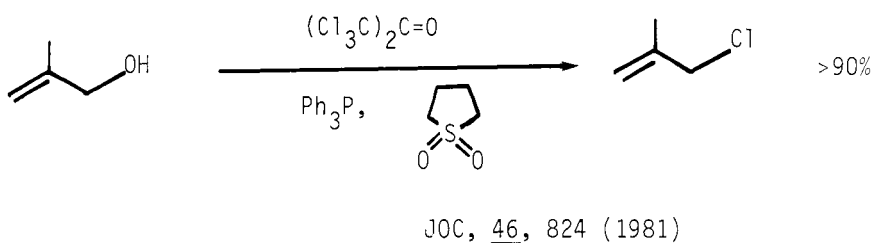
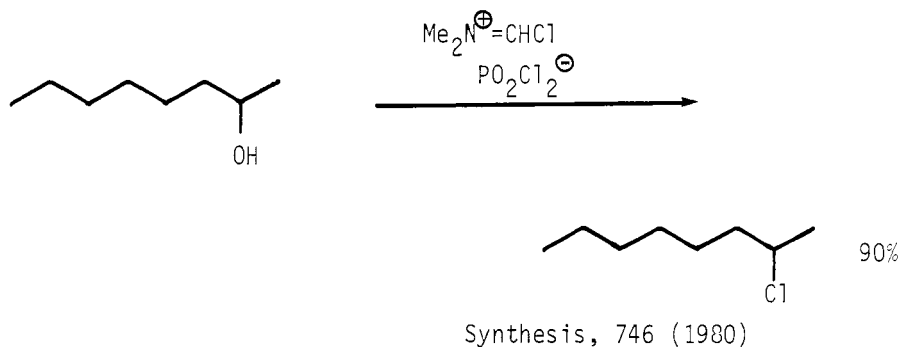


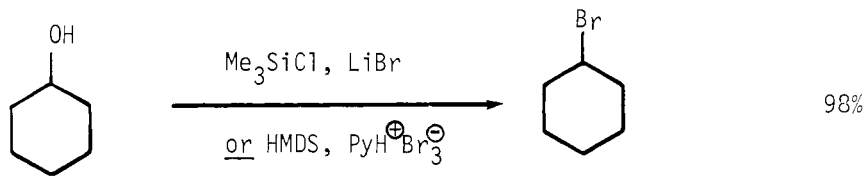
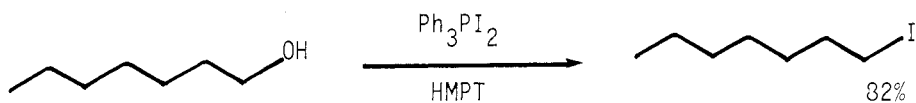
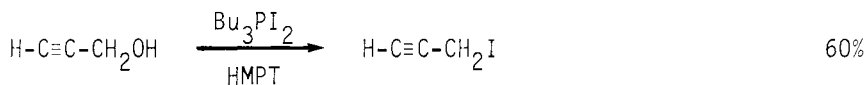
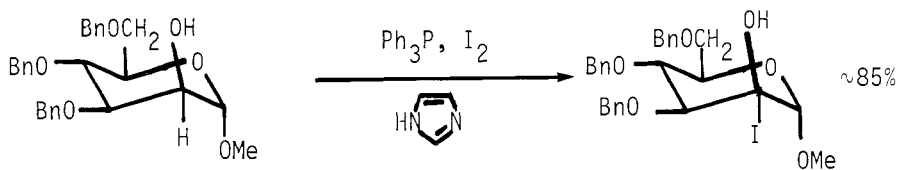
Synth Comm, 11, 247 (1981)

Section 137 Halides from Carboxylic Acids

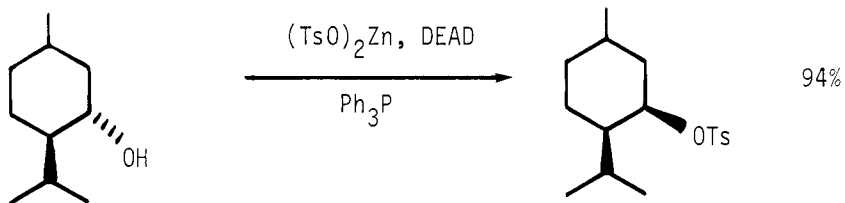


JOC, 45, 4226 (1980)

Section 138 Halides and Sulfonates from Alcohols

JOC, 45, 1638 (1980)Aust J Chem, 35, 517 (1982)Aust J Chem, 35, 517 (1982)

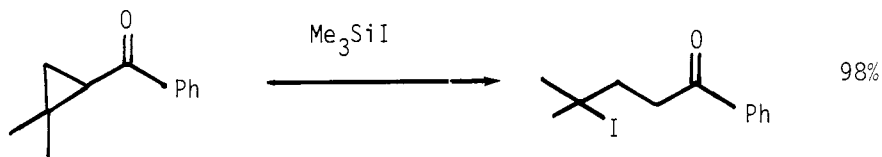
JCS Perkin I, 2866 (1980)

Tetr Lett, 23, 4461 (1982)Section 139 Halides from Aldehydes

No additional examples.

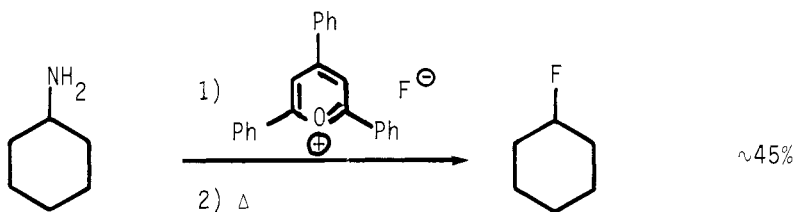
Section 140 Halides from Alkyls

For the conversion $\text{RH} \rightarrow \text{RHal}$ see Section 146 (Halides from Hydrides)

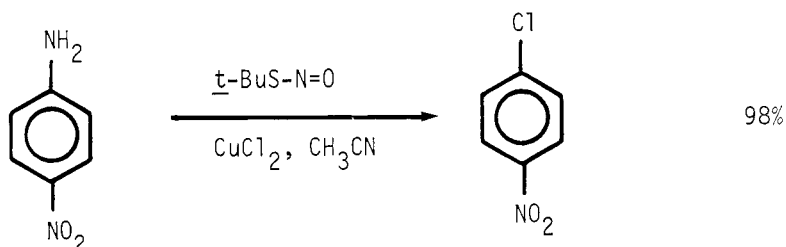
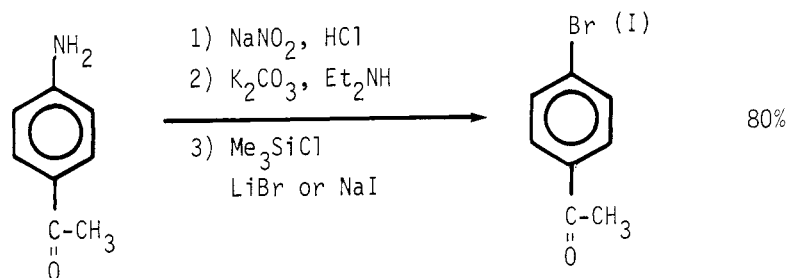
JOC, 46, 2412 (1981)

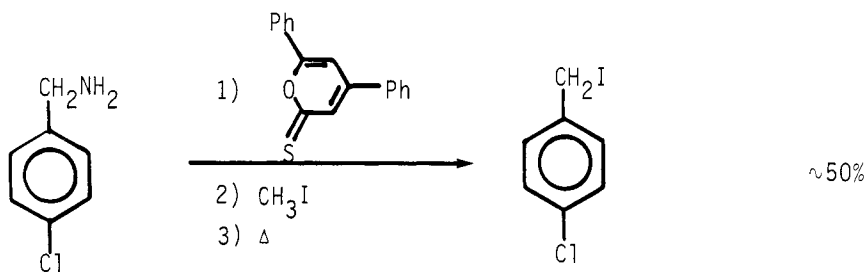
Section 141 Halides and Sulfonates from Amides

No additional examples.

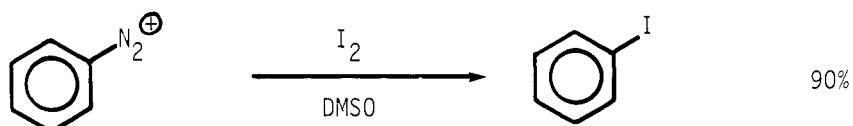
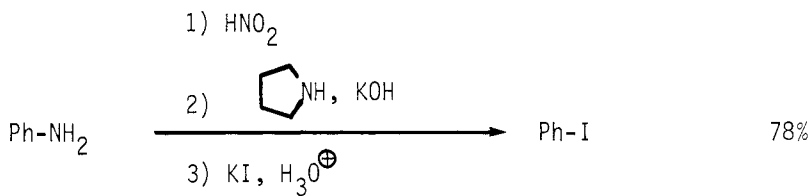
Section 142 Halides from Amines

JCS Perkin I, 1890 and 2901 (1980)

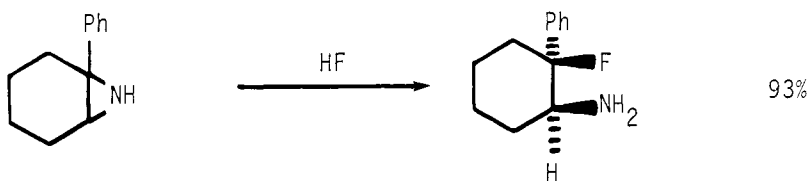
Bull Chem Soc Japan, 53, 1065 (1980)JOC, 46, 5239 (1981)

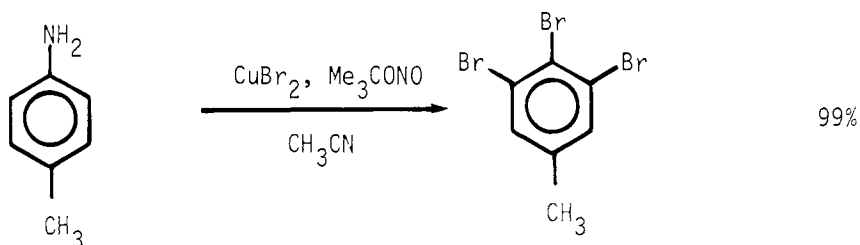
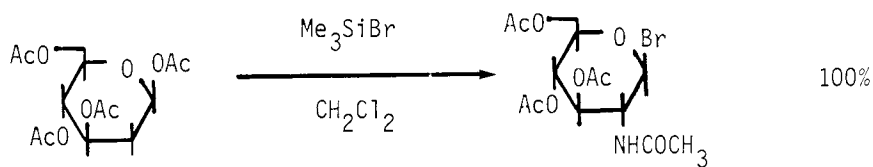
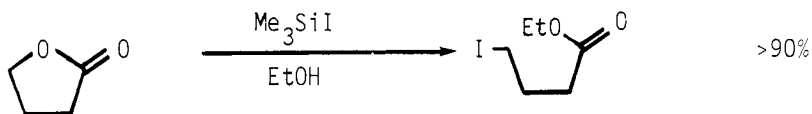
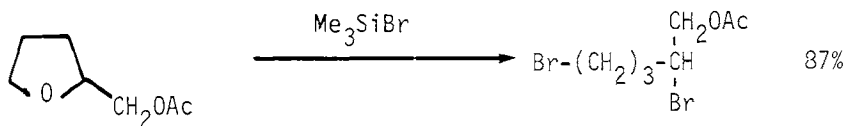


Synthesis, 853 (1980)

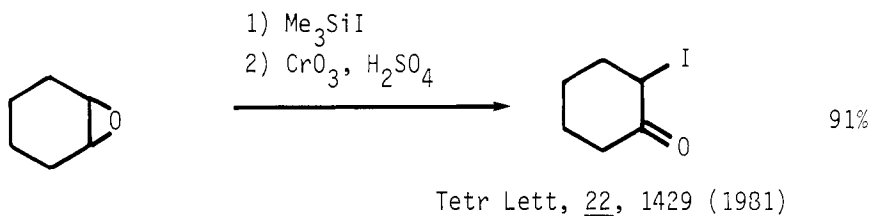
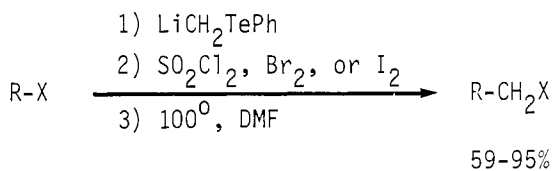
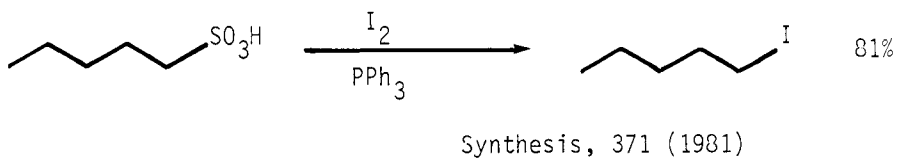
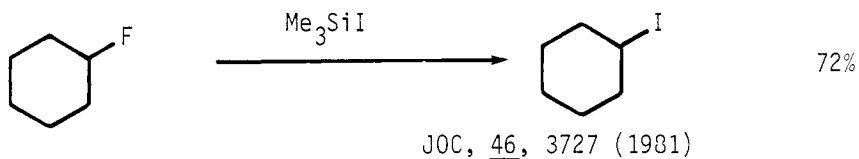
Synth Comm, 11, 639 (1981)

Synthesis, 572 (1980)

JOC, 45, 5328 and 5333 (1980)

JOC, 45, 2570 (1980)Section 143 Halides from EstersTetr Lett, 22, 513 (1981)Synth Comm, 11, 763 (1981)Section 144 Halides from Ethers and Epoxides

Synthesis, 303 (1981)

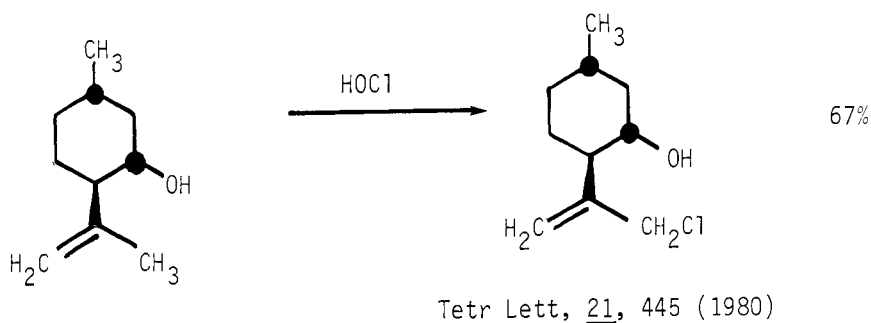
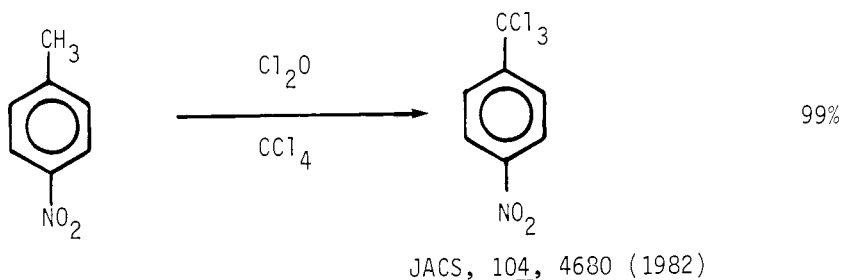
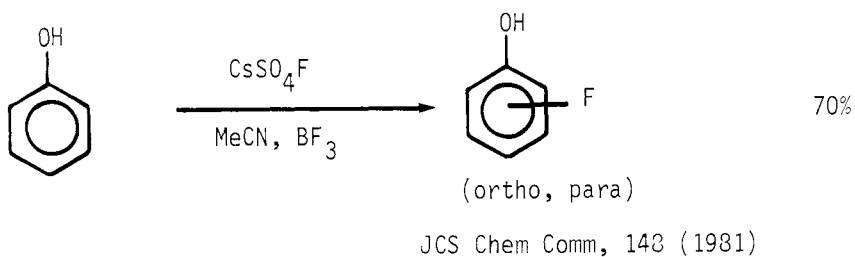
Section 145 Halides from Halides and Sulfonates

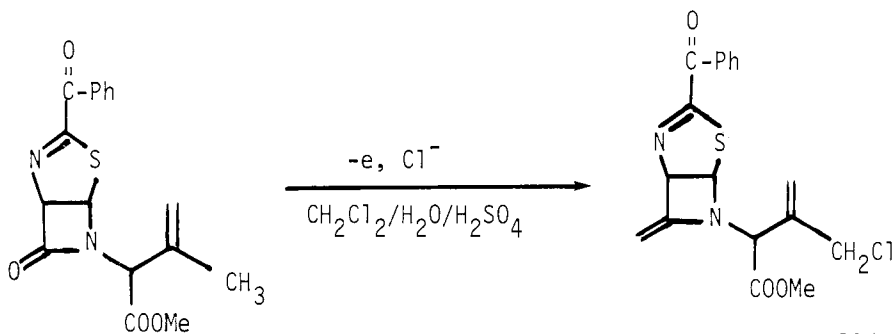
$\text{R} = 1^\circ \text{ alkyl}$

Chem Lett, 1031 (1982)

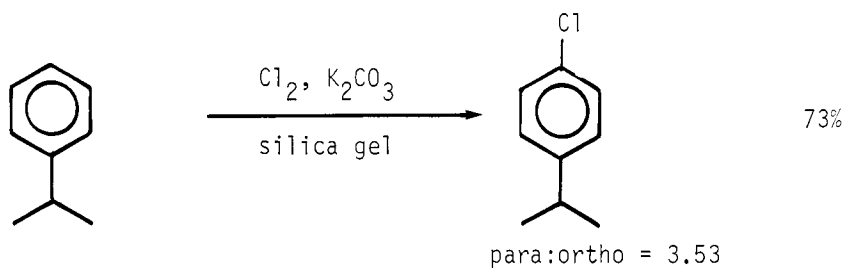
Section 146 Halides from Hydrides

α -Halogenations of aldehydes, ketones, esters, and acids are found in Sections 333 (Haloaldehydes), 369 (Haloketones), 359 (Haloesters), and 319 (Haloacids).





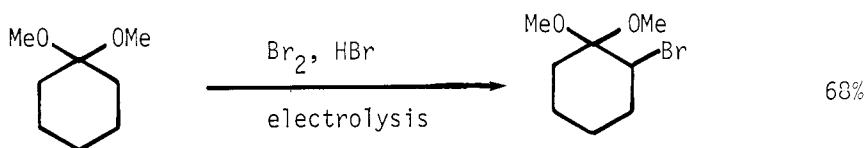
80%

Tetr Lett, 22, 3193 (1981)

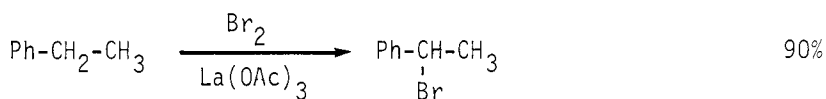
73%

para:ortho = 3.53

Chem Lett, 1423 (1980)

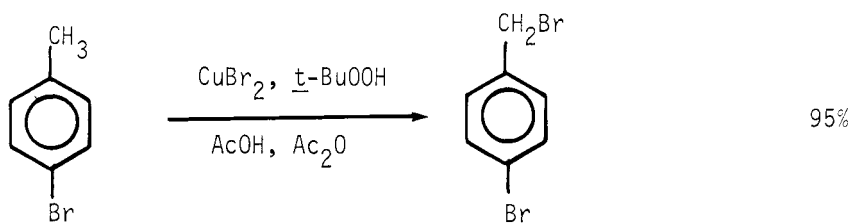
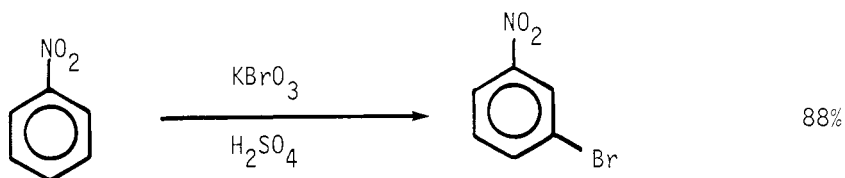
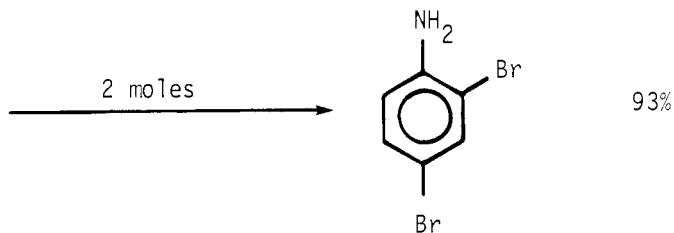
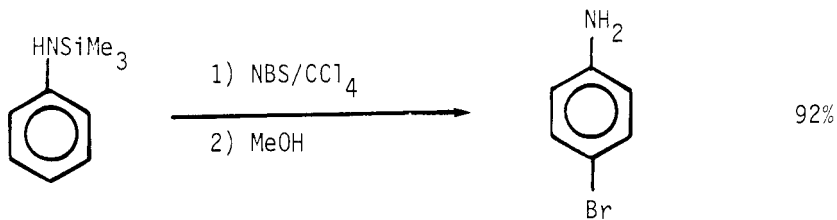


68%

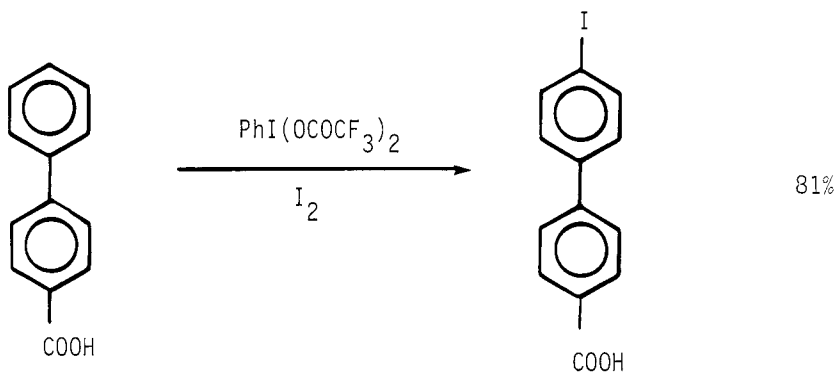
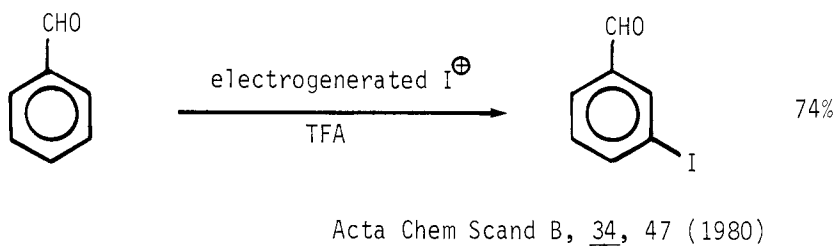
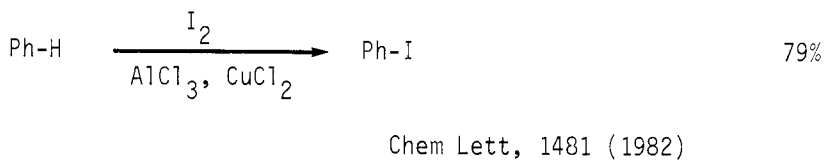
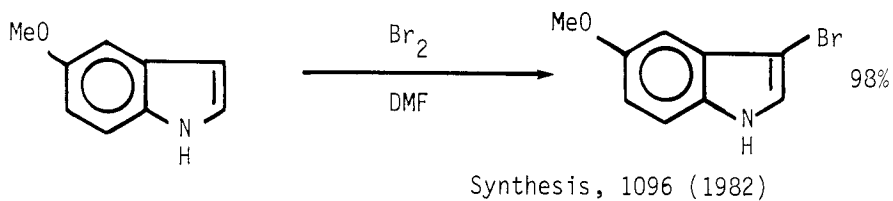
Synth Comm, 10, 821 (1980)

90%

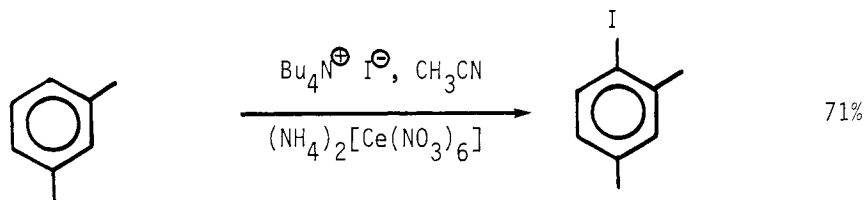
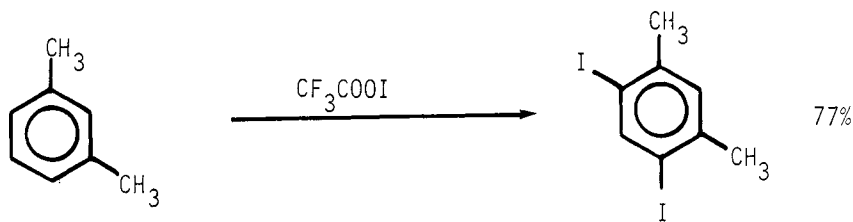
Bull Soc Chim France II, 327 (1982)

Synth Comm, 11, 669 (1981)JOC, 46, 2169 (1981)

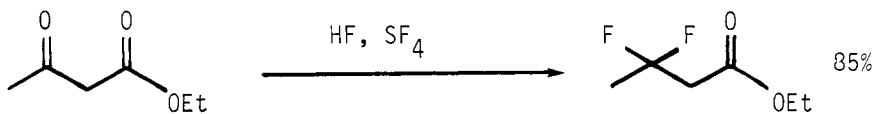
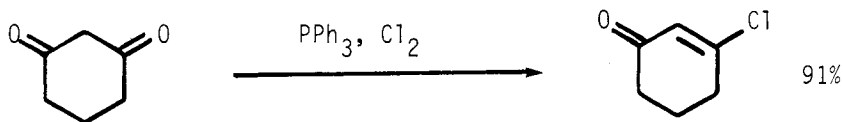
Synthesis, 263 (1982)



JOC (USSR), 17, 2320 (1982)

Bull Chem Soc Japan, 54, 2847 (1981)

Synthesis, 486 (1980)

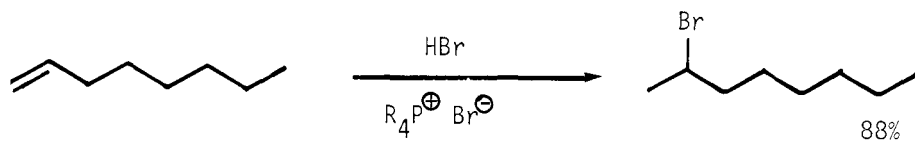
Section 147 Halides from KetonesJOC (USSR), 17, 1260 (1981)Can J Chem, 60, 210 (1982)

Section 148 Halides and Sulfonates from Nitriles

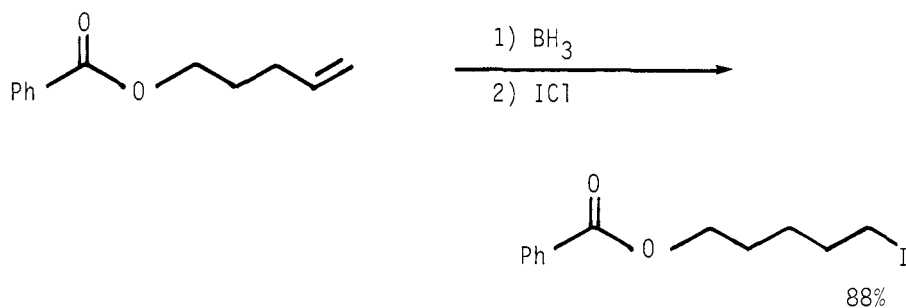
No examples.

Section 149 Halides from Olefins

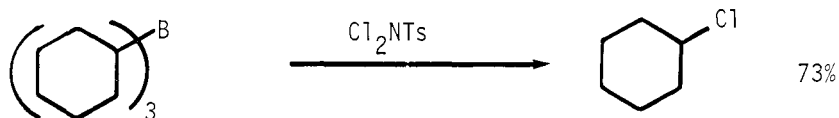
For halocyclopropanations see Section 74 (Alkyls from Olefins).



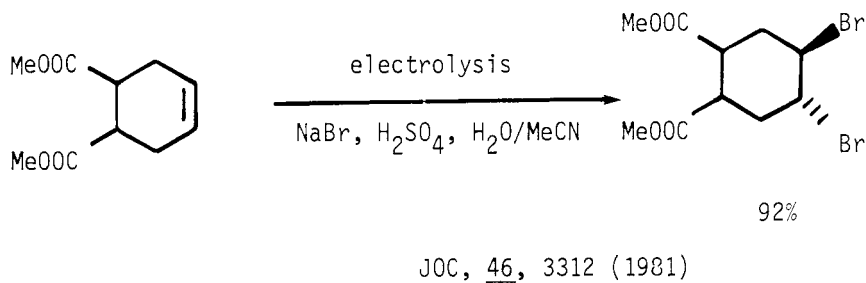
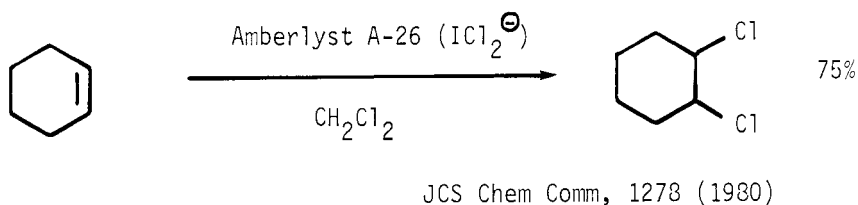
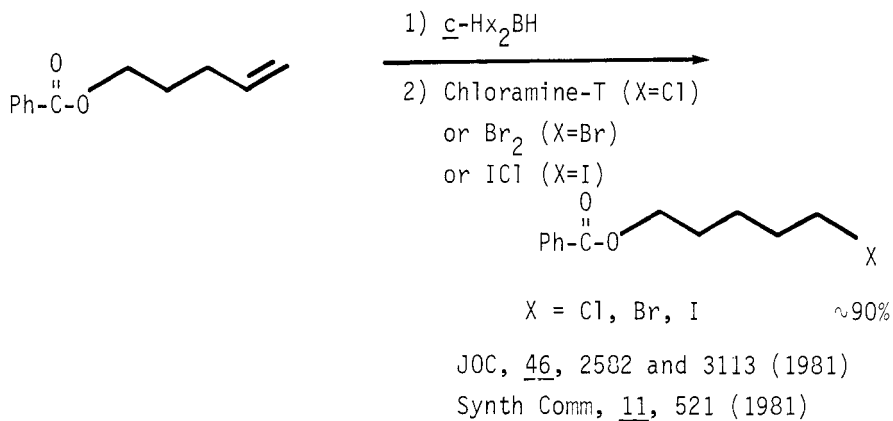
JOC, 45, 3527 (1980)

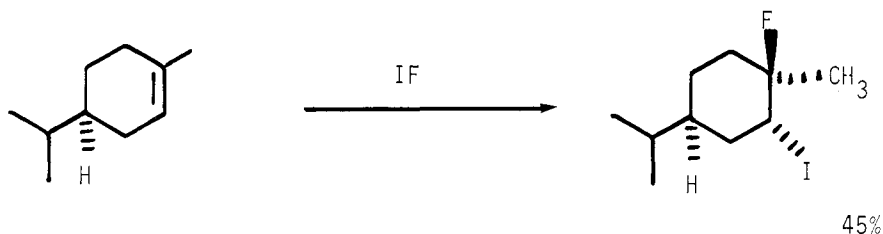
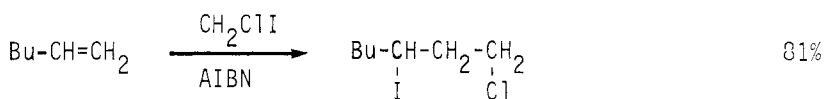
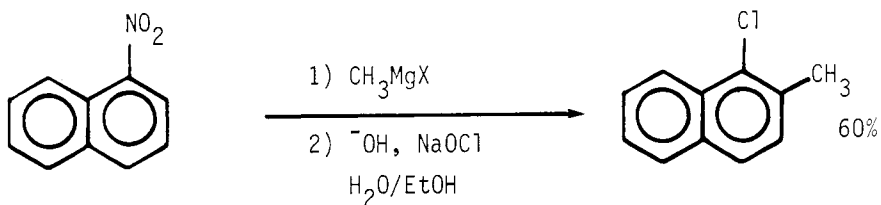


JOC, 45, 3578 (1980)

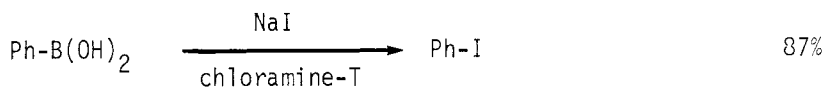


J Chem Res (S), 376 (1981)



Tetr Lett, 21, 4543 (1980)Bull Chem Soc Japan, 53, 770 (1980)Section 150 Halides from Miscellaneous Compounds

Synthesis, 616 (1980)

Org Prep Proc Int, 14, 359 (1982)

Review: "Methods of Fluorination in Organic Chemistry"

Angew Chem Int Ed, 20, 647 (1981)

Review: "Radioiodination Techniques for Small Organic Molecules"

Chem Rev, 82, 575 (1982)

CHAPTER 11

PREPARATION OF HYDRIDES

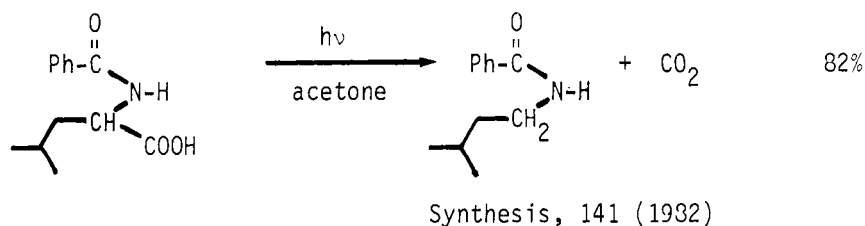
This chapter lists hydrogenolysis and related reactions by which functional groups are replaced by hydrogen, e.g. $\text{RCH}_2\text{X} \rightarrow \text{RCH}_2\text{-H}$ or R-H

Section 151 Hydrides from Acetylenes

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

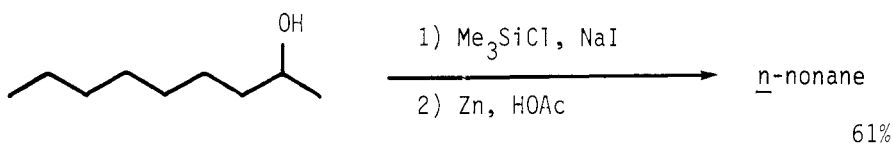
Section 152 Hydrides from Carboxylic Acids

This section lists examples of decarboxylation ($\text{R-COOH} \rightarrow \text{R-H}$) and related reactions.

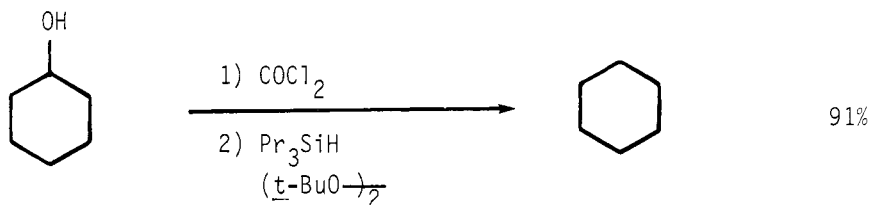


Section 153 Hydrides from Alcohols and Phenols

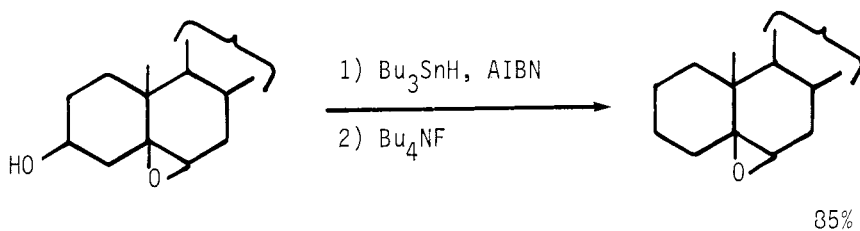
This section lists examples of the hydrogenolysis of alcohols and phenols, ROH \rightarrow RH



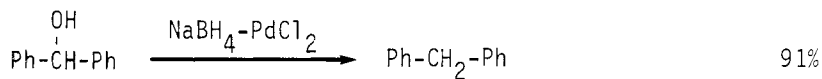
Synthesis, 32 (1981)



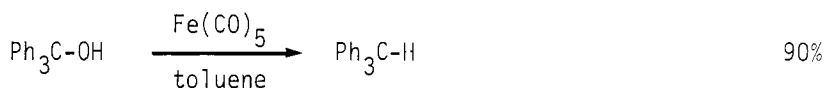
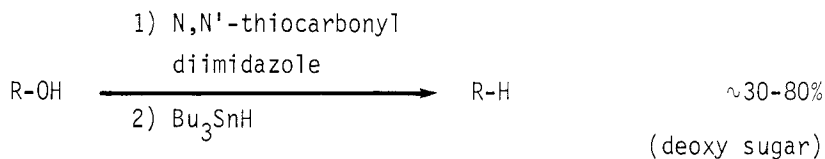
JCS Perkin I, 1207 (1980)



JACS, 103, 932 (1981)



Chem Lett, 1029 (1981)

Tetr Lett, 21, 801 (1980)

R = protected sugar

JOC, 46, 4843 (1981)

Also via Halides and Sulfonates, Section 160

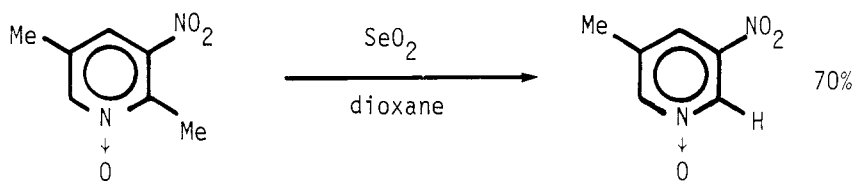
Section 154 Hydrides from Aldehydes

No additional examples.

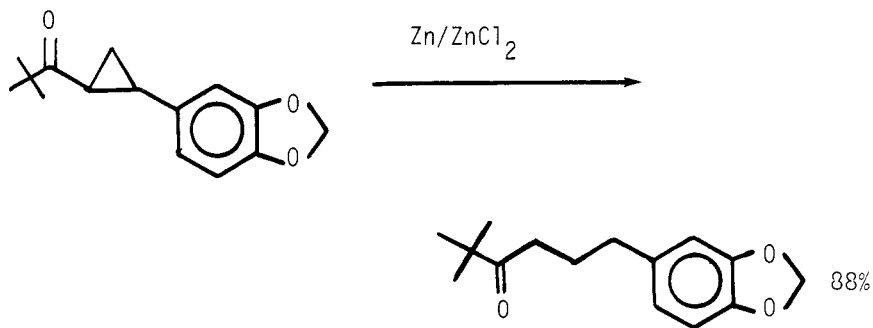
For the conversion $\text{RCHO} \rightarrow \text{RMe}$ etc. see Section 64 (Alkyls from Aldehydes)

Section 155 Hydrides from Alkyls

This section lists examples of the conversion $R-R' \rightarrow R-H$ or
 $Ar-R \rightarrow Ar-H$



Tetr Lett, 21, 2433 (1980)



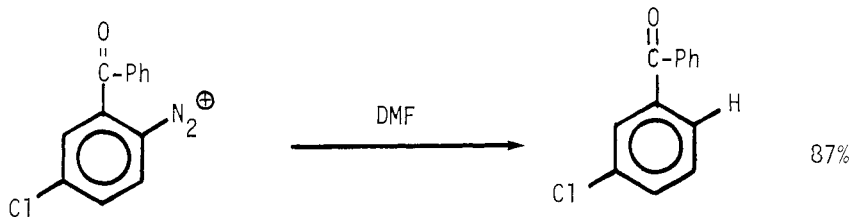
Tetr Lett, 22, 695 (1981)

Section 156 Hydrides from Amides

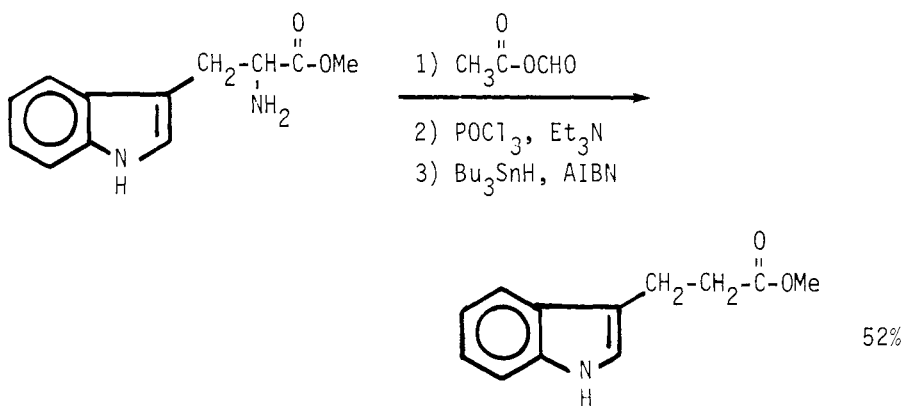
No additional examples.

Section 157 Hydrides from Amines

This section lists examples of the conversion $\text{RNH}_2 \rightarrow \text{RH}$



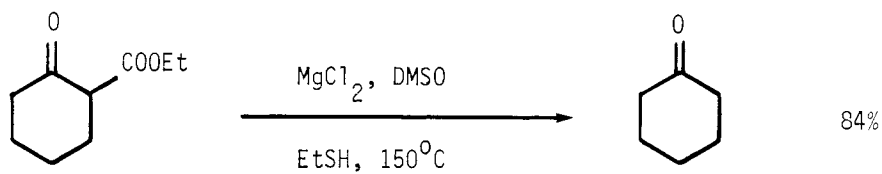
Indian J Chem, 20B, 767 (1981)



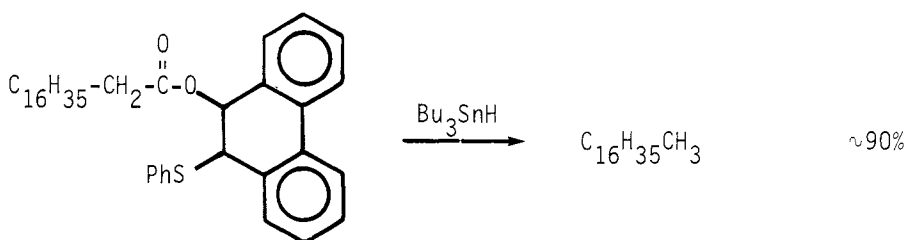
Synthesis, 68 (1980)

Section 158 Hydrides from Esters

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



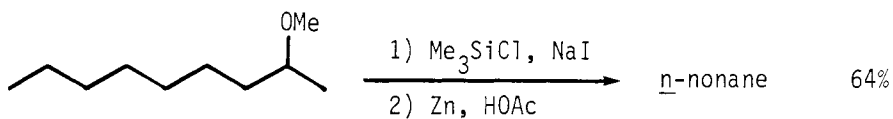
Synthesis, 119 (1981)



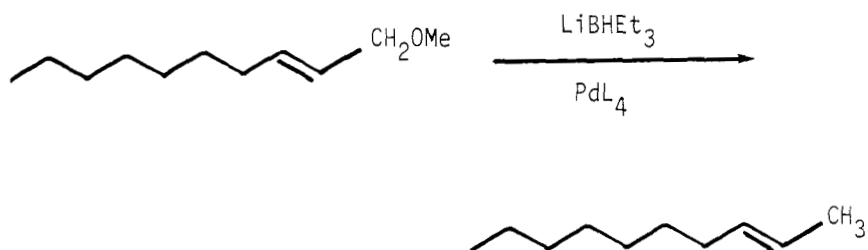
JCS Chem Comm, 732 (1980)

Section 159 Hydrides from Ethers

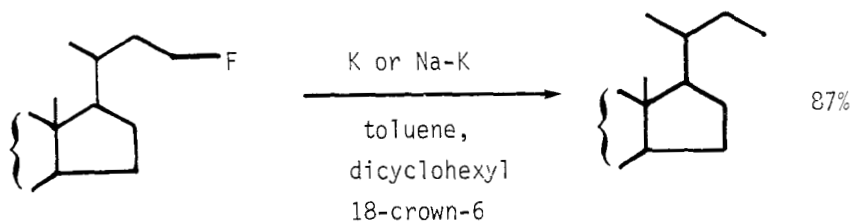
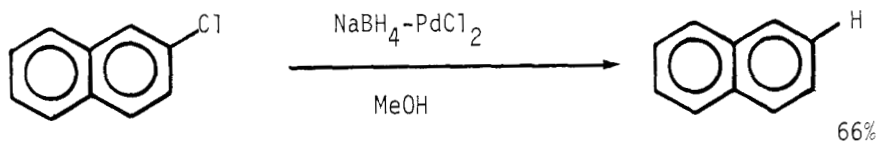
This section lists examples of the reaction $\text{R-O-R}' \rightarrow \text{R-H}$.



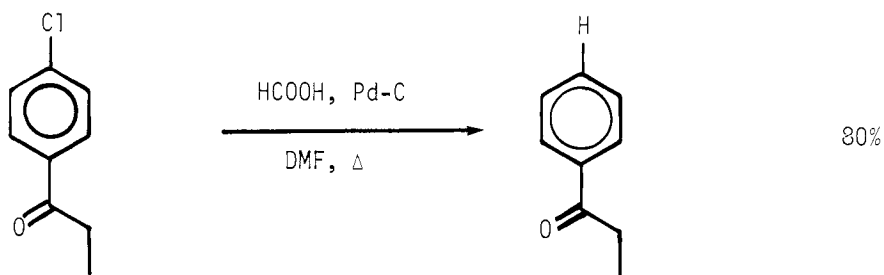
Synthesis, 32 (1981)

JOC, 47, 4380 (1982)Section 160 Hydrides from Halides and Sulfonates

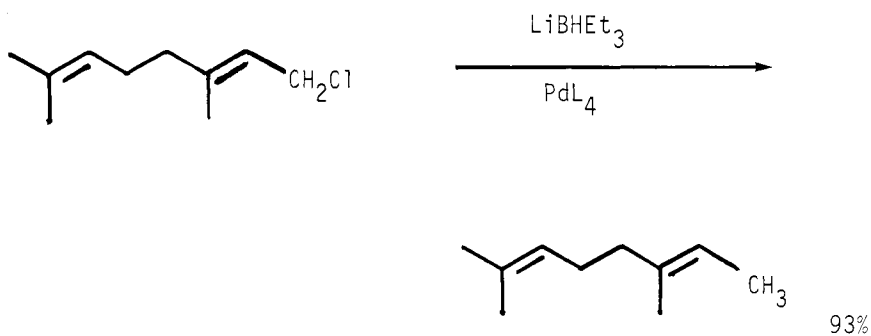
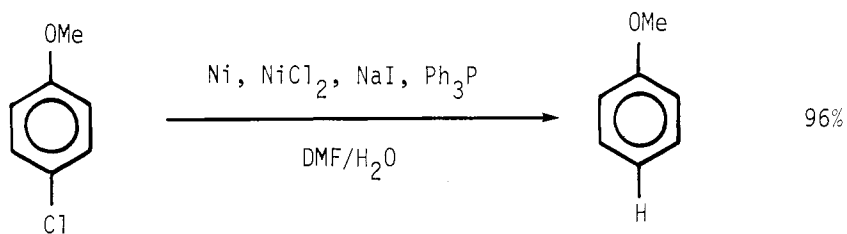
This section lists the reductions of halides and sulfonates,

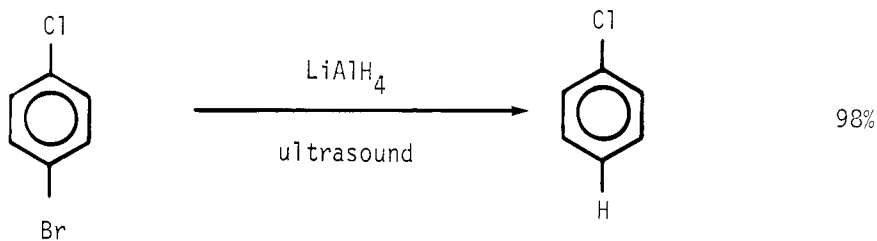
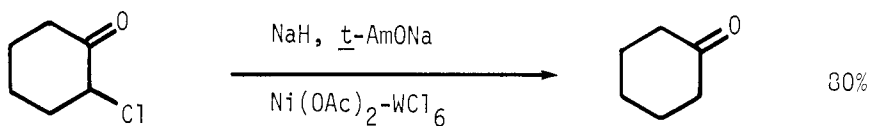
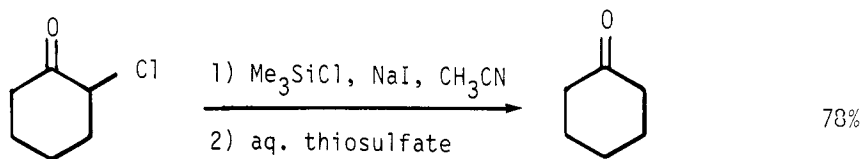
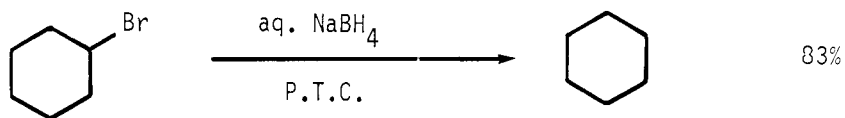
 $\text{RX} \rightarrow \text{RH}$ Tetr Lett, 22, 2583 (1981)

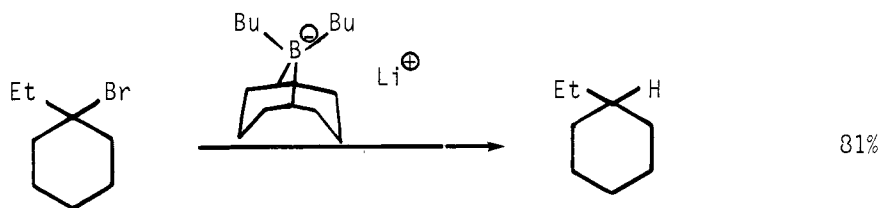
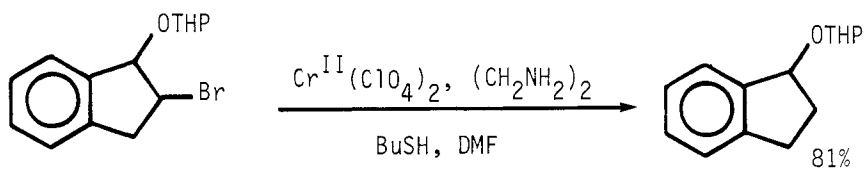
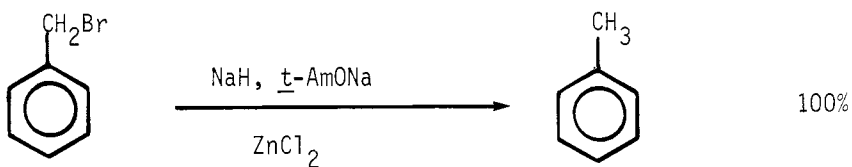
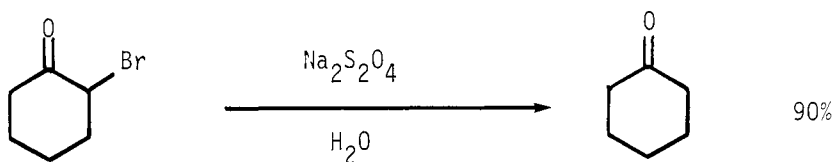
Chem Lett, 1029 (1981)

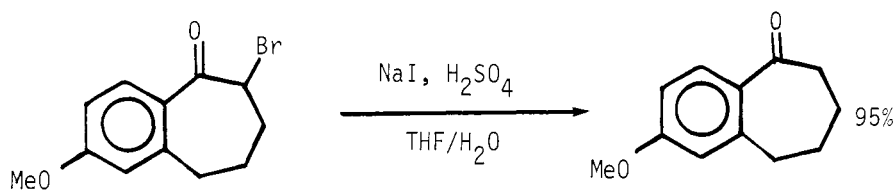
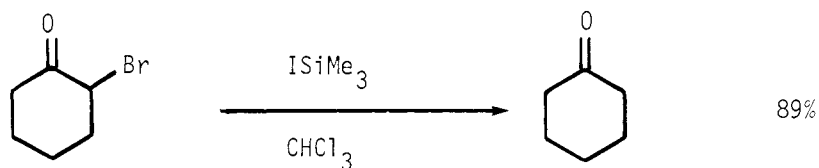
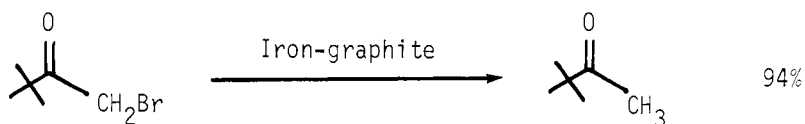
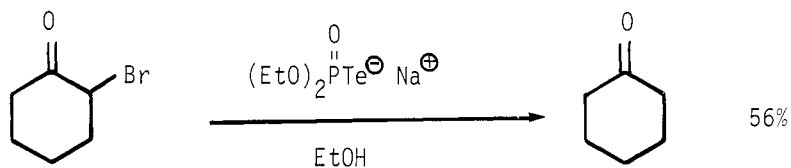


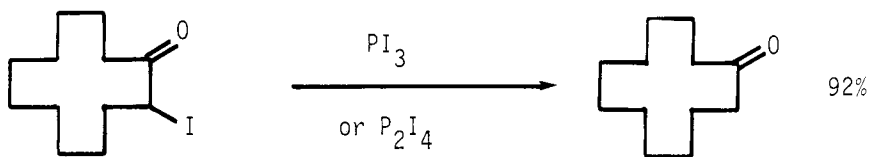
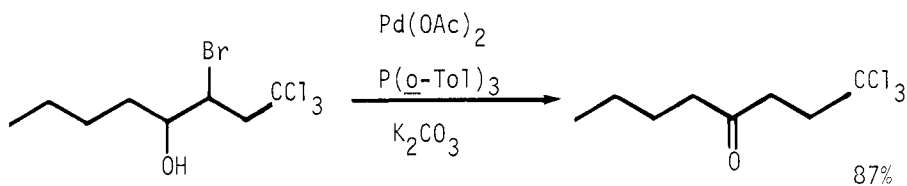
Synthesis, 876 (1982)

JOC, 47, 4380 (1982)JOC, 47, 2622 (1982)

Tetr Lett, 23, 1643 (1982)JOC, 46, 1270 (1981)JOC, 45, 3531 (1980)JOC, 46, 3909 (1981)

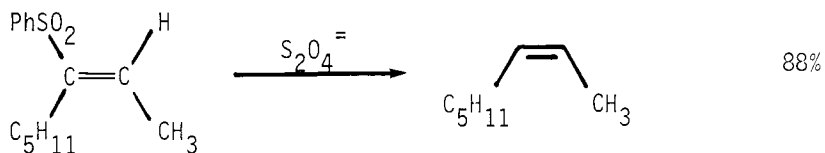
Tetrahedron, 37, 2261 (1981)Angew Chem Int Ed, 19, 46 (1980)JOC, 46, 1270 (1981)Synth Comm, 12, 261 (1982)

Tetr Lett, 21, 3195 (1980)Synth Comm, 11, 101 (1981)JOC, 47, 876 (1982)JOC, 47, 1124 (1982)

Tetr Lett, 22, 1431 (1981)Tetr Lett, 23, 3085 (1982)

Review: "The Hydrogenolysis of Organic Halides"

Synthesis, 425 (1980)

A study of the reduction of alkyl halides using LiAlH_4 in THF.JOC, 47, 276 (1982)Tetr Lett, 23, 3265 (1982)

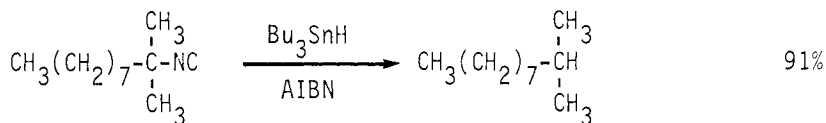
Section 161 Hydrides from Hydrides

No additional examples.

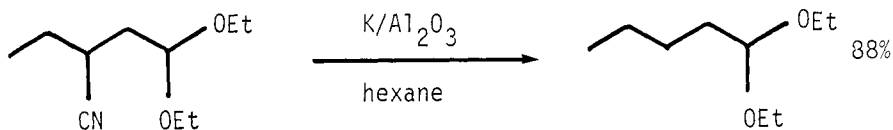
Section 162 Hydrides from Ketones

No additional examples.

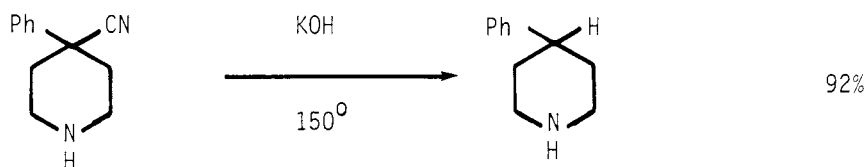
For the conversion $R_2CO \rightarrow R_2CH_2$ or R_2CHR' see Section 72 (Alkyls and Methylenes from Ketones)

Section 163 Hydrides from Nitriles

JCS Perkin I, 2657 (1980)



JOC, 45, 3227 (1980)

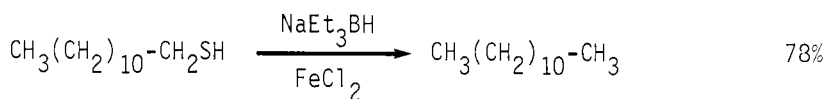


Synth Comm, 10, 939 (1980)

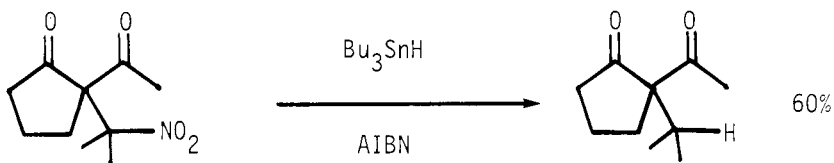
Section 164 Hydrides from Olefins

No additional examples.

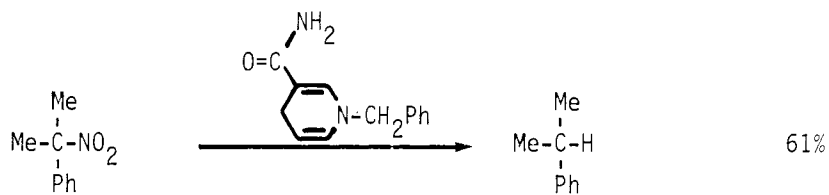
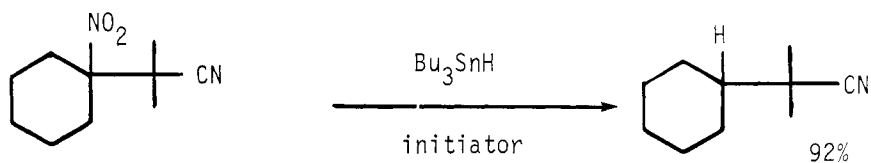
Section 165 Hydrides from Miscellaneous Compounds



Angew Chem Int Ed, 19, 315 (1980)



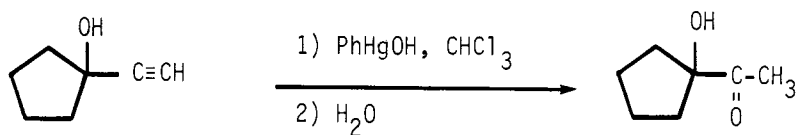
Tetr Lett, 22, 1705 (1981)

JACS, 102, 2851 (1980)JACS, 103, 1557 (1981)

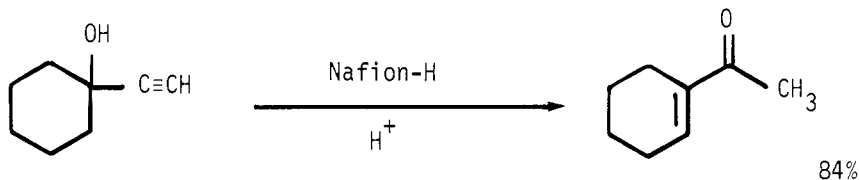
CHAPTER 12

PREPARATION OF KETONES

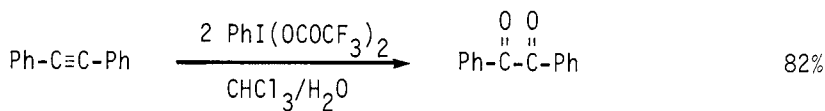
Section 166 Ketones from Acetylenes



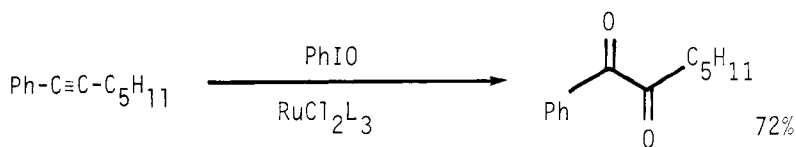
JOC, 47, 3331 (1982)



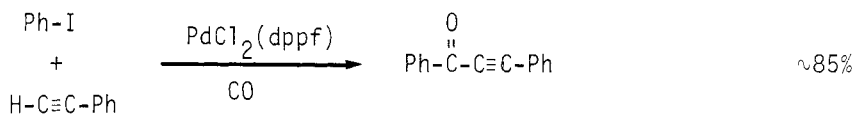
Synthesis, 473 (1981)



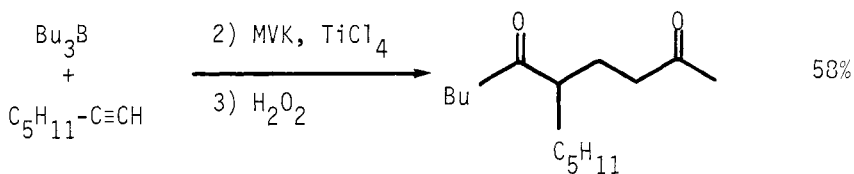
Doklady Chem, 245, 140 (1979)



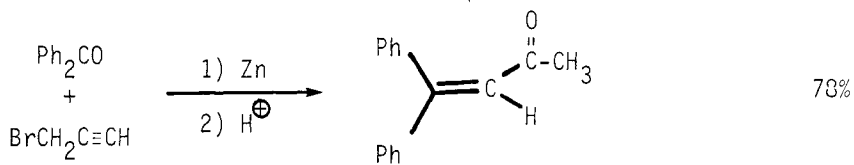
Helv Chim Acta, 64, 2531 (1981)



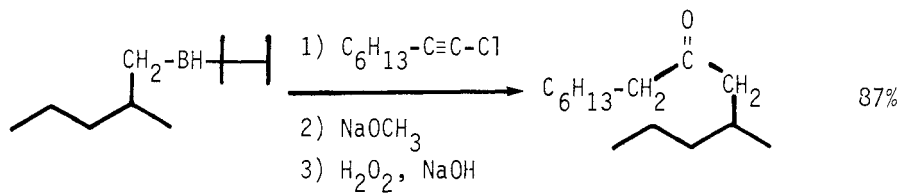
JCS Chem Comm, 333 (1981)



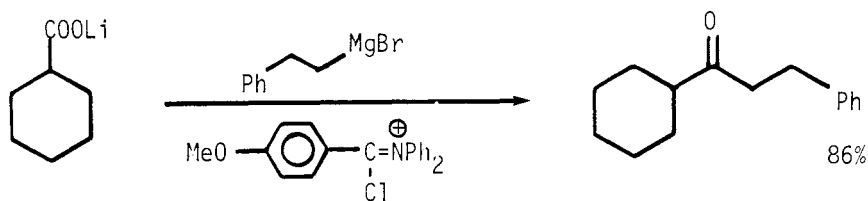
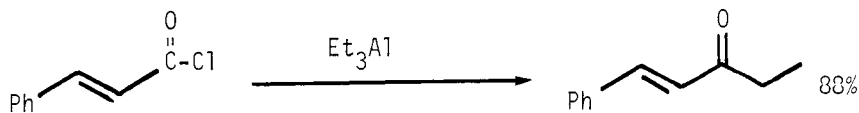
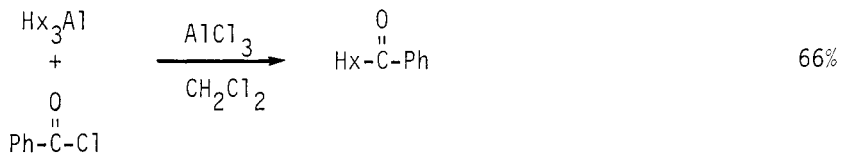
Chem Lett, 221 (1980)

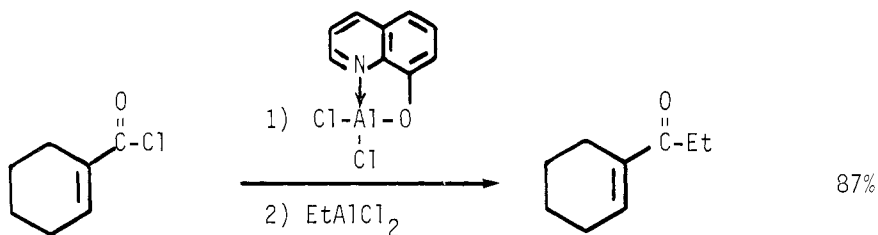
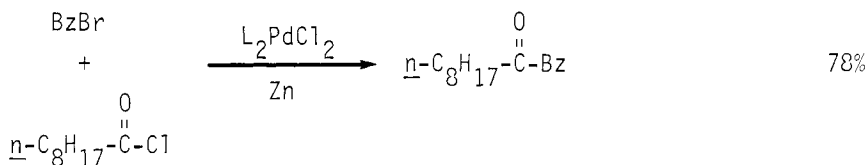


Synth Comm, 10, 637 (1980)

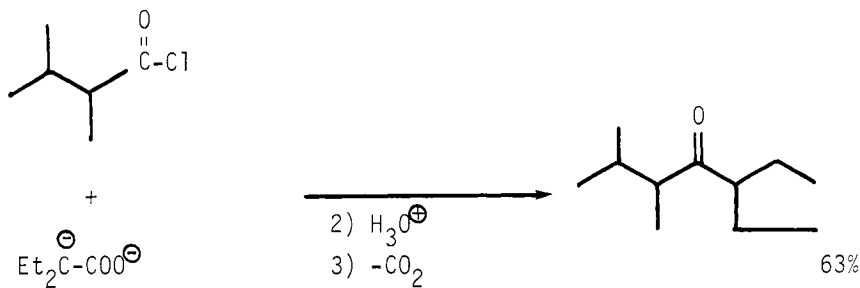


Synthesis, 193 (1982)

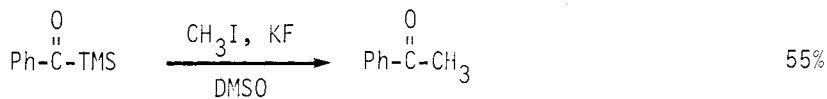
Section 167 Ketones from Carboxylic Acids and Acid HalidesTetr Lett, 23, 5059 (1982)J Gen Chem (USSR), 51, 1359 and 1434 (1982)J Gen Chem (USSR), 50, 2195 (1980)

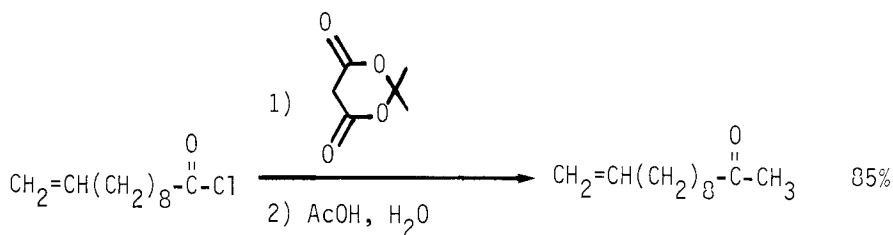
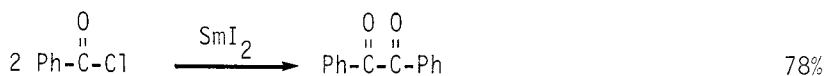
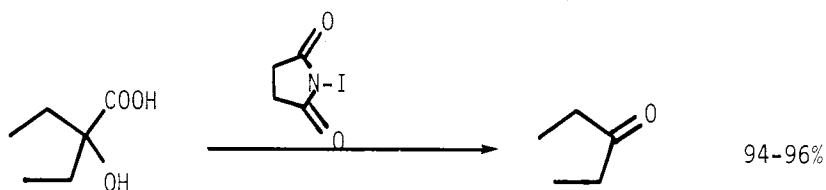
J Gen Chem (USSR), 52, 1170 (1982)

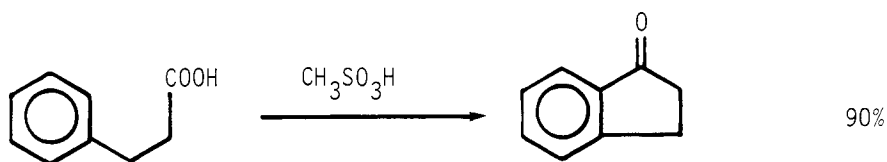
Chem Lett, 1135 (1981)



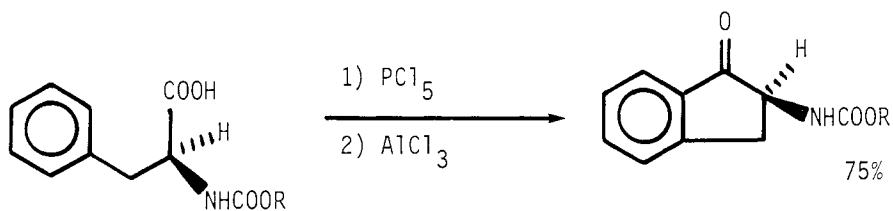
J Chem Research(S), 44 (1980)

Tetr Lett, 22, 1881 (1981)

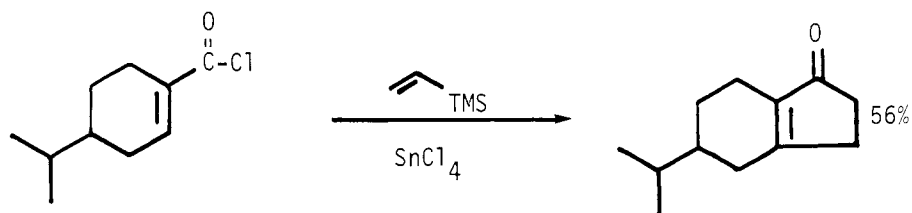
Indian J Chem, 20B, 504 (1981)Synth Comm, 10, 221 (1980)Tetr Lett, 22, 3959 (1981)JOC, 47, 3006 (1982)Angew Chem Int Ed, 19, 822 (1980)



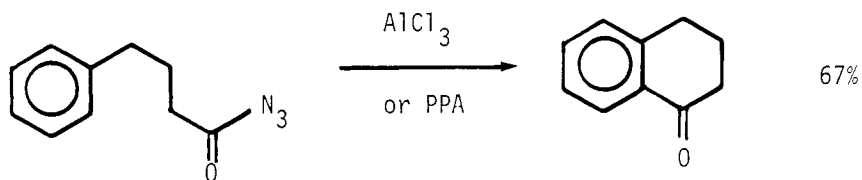
JOC, 46, 2974 (1981)



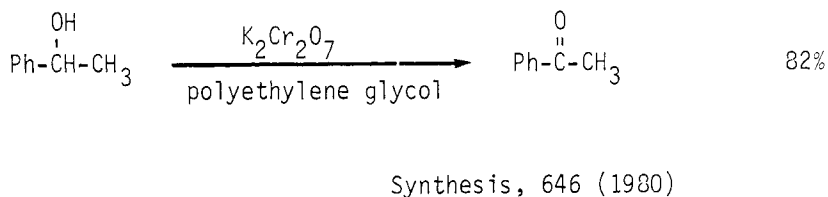
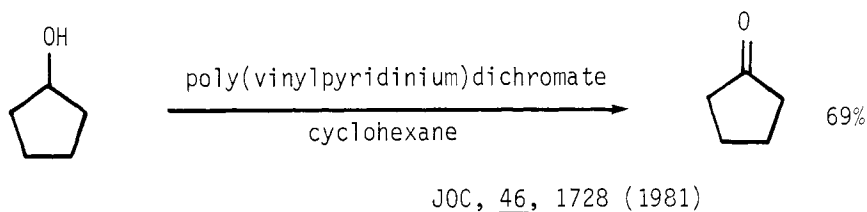
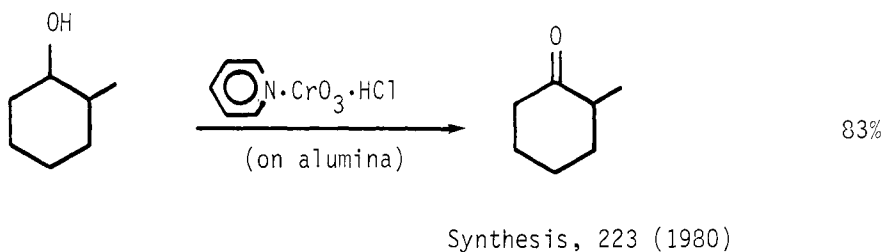
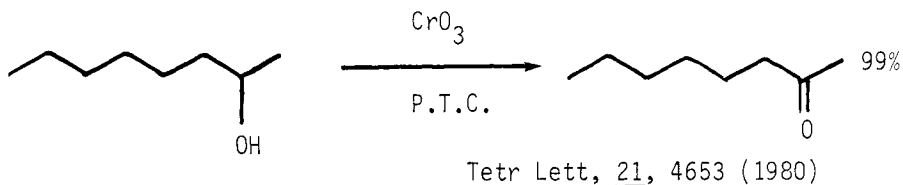
JOC, 46, 2431 (1981)

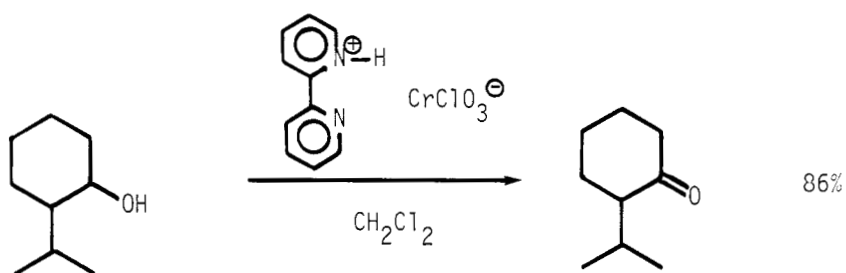


JOC, 45, 1046 (1980)

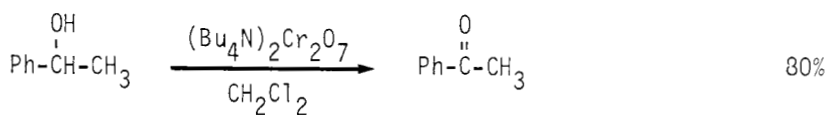
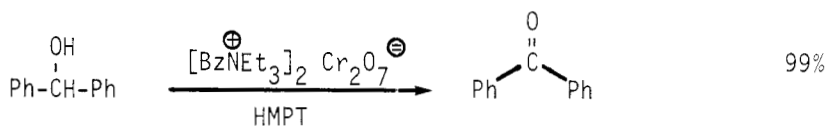


Chem Lett, 1501 (1980)

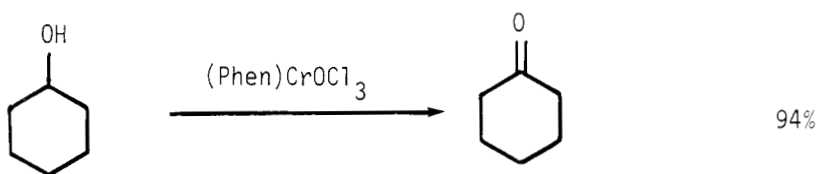
Section 168 Ketones from Alcohols

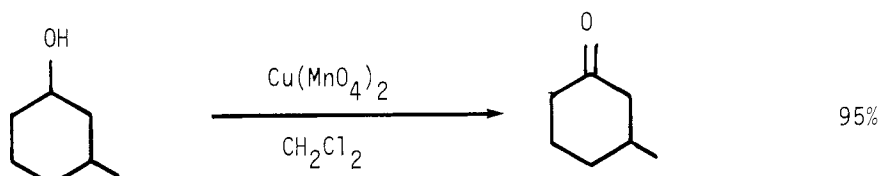
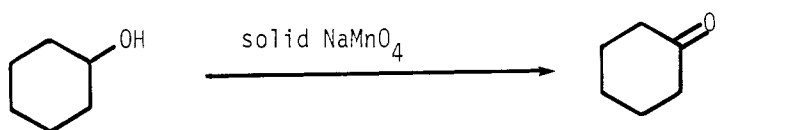
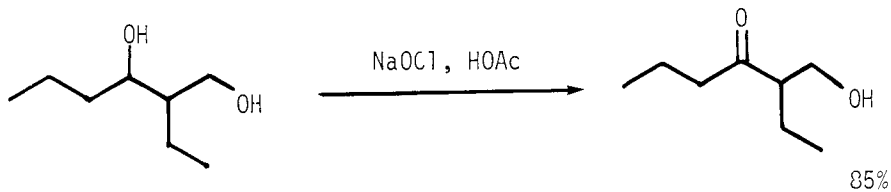
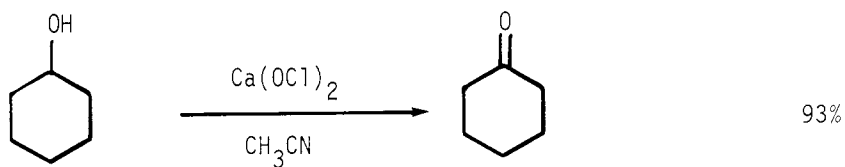


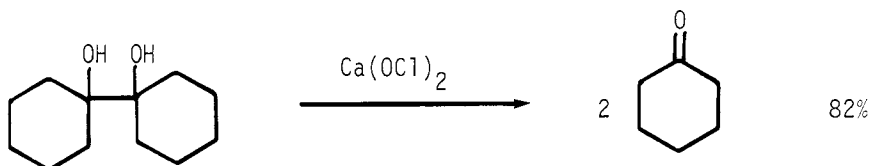
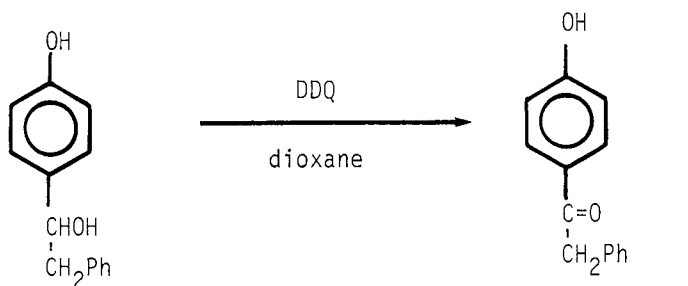
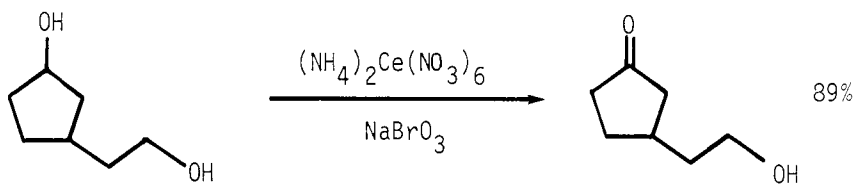
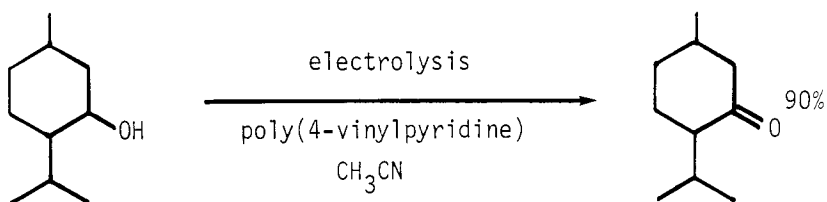
Synthesis, 691 (1980)

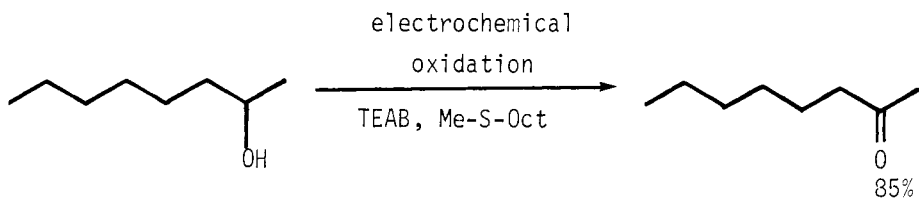
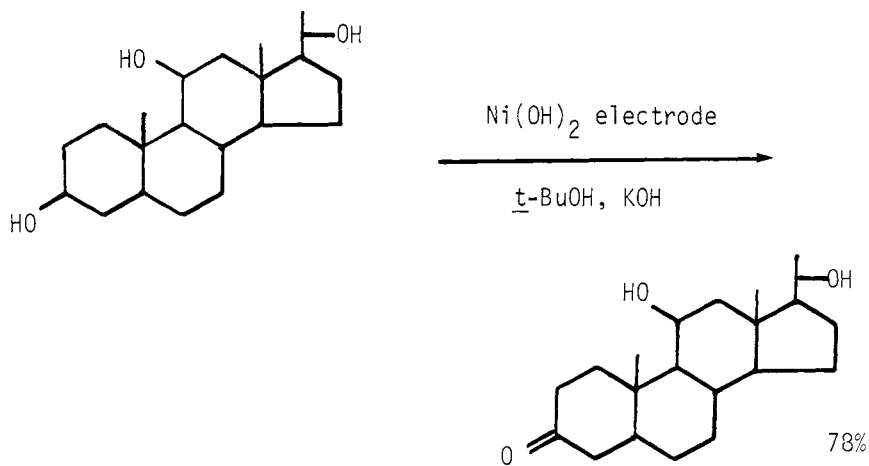
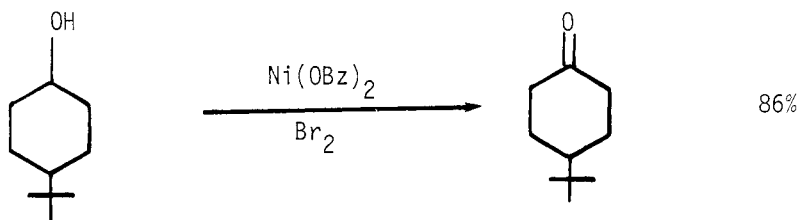
Synth Comm, 10, 75 (1980)

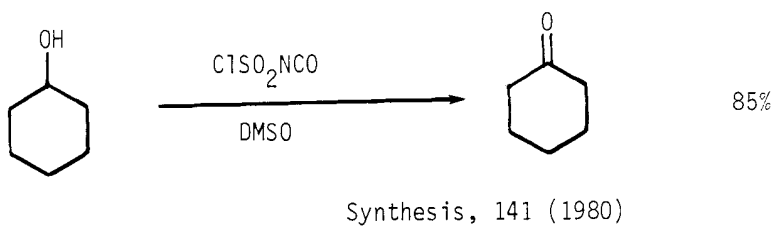
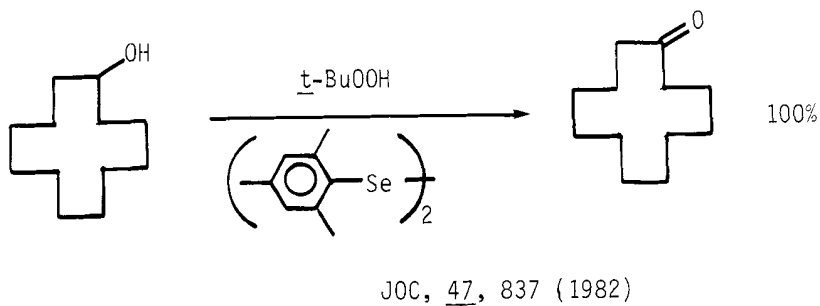
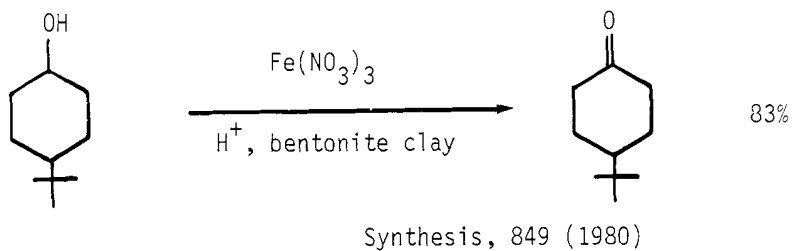
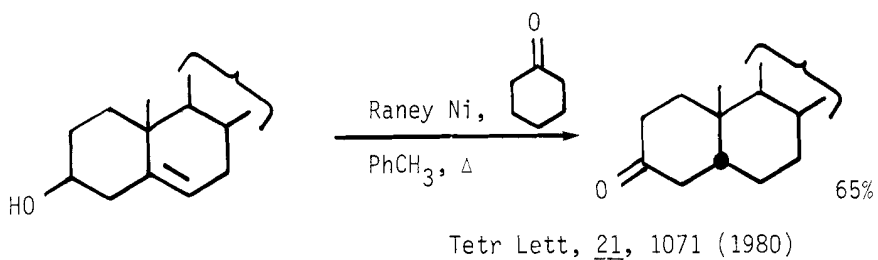
Synthesis, 1091 (1982)

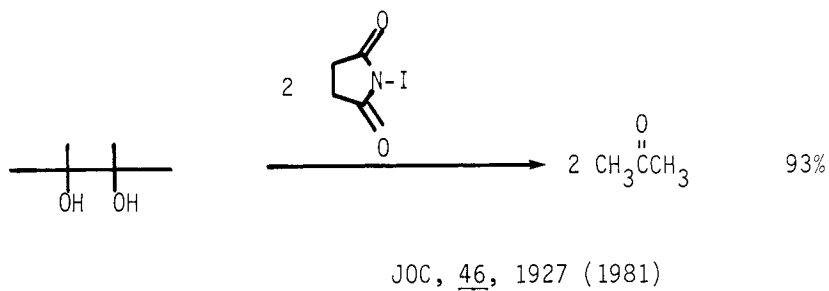
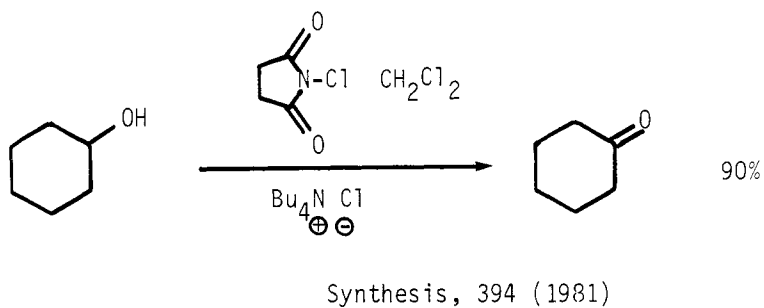
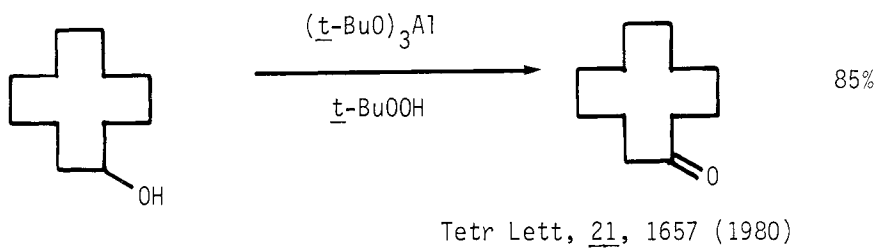
Tetr Lett, 21, 1583 (1980)

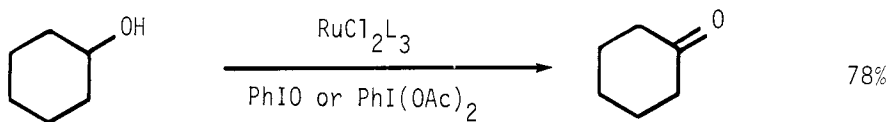
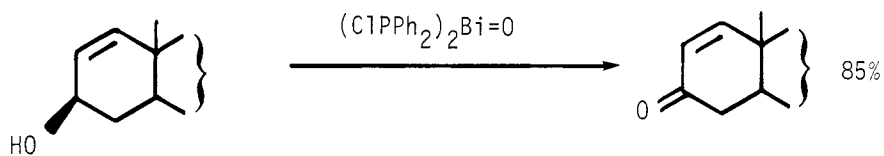
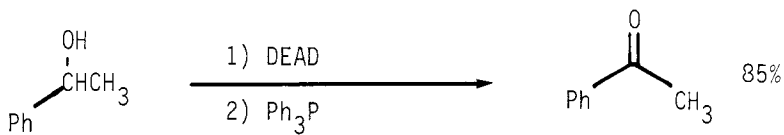
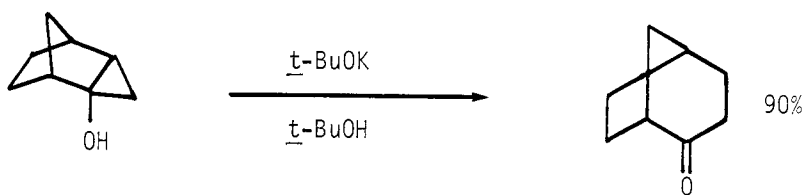
JOC, 47, 2790 (1982)Tetr Lett, 22, 1655 (1981)JOC, 45, 2030 (1980)Tetr Lett, 23, 4647 (1982)Tetr Lett, 23, 35 (1982)

Tetr Lett, 23, 3135 (1982)JOC, 45, 1596 (1980)Tetr Lett, 23, 539 (1982)JOC, 45, 5269 (1980)

Tetr Lett, 21, 1867 (1980)Tetrahedron, 38, 3299 (1982)Synth Comm, 10, 881 (1980)

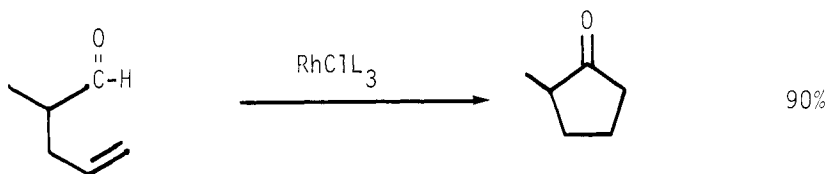
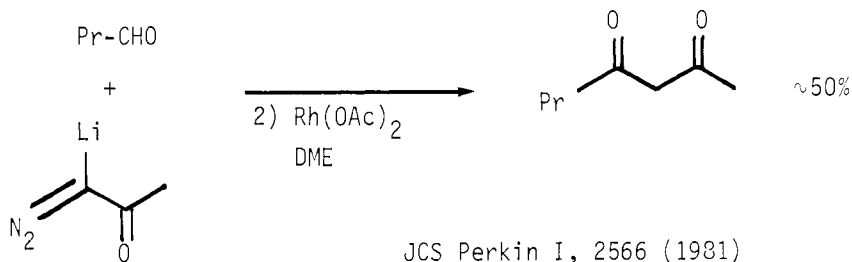




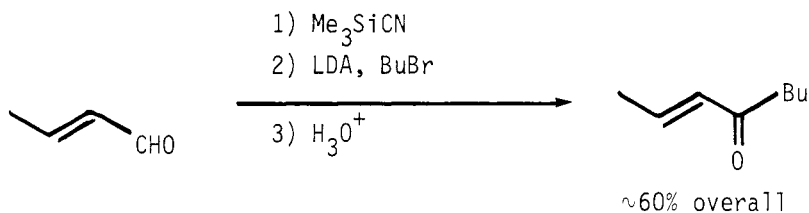
Tetr Lett, 22, 2361 (1981)Tetrahedron, 37, Suppl #1, 73 (1981)Tetr Lett, 22, 2295 (1981)Can J Chem, 58, 2730 (1980)

Tetr Lett, 23, 983 (1982)

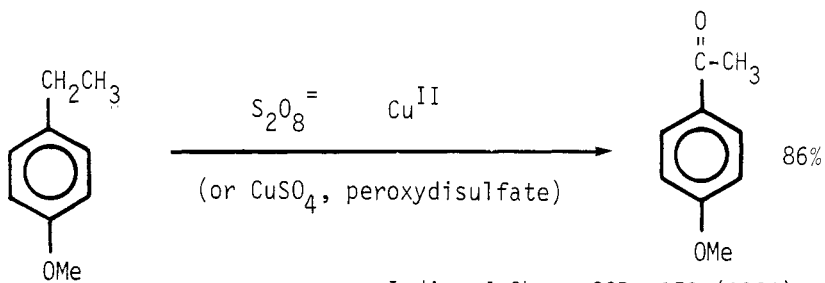
Related Methods: Aldehydes from Alcohols and Phenols (Section 48)

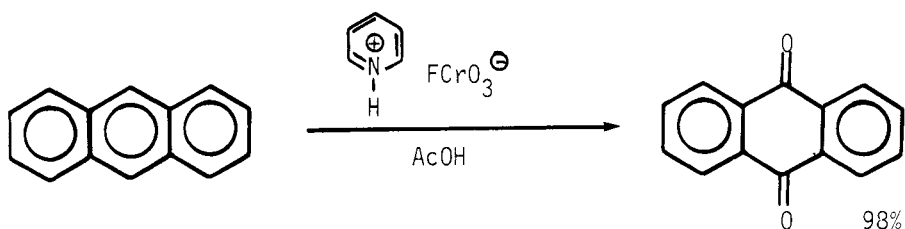
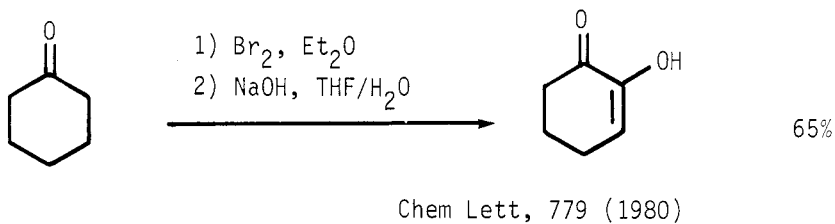
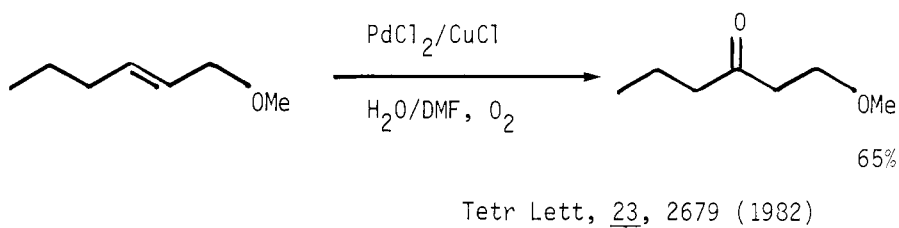
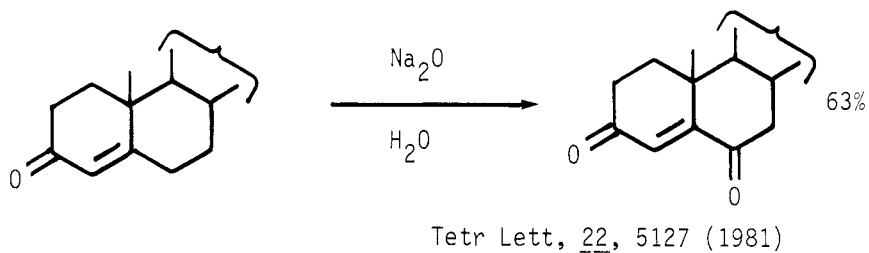
Section 169 Ketones from AldehydesJACS, 102, 190 (1980)

JCS Perkin I, 2566 (1981)

Chem Ber, 113, 3783 (1980)Org Syn, 59, 53 (1980)Section 170 Ketones from Methylene and Aryls

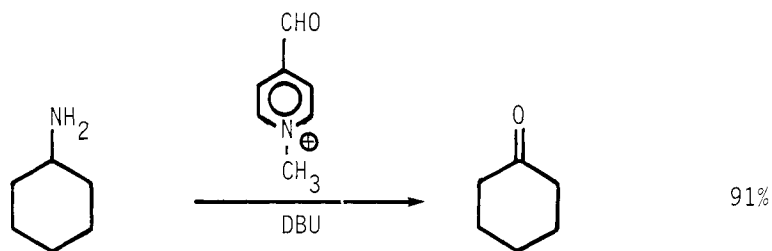
This section lists examples of the reaction $\text{R}-\text{CH}_2-\text{R}' \rightarrow \text{R}-\overset{\text{O}}{\underset{\text{||}}{\text{C}}}-\text{R}'$

Indian J Chem, 20B, 153 (1981)

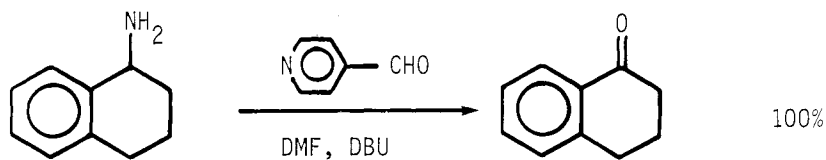


Section 171 Ketones from Amides

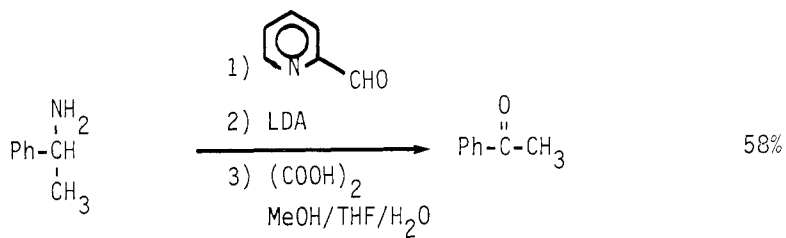
No additional examples.

Section 172 Ketones from Amines

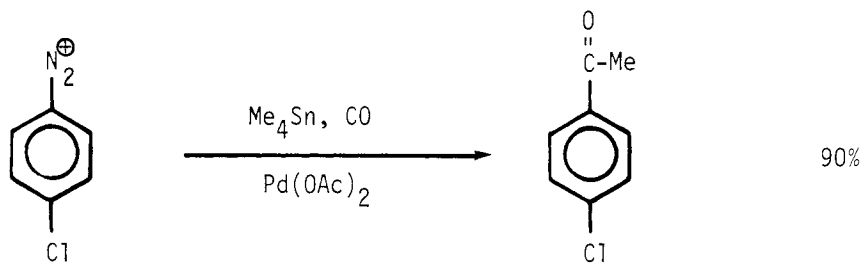
JACS, 104, 4446 (1982)



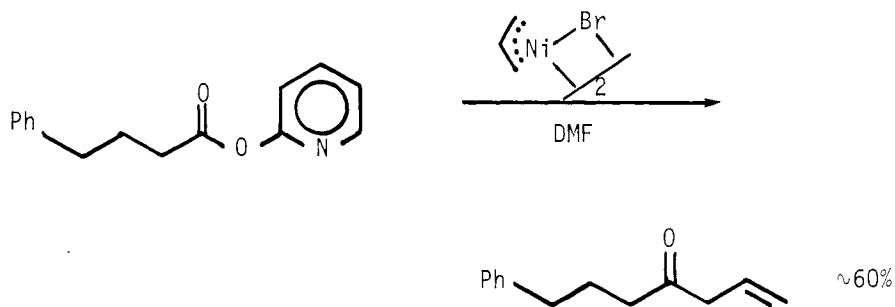
Synthesis, 756 (1982)



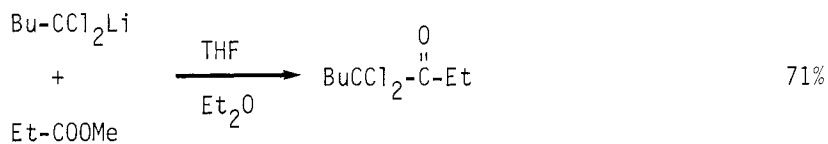
JOC, 46, 1937 (1981)

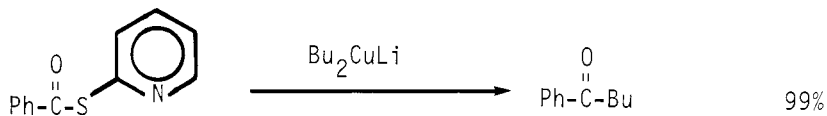


Chem Lett, 35 (1982)

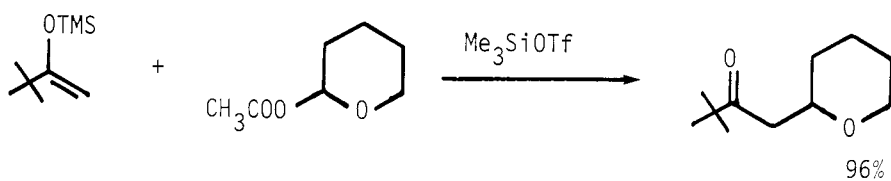
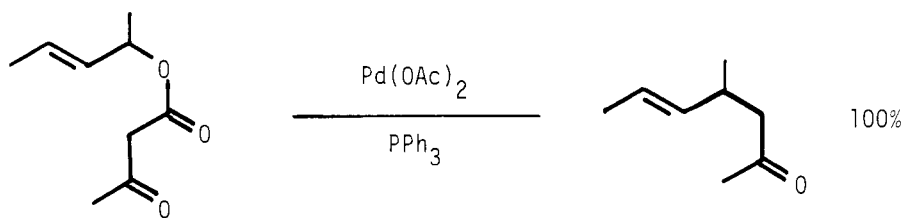
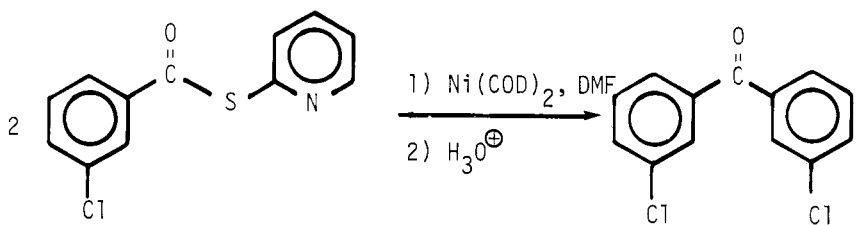
Section 173 Ketones from Esters

Chem Lett, 1483 (1979)

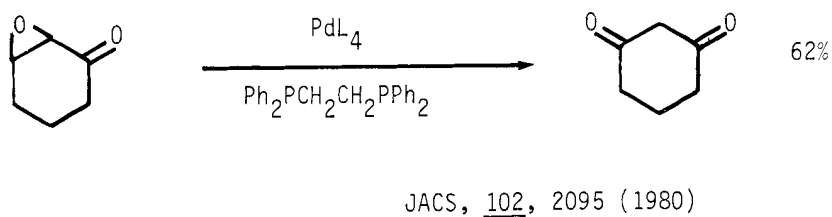
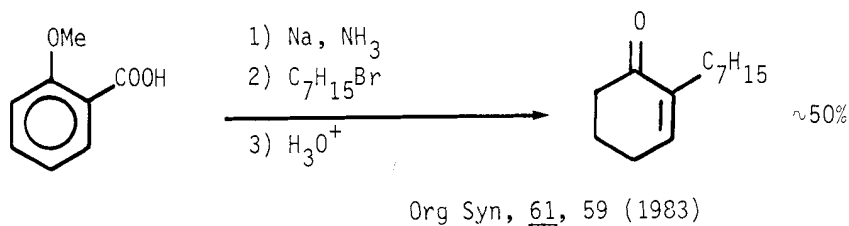
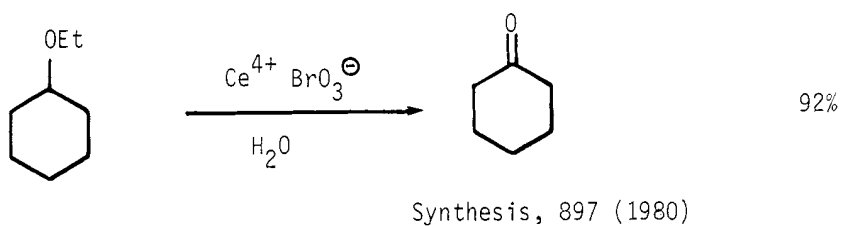
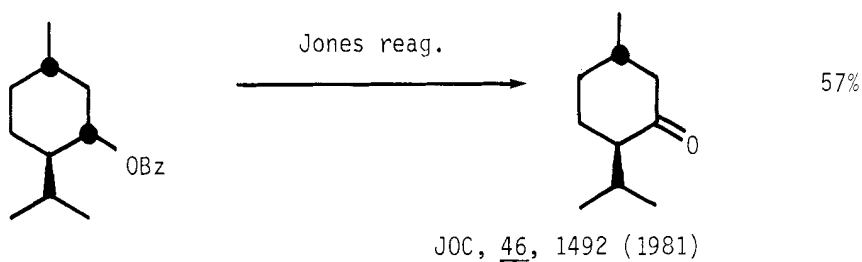
Comptes Rendus (C), 291, 105 (1980)

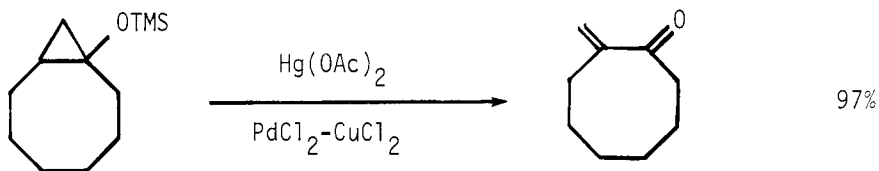
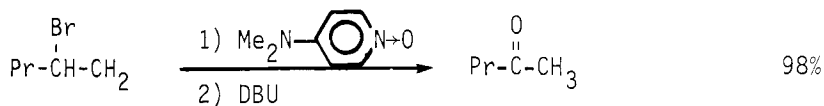
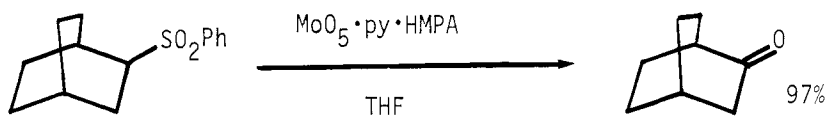
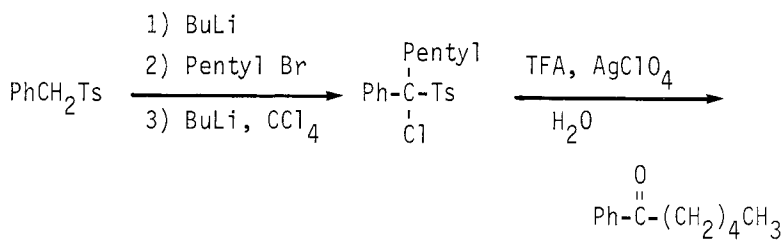


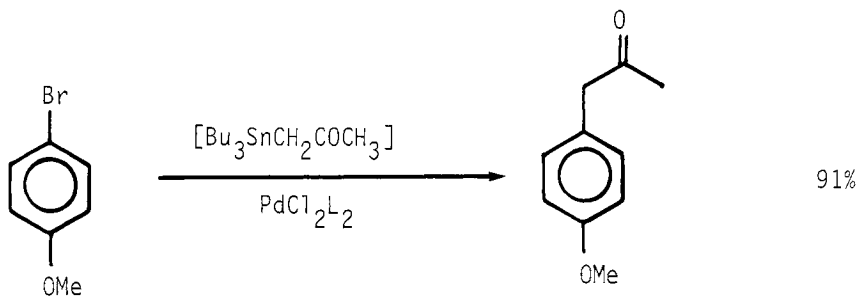
JCS Chem Comm, 1231 (1981)

Tetr Lett, 23, 2601 (1982)Tetr Lett, 21, 3199 (1980)

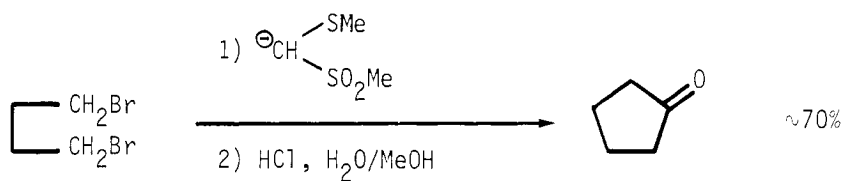
Chem Lett, 51 (1980)

Section 174 Ketones from Ethers and Epoxides

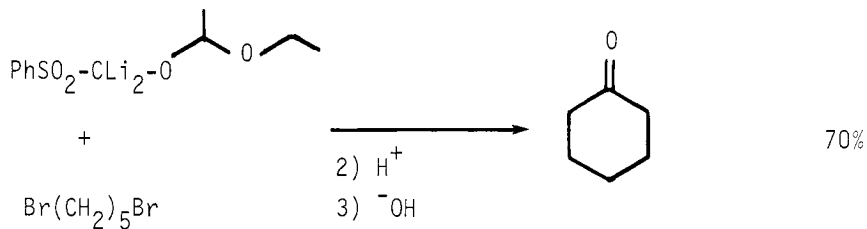
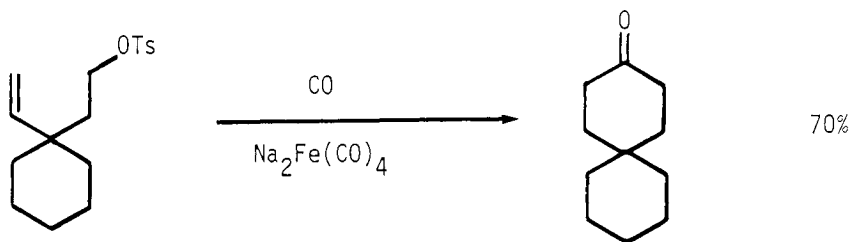
Tetr Lett, 21, 4283 (1980)Section 175 Ketones from Halides and SulfonatesBull Chem Soc Japan, 54, 2221 (1981)Tetr Lett, 21, 3339 (1980)Bull Chem Soc Japan, 53, 3027 (1980)

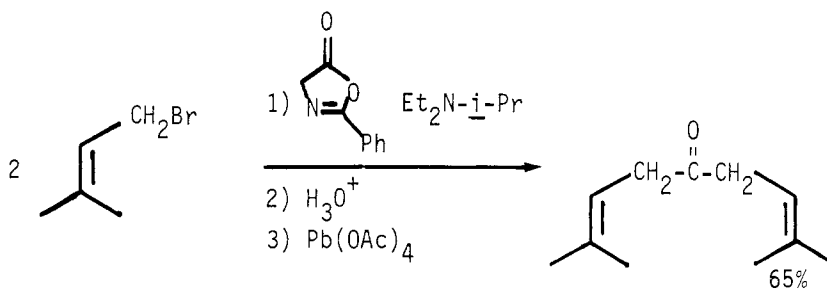
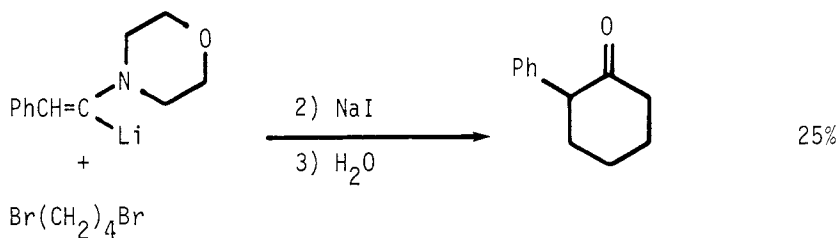


Chem Lett, 939 (1982)



Chem Lett, 813 (1982)

Bull Chem Soc Japan, 53, 3619 (1980)Tetr Lett, 21, 4687 (1980)

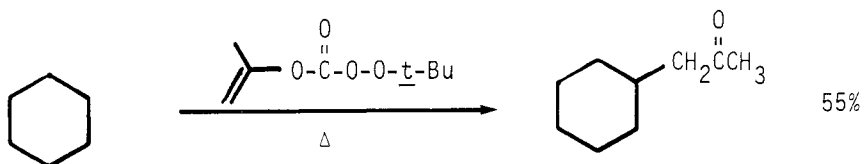
Chem Ber, 113, 3706 (1980)

JCS Chem Comm, 1121 (1981)

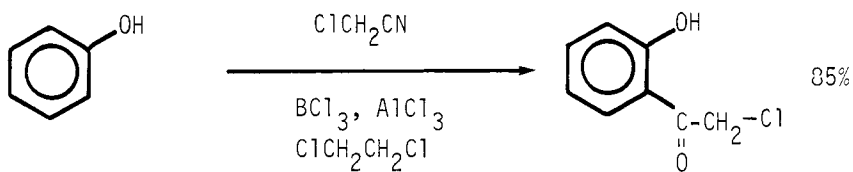
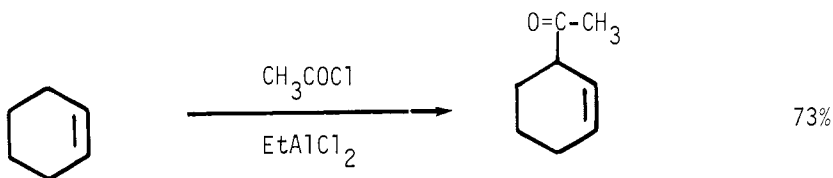
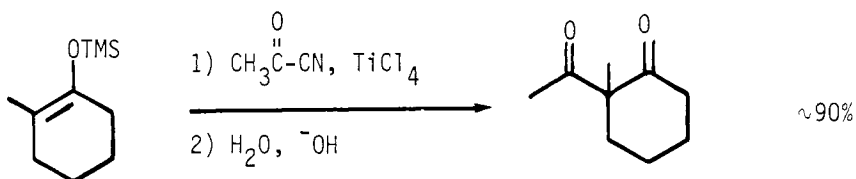
Related methods: Ketones from Ketones (Section 177), Aldehydes from Halides (Section 55)

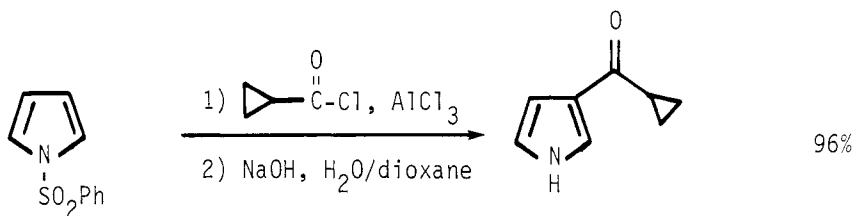
Section 176 Ketones from Hydrides

This section lists examples of the replacement of hydrogen by ketonic groups, $\text{RH} \rightarrow \text{RCOR}'$. For the oxidation of methylenes $\text{R}_2\text{CH}_2 \rightarrow \text{R}_2\text{CO}$ see Section 170 (Ketones from Alkyls and Methylenes)



Synthesis, 761 (1982)

JOC, 46, 189 (1981)JOC, 47, 5393 (1982)Tetr Lett, 22, 1171 (1981)

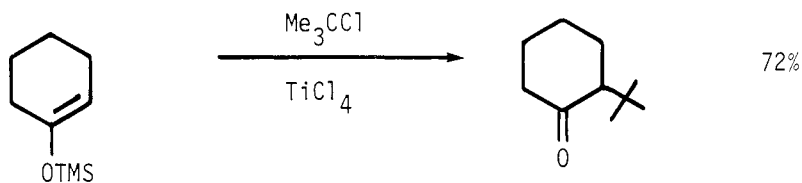


Tetr Lett, 22, 4901 (1981)

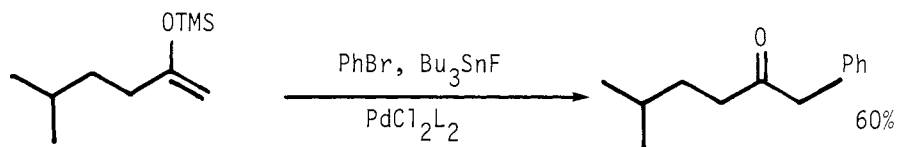
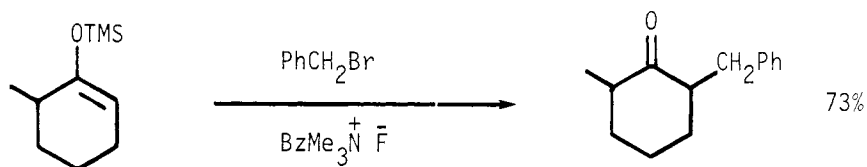
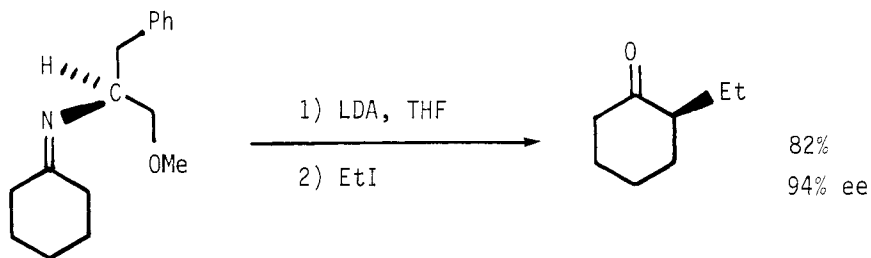
Section 177 Ketones from Ketones

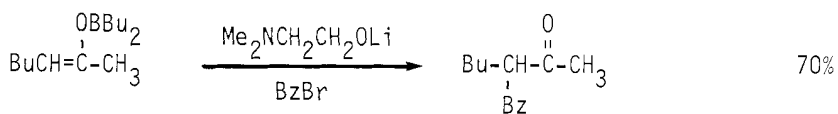
This section contains alkylations of ketones and protected ketones, ketone transpositions and annelations, ring expansions and ring openings, and dimerizations. Conjugate reductions and Michael alkylations of enones are listed in Section 74 (Alkyls from Olefins).

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

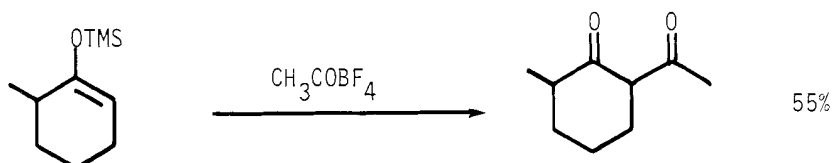


Chem Ber, 113, 3734 and 3741 (1980)

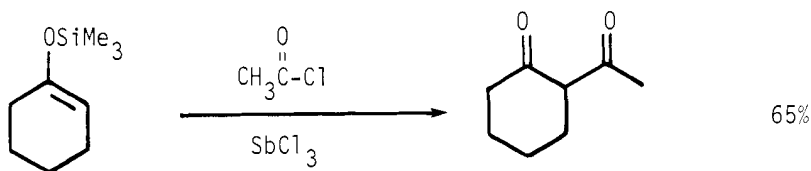
JACS, 104, 6031 (1982)JACS, 104, 1025 (1982)Review: "Lewis Acid Induced α -Alkylation of Carbonyl Compounds"Angew Chem Int Ed, 21, 96 (1982)JACS, 103, 3081 and 3088 (1981)



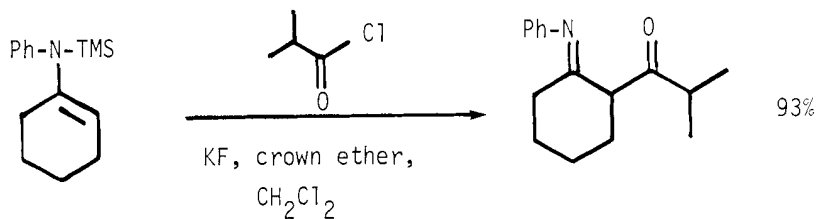
Synth Comm, 10, 139 (1980)



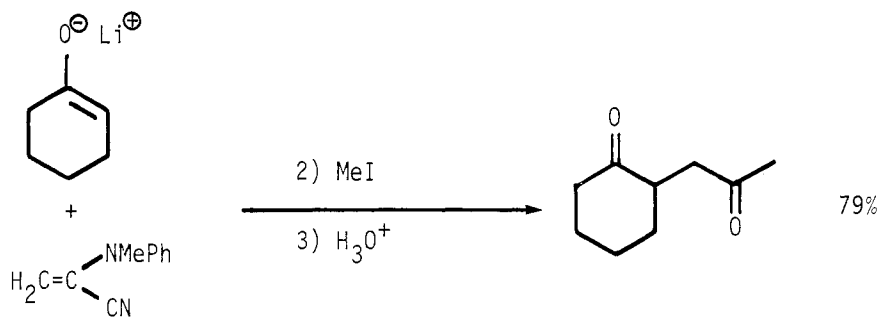
JOC, 46, 3771 (1981)



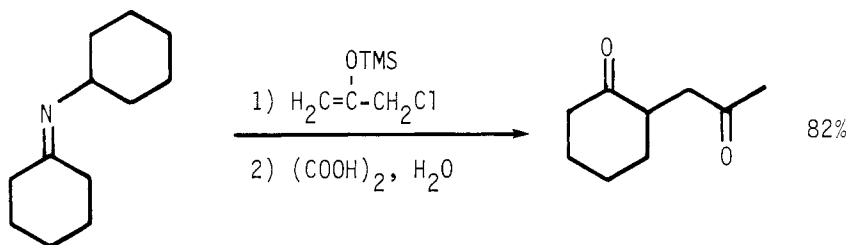
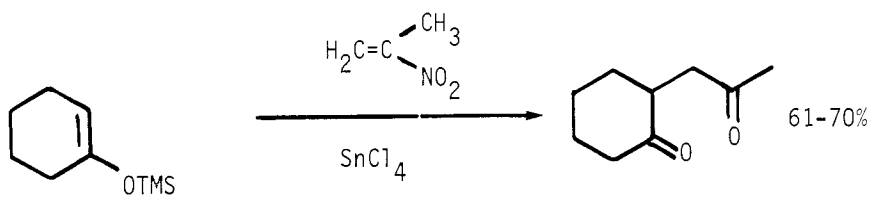
JOC, 47, 5099 (1982)

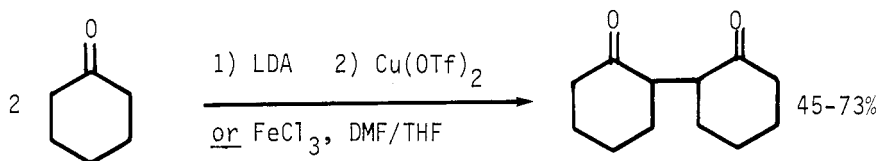
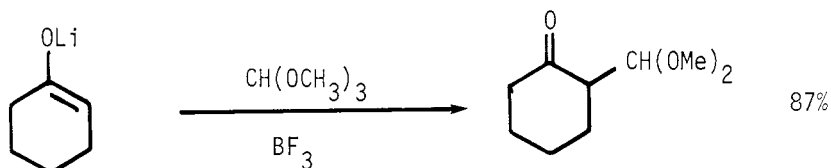
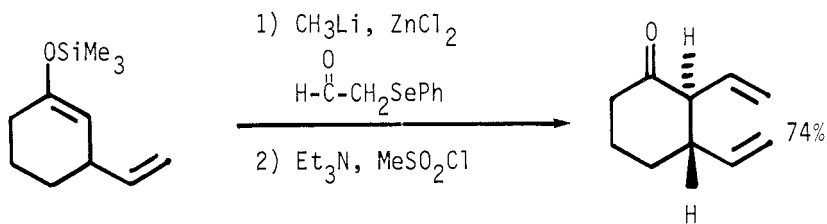
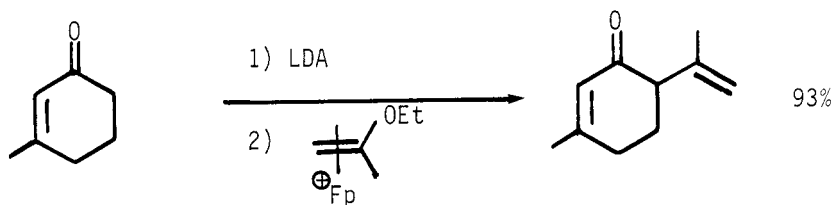


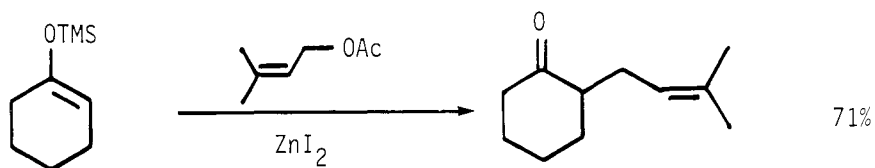
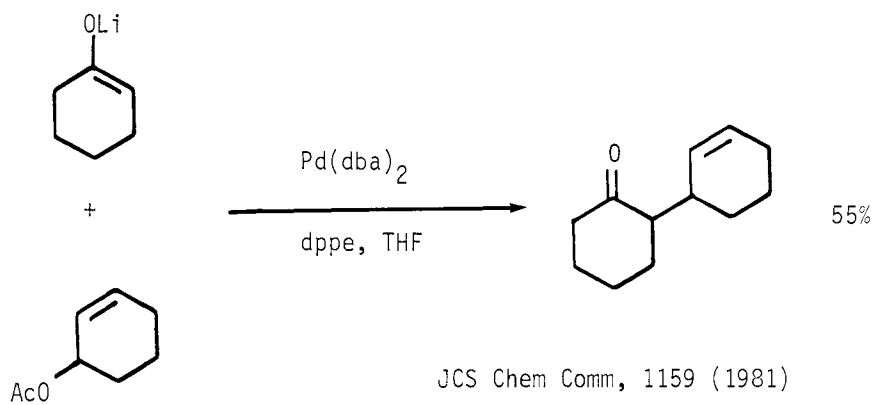
Tetr Lett, 23, 3073 (1982)



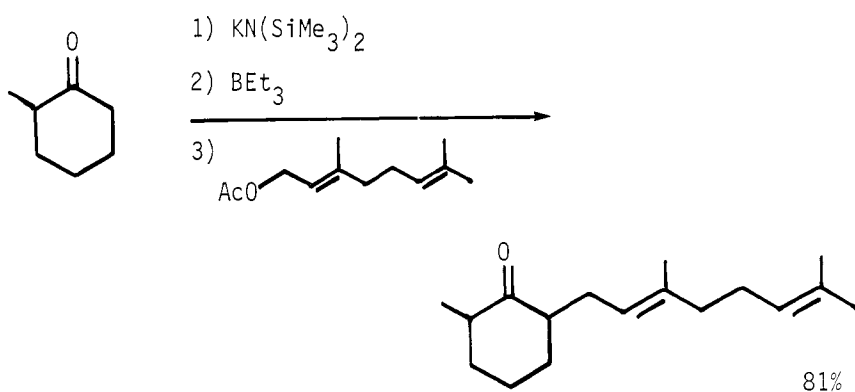
Synthesis, 413 (1980)

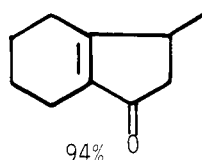
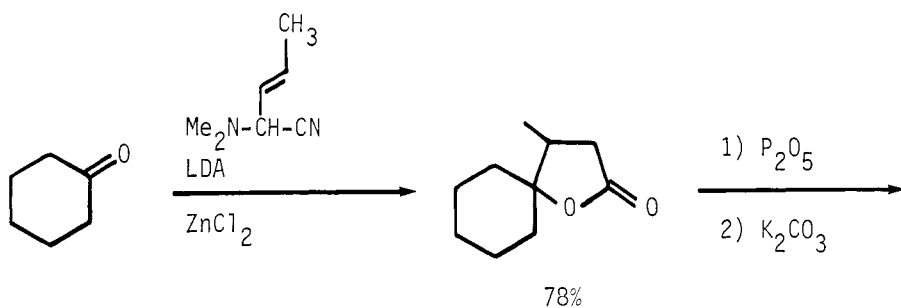
JOC, 46, 4631 (1981)Org Syn, 60, 117 (1981)

Chem Pharm Bull, 28, 262 (1980)JOC, 45, 5408 (1980)Tetr Lett, 23, 3595 (1982)JOC, 47, 1632 (1982)JOC, 46, 4103 (1981)

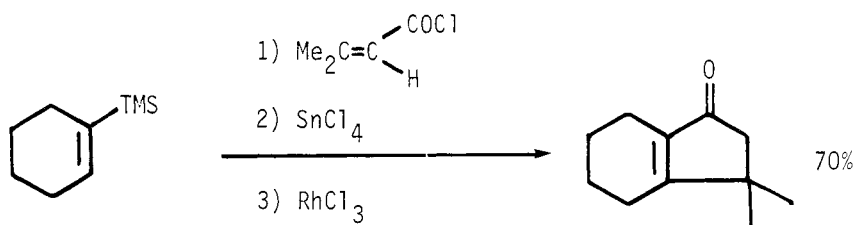
Synth Comm, 11, 217 (1981)

JCS Chem Comm, 1159 (1981)

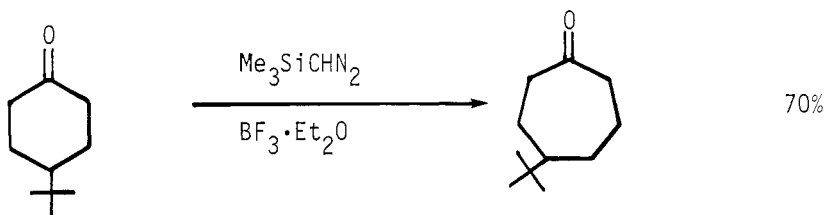
JOC, 47, 3188 (1982)



Tetr Lett, 21, 1205 (1980)

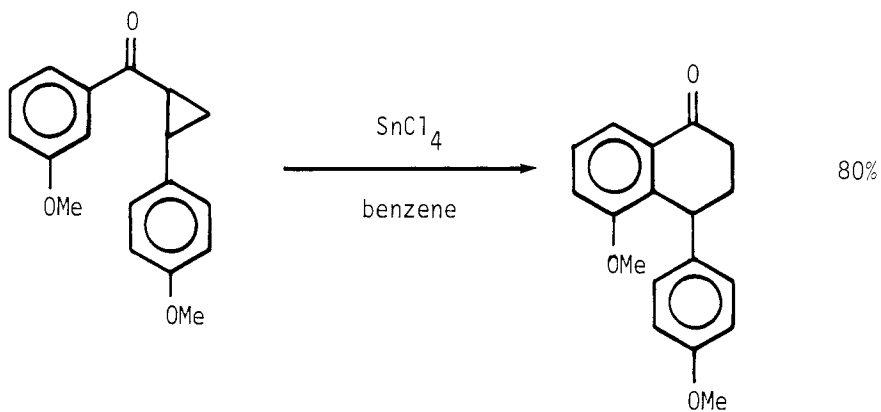
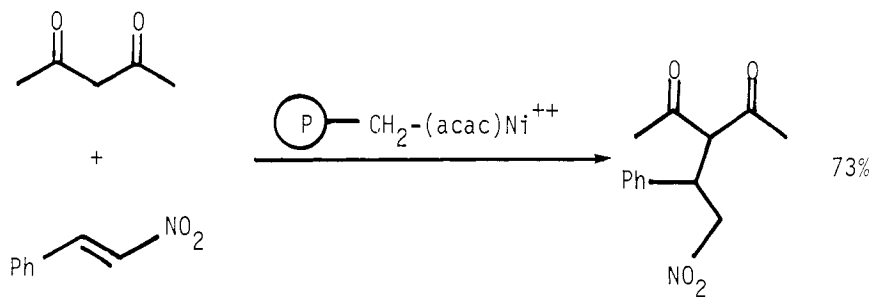


JOC, 45, 3017 (1980)

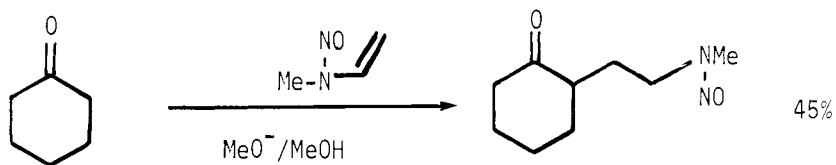


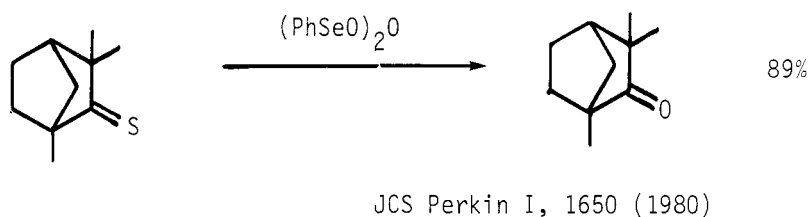
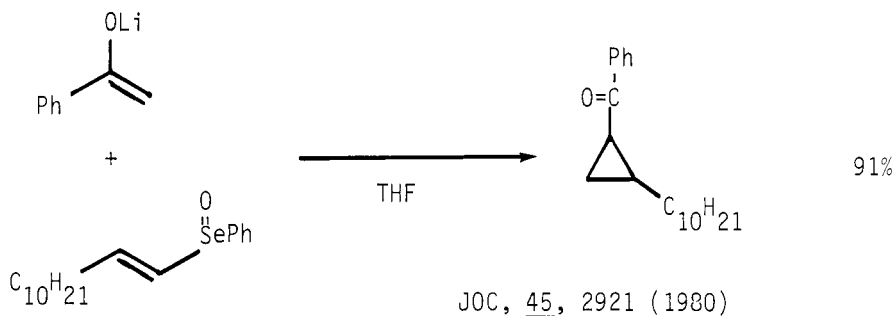
Chem Pharm Bull, 30, 119 (1982)

Tetr Lett, 21, 4619 (1980)

Tetr Lett, 21, 1887 (1980)

Synthesis, 467 (1982)

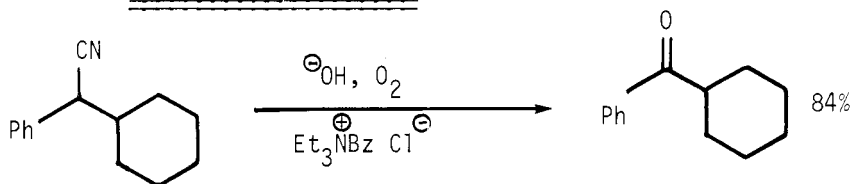
JOC, 45, 2919 (1980)



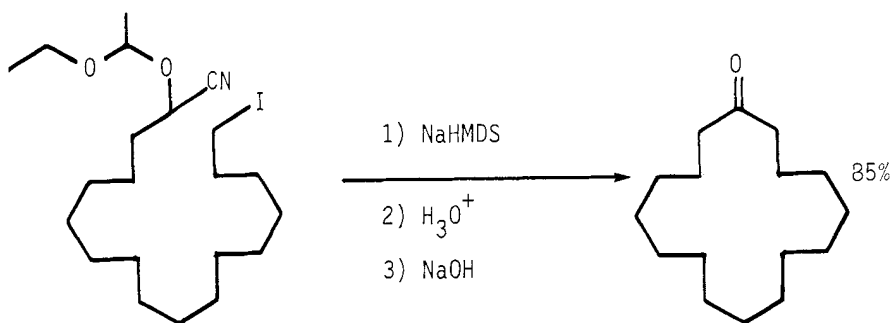
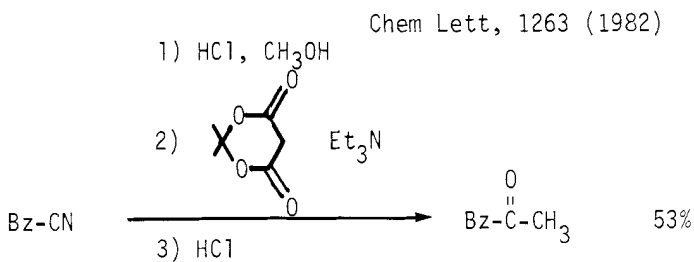
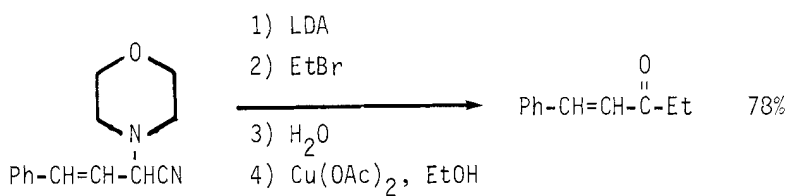
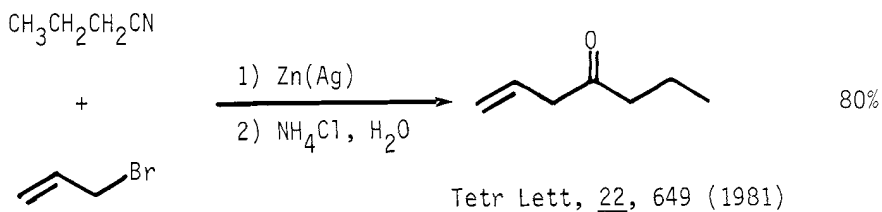
Ketones may also be alkylated and homologated via olefinic ketones (Section 374)

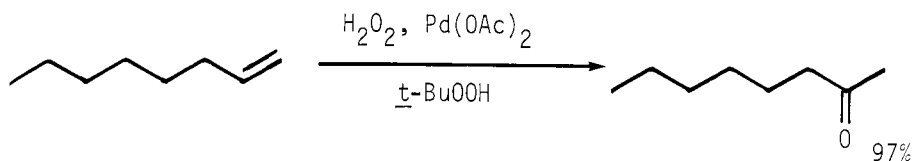
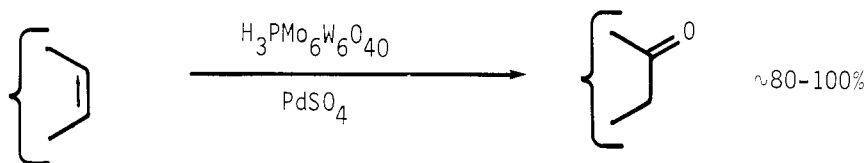
Related Methods: Aldehydes from Aldehydes (Section 49)

Section 178 Ketones from Nitriles

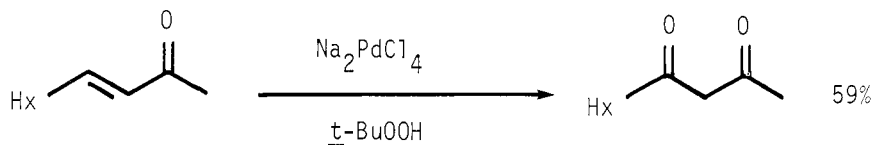


Synthesis, 1009 (1980)

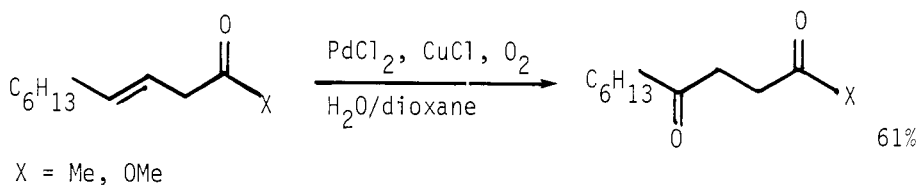


Section 179 Ketones from OlefinsJOC, 45, 5387 (1980)

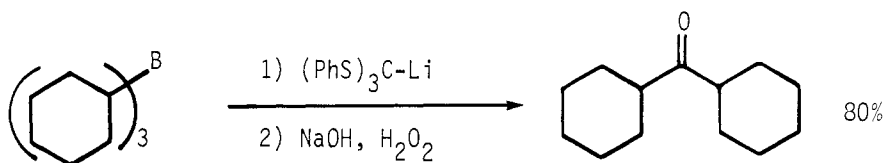
JCS Chem Comm, 1274 (1981)



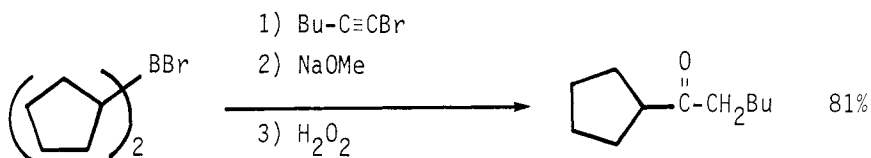
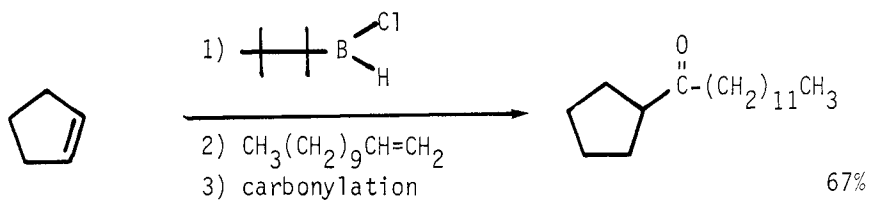
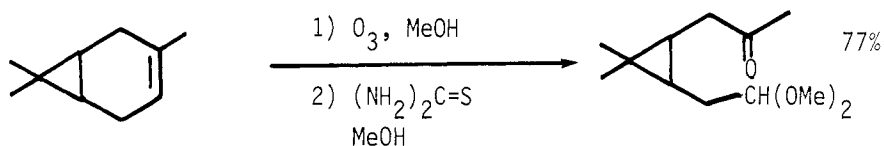
Chem Lett, 257 (1980)

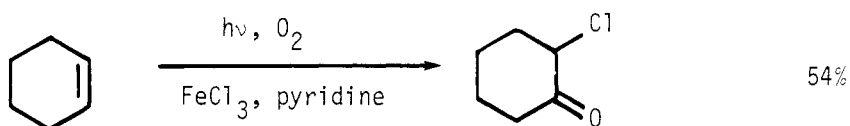


Chem Lett, 859 (1982)



JCS Chem Comm, 1149 (1981)

JOC, 47, 754 (1982)JOC, 45, 4540 and 4542 (1980)Tetrahedron, 38, 3013 (1982)

JOC, 46, 509 (1981)

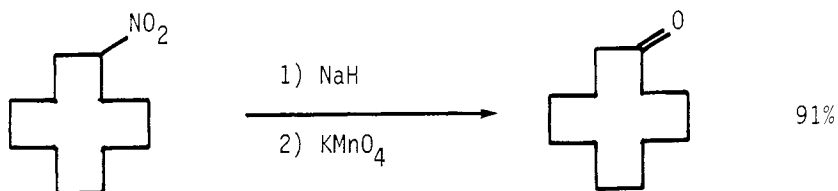
Review: "Ozonolysis -- A Modern Method in the Chemistry of Olefins"

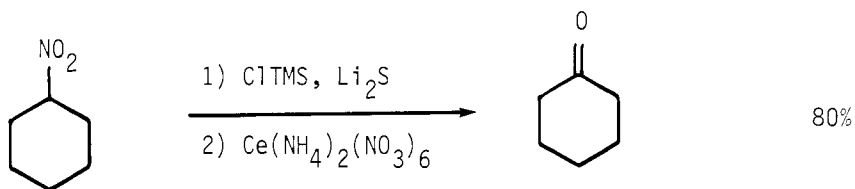
Russ Chem Rev, 50, 636 (1981)

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

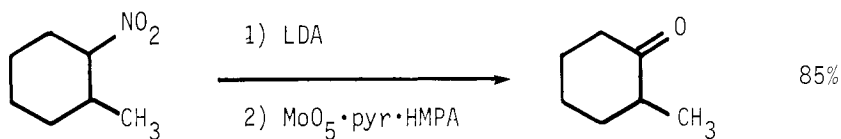
Section 180 Ketones from Miscellaneous Compounds

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

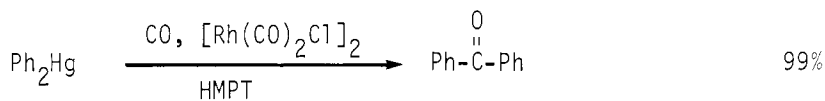
JOC, 47, 4534 (1982)



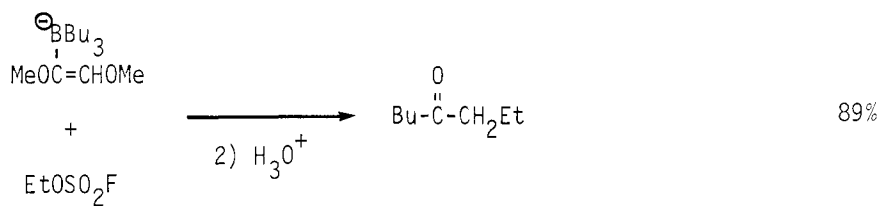
Synthesis, 44 and 662 (1980)



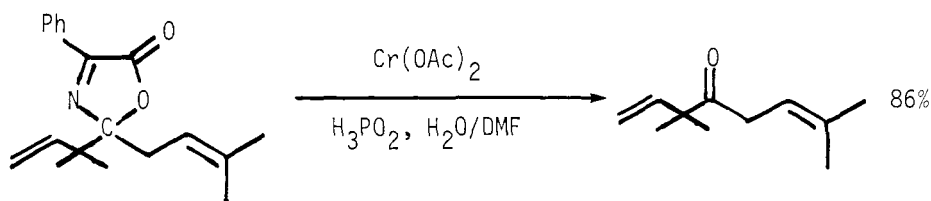
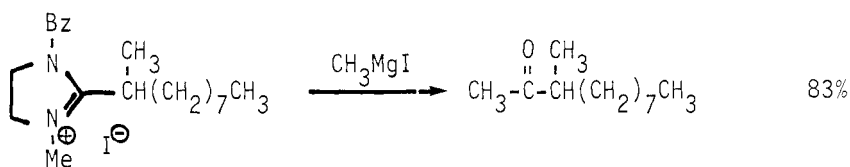
Tetr Lett, 22, 5235 (1981)



Bull Acad USSR Chem, 31, 211 (1982)



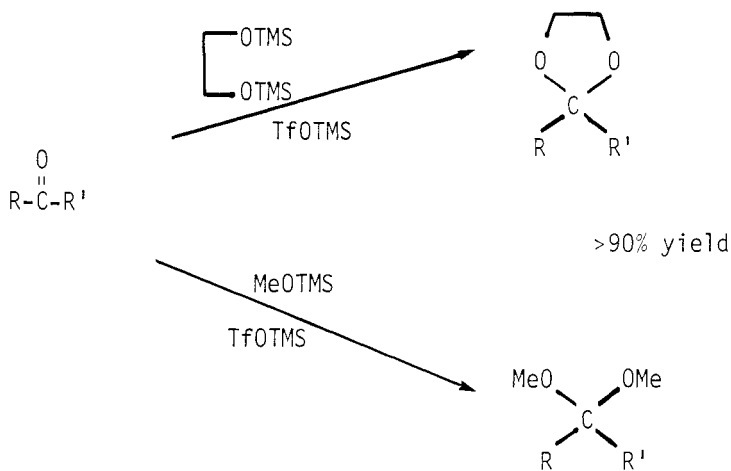
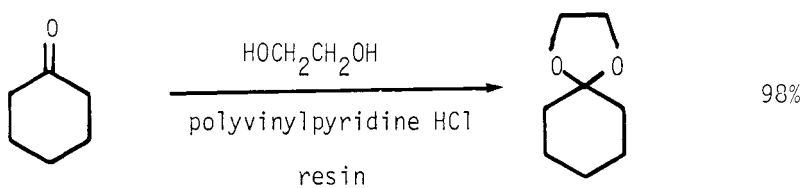
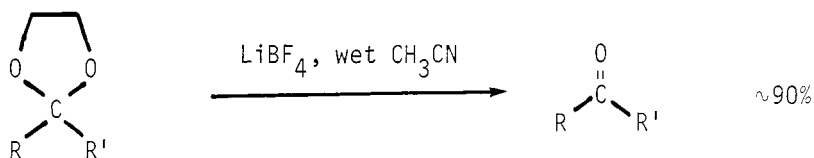
Chem Lett, 1059 (1981)

Angew Chem Int Ed, 20, 395 (1981)

JCS Chem Comm, 282 (1982)

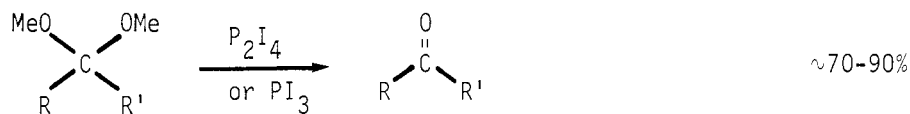
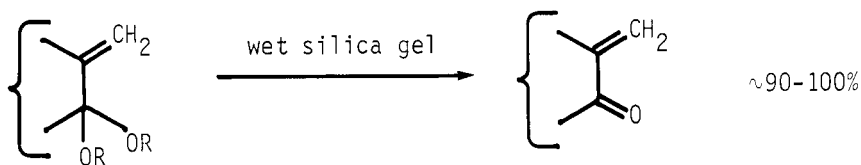
Section 180A Protection of Ketones

See Section 362 for the formation of enol esters and 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.

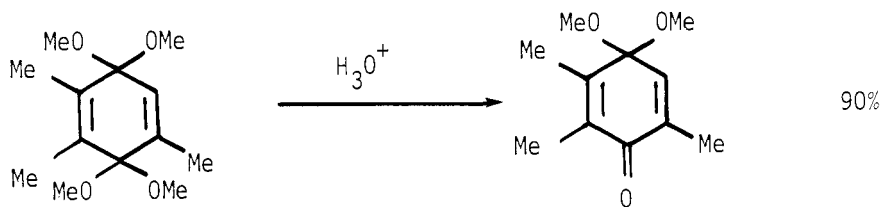
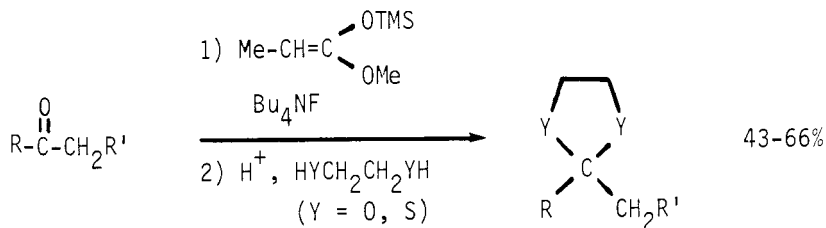
Tetr Lett, 21, 1357 (1980)Bull Chem Soc Japan, 54, 309 (1981)

Also removes dimethyl and diethyl ketals.

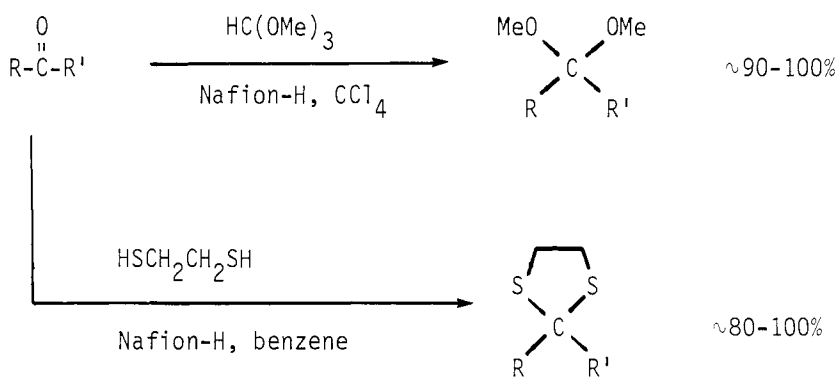
Synth Comm, 12, 267 (1982)

Angew Chem Int Ed, 19, 1006 (1980)R = Me, Et, $-(\text{CH}_2)_2$

J Chem Res (S), 248 (1982)

JOC, 45, 3422 (1980)

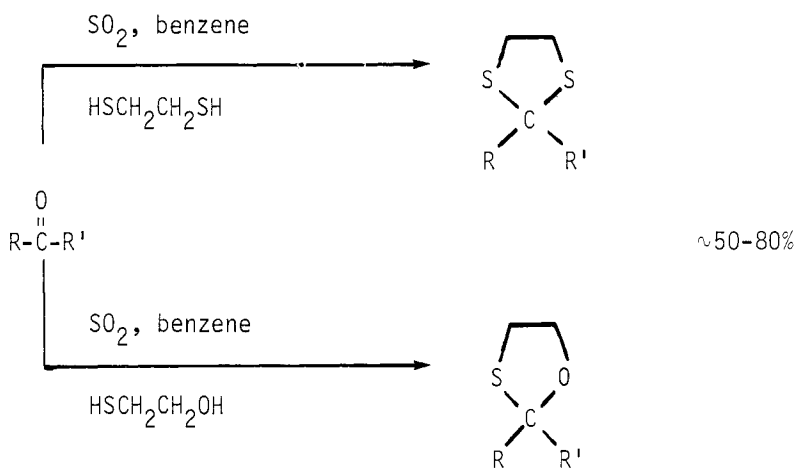
Synthesis, 1089 (1982)



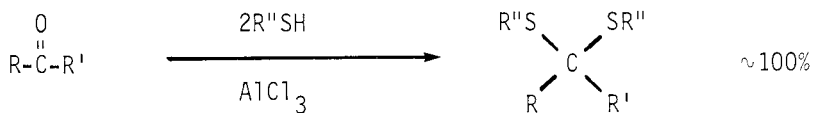
Synthesis, 282 (1981)

Review: "Methods for the Preparation of Acetals from Alcohols or Oxiranes and Carbonyl Compounds"

Synthesis, 501 (1981)

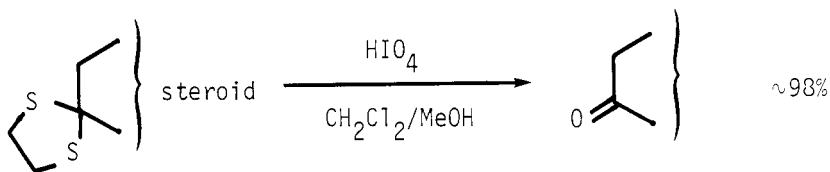


Synthesis, 831 (1982)

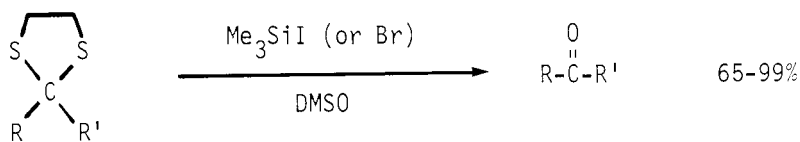


R'' = alkyl, dithiol

Tetr Lett, 21, 4225 (1980)

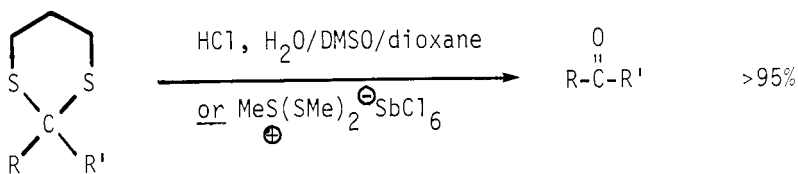


JCS Chem Comm, 886 (1980)



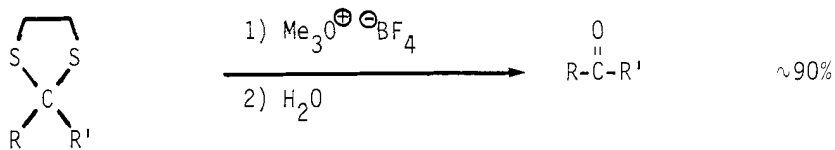
R, R' = alkyl, aryl, cyclic

Synthesis, 965 (1982)

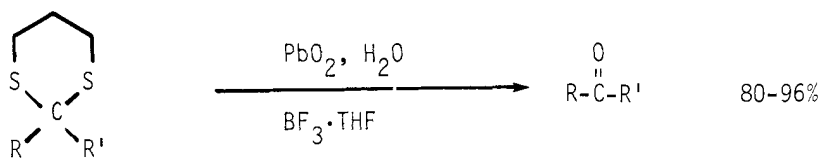


R, R' = alkyl, aryl

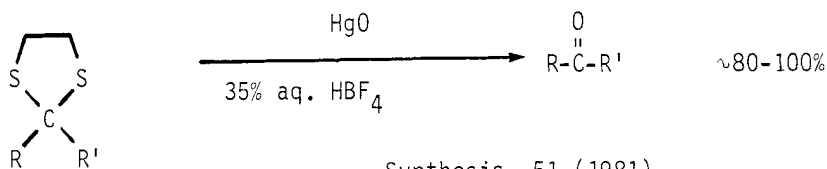
Synthesis, 679 (1982)



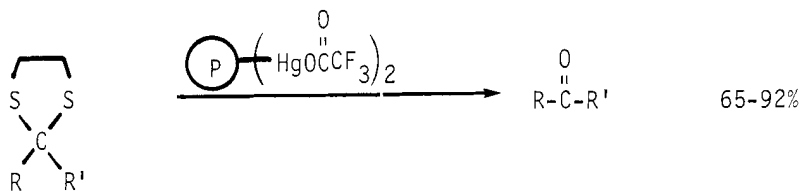
Synthesis, 135 (1981)

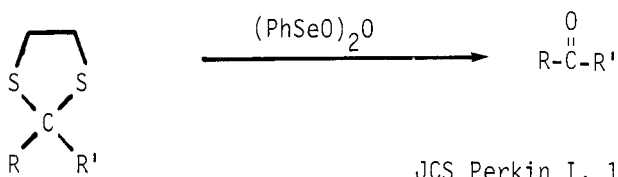


Synthesis, 580 (1982)

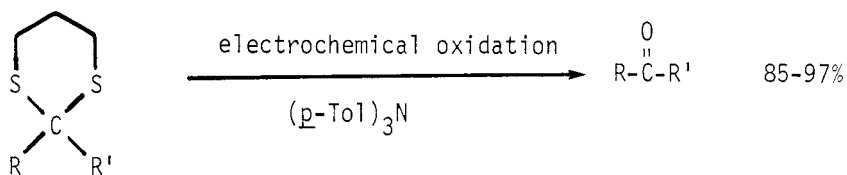
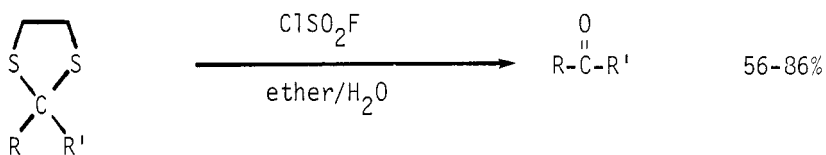


Synthesis, 51 (1981)

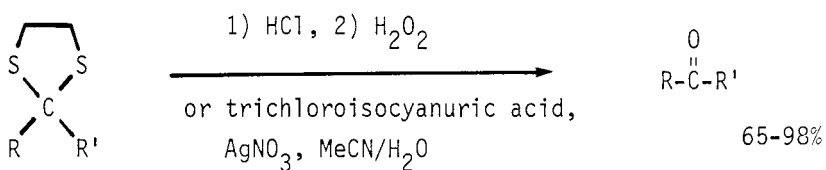
JOC, 47, 2212 (1982)



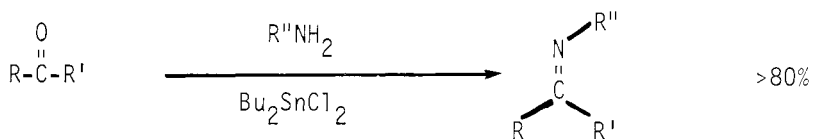
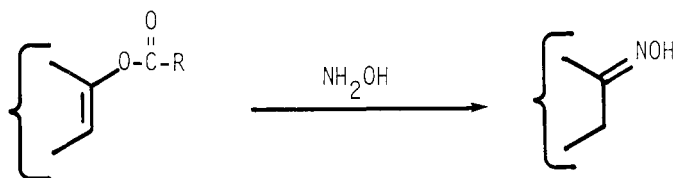
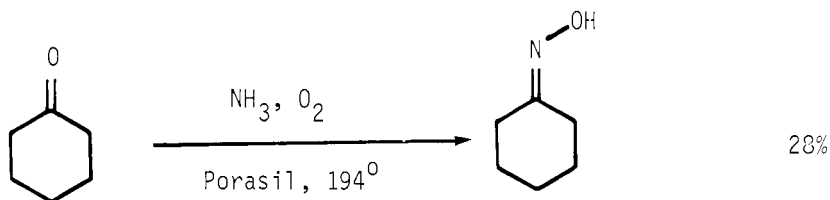
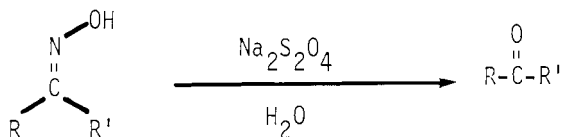
JCS Perkin I, 1654 (1980)

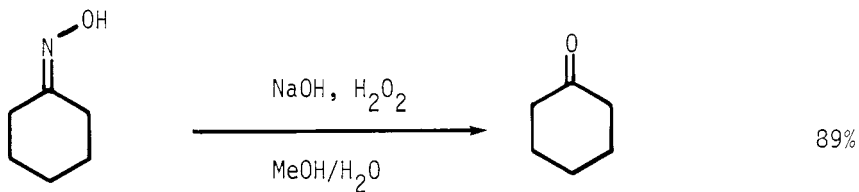
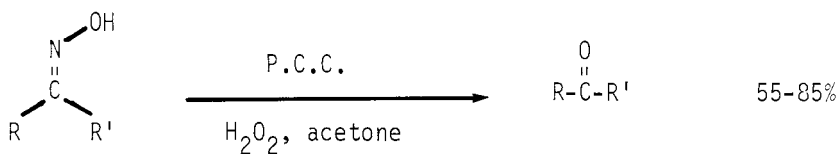
Tetr Lett, 21, 511 (1980)

Synthesis, 146 (1981)

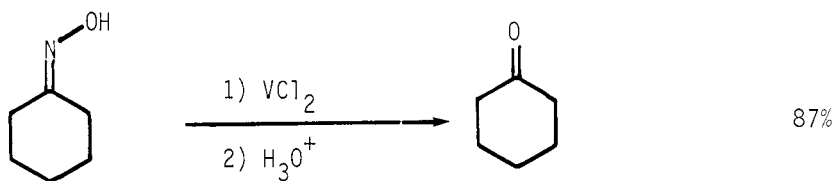


Synthesis, 657 and 659 (1980)

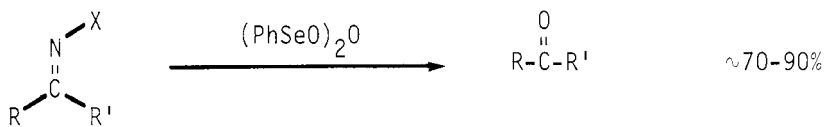
Synth Comm, 12, 495 (1982)Tetr Lett, 21, 1425 (1980)JACS, 102, 1453 (1980)Aust J Chem, 32, 201 (1979)

Synth Comm, 10, 465 (1980)

Synthesis, 125 (1980)

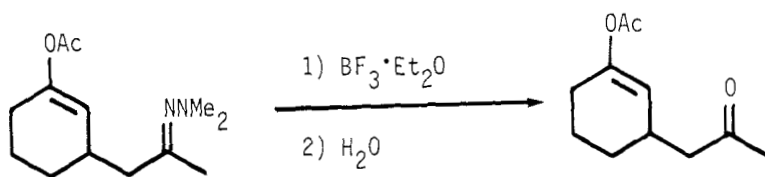


Synthesis, 220 (1980)

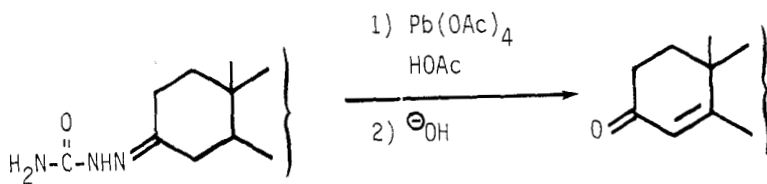


X = OH, NHPH

JCS Perkin I, 1212 (1980)



Synth Comm, 12, 15 (1982)



Tetr Lett, 21, 651 (1980)

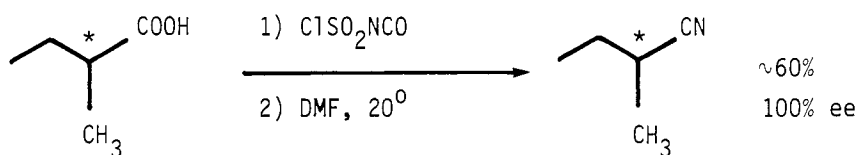
CHAPTER 13

PREPARATION OF NITRILES

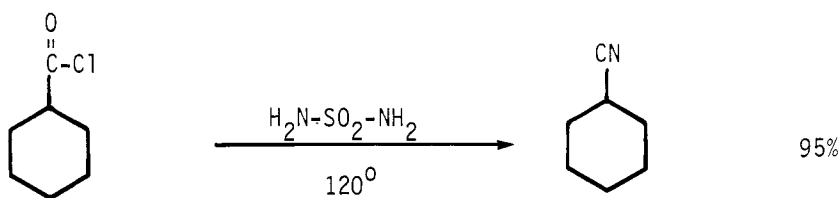
Section 181 Nitriles from Acetylenes

No additional examples.

Section 182 Nitriles from Carboxylic Acids and Acid Halides

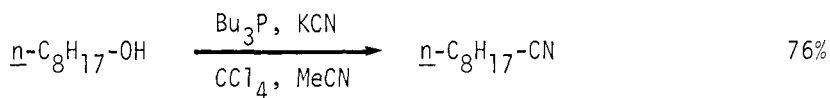


Synth Comm, 12, 25 (1982)

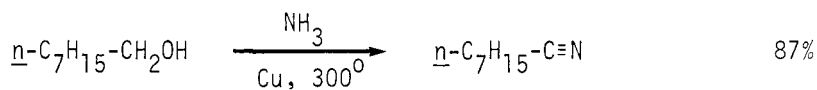
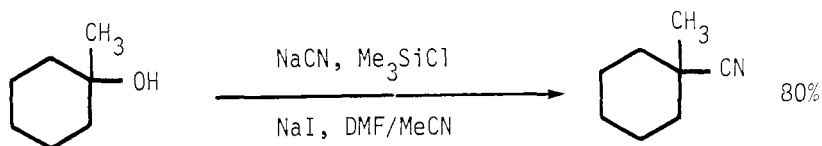
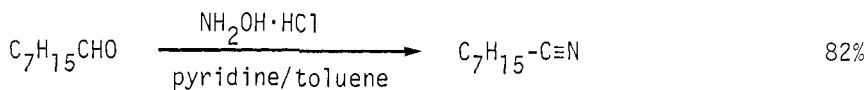


(Slightly lower yields starting from the acid)

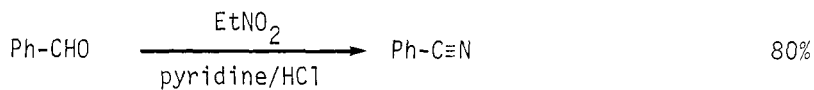
Tetr Lett, 23, 1505 (1982)

Section 183 Nitriles from Alcohols

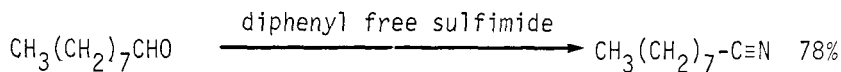
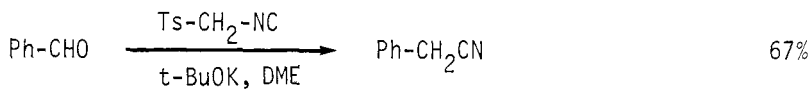
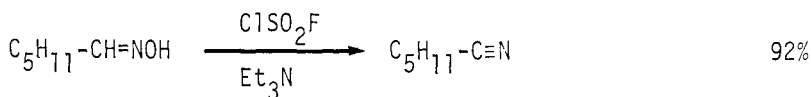
Synthesis, 1007 (1980)

JOC, 46, 754 (1981)JOC, 46, 2985 (1981)Section 184 Nitriles from Aldehydes

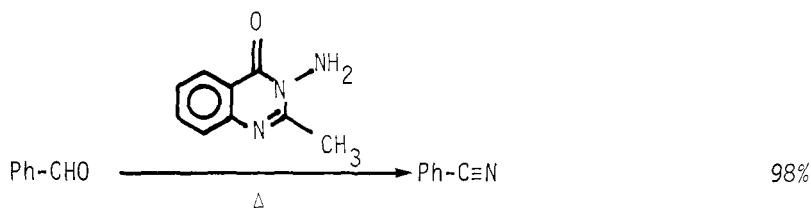
Synthesis, 190 (1982)



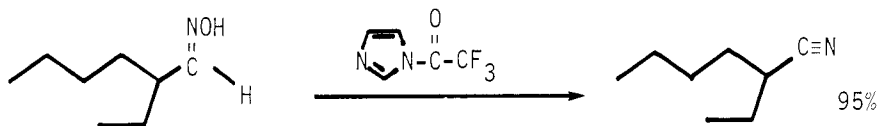
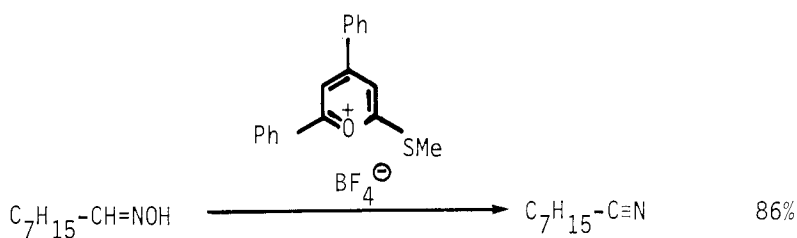
Synthesis, 739 (1981)

Tetr Lett, 21, 761 (1980)Synth Comm, 10, 399 (1980)

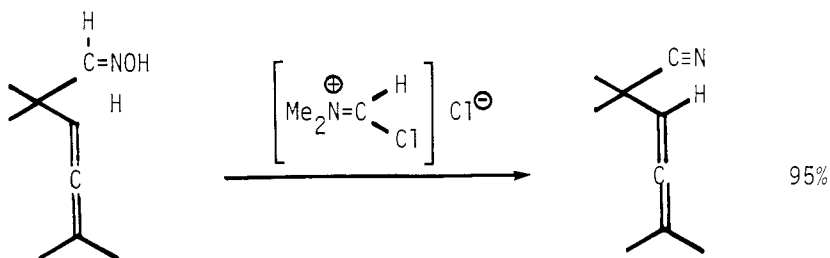
Synthesis, 659 (1980)



Synthesis, 702 (1980)

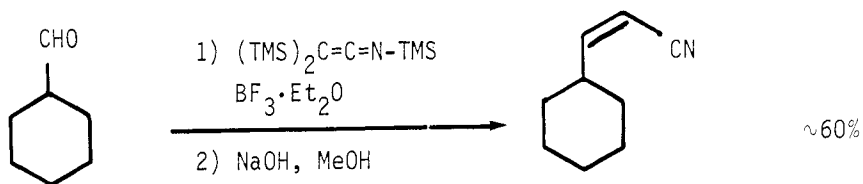
Bull Chem Soc Japan, 54, 1579 (1981)

Synthesis, 1016 (1982)

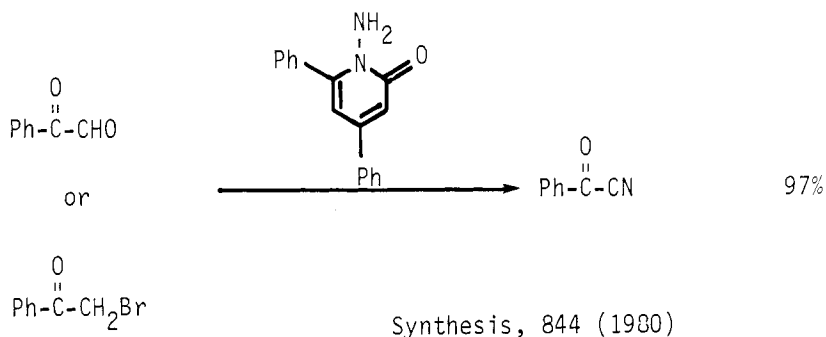
Tetr Lett, 22, 1599 (1981)



Synthesis, 1005 (1980)



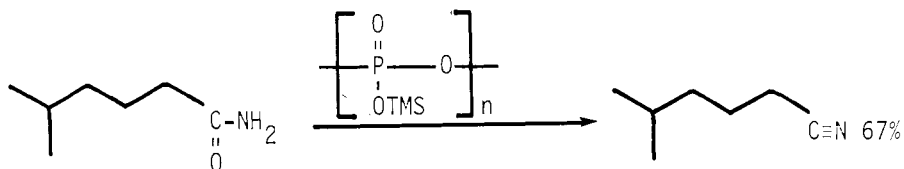
JCS Chem Comm, 56 (1982)



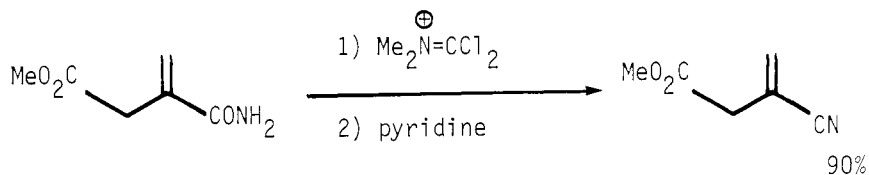
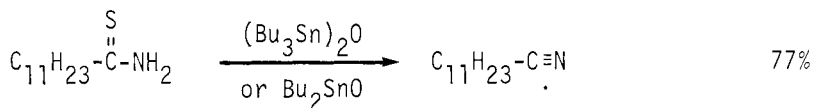
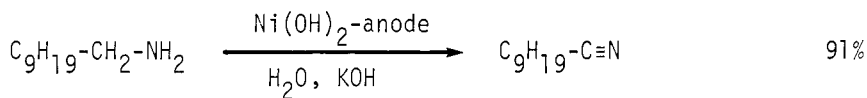
Synthesis, 844 (1980)

Section 185 Nitriles from Alkyls, Methylene, and Aryls

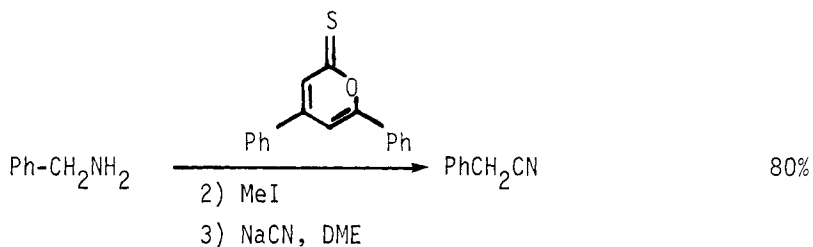
No additional examples.

Section 186 Nitriles from Amides

Synthesis, 591 (1982)

Synth Comm, 10, 479 (1980)JOC, 47, 4594 (1982)Section 187 Nitriles from Amines

Synthesis, 145 (1982)



Synthesis, 711 (1981)

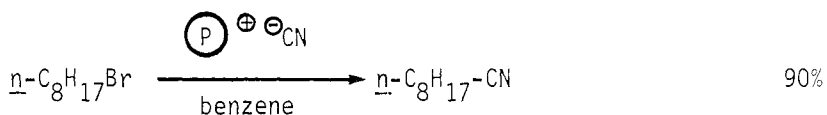
Section 188 Nitriles from Esters

No additional examples.

Section 189 Nitriles from Ethers and Epoxides

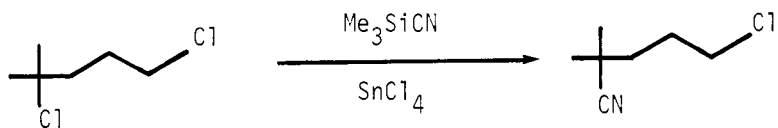
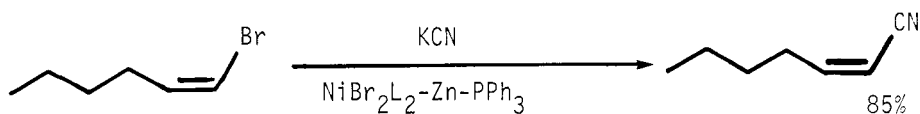
No additional examples.

Section 190 Nitriles from Halides

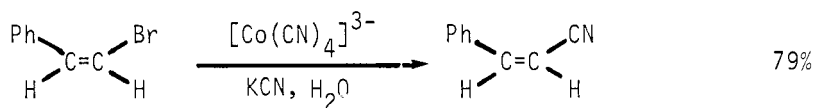
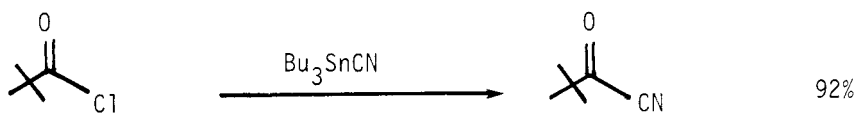


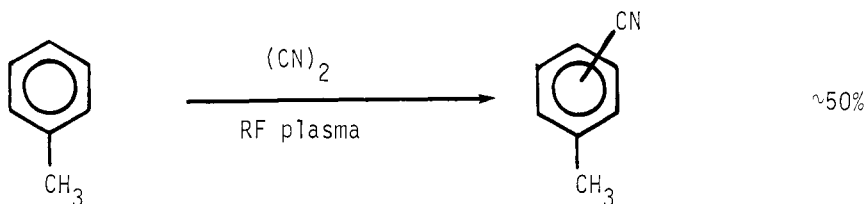
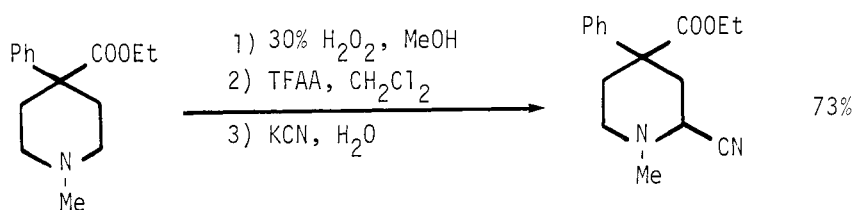
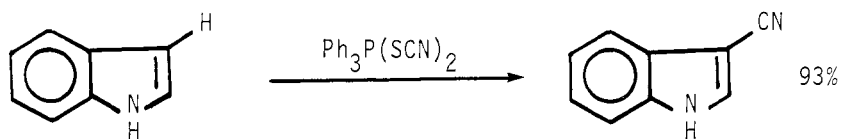
Uses a cationic resin loaded with cyanide.

Synthesis, 299 (1980)

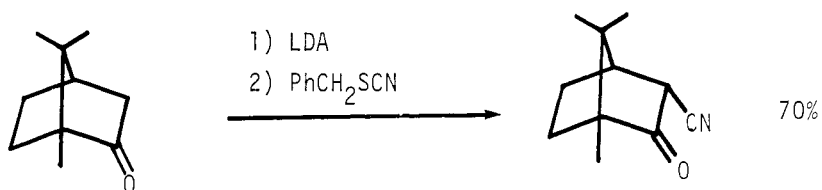
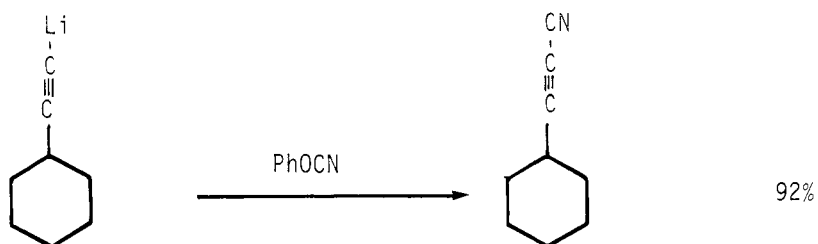
Angew Chem Int Ed, 20, 1017 (1981)

Chem Lett, 1565 (1982)

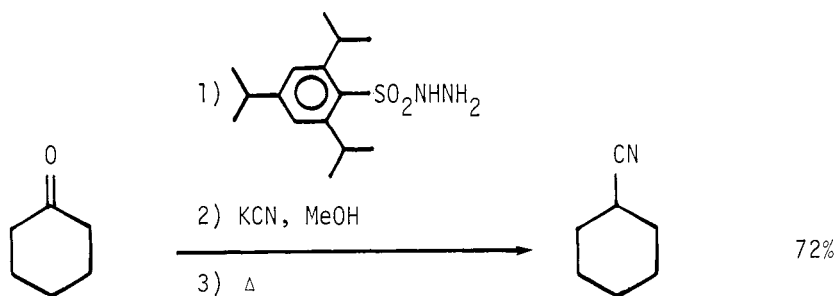
JACS, 104, 1560 (1982)Tetr Lett, 21, 2959 (1980)

Section 191 Nitriles from HydridesJACS, 102, 7119 (1980)Synth Comm, 10, 495 (1980)

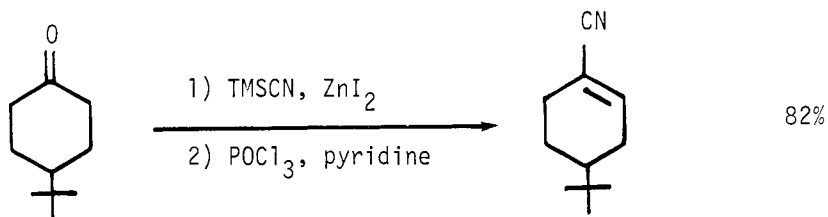
JCS Perkin I, 1132 (1980)

Comptes Rendus, 291, 179 (1980)

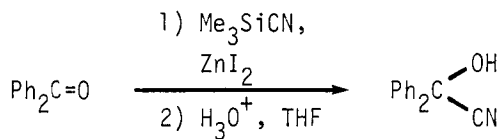
Synthesis, 150 (1980)

Section 192 Nitriles from Ketones

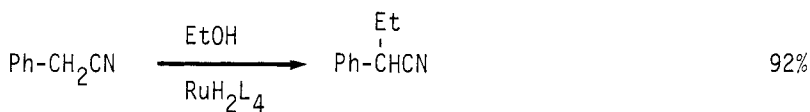
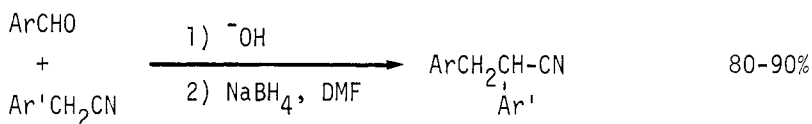
JCS Perkin I, 1487 (1980)

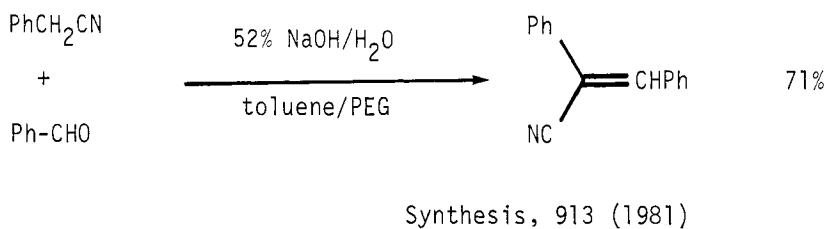
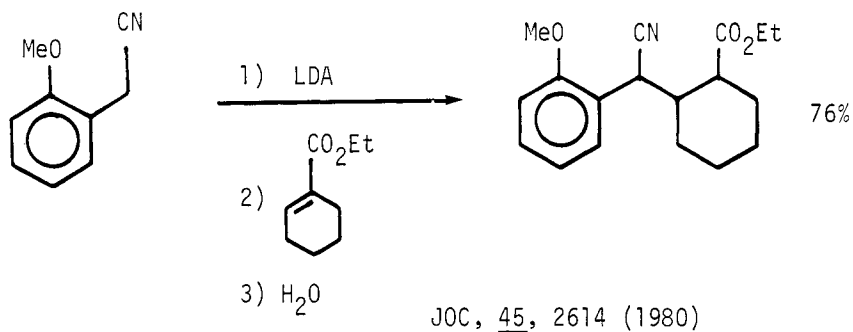


Chem Lett, 1427 (1979)

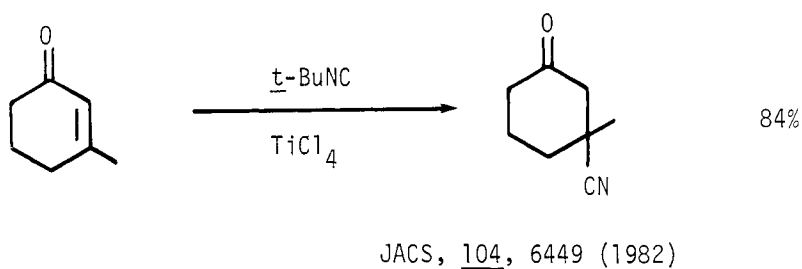
Org Syn, 60, 14 (1981)Section 193 Nitriles from Nitriles

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

Tetr Lett, 22, 4107 (1981)JOC, 45, 171 (1980)



Section 194 Nitriles from Olefins



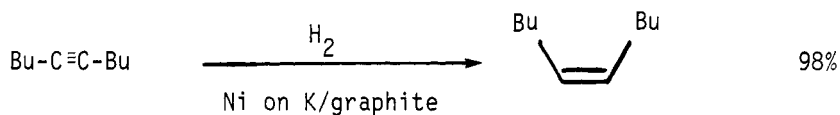
Section 195 Nitriles from Miscellaneous Compounds

No additional examples.

CHAPTER 14

PREPARATION OF OLEFINS

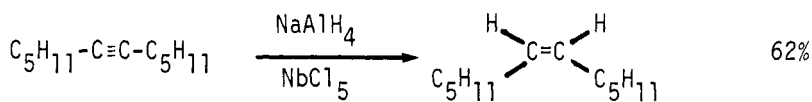
Section 196 Olefins from Acetylenes



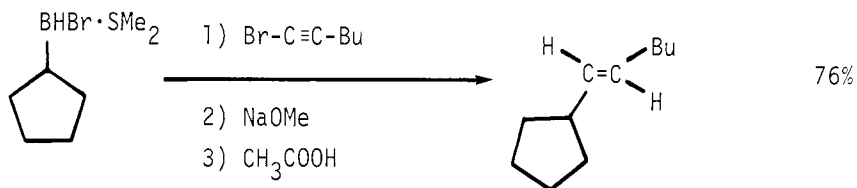
JCS Chem Comm, 540 (1981)
JOC, 46, 5340 and 5344 (1981)



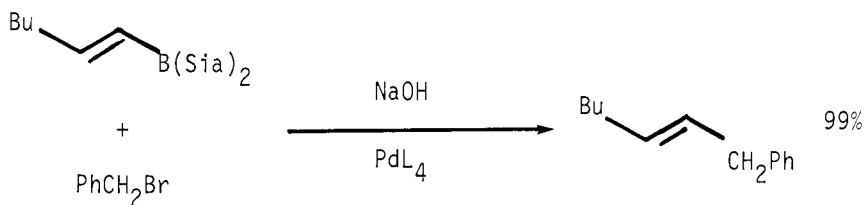
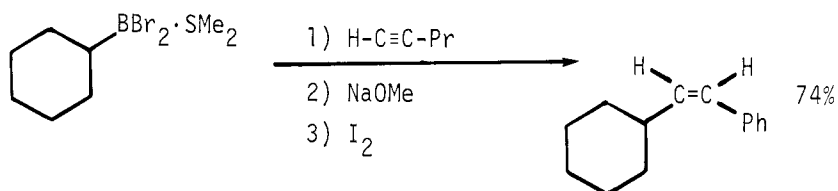
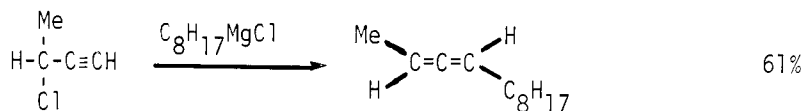
Tetr Lett, 21, 1069 (1980)

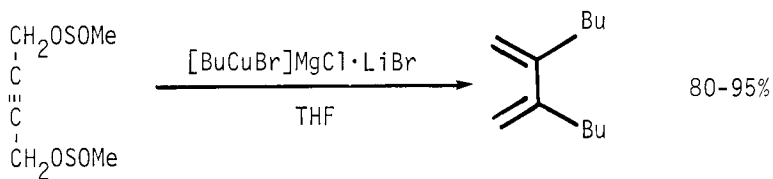
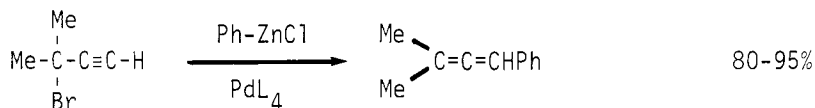


Chem Lett, 157 (1982)

JOC, 47, 754 (1982)JOC, 47, 3808 (1982)

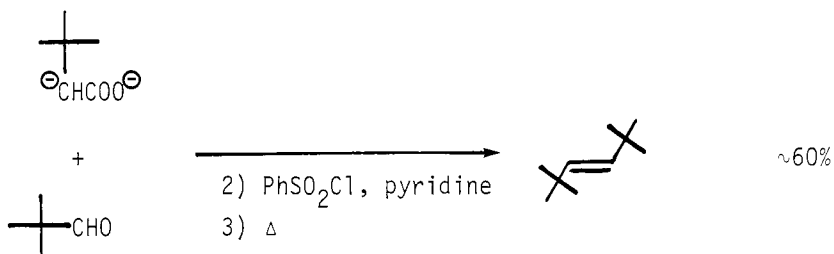
Synthesis, 195 (1982)

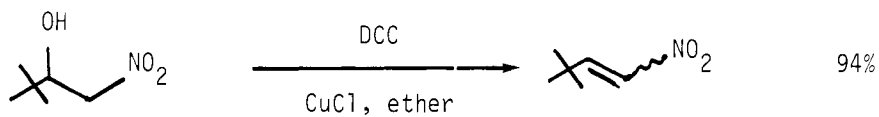
Tetr Lett, 21, 2865 (1980)Bull Chem Soc Japan, 53, 1670 (1980)JOC, 47, pages 171, 3806, and 5407 (1982)Tetr Lett, 21, 5019 (1980)

Rec Trav Chim Pays-Bas, 99, 340 (1980)Tetr Lett, 22, 1451 (1981)

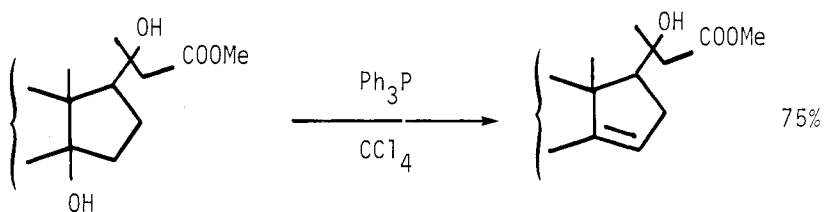
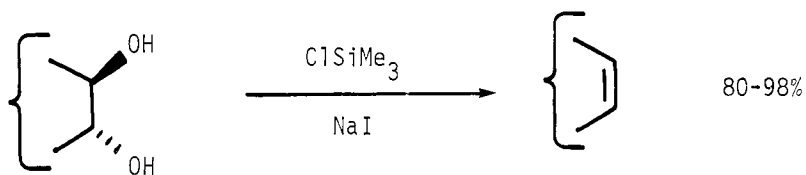
Review: "Carbometallation (C-metallation) of Alkynes: Stereo-specific Synthesis of Alkenyl Derivatives"

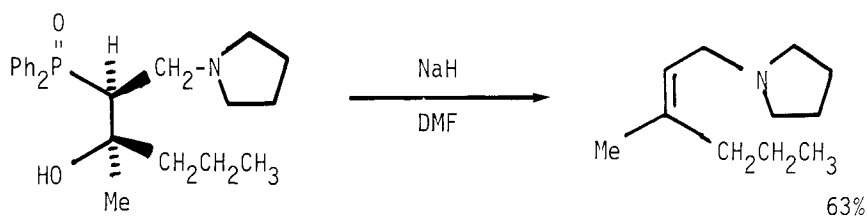
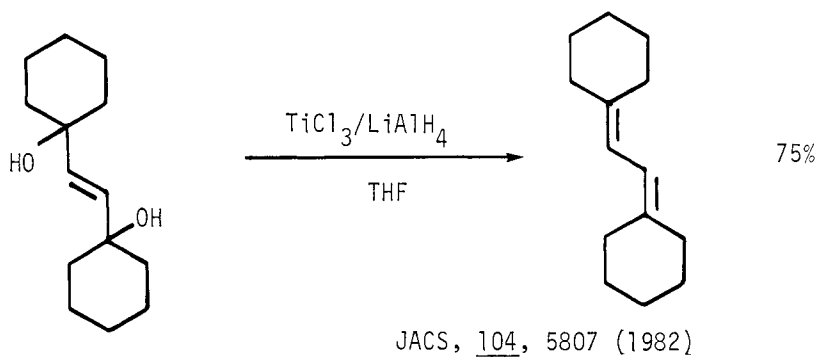
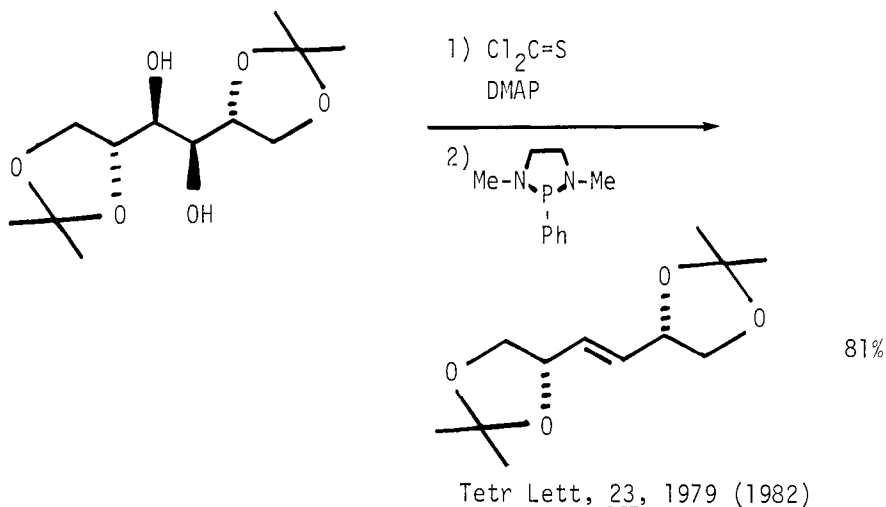
Synthesis, 841 (1981)

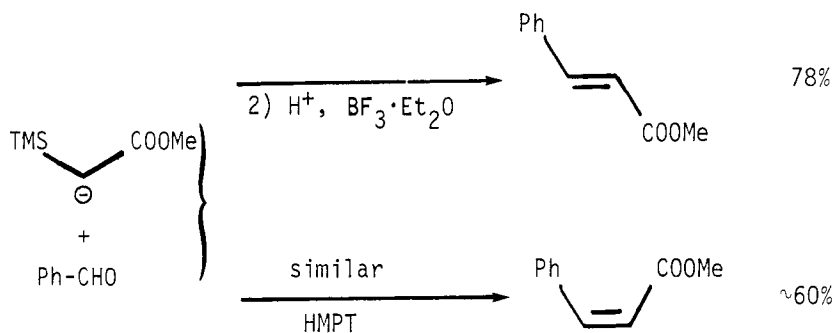
Section 197 Olefins from Carboxylic AcidsJOC, 46, 3359 (1981)

Section 198 Olefins from Alcohols

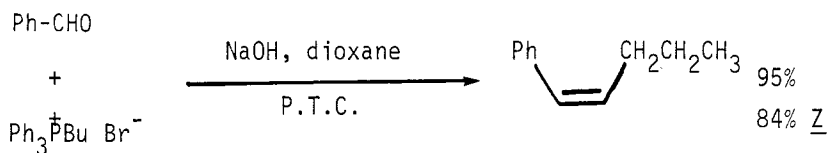
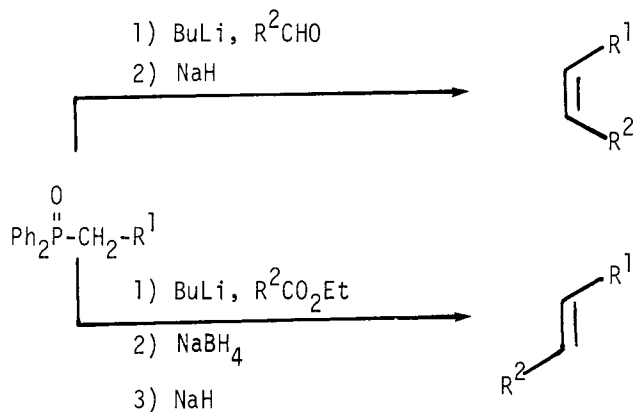
Synthesis, 1017 (1982)

Z Chem, 20, 372 (1980)Tetr Lett, 23, 1365 (1982)

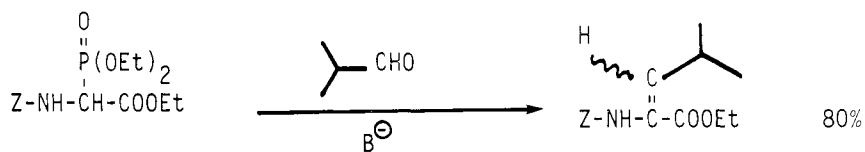
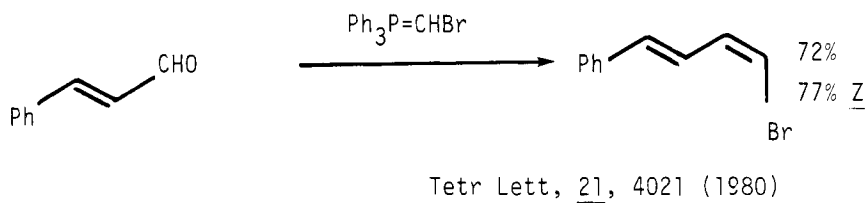
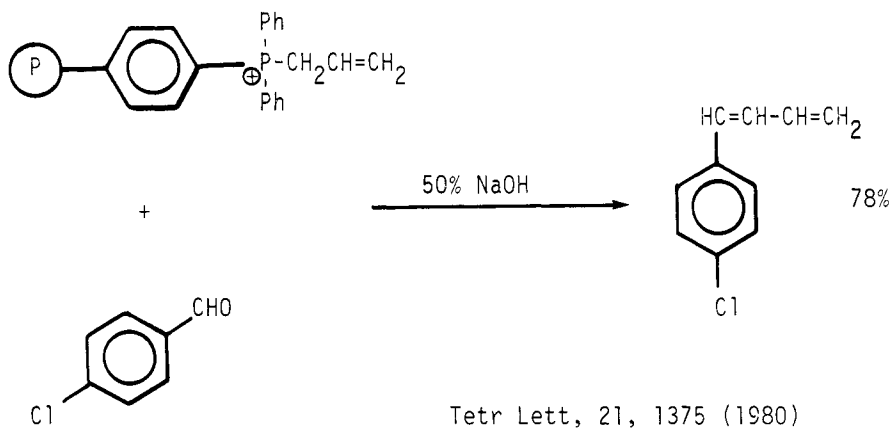


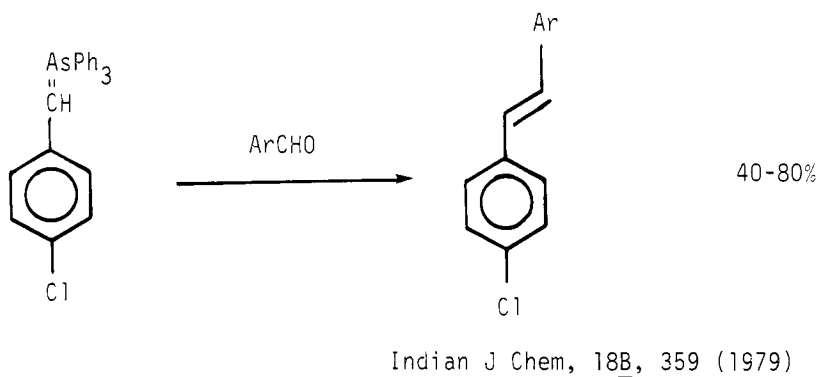
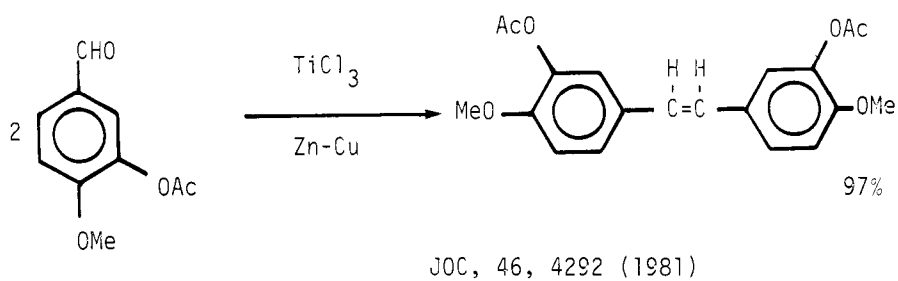
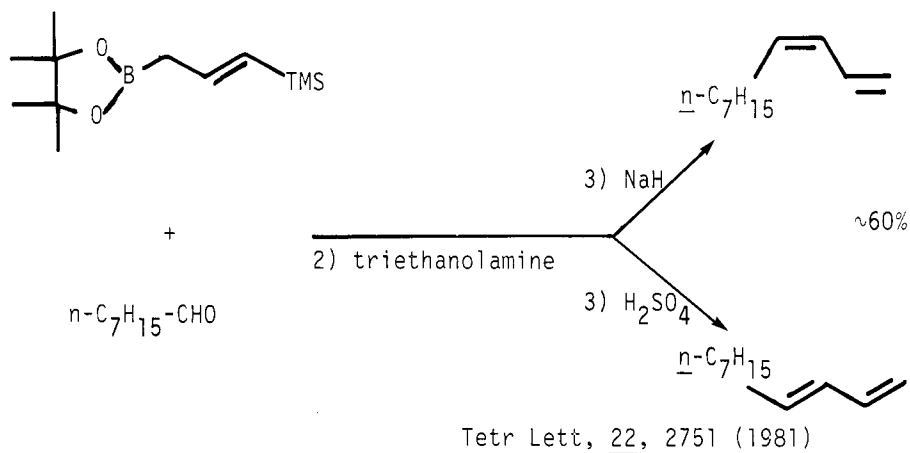
Section 199 Olefins from Aldehydes

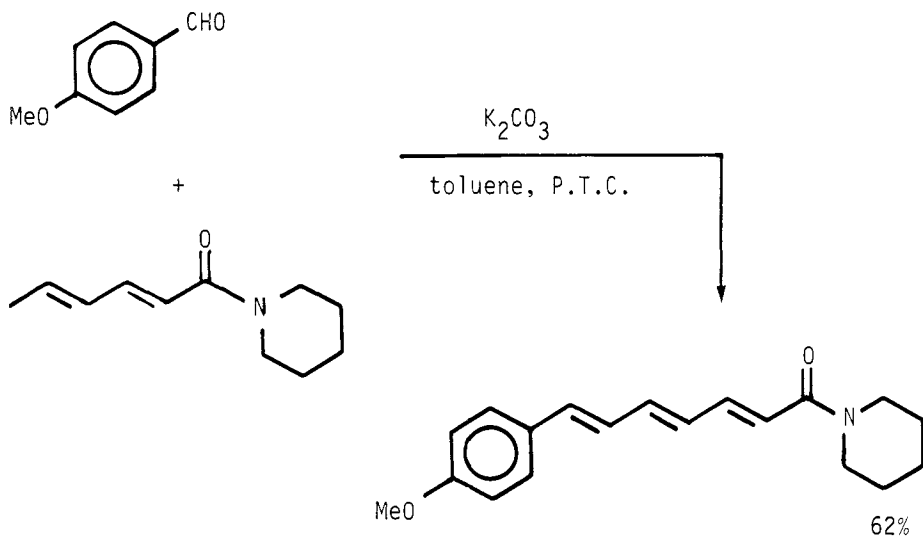
JCS Chem Comm, 877 (1981)

Synth Comm, 11, 125 (1981)

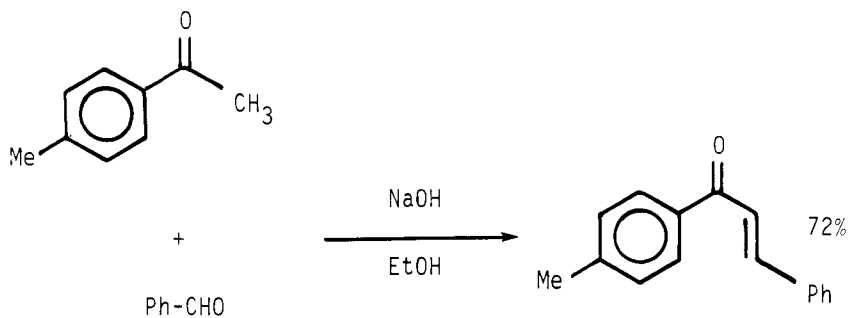
JCS Chem Comm, 100 (1981)



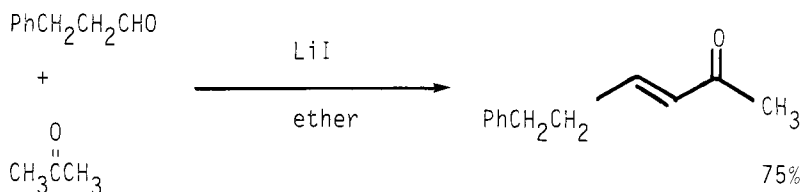




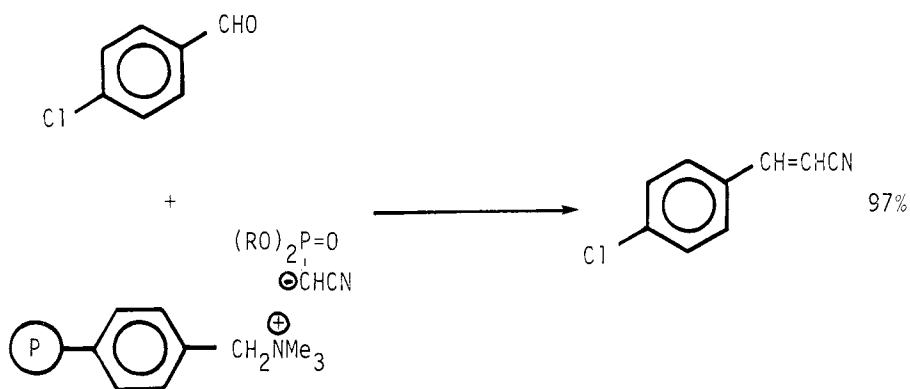
J Chem Research (S), 106 (1981)



Synthesis, 647 (1980)



JCS Chem Comm, 486 (1980)

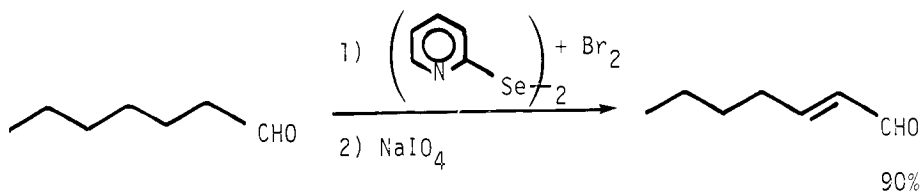


JCS Perkin I, 2516 (1980)

Related Methods: "Olefins from Ketones (Section 207)

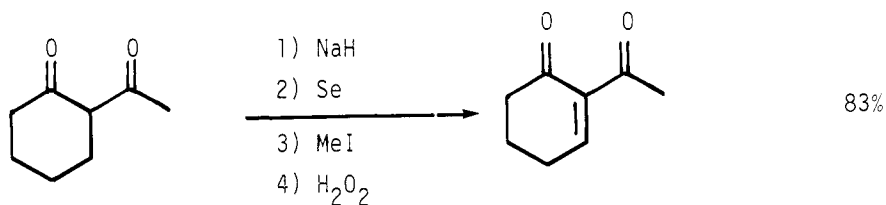
Section 200 Olefins from Alkyls, Methylenes, and Aryls

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

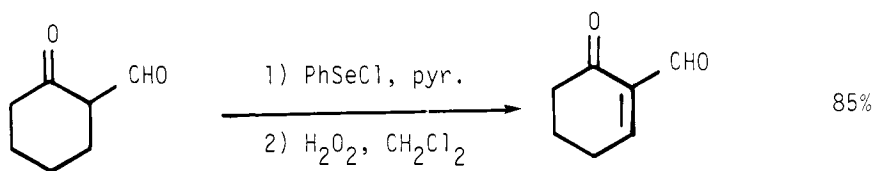


Also works with ketones.

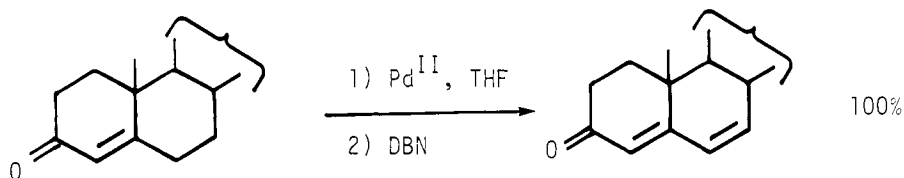
Tetr Lett, 23, 2105 (1982)



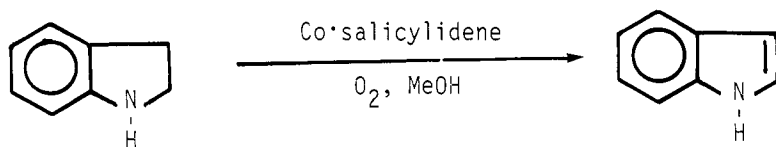
Tetr Lett, 22, 3043 (1981)



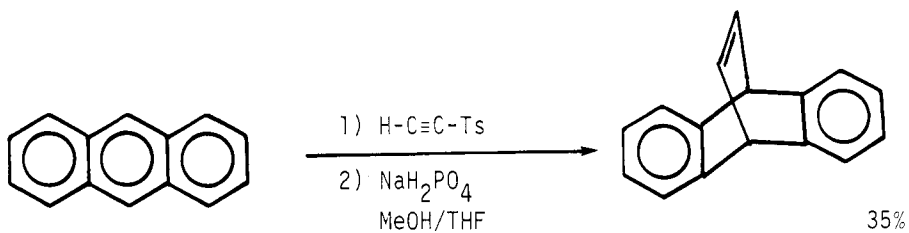
JOC, 46, 2920 (1981)



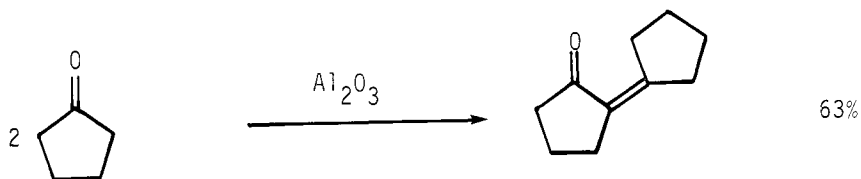
Aust J Chem, 33, 1537 (1980)



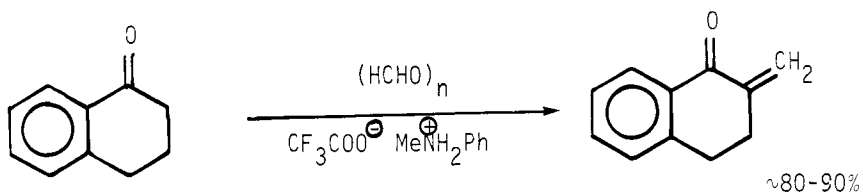
Chem Lett, 1287 (1980)

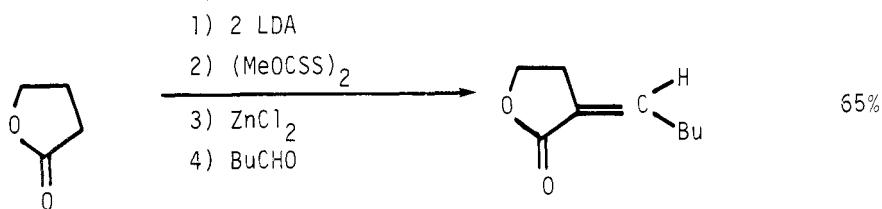


JCS Chem Comm, 639 (1980)



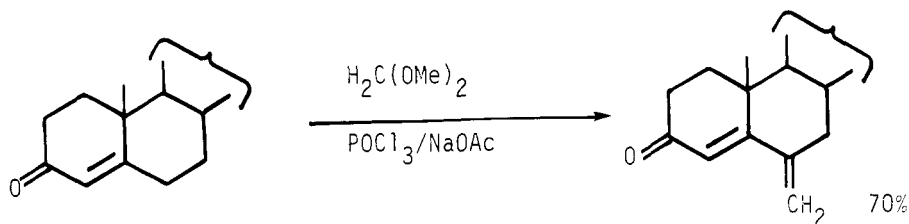
Synthesis, 60 (1982)

Org Syn, 60, 88 (1981)



(E isomer is formed in 58% yield if ZnCl₂ is omitted.)

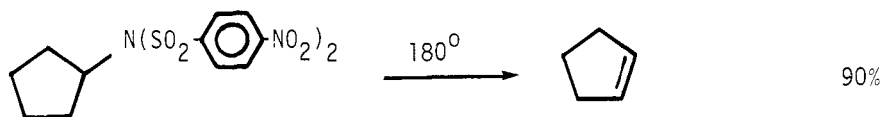
Chem Lett, 595 (1980)



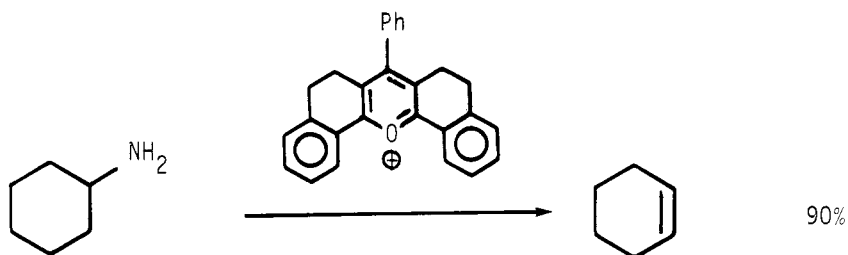
Synthesis, 34 (1982)

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

Section 201 Olefins from Amides



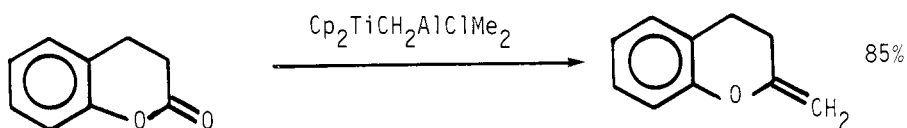
Tetr Lett, 22, 199 (1981)

Section 202 Olefins from Amines

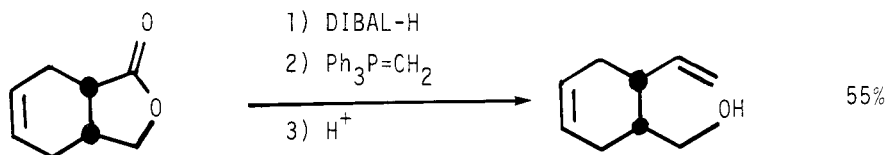
An alternative to the Hofmann elimination.

JCS Perkin I, 2347 (1982)

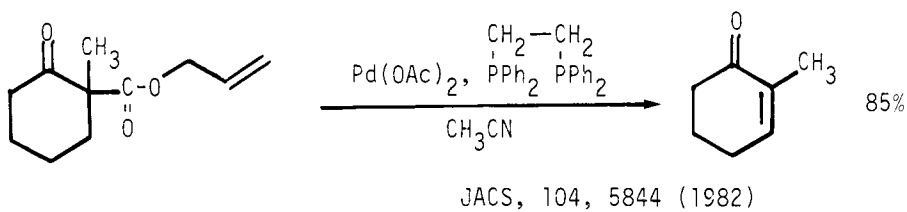
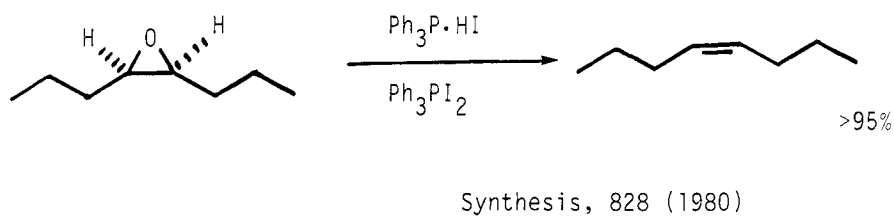
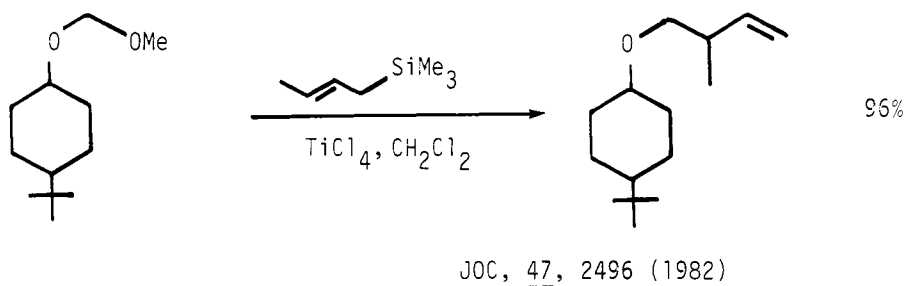
JCS Chem Comm, 96 (1981)

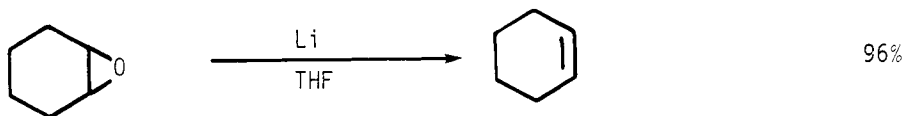
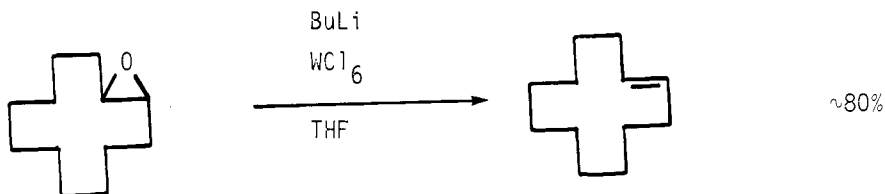
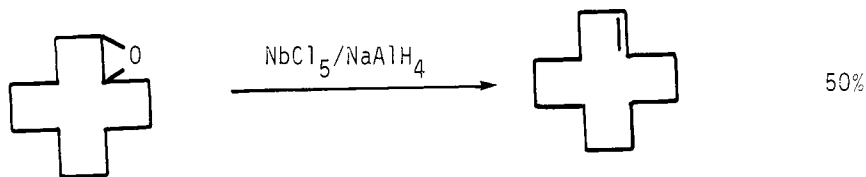
Section 203 Olefins from Esters

JACS, 102, 3270 (1980)

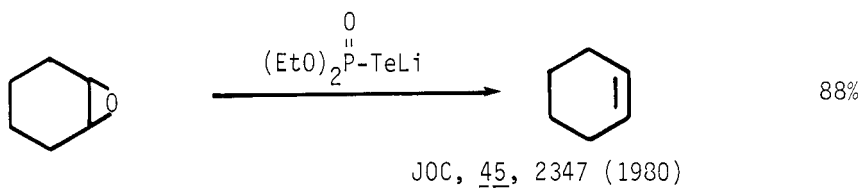
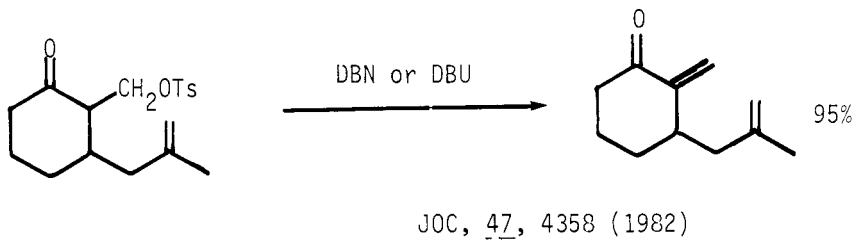
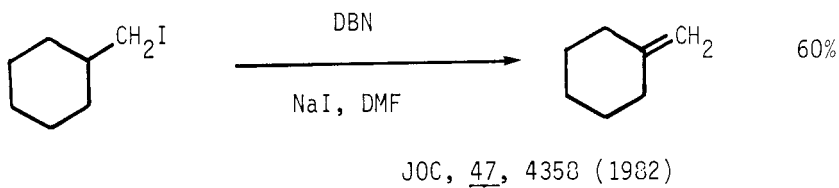
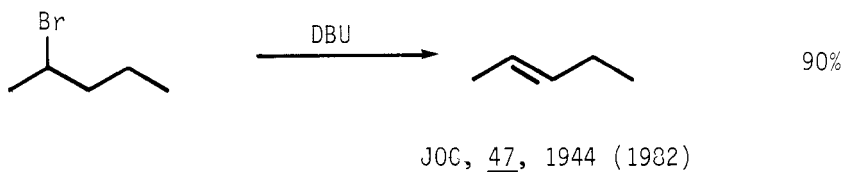


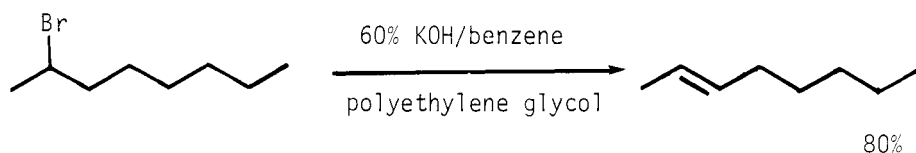
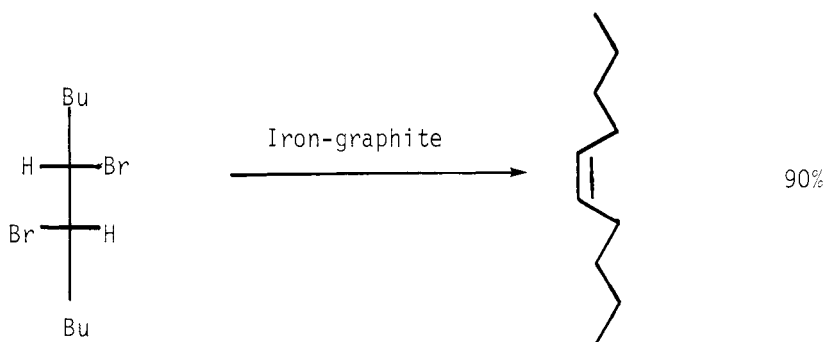
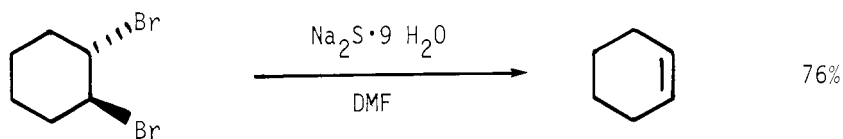
Synthesis, 1015 (1980)

Section 204 Olefins from Ethers and Epoxides

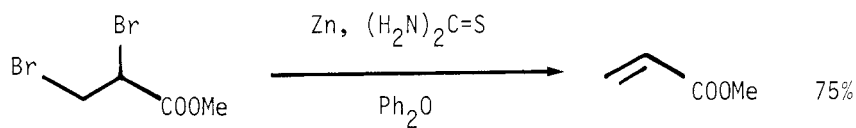
Tetr Lett, 21, 1173 (1980)Tetr Lett, 22, 3551 (1981)Org Syn, 60, 29 (1981)

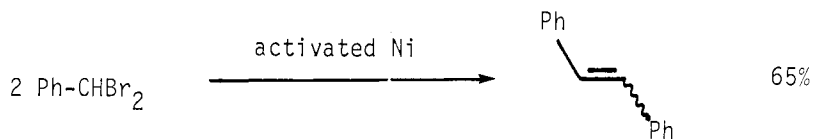
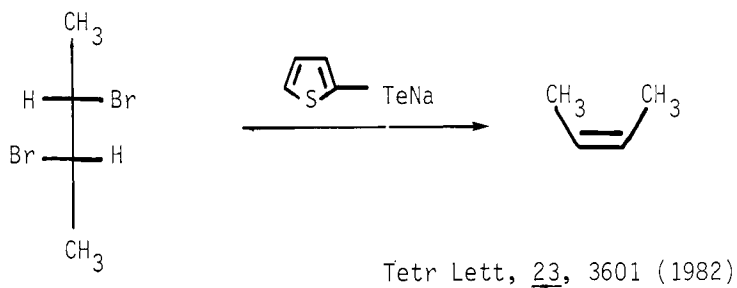
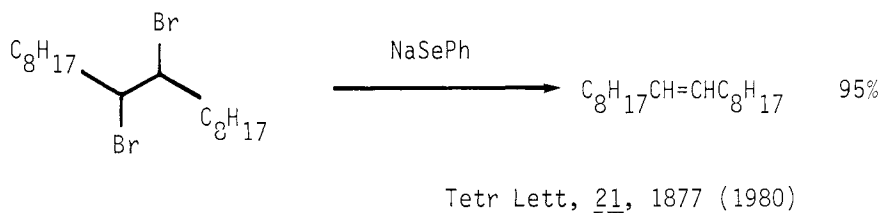
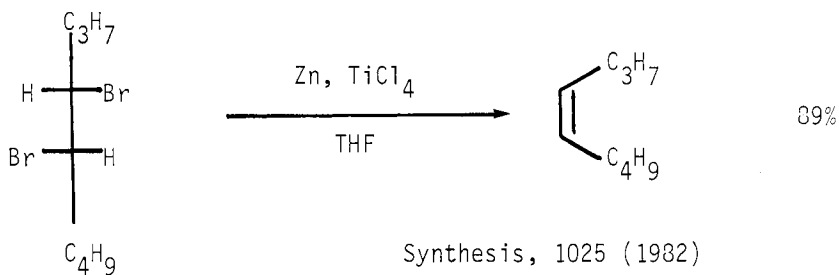
Chem Lett, 157 (1982)

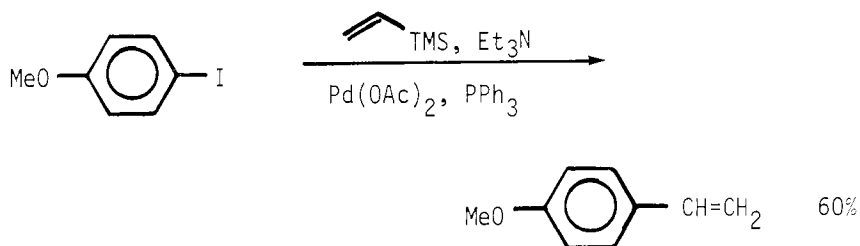
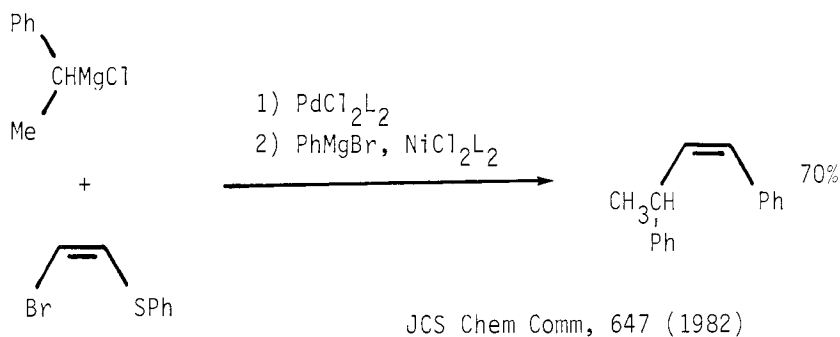
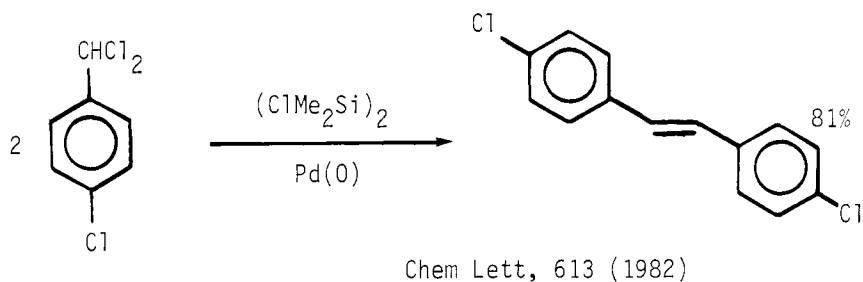
Section 205 Olefins from Halides and Sulfonates

JOC, 47, 2493 (1982)JOC, 47, 876 (1982)

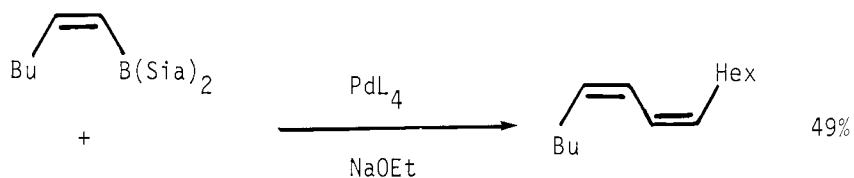
Synthesis, 879 (1981)

Synth Comm, 11, 901 (1981)

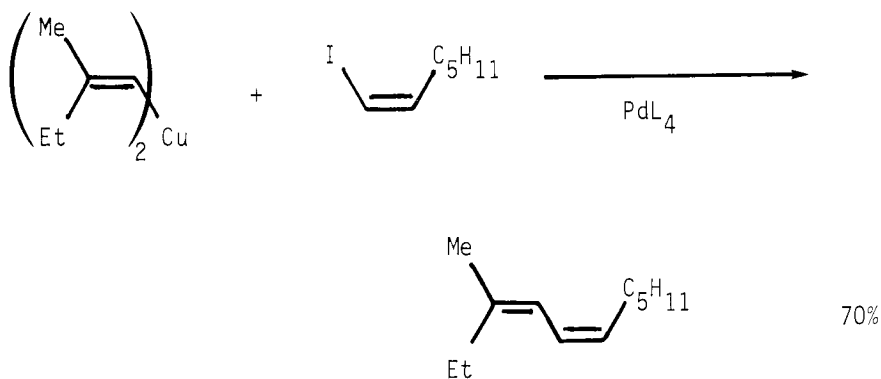


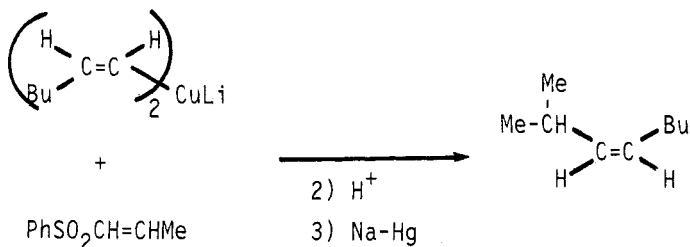


Chem Lett, 1993 (1982)

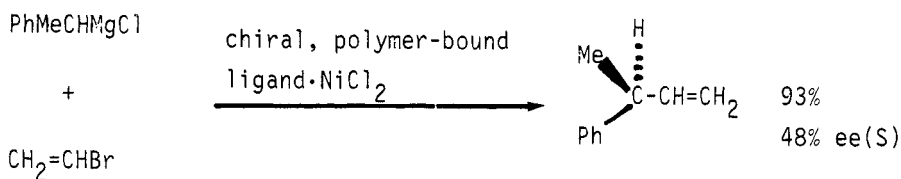
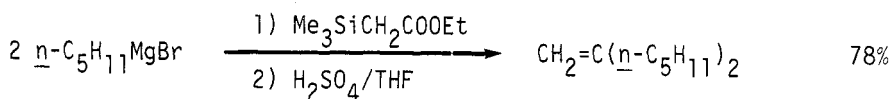
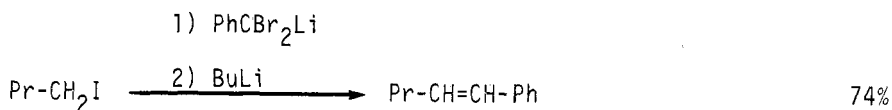
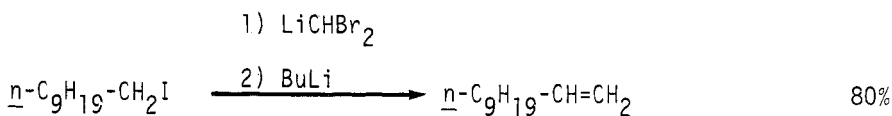
Tetr Lett, 22, 127 (1981)

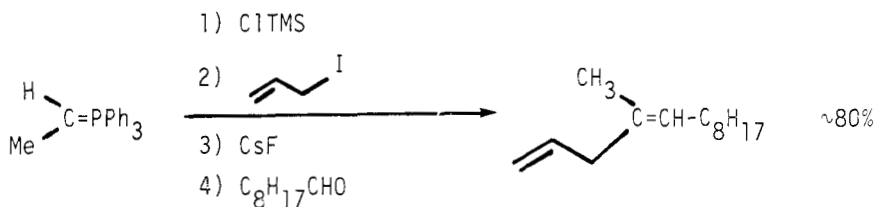
Review: "Palladium-Catalyzed Vinylation of Organic Halides"

Org React, 27, 345 (1982)Tetr Lett, 22, 959 (1981)Tetr Lett, 23, 1591 (1982)

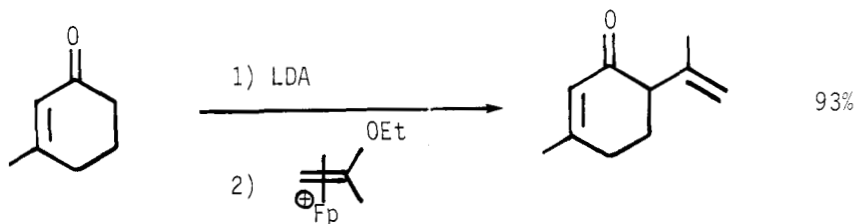


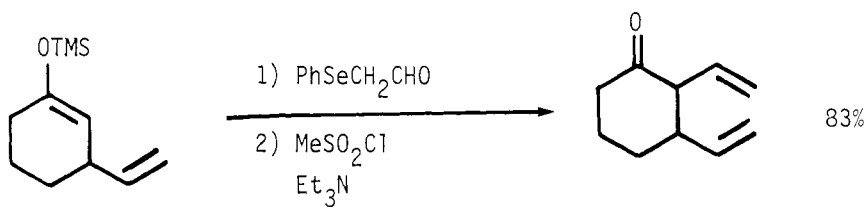
JCS Chem Comm, 523 (1981)

Tetr Lett, 21, 4623 (1980)Tetr Lett, 23, 1035 (1982)Comptes Rendus, 294, 37 (1982)

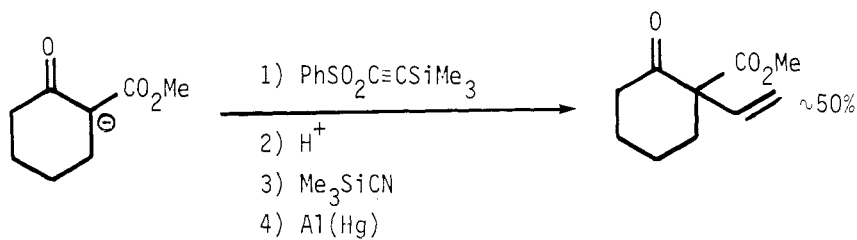
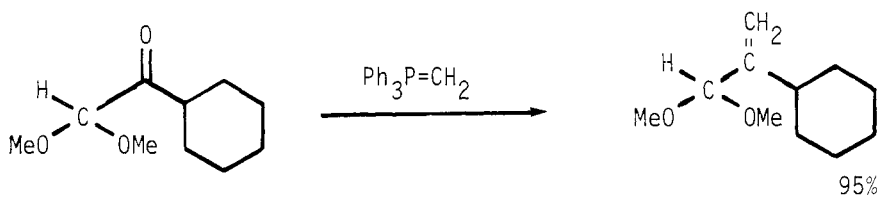
Angew Chem Int Ed, 21, 545 (1982)Section 206 Olefins from Hydrides

This section contains examples of the conversion $\text{R-H} \rightarrow \text{R-C=C}$. For conversions of methylenes to olefins ($\text{R-CH}_2\text{-R}' \rightarrow \text{R-C(R)R}'$), see Section 200.

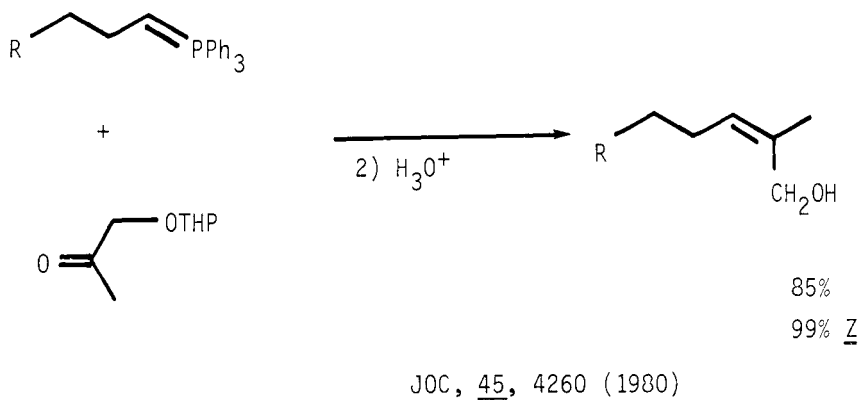
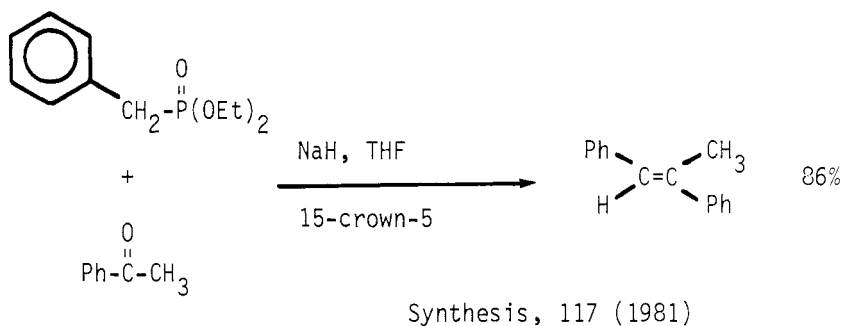
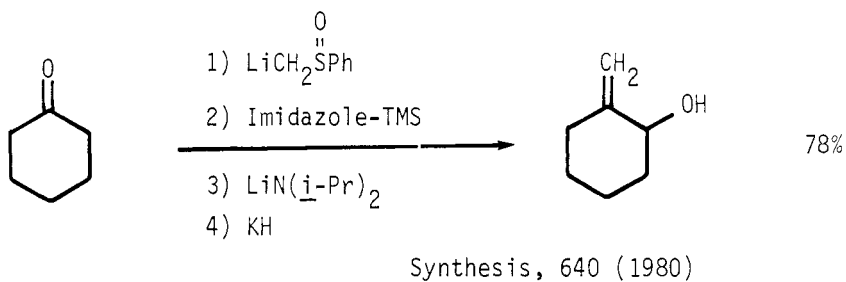
JOC, 46, 4103 (1981)

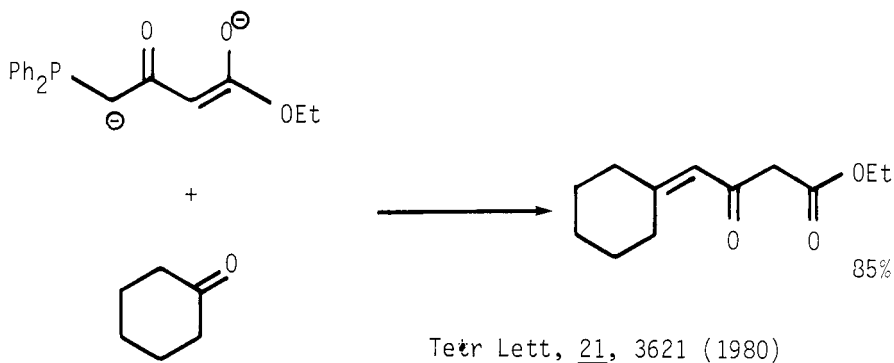


JCS Chem Comm, 434 (1981)

JOC, 47, 4713 (1982)Section 207 Olefins from Ketones

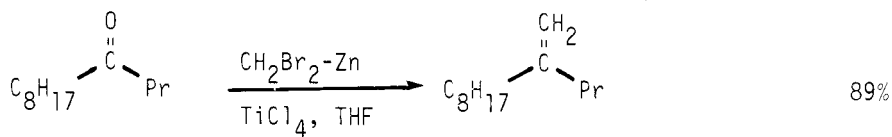
J Chem Research (S), 246 (1982)



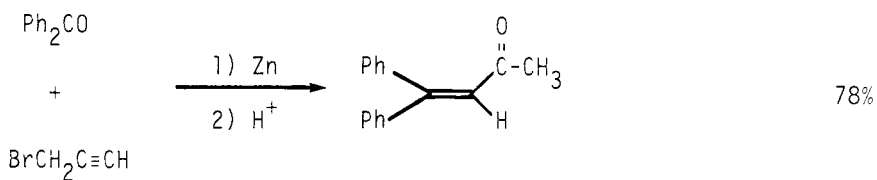


Review: "Cycloalkenes by Intramolecular Wittig Reactions"

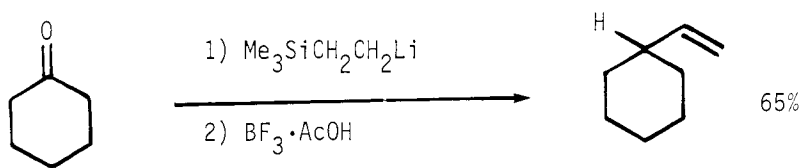
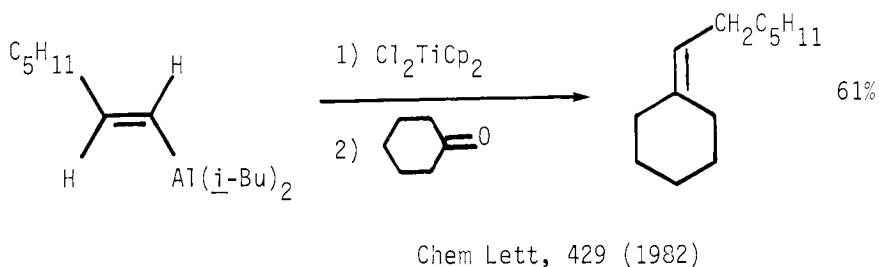
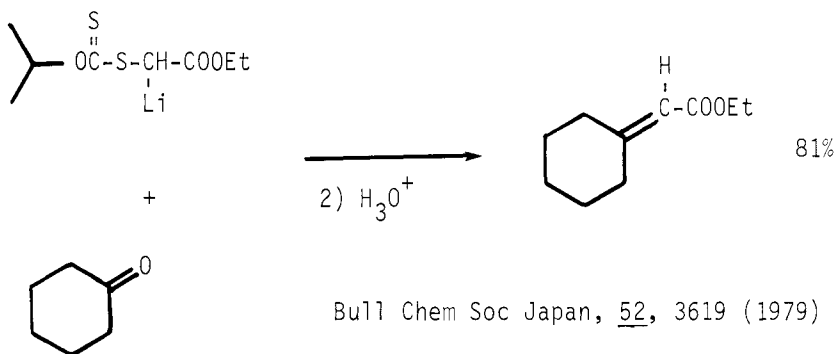
Tetrahedron, 36, 1717 (1980)

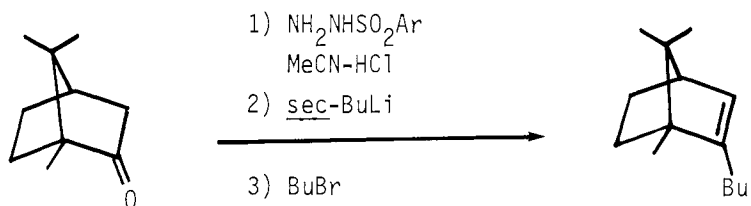
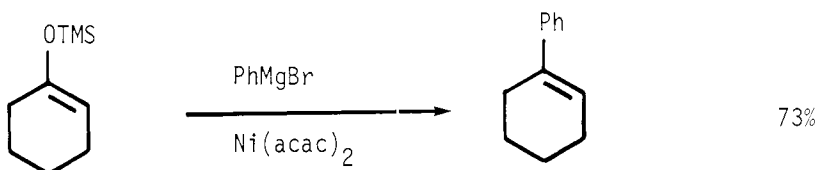


Bull Chem Soc Japan, 53, 1698 (1980)

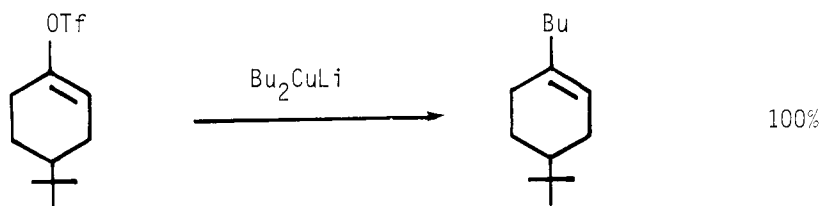


Synth Comm, 10, 637 (1980)

JOC, 47, 1983 (1982)

Org Syn, 61, 141 (1983)

73%

Tetr Lett, 21, 3915 (1980)

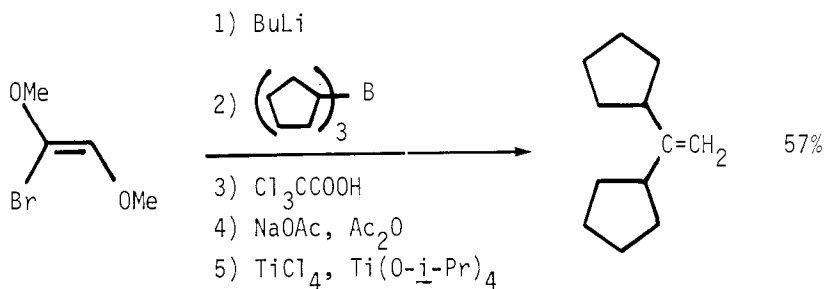
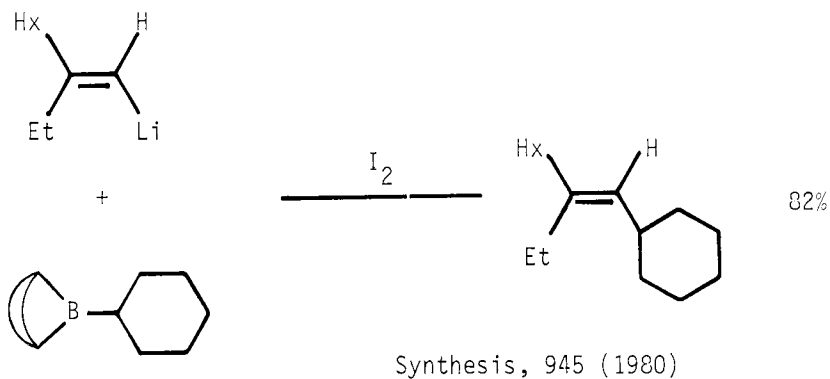
100%

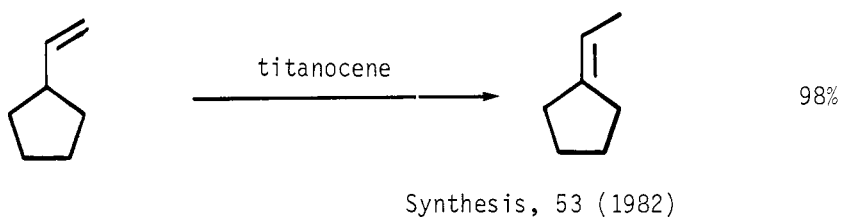
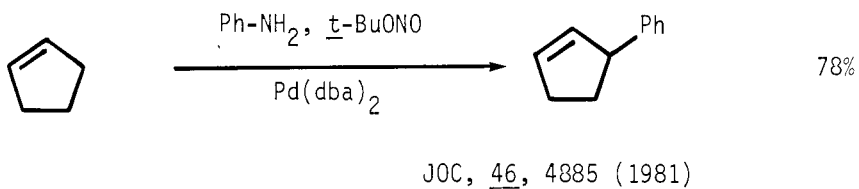
Tetr Lett, 21, 4313 (1980)

Related methods: Olefins from Aldehydes (Section 199).

Section 208 Olefins from Nitriles

No additional examples.

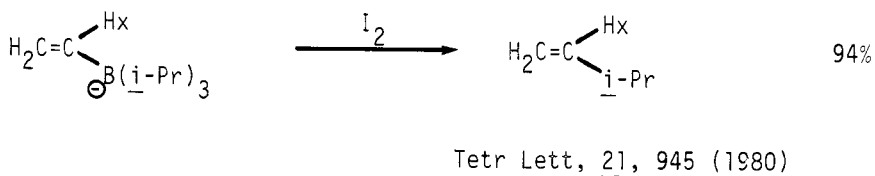
Section 209 Olefins from Olefins

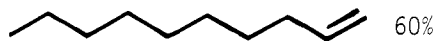
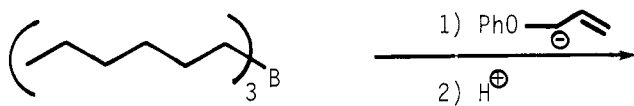


Review: "The 1,5-Shift Reaction"

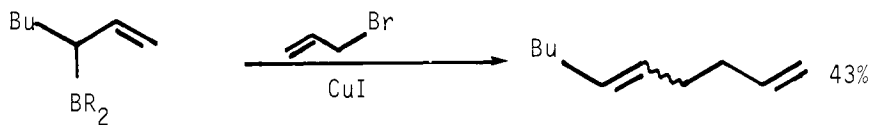
Russ Chem Rev, 50, 666 (1981)

Section 210 Olefins from Miscellaneous Compounds

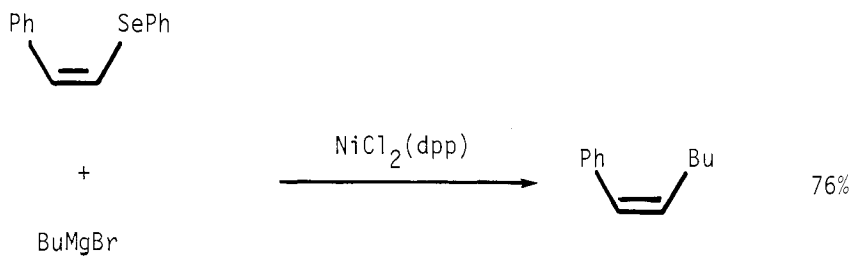




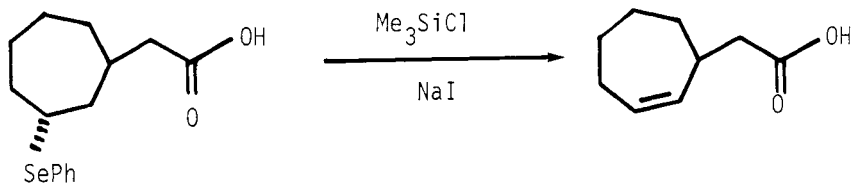
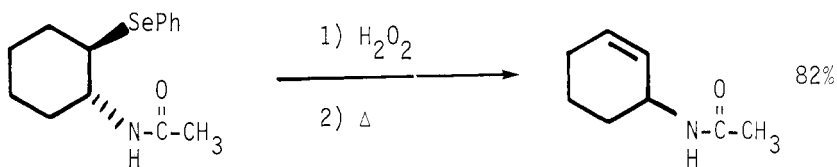
Synth Comm, 12, 813 (1982)



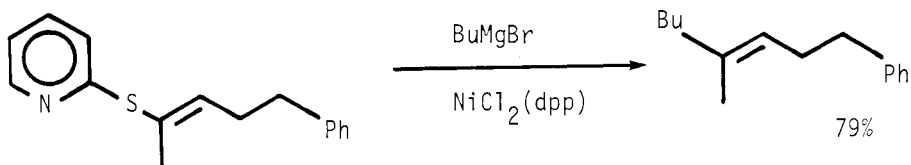
Synth Comm, 12, 813 (1982)



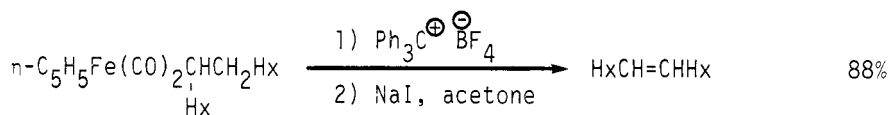
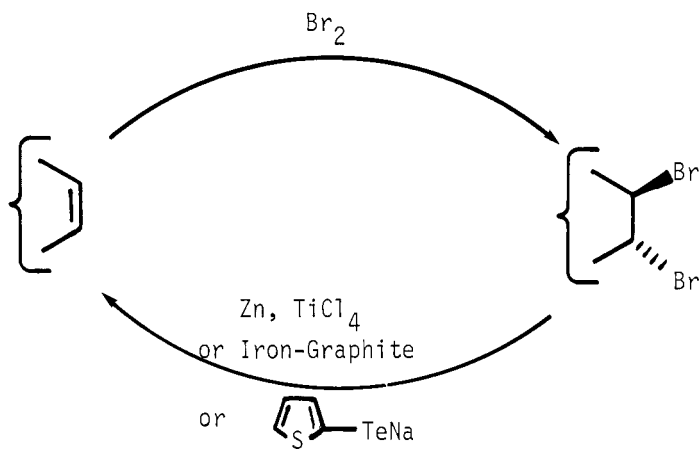
Tetr Lett, 21, 87 (1980)

JOC, 46, 231 (1981)

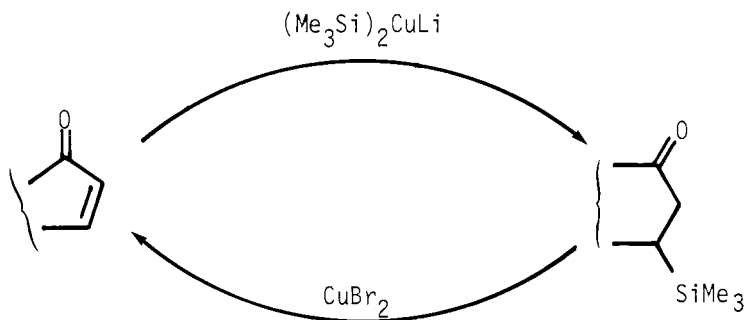
JCS Chem Comm, 546 (1981)



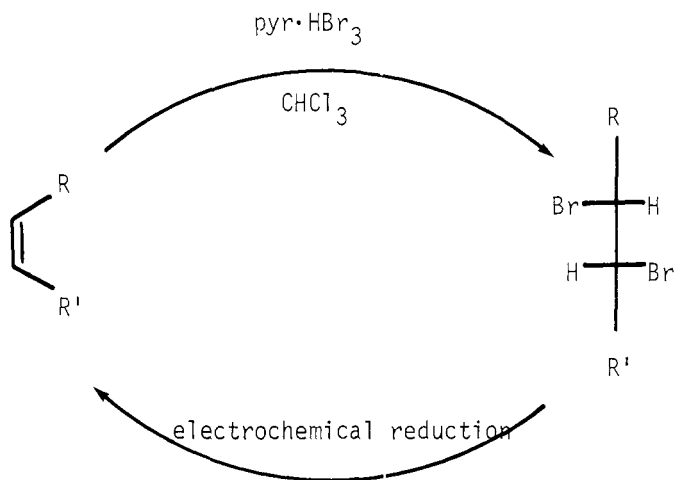
Chem Lett, 1209 (1980)

JOC, 45, 291 (1980)Section 210A Protection of Olefins

Synthesis, 1025 (1982)
 JOC, 47, 876 (1982)
 Tetr Lett, 23, 3601 (1982)



JCS Perkin I, 2520 (1981)

Tetr Lett, 22, 623 (1981)

Use of $(\text{diene})\text{Fe}(\text{CO})_3$ complexes in the synthesis of insect pheromones. The $\text{Fe}(\text{CO})_3$ complex locks the 1,3-diene in the E configuration, while other synthetic transformations take place. Cleaved by $\text{Et}_3\text{N} + \text{O}$.

JCS Chem Comm, 373 (1981)

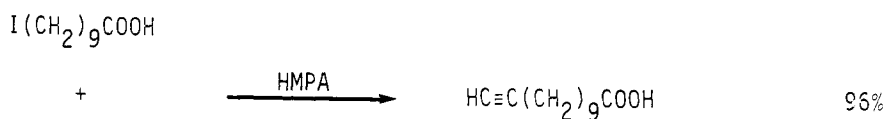
CHAPTER 15

PREPARATION OF DIFUNCTIONAL COMPOUNDS

Section 300 Acetylene - Acetylene

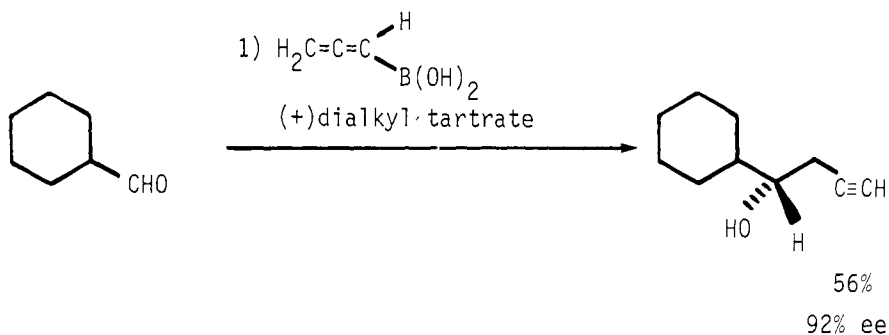
No additional examples.

Section 301 Acetylene - Carboxylic Acid

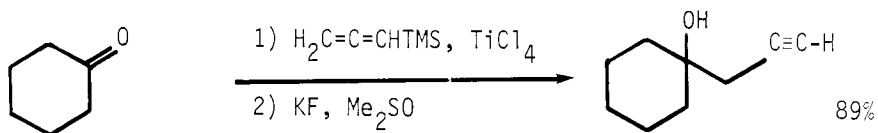
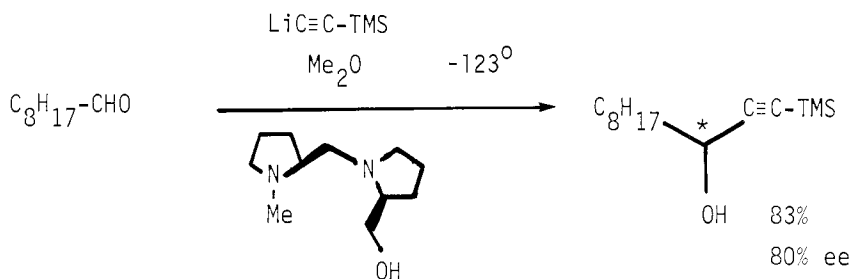


Synth Comm, 10, 653 (1980)

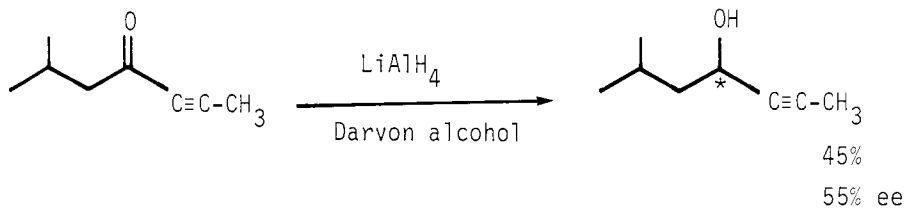
Section 302 Acetylene - Alcohol

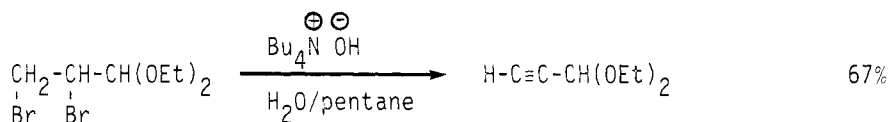


JACS, 104, 7667 (1982)

JOC, 45, 3925 (1980)

Chem Lett, 255 (1980)

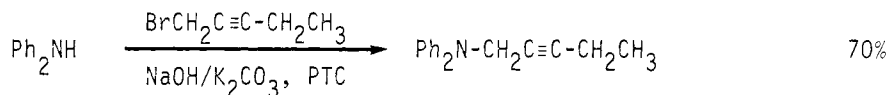
JOC, 45, 582 (1980)Using a chiral binaphthyl, Tetr Lett, 22, 247 (1981)

Section 303 Acetylene - Aldehyde

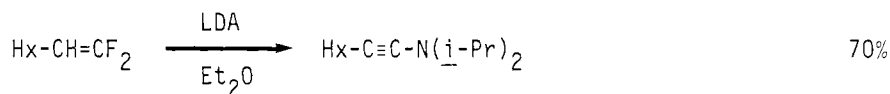
67%

Org Syn, 59, 10 (1980)Section 304 Acetylene - Amide

No additional examples.

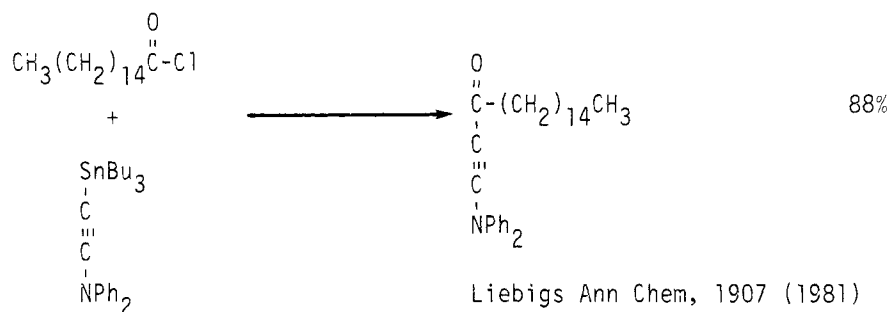
Section 305 Acetylene - Amine

70%

JOC (USSR), 18, 848 (1982)

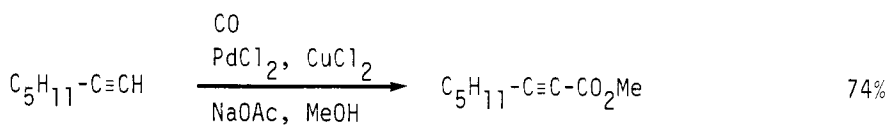
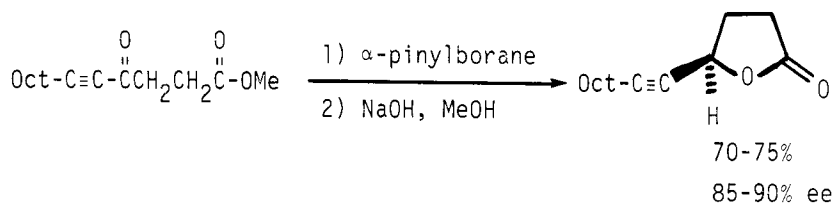
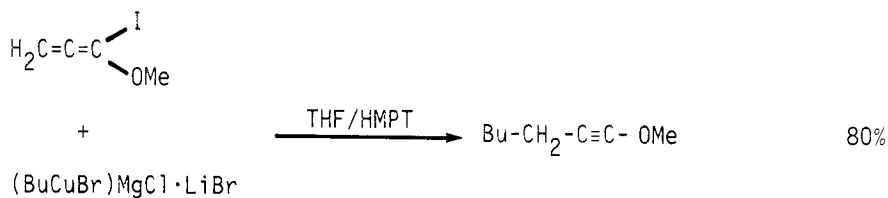
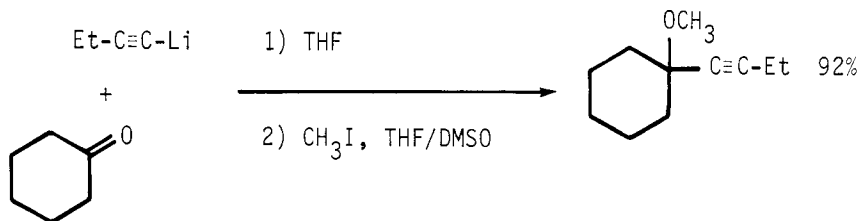
70%

Chem Lett, 935 (1980)

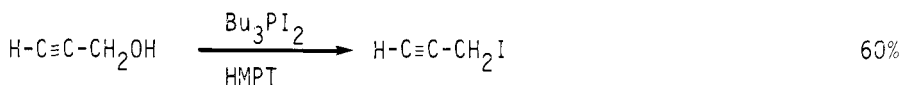
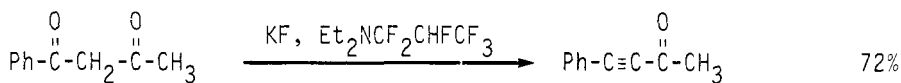


88%

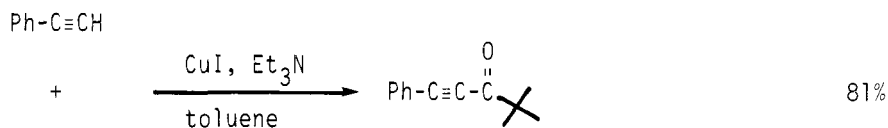
Liebigs Ann Chem, 1907 (1981)

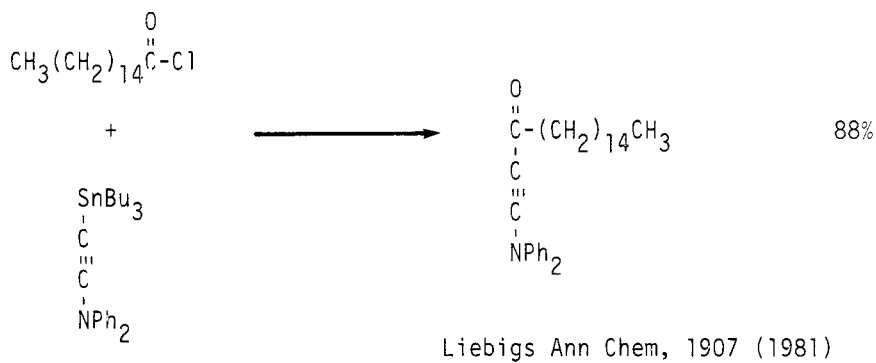
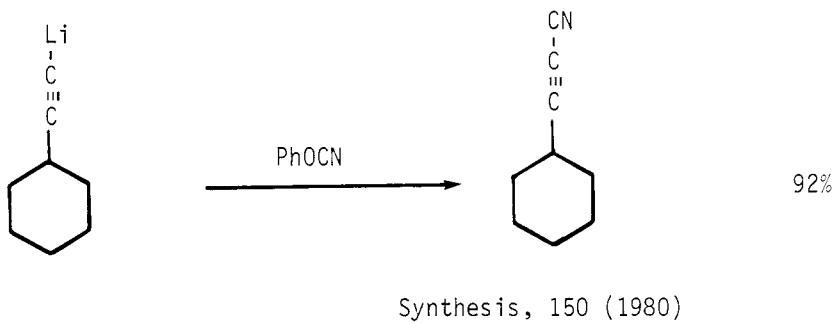
Section 306 Acetylene - EsterTetr Lett, 21, 849 (1980)JOC, 46, 4107 (1981)Section 307 Acetylene - EtherJOC, 45, 1158 (1980)

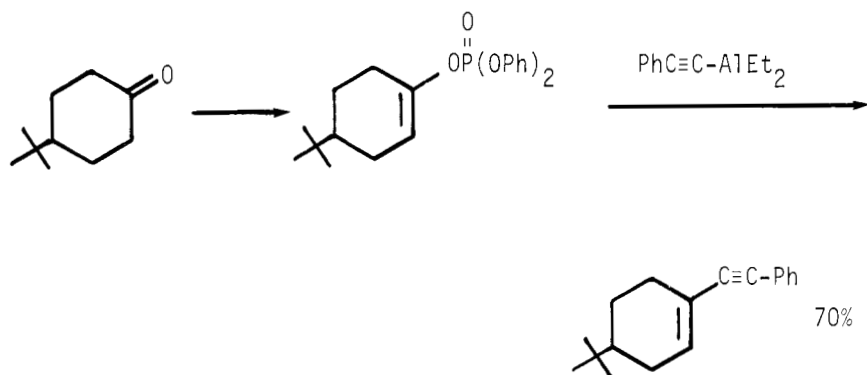
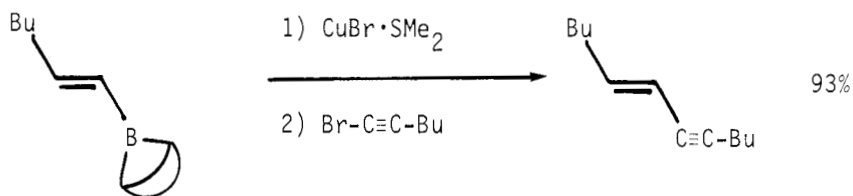
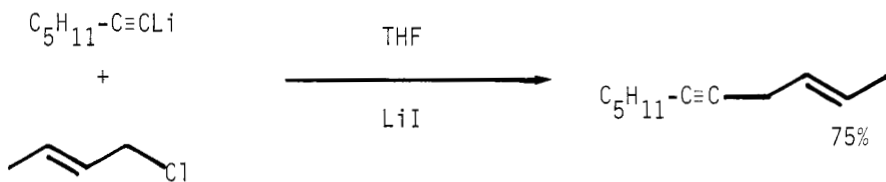
Synthesis, 459 (1981)

Section 308 Acetylene - HalideSynth Comm, 10, 345 (1980)Aust J Chem, 35, 517 (1982)Section 309 Acetylene - Ketone

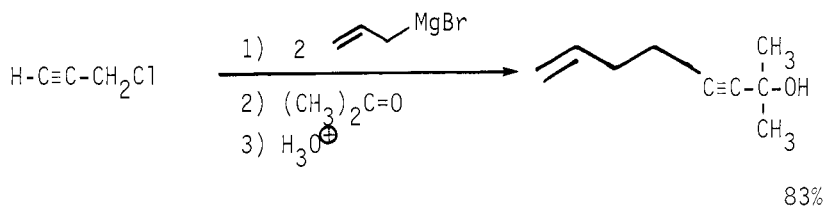
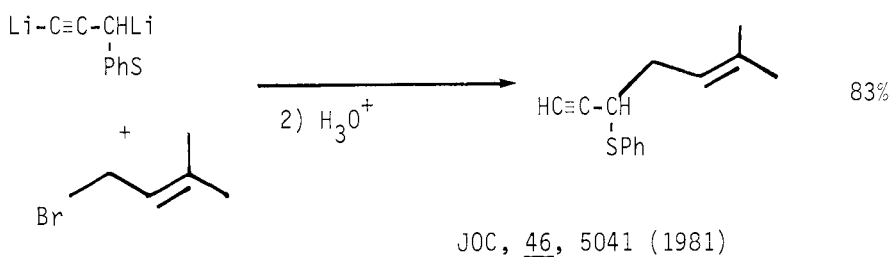
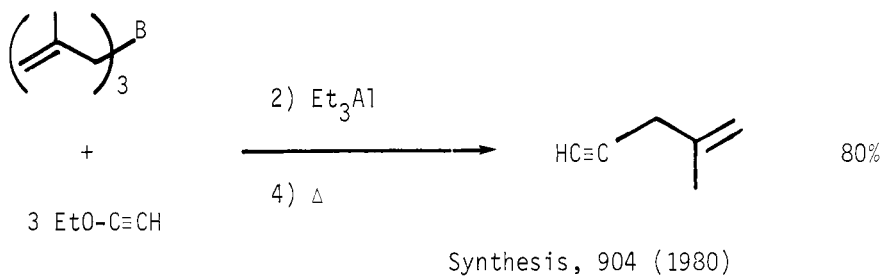
Chem Lett, 1327 (1980)

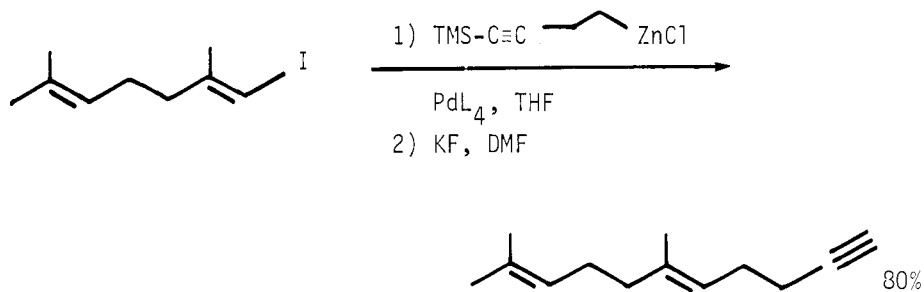
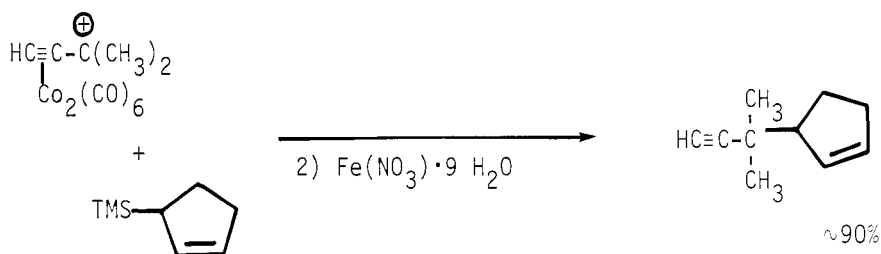
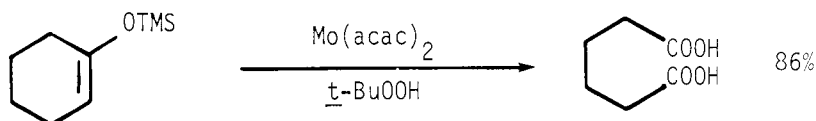
Bull Acad USSR Chem, 30, 918 (1981)

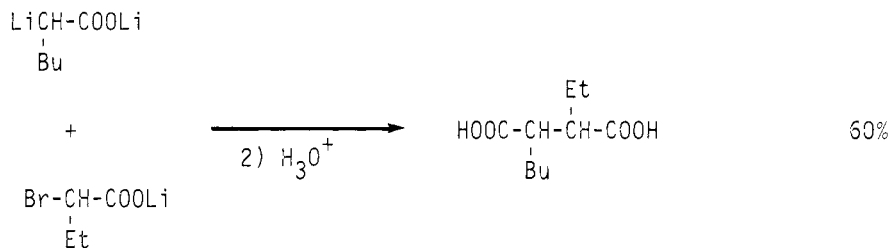
Section 310 Acetylene - Nitrile

Section 311 Acetylene - OlefinTetr Lett, 21, 2531 (1980)JOC, 46, 645 (1981)

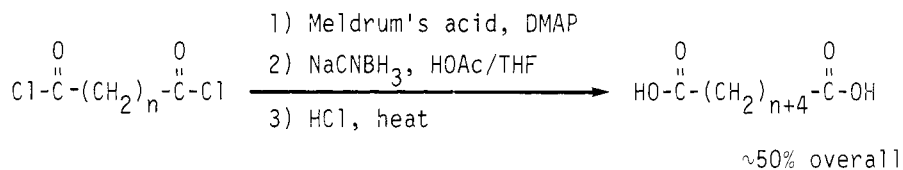
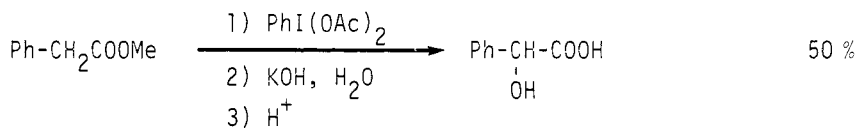
Chem Lett, 669 (1980)

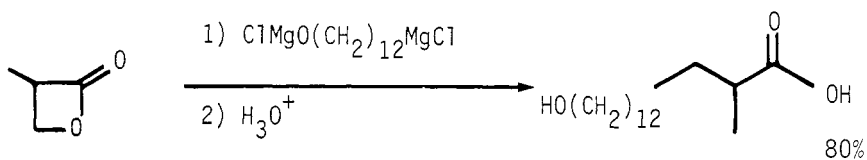


JACS, 102, 3298 (1980)Tetr Lett, 21, 1595 (1980)Section 312 Carboxylic Acid - Carboxylic AcidTetr Lett, 22, 2595 (1981)

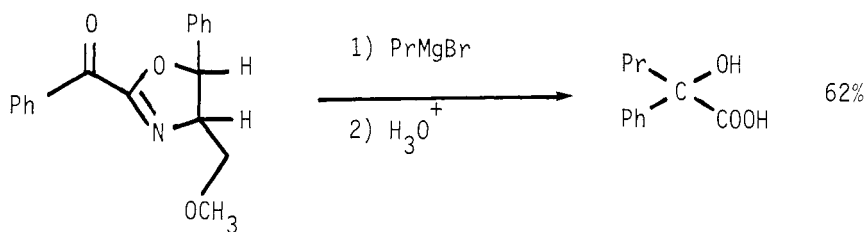


Synthesis, 710 (1980)

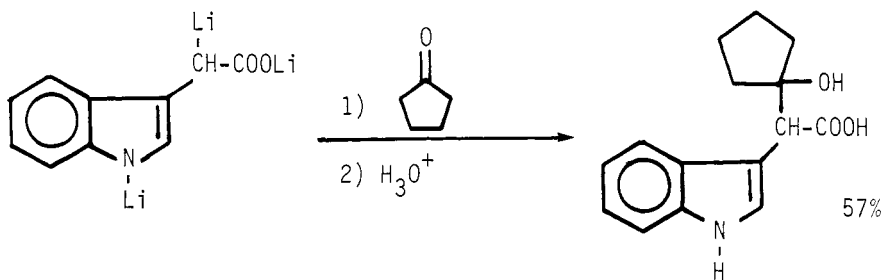
Synth Comm, 12, 19 (1982)Section 313 Carboxylic Acid - AlcoholTetr Lett, 22, 2747 (1981)



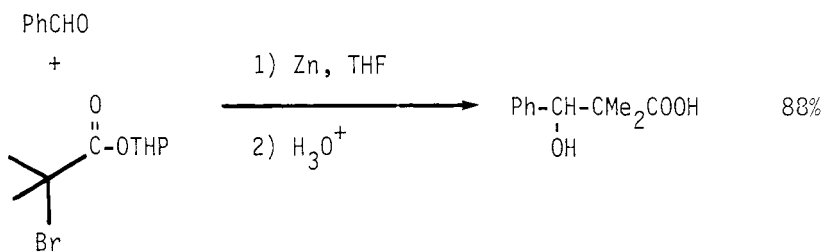
Chem Lett, 569 (1982)



JOC, 45, 2785 (1980)



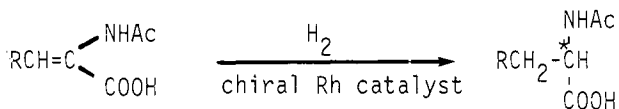
JOC, 45, 447 (1980)



Bull Soc Chim France II, 145 (1980)

Section 314 Carboxylic Acid - Aldehyde

No additional examples.

Section 315 Carboxylic Acid - Amide

JOC, 45, 5187 (1980)

Chem Ber, 113, 2323 (1980)

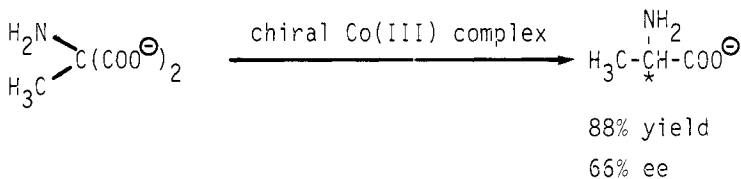
JACS, 102, 988 (1980)

JACS, 103, 2273 (1981)

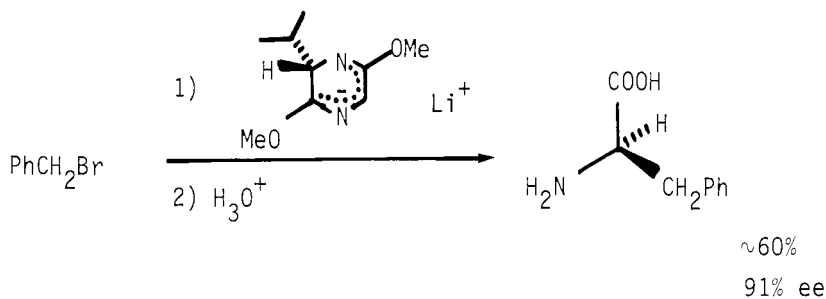
JOC, 46, 2954 and 2960 (1981)

Synthesis, 75 (1981)

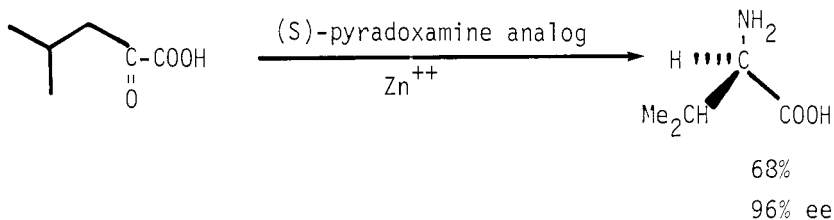
Related methods: Section 316 (Acid-Amine); Section 344 (Amide-Ester); Section 351 (Amine - Ester)

Section 316 Carboxylic Acid - Amine

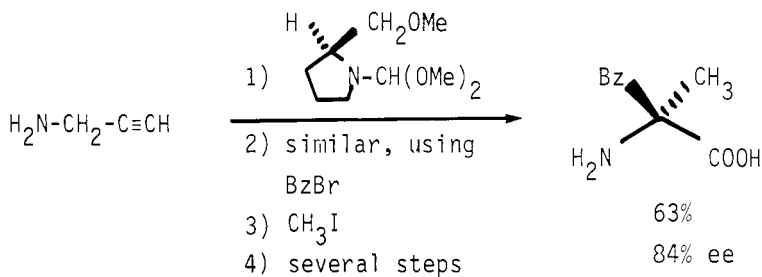
JACS, 103, 2459 (1981)



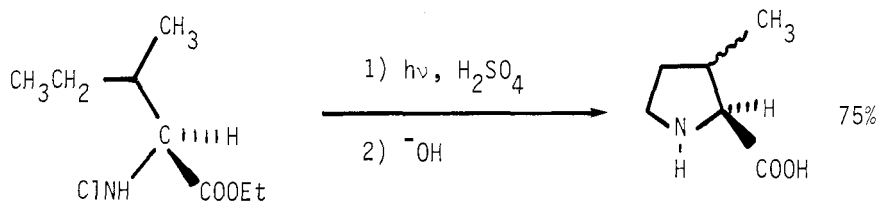
Angew Chem Int Ed, 20, 798 (1981)



Chem Lett, 1765 and 1769 (1982)



Angew Chem Int Ed, 19, 725 (1980)

Tetrahedron, 36, 2961 (1980)

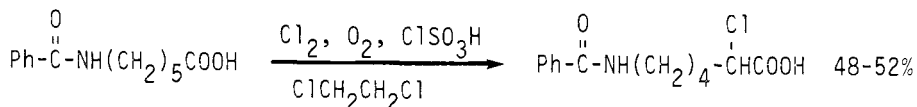
Related methods: Section 315 (Acid-Amide); Section 344 (Amide-Ester); Section 351 (Amine-Ester)

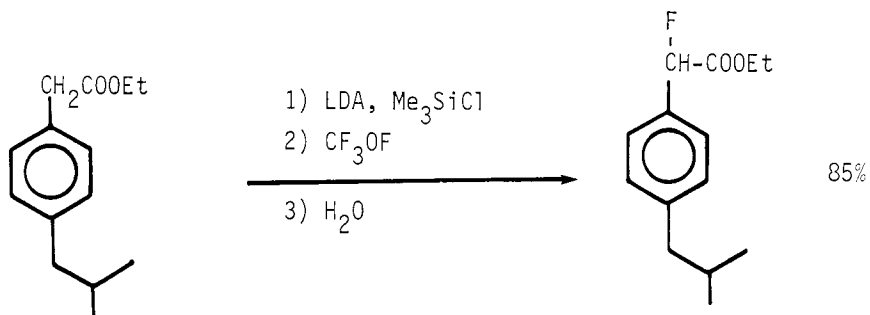
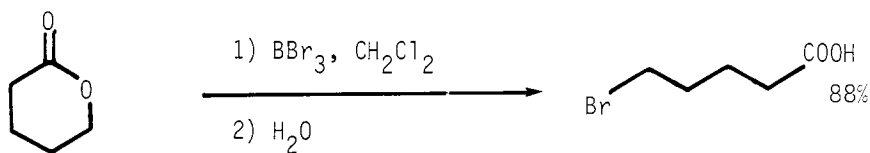
Section 317 Carboxylic Acid - Ester

No additional examples.

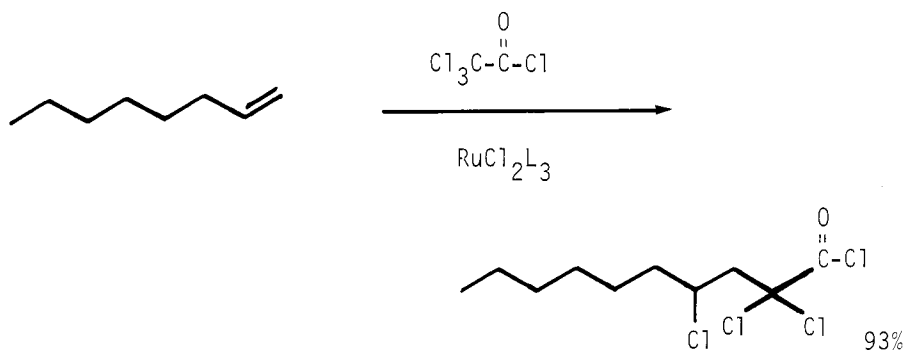
Section 318 Carboxylic Acid - Ether, Epoxide

No additional examples.

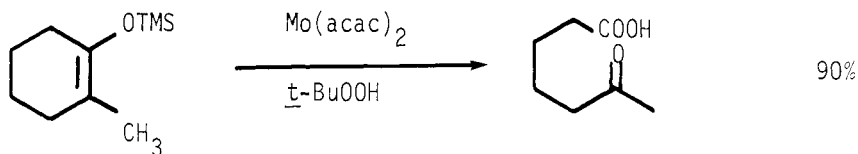
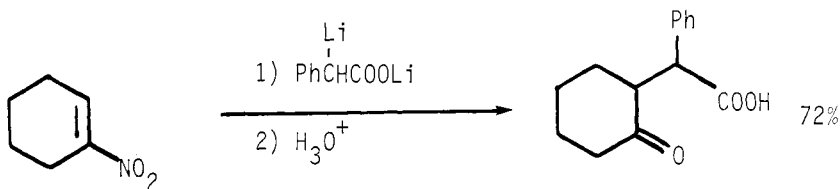
Section 319 Carboxylic Acid - Alkyl HalideOrg Syn, 59, 20 (1980)

JACS, 102, 4845 (1980)

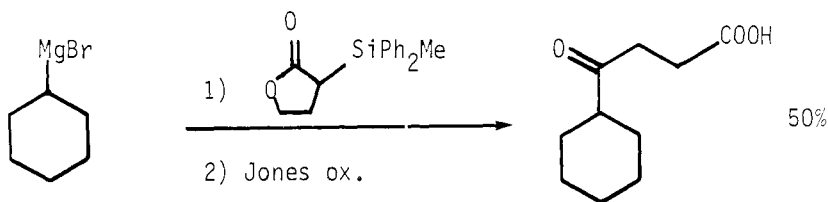
Synthesis, 963 (1982)

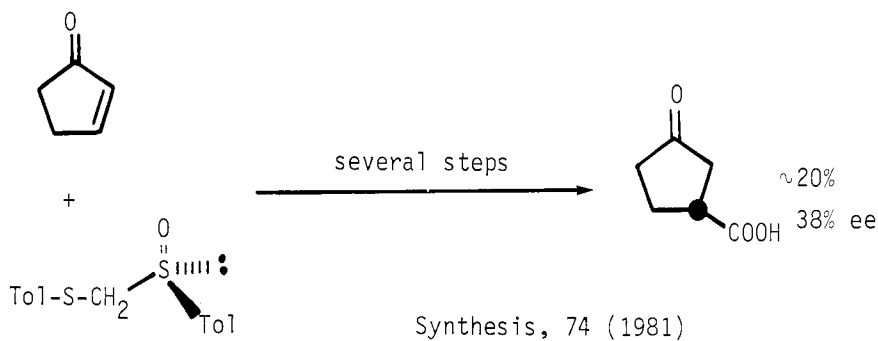


Chem Lett, 1255 (1982)

Section 320 Carboxylic Acid - KetoneTetr Lett, 22, 2595 (1981)

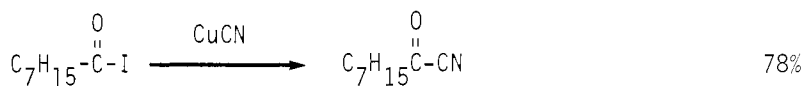
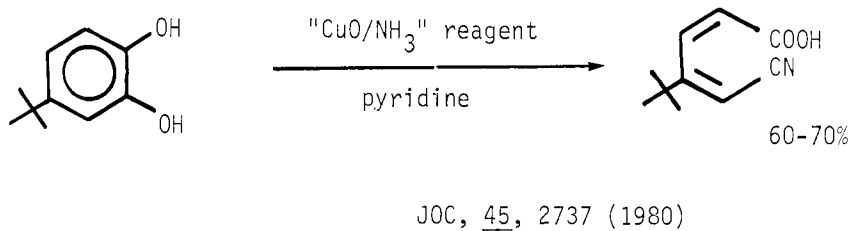
Chem Lett, 1505 (1982)

Tetr Lett, 23, 271 (1982)

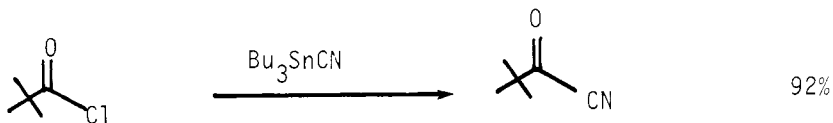
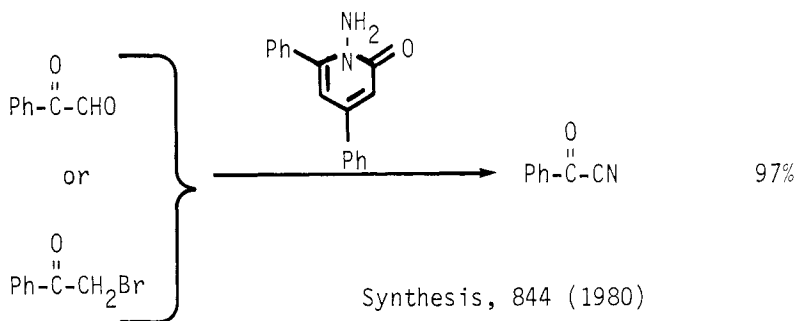


Also via: Ketoesters (Section 360)

Section 321 Carboxylic Acid - Nitrile



Angew Chem Int Ed, 21, 83 (1982)

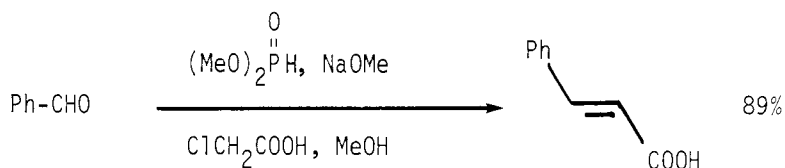
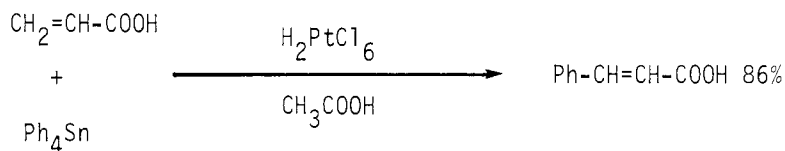
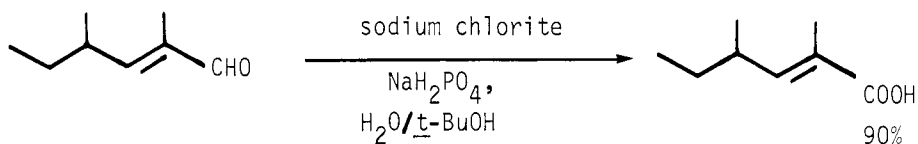
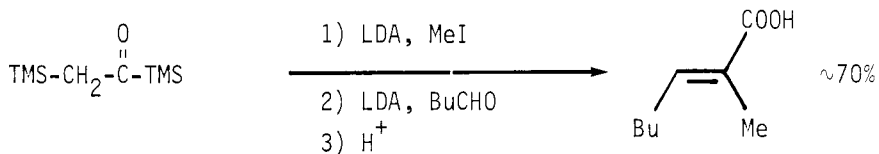
Tetr Lett, 21, 2959 (1980)Bull Chem Soc Japan, 54, 637 (1981)

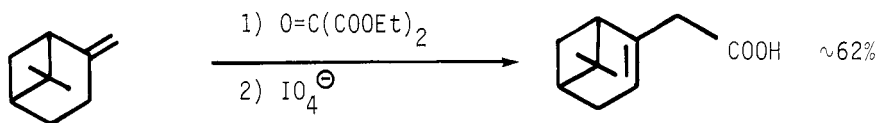
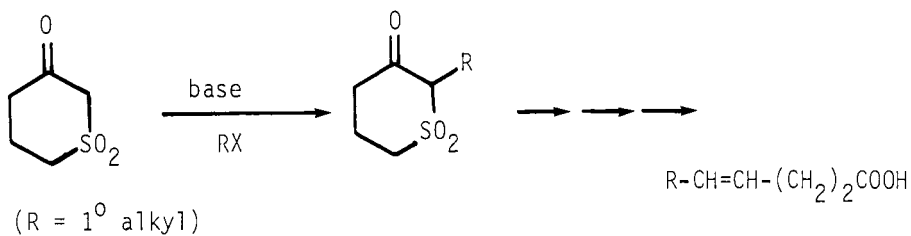
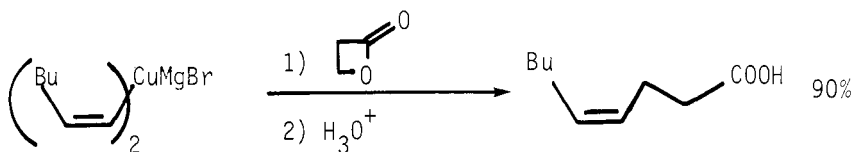
Synthesis, 844 (1980)

Review: "The Chemistry of Acyl Cyanides"

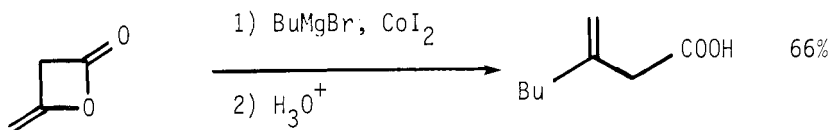
Angew Chem Int Ed, 21, 36 (1982)

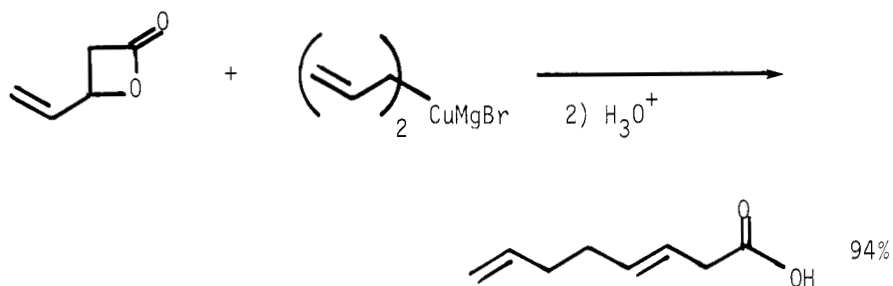
Also via: Section 361 (Cyanoesters)

Section 322 Carboxylic Acid - OlefinJOC, 46, 2514 (1981)Bull Acad USSR Chem, 30, 2211 (1982)Tetrahedron, 37, 2091 (1981)JACS, 103, 6217 (1981)

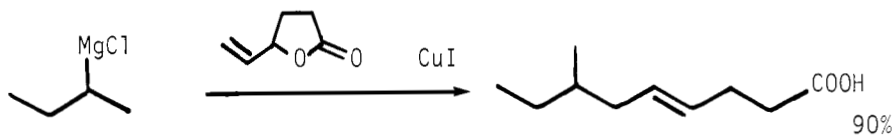
JACS, 102, 2473 (1980)Chem Ber, 114, 909 (1981)

Chem Lett, 1123 (1980)

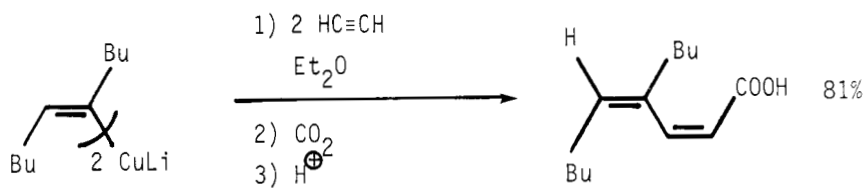
Bull Chem Soc Japan, 55, 3555 (1982)



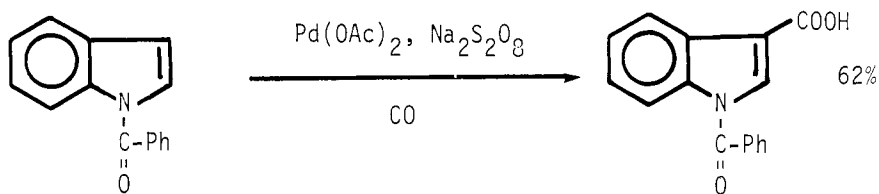
Tetr Lett, 22, 1817 (1981)



Tetr Lett, 23, 3583 (1982)

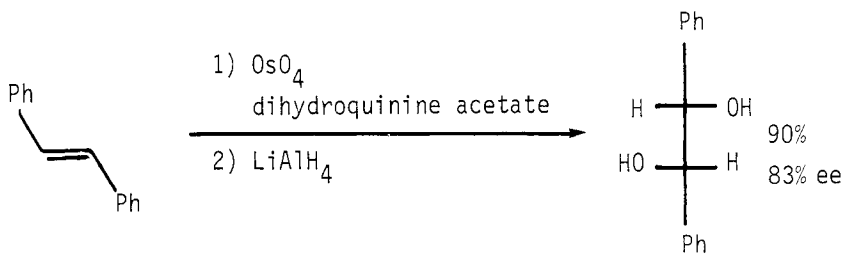
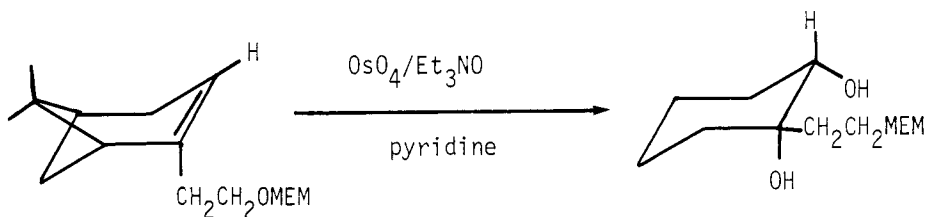


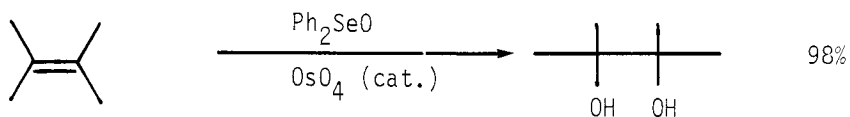
Tetr Lett, 23, 5151 (1982)



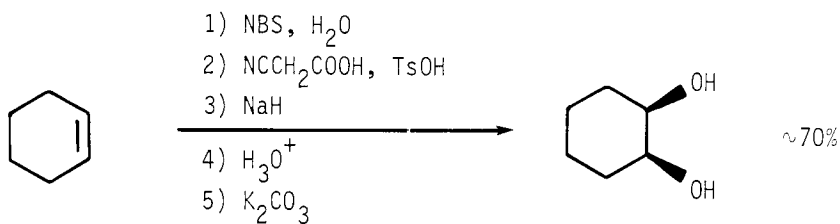
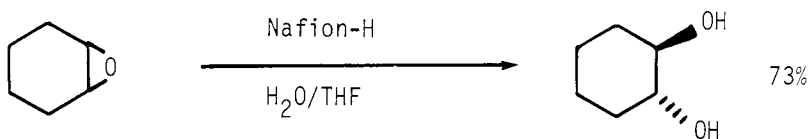
Chem Lett, 1151 (1982)

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

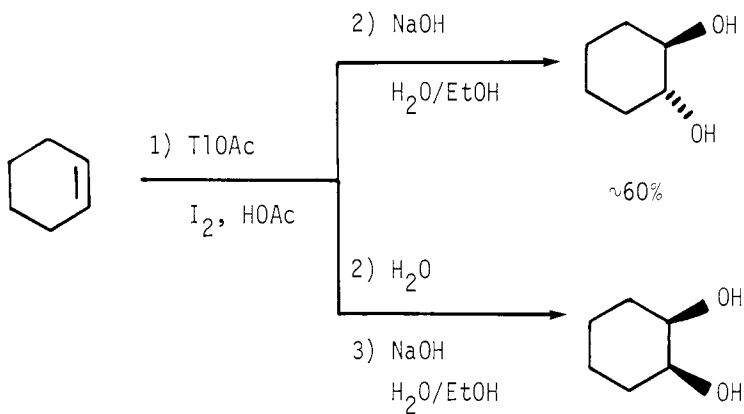
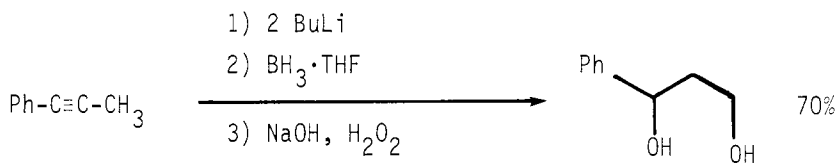
Section 323 Alcohol - AlcoholJACS, 102, 4263 (1980)Tetr Lett, 21, 449 (1980)

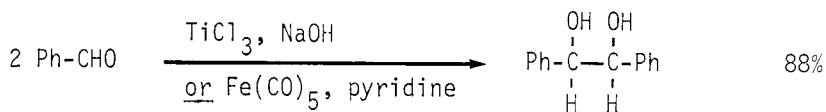
Tetr Lett, 22, 2051 (1981)

Review: "Osmium Tetroxide Cis-Hydroxylation of Unsaturated Substrates"

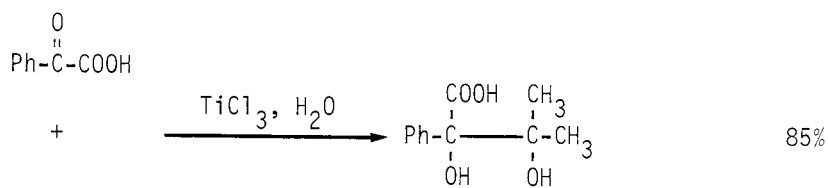
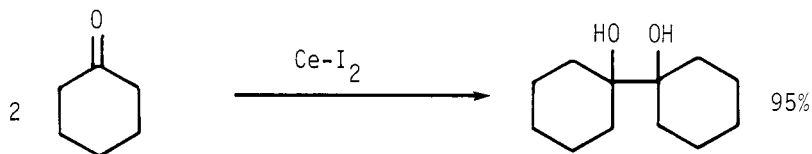
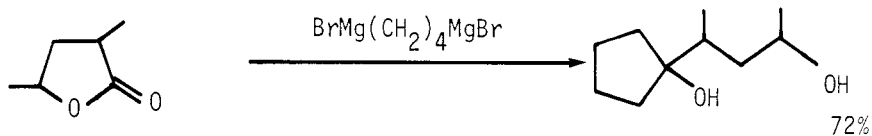
Chem Rev, 80, 187 (1980)Tetr Lett, 23, 4217 (1982)

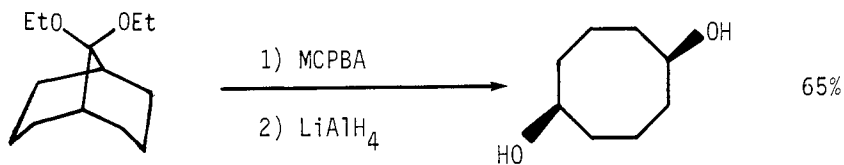
Synthesis, 280 (1981)

Org Syn, 59, 169 (1980)JOC, 45, 1 (1980)Tetrahedron, 36, 299 (1980)

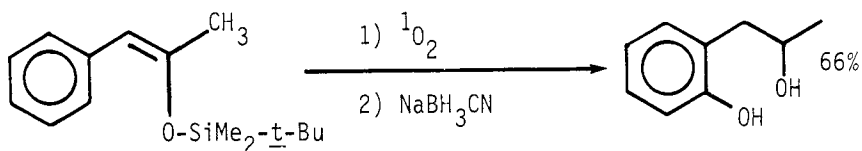
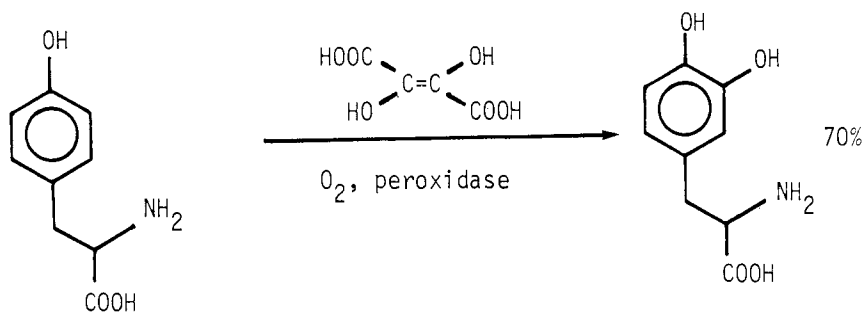


Chem Lett, 1141 (1980)

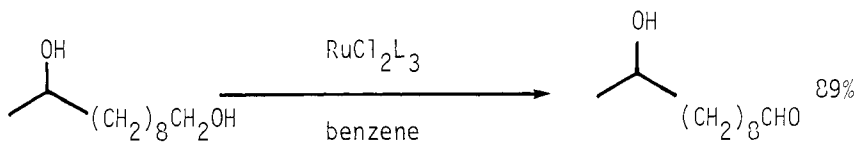
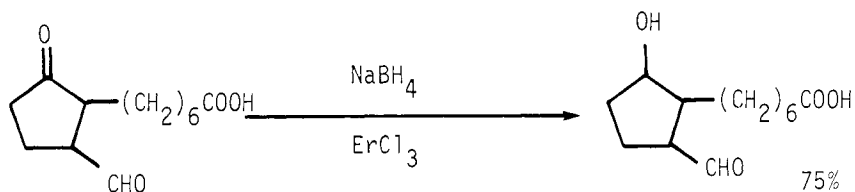
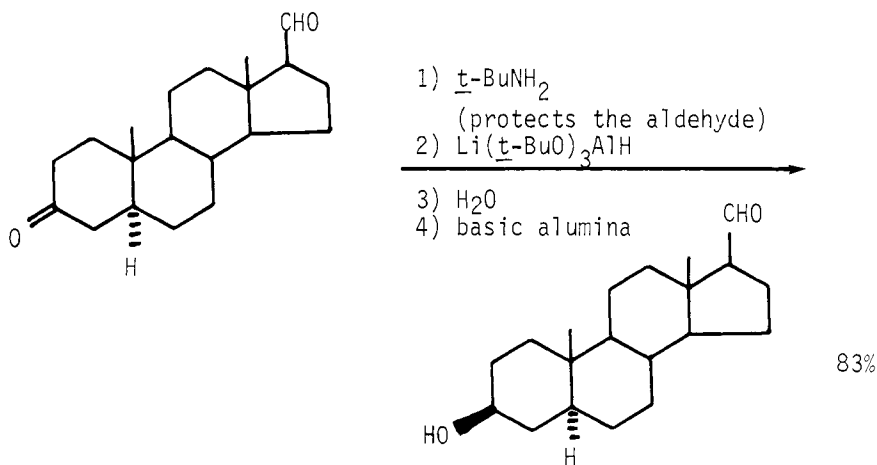
Tetr Lett, 23, 3517 (1982)JOC, 47, 2852 (1982)Tetr Lett, 23, 1353 (1982)JOC, 45, 1828 (1980)

JACS, 104, 1769 (1982)

Review: "Advances in Stereochemical Control: The 1,2- and 1,3-Diol Systems"

Aldrichimica Acta, 15, 47 (1982)Tetr Lett, 23, 1717 (1982)JACS, 103, 6263 (1981)

Also via: Hydroxyesters (Section 327); Diesters (Section 357)

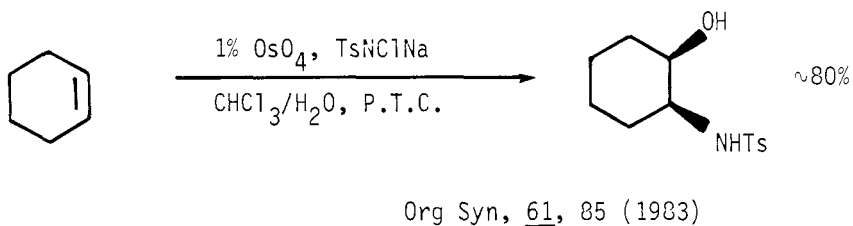
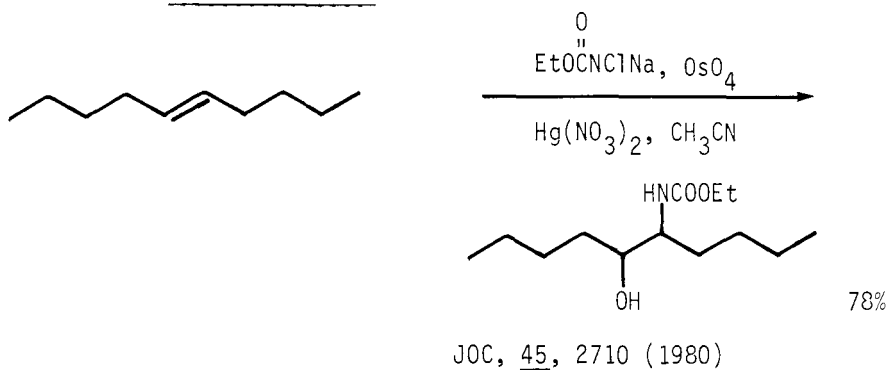
Section 324 Alcohol - AldehydeTetr Lett, 22, 1605 (1981)Tetr Lett, 22, 4077 (1981)Tetrahedron, 38, 1827 (1982)

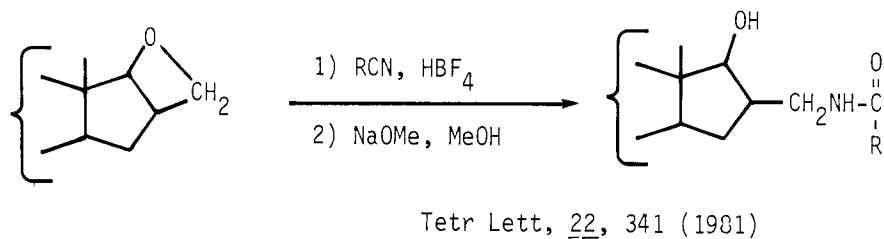
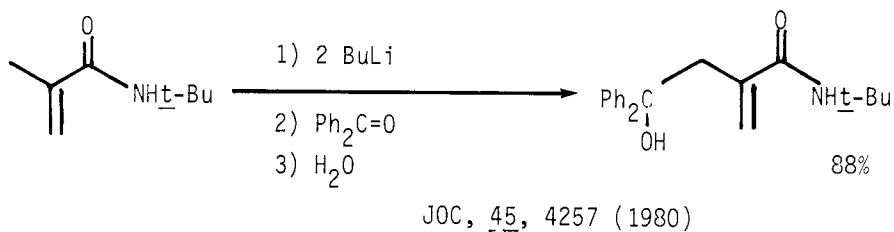
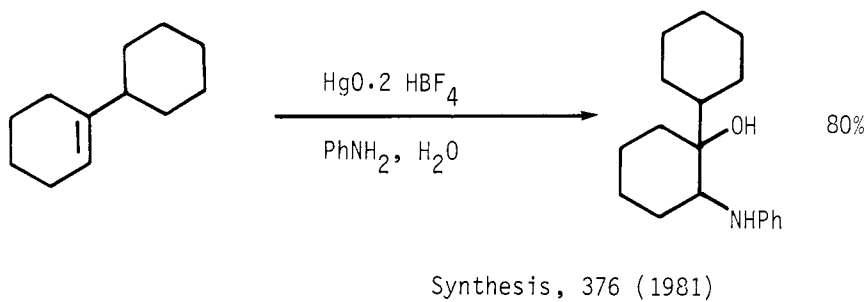
Review: "The Directed Aldol Reaction"

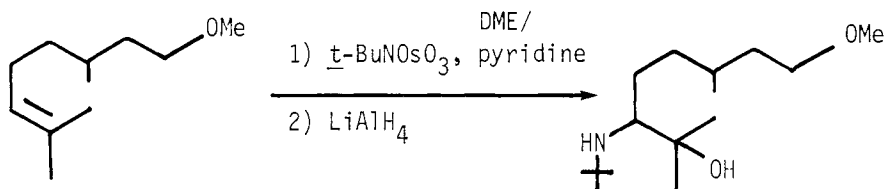
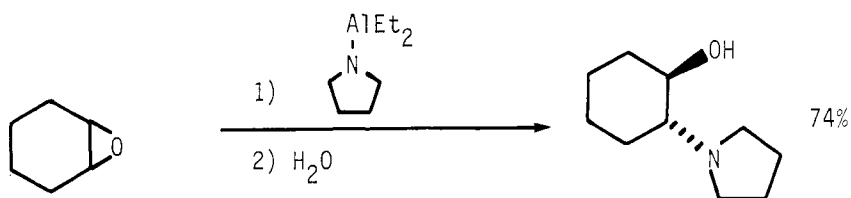
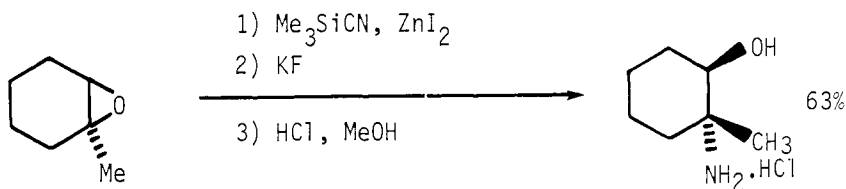
Org React, 28, 203 (1982)

Related methods: Alcohol - Ketone (Section 33)

Section 325 Alcohol - Amide

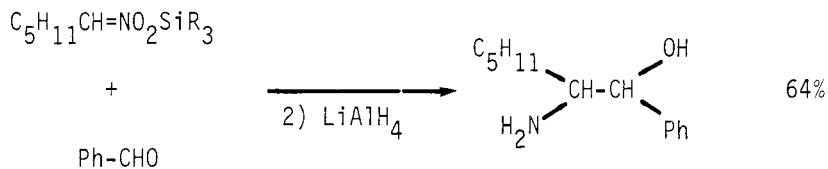


Section 326 Alcohol - Amine

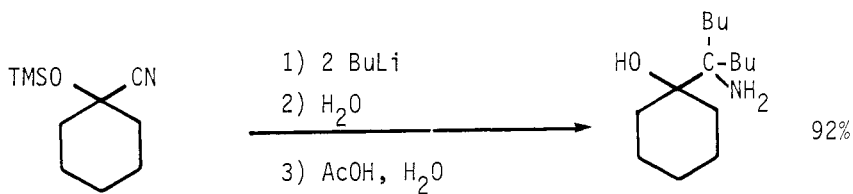
JOC, 45, 2257 (1980)Tetr Lett, 22, 195 (1981)JACS, 104, 5849 (1982)

Review: "Stereoselective Synthesis of Diastereomeric Amino Alcohols from Chiral Aminocarbonyl Compounds by Reduction or by Addition of Organometallic Reagents"

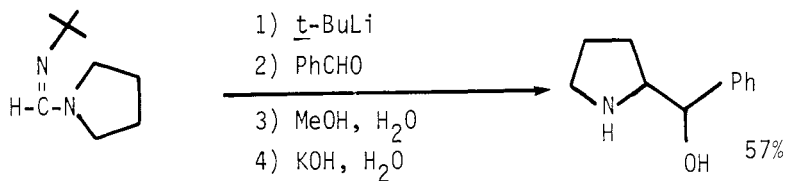
Synthesis, 605 (1982)



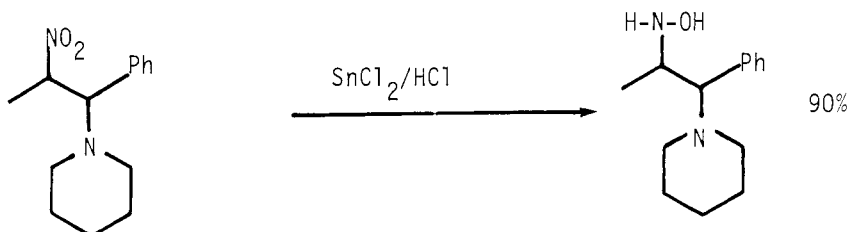
Helv Chim Acta, 64, 2264 (1981)



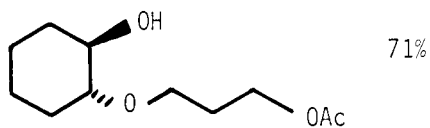
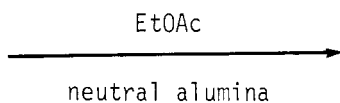
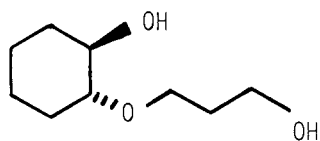
Synthesis, 270 (1981)



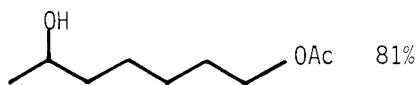
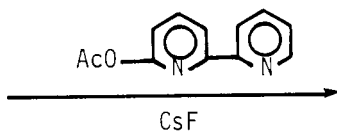
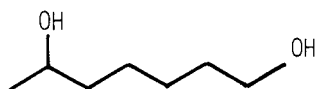
JACS, 102, 7125 (1980)



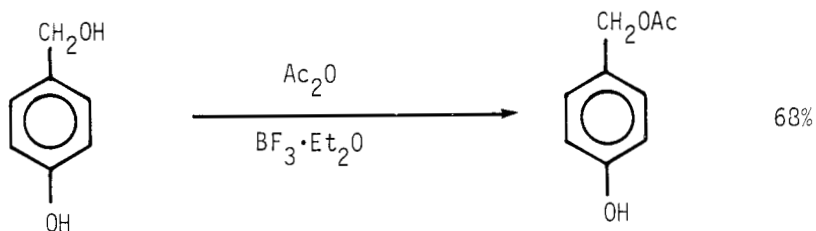
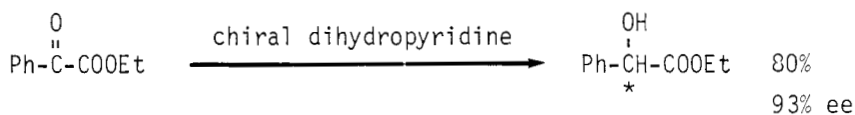
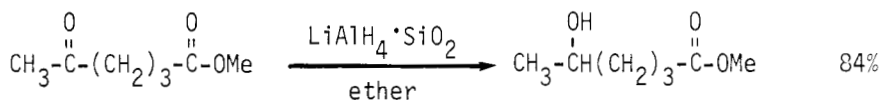
Synthesis, 599 (1982)

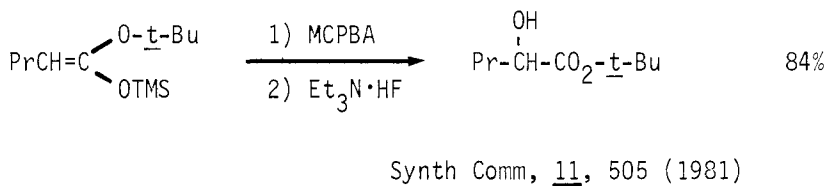
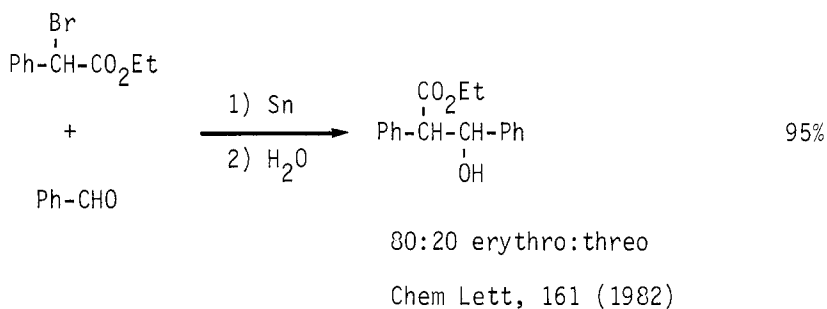
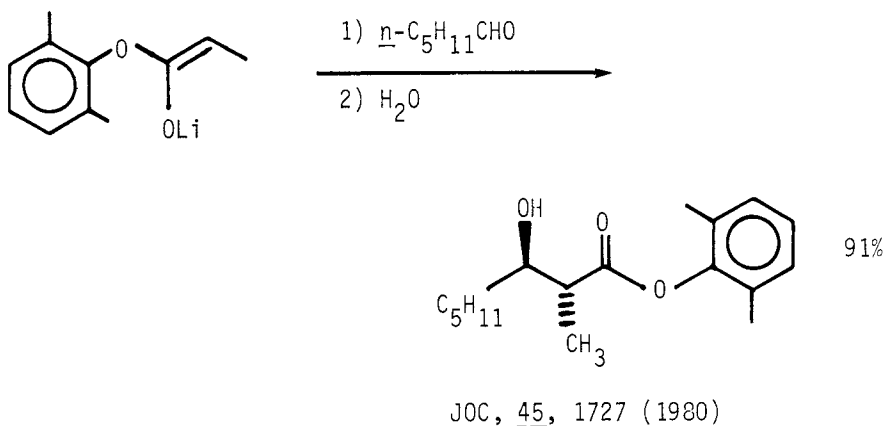
Section 327 Alcohol - Ester

Synthesis, 789 (1981)
 Tetr Lett, 22, 5003 and 5007 (1981)

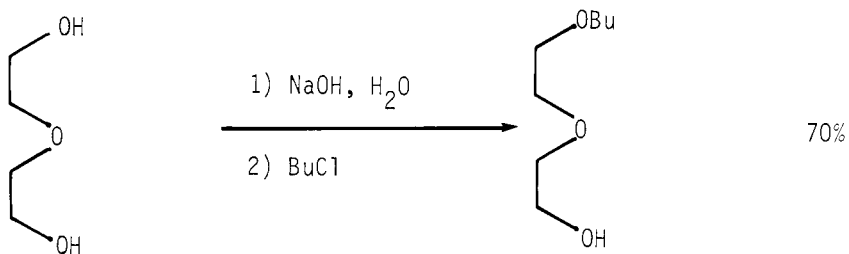
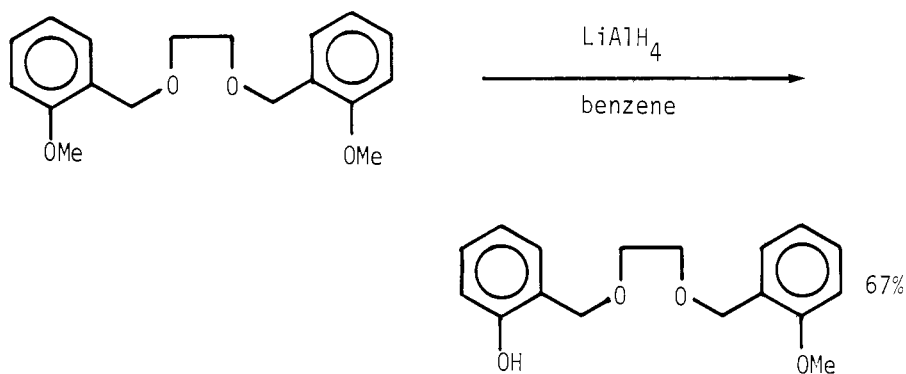


Chem Lett, 563 (1981)

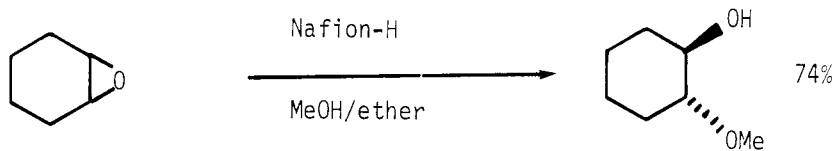
Chem Pharm Bull, 29, 3202 (1981)JACS, 103, 2091 (1981)JACS, 103, 4613 (1981)Tetr Lett, 23, 4585 (1982)



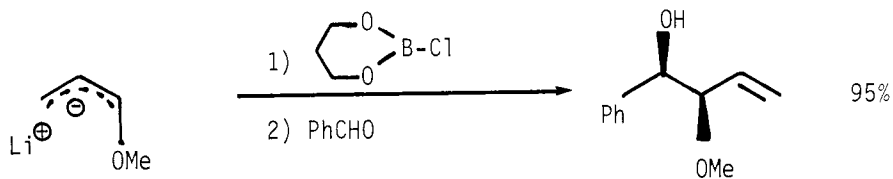
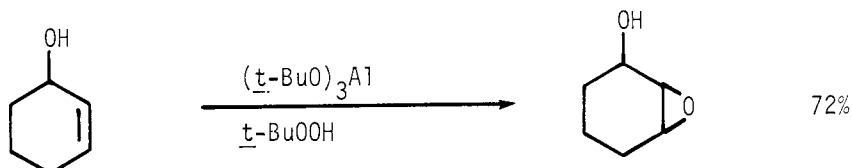
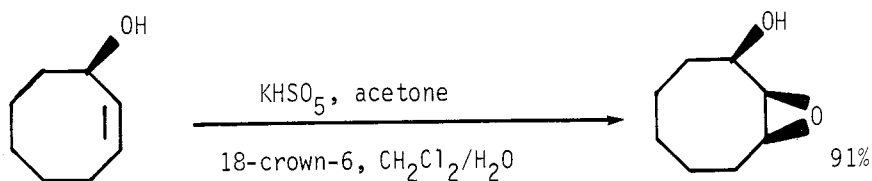
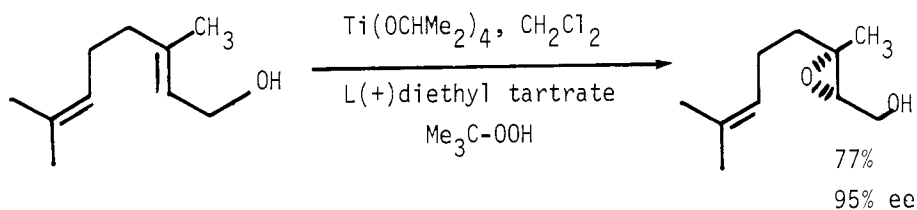
Also via: Hydroxyacids (Section 313)

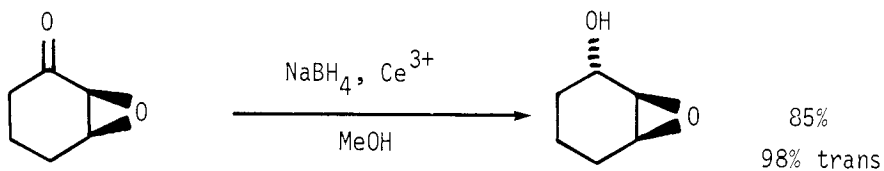
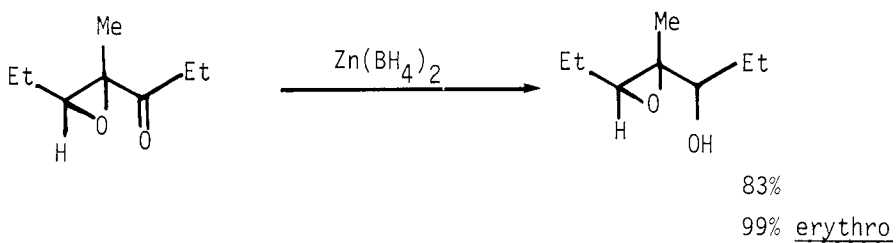
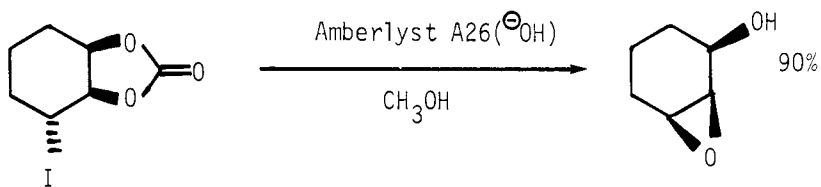
Section 328 Alcohol - Ether, EpoxideJOC, 45, 1095 (1980)

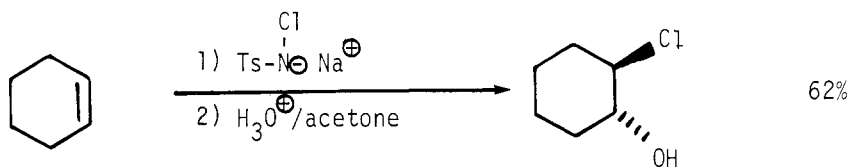
JCS Chem Comm, 507 (1980)



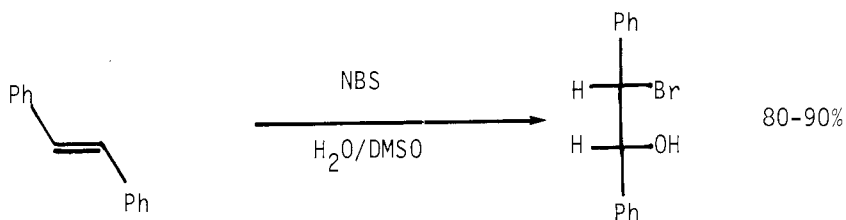
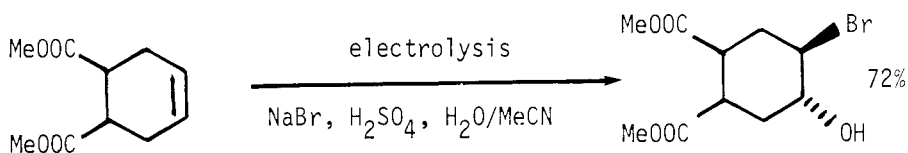
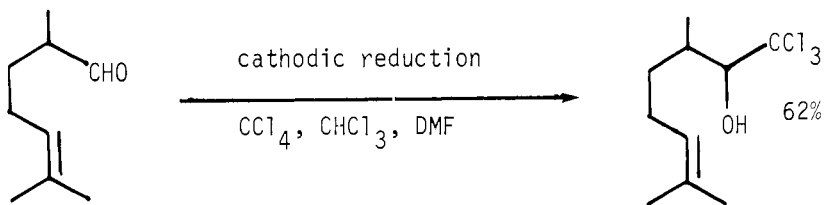
Synthesis, 280 (1981)

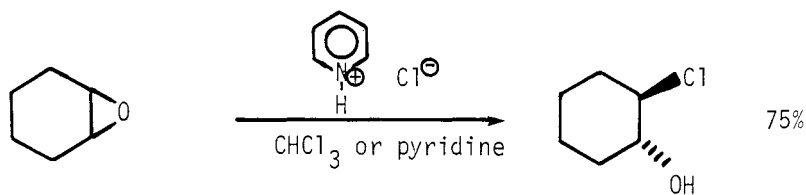
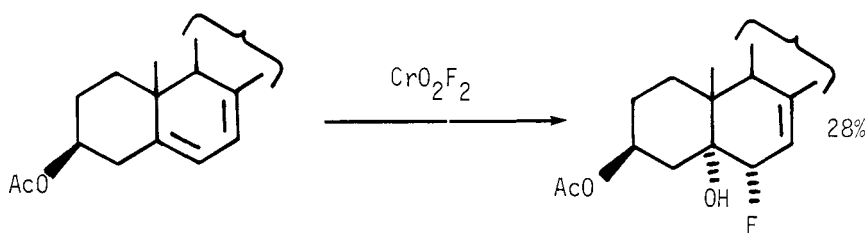
JOC, 47, 2498 (1982)Tetr Lett, 21, 1657 (1980)JOC, 47, 2670 (1982)JACS, 102, 5974 (1980)

Synth Comm, 10, 623 (1980)Tetr Lett, 22, 4723 (1981)JOC, 47, 4626 (1982)

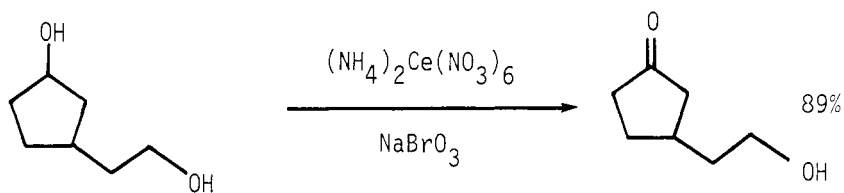
Section 329 Alcohol - Halide

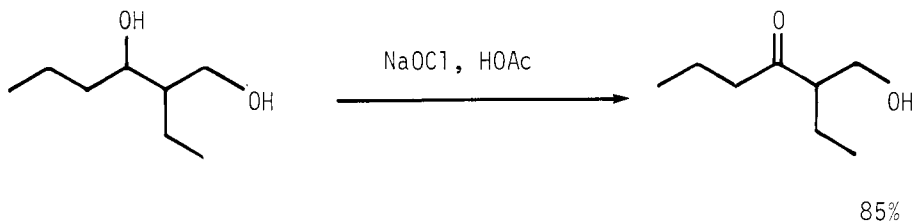
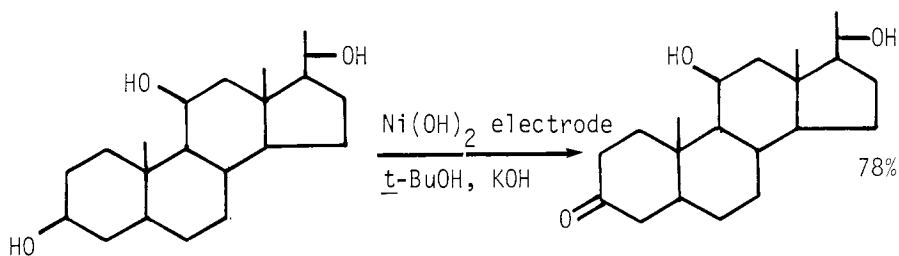
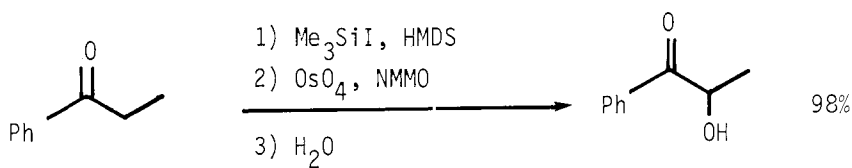
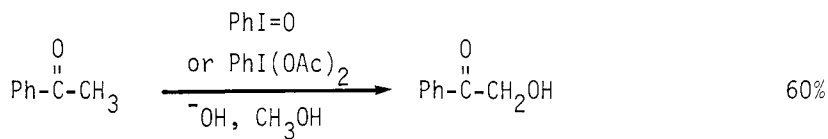
Synthesis, 362 (1981)

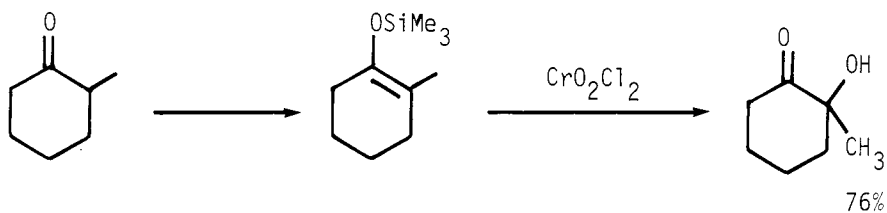
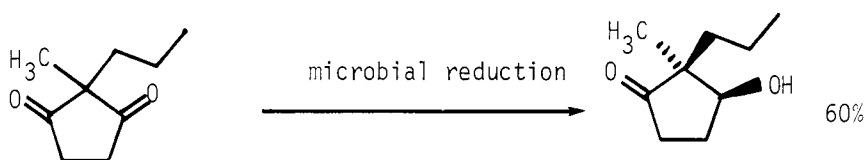
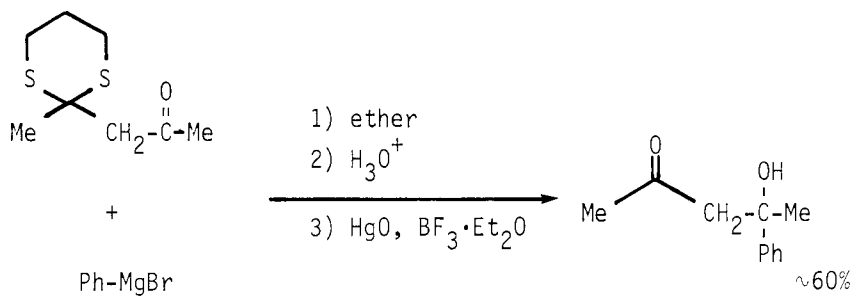
Org Syn, 59, 16 (1980)JOC, 46, 3312 (1981)Tetr Lett, 23, 1609 (1982)

Synth Comm, 11, 287 (1981)

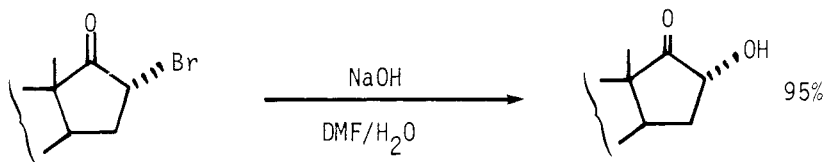
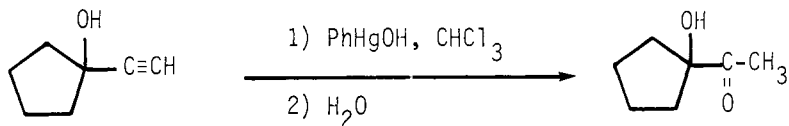
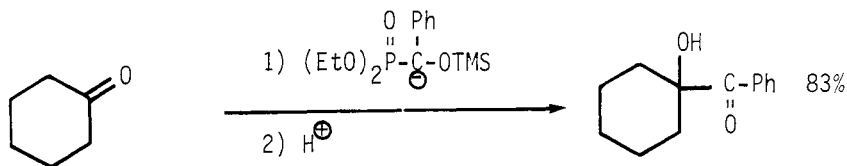
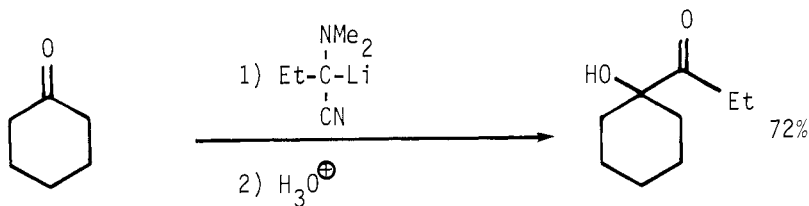
JCS Perkin I, 639 (1980)

Section 330 Alcohol - KetoneTetr Lett, 23, 539 (1982)

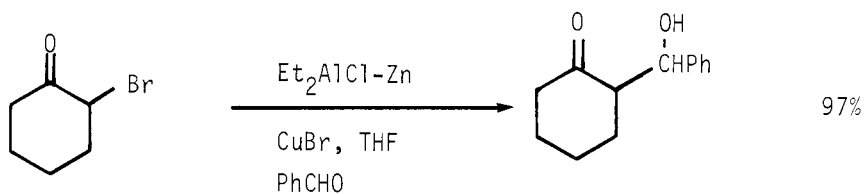
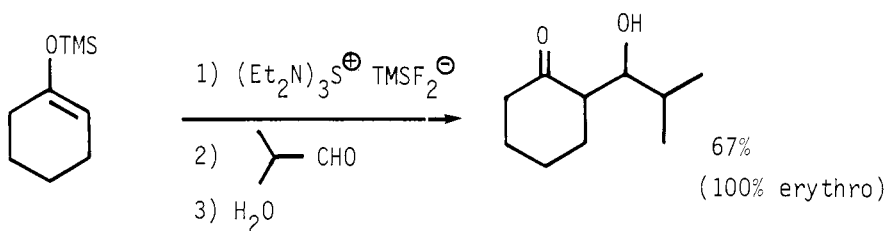
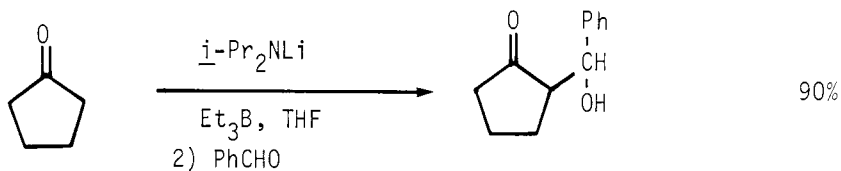
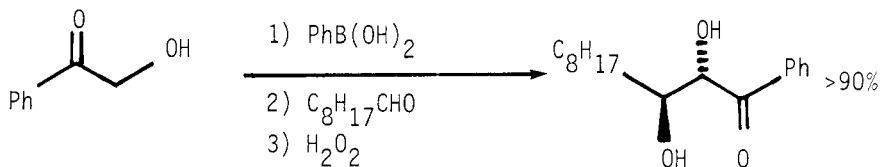
Tetr Lett, 23, 4647 (1982)Tetrahedron, 38, 3299 (1982)Tetr Lett, 22, 607 (1981)Tetr Lett, 22, 1283 (1981)

Tetr Lett, 23, 2917 (1982)JOC, 47, 2820 (1982)

Synthesis, 561 (1980)

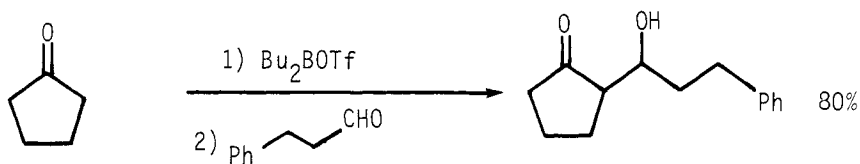
JOC, 47, 4024 (1982)JOC, 47, 3331 (1982)Tetr Lett, 21, 1017 (1980)

Chem Lett, 71 (1980)

Bull Chem Soc Japan, 53, 3301 (1980)JACS, 103, 2106 (1981)Threo product is favored by a 97/3 ratio.Tetr Lett, 23, 2387 (1982)

Chem Lett, 509 (1982)

Chem Lett, 1291 (1982)



Bull Chem Soc Japan, 53, 174 (1980)

Aldol reactions of boron enolates with aldehydes to form erythro

alcohols: JACS, 102, 4548 (1980)

JACS, 103, 1566 (1981)

JACS, 103, 2127 (1981)

JACS, 103, 3099 (1981)

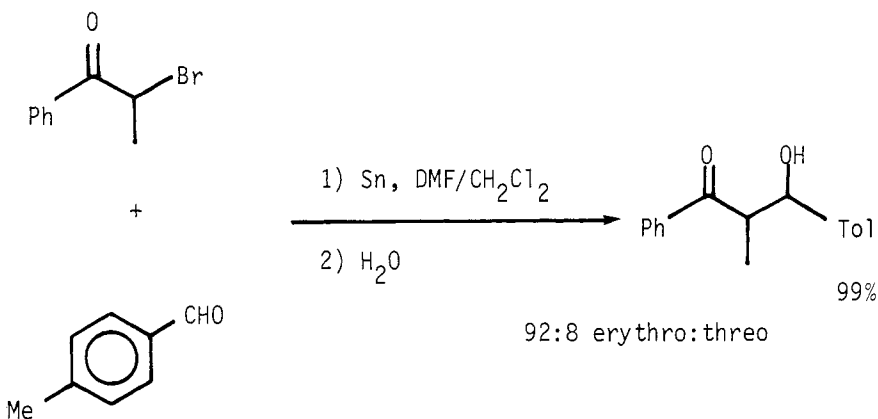
JACS, 103, 3229 (1981)

Using Zr enolates:

JACS, 103, 2876 (1981)

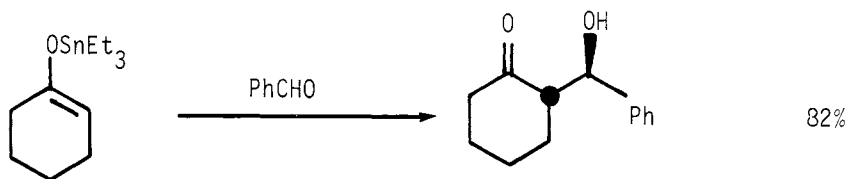
Erythro or threo selectivity:

JACS, 103, 4278 (1981)

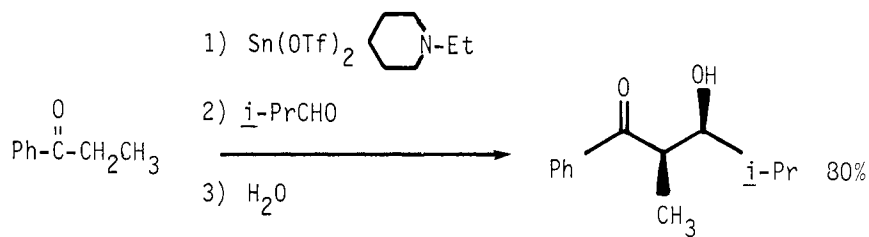


92:8 erythro:threo

Chem Lett, 467 (1982)

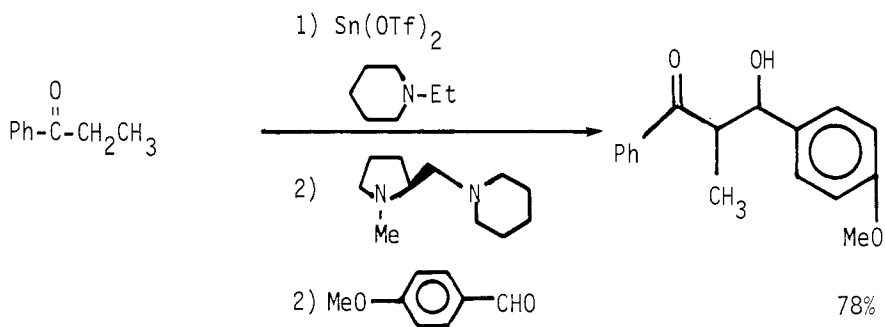


JCS Chem Comm, 162 (1981)

Tetr Lett, 23, 627 (1982)

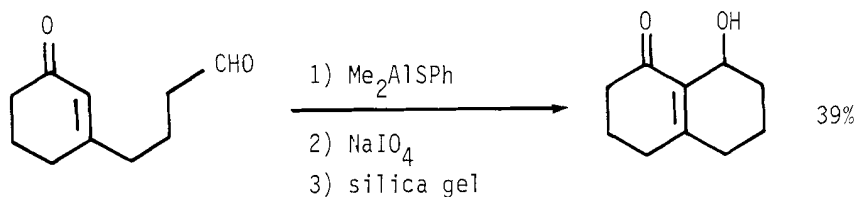
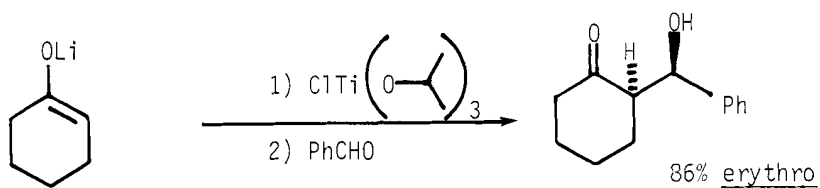
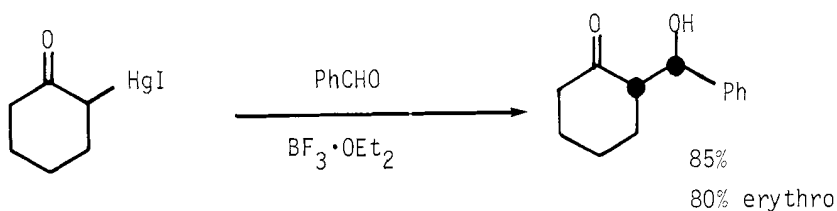
91:9 erythro:threo

Chem Lett, 353 (1982)



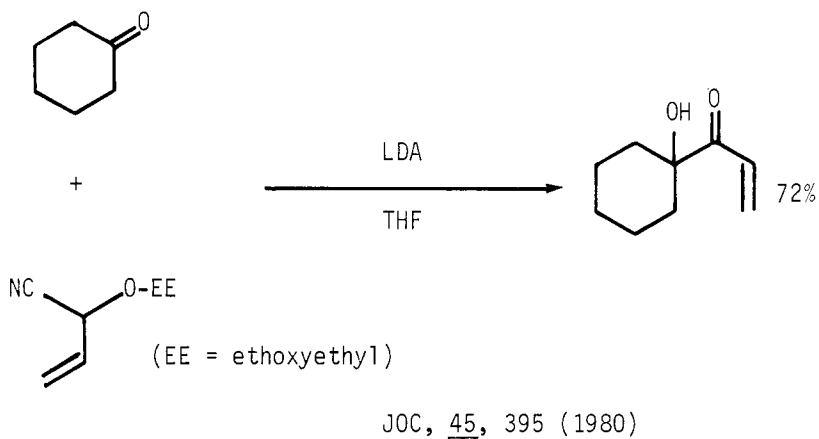
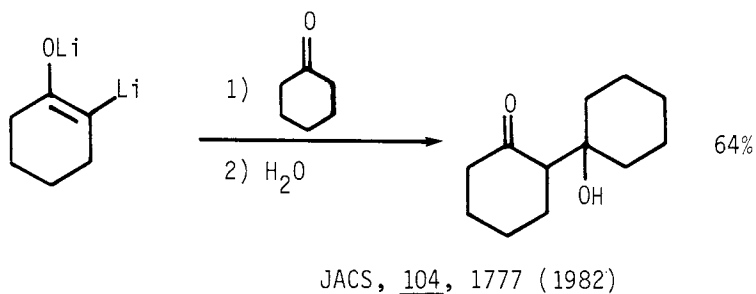
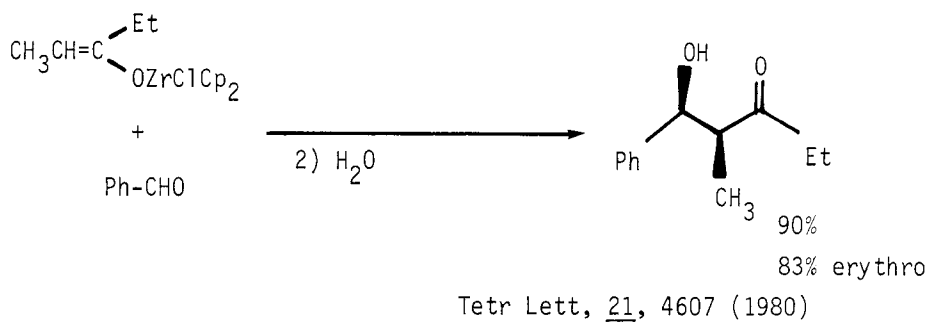
Chem Lett, 1441 (1982)

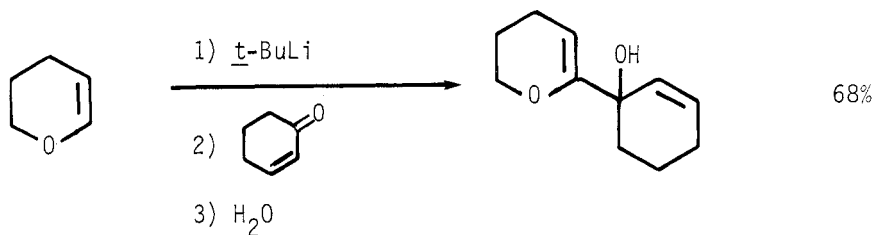
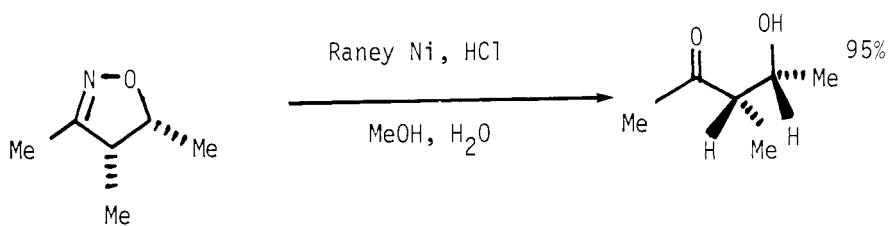
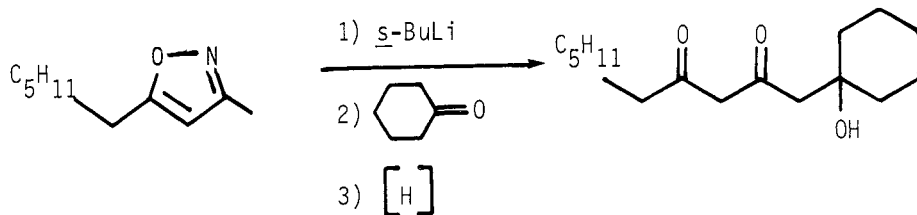
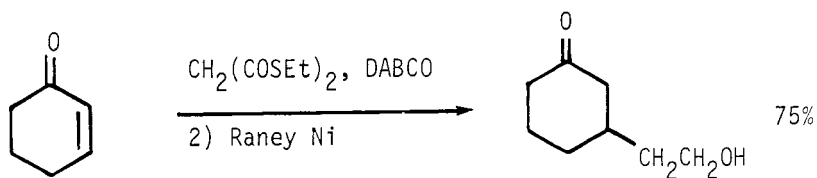
Chem Lett, 1459 (1982)

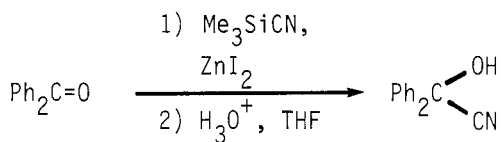
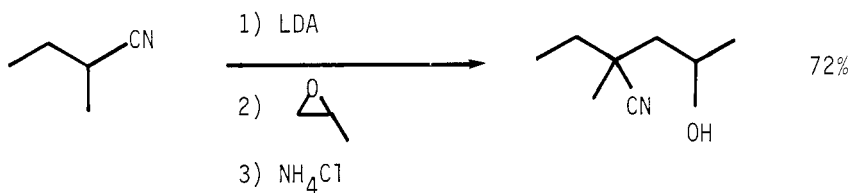
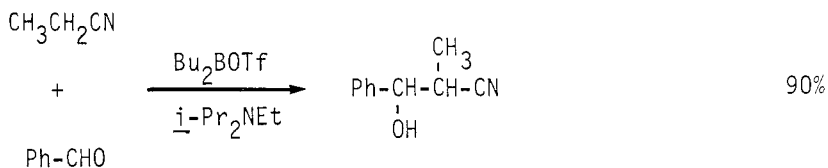
Tetr Lett, 21, 361 (1980)Bull Chem Soc Japan, 54, 274 (1981)Tetr Lett, 22, 4691 (1981)JACS, 104, 2323 (1982)

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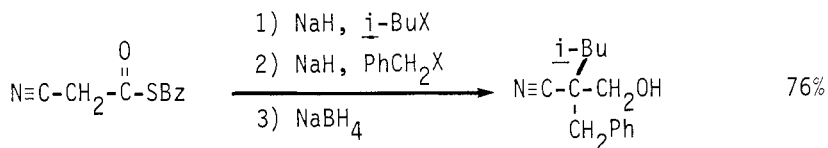
Org React, 28, 203 (1982)



Tetrahedron, 37, 3997 (1981)Tetr Lett, 23, 3123 (1982)Tetr Lett, 22, 3699 (1981)Can J Chem, 60, 94 (1982)

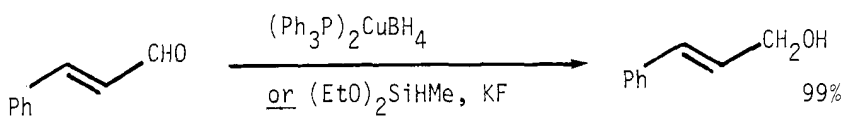
Section 331 Alcohol - NitrileOrg Syn, 60, 14 (1981)Synth Comm, 10, 49 (1980)

Chem Lett, 1401 (1982)

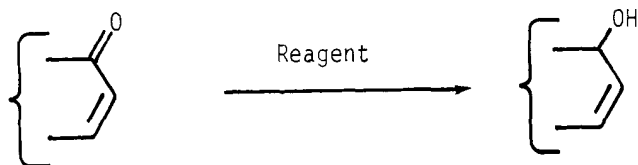
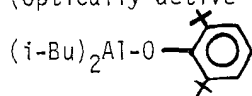
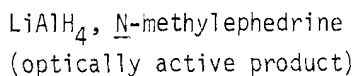
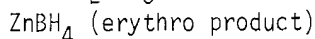
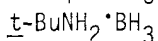
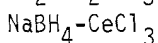
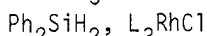
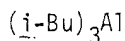
Tetr Lett, 23, 3151 (1982)

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).



JCS Chem Comm, 121 (1981)

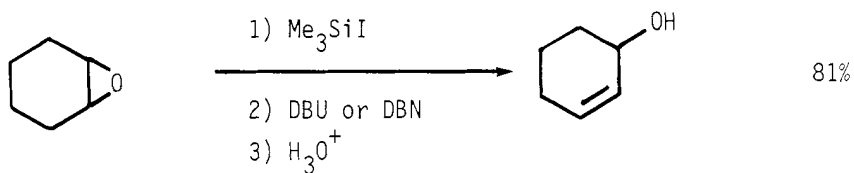
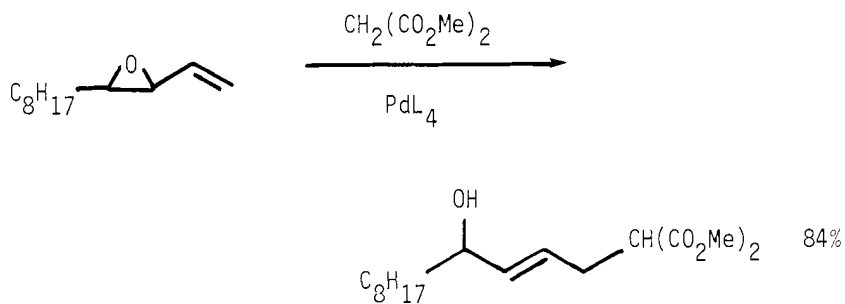
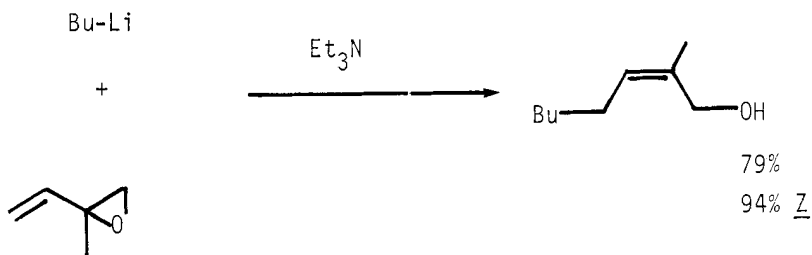
Tetr Lett, 22, 675 (1981)ReagentReferenceJOC, 47, 4640 (1982)Organometallics, 1, 1390 (1982)JACS, 103, 5454 (1981)Tetr Lett, 21, 693 and 697 (1980)Tetr Lett, 21, 1641 (1980)

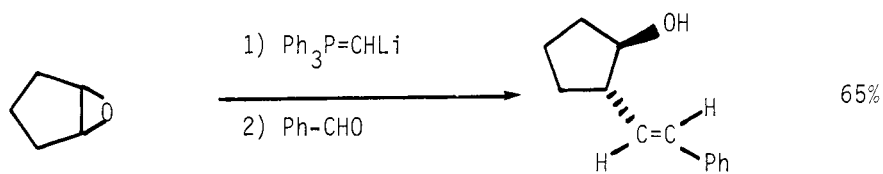
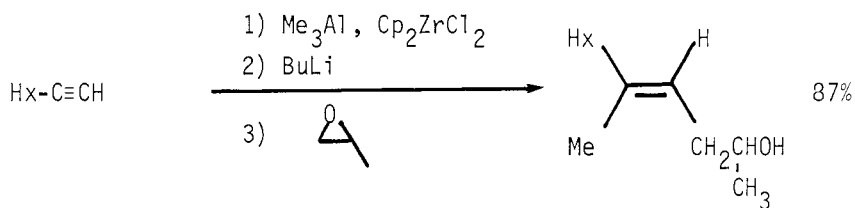
JCS Chem Comm, 1026 (1980)

Chem Lett, 981 (1980)

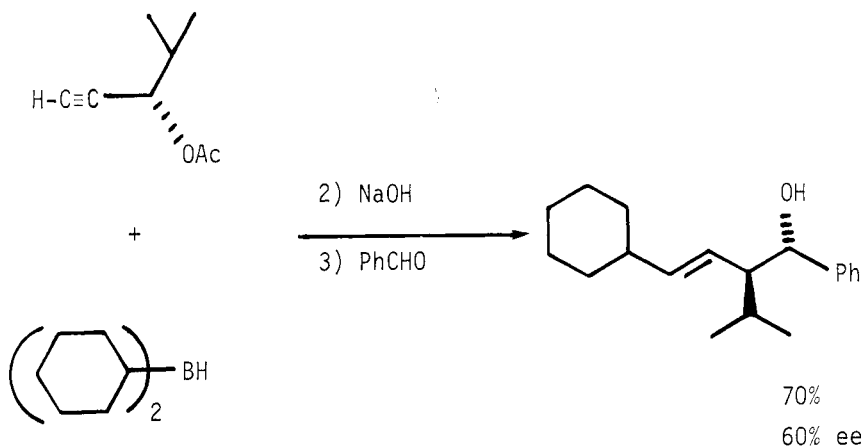
Bull Chem Soc Japan, 54, 3033 (1981)

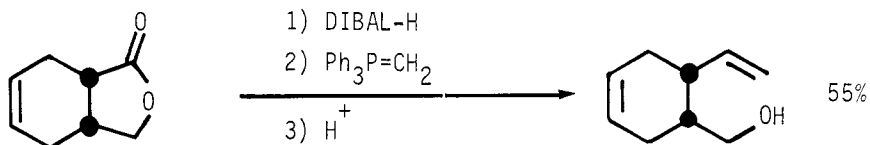
(gives stereoselectivity in reaction with PG intermediate)

Tetr Lett, 21, 2329 (1980)JOC, 45, 924 and 2579 (1980)Tetr Lett, 22, 2575 (1981)94% ZTetr Lett, 22, 577 (1981)

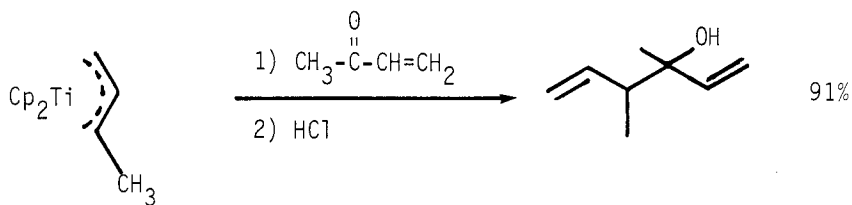
JACS, 104, 4724 (1982)

Synthesis, 1034 (1980)

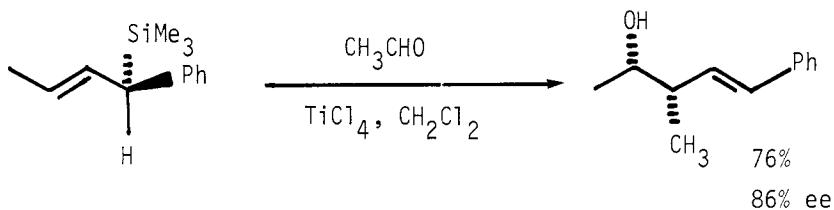
JACS, 104, 2330 (1982)



Synthesis, 1015 (1980)



Tetr Lett, 22, 243 (1981)

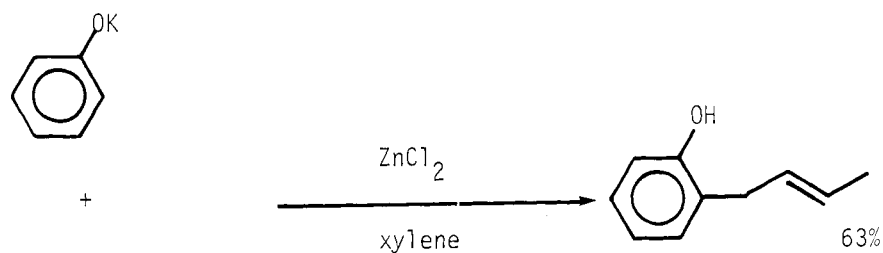


JACS, 104, 4963 (1982)

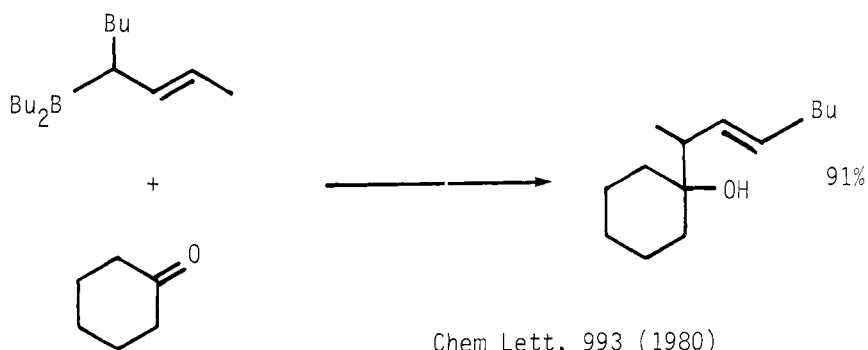


Tetr Lett, 21, 1815 (1980)

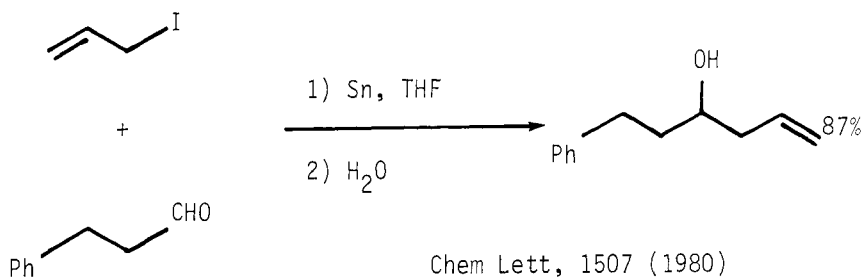
JACS, 104, 555 (1982)



Synthesis, 310 (1981)

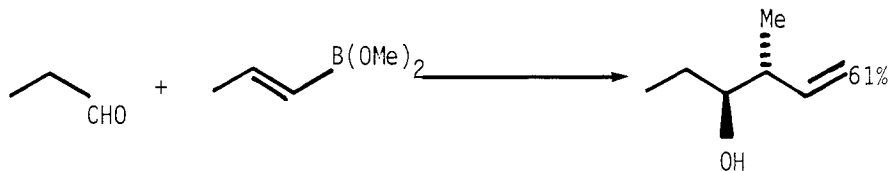
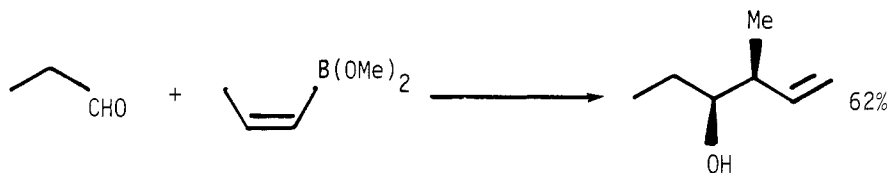
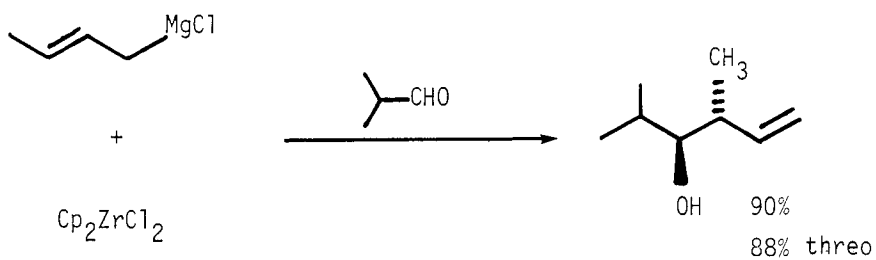
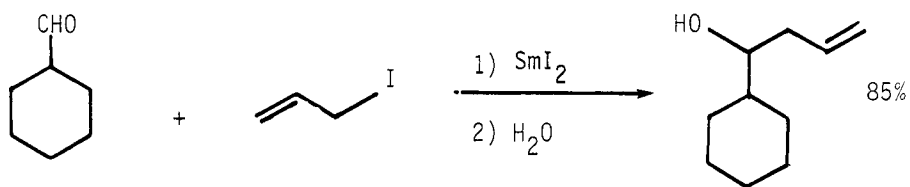


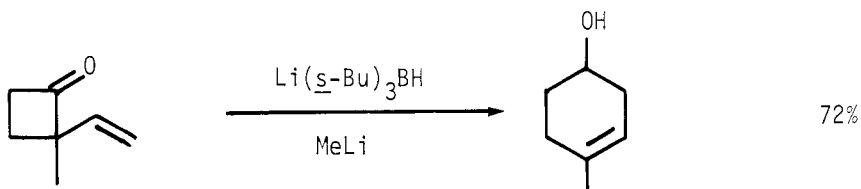
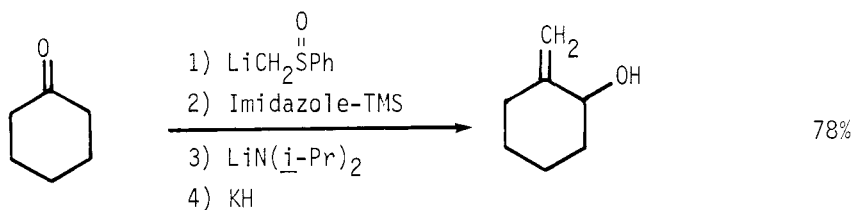
Chem Lett, 993 (1980)



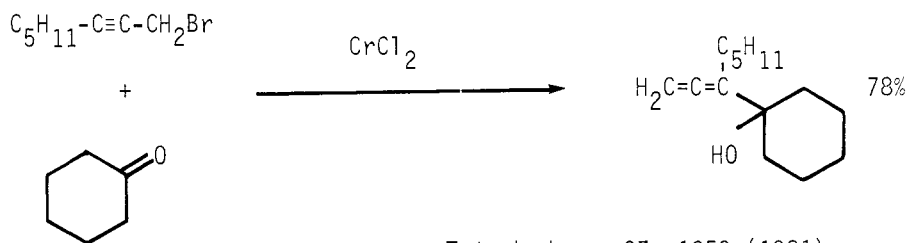
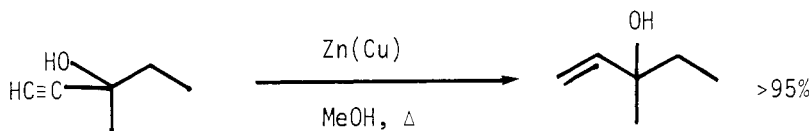
Chem Lett, 1507 (1980)

Chem Lett, 1527 (1981)

Helv Chim Acta, 65, 1258 (1982)Tetr Lett, 22, 2895 (1981)Tetr Lett, 23, 3497 (1982)

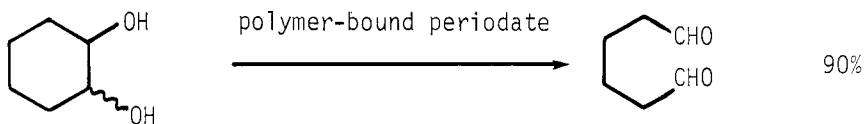
Tetrahedron, 37, 3943 (1981)

Synthesis, 640 (1980)

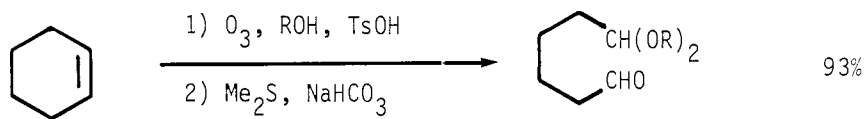
Tetrahedron, 37, 1359 (1981)Tetr Lett, 21, 1069 (1980)

Also via: Acetylenes - Alcohols (Section 302)

Section 333 Aldehyde - Aldehyde



JCS Perkin I, 509 (1982)



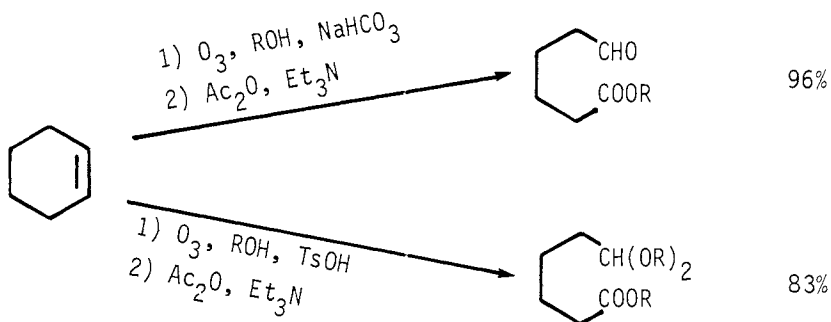
Tetr Lett, 23, 3867 (1982)

Section 334 Aldehyde - Amide

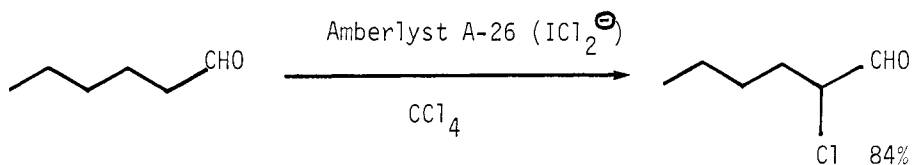
No additional examples.

Section 335 Aldehyde - Amine

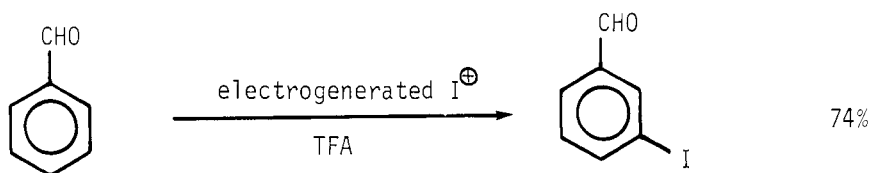
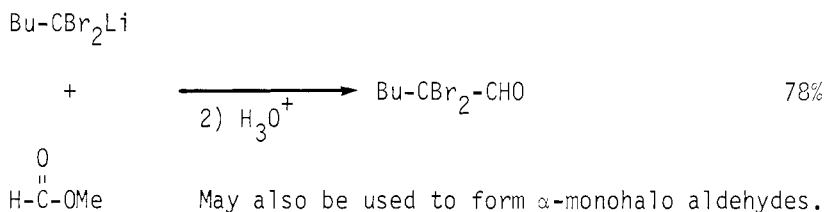
No additional examples.

Section 336 Aldehyde - EsterTetr Lett, 23, 3867 (1982)Section 337 Aldehyde - Ether, Epoxide

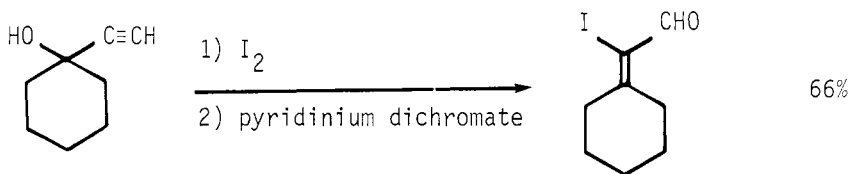
No additional examples.

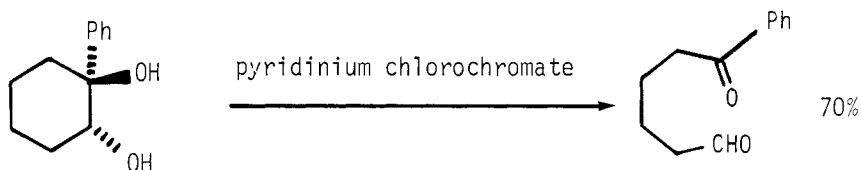
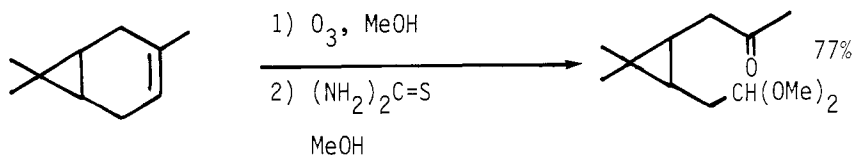
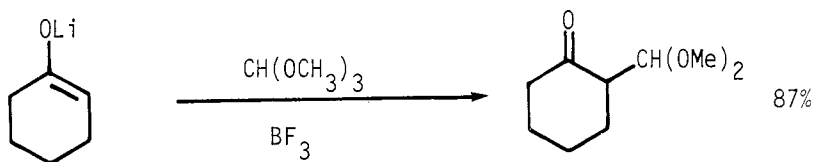
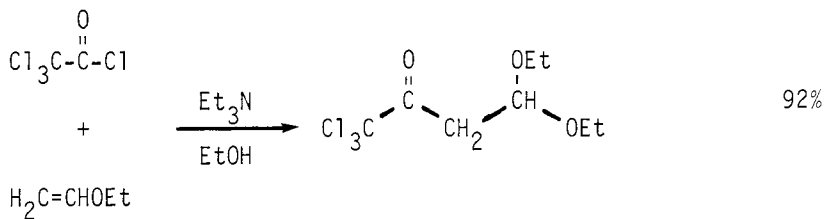
Section 338 Aldehyde - Halide

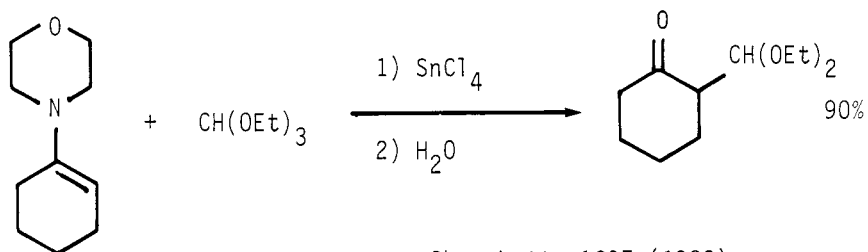
JCS Chem Comm, 1278 (1980)

Acta Chem Scand B, 34, 47 (1980)

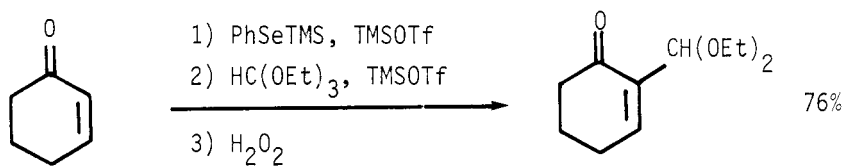
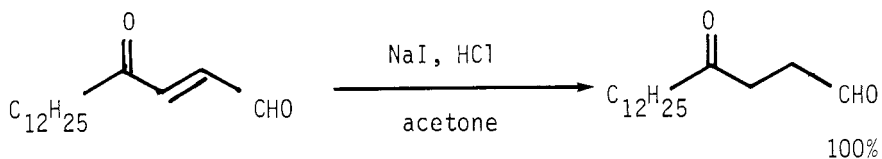
Synthesis, 644 (1980)

Tetr Lett, 22, 1041 (1981)

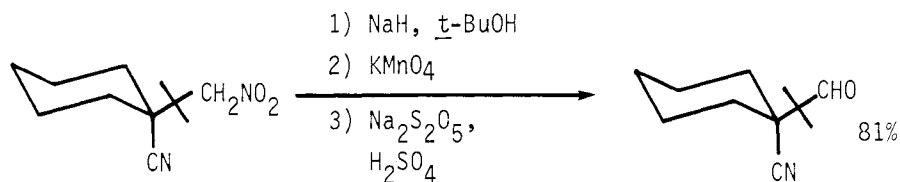
Section 339 Aldehyde - KetoneSynth Comm, 12, 833 (1982)Tetrahedron, 38, 3013 (1982)Tetr Lett, 23, 3595 (1982)Chem Ber, 115, 2766 (1982)



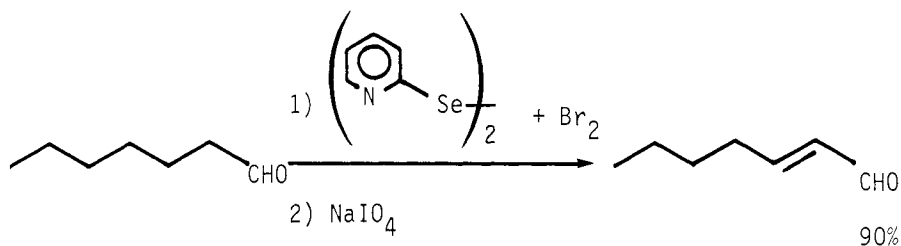
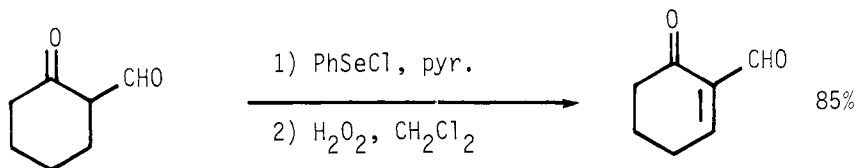
Chem Lett, 1307 (1982)

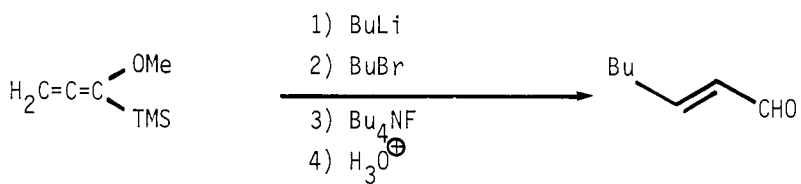
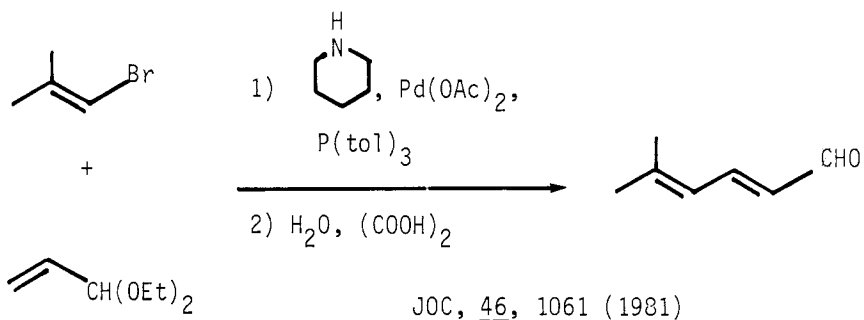
Tetr Lett, 22, 1809 (1981)

Synthesis, 245 (1980)

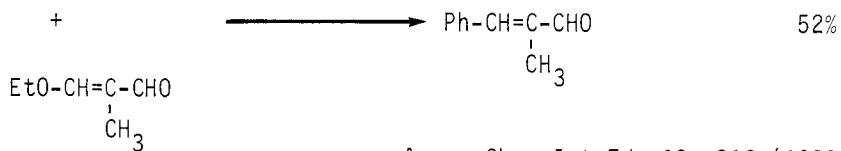
Section 340 Aldehyde - NitrileJOC, 47, 4534 (1982)Section 341 Aldehyde - Olefin

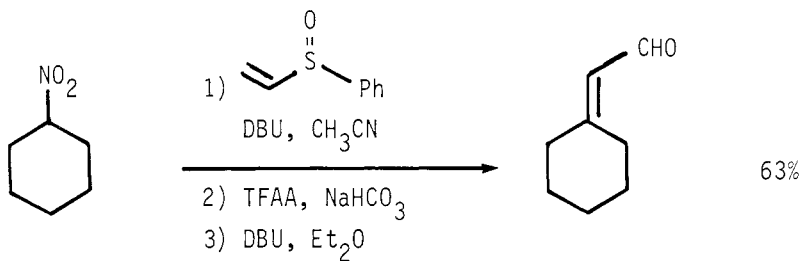
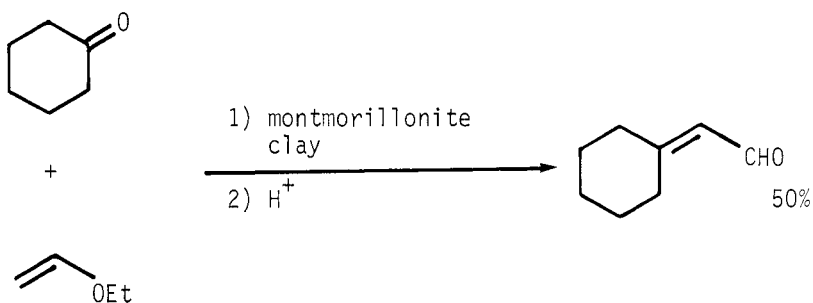
For the oxidation of allylic alcohols to olefinic aldehydes see also Section 48 (Aldehydes from Alcohols).

Tetr Lett, 23, 2105 (1982)JOC, 46, 2920 (1981)

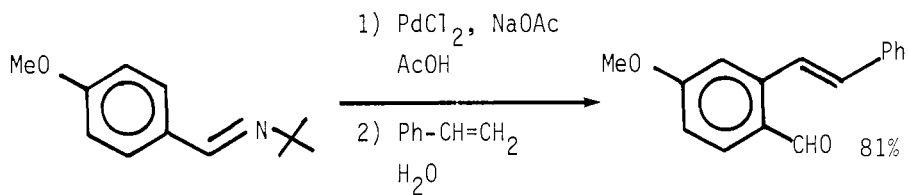
Tetr Lett, 21, 3987 (1980)

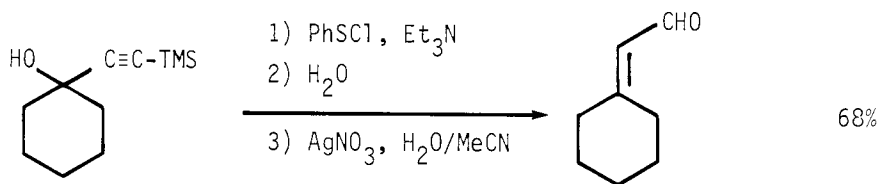
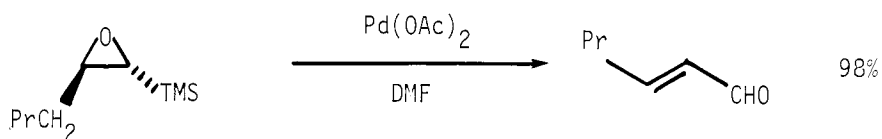
PhMgBr

Angew Chem Int Ed, 19, 816 (1980)

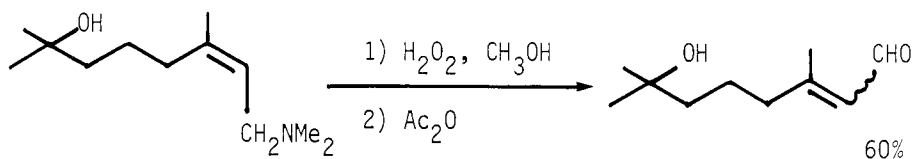
JOC, 47, 5017 (1982)

Synthesis, 137 (1981)

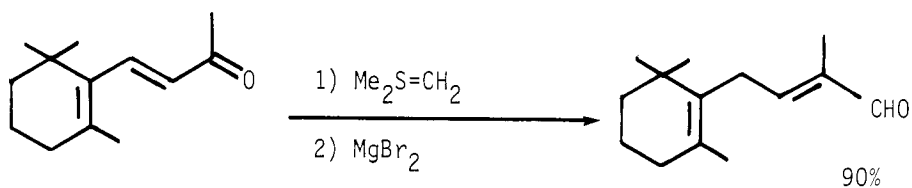
Tetr Lett, 23, 1957 (1982)

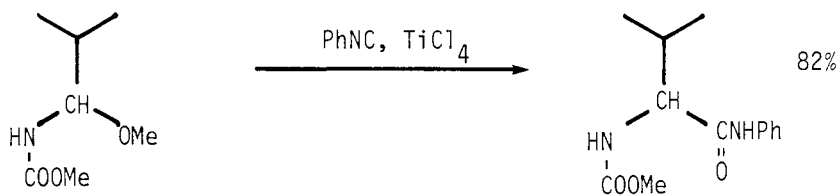
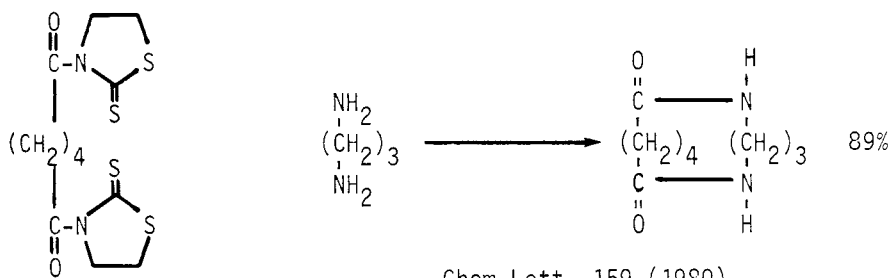
Tetr Lett, 22, 2021 (1981)

Chem Lett, 1997 (1982)

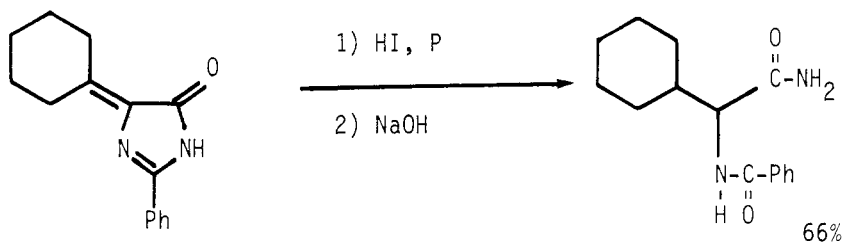


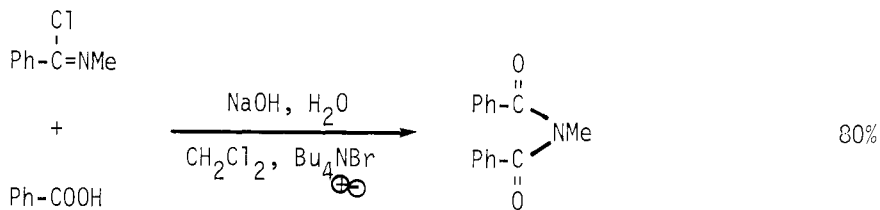
Chem Lett, 1987 (1982)

Helv Chim Acta, 63, 1665 (1980)Also via: β -Hydroxyaldehydes (Section 324)

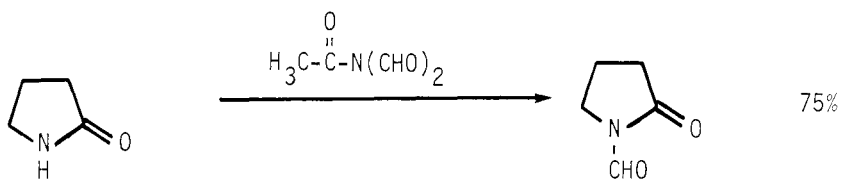
Section 342 Amide - AmideTetr Lett, 22, 2411 (1981)

Chem Lett, 159 (1980)

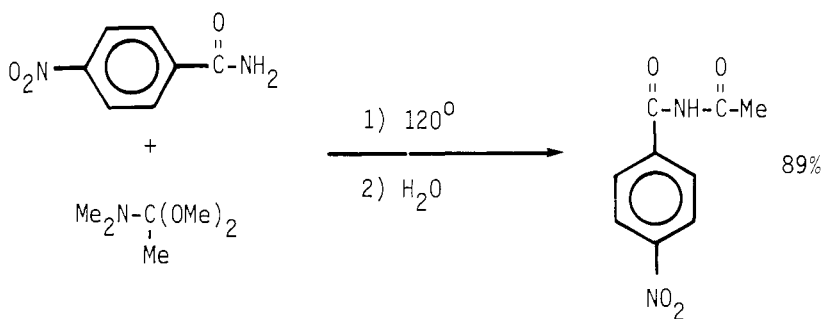
Indian J Chem, 19B, 70 (1980)



Synthesis, 114 (1980)

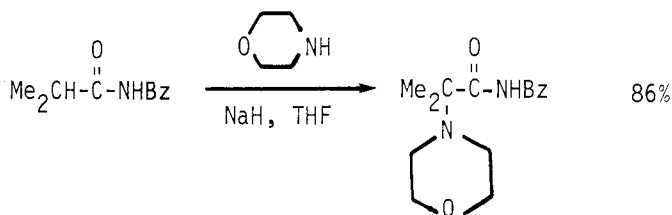


Synthesis, 264 (1982)

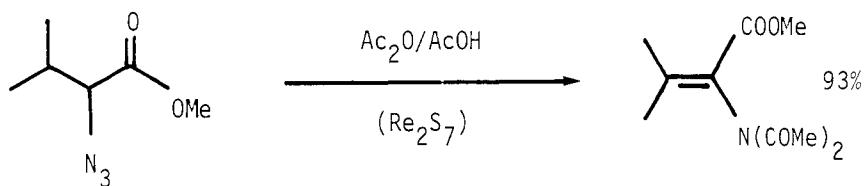
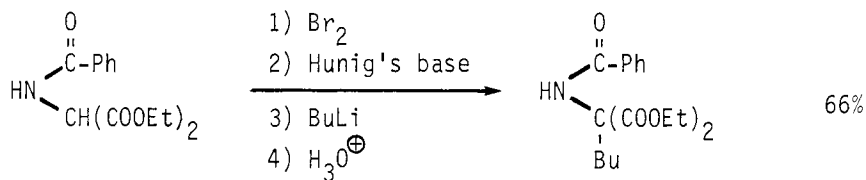


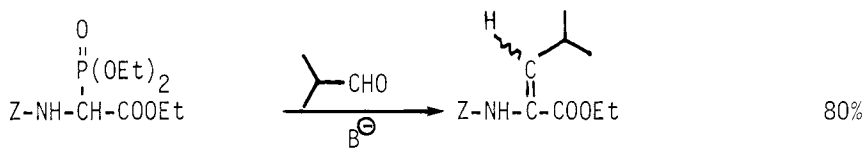
Synthesis, 119 (1980)

Also via: Dicarboxylic acids (Section 312); Diamines (Section 350)

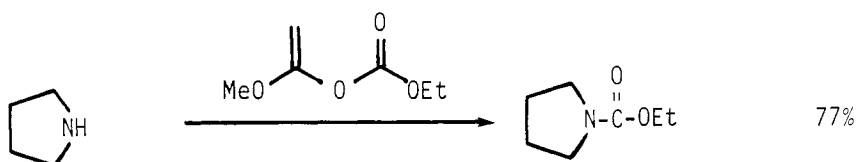
Section 343 Amide - Amine

Synthesis, 1092 (1982)

Section 344 Amide - EsterAngew Chem Int Ed, 21, 203 (1982)Angew Chem Int Ed, 21, 203 (1982)



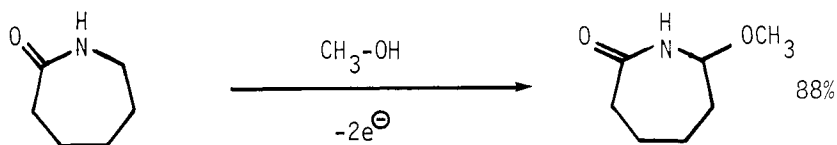
Angew Chem Int Ed, 21, 776 (1982)



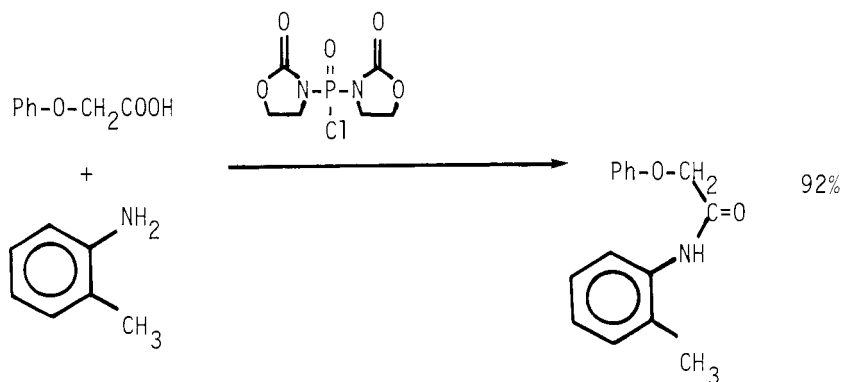
JOC, 45, 4519 (1980)

Related methods: Section 315 (Acid-Amide); Section 316 (Acid-Amine); Section 351 (Amine-Ester)

Section 345 Amide - Ether



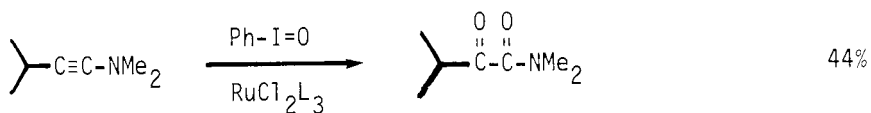
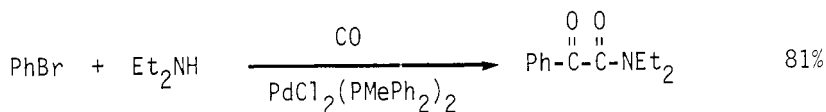
Synthesis, 315 (1980)

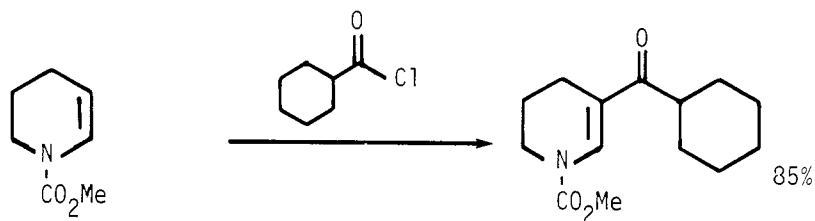
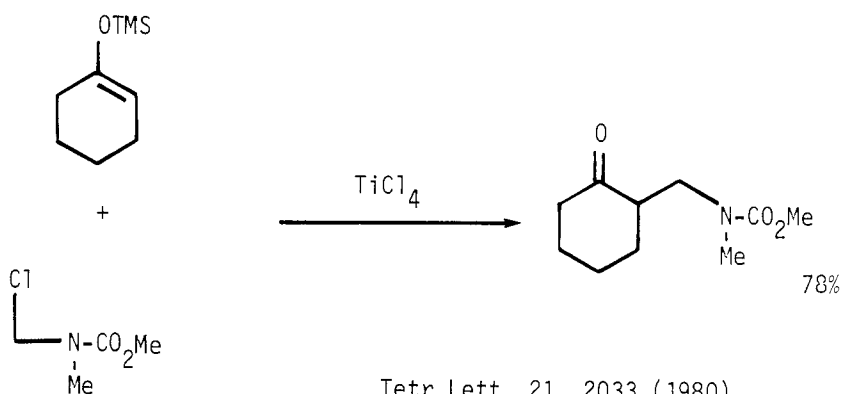
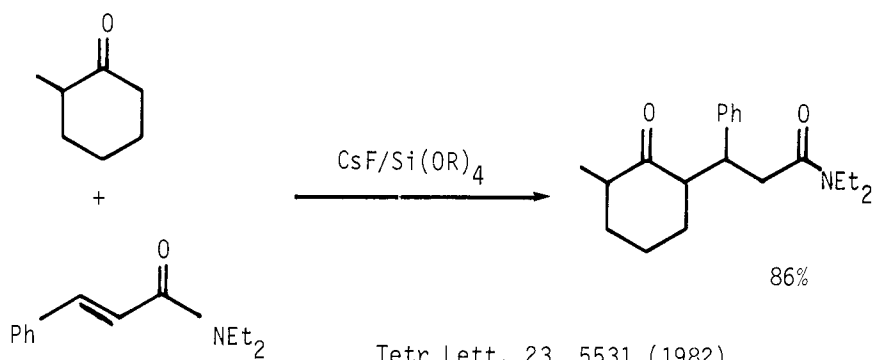


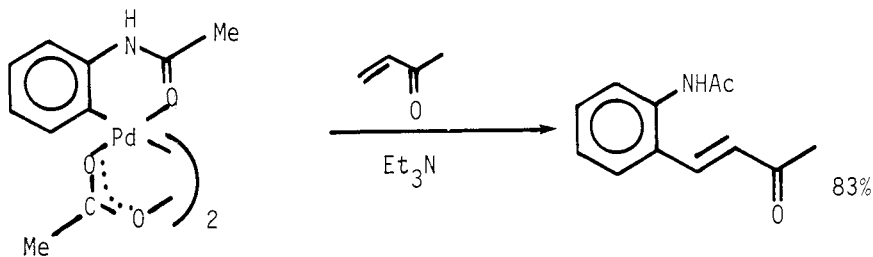
Synthesis, 547 (1980)

Section 346 Amide - Halide

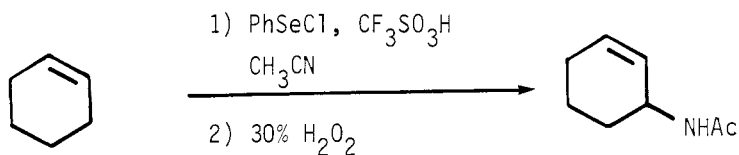
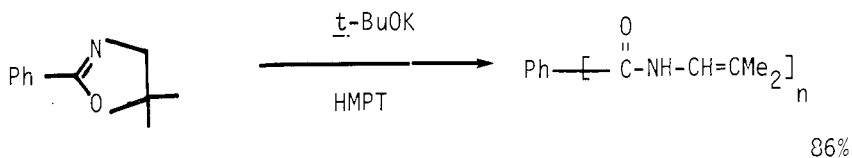
No additional examples.

Section 347 Amide - KetoneTetr Lett, 23, 3661 (1982)Tetr Lett, 23, 3383 (1982)

Tetr Lett, 23, 1201 (1982)Tetr Lett, 21, 2033 (1980)Tetr Lett, 23, 5531 (1982)

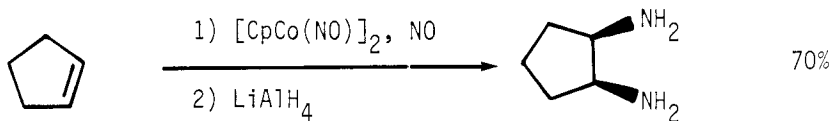
JOC, 46, 4416 (1981)Section 348 Amide - Nitrile

No additional examples.

Section 349 Amide - OlefinJOC, 46, 4727 (1981)Angew Chem Int Ed, 21, 630 (1982)

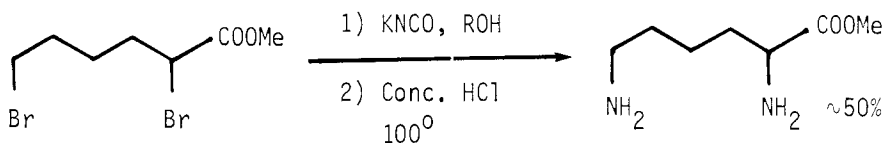
Also via: Olefinic acids (Section 322)

Section 350 Amine - Amine

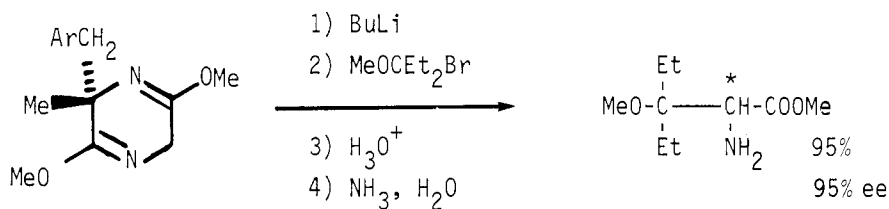


JACS, 102, 5676 (1980)

Section 351 Amine - Ester

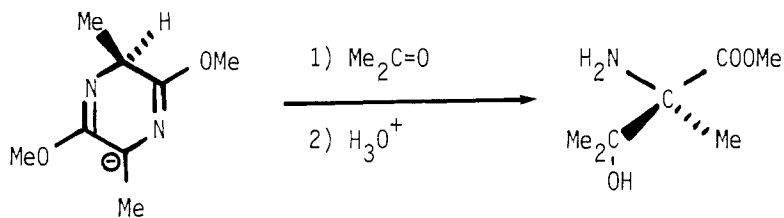
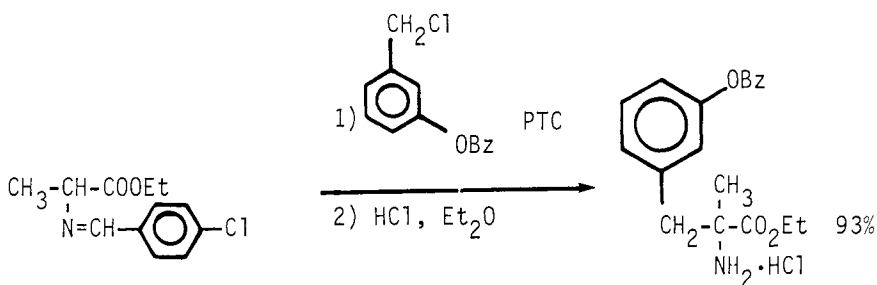
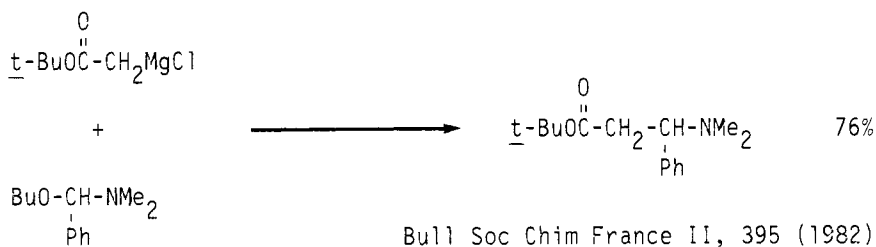


Chem Ber, 114, 173 (1981)

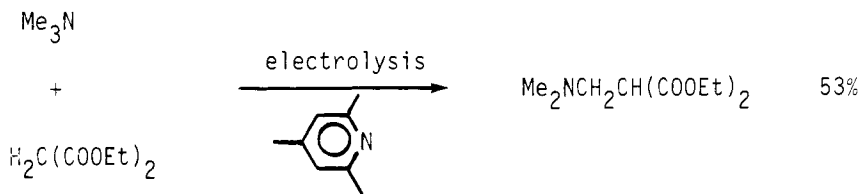


Synthesis, 966 (1981)

Synthesis, 861 and 370 (1982)

Angew Chem Int Ed, 19, 212 (1980)Tetr Lett, 23, 4259 (1982)

Bull Soc Chim France II, 395 (1982)

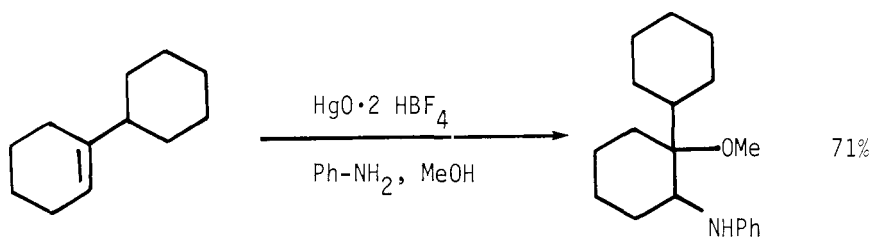
Tetrahedron, 37, 2297 (1981)

Review: "Methods of Synthesis and Properties of β -Dimethylamino-ethyl and Choline Esters of Amino Acids and Peptides"

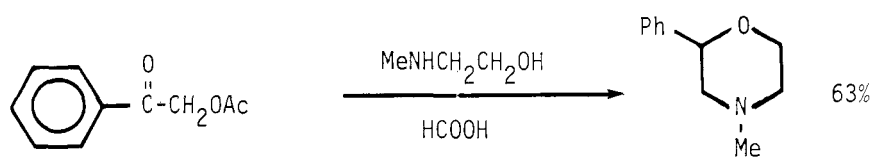
Russ Chem Rev, 50, 1151 (1981)

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

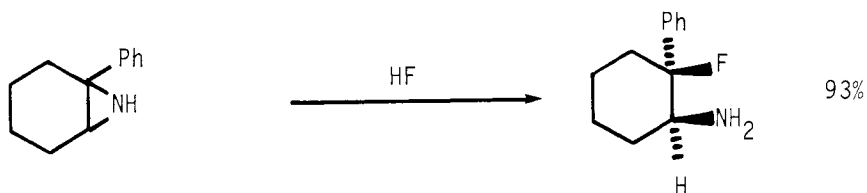
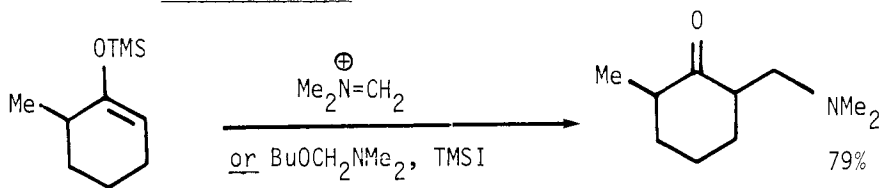
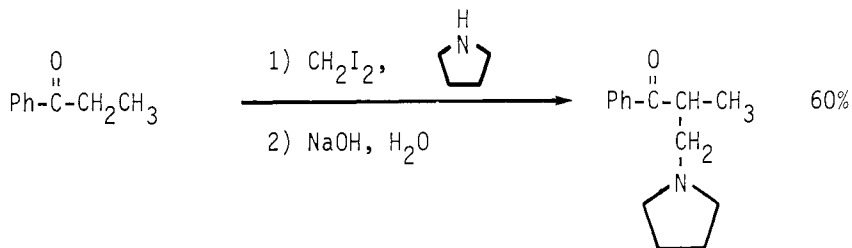
Section 352 Amine - Ether

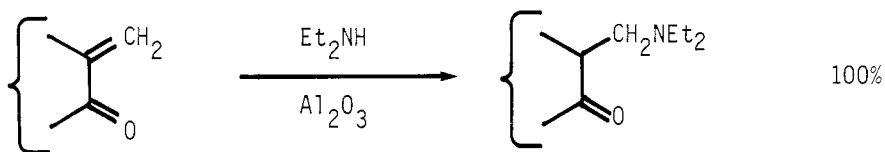
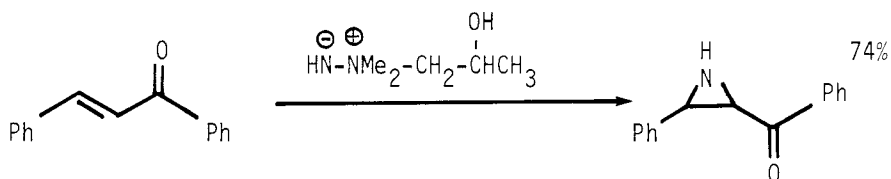


Synthesis, 376 (1981)

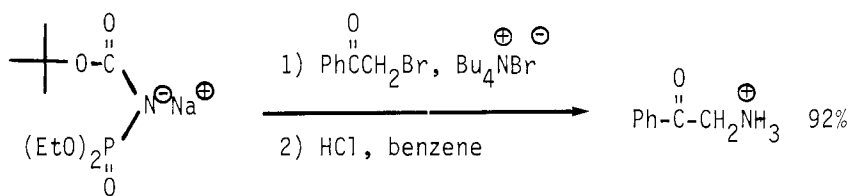


Chem Ber, 115, 2635 (1982)

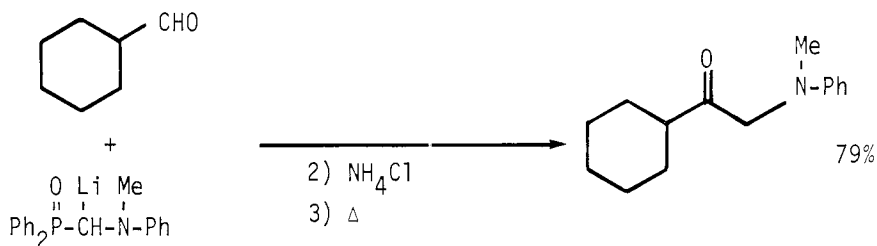
Section 353 Amine - HalideJOC, 45, 5328 and 5333 (1980)Review: "The Synthesis of β -Halogenated Enamines"Org Prep Proc Int, 13, 241 (1981)Section 354 Amine - KetoneTetr Lett, 21, 805 (1980)Tetr Lett, 23, 547 (1982)BCS Japan, 55, 1331 (1982)

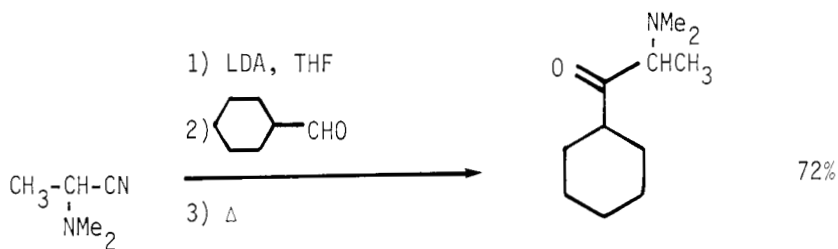
Tetr Lett, 21, 809 (1980)

Synthesis, 650 (1980)

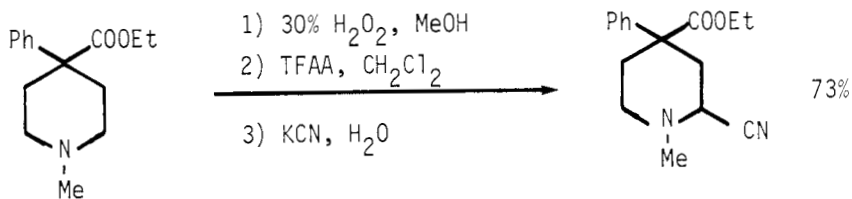
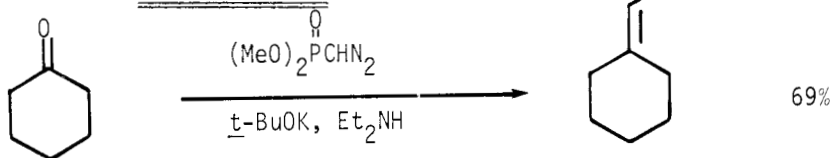


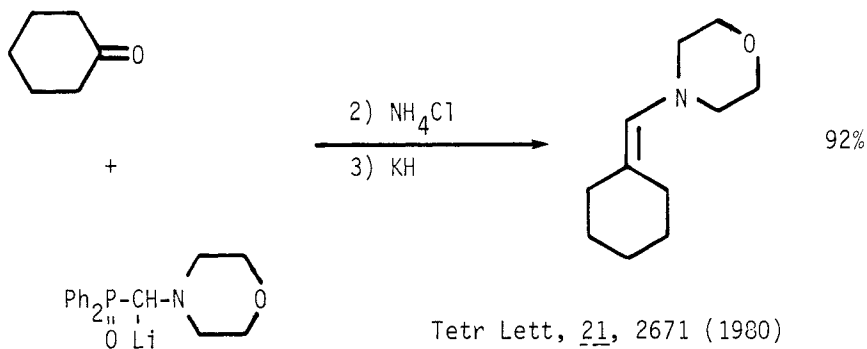
Synthesis, 922 (1982)

Tetr Lett, 22, 2799 (1981)

Tetr Lett, 23, 639 (1982)

Review: "Amino Acids as the Amine Component in the Mannich Reaction"

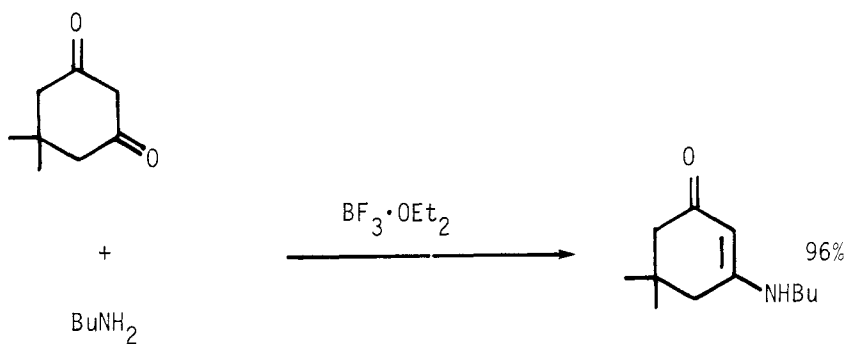
Russ Chem Rev, 51, 387 (1982)Section 355 Amine - NitrileSynth Comm, 10, 495 (1980)Section 356 Amine - OlefinTetr Lett, 21, 2041 (1980)



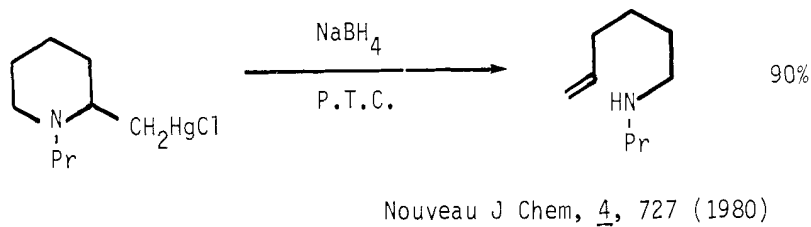
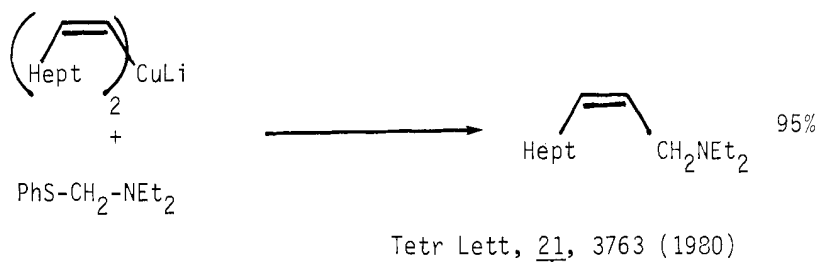
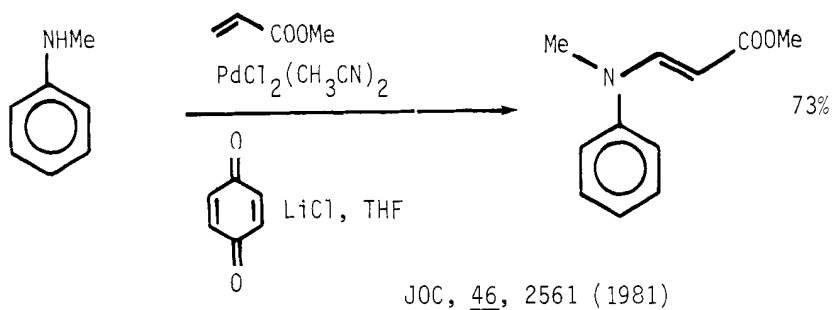
Review: "Enamines: Recent Advances in Synthetic, Spectroscopic, Mechanistic, and Stereochemical Aspects."

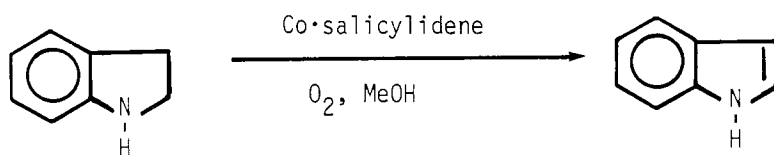
Tetrahedron, 38, 1975 (1982)

Tetrahedron, 38, 3363 (1982)

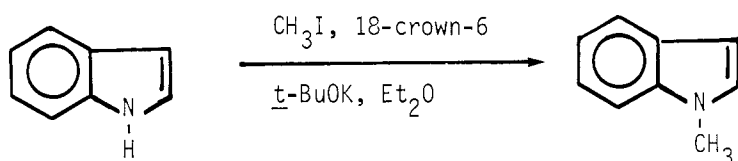


Synthesis, 380 (1981)

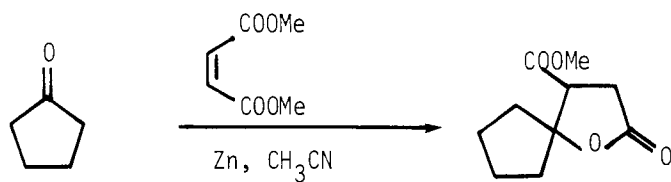




Chem Lett, 1287 (1980)

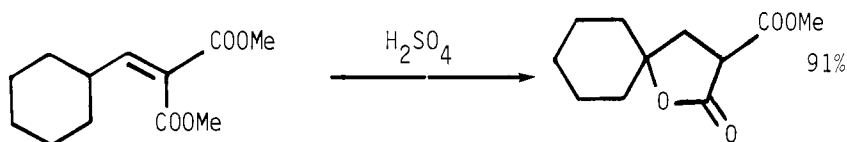


87%

JOC, 45, 3172 (1980)Section 357 Ester - Ester

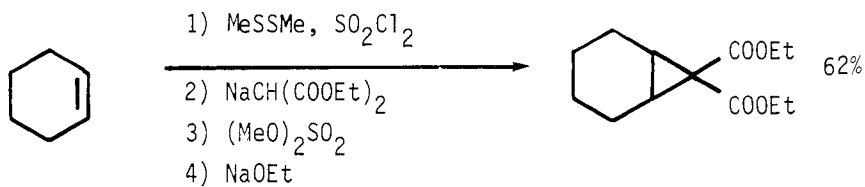
66%

Chem Lett, 1217 (1981)

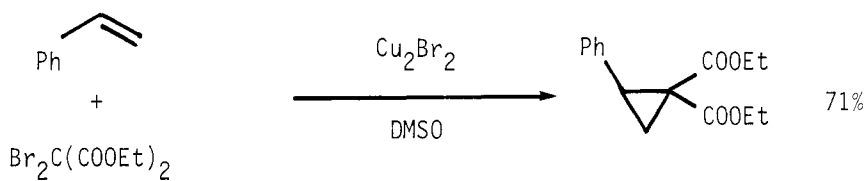
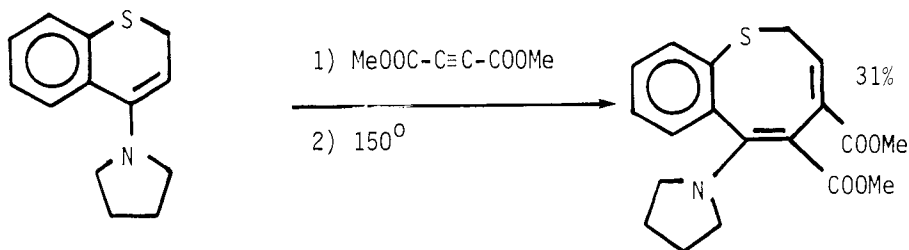


91%

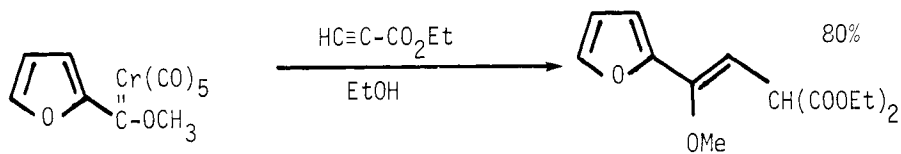
Synth Comm, 11, 35 (1981)



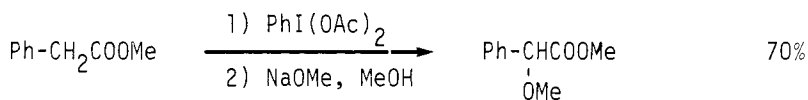
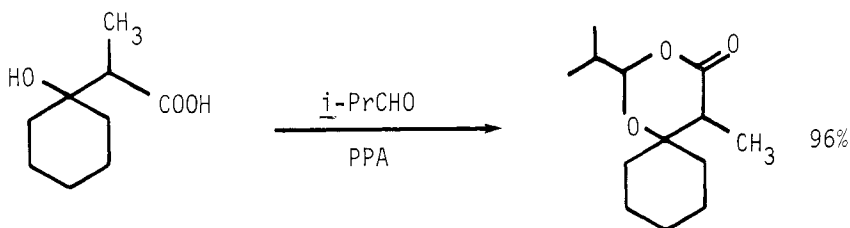
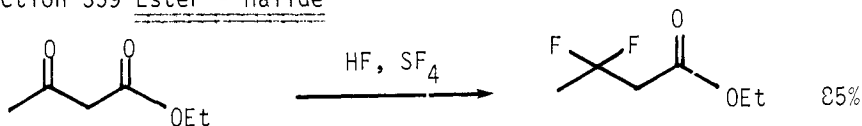
Synthesis, 690 (1980)

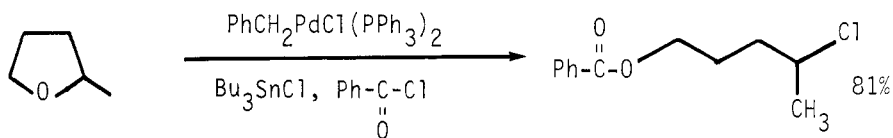
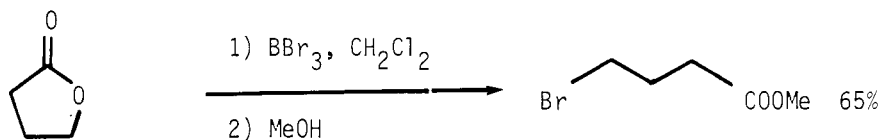
Bull Chem Soc Japan, 54, 2539 (1981)

Acta Chem Scand B, 435 (1982)

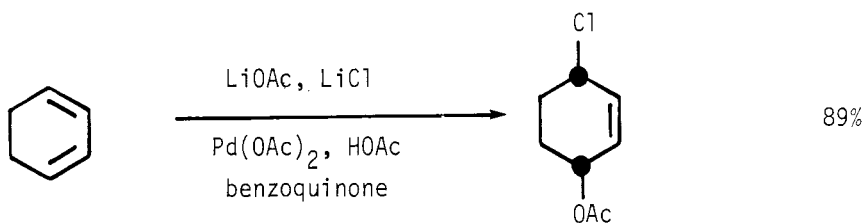
Tetr Lett, 23, 3765 (1982)

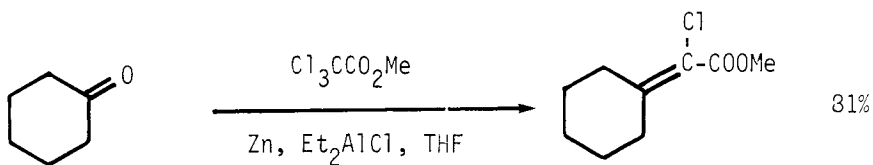
Also via: Dicarboxylic acids (Section 312); Hydroxyesters (Section 327)' Diols (Section 323)

Section 358 Ester - EtherTetr Lett, 22, 2747 (1981)Aust J Chem, 33, 685 (1980)Section 359 Ester - HalideJOC (USSR), 17, 1260 (1981)

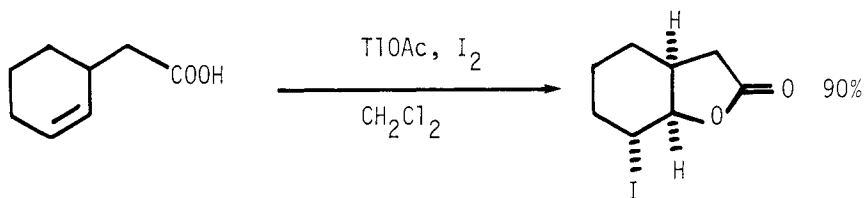
JOC, 47, 1215 (1982)

Synthesis, 963 (1982)

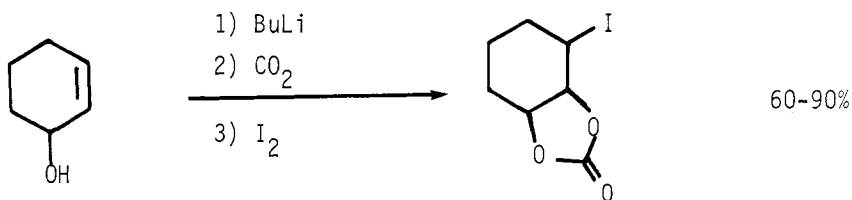
Synth Comm, 11, 763 (1981)Tetr Lett, 23, 1617 (1982)



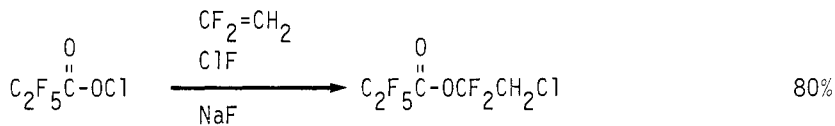
Bull Chem Soc Japan, 53, 1698 (1980)



Aust J Chem, 32, 2793 (1979)

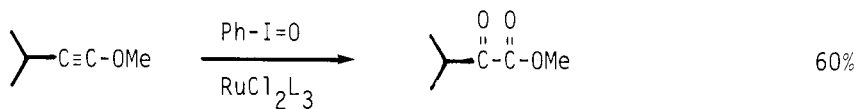
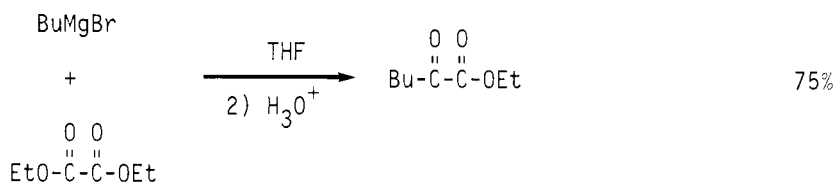
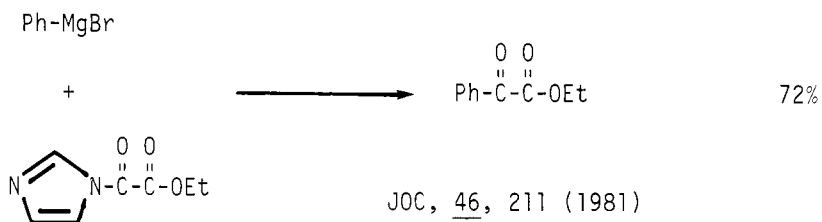
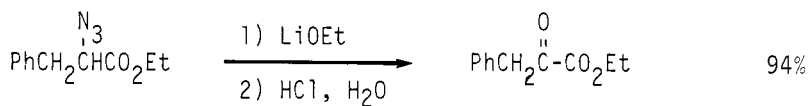
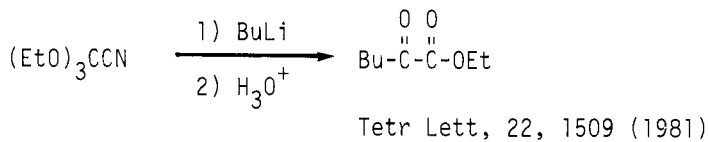


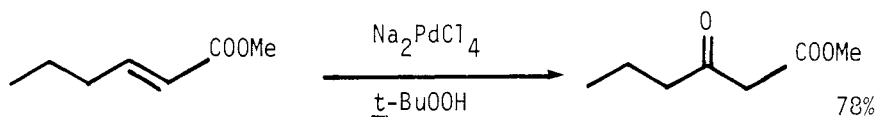
JCS Chem Comm, 465 (1981)



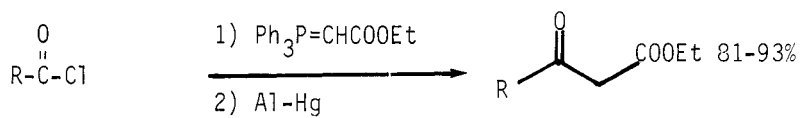
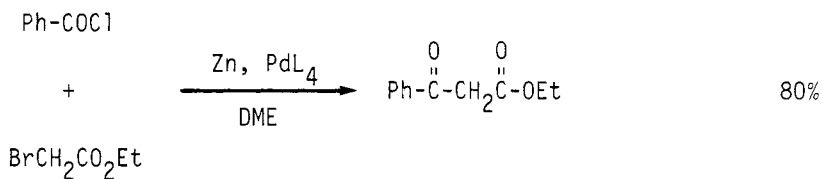
JOC, 45, 1214 (1980)

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

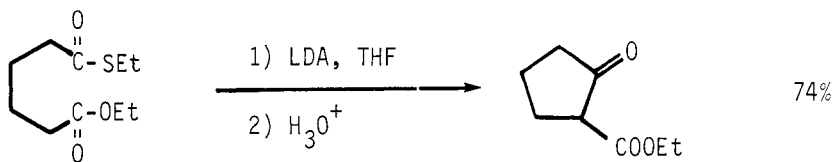
Section 360 Ester - KetoneTetr Lett, 23, 3661 (1982)Synth Comm, 11, 943 (1981)JOC, 46, 211 (1981)JOC, 45, 4952 (1980)

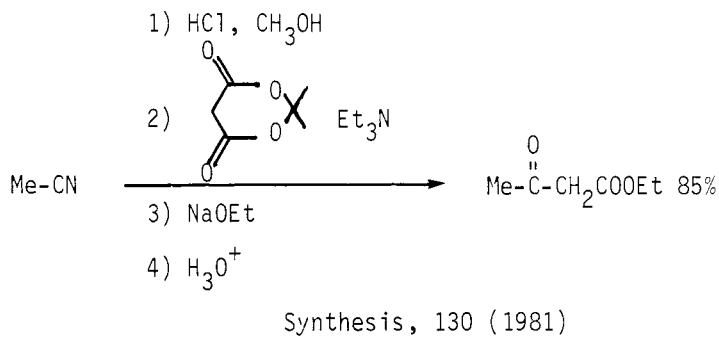
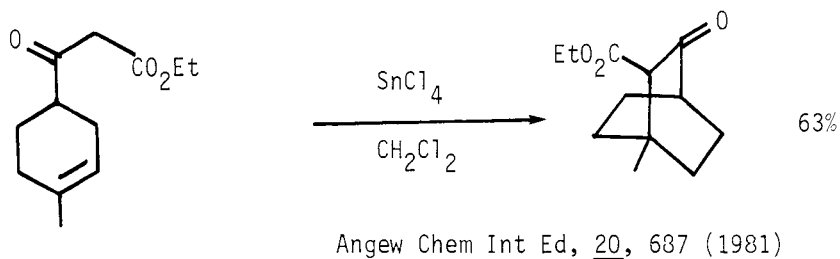
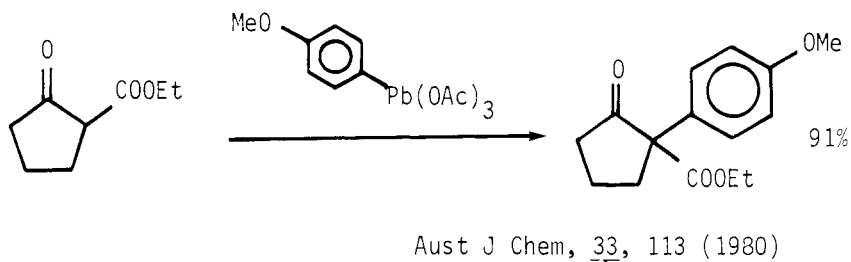
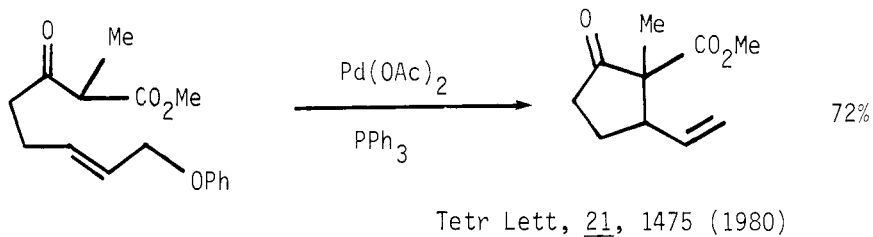


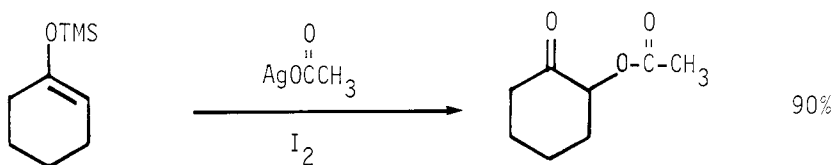
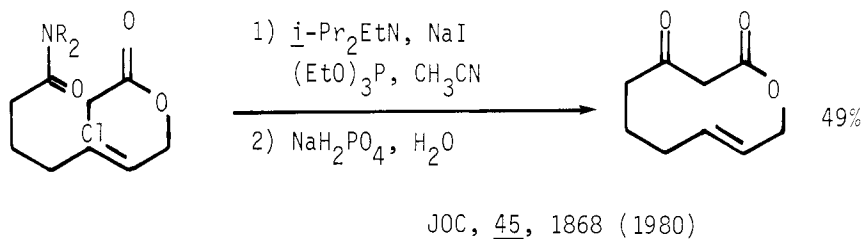
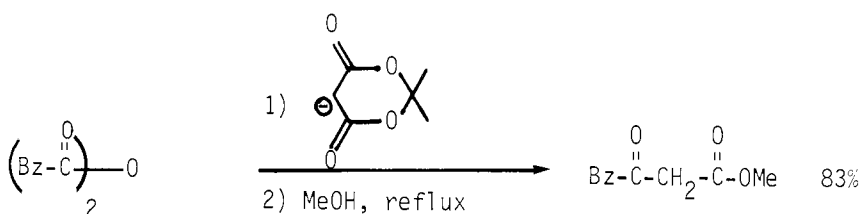
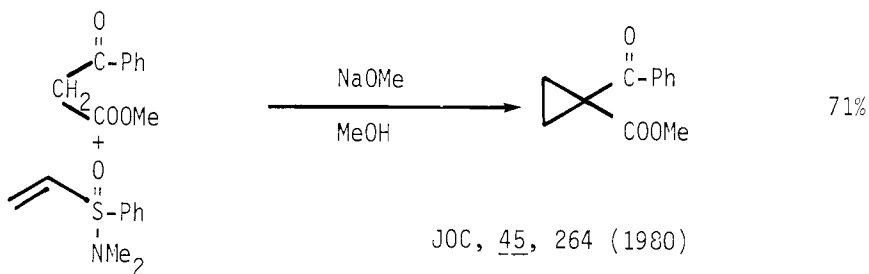
Chem Lett, 257 (1980)

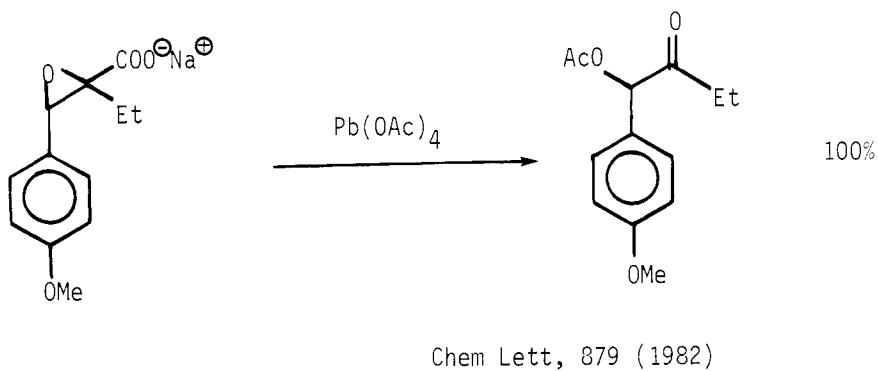
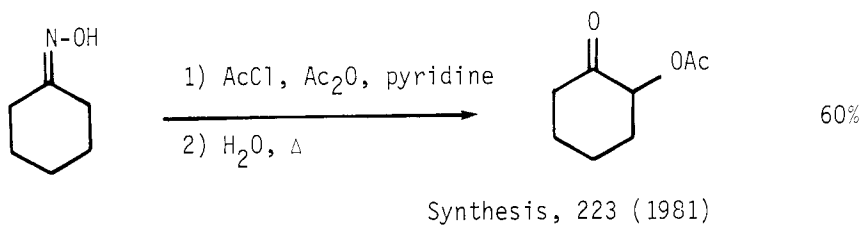
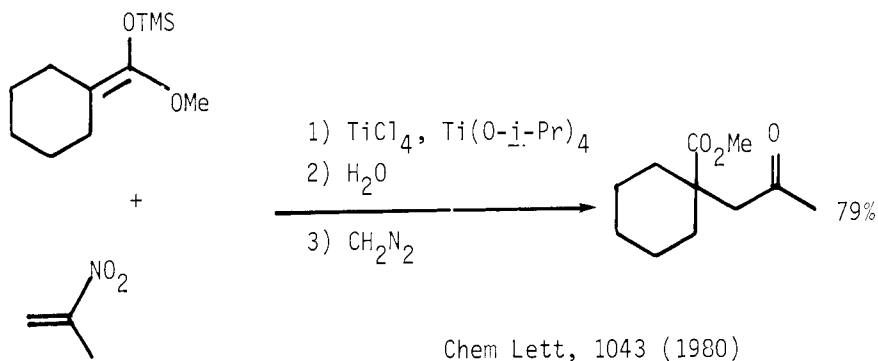
JOC, 47, 4955 and 4963 (1982)

Chem Lett, 1559 (1982)

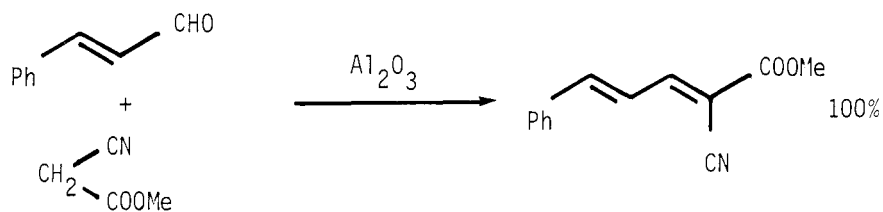
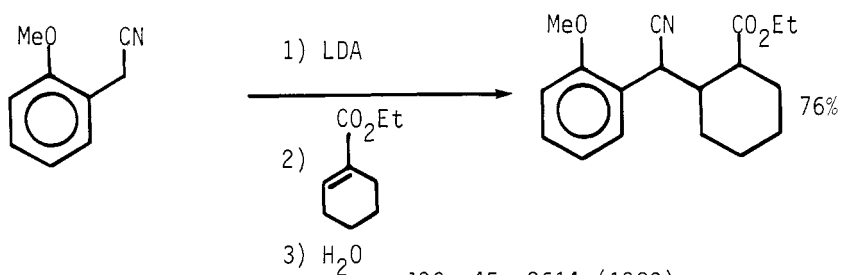
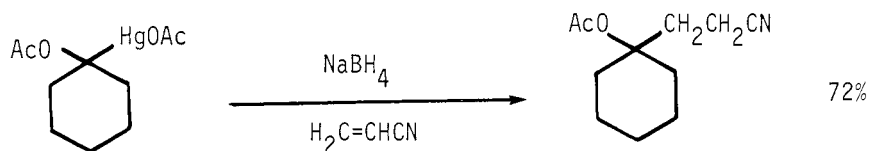
Tetr Lett, 22, 1353 (1981)



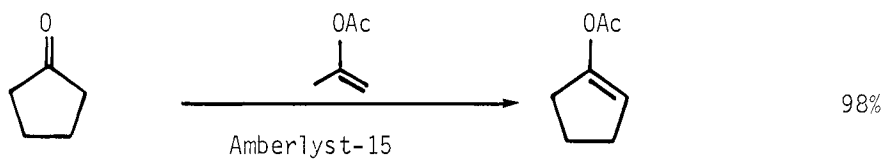
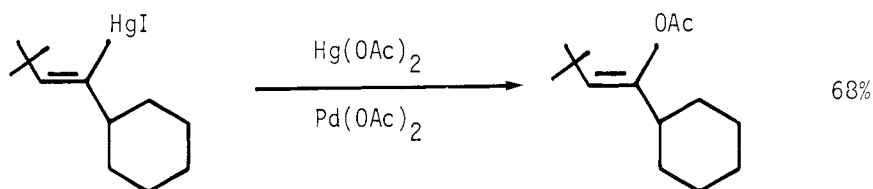
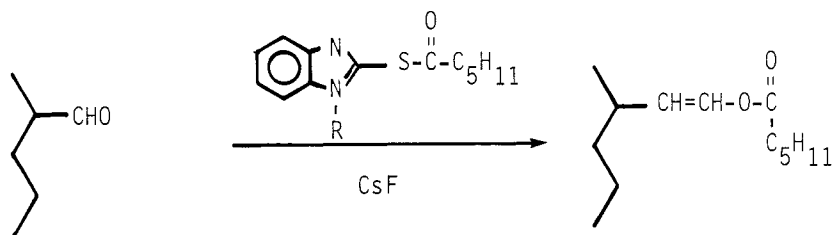




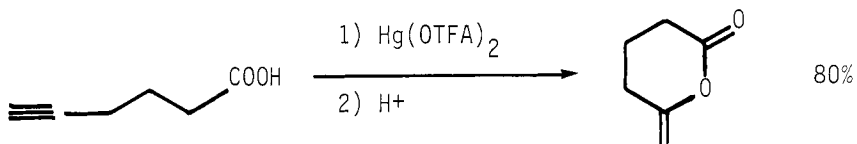
Also via: Ketoacids (Section 320); Hydroxyketones (Section 330)

Section 361 Ester - NitrileTetr Lett, 23, 4927 (1982)JOC, 45, 2614 (1980)Angew Chem Int Ed, 21, 130 (1982)Section 362 Ester - Olefin

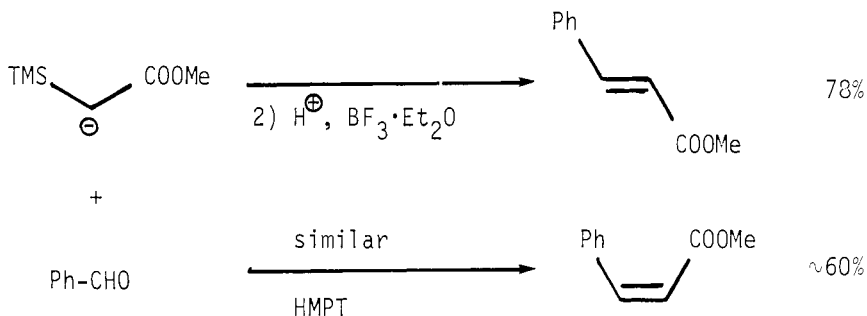
This section contains syntheses of enol esters and esters of unsaturated acids.

Indian J Chem, 21B, 358 (1982)JACS, 102, 1966 (1980)

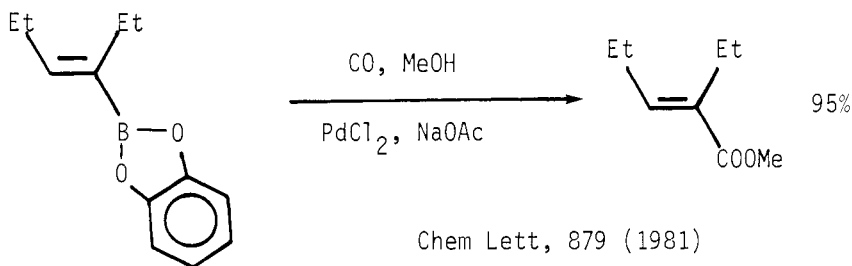
Chem Lett, 529 (1980)

JACS, 103, 5459 (1981)

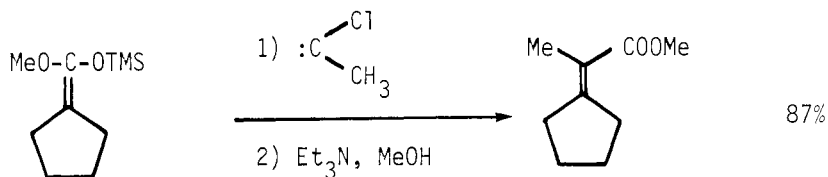
Related methods: Protection of Aldehydes (Section 60A); Protection of Ketones (Section 180A)



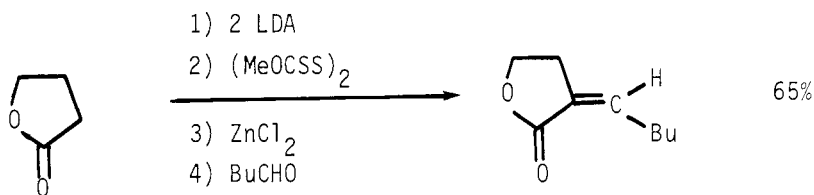
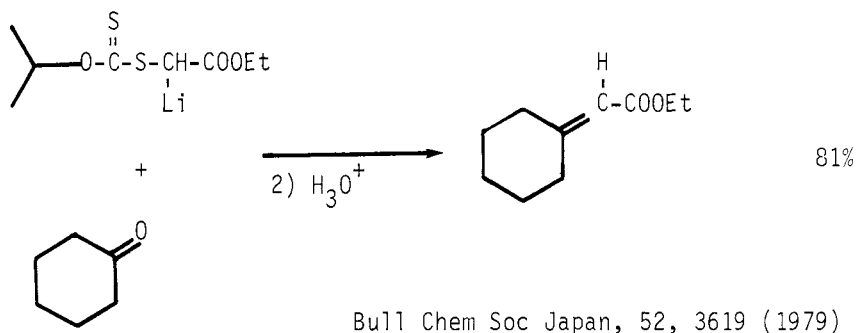
JCS Chem Comm, 877 (1981)



Chem Lett, 879 (1981)

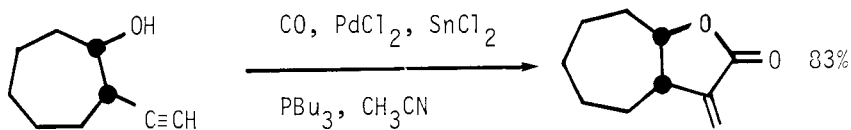
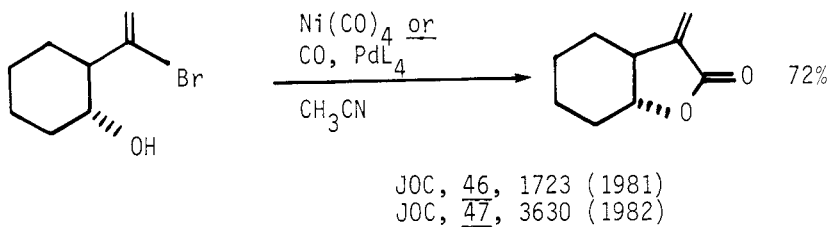


Synthesis, 58 (1982)

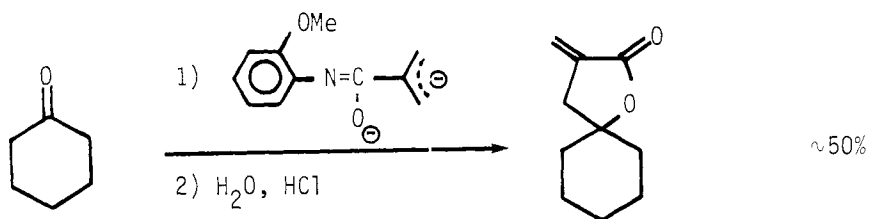


(E isomer is formed in 58% yield if ZnCl_2 is omitted.)

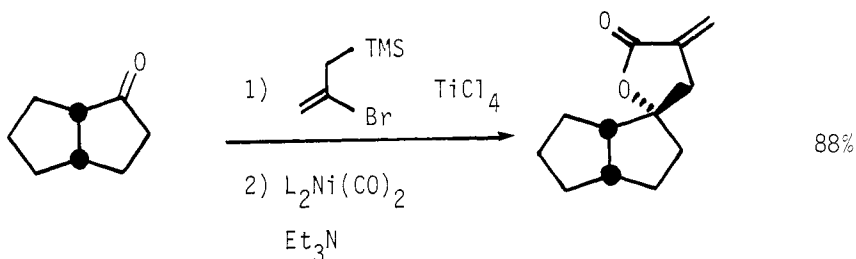
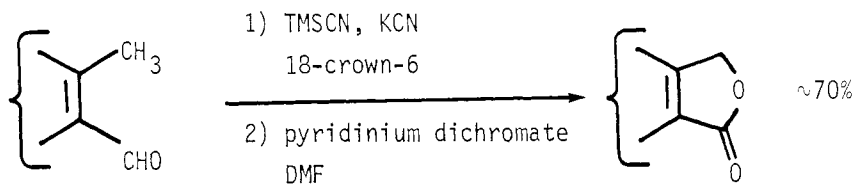
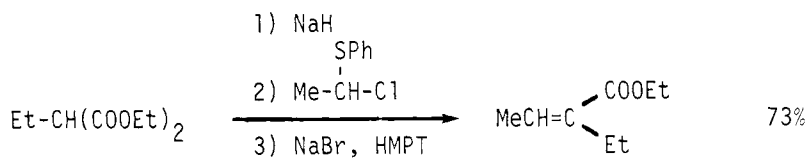
Chem Lett, 595 (1980)



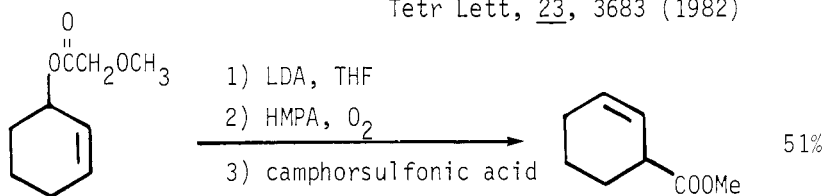
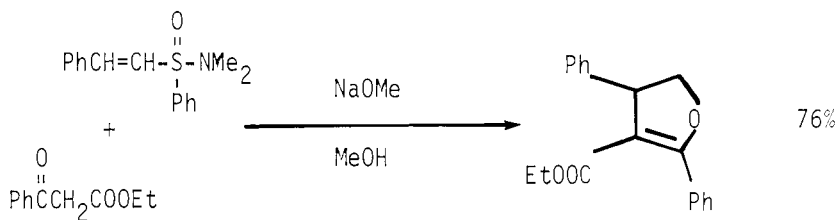
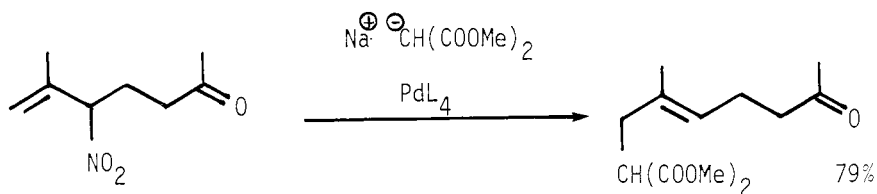
JACS, 103, 7520 (1981)



Chem Lett, 1567 (1980)

JACS, 104, 6879 (1982)Tetr Lett, 21, 731 (1980)

Synthesis, 131 (1982)

Tetr Lett, 23, 3683 (1982)JOC, 45, 4135 (1980)JOC, 45, 264 (1980)

JCS Chem Comm, 821 (1982)

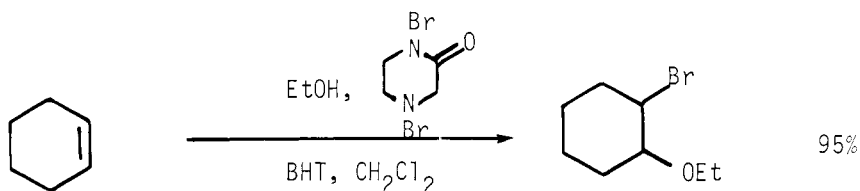
Also via: Acetylenic esters (Section 306); Olefinic acids (Section 322); β -Hydroxyesters (Section 327)

Section 363 Ether - Ether

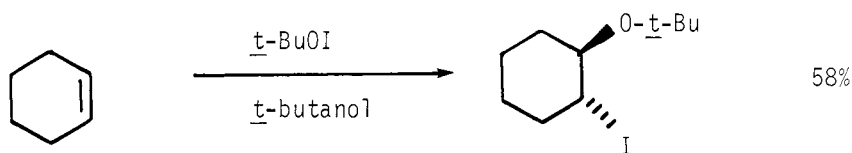
See Section 60A (Protection of Aldehydes) and Section 180A (Protection of Ketones) for reactions involving the formation of acetals and ketals.

No additional examples.

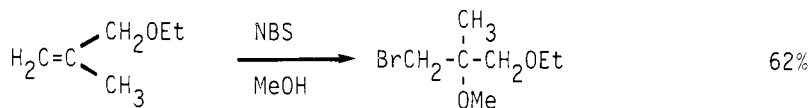
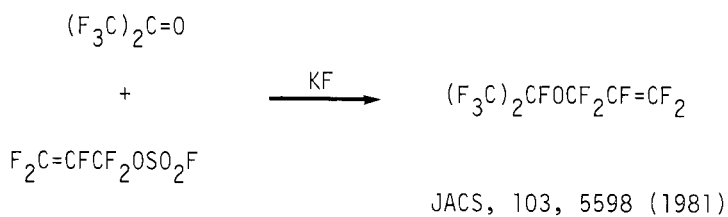
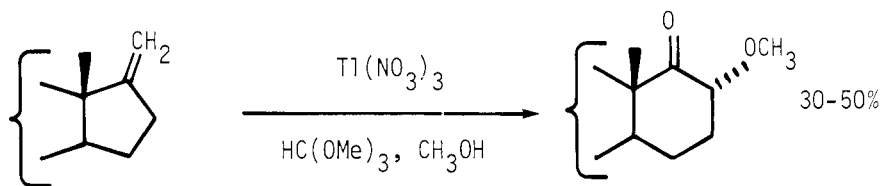
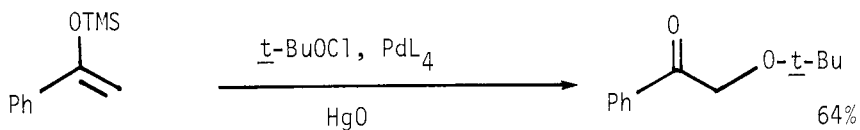
Section 364 Ether - Halide



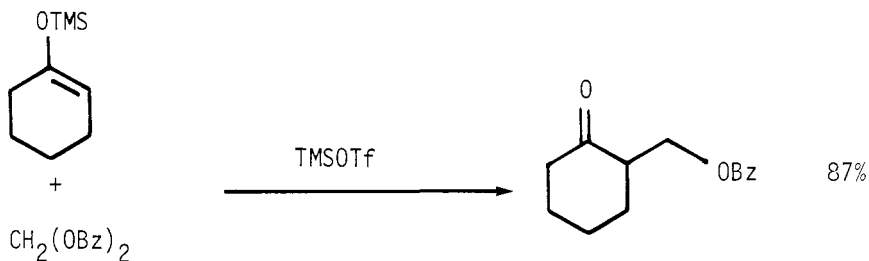
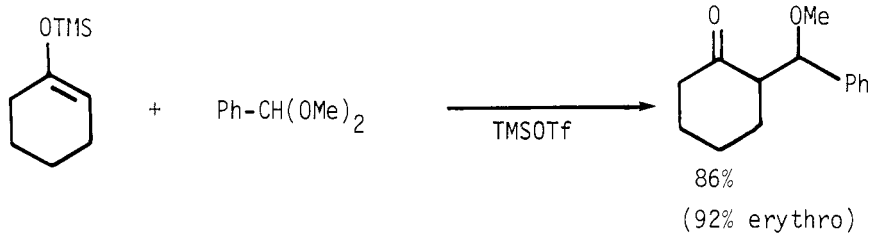
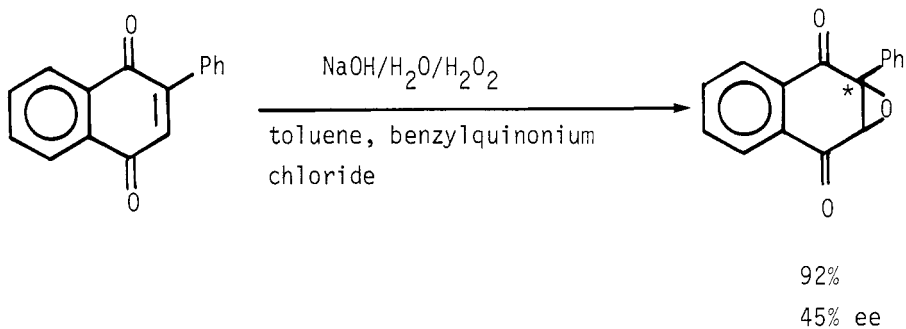
Bull Chem Soc Japan, 53, 219 (1980)

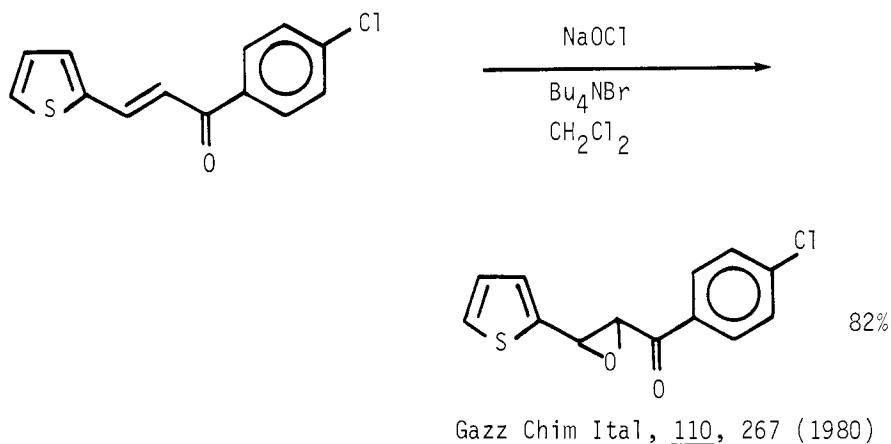
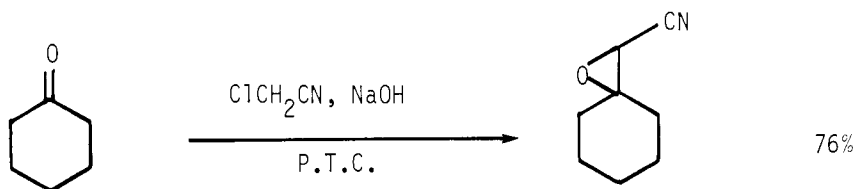
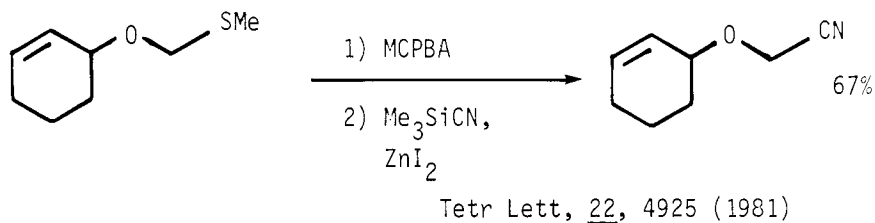


Tetr Lett, 21, 2005 (1980)

Z Chem, 20, 209 (1980)Section 365 Ether, Epoxide - KetoneJOC, 46, 3326 (1981)

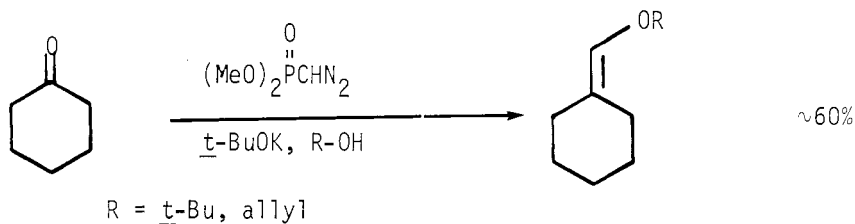
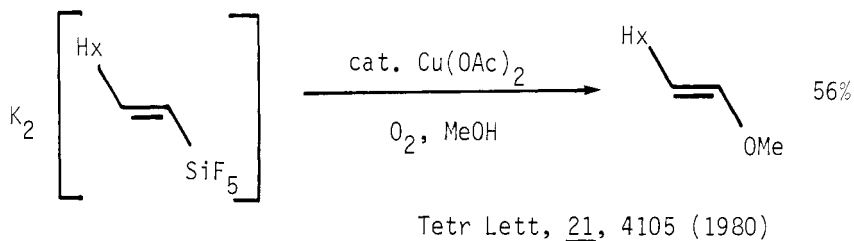
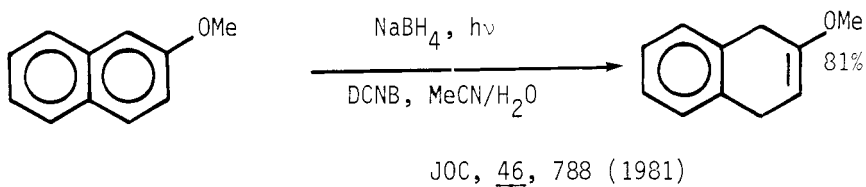
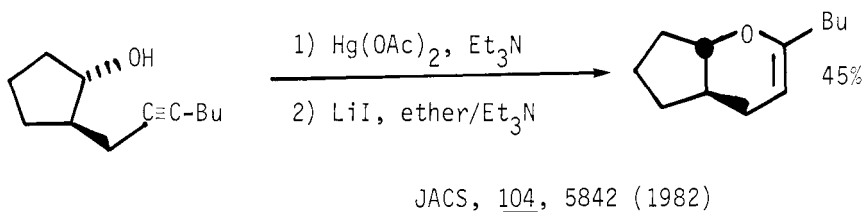
Chem Lett, 369 (1982)

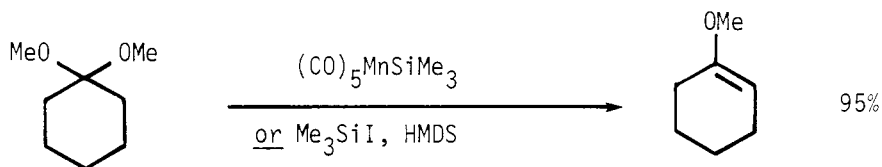
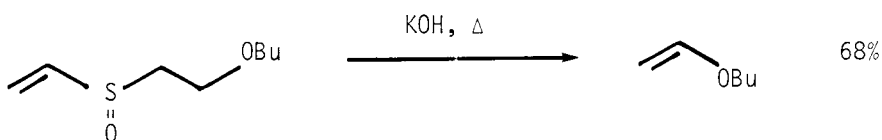
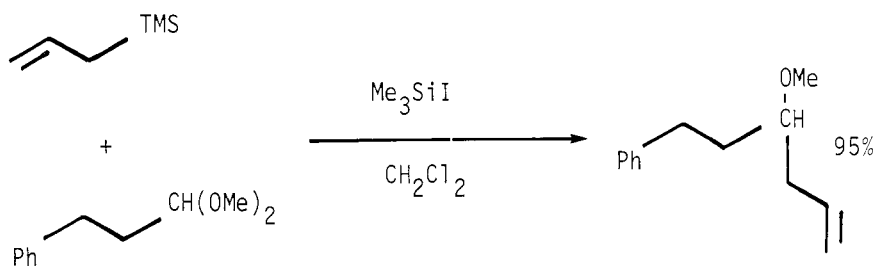
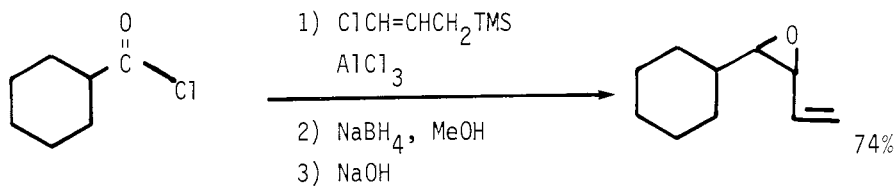
Tetr Lett, 21, 2527 (1980)JACS, 102, 3248 (1980)JOC, 45, 2498 (1980)

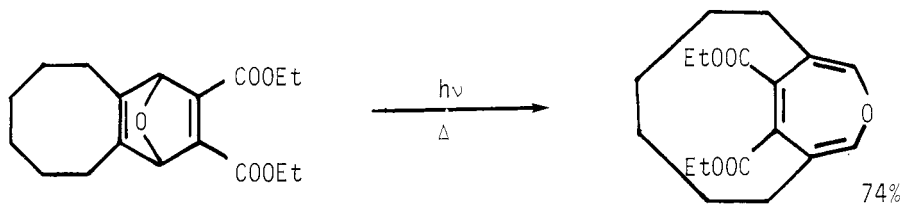
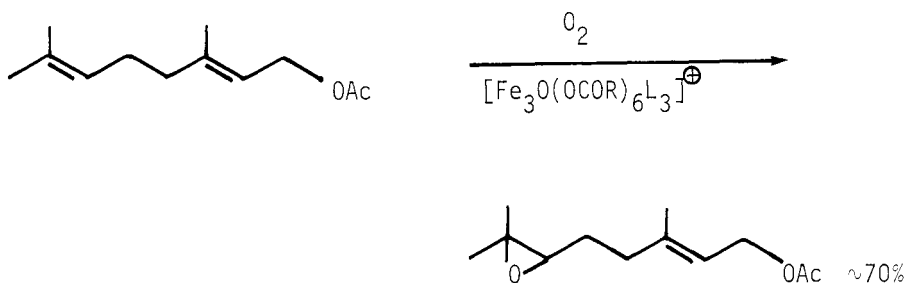
Section 366 Ether, Epoxide - NitrileBull Chem Soc Japan, 53, 1463 (1980)

Section 367 Ether - Olefin

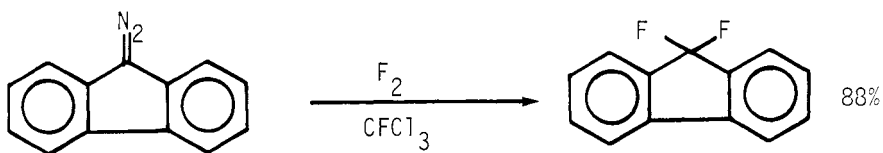
Related methods: Protection of Ketones (Section 180A).

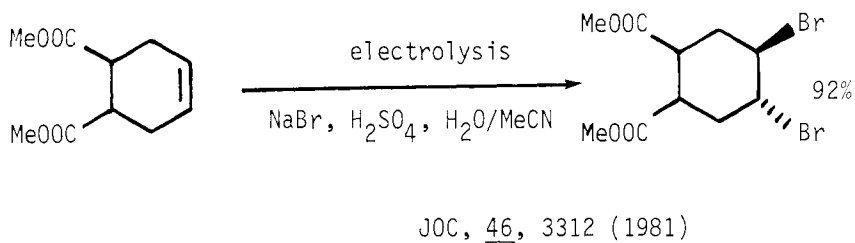
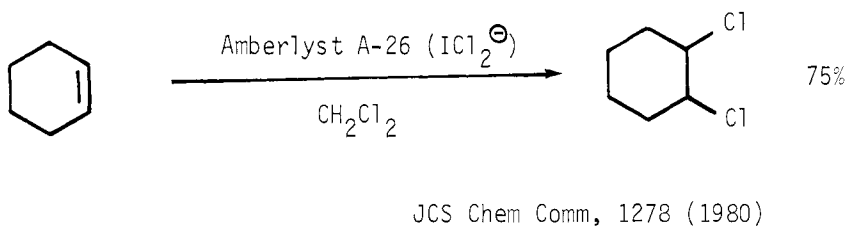
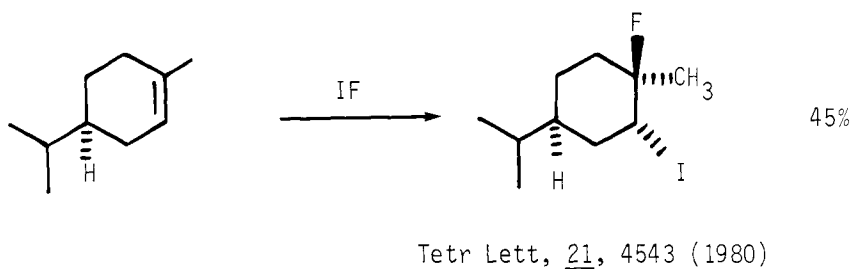
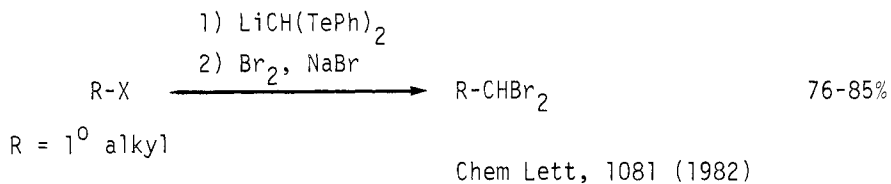
Tetr Lett, 21, 2041 (1980)Tetr Lett, 21, 5003 (1980)

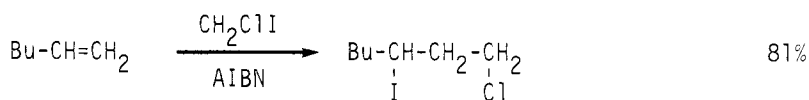
Organometallics, 1, 1467 (1982)Tetr Lett, 23, 323 (1982)JOC (USSR), 18, 395 (1982)Tetr Lett, 22, 745 (1981)Tetr Lett, 21, 4369 (1980)

Chem Ber, 114, 3725 (1981)JACS, 104, 6450 (1982)Section 368 Halide - Halide

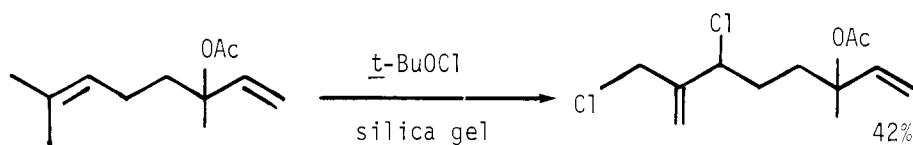
Halocyclopropanations are found in Section 74 (Alkyls from Olefins).

JOC, 46, 3917 (1981)

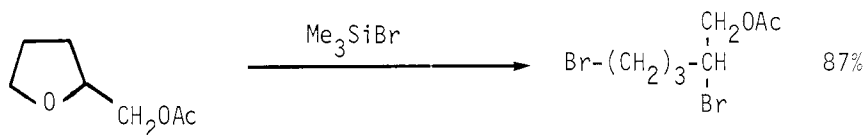




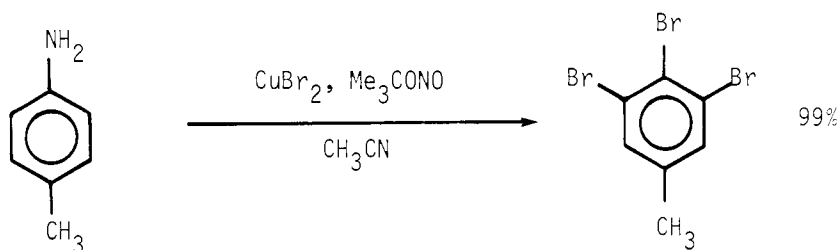
Bull Chem Soc Japan, 53, 770 (1980)



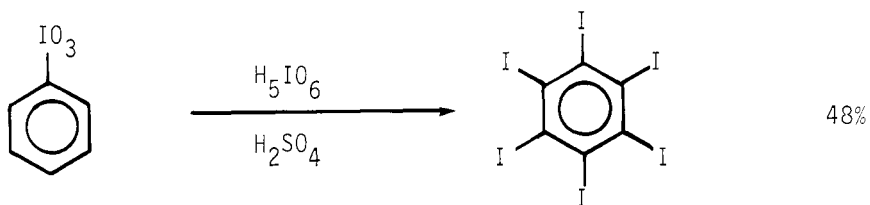
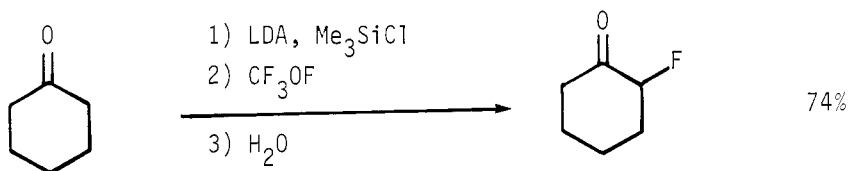
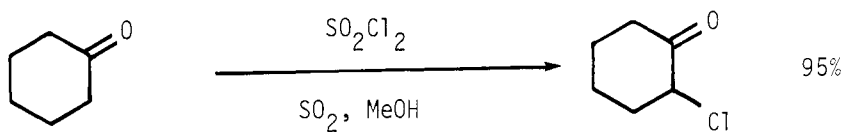
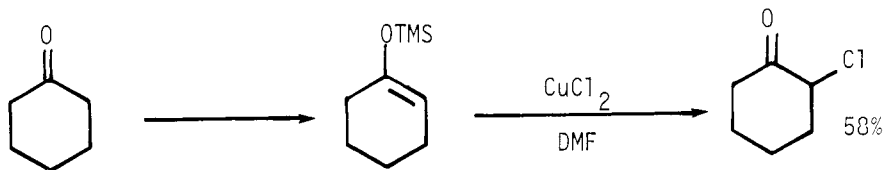
Chem Lett, 141 (1982)

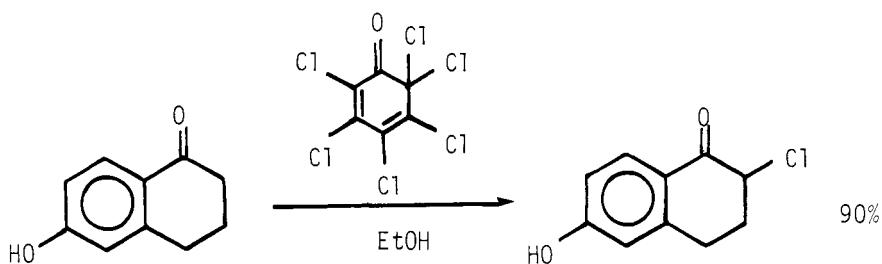


Synthesis, 383 (1981)

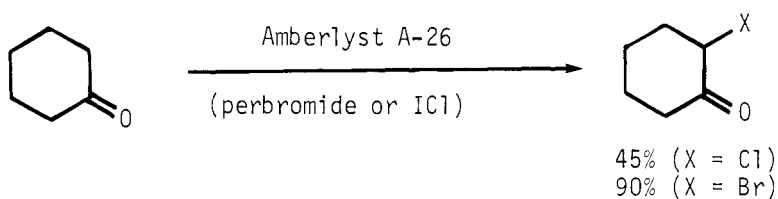


JOC, 45, 2570 (1980)

JOC, 47, 4770 (1982)Section 369 Halide - KetoneJACS, 102, 4845 (1980)JOC, 46, 4486 (1981)JOC, 45, 2022 (1980)

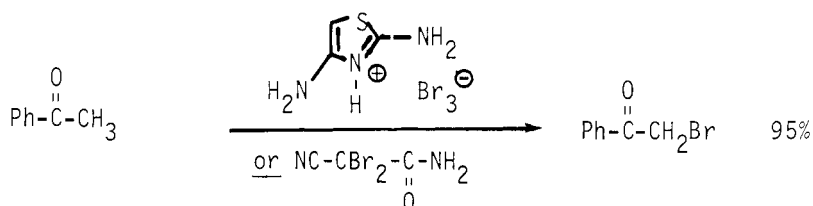
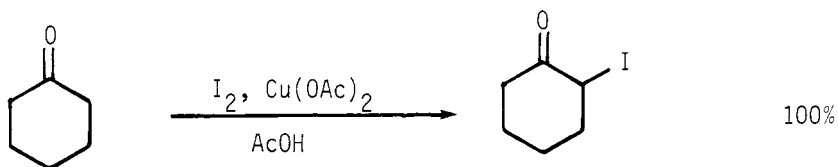


Synthesis, 1018 (1982)

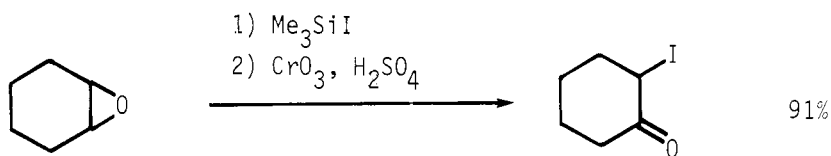
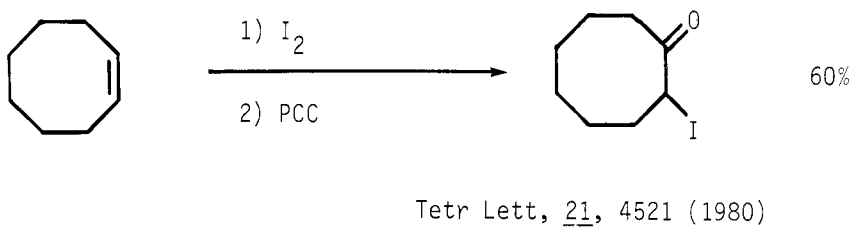
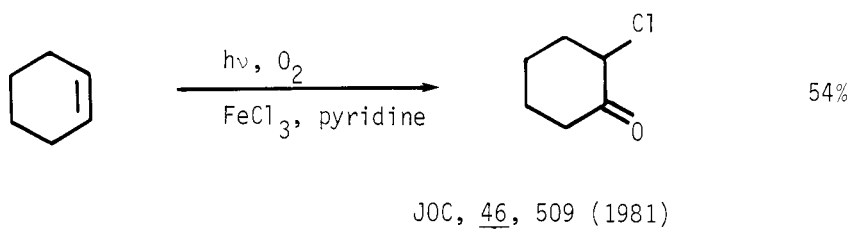
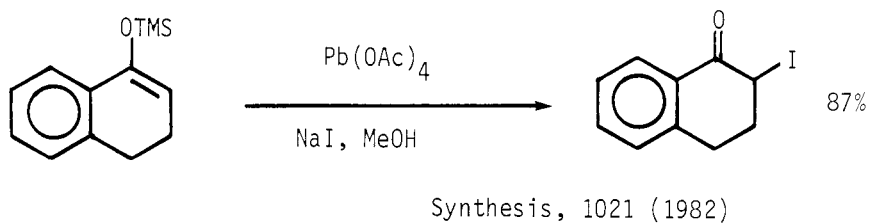


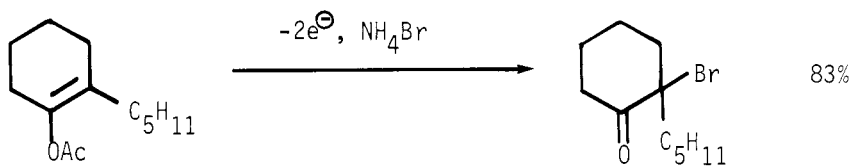
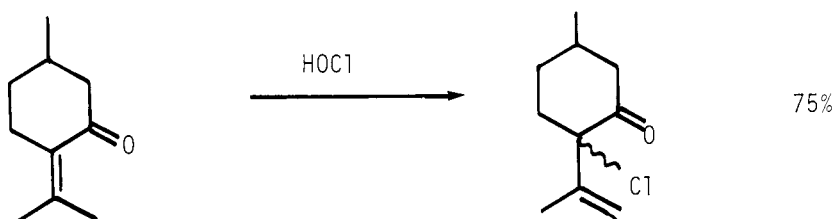
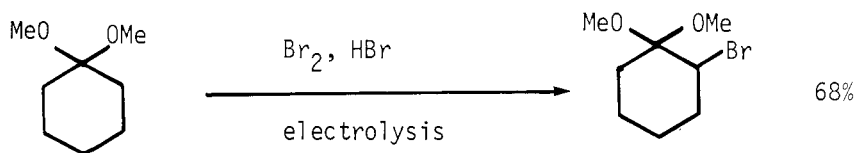
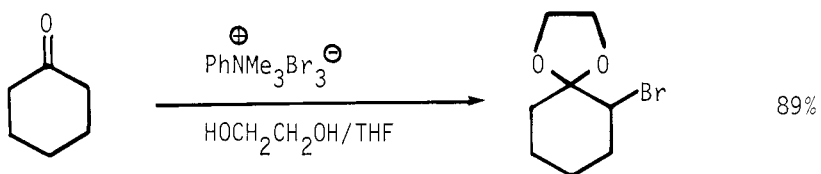
JCS Chem Comm, 1278 (1980)

Synthesis, 143 (1980)

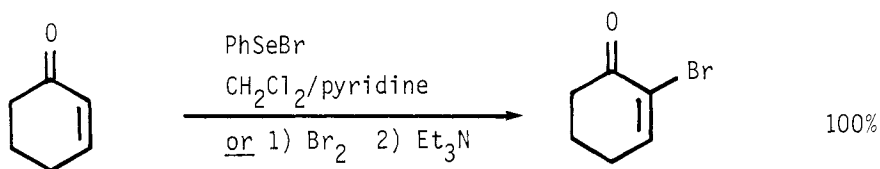
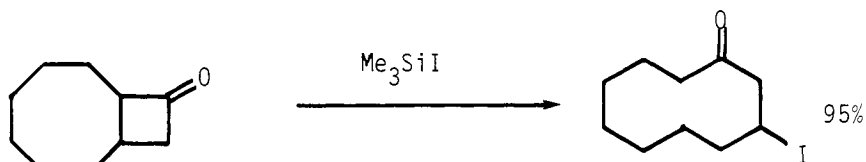
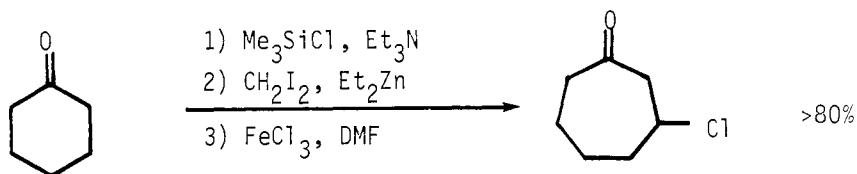
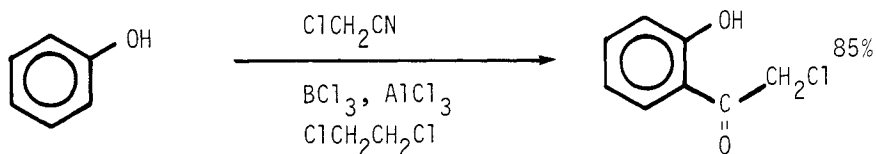
Indian J Chem, 17B, 305 (1979)
Synthesis, 487 (1980)

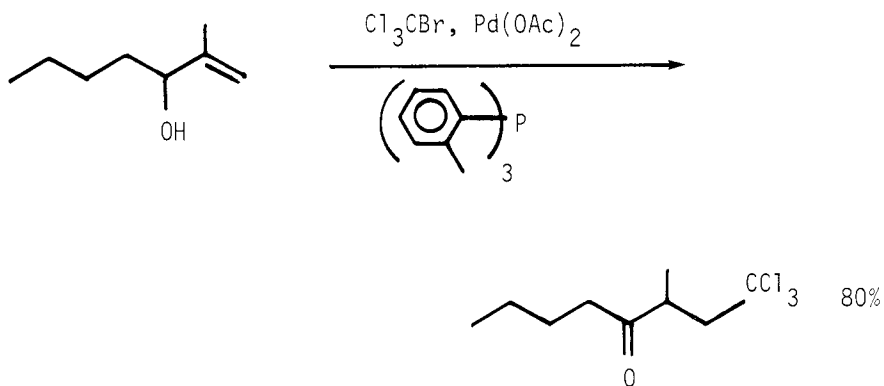
Synthesis, 312 (1981)



JOC, 45, 2731 (1980)Tetr Lett, 22, 5019 (1981)Synth Comm, 10, 821 (1980)

Synthesis, 309 (1982)

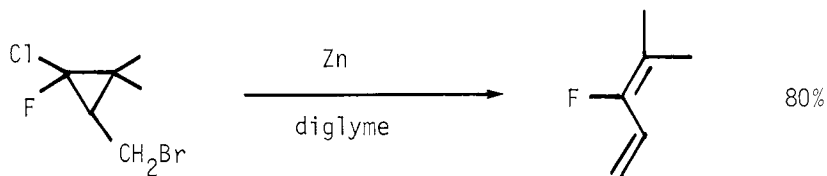
Tetr Lett, 22, 3301 (1981)JOC, 47, 5088 (1982)Tetr Lett, 21, 2639 (1980)Org Syn, 59, 113 (1980)JOC, 46, 189 (1981)

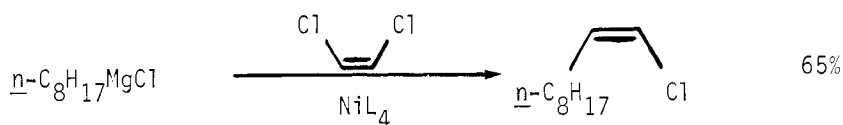
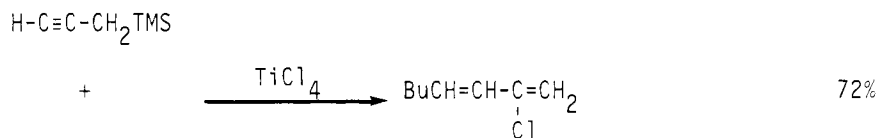
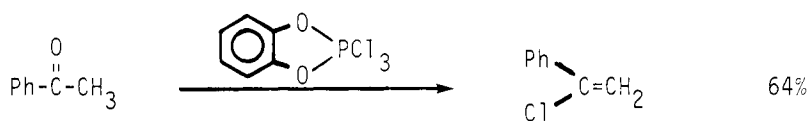
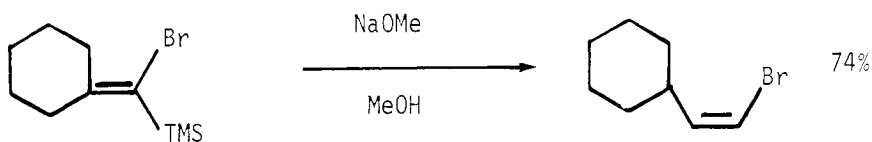
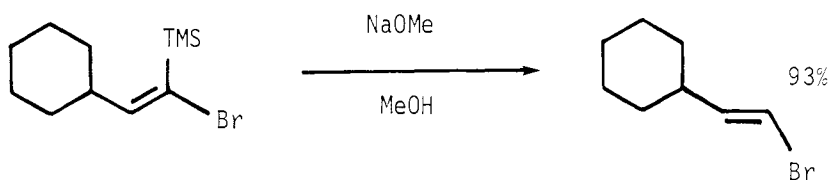


Chem Lett, 1605 (1981)

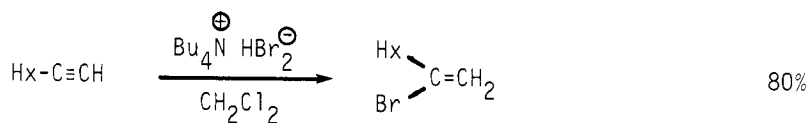
Review: "Fluorine-Containing β -Diketones"Russ Chem Rev, 50, 180 (1981)Section 370 Halide - Nitrile

No additional examples.

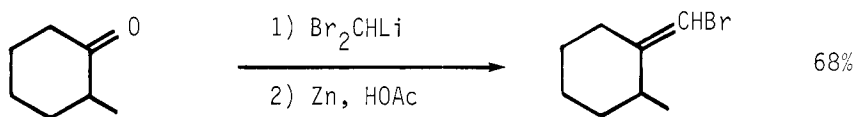
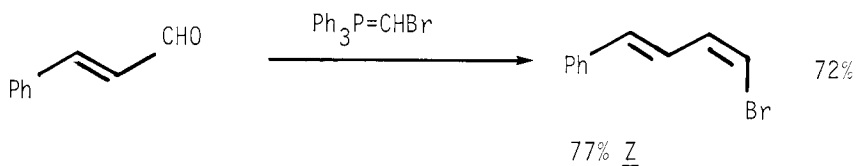
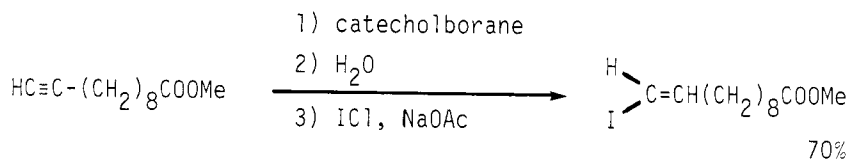
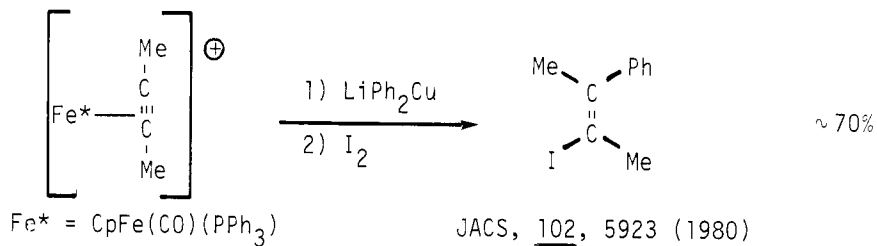
Section 371 Halide - OlefinHelv Chim Acta, 63, 1236 (1980)

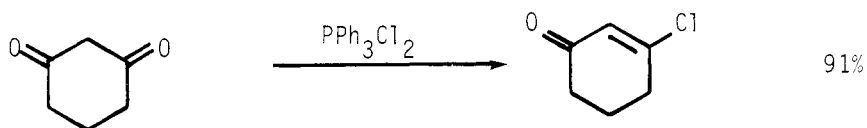
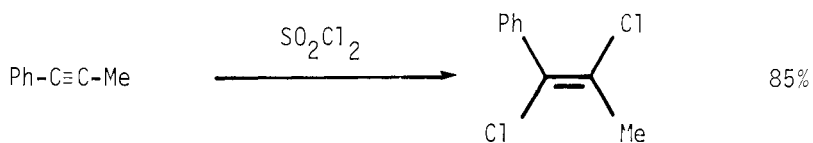
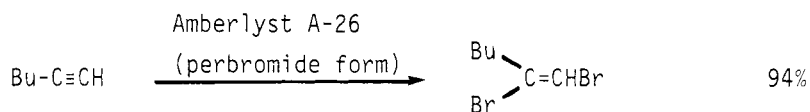
Tetr Lett, 22, 315 (1981)Tetr Lett, 22, 453 (1981)Z Chem, 22, 126 (1982)

Synthesis, 999 (1981)

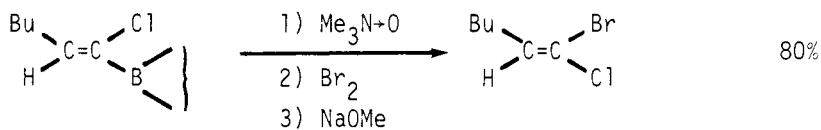
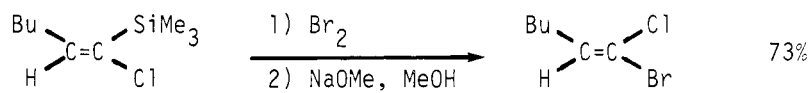


Synthesis, 805 (1980)

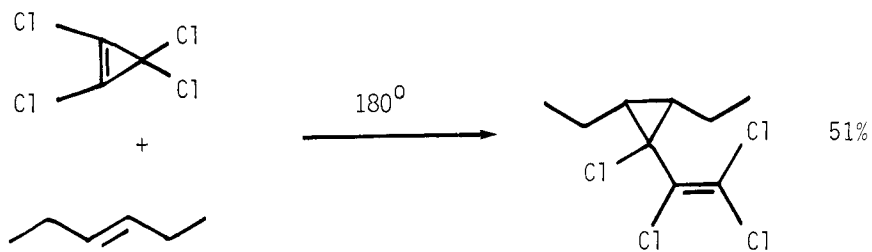
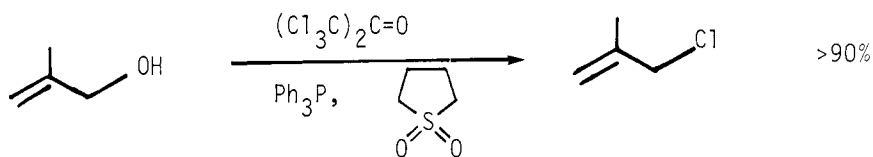
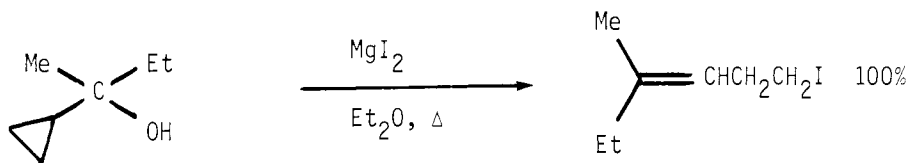
Tetr Lett, 22, 3745 (1981)Tetr Lett, 21, 4021 (1980)Synth Comm, 11, 247 (1981)

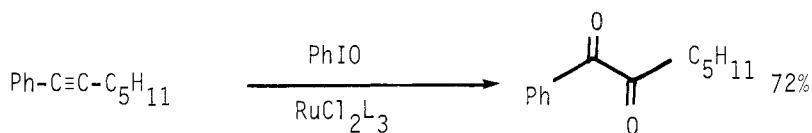
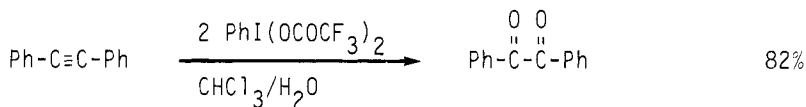
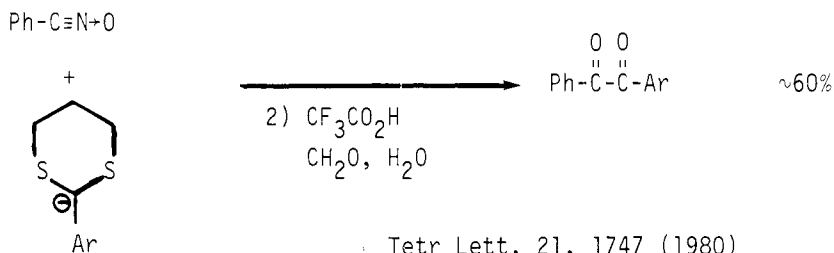
Can J Chem, 60, 210 (1982)Bull Chem Soc Japan, 54, 2843 (1981)

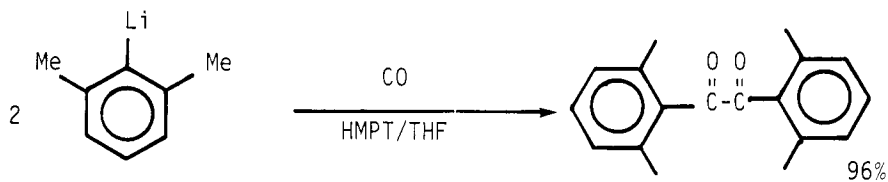
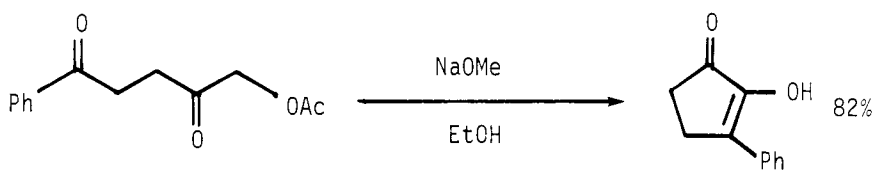
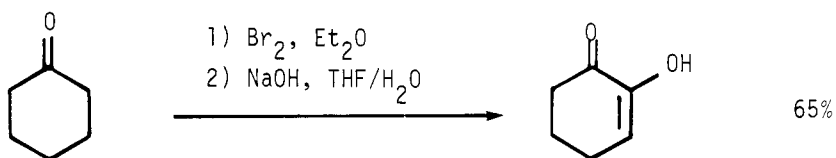
Synthesis, 143 (1980)



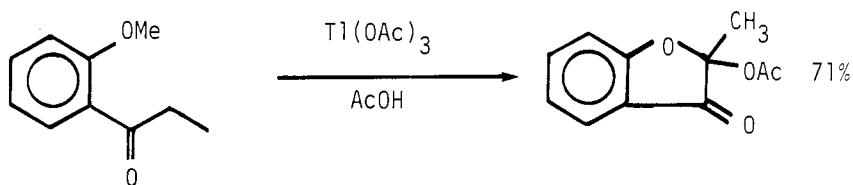
Synthesis, 127 (1982)

Angew Chem Int Ed, 19, 138 (1980)JOC, 46, 824 (1981)JOC, 46, 1504 (1981)JOC, 45, 2566 (1980)

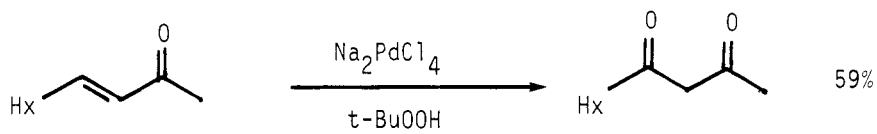
Section 372 Ketone - KetoneHelv Chim Acta, 64, 2531 (1981)Doklady Chem, 245, 140 (1979)Tetr Lett, 21, 1747 (1980)Tetr Lett, 22, 3959 (1981)

JOC, 47, 4347 (1982)Tetr Lett, 21, 3479 (1980)

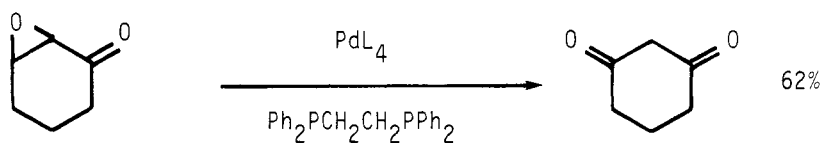
Chem Lett, 779 (1980)



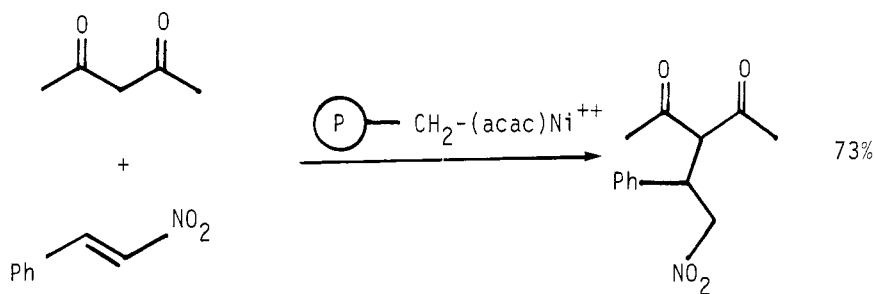
Chem Lett, 305 (1980)



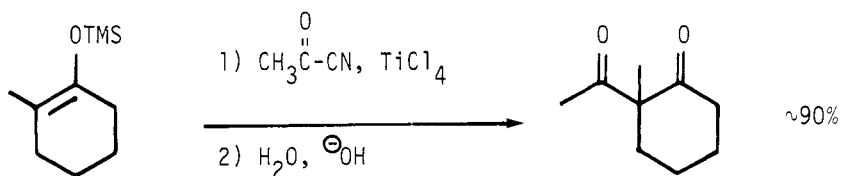
Chem Lett, 257 (1980)



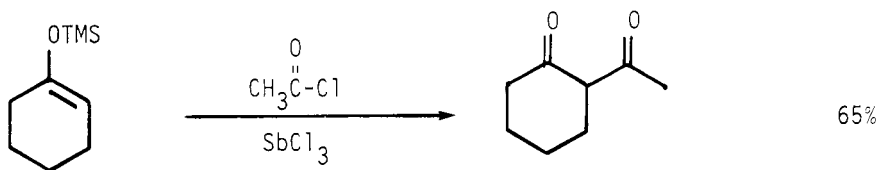
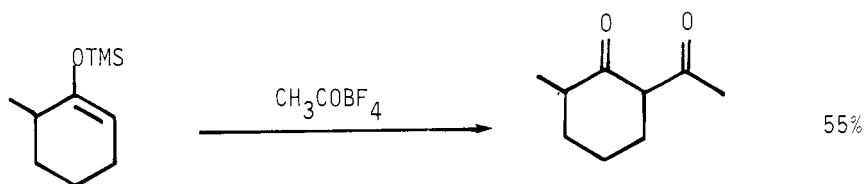
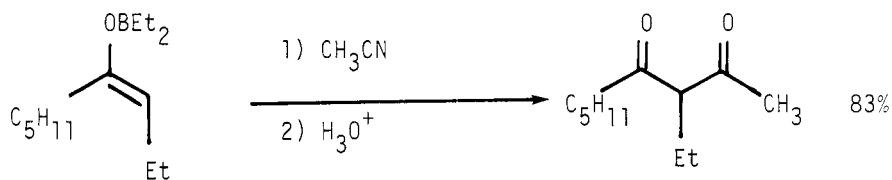
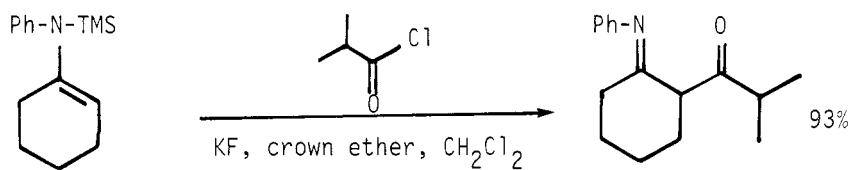
JACS, 102, 2095 (1980)

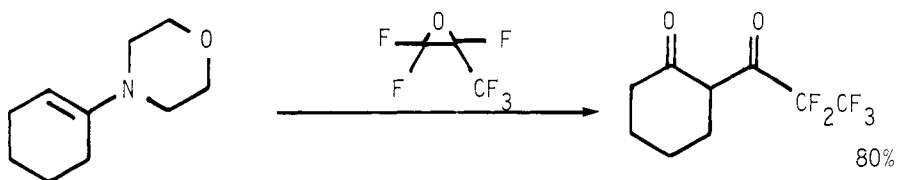
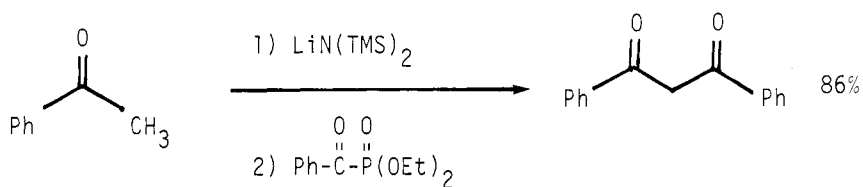


Synthesis, 467 (1982)

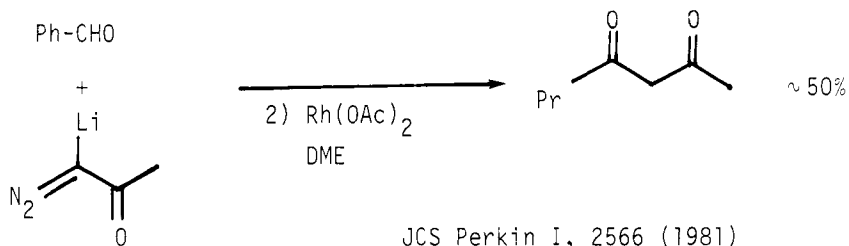


Tetr Lett, 22, 1171 (1981)

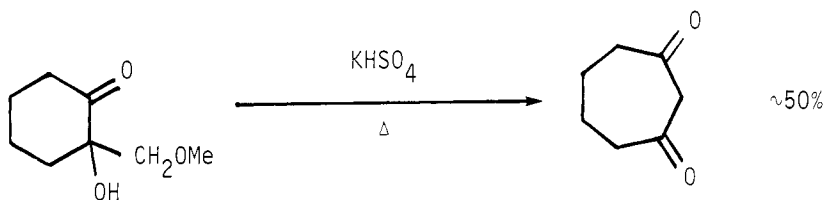
JOC, 47, 5099 (1982)JOC, 46, 3771 (1981)Synth Comm, 12, 189 (1982)Tetr Lett, 23, 3073 (1982)

BCS Japan, 55, 3345 (1982)

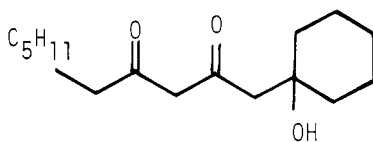
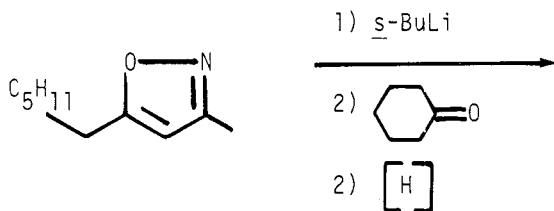
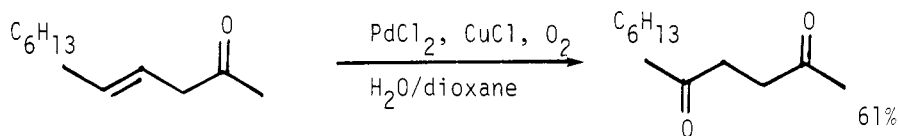
Chem Lett, 1087 (1981)



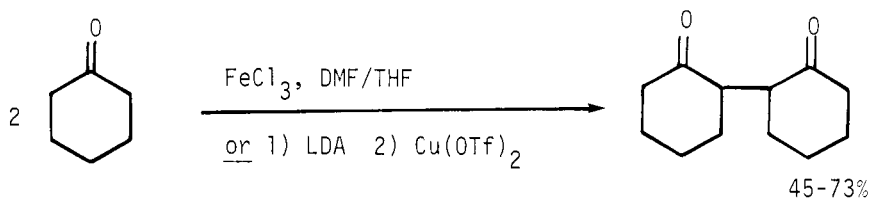
JCS Perkin I, 2566 (1981)

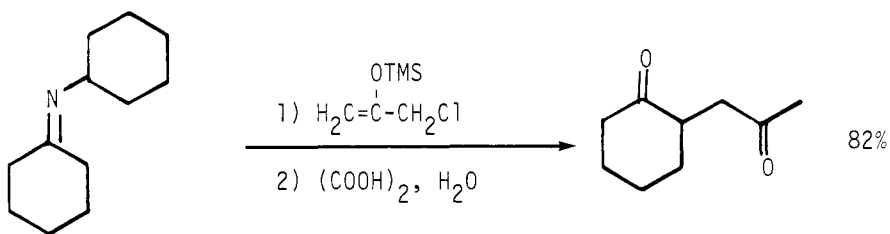
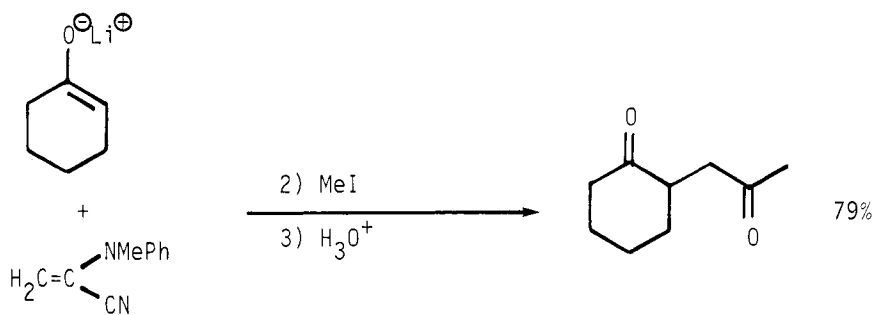


Chem Lett, 551 (1981)

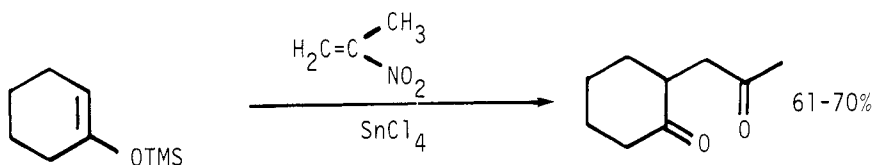
Tetr Lett, 22, 3699 (1981)

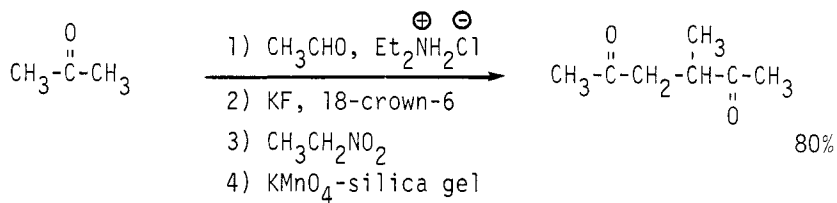
Chem Lett, 859 (1982)

Chem Pharm Bull, 28, 262 (1980)JOC, 45, 5408 (1980)

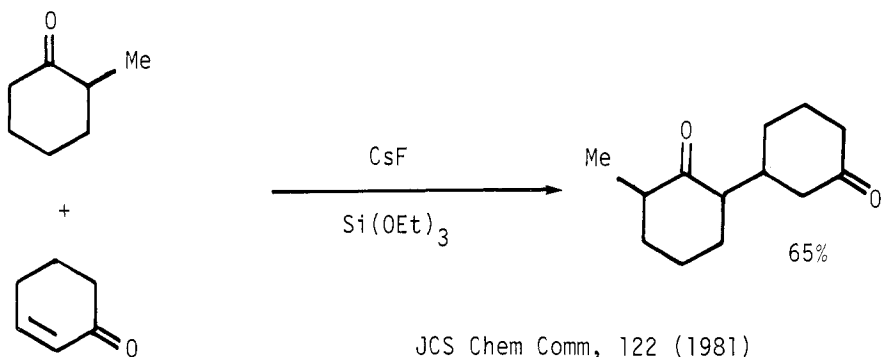
JOC, 46, 4631 (1981)

Synthesis, 413 (1980)

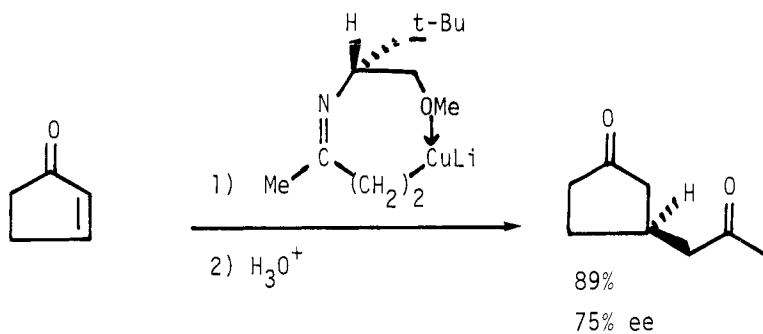
Org Syn, 60, 117 (1981)

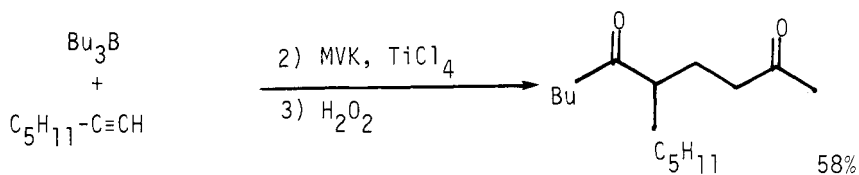


JCS Chem Comm, 635 (1982)

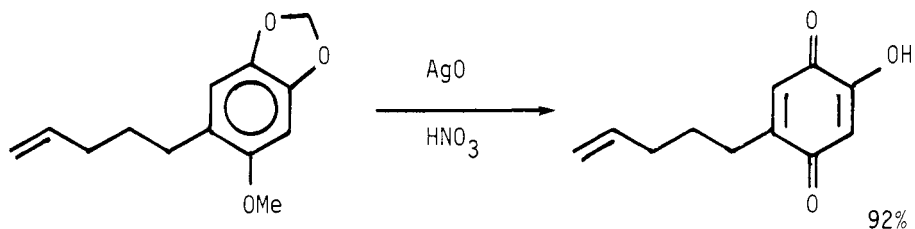
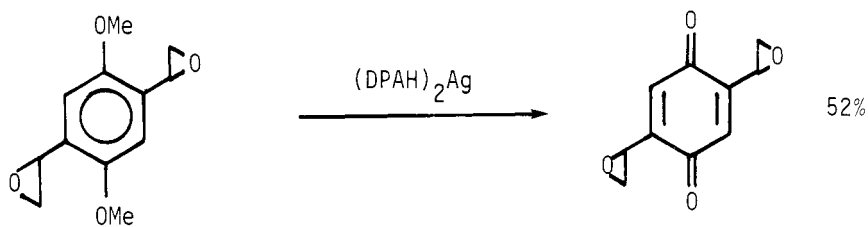


JCS Chem Comm, 122 (1981)

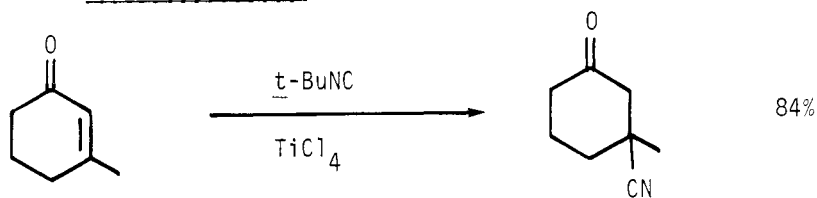
Tetr Lett, 23, 3711 (1982)

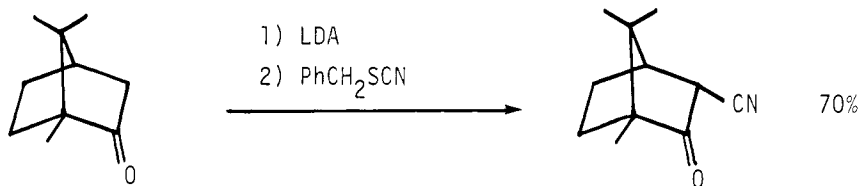


Chem Lett, 221 (1980)

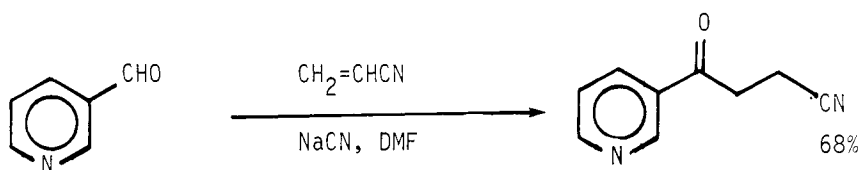
Synth Comm, 10, 9 (1980)

Chem Lett, 725 (1980)

Section 373 Ketone - NitrileJACS, 104, 6449 (1982)



Comptes Rendus, 291, 179 (1980)



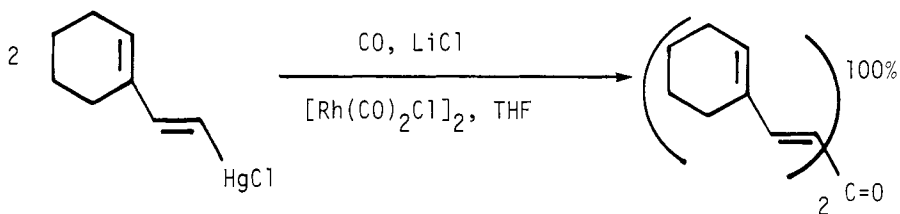
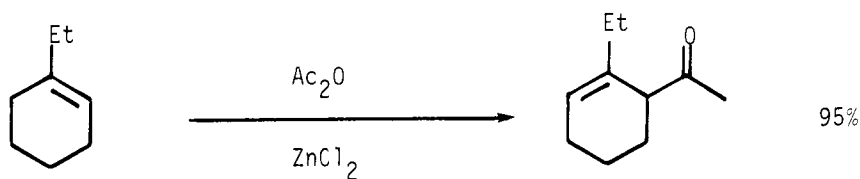
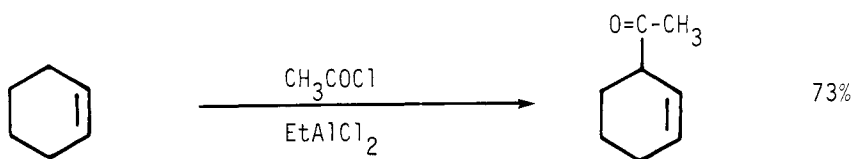
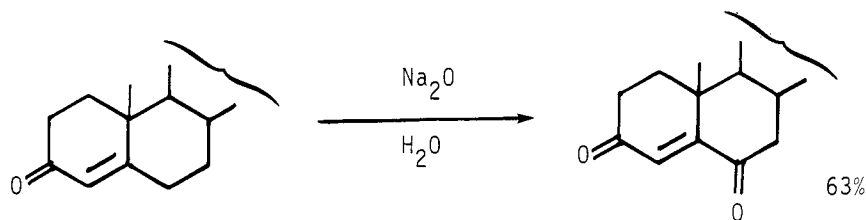
Org Syn, 59, 53 (1980)

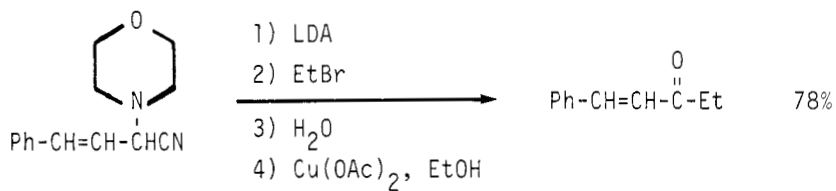
Section 374 Ketone - Olefin

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

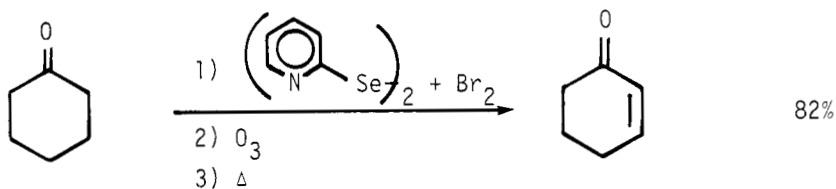
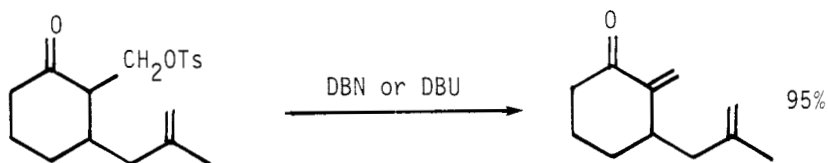
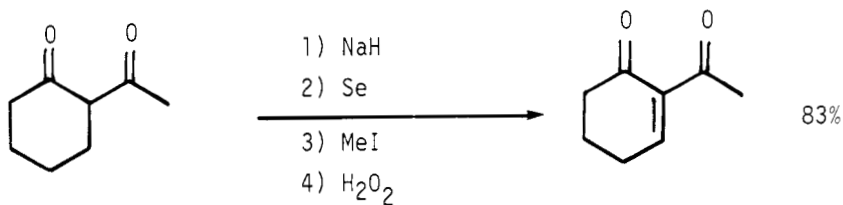
For the oxidation of allylic methylene groups ($C=C-CH_2 \rightarrow C=C-CO$), see Section 170 (Ketones from Alkyls and Methylene).

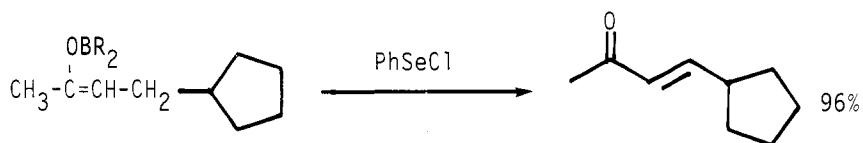
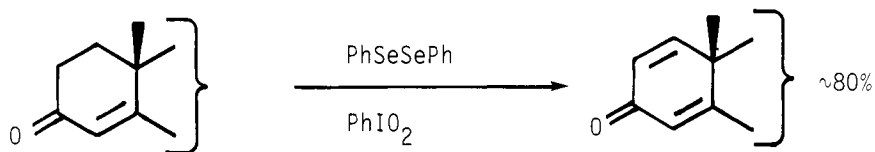
For the alkylation of olefinic ketones, see also Section 177 (Ketones from Ketones), and Section 74 (Alkyls from Olefins) for conjugate alkylations.

JOC, 45, 3840 (1980)JACS, 102, 3848 (1980)JOC, 47, 5393 (1982)Tetr Lett, 22, 5127 (1981)

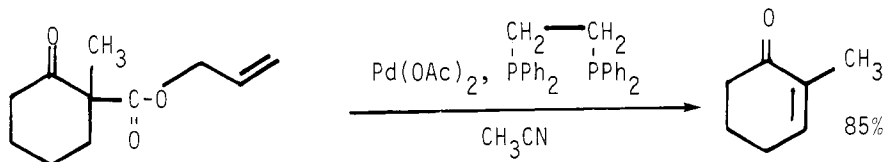


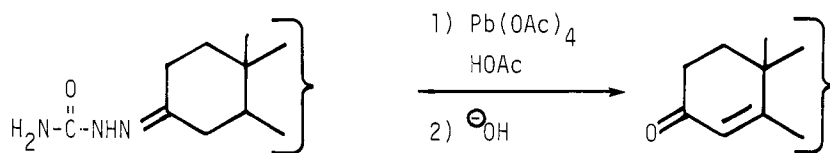
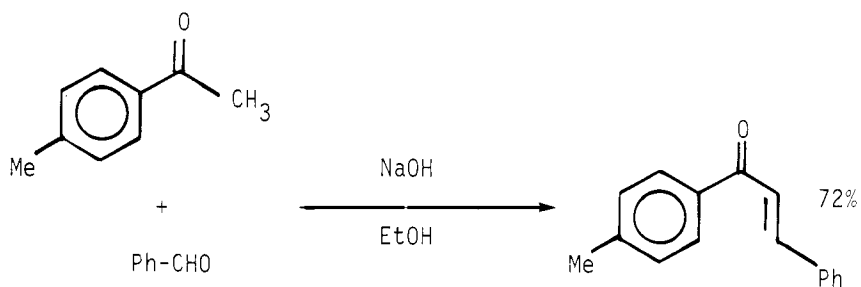
Chem Lett, 1263 (1982)

Tetr Lett, 23, 2105 (1982)JOC, 47, 4358 (1982)Tetr Lett, 22, 3043 (1981)

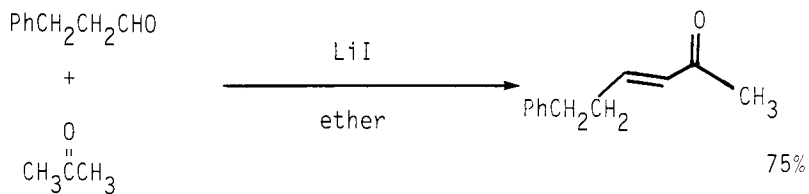
Synth Comm, 10, 667 (1980)

JCS Chem Comm, 1044 (1981)

JACS, 104, 5844 (1982)

Tetr Lett, 21, 651 (1980)

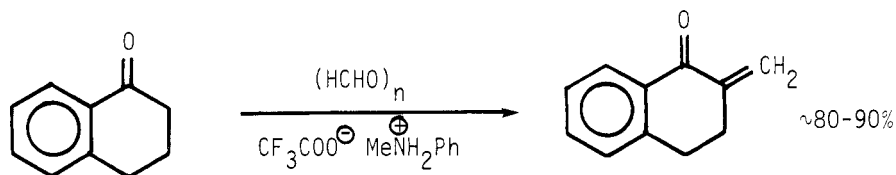
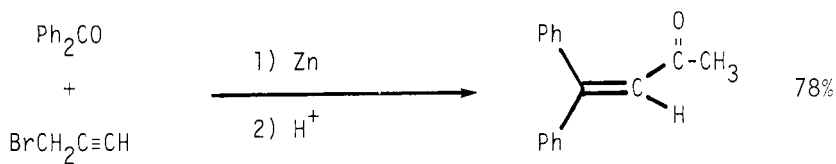
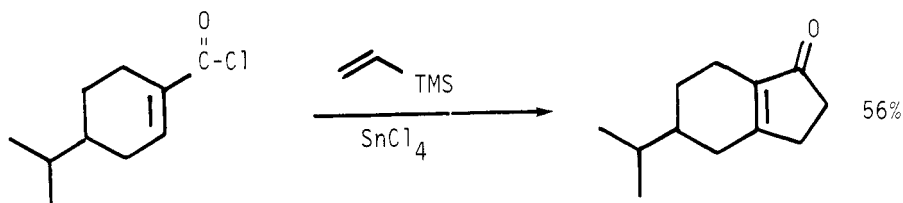
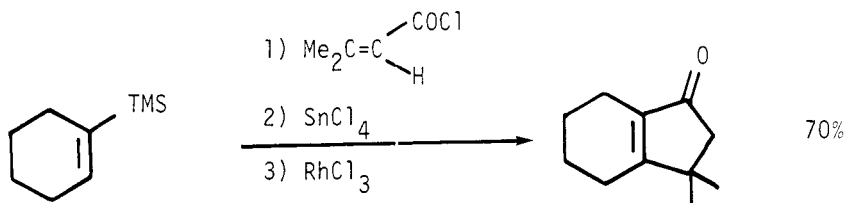
Synthesis, 647 (1980)

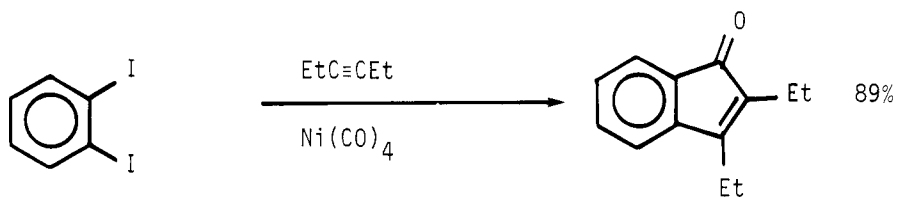
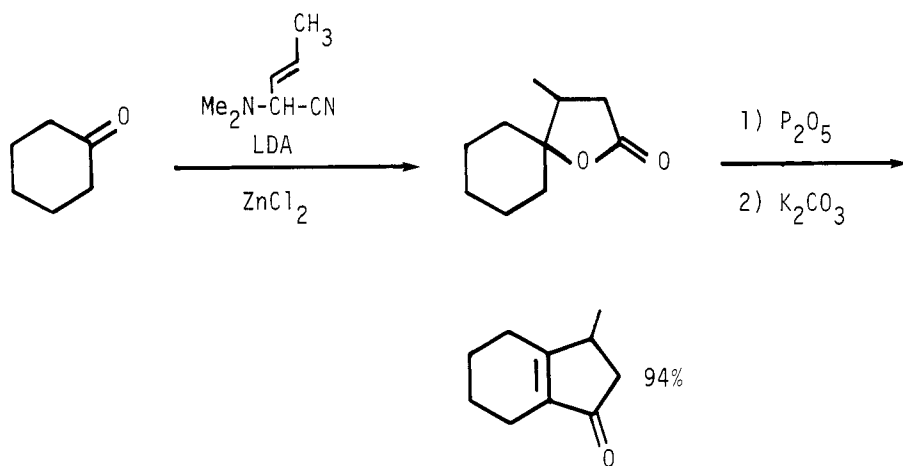
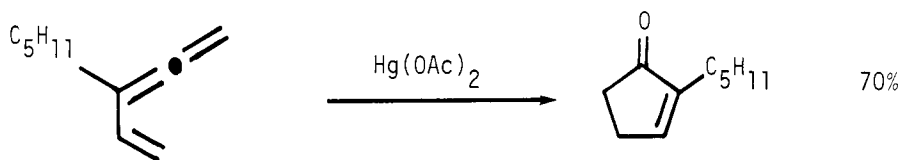


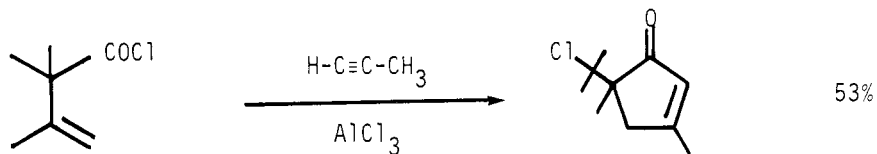
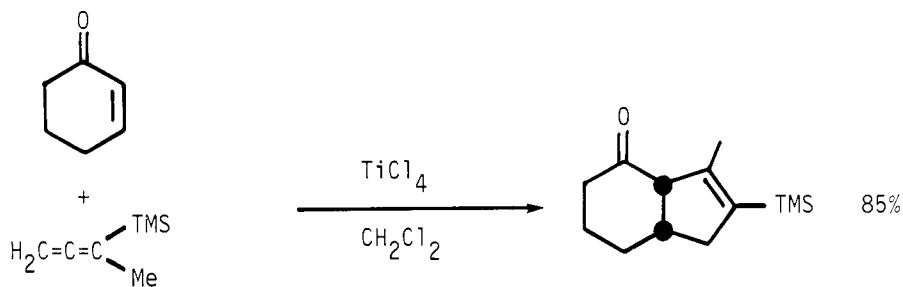
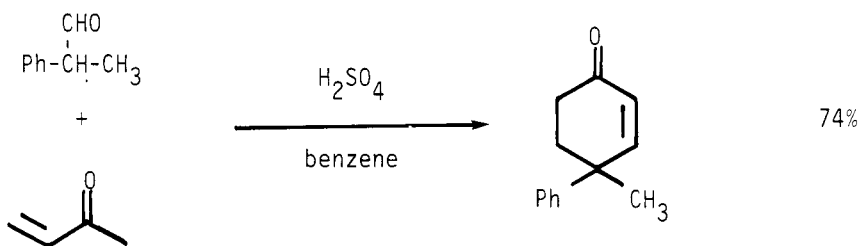
JCS Chem Comm, 486 (1980)

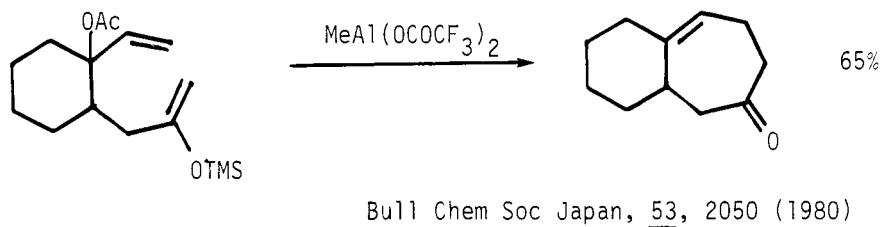
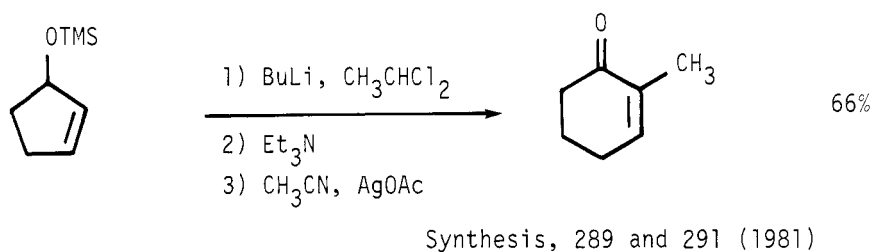
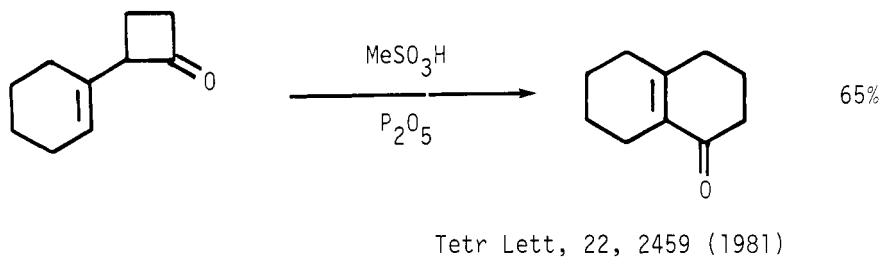
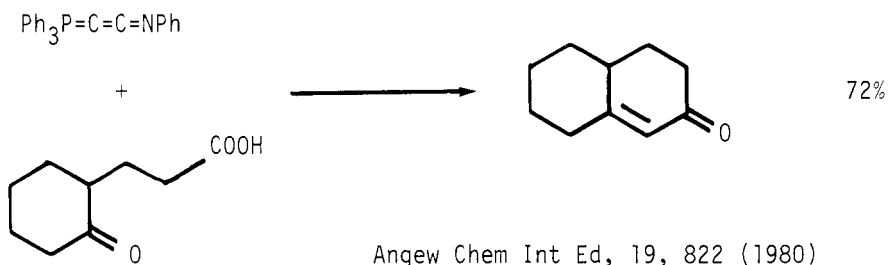


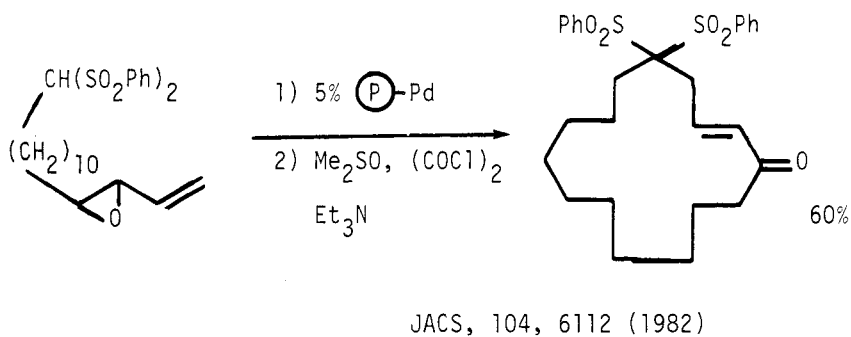
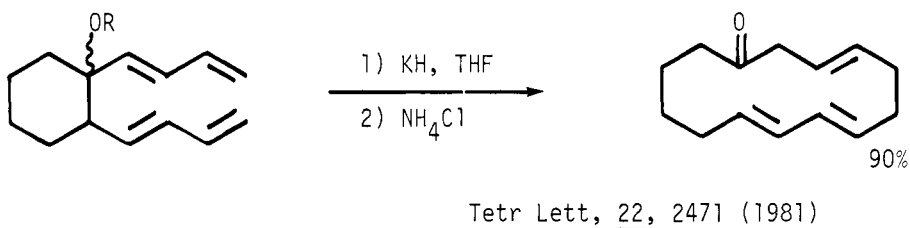
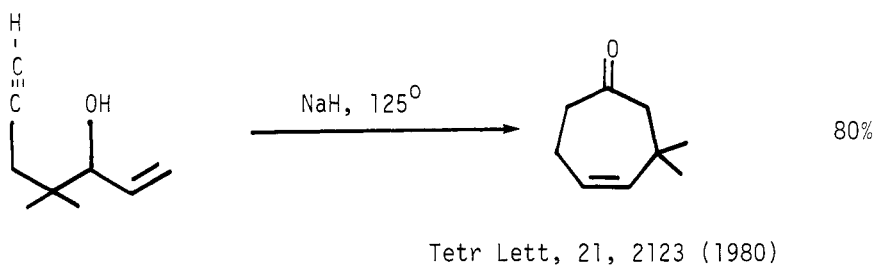
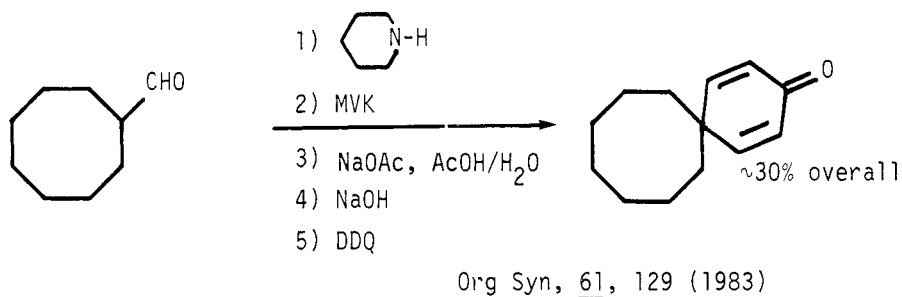
Synthesis, 60 (1982)

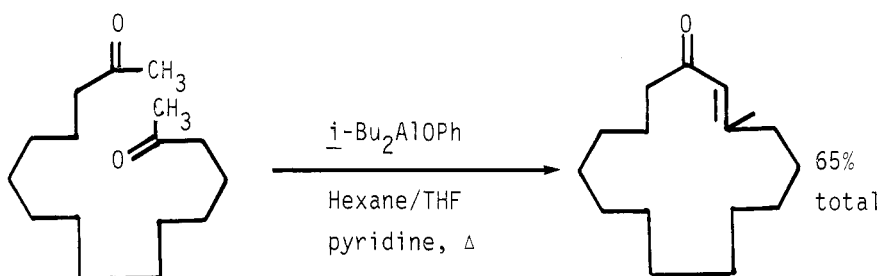
Org Syn, 60, 88 (1981)Synth Comm, 10, 637 (1980)JOC, 45, 1046 (1980)JOC, 45, 3017 (1980)

JOC, 45, 5426 (1980)Tetr Lett, 21, 1205 (1980)Tetrahedron, 36, 189 (1980)

Tetr Lett, 23, 4923 (1982)JACS, 103, 1604 (1981)JOC, 45, 5399 (1980)

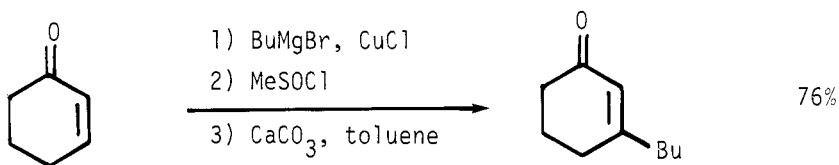




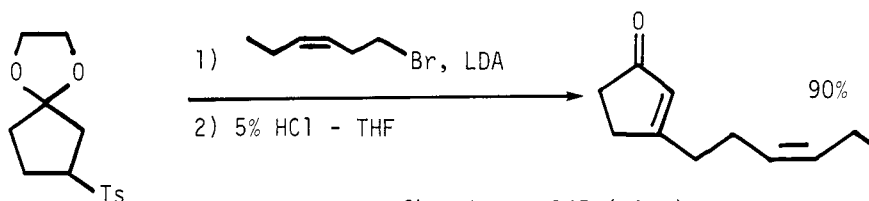


(mixture of E and Z plus some β,γ -isomer)

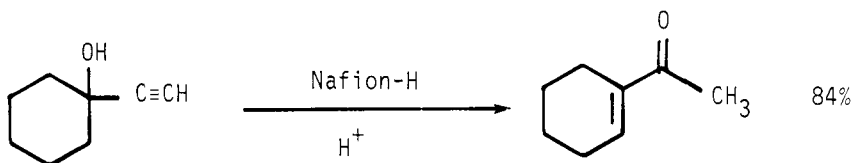
Bull Chem Soc Japan, 53, 1417 (1980)



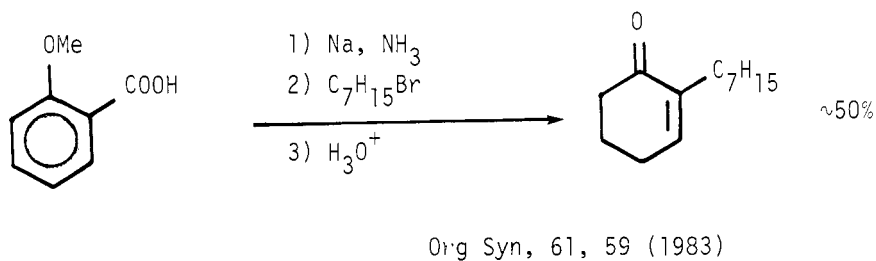
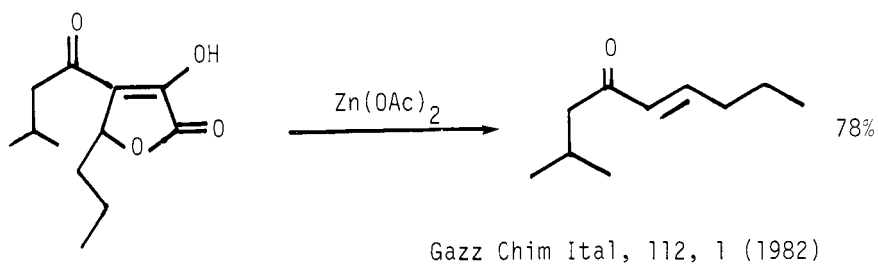
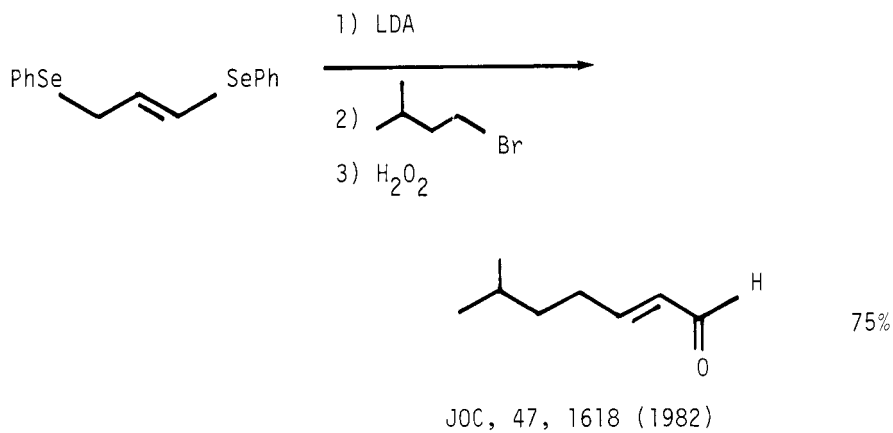
Chem Lett, 1159 (1981)

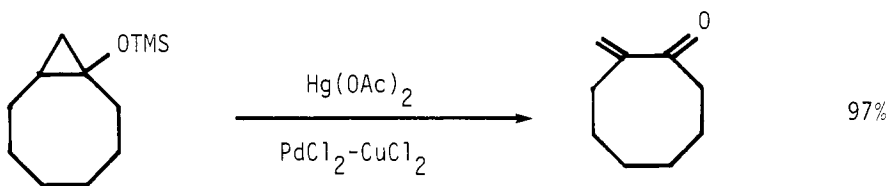
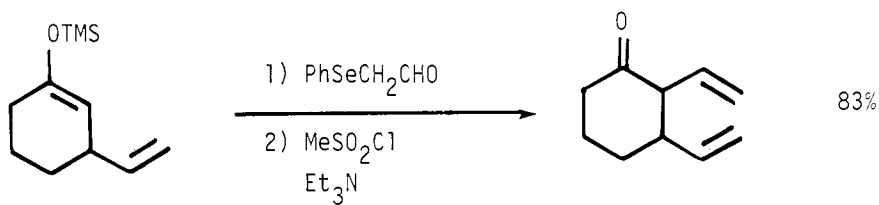


Chem Lett, 165 (1982)

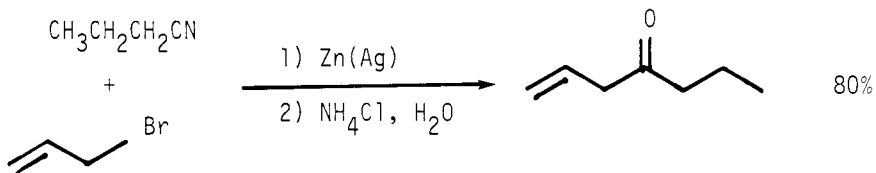
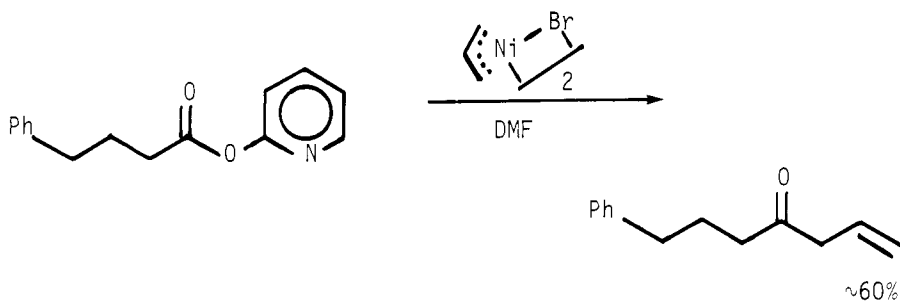


Synthesis, 473 (1981)

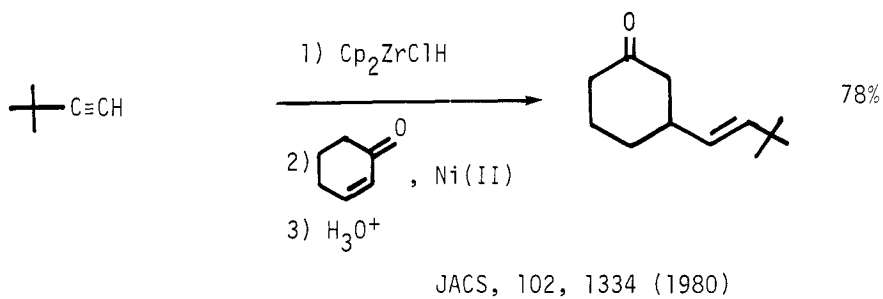
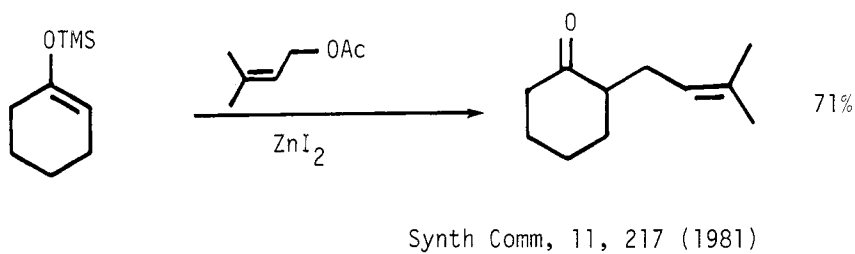
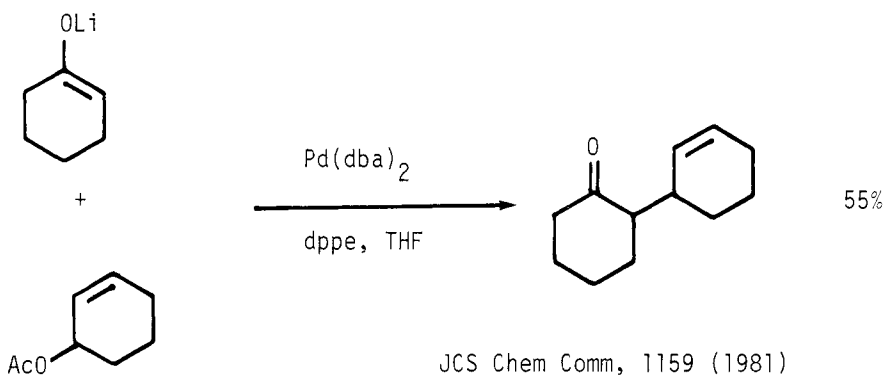


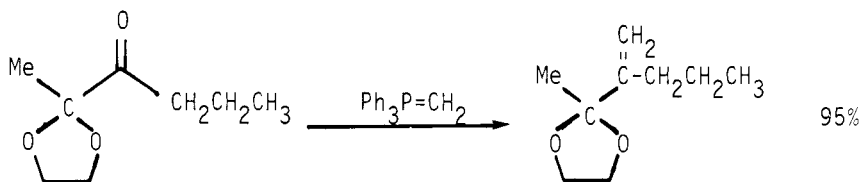
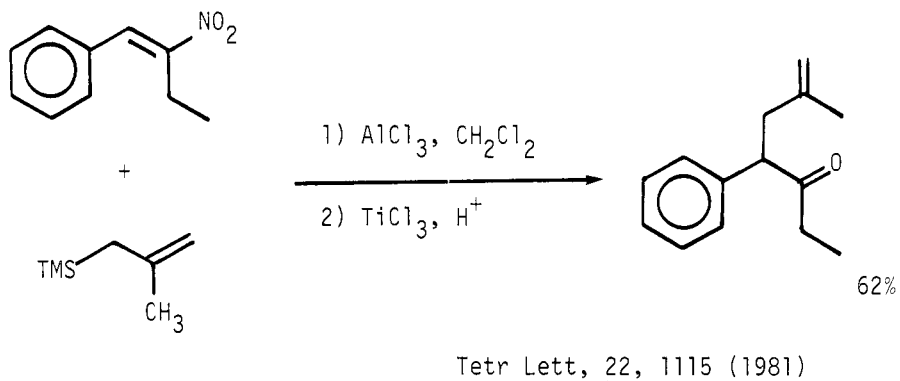
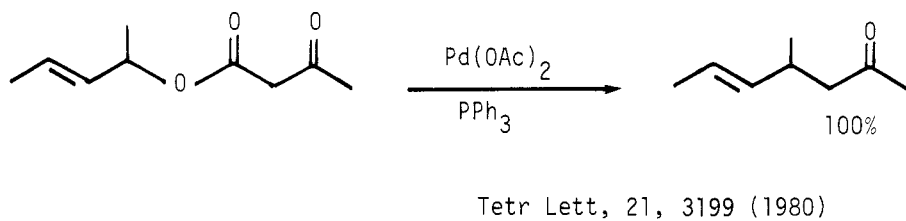
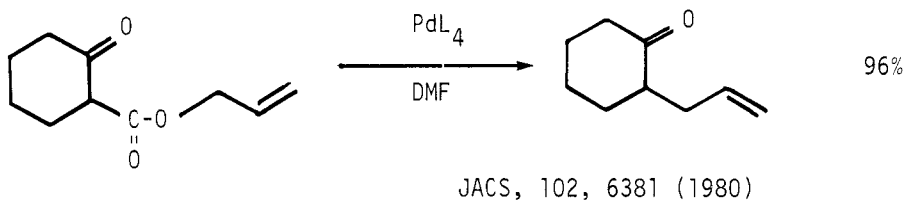
Tetr Lett, 21, 4283 (1980)

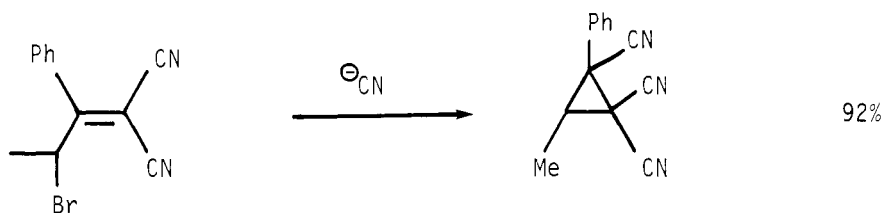
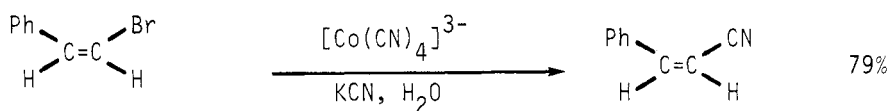
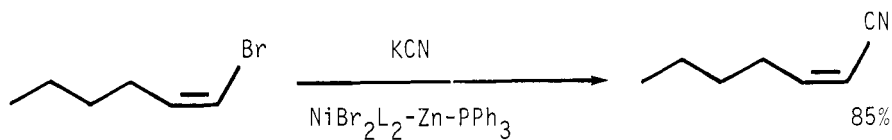
JCS Chem Comm, 434 (1981)

Tetr Lett, 22, 649 (1981)

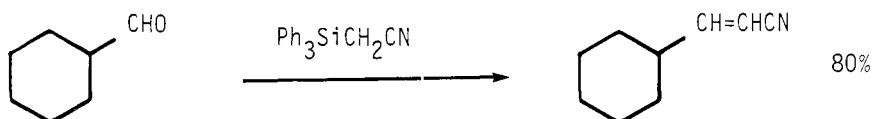
Chem Lett, 1483 (1979)

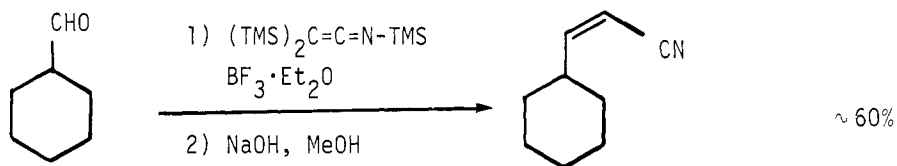




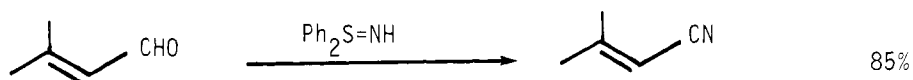
Section 375 Nitrile - NitrileActa Chem Scand B, 34, 289 (1980)Section 376 Nitrile - OlefinJACS, 104, 1560 (1982)

Chem Lett, 1565 (1982)

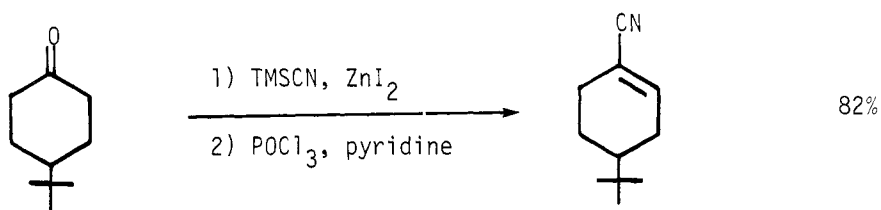
JACS, 103, 5568 (1981)



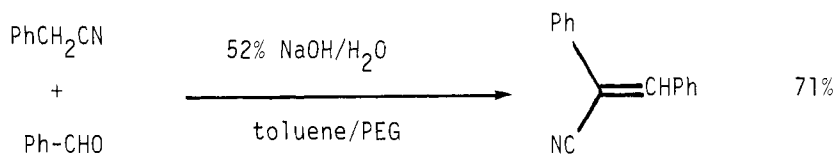
JCS Chem Comm, 56 (1982)



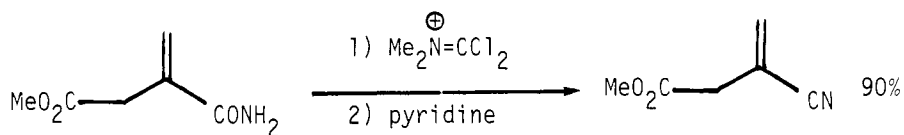
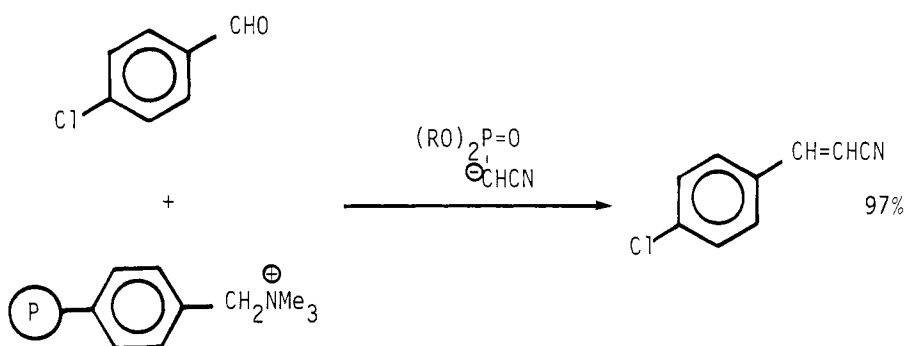
Synthesis, 1005 (1980)



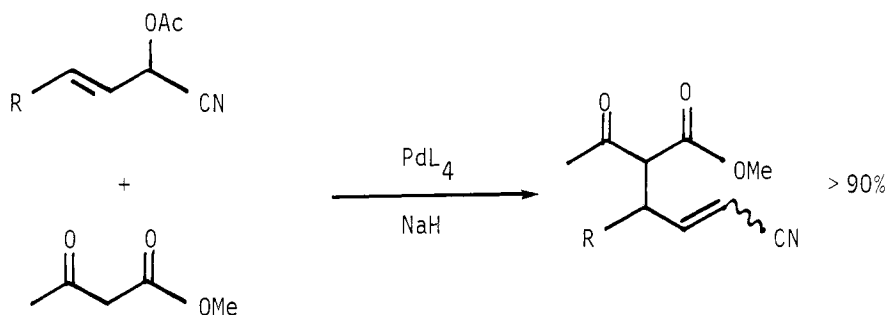
Chem Lett, 1427 (1979)

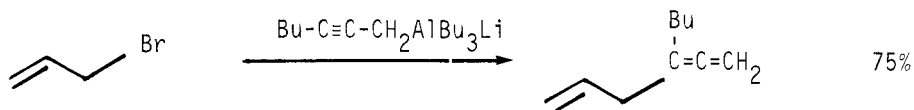
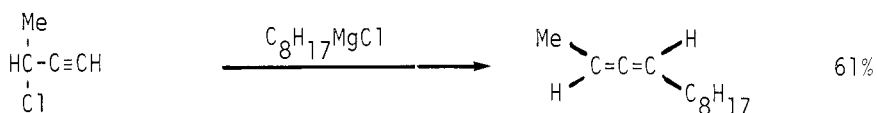
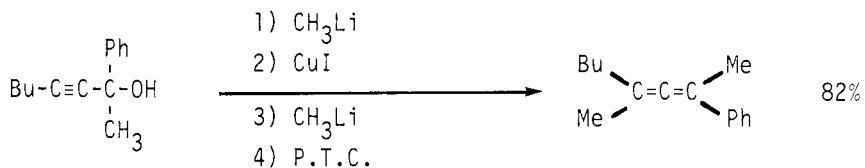
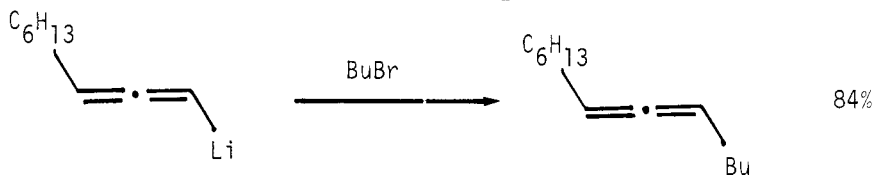


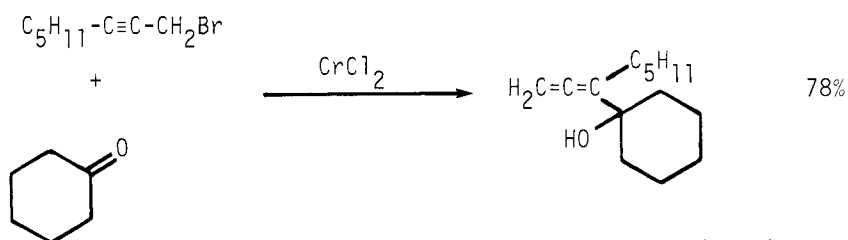
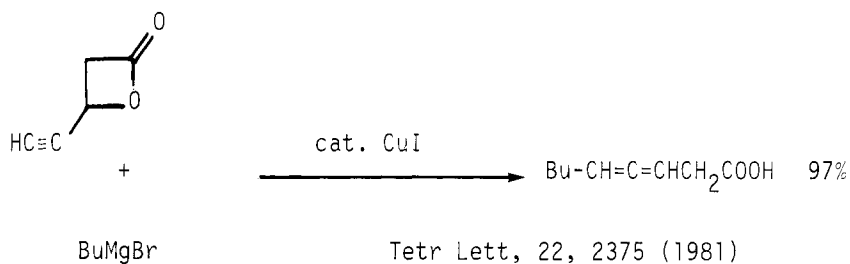
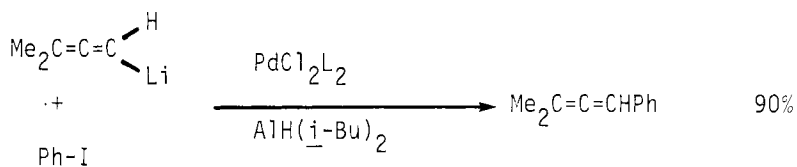
Synthesis, 913 (1981)

Synth Comm, 10, 479 (1980)

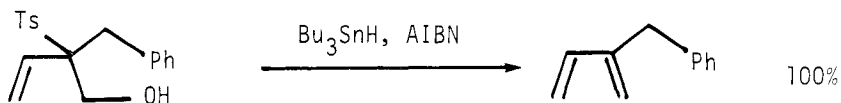
JCS Perkin I, 2516 (1980)

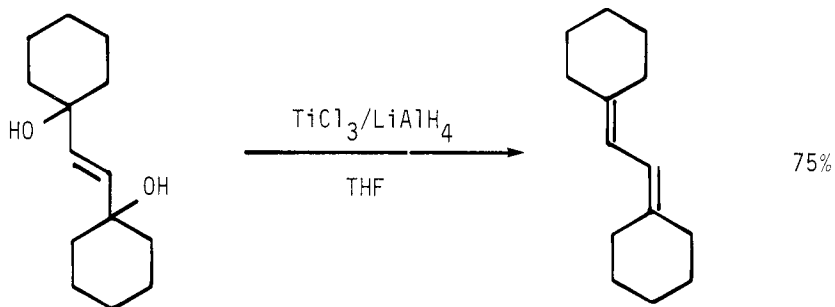
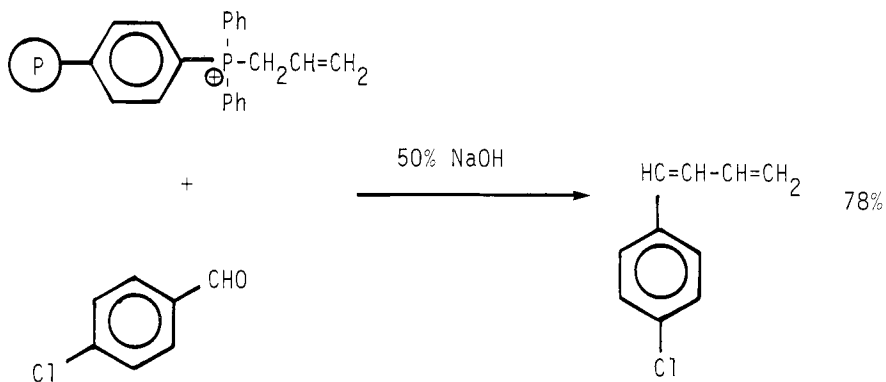
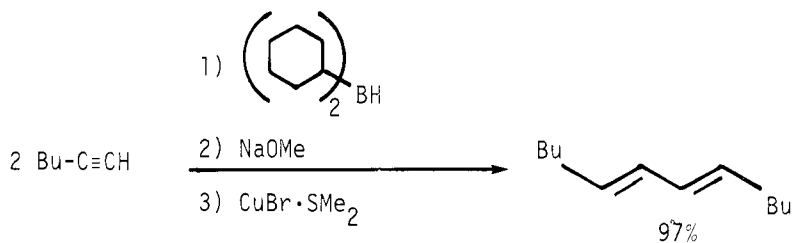
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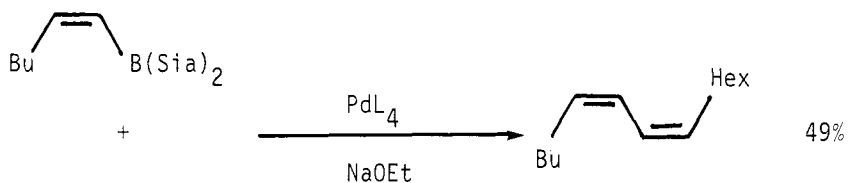
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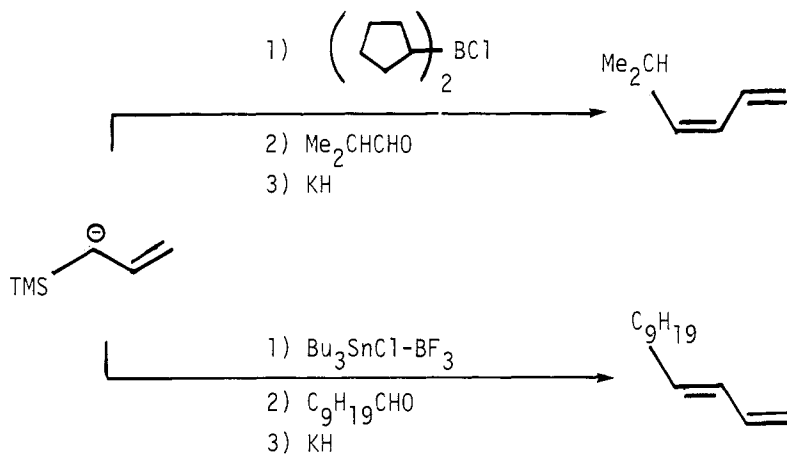
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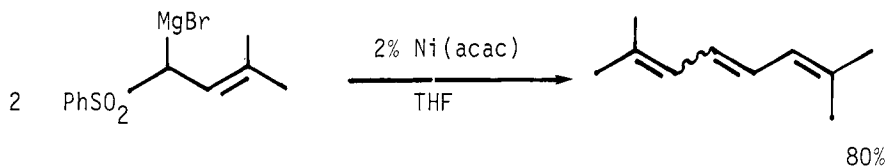
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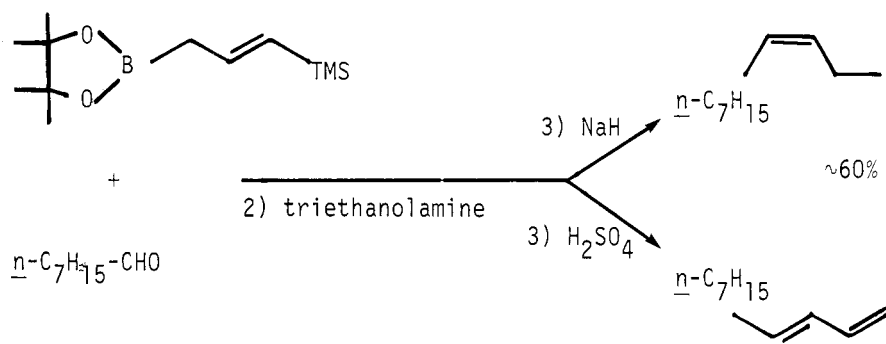
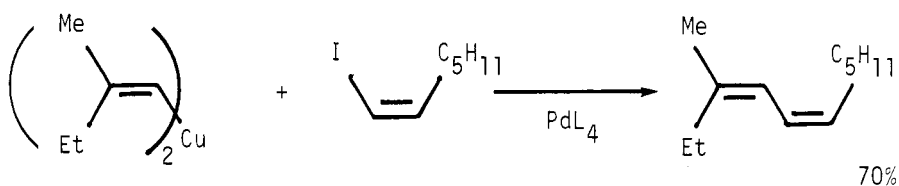
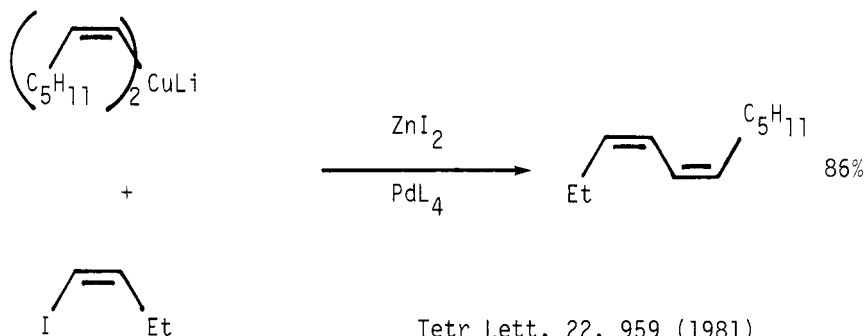
Tetr Lett, 22, 127 (1981)

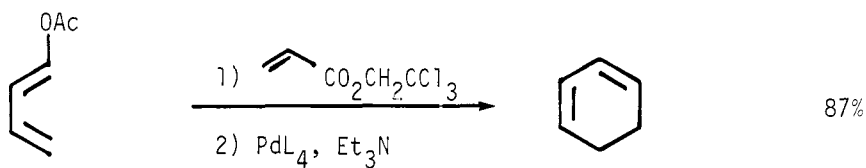


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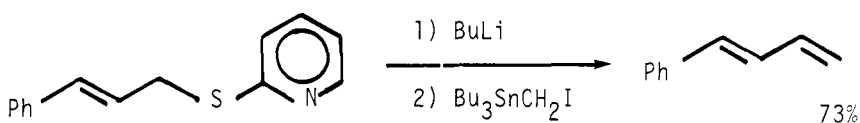
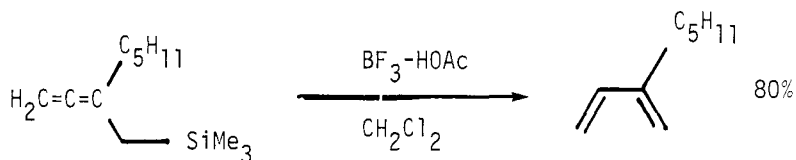


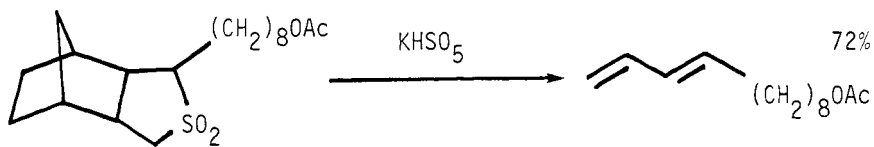
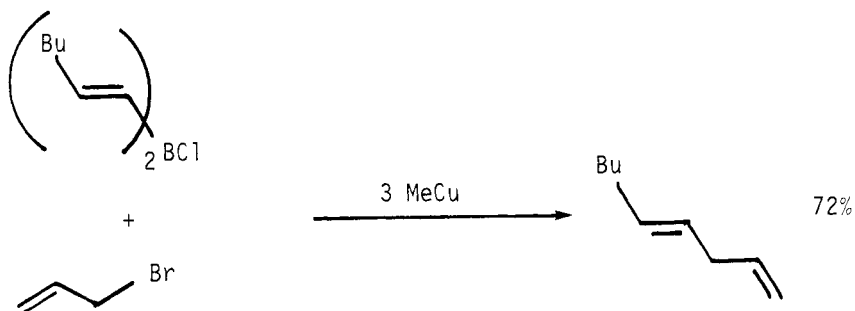
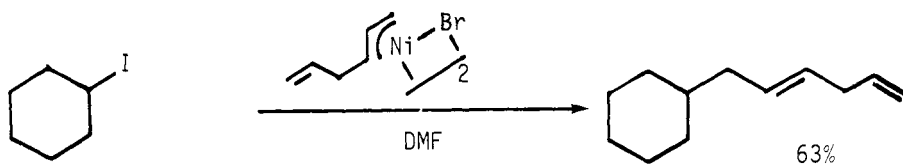
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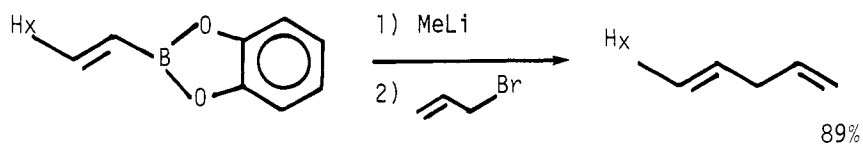
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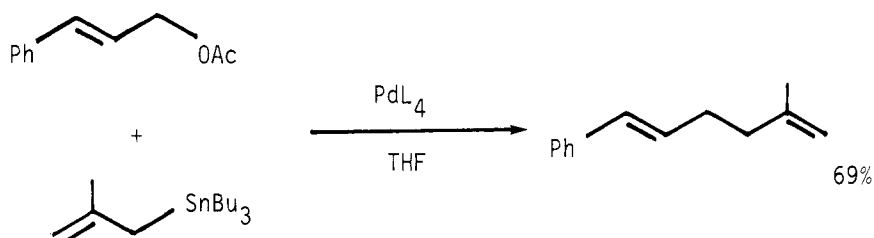
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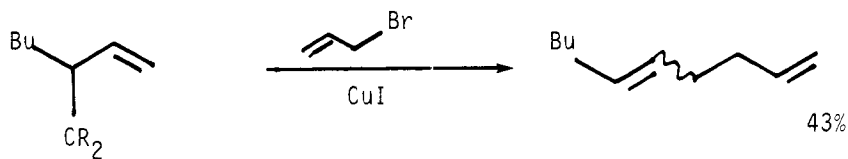
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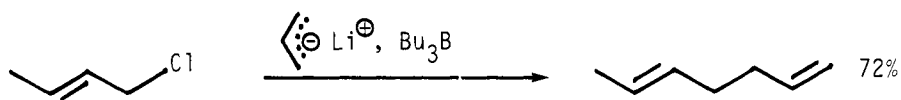
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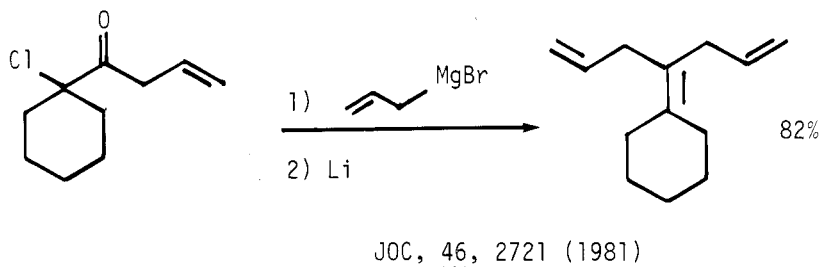
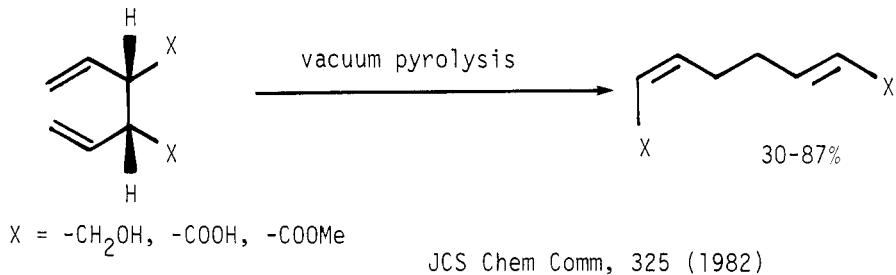
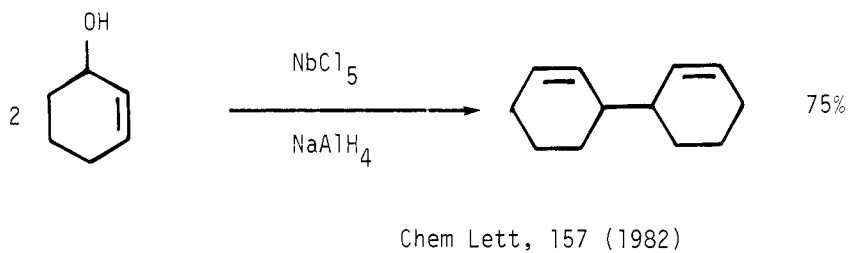
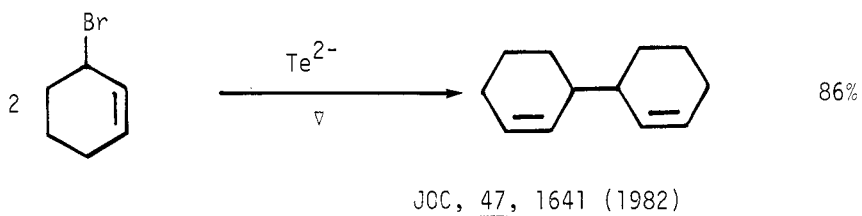
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