

Compendium of Organic Synthetic Methods

Volume 6

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PREFACE

It has been sixteen years since Ian and Shuyen Harrison first published the *Compendium of Organic Synthetic Methods* to facilitate the search for functional group transformations in the formidable body of the original literature. In Volume 2 this concept was expanded to include difunctional compounds. Louis Hegedus and Leroy Wade carried on this important compilation in Volume 3 and Wade continued with Volumes 4 and 5. Volume 6 is intended to continue the Harrisons' stated purpose of "a comprehensive one-volume listing of synthetic methods as an intermediary between the chemist and the literature."

Compendium of Organic Synthetic Methods, Volume 6, presents the functional group transformations and difunctional compound preparations of 1983, 1984, 1985, and 1986. The classification schemes of the first five volumes have been followed but a new chapter has been added. Each literature citation now includes all authors and the text concludes with an Author Index. The new Chapter 15 classifies the oxides of nitrogen, sulfur, and selenium with section headings identical to Chapters 1–14. The difunctional compounds now appear in Chapter 16. The experienced user of the *Compendium* will require no special instructions for the use of the new oxides chapter or the complete volume.

Author citations and the Author Index have been included to facilitate literature searches and to follow the current work of a particular author. The citations should not prove obtrusive and will hopefully assist the synthetic community.

I wish to express my gratitude to Professor Michael Edwards who first suggested this project to me. I also wish to thank Professor Leon Ghosez who provided the facilities for a pleasant sabbatical leave, which allowed completion of the research for this text. My thanks to Tae Woo Kwon, Jennline Sheu, Royce Menezes, Chung Jen Wang, Paul Keusenkothen, and Young Chan Son who proofread parts of the manuscript and offered many helpful suggestions. I want to thank my wife Sarah and son Steven for their patience and moral support throughout this work.

MICHAEL B. SMITH

Storrs, Connecticut
June 1987

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ABBREVIATIONS

Ac	Acetyl = $\text{—}\overset{\text{O}}{\parallel}\text{CCH}_3$
acac	Acetylacetonate
AIBN	Azo- <i>bis</i> -isobutyronitrile
aq.	Aqueous
-B	9-Borabicyclo[3.3.1]nonylboryl
9-BBN	9-Borabicyclo[3.3.1]nonane
Bn (Bz)	Benzyl = $\text{—CH}_2\text{Ph}$
Boc	<i>t</i> -Butoxycarbonyl = $\text{—}\overset{\text{O}}{\parallel}\text{C—O—}t\text{Bu}$
bpy (bipy)	2,2'-Bipyridyl
Bu	<i>n</i> -Butyl = $\text{—CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
CAM	Carboxamidomethyl
CAN	Ceric ammonium nitrate = $(\text{NH}_4)_2\text{Ce}(\text{NO}_3)_6$
c-	Cyclo-
cat.	Catalytic
CBZ	Carbobenzoxy = $\text{—}\overset{\text{O}}{\parallel}\text{COCH}_2\text{Ph}$
COD	1,5-Cyclooctadienyl
Cp	Cyclopentadienyl
Cy	Cyclohexyl
DABCO	1,4-Diazabicyclo[2.2.2]octane
dba	Dibenzylidene acetone
DBE	1,2-Dibromoethane = $\text{BrCH}_2\text{CH}_2\text{Br}$
DBN	1,8-Diazabicyclo[5.4.0]undec-7-ene
DBU	1,5-Diazabicyclo[4.3.0]non-5-ene
DCC	1,3-Dicyclohexylcarbodiimide = $\text{C}_6\text{H}_{13}\text{—N=C=N—C}_6\text{H}_{13}$
DCE	1,2-Dichloroethane = $\text{ClCH}_2\text{CH}_2\text{Cl}$
DDQ	2,3-Dichloro-5,6-dicyano-1,4-benzoquinone
DEA	Diethylamine = $\text{HN}(\text{CH}_2\text{CH}_3)_2$
DEAD	Diethylazodicarboxylate
Dibal-H	Diisobutylaluminum hydride
Diphos-4	1,4- <i>bis</i> -(Diphenylphosphino)butane
DMAP	4-Dimethylaminopyridine
DME	Dimethoxyethane
DMF	<i>N,N</i> -Dimethylformamide = HCNMe_2

dppe	1,2- <i>bis</i> -Diphenylphosphinoethane
dppf	<i>bis</i> -(Diphenylphosphine)ferrocene
dppp	1,3- <i>bis</i> -(Diphenylphospine)propane
dvb	Divinylbenzene
e ⁻	Electrolysis
ee	Enantiomeric excess
EE	Ethoxyethyl
Et	Ethyl = —CH ₂ CH ₃
EDA	Ethylenediamine = H ₂ NCH ₂ CH ₂ NH ₂
EDTA	Ethylenediaminetetraacetic acid
FMN	Flavin mononucleotide
fod	<i>tris</i> -(6,6,7,7,8,8,8)-Heptafluoro-2,2-dimethyl-3,5-octanedionate
Fp	Cyclopentadienylbiscarbonyliron
FVP	Flash vacuum pyrolysis
<i>hν</i>	Irradiation with light
1,5-HD	1,5-Hexadienyl
HMPA	Hexamethylphosphoramide = (Me ₃ N) ₃ P=O
HMPT	Hexamethylphosphorous triamide = (Me ₃ N) ₃ P
iPr	Isopropyl = —CH(CH ₃) ₂
LICA	Lithium cyclohexylisopropylamide
LDA	Lithium diisopropylamide = LiN(iPr) ₂
LTMP	Lithium 2,2,6,6-tetramethylpiperidine
mcpba	<i>meta</i> -Chloroperoxybenzoic acid
Me	Methyl = —CH ₃
MEM	β-Methoxyethoxymethyl = MeOCH ₂ CH ₂ OCH ₂ —
MOM	Methoxymethyl = MeOCH ₂ —
Ms	Methanesulfonyl = CH ₃ SO ₂ —
MTM	Methylthiomethyl = CH ₃ SCH ₂ —
NAD	Nicotinamide adenine dinucleotide
NADP	Sodium triphosphopyridine nucleotide
NBD	Norbornadiene
NBS	<i>N</i> -Bromosuccinimide
NCS	<i>N</i> -Chlorosuccinimide
Ni(R)	Raney nickel
Ⓟ	Polymeric backbone
PCC	Pyridinium chlorochromate
PDC	Pyridinium dichromate
PEG	Polyethylene glycol
Ph	Phenyl = —C ₆ H ₅
Pip	Piperidine = HN—CH ₂ CH ₂ CH ₂ CH ₂ —
Pr	<i>n</i> -Propyl = —CH ₂ CH ₂ CH ₃
Py	Pyridine = C ₆ H ₅ N
quant.	Quantitative yield
Red-Al	[(MeOCH ₂ CH ₂ O) ₂ AlH ₂]Na
TBAF	<i>n</i> -Bu ₄ N ⁺ F ⁻
TBHP	<i>t</i> -Butylhydroperoxide = Me ₃ COOH

tBu	<i>t</i> -Butyl = $\text{—C(CH}_3)_3$
TEMPO	Tetramethylpiperidinyloxy free radical
TFA	Trifluoroacetic acid = CF_3COOH
TFAA	Trifluoroacetic anhydride = $\text{CF}_3\text{COCCH}_3$
Tf	Triflate = $\text{—OSO}_2\text{CF}_3$
THF	Tetrahydrofuran
THP	Tetrahydropyran
TMEDA	Tetramethylethylenediamine
TMS	Trimethylsilyl = $\text{—Si(CH}_3)_3$
TMP	2,2,6,6-Tetramethylpiperidine
Tol	Tolyl = $4\text{-C}_6\text{H}_4\text{CH}_3$
Tr	Trityl = —CPh_3
TRIS	Triisopropylphenylsulfonyl
Ts (Tos)	Tosyl = <i>p</i> -toluenesulfonyl
»»»»)	Sonication

Sections—heavy type
Pages—light type

PREPARATION OF →

FROM

PROTECTION

Carboxylic acids	30A	17
Alcohols, phenols	45A	46
Aldehydes	60A	64
Amines	105A	136
Ethers	135A	180
Ketones	180A	236

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

Pages—light type

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

INTRODUCTION

Relationship between Volume 6 and Previous Volumes. *Compendium of Organic Synthetic Methods, Volume 6* presents about 1100 examples of published methods for the preparation of monofunctional compounds, updating the 7000 in Volumes 1 through 5. In addition, Volume 6 contains about 900 examples of preparations of difunctional compounds and various functional groups, updating the sections introduced in Volume 2. For Chapters 1 through 14 the same systems of section and chapter numbering are used as in previous volumes. Chapter 15 is new and classifies the preparation of oxides of nitrogen (nitro compounds, nitrones, *N*-oxides, etc.), sulfur (sulf-oxides and sulfones), and selenium (selenoxides and Se dioxides) according to the scheme used for all other monofunctional compounds. Therefore, "Oxides from Acetylenes" appears as Section 211 and the chapter concludes with "Oxides from Miscellaneous Compounds", Section 225. The difunctional compounds now appear in Chapter 16 (Chapter 15 in Volumes 2 through 5) but the section numbers remain the same.

A minor change from previous volumes is the inclusion of thiols with all alcohol classifications and sulfides (thioethers) are classified with ethers. Both of these changes are reflected in the chapter titles, section titles, and citations. These changes do not alter the fundamental organization.

Each literature citation follows the notation used in previous volumes but is accompanied by a complete author list. The principal author(s) are denoted by an asterisk (*). Following Chapter 16 is an alphabetical listing of all authors (last name, initials).

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 loosely arranged in ascending order of year cited (1983–1986), although an effort has been made to put similar reactions together when possible. Review articles are collected at the end of each appropriate section.

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, methylenes, and aryls 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
$\text{RBr} + \text{CH} \equiv \text{CH} \rightarrow \text{RC} \equiv \text{CR}$	Acetylenes from halides; also acetylenes from acetylenes
$\text{ROH} + \text{RCOOH} \rightarrow \text{RCOOR}$	Esters from alcohols; also esters from carboxylic acids
$\text{RCH}=\text{CHCHO} \rightarrow \text{RCH}_2\text{CH}_2\text{CHO}$	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. xiii, 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 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, thiols, and phenols from alcohols, thiols, and phenols. Alkylations that involve conjugate additions across a double bond are found in Section 74 (alkyls, methylenes, and aryls 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 (olefins from aldehydes) and Section 207 (olefins from ketones). The aldol condensation can be found in the chapters on difunctional compounds in Section 324 (alcohol, thiol–aldehyde) and in Section 330 (alcohol, thiol–ketone).

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

The pairs of functional groups alcohol, ester; carboxylic acid, ester; amine, amide; and 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 in the text.

The original literature must be used to determine the generality of reactions, although this is occasionally stated in the citation. This is only done in cases where such generality is stated clearly in the original citation. A reaction given in this book for a primary aliphatic substrate may also be applicable to tertiary or aromatic compounds. This book provides very limited experimental conditions or precautions and the reader is referred to the original literature before attempting a reaction. In no instance should the citation be taken as a complete experimental procedure. Not to refer to the original literature could be hazardous. 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, thiol, aldehyde, amide, amine, ester, ether, epoxide, thioether, 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. Difunctional compounds that have an oxide as the second group are found in the monofunctional sections for the nonoxide functional group. Therefore, the nitroketone product of oxidation of a nitroalcohol is found in Section 168 (ketones from alcohols and thiols). Conversion of an oxide to another functional group is generally found in the "Miscellaneous" section, so conversion of a nitroalkane to an amine is found in Section 105 (amines from miscellaneous compounds). The following examples illustrate the application of this classification system:

<i>Difunctional Product</i>	<i>Section Title</i>
$\text{RC}\equiv\text{C}-\text{C}\equiv\text{CR}$	Acetylene-acetylene
$\text{RCH}(\text{OH})\text{COOH}$	Carboxylic acid-alcohol
$\text{RCH}=\text{CHOMe}$	Ether-olefin
RCHF_2	Halide-halide
$\text{RCH}(\text{Br})\text{CH}_2\text{F}$	Halide-halide
$\text{RCH}(\text{OAc})\text{CH}_2\text{OH}$	Alcohol-ester
$\text{RCH}(\text{OH})\text{CO}_2\text{Me}$	Alcohol-ester
$\text{RCH}=\text{CHCH}_2\text{CO}_2\text{Me}$	Ester-olefin
$\text{RCH}=\text{CHOAc}$	Ester-olefin
$\text{RCH}(\text{OMe})\text{CH}_2\text{SO}_2\text{CH}_2\text{CH}_2\text{OH}$	Alcohol-ether

How to Use the Book to Locate Examples of the Preparation of Difunctional Compounds. The difunctional index on p. xiv gives the section and page corresponding to each difunctional product. Thus Section 327 (alcohol, thiol-ester) contains examples of the preparation of hydroxyesters; Section 323 (alcohol, thiol-alcohol, thiol) 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, $\text{RCH}=\text{CHBr} \rightarrow \text{RCH}=\text{CHCOOH}$, carboxylic acids from halides (Section 25, monofunctional compounds) or carboxylic acid-olefin (Section 322, difunctional compounds). 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 be extended to the preparation of diols by using the corre-

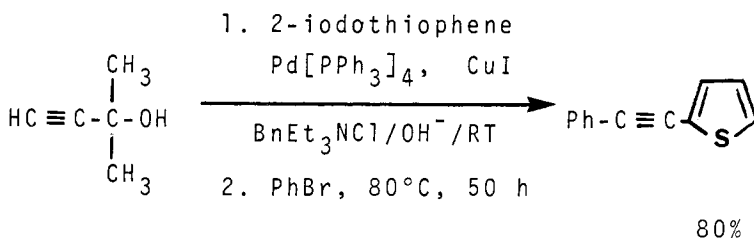
sponding dichloro compound as a starting material. Such methods are not fully covered in the difunctional sections.

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 $\text{RCH}(\text{OAc})\text{CH}_2\text{OAc}$ (ester-ester) would thus be of interest to anyone preparing the diol $\text{RCH}(\text{OH})\text{CH}_2\text{OH}$ (alcohol-alcohol).

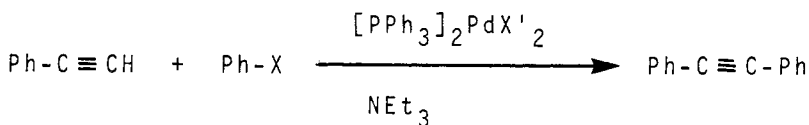
CHAPTER 1

PREPARATION OF ACETYLENES

SECTION 1: Acetylenes from Acetylenes



Carpita, A.; Lessi, A.; Rossi, R.* Synthesis, (1984), 571



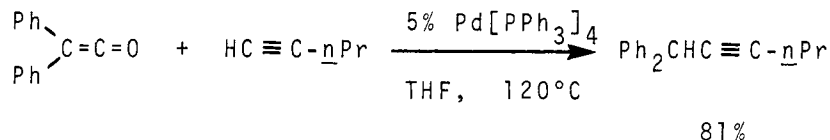
$\text{CHCl}_3\text{-CuI}$; X = I; X' = Ph, I 97%

Bumagin, N.A.; Ponomarev, A.B.; Beletskaya, I.P.

Bull Acad Sci USSR, (1984), **33**, 1433

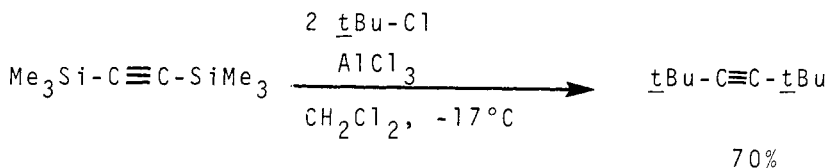
DMF; X = Tf; X' = Cl, Cl 91%

Chen, Q-Y.*; Yang, Z-Y. Tetrahedron Lett, (1986), **27**, 1171

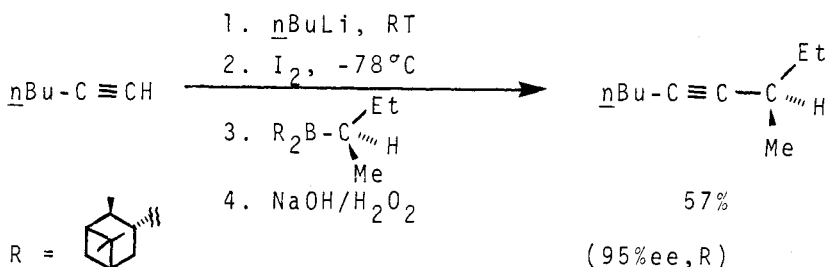


Mitsudo, T.; Kadokura, M.; Watanabe, Y.*

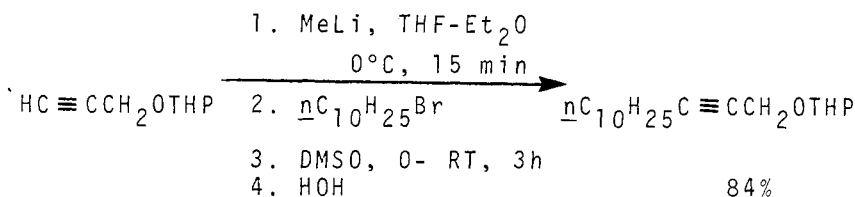
Tetrahedron Lett, (1985), **26**, 3697



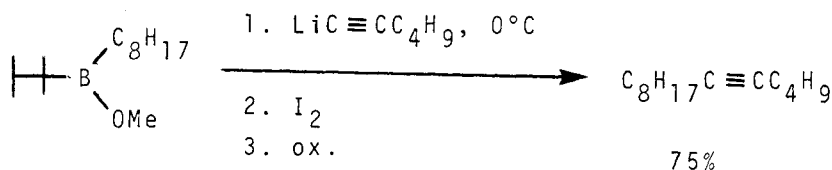
Capozzi, G.*; Ottana, R.; Romeo, G.; Marcuzzi, F.
Gazz Chim Ital, (1985), 115, 311



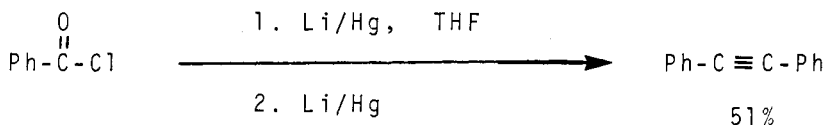
Brown, C.A.*; Desai, M.C.; Jadhav, P.K.
J Org Chem, (1986), 51, 162



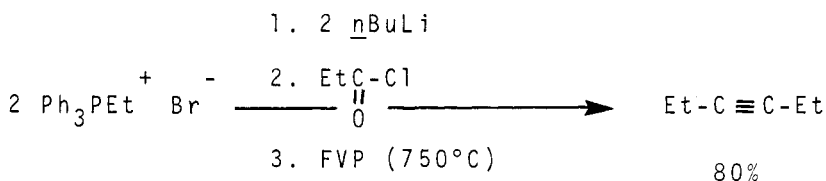
Chong, J.M.*; Wong, S. Tetrahedron Lett, (1986), 27, 5445



Sikorski, J.A.; Bhat, N.G.; Cole, T.E.; Wang, K.K.; Brown, H.C.*
J Org Chem, (1986), 51, 4521

SECTION 2: Acetylenes from Acid Derivatives

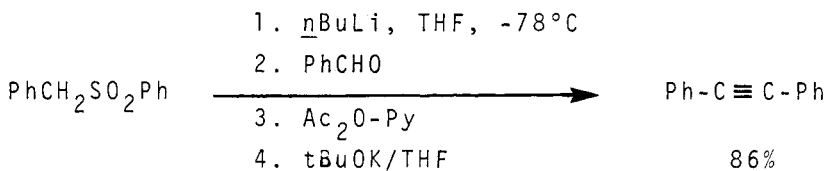
Horner, L.*; Dickerhof, K. Chem Ber, (1983), 116, 1615



Aitken, R.A.*; Atherton, J.I. JCS Chem Comm, (1985), 1140

SECTION 3: Acetylenes from Alcohols and Thiols

No Additional Examples

SECTION 4: Acetylenes from Aldehydes

Mandai, T.*; Yanagi, T.; Araki, K.; Morisaki, Y.; Kawada, M.; Otera, J.

J Am Chem Soc, (1984), 106, 3670

SECTION 5: Acetylenes from Alkyl, Methylenes, and Aryls

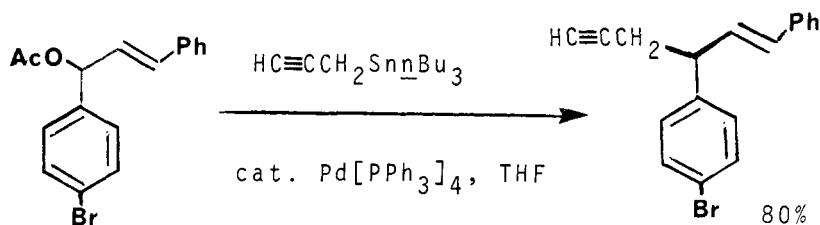
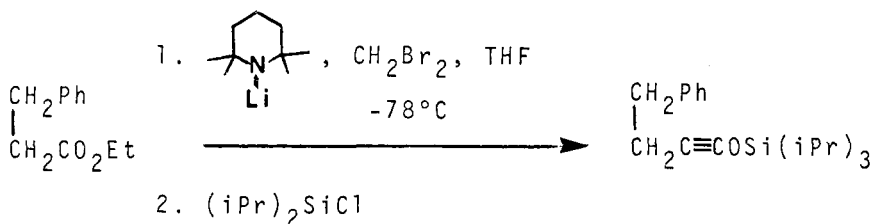
No Additional Examples

SECTION 6: Acetylenes from Amides

No Additional Examples

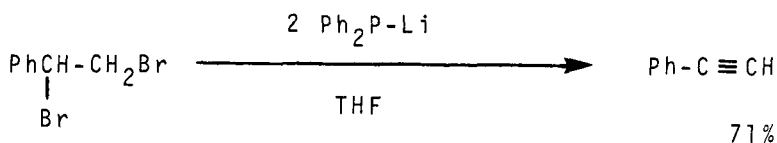
SECTION 7: Acetylenes from Amines

No Additional Examples

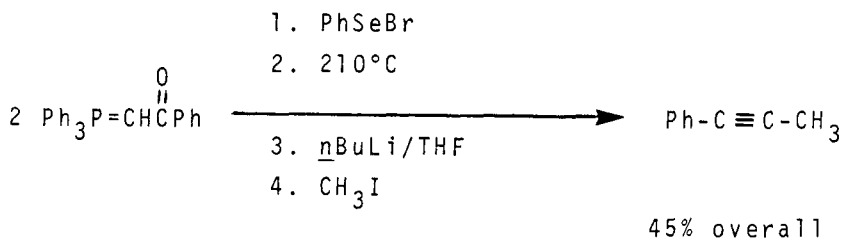
SECTION 8: Acetylenes from EstersKeinan, E.* , Peretz, M. J Org Chem, (1983), 48, 5302Kowalski, C.J.* , Lal, G.S., Haque, M.S.
J Am Chem Soc, (1986), 108, 7127

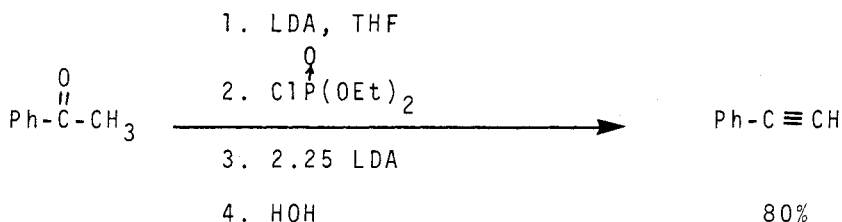
SECTION 9: Acetylenes from Ethers, Epoxides, and Thioethers

No Additional Examples

SECTION 10: Acetylenes from Halides and SulfonatesGillespie, D.G.; Walker, B.J.* JCS Perkin I, (1983), 1689SECTION 11: Acetylenes from Hydrides

No Additional Examples

For examples of the reaction $\text{RC}\equiv\text{CH} + \text{RC}\equiv\text{C-C}\equiv\text{CR}'$ see section 300 (Acetylene - Acetylene)SECTION 12: Acetylenes from KetonesBraga, A.L.; Comasseto, J.V.*; Petragnani, N.
Synthesis, (1984), 240

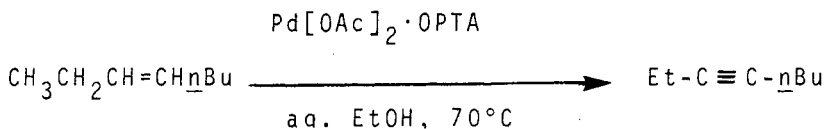


Negishi, E.*; King, A.O.; Tour, J.M. Org Syn, (1985), 64, 44

SECTION 13: Acetylenes from Nitriles

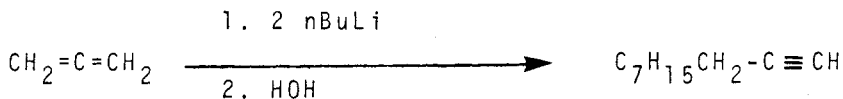
No Additional Examples

SECTION 14: Acetylenes from Olefins

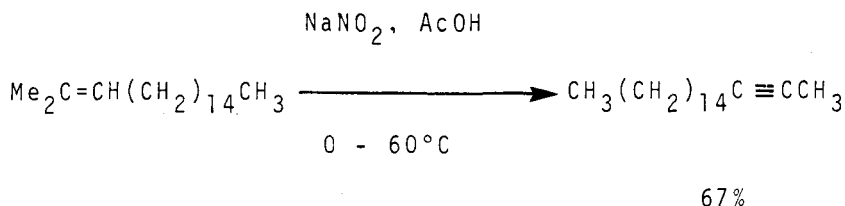


OPTA = oligo-p-phenyleneterephthalamide 98%

Cum, G.*; Gallo, R.; Ipasli, S.; Spadaro, A.
JCS Chem Comm, (1985), 1571

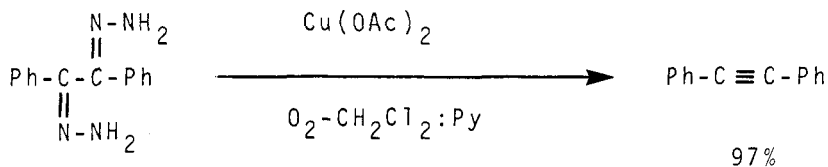


Hooz, J.*; Calzada, J.G.; McMaster, D.
Tetrahedron Lett, (1985), 26, 271



Abidi, S.L.* Tetrahedron Lett., (1986), 27, 267

SECTION 15: Acetylenes from Miscellaneous Compounds



Tsuji, J.*; Kezuka, H.; Toshida, Y.; Takayanagi, H.; Yamamoto, K.

Tetrahedron, (1983), 39, 3279

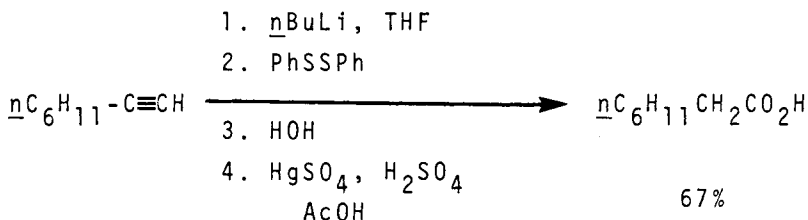
SECTION 15A: Protection of Acetylenes

No Additional Examples

CHAPTER 2

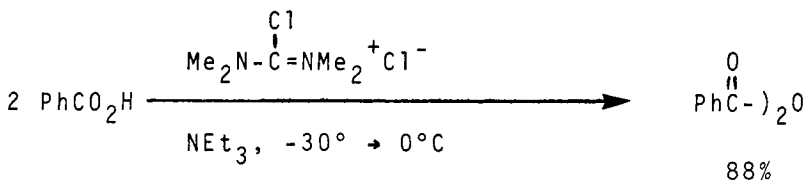
PREPARATION OF CARBOXYLIC ACIDS, ACID HALIDES, AND ANHYDRIDES

SECTION 16: Acid Derivatives from Acetylenes

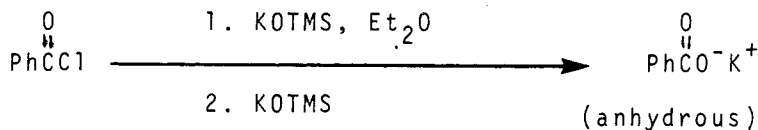


Abrams, S.R.* Can J Chem, (1983), 61, 2423

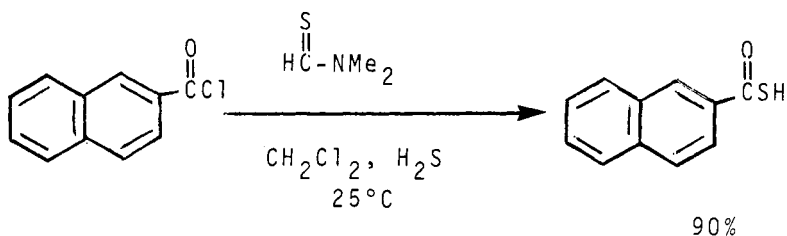
SECTION 17: Acid Derivatives from Acid Derivatives



Fujisawa, T.*; Tajima, K.; Sato, T.
Bull Chem Soc Jpn, (1983), 56, 3529



Laganis, E.D.*; Chenard, B.L.
Tetrahedron Lett, (1984), 25, 5831

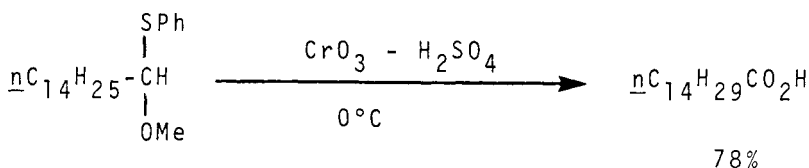


Kobayashi, Y.*; Itabashi, K.* Synthesis, (1985), 671

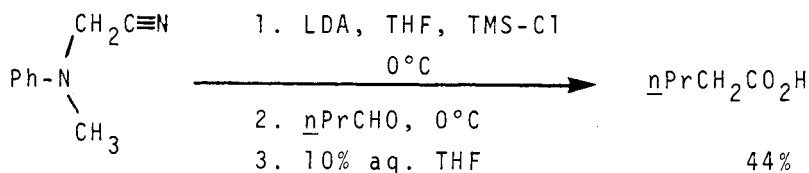
SECTION 18: Acid Derivatives from Alcohols and Thiols

No Additional Examples

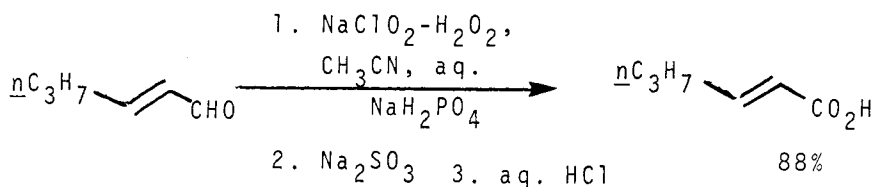
SECTION 19: Acid Derivatives from Aldehydes



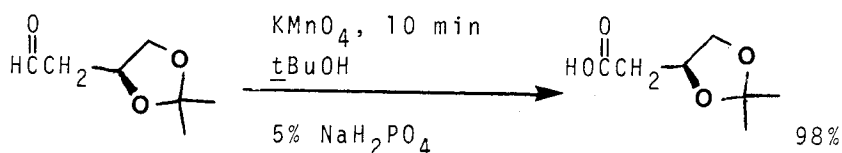
Mandai, T.; Hara, K.; Nakajima, T.; Kawada, M.; Otera, J.*
Tetrahedron Lett., (1983), 24, 4993



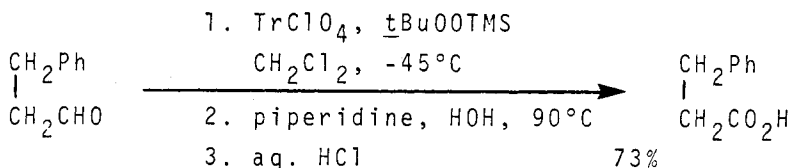
Takahashi, K.*; Shibasaki, K.; Agura, K.; Iida, H.
J Org Chem, (1983), 48, 3566



Dalcanale, E.*; Mantanari, F.* J Org Chem, (1986), **51**, 567



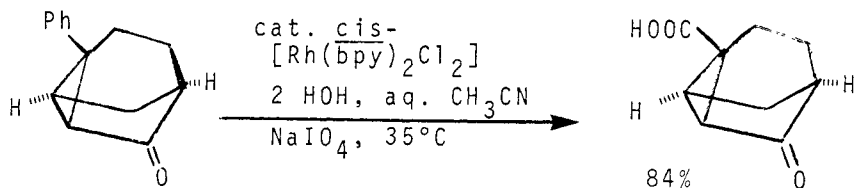
Abiko, A.; Roberts, J.C.; Takemasa, T.; Masamune, S.*
Tetrahedron Lett., (1986), **27**, 4537



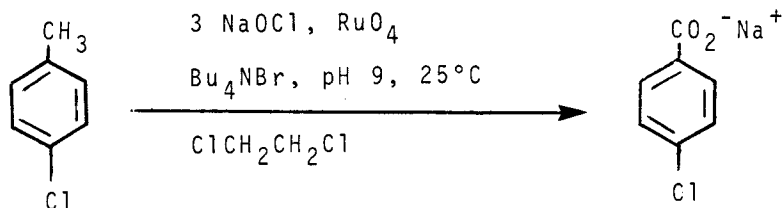
Mukaiyama, T.; Miyoshi, N.; Kato, J.; Ohshima, M.
Chem Lett., (1986), 1385

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

SECTION 20: Acid Derivatives from Alkyl, Methylenes, and Aryls



Chakraborti, A.K.; Ghatak, U.R.* JCS Perkin I, (1985), 2605

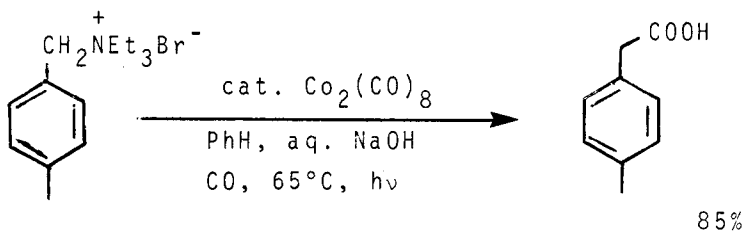


84%

Sasson, Y.*; Zappi, G.D.; Neumann, R.*

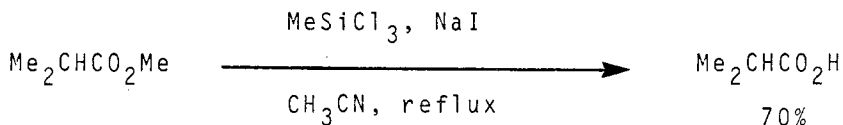
J Org Chem, (1986), 51, 2880SECTION 21: Acid Derivatives from Amides

No Additional Examples

SECTION 22: Acid Derivatives from Amines

85%

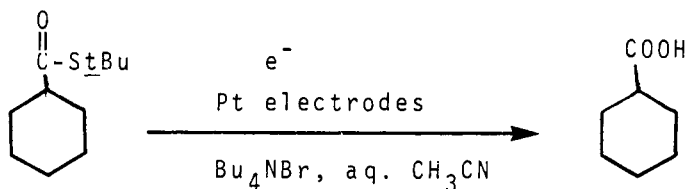
Brunet, J.J.; Sidot, C.; Caubere, P.*

J Org Chem, (1983), 48, 1919SECTION 23: Acid Derivatives from Esters

70%

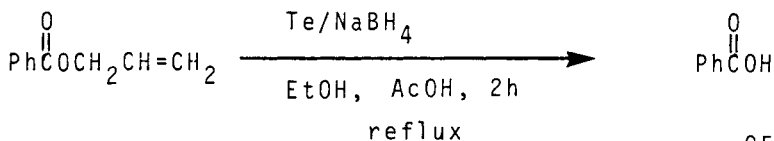
Olah, G.A.*; Husain, A.; Singh, B.P.; Mehrota, A.K.

J Org Chem, (1983), 48, 3667



94%

Kimura, M.; Matsubara, S.; Sawaki, Y.
JCS Chem Comm., (1984), 1619



95%

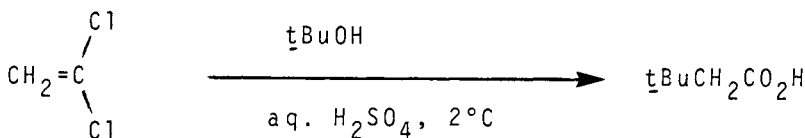
Shobara, N.; Shanmugam, P.* Ind J Chem B, (1986), 25B, 658

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

SECTION 24: Acid Derivatives from Ethers, Epoxides, and Thioethers

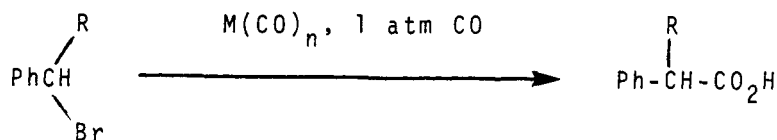
No Additional Examples

SECTION 25: Acid Derivatives from Halides and Sulfonates



90%

Randriamahefa, S.; Deschamps, P.; Gallo, R.*
Synthesis, (1985), 493

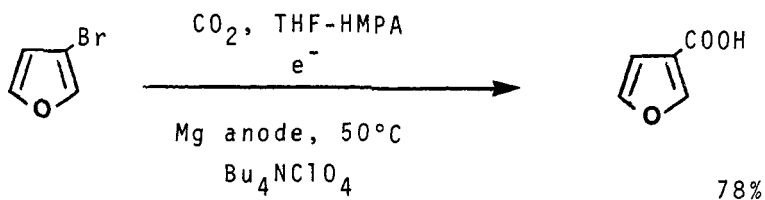


aq. benzene; R=H; M=Fe; n=5 75%

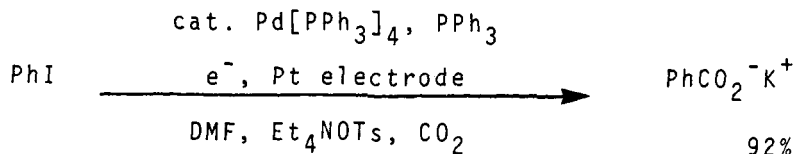
Tanguay, G.; Weinberger, B.; des Abbayes, H.*
Tetrahedron Lett., (1983), 24, 4005

EtOH/NaOH; R=Me; M=Co; n=4 80%

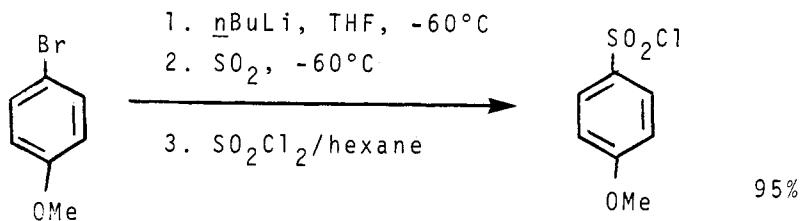
Francaianci, F.; Gardano, A.; Foa, M.
J Organomet Chem., (1985), 282, 277



Sock, O.; Troupel, M.; Perichon, J.
Tetrahedron Lett., (1985), 26, 1509

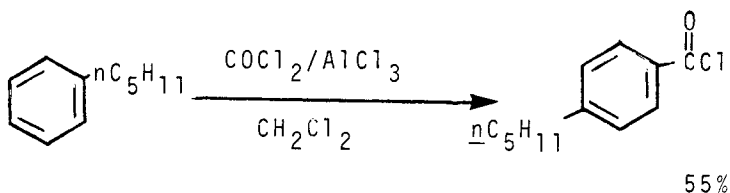


Torii, S.*; Tanaka, H.; Hamatani, T.; Morisaki, K.; Jutand, A.;
 Pfluger, F.; Fauvarque, J.-F.
Chem Lett., (1986), 169



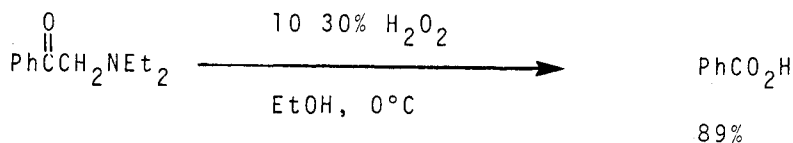
Hamada, T.*; Yonemitsu, O. Synthesis, (1986), 852

SECTION 26: Acid Derivatives from Hydrides

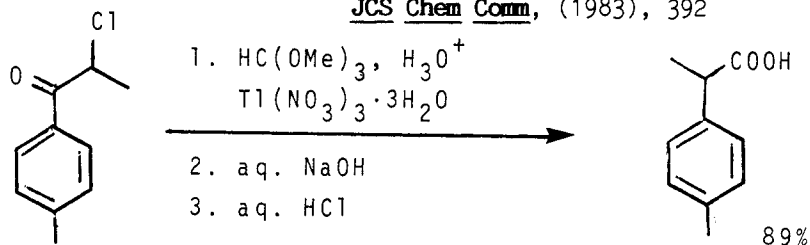


Neubert, M.E.; Fishel, D.L. Org Syn, (1983), 61, 8

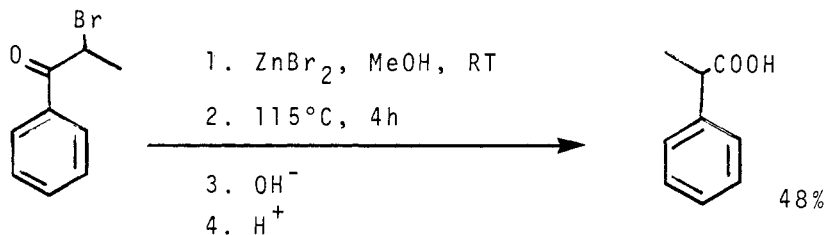
SECTION 27: Acid Derivatives from Ketones



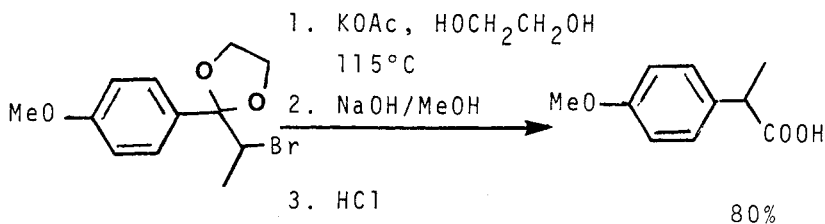
Wenkert, D.*; Eliasson, K.M.; Rudisill, D.
JCS Chem Comm, (1983), 392



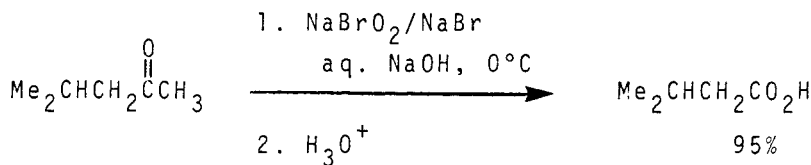
Fujii, K.; Nakao, K.; Yamauchi, T.* Synthesis, (1983), 444



Giordano, C.*; Castaldi, G.; Uggeri, F.; Gurzoni, F.
Synthesis, (1985), 436

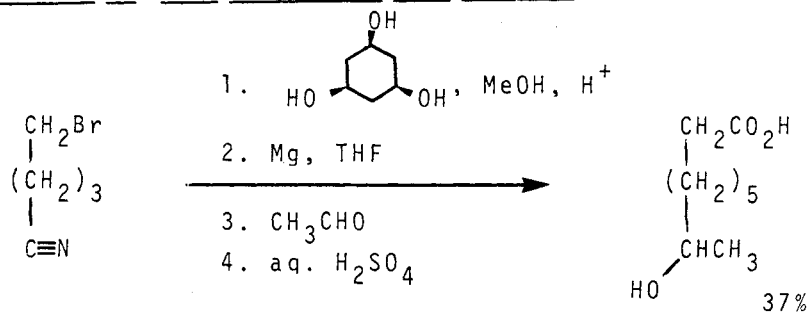


Castaldi, G.*; Giordano, C.; Uggeri, F. Synthesis, (1985), 505

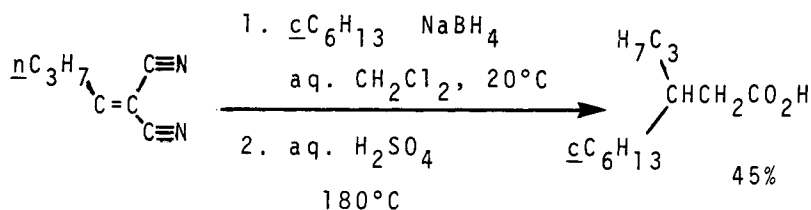


Kajigaeshi, S.*; Nakagawa, T.; Nagasaki, N.; Fujisaka, S.
Synthesis, (1985), 674

SECTION 28: Acid Derivatives from Nitriles

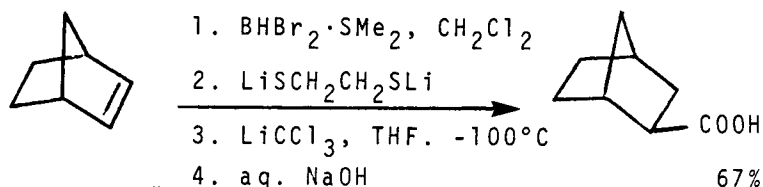


Voss, G.; Gerlach, H.* Helv Chim Acta, (1983), **66**, 2294

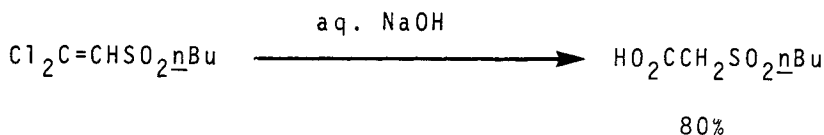


Giese, B.*; Harnisch, H.; Lachhein, S.
Synthesis, (1983), 733

SECTION 29: Acid Derivatives from Olefins



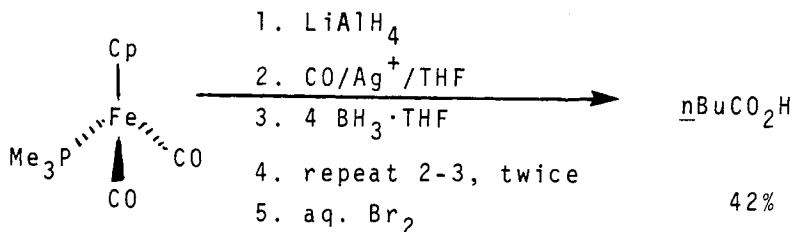
Brown, H.C.*; Imai, T. J Org Chem, (1984), 49, 892



Mirskova, A.N.; Kryukova, Yu.I.; Levkovskaya, G.G.; Guseva, S.A.; Voronko, M.G.

J Org Chem USSR, (1984), 20, 545

SECTION 30: Acid Derivatives from Miscellaneous Compounds



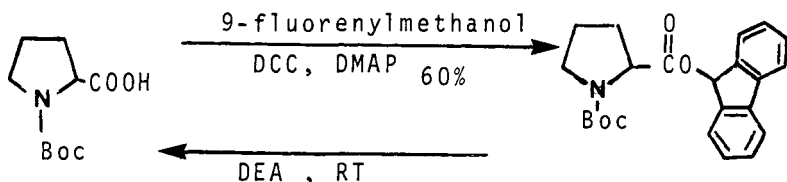
Brown, S.L.; Davies, S.G.* JCS Chem Comm, (1986), 84

Review: "Synthesis of Dithiocarboxylic Acids"

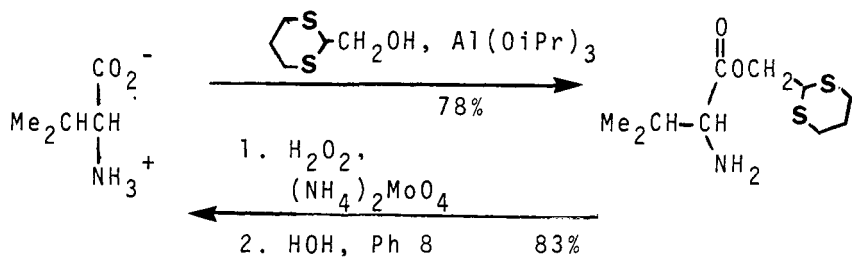
Ramadas, S.R.; Srinivasan, P.S.; Ramachandran, J.; Sastry, V.V.S.K.

Synthesis, (1983), 605

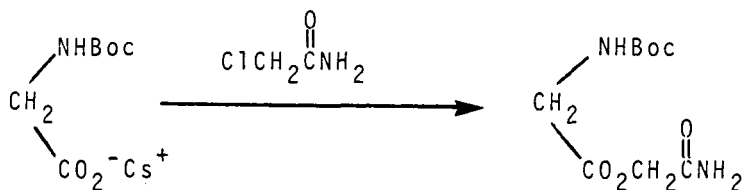
SECTION 30A: Protection of Carboxylic Acid Derivatives



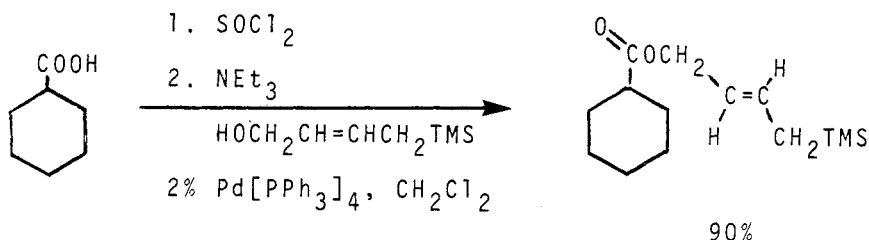
Kessler, H.*; Siegmeier, R. **Tetrahedron Lett.**, (1983), 24, 281



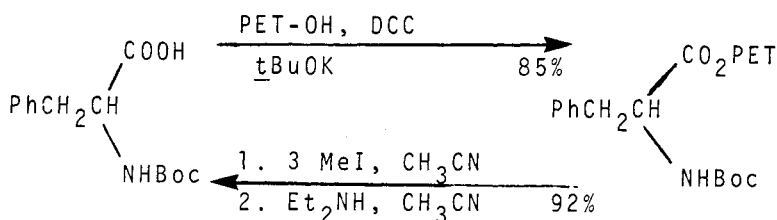
Kunz, H.*; Waldmann, H. *Angew Chem Int Ed Engl*, (1983), 22, 62



Martinez, J.*; Laur, J.; Castro, B. **Tetrahedron Lett**, (1983), 24, 5219

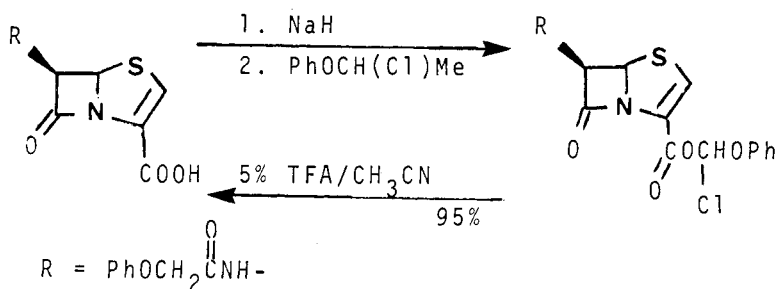


Mastalerz, H.* J Org Chem, (1984), 49, 4092



PET = 2(2-pyridyl)ethyl

Kessler, H.*; Becker, G.; Kagler, H.; Wolff, M.
Tetrahedron Lett, (1984), 25, 3971



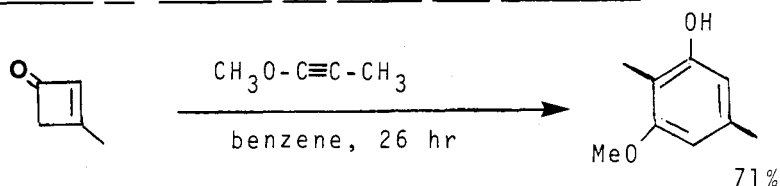
Alpegiani, M.; Bedeschi, A.; Foglio, M.; Perrone, E.
Gazz Chim Ital, (1984), 114, 391

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).

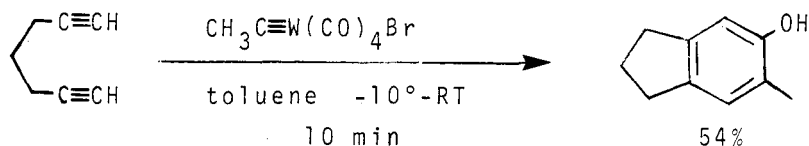
CHAPTER 3

PREPARATION OF ALCOHOLS, PHENOLS, AND THIOLS

SECTION 31: Alcohols and Thiols from Acetylenes

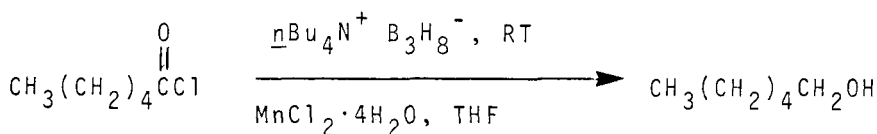


Danheiser, R.L.*; Gee, S.K. J Org Chem, (1984), 49, 1672



Sivavec, T.M.; Katz, T.J.* Tetrahedron Lett, (1985), 26, 2159

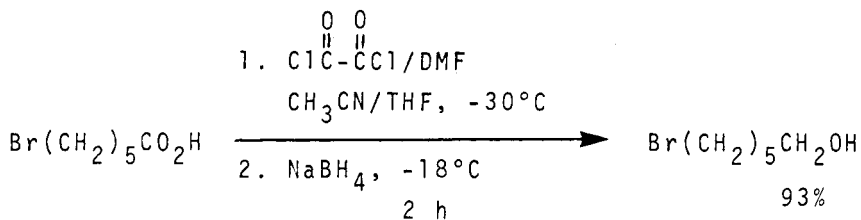
SECTION 32: Alcohols and Thiols from Acid Derivatives



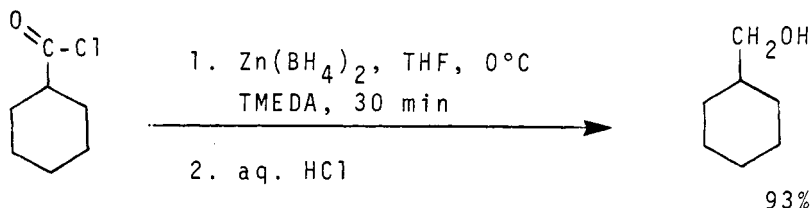
B_3H_8 = octahydrotriborate

Tamblyn, W.H.*; Aquadro, R.E.; DeLuca, O.D.; Weingold, D.H.;
 Dao, T.V.

Tetrahedron Lett, (1983), 24, 4953

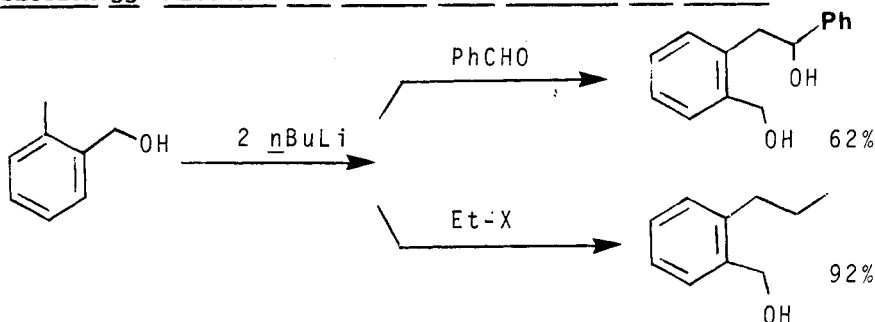


Fujisawa, T.*; Mori, T.; Sato, T. Chem Lett, (1983), 835

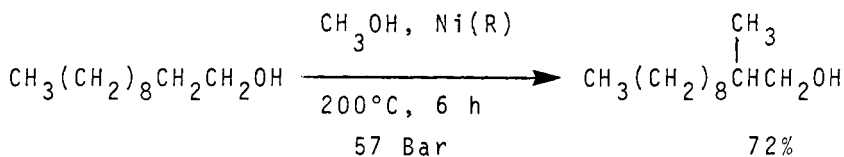


Kotsuki, H.*; Ushio, Y.; Yoshimura, N.; Ochi, M.
Tetrahedron Lett, (1986), 27, 4213

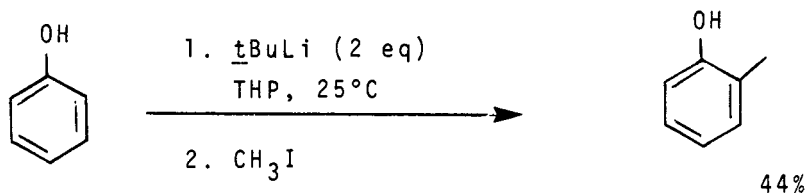
SECTION 33: Alcohols and Thiols from Alcohols and Thiols



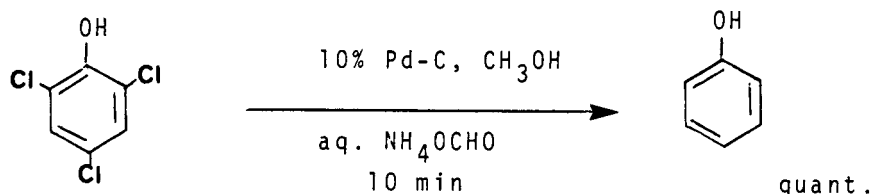
Braun, M.*; Ringer, E. Tetrahedron Lett, (1983), 24, 1233



Sabadie, J.; Descotes, G. Bull Chem Soc Fr, (1983), II253



Posner, G.H.*; Canella, K.A. J Am Chem Soc, (1985), 107, 2571



Anwer, M.K.; Spatola, A.F. Tetrahedron Lett, (1985), 26, 1381

SECTION 34: Alcohols and Thiols from Aldehydes

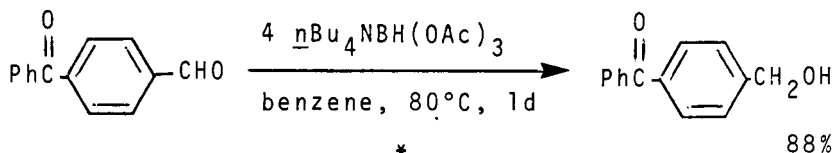
The following reaction types are included in this section:

A. Reductions of Aldehydes to Alcohols.

B. Alkylation of Aldehydes, forming Alcohols.

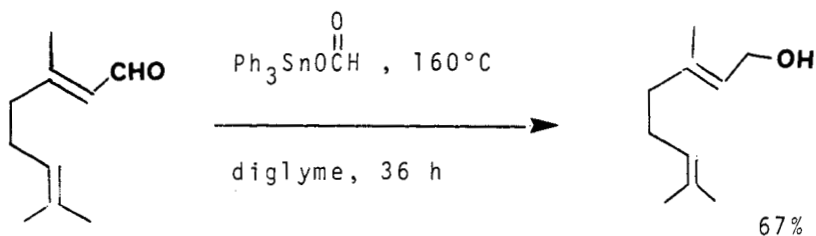
Coupling of Aldehydes to form Diols is found in Section 323 (Alcohol - Alcohol).

Section 34A: Reductions of Aldehydes to Alcohols

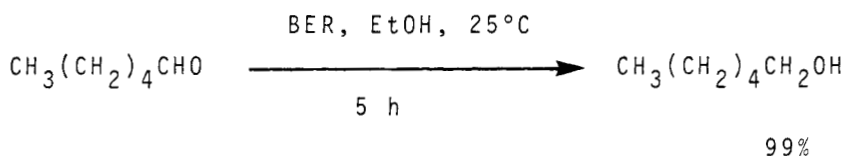


Nutaitis, C.F.; Gribble, G.W.*

Tetrahedron Lett, (1983), 24, 4287

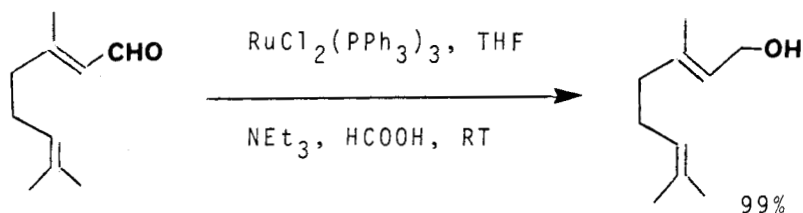


Wuest, J.D.*; Zacharie, B. J Org Chem, (1984), 49, 166

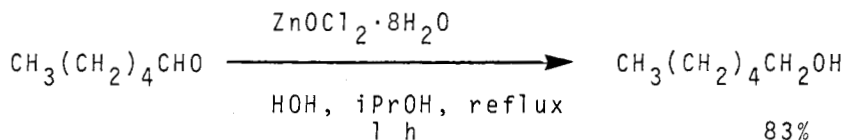


BER = borohydride exchange resin

Yoon, N.M.*; Park, K.B.; Gyoung, Y.S.
Tetrahedron Lett, (1983), 24, 5367

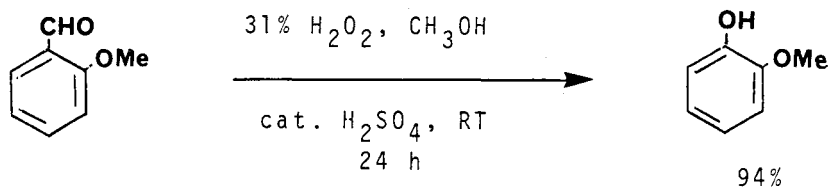


Khai, B.T.; Arcelli, A. Tetrahedron Lett, (1985), 26, 3365



Matsushita, H.*; Ishiguro, S.; Ichinose, H.; Izumi, A.;
 Mizusaki, S.

Chem Lett, (1985), 731



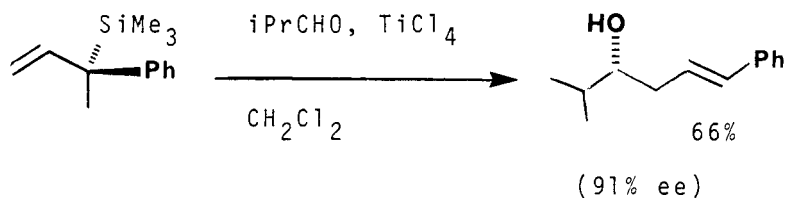
Matsumoto, M.*; Kobayashi, H.; Hotta, Y.
J Org Chem, (1984), 49, 4740

Review: "cis-Alkyl and cis-Acylrhodium and Iridium Hydrides:
 Model Intermediates in Homogeneous Catalysis"

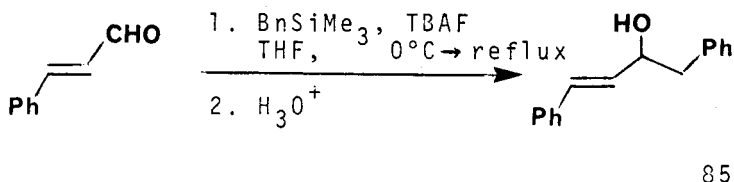
Milstein, D.* Accts Chem Res, (1984), 17, 221

Section 34B: Alkylation of Aldehydes, forming Alcohols

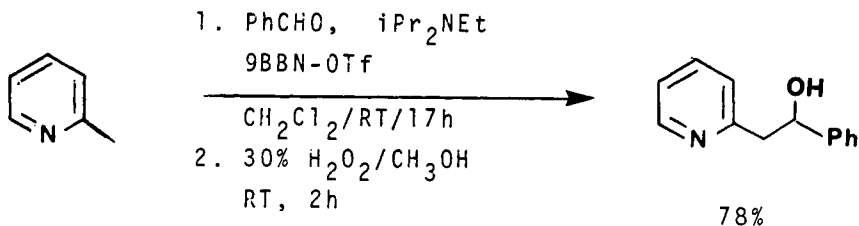
Aldol reactions are listed in : Section 324
 (Aldehyde-Alcohol) and Section 330 (Ketone-Alcohol).



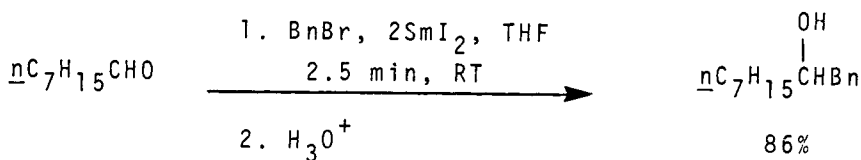
Hayashi, T.; Konishi, M.; Kumada, M.*
J Org Chem, (1983), 48, 281



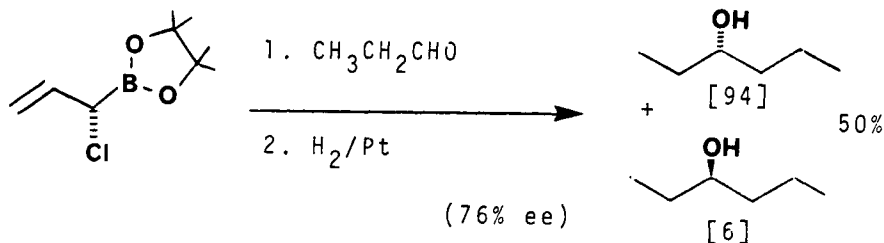
Bennetau, B.; Dunogues, J. Tetrahedron Lett, (1983), 24, 4217



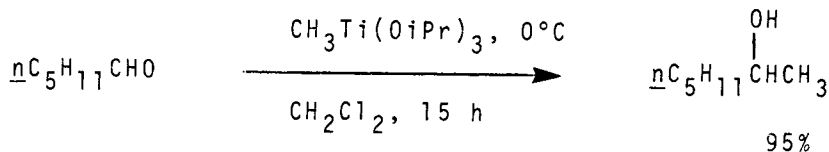
Hamana, H.*; Sugawara, T. Chem Lett, (1983), 333



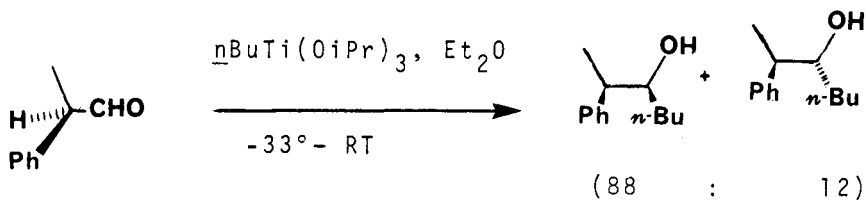
Soupe, J.; Danson, L.; Namy, J.L.; Kagan, H.B.*
J Organomet Chem, (1983), 250, 227



Hoffmann, R.W.*; Landmann, B.
Angew Chem Int Ed Engl, (1984), 23, 437

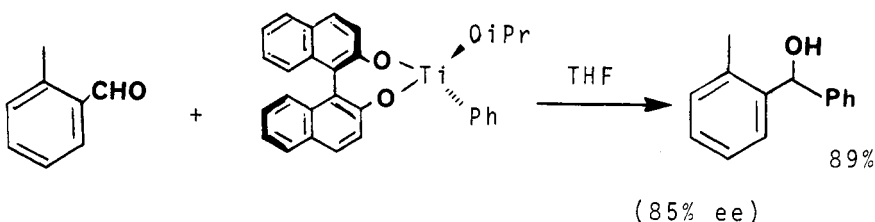


Reetz, M.T.*; Westermann, J.; Steinbach, R.; Wenderoth, B.;
Peter, R.; Ostarek, R.; Maus, S.
Chem Ber, (1985), 118, 1421

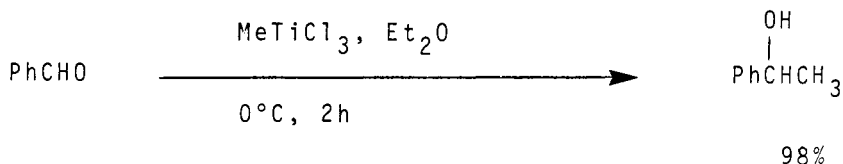


Reetz, M.T.*; Steinbach, R.; Westermann, J.; Peter, R.; Wenderoth, B. 75%

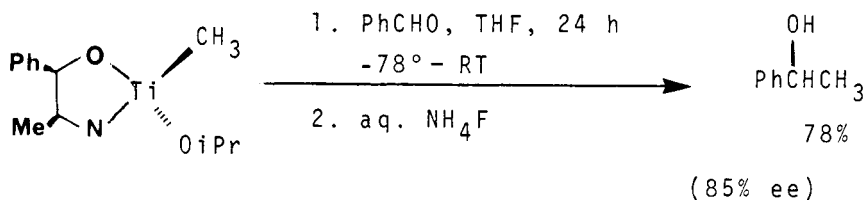
Chem Ber, (1985), **118**, 1441



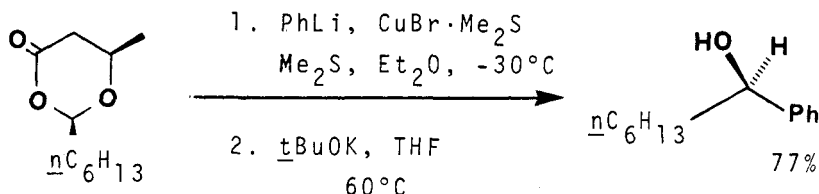
Seebach, D.*; Beck, A.K.; Roggo, S.; Wonnacott, A.
Chem Ber, (1985), **118**, 3673



Reetz, M.T.*; Kyung, S.H.; Hüllmann, M.
Tetrahedron, (1986), **42**, 2931

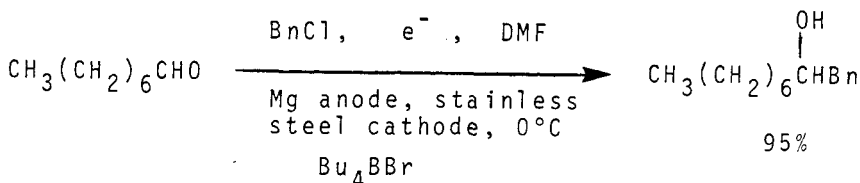


Reetz, M.T.*; Kükenhöfner, T.; Weinig, P.
Tetrahedron Lett, (1986), **27**, 5711



Schreiber, S.L.*; Reagan, J. (97% ee, R)

Tetrahedron Lett., (1986), 27, 2945



Sibille, S.; d'Incan, E.; Leport, L.; Perichon, J.

Tetrahedron Lett., (1986), 27, 3129

Review: "Reactivity and Stereochemical Factors of the Reduction of Carbonyl Functions with Metallic Borohydride"

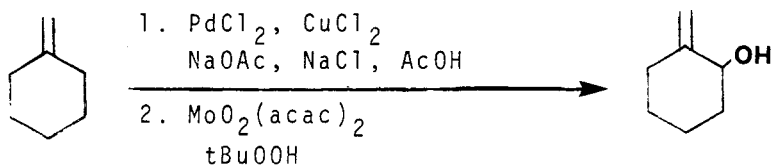
Caro, B.; Boyer, B.; Lamaty, G.; Jaouen, G.

Bull Chem Soc Fr., (1983), II281

Related Methods: Alcohols from Ketones (Section 42)

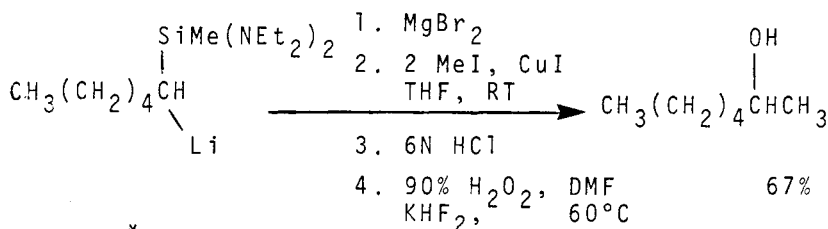
SECTION 35: Alcohols and Thiols from Alkyl, Methylenes, and Aryls

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).



Jitsukawa, K.; Kaneda, K.; Teranishi, S.*

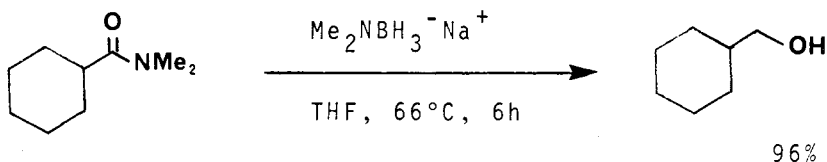
J Org Chem, (1983), 48, 389



Tamao, K.*; Iwahara, T.; Kanatani, R.; Kumada, M.

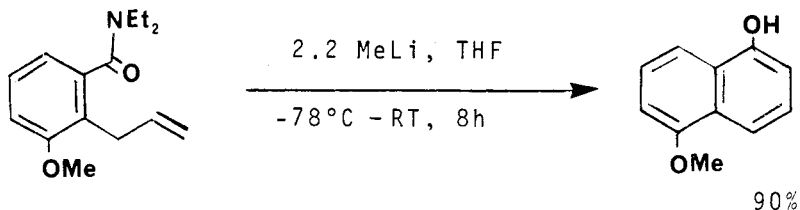
Tetrahedron Lett, (1984), 25, 1909, 1913

SECTION 36: Alcohols and Thiols from Amides



Hutchins, R.O.*; Learn, K.; El-Telbany, F.; Stercho, Y.P.

J Org Chem, (1984), 49, 2438

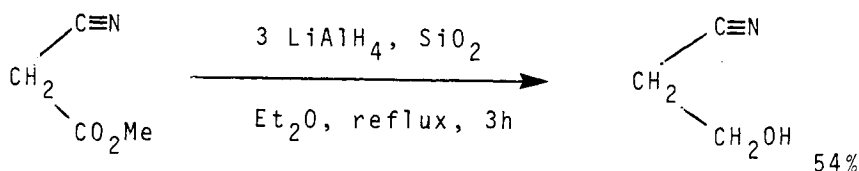


Sibi, M.P.; Dankwardt, J.W.; Snieckus, V.*

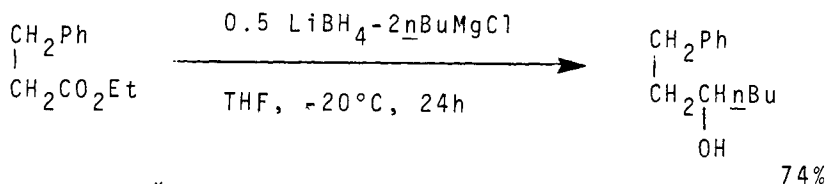
J Org Chem, (1986), 51, 271

SECTION 37: Alcohols and Thiols from Amines

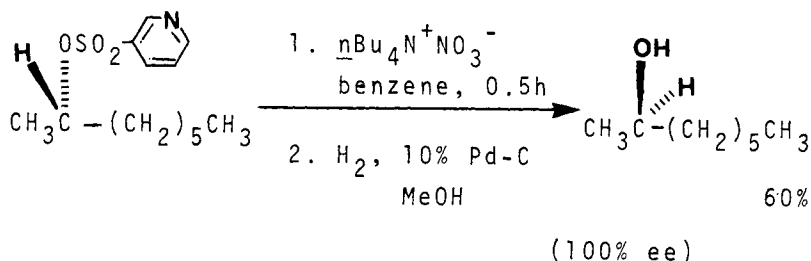
No Additional Examples

SECTION 38: Alcohols and Thiols from Esters

Kamitori, Y.; Hojo, M.*; Masuda, R.; Inoue, T.; Izumi, T.
Tetrahedron Lett., (1983), 24, 2575

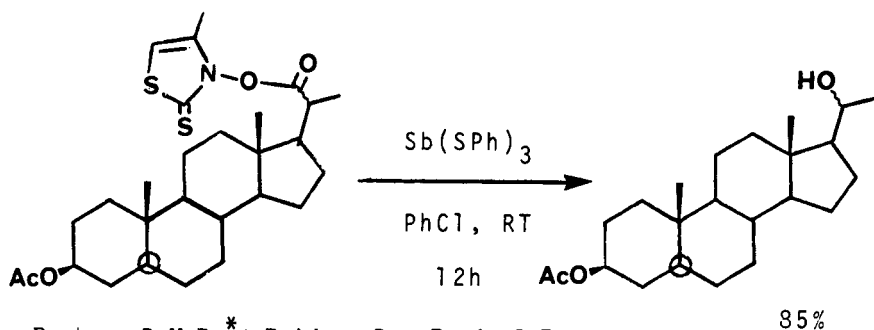


Comins, D.L.*; Herrick, J.J.
Tetrahedron Lett., (1984), 25, 1321



Cainelli, G.; Manescalchi, F.; Martelli, G.; Panunzio, M.;
 Plessi, L.

Tetrahedron Lett., (1985), 26, 3369

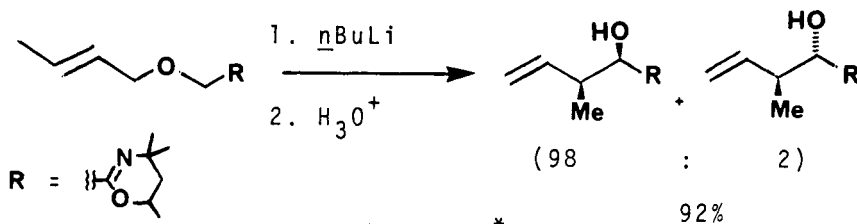


Barton, D.H.R.*; Bridon, D.; Zard, S.Z.
JCS Chem Comm, (1985), 1066

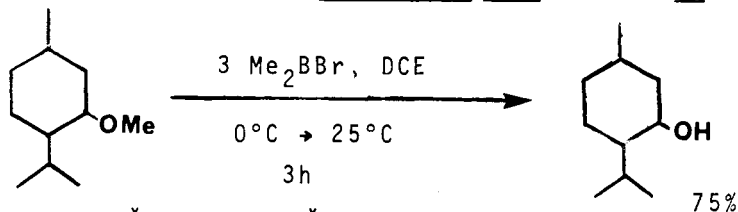
Related Methods: Carboxylic Acids from Esters (Section 23)
 Protection of Alcohols (Section 45A)
 Hydrolysis of Esters is covered in Section 23.

SECTION 39: Alcohols and Thiols from Ethers, Epoxides, and Thioethers

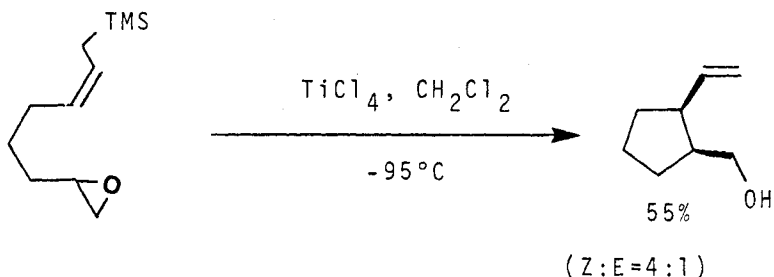
Additional examples of ether cleavages may be found in Section 45A (Protection of Alcohols and Phenols).



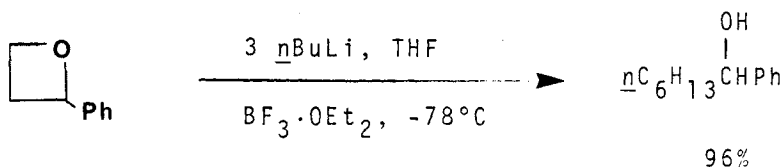
Mikami, K.; Fujimoto, K.; Nakai, T.*
Tetrahedron Lett, (1983), 24, 513



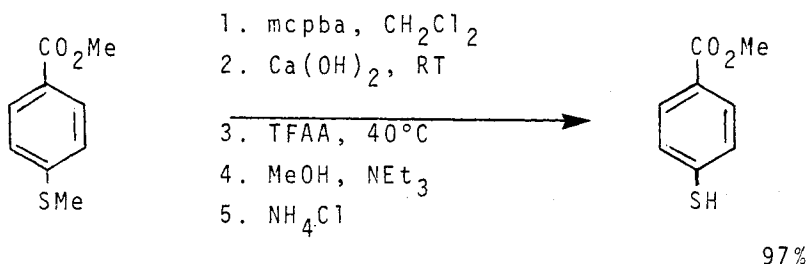
Guindon, Y.*; Yoakim, C.*; Morton, H.E.
Tetrahedron Lett, (1983), 24, 2969



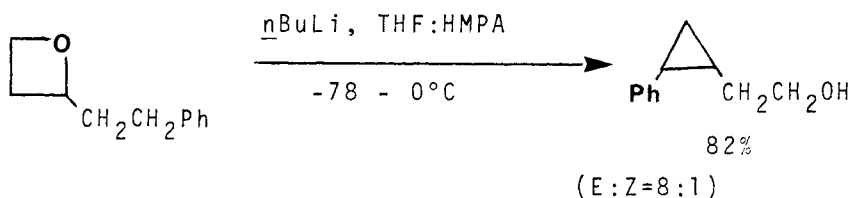
Tan, T.S.; Mather, A.N.; Procter, G.; Davidson, A.H.
JCS Chem Comm, (1984), 585



Eis, M.J.; Wrobel, J.E.; Ganem, B.*
J Am Chem Soc, (1984), 106, 3693



Young, R.N.*; Gauthier, J.Y.; Coombs, W.
Tetrahedron Lett, (1984), 25, 1753

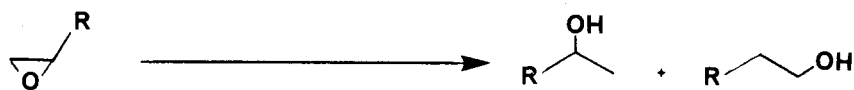


Yamaguchi, M.*; Hirao, I. Tetrahedron Lett, (1984), 25, 4549



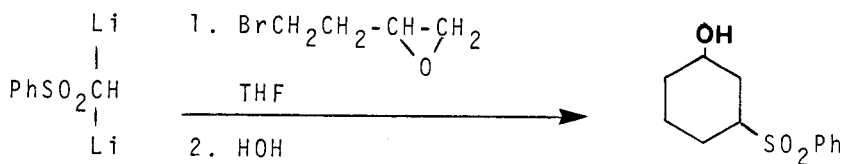
$R = \text{c-C}_6\text{H}_{11}$; $R' = \text{H}$; TiCl_4 , Et_3SiH , -78°C 85%
(96% ee)
 Atsunori, M.; Ishihara, K.; Yamamoto, H.*
Tetrahedron Lett., (1986), 27, 987

$R = \text{n-C}_8\text{H}_{17}$; $R' = \text{H}$ 90%
(89% ee)
 Lindell, S.D.; Elliott, J.D.; Johnson, W.S.*
Tetrahedron Lett., (1984), 25, 3947

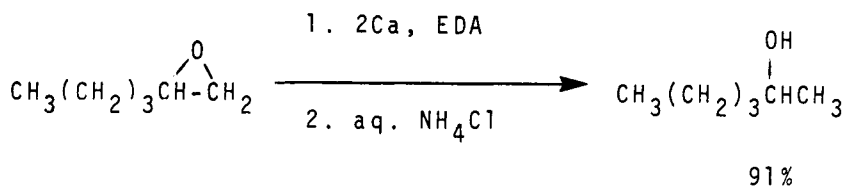


$R = \text{n-C}_9\text{H}_{19}$; $\text{Zn/CH}_2\text{Cl}_2/\text{Me}_2\text{SiCl}_2$ 96% (69:31)
 Vankar, Y.D.*; Arya, P.S.; Rao, C.T.
Syn Commun., (1983), 13, 869

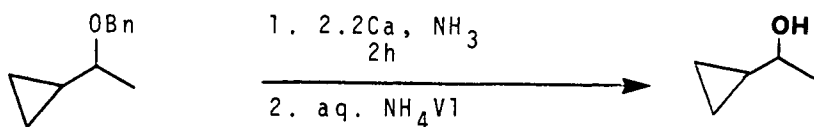
$R = \text{n-C}_6\text{H}_{13}$; $\text{1. NaHTe/EtOH/reflux}$ 75% (100:0)
2. DBE 3. Nickel boride
 Barton, D.H.R.*; Fekih, A.; Lusinchi, X.
Tetrahedron Lett., (1985), 26, 6197



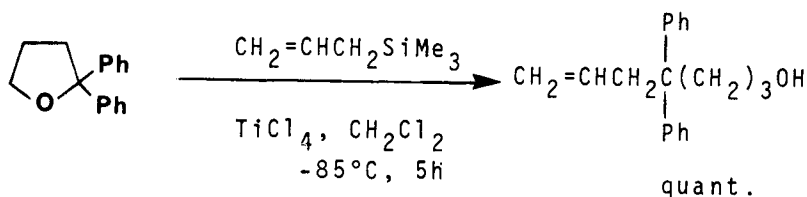
Eisch, J.J.*; Dua, S.K.; Behrooz, M.
J Org Chem., (1985), 50, 3674



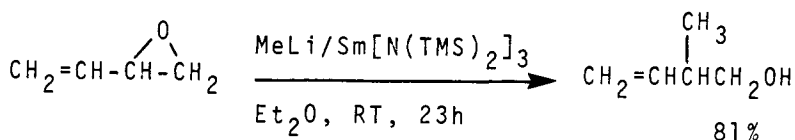
Benkeser, R.A.*; Rappa, A.; Wolsieffer, L.A.
J Org Chem, (1986), 51, 3391



Hwu, J.R.*; Chua, V.; Schroeder, J.E.; Barrans Jr., R.E.;
 Khoudary, K.P.; Wang, N.; Wetzel, J.M.
J Org Chem, (1986), 51, 4731



Oku, A.*; Homoto, Y.; Harada, T. Chem Lett, (1986), 1495



Mukerji, I.; Wayda, A.*; Dabbagh, G.; Bertz, S.H.*
Angew Chem Int Ed Engl, (1986), 25, 760

Reviews:

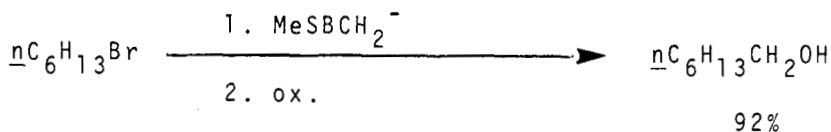
"Cleavage of Ethers"

Bhatt, M.V.; Kulkarni, S.U. Synthesis, (1983), 249

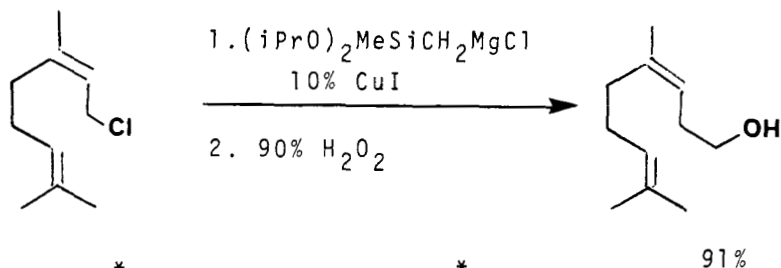
"Synthetically Useful Reactions of Epoxides"

Smith, J.G.* Synthesis, (1983), 629

SECTION 40: Alcohols and Thiols from Halides and Sulfonates

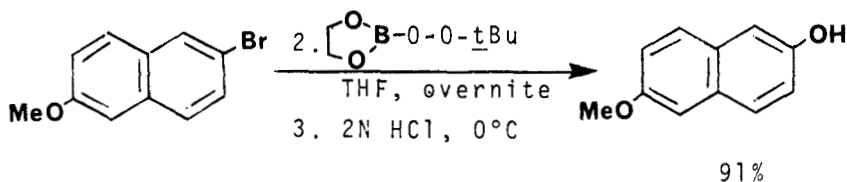


Pelter, A.; Williams, L.; Wilson, J.W.; Singaram, B.
Tetrahedron Lett., (1983), 24, 627, 631

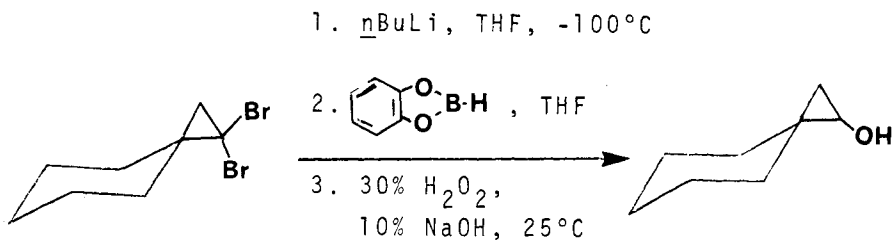


Tamao, K.*; Ishida, N.; Kumada, M.*
J Org Chem, (1983), 48, 2120

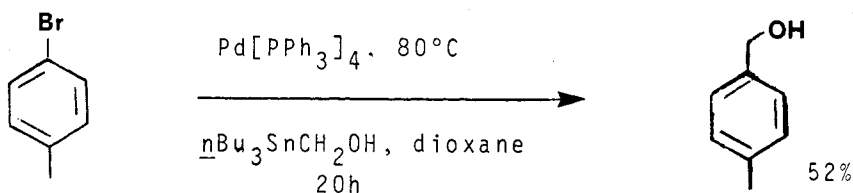
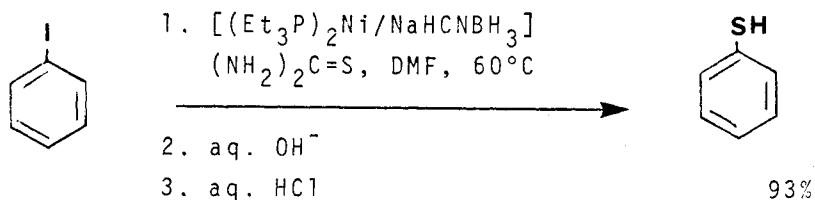
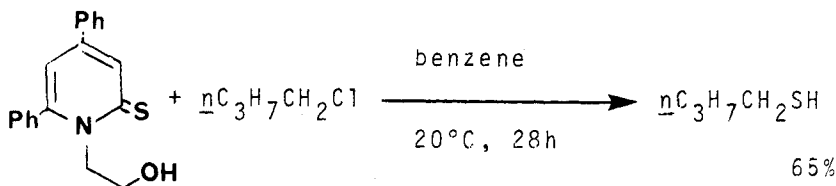
1. Mg, THF

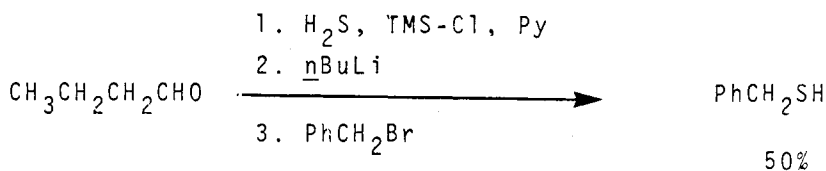


Hoffmann, R.W.; Ditrich, L. Synthesis, (1983), 107

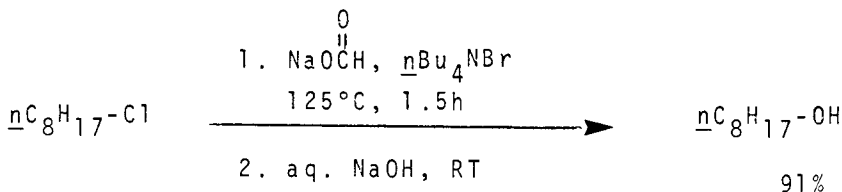


32%

Danheiser, R.L.*; Savoca, A.C. J Org Chem, (1985), 50, 2401Kosugi, M.; Sumiya, T.; Ohhashi, K.; Sano, H.; Migita, T.*
Chem Lett, (1985), 997Takagi, K.* Chem Lett, (1985), 1307Molina, P.*; Alajarin, M.; Vilaplana, M.J.; Katritzky, A.R.*
Tetrahedron Lett, (1985), 26, 469



Harpp, D.N.*; Kobayashi, M. Tetrahedron Lett., (1986), 27, 3975



Zahalka, H.A.; Sasson, Y.* Synthesis, (1986), 763

SECTION 41: Alcohols and Thiols from Hydrides

No Additional Examples

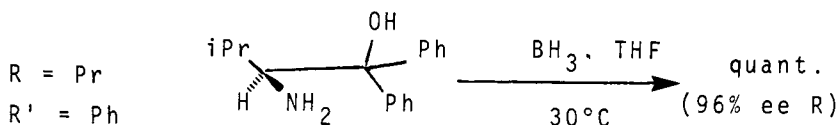
SECTION 42: Alcohols and Thiols from Ketones

The following reactions types are included in this section:

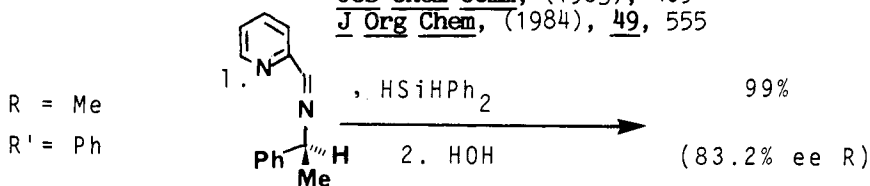
- A. Reductions of Ketones to Alcohols.
- B. Alkylations of Ketones, forming Alcohols.

Coupling of ketones to give diols is found in Section 323 (Alcohol - Alcohol).

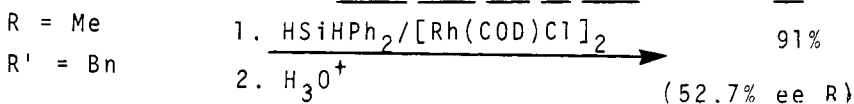
SECTION 42A: Reductions of Ketones to Alcohols

Asymmetric Reduction:

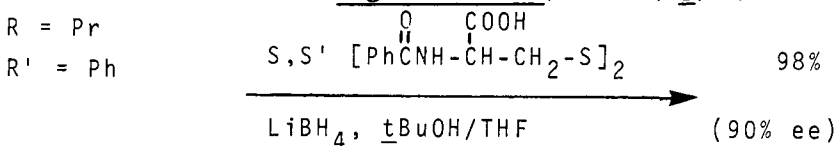
Itsuno, S.*; Ito, K.; Hirao, A.; Nakahama, S.
JCS Chem Comm, (1983), 469
J Org Chem, (1984), 49, 555



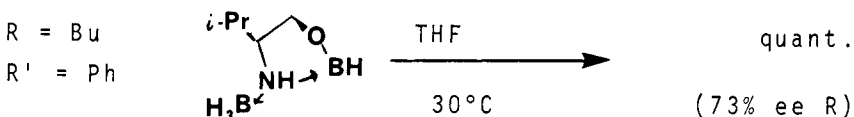
Brunner, H.*; Riepel, G.; Weitzer, H.
Angew Chem Int Ed Engl, (1983), 22, 331



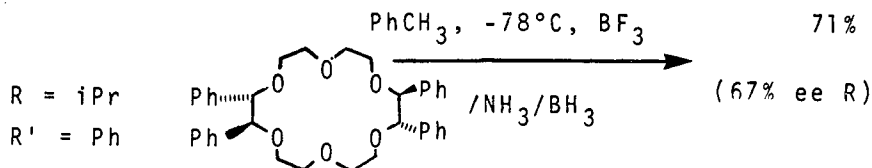
Brunner, H.*; Becker, R.; Riepel, G.
Organometallics, (1984), 3, 1354



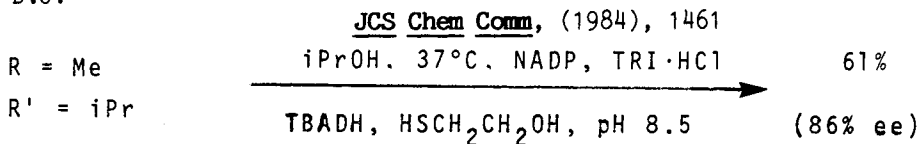
Soai, K.*; Oyamada, H.; Yamanoi, T. JCS Chem Comm, (1984), 413



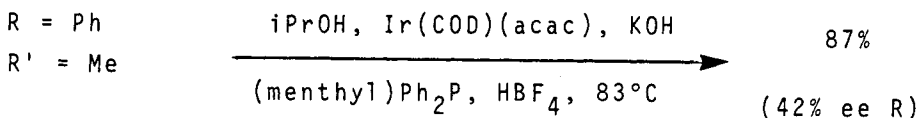
Itsuno, S.*; Hirao, A.; Nakahama, S.; Yamazaki, N.
JCS Perkin I, (1983), 1673



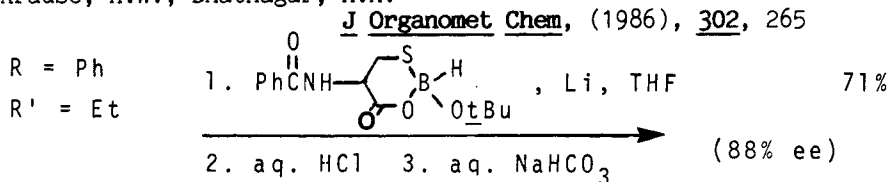
Allwood, B.L.; Shahriari-Zavareh, H.; Stoddart, J.F.; Williams, D.J.



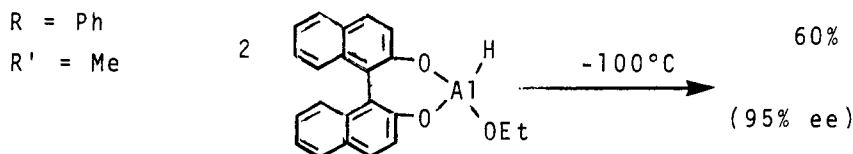
Keinan, E.*; Hafeli, E.K.; Seth, K.K.; Lamed, R.
J Am Chem Soc, (1986), 108, 162



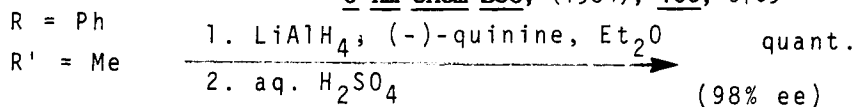
Krause, H.W.; Bhatnagar, A.K.



Soai, K.*; Yamanoi, T.; Oyamada, H. Chem Lett, (1984), 251

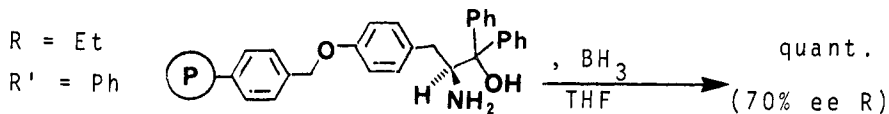


Noyori, R.*; Tomino, I.; Tanimoto, Y.; Nishizawa, M.
J Am Chem Soc, (1984), 106, 6709



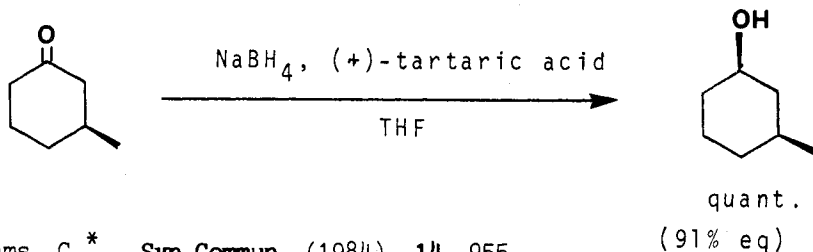
Červinka, O.; Fábryová, A.; Sablukova, I.

Coll Czech Chem Comm, (1986), 51, 401

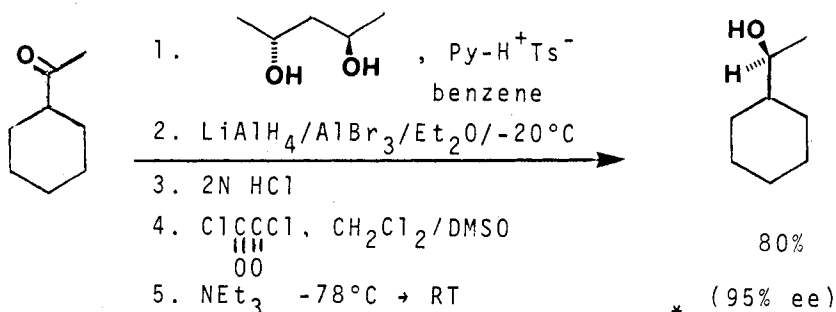


Itsuno, S.*; Nakano, M.; Ito, K.; Hirao, A.; Owa, M.; Konda, N.; Nakahama, S.

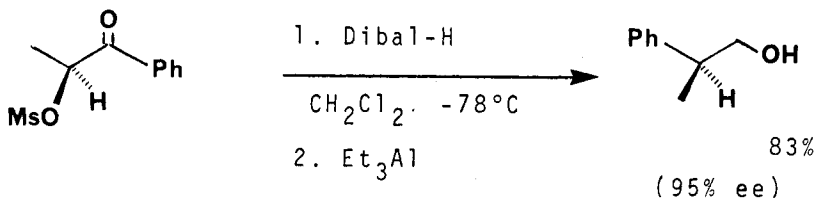
JCS Perkin I, (1985), 2615



Adams, C.* Syn Commun, (1984), 14, 955

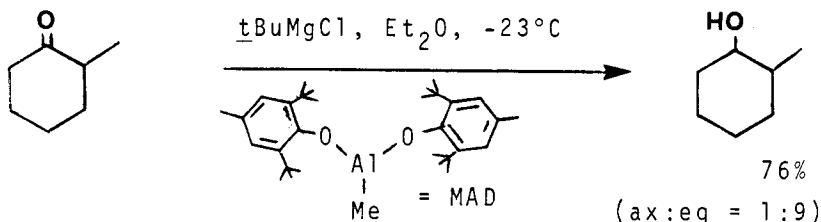


Mori, A.; Fujiwara, J.; Maruoka, K.; Yamamoto, H.* Tetrahedron Lett, (1983), 24, 4581



Suzuki, K.; Katayama, E.; Matsumoto, T.; Tsuchihashi, G.* Tetrahedron Lett, (1984), 25, 3715

Non-Asymmetric Reduction:



Maruoka, K.; Sakurai, M.; Yamamoto, H.*

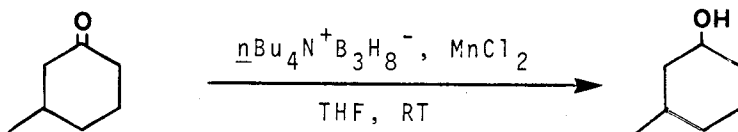
Tetrahedron Lett., (1985), 26, 38531. MAD, PhCH_3

84%

2. MeLi

(ax:eq = 1:99)

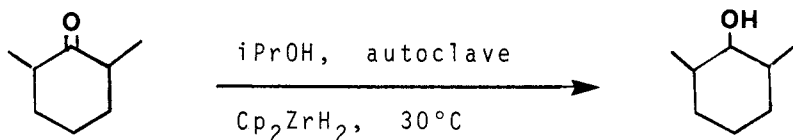
Maruoka, K.; Itoh, T.; Yamamoto, H.*

J Am Chem Soc., (1985), 107, 4573

93%

 B_3H_8^- = octahydrotriborate

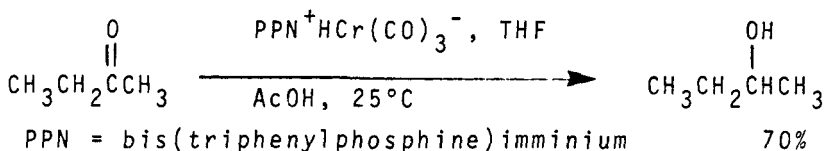
Tamblyn, W.H.*; Aquadro, R.E.; DeLuca, O.D.; Weingold, D.H.; Dao, T.V.

Tetrahedron Lett., (1983), 24, 4955

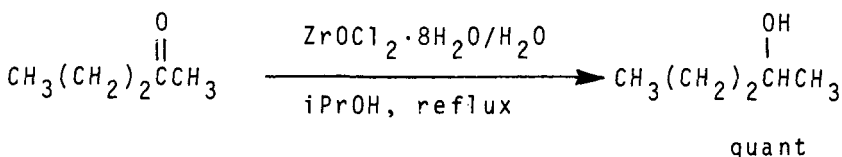
92%

Ishii, Y.*; Nakano, T.; Inada, A.; Kishigami, Y.; Sakurai, K.; Ogawa, M.*

J Org Chem., (1986), 51, 240

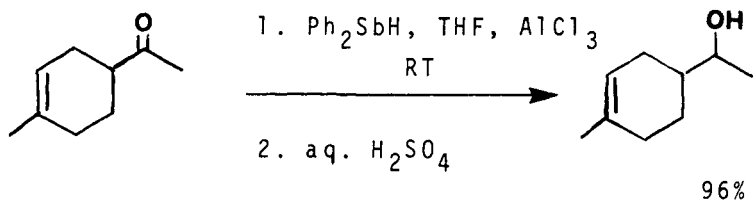


Gaus, P.L.*; Kao, S.C.*; Youngdahl, K.; Darensbourg, M.Y.*
J Am Chem Soc, (1985), **107**, 2428



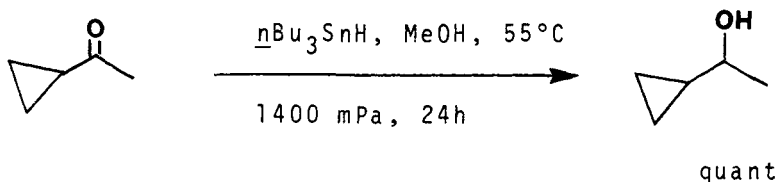
Matsushita, H.*; Ishiguro, S.; Ichinose, H.; Izumi, A.;
 Mizusaki, S.

Chem Lett, (1985), 731



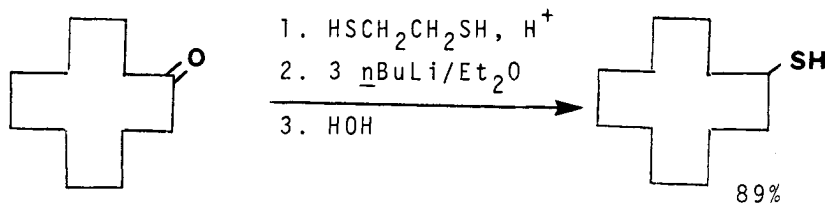
Huang, Y.Z.; Shen, Y.C.; Chen, C.

Tetrahedron Lett, (1985), **26**, 5171



Dequeil-Castaing, M.; Rahm, A.*; Dahan, N.

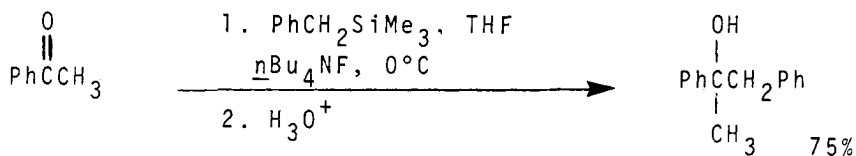
J Org Chem, (1986), **51**, 1672



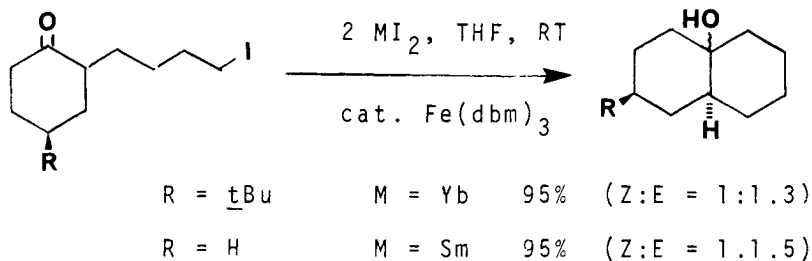
Wilson, S.R.*; Georgiadis, G.M. Org Syn, (1983), 61, 74

SECTION 42B: Alkylation of Ketones, Forming Alcohols

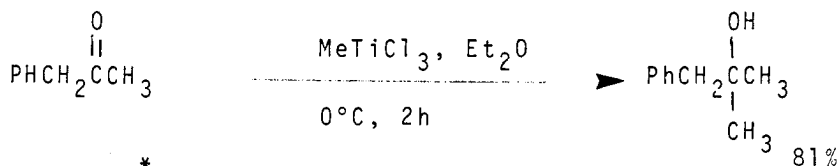
Aldol reactions are listed in Section 330 (Ketone-Alcohol).



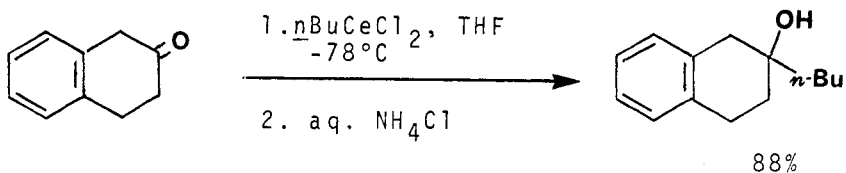
Bennetau, B.; Dunogues, J. Tetrahedron Lett, (1983), 24, 4217



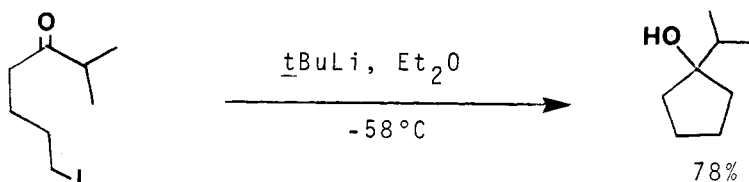
Molander, G.A.*; Etter, J.B. J Org Chem, (1986), 51, 1778
Tetrahedron Lett, (1984), 25, 3281



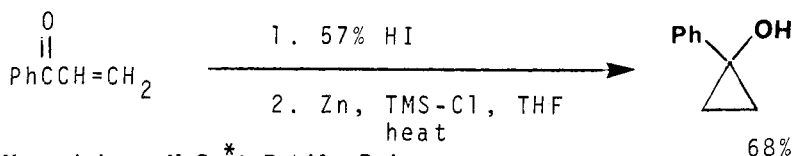
Reetz, M.T.*; Kyung, S.H.; Hüllmann, M.
Tetrahedron, (1986), 42, 2931



Imamoto, T.*; Sugiura, Y.; Takujama, N.
Tetrahedron Lett., (1984), 25, 4233



Cooke Jr., M.P.*; Houppis, I.N.
Tetrahedron Lett., (1985), 26, 4987



Narasimhan, N.S.*; Patil, P.A.
Tetrahedron Lett., (1986), 27, 5133

Reviews:

"Metal-Ammonia Reduction of Cyclic Aliphatic Ketones"

Huffman, J.W.* Accts Chem Res., (1983), 16, 399

"An Introduction of Chiral Centers into Acyclic Systems Based On Stereoselective Ketone Reduction"

Oishi, T., Nakata, T. Accts Chem Res., (1984), 17, 338

"Microbial Asymmetric Catalysis - Enantioselective Reduction of Ketones"

Sih, C.J.*; Chen, C.-S.

Angew Chem Int Ed Engl., (1984), 23, 570

"Stereoselective Acyclic Ketone Reduction"

Nakata, T.*; Fukui, M.; Ohtsuka, H.; Oishi, T.*
Tetrahedron, (1984), 40, 2225

"Mechanism and Stereochemistry of Alkali Metal Reductions of Cyclic and Unsaturated Ketones in Protic Solvents"

Pradhan, S.K.* Tetrahedron, (1986), 42, 6351

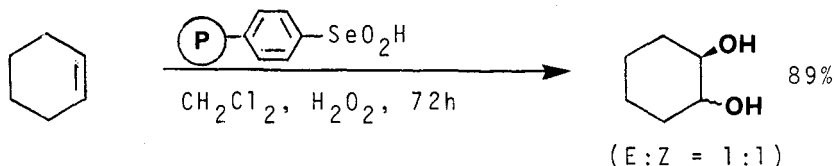
Related Methods: Alcohols from Aldehydes (Section 34)

SECTION 43: Alcohols and Thiols from Nitriles

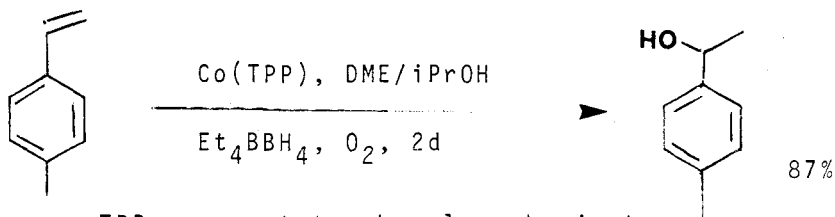
No Additional Examples

SECTION 44: Alcohols and Thiols from Olefins

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

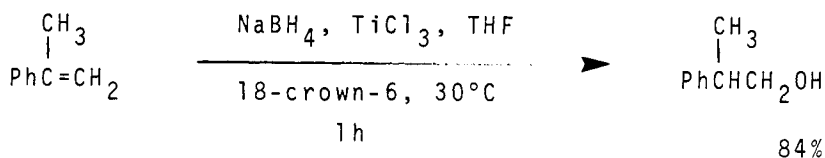


Taylor, R.T.*; Flood, L.A. J Org Chem, (1983), 48, 5160

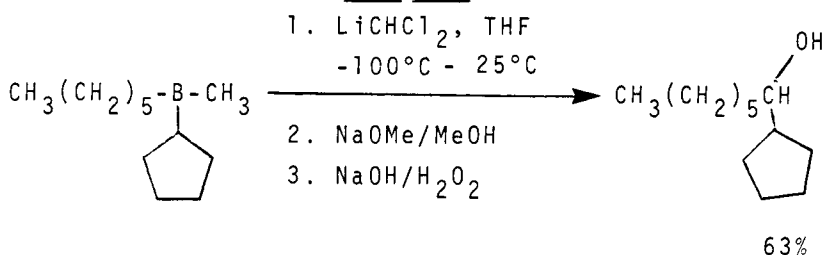


TPP = meso-tetraphenylporphyrinato

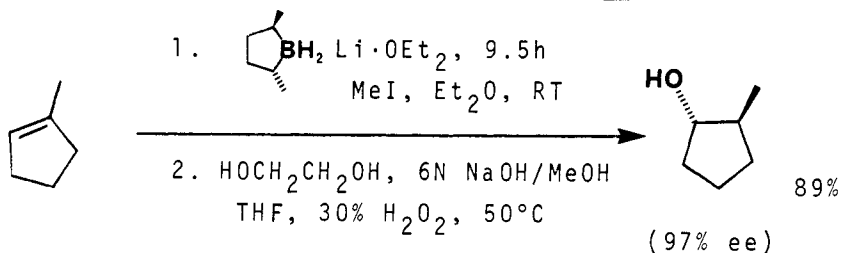
Okamoto, T.*; Oka, S. J Org Chem, (1984), 49, 1589



Lee, H.S.*; Isagawa, K.*; Toyoda, H.; Otsuji, Y.
Chem Lett, (1984), 673

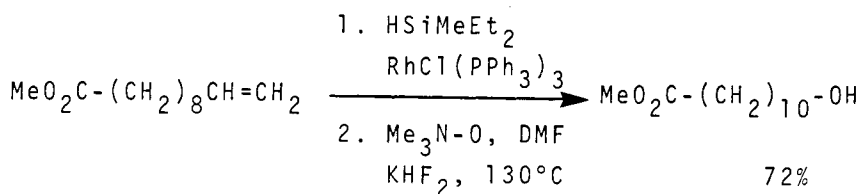


Brown, H.C.*; Imai, Y.; Perumal, P.T.; Singaram, B.
J Org Chem, (1985), 50, 4032



Masamune, S.*; Kim, B.M.; Petersen, J.S.; Sato, T.; Veenstra, S.J.

J Am Chem Soc, (1985), 107, 4549

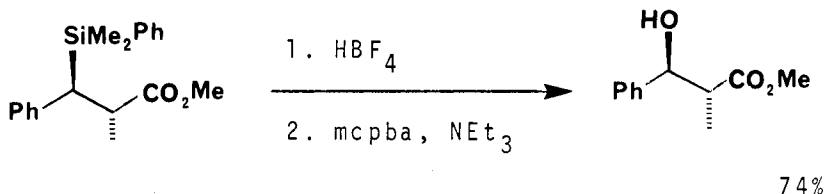


Sakurai, H.*; Ando, M.; Kawada, N.; Sato, K.; Hosomi, A.*
Tetrahedron Lett, (1986), 27, 75

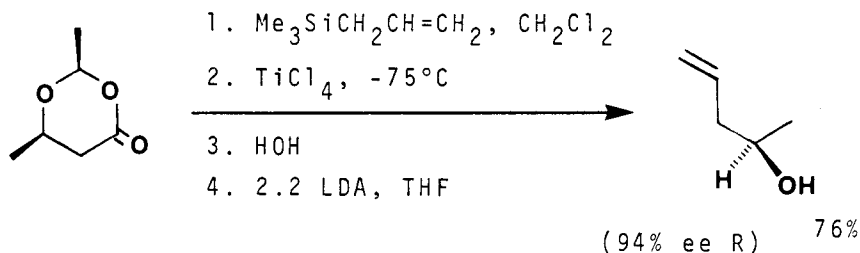
Review: "The Use of Chiral Organoboranes in Organic Synthesis"

Matteso, D.S.* Synthesis, (1986), 973

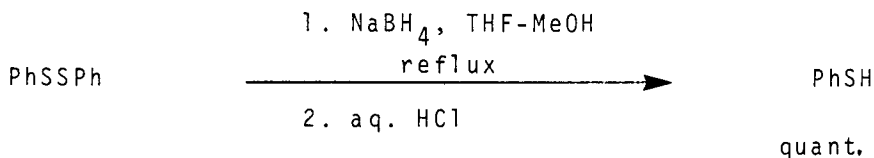
SECTION 45: Alcohols and Thiols from Miscellaneous Compounds



Fleming, I.*; Henning, R.; Plaut, H. JCS Chem Comm, (1984), 29

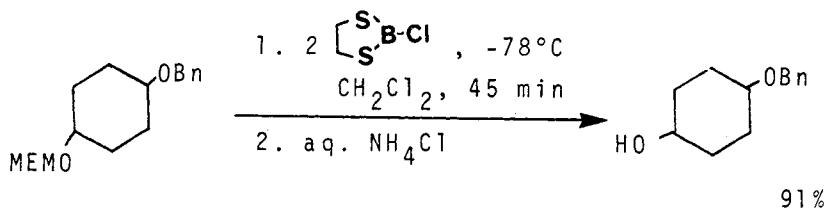


Seebach, D.*; Imwinkelried, R.; Stucky, G.
Angew Chem Int Ed Engl, (1986), 25, 178

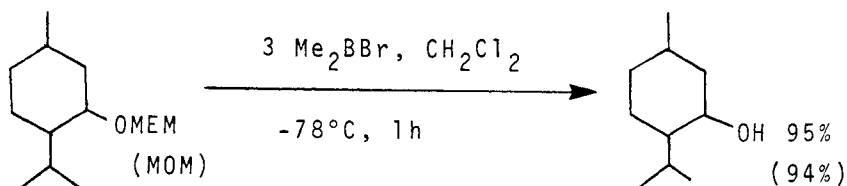


Ookawa, A.; Yokoyama, S.; Soai, K.*
Syn Commun, (1986), 16, 819

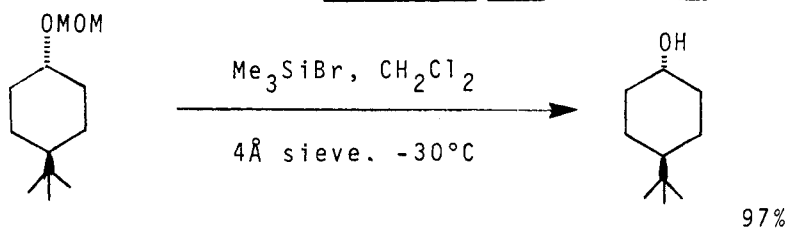
For conversions of boranes to alcohols (Section 44)

SECTION 45A: Protection of Alcohols and Thiols

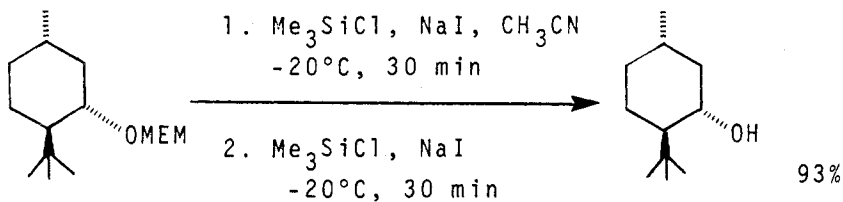
Williams, D.R.*; Sakdarat, S.

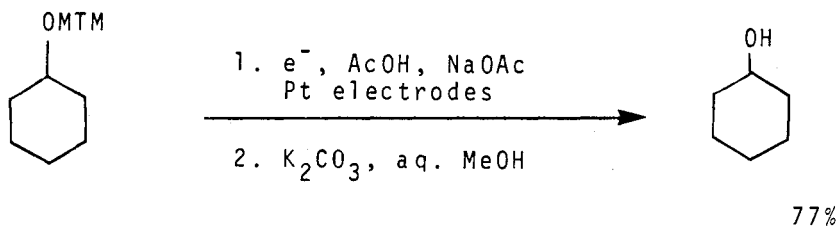
Tetrahedron Lett., (1983), 24, 3965

Guindon, Y.*; Yoakim, C.; Morton, H.E.

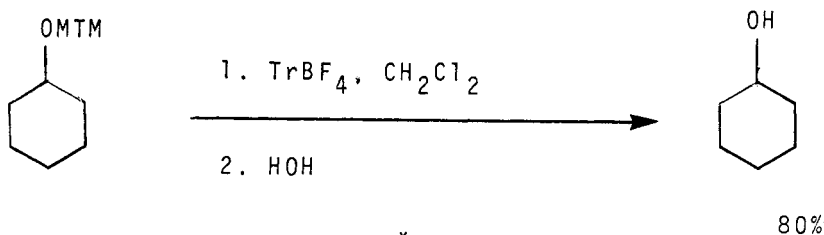
J Org Chem, (1984), 49, 3912Tetrahedron Lett., (1983), 24, 3969

Hanessian, S.*; Delorme, D.; Dufresne, Y.

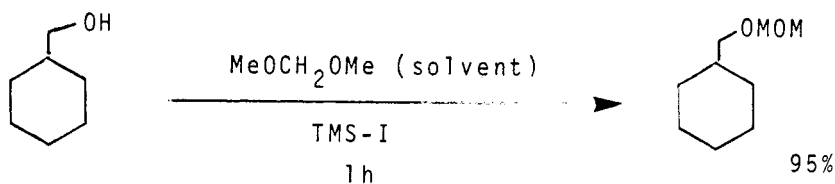
Tetrahedron Lett., (1984), 25, 2515Rigby, J.H.*; Wilson, J.Z. Tetrahedron Lett., (1984), 25, 1429



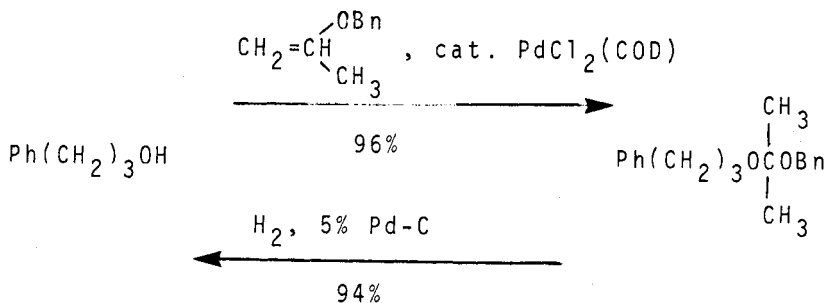
Mandai, T.; Yasunaga, H.; Kawada, M.; Otera, J.*
Chem Lett, (1984), 715



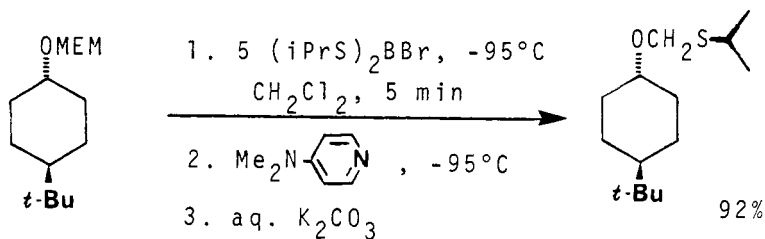
Chowdhury, P.K.*; Sharma, R.P.*; Batuah, J.N.
Tetrahedron Lett, (1983), 24, 4485



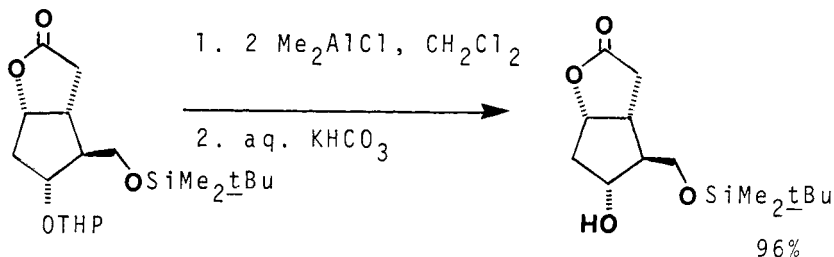
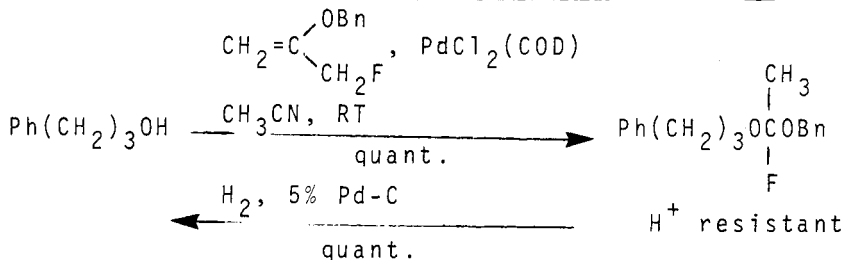
Olah, G.A.*; Husain, A.; Narang, S.C. Synthesis, (1983), 896



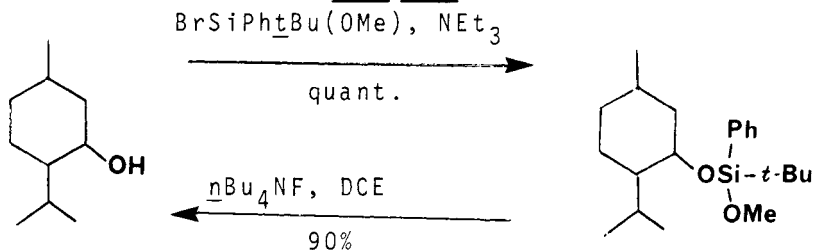
Mukaiyama, T.*; Ohshima, M.; Murakami, M.
Chem Lett, (1984), 265



Corey, E.J.*; Hua, D.H.; Seitz, S.P.

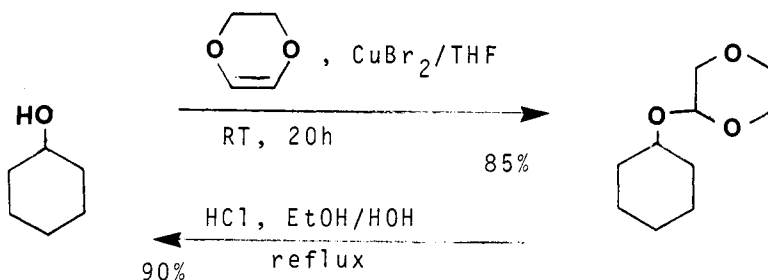
Tetrahedron Lett., (1984), 25, 3Ogawa, Y.; Shibasaki, M.* Tetrahedron Lett., (1984), 25, 663

Mukaiyama, T.*; Ohshima, M.; Nagaoka, H.; Murakami, M.

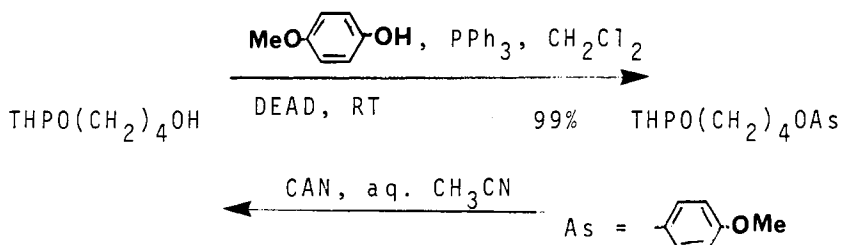
Chem Lett., (1984), 615

Guindon, Y.*; Fortin, R.; Yoakim, C.; Gillard, J.W.

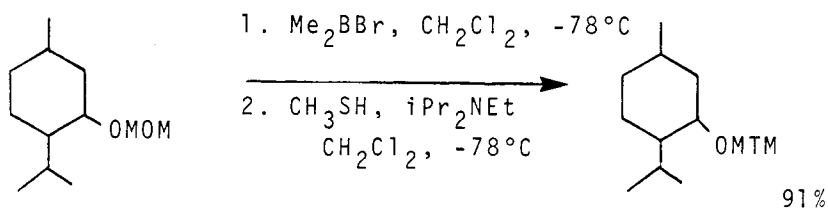
Tetrahedron Lett., (1984), 25, 4717



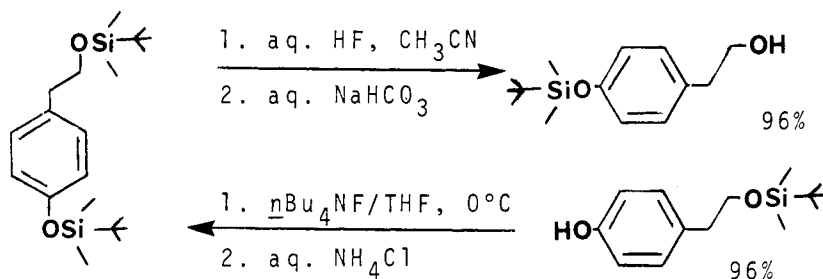
Fetizon, M.*; Hanna, I. Synthesis, (1985), 806



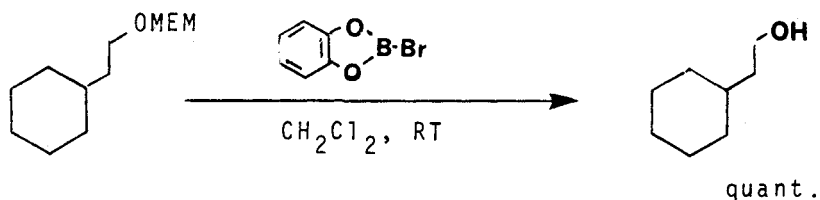
Fukuyama, T.*; Laird, A.A.; Hotchkiss, L.M.
Tetrahedron Lett., (1985), 26, 6291



Morton, H.E.*; Guindon, Y. J Org Chem, (1985), 50, 5379



Collington, E.W.*; Flinch, H.*; Smith, I.J.
Tetrahedron Lett., (1985), 26, 681

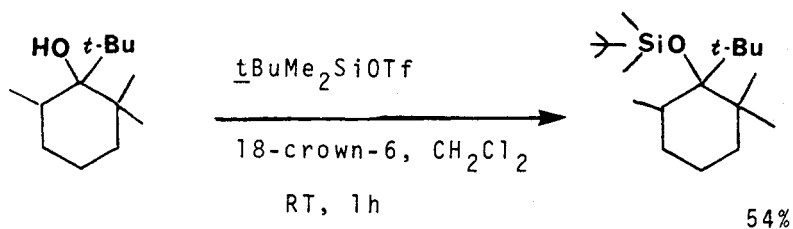


Boeckman Jr., R.K.*; Potenza, J.C.

Tetrahedron Lett., (1985), 26, 1411

King, P.F.*; Stroud, S.G.

Tetrahedron Lett., (1985), 26, 1415



Braish, T.F.*; Fuchs, P.L.*

Syn Commun., (1986), 16, 111

Related Methods: Esters from Alcohols (Section 123)
 Alcohols from Ethers (Section 39)
 Esters from Alcohols (Section 108)
 Alcohols from Esters (Section 38)

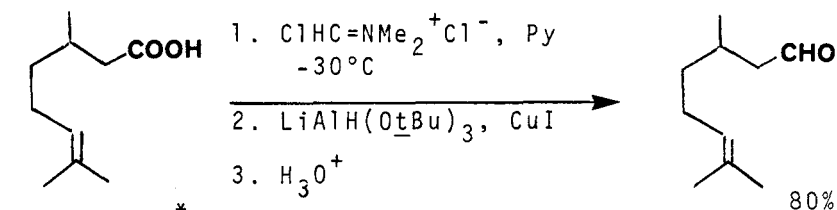
CHAPTER 4

PREPARATION OF ALDEHYDES

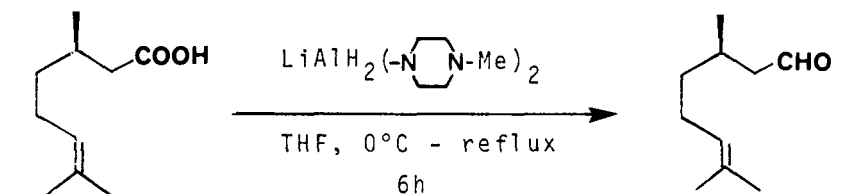
SECTION 46: Aldehydes from Acetylenes

No Additional Examples

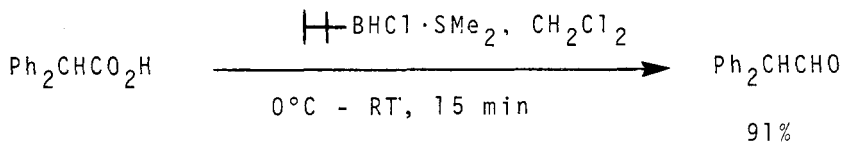
SECTION 47: Aldehydes from Acid Derivatives



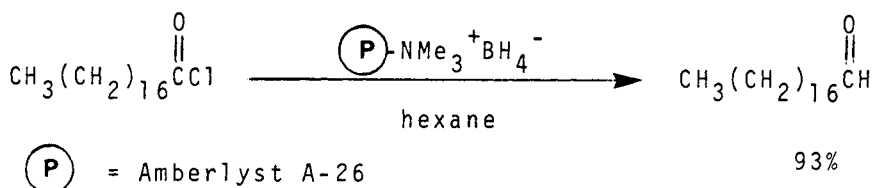
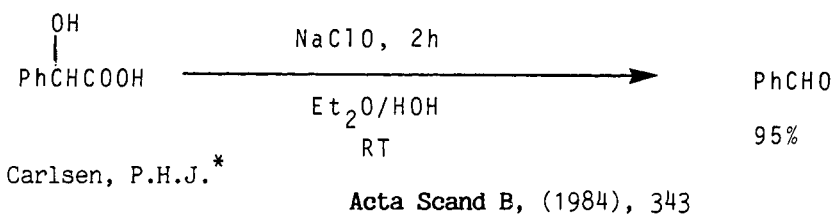
Fujisawa, T.*; Mori, T.; Tsuge, S.; Sato, T.
Tetrahedron Lett., (1983), 24, 1543



Hubert, T.D.; Eyman, D.P.; Wiemer, D.F.*
J Org Chem., (1984), 49, 2279

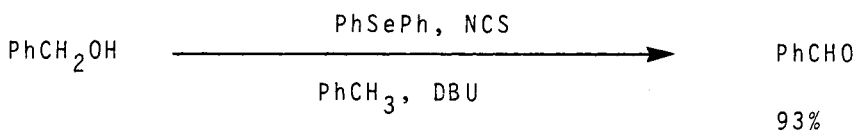


Brown, H.C.*; Cha, J.S.; Nazer, B.; Yoon, N.M.
J Am Chem Soc., (1984), 106, 8001

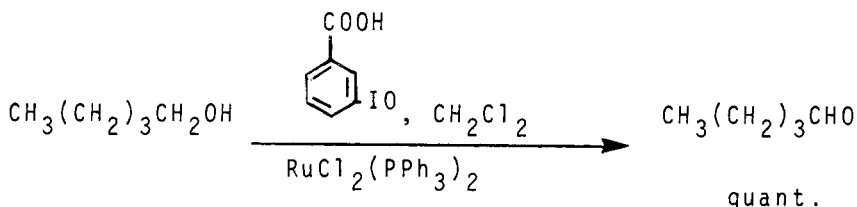


Gordeev, K.Yu.; Serebrennikova, G.A.; Evstigneeva, R.P.
J Org Chem USSR, (1985), 21, 2393

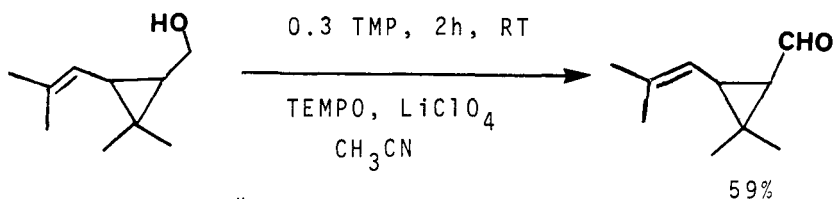
SECTION 48: Aldehydes from Alcohols and Thiols



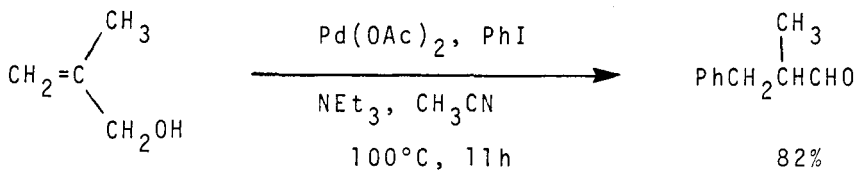
Takai, K.*; Yasumura, M.; Negoro, K.
J Org Chem, (1983), 48, 54



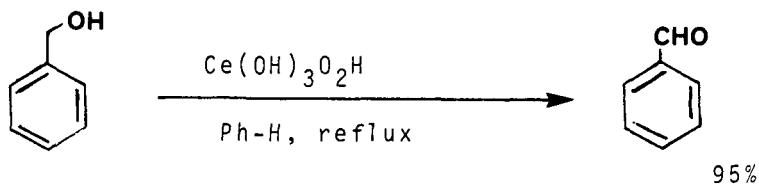
Müller, P.; Godoy, J. Helv Chim Acta, (1983), 66, 1790



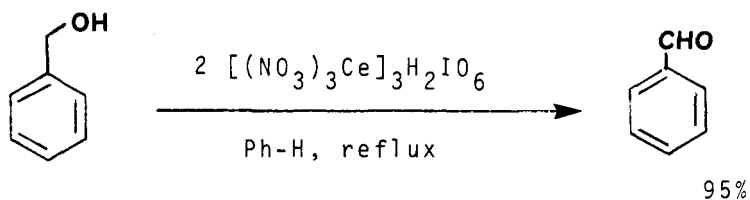
Semmelhack, M.F.*; Chou, C.S.; Cortes, D.A.
J Am Chem Soc, (1983), 105, 4492



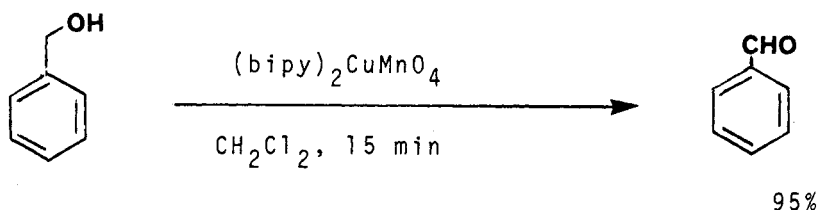
Buntin, S.A.; Heck, R.F.* Org Syn, (1983), 61, 82



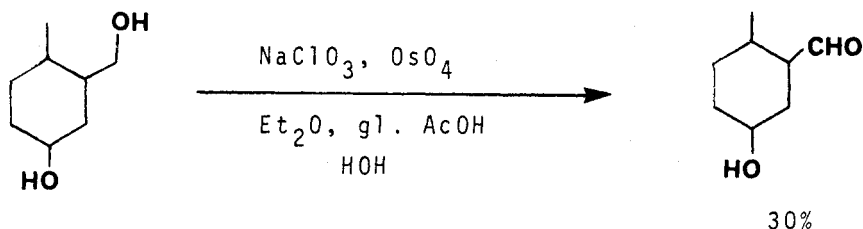
Firouzabadi, H.; Iranpoor, N. Syn Commun, (1984), 14, 875



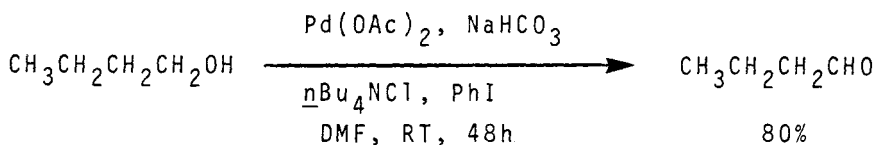
Firouzabadi, H.; Iranpoor, N.; Hajipoor, G.; Toofan, J.
Syn Commun, (1984), 14, 1033



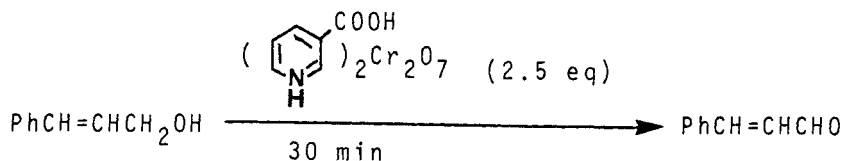
Firouzabadi, H.*; Sardarian, A.R.; Naderi, M.; Vessal, B.
Tetrahedron, (1984), **40**, 5001



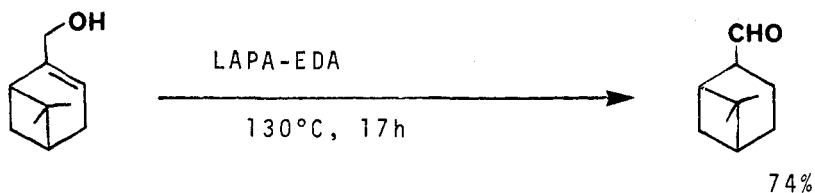
Maione, A.M.; Romeo, A.* Synthesis, (1984), 955



Choudary, B.M.*; Reddy, N.P.; Kantam, M.L.; Jamil, Z.
Tetrahedron Lett, (1985), **26**, 6257



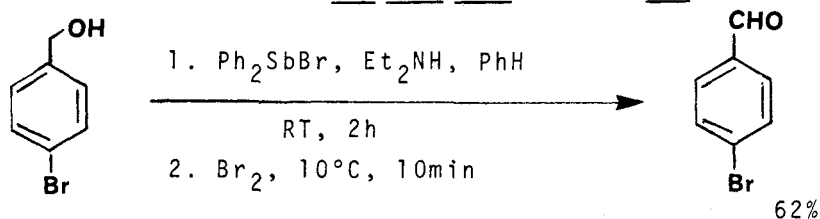
Lopez, C.; Gonzalez, A.; Cossio, F.P.; Palomo, C.*
Syn Commun, (1985), **15**, 1197



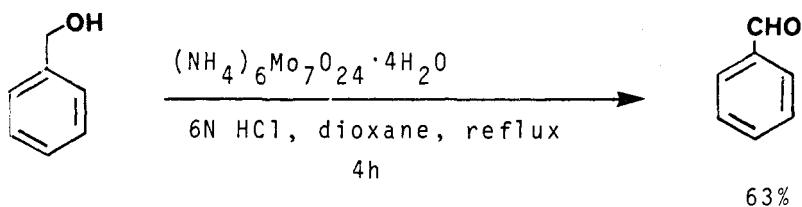
LAPA = lithium 3-aminopropanamide (95% Z)

Hoffmann, H.M.R.*; Köver, A.; Pauluth, D.

JCS Chem Comm, (1985), 812

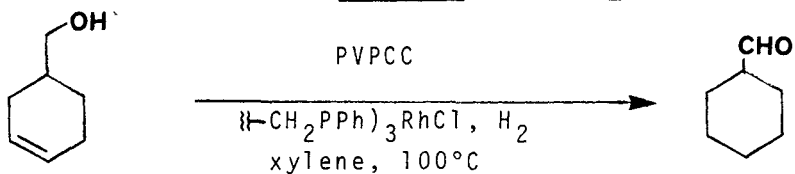


Huang, Y.*; Shen, Y.; Chen, C. Synthesis, (1985), 651



Sur, M.; Adak, M.M.; Pathak, T.*; Hazra, B.; Banerjee, A.

Synthesis, (1985), 652

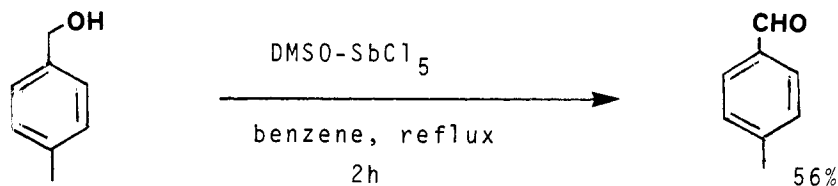


80%

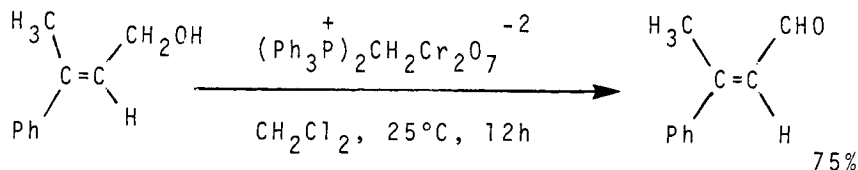
PVPCC = poly(vinylpyridinium)chlorochromate

Bergbreiter, D.E.*; Chandran, R.

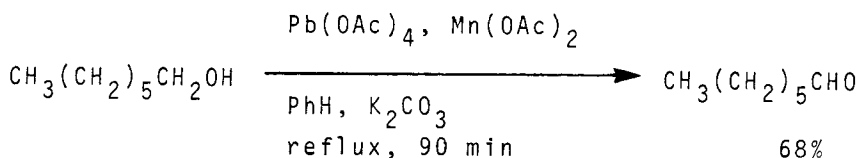
J Am Chem Soc, (1985), 107, 4792



Yamamoto, J.*; Ito, S.; Tsuboi, Ta.; Tsuboi, Ts.; Tsukihara, K.
Bull Chem Soc Jpn, (1985), 58, 470



Cristau, H.-J.*; Torreilles, E.*; Morand, P.; Christol, H.
Tetrahedron Lett, (1986), 27, 1775



Mihailovic, M.L.*; Kostantinovic, S.; Vukicevic, R.
Tetrahedron Lett, (1986), 27, 2287

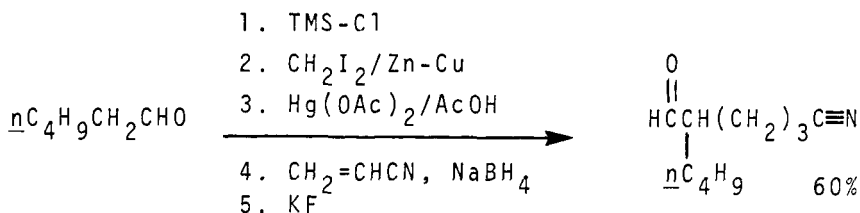
Review: "Chromium (VI) Based Oxidants"

Firouzabadi, H.*; Iranpoor, N.; Kiaeezadeh, F.; Toofan, J.
Tetrahedron, (1986), 42, 719

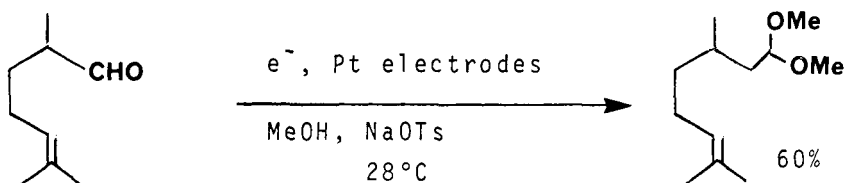
Related Methods: Ketones from Alcohols and Phenols (Section 168)

SECTION 49: Aldehydes from Aldehydes

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



Giese, B.*; Horler, H. Tetrahedron Lett., (1983), 24, 3221



Gora, J.; Smigielski, K.; Kula, J. Synthesis, (1986), 586

Review: "Alkylation of Ketones and Aldehydes via Nitrogen Derivatives"

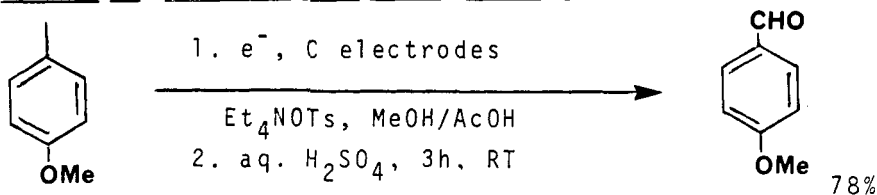
Whitesell, J.K.; Whitesell, M.A. Synthesis, (1983), 517

Related Methods: Aldehydes from Ketones (Section 57)

Ketones from Ketones (Section 177)

Also via: Olefinic aldehydes (Section 341)

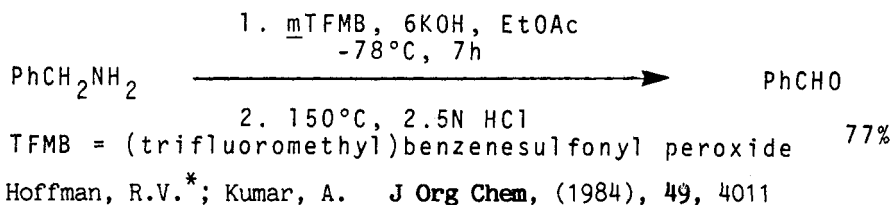
SECTION 50: Aldehydes from Alkyl, Methylenes, and Aryls



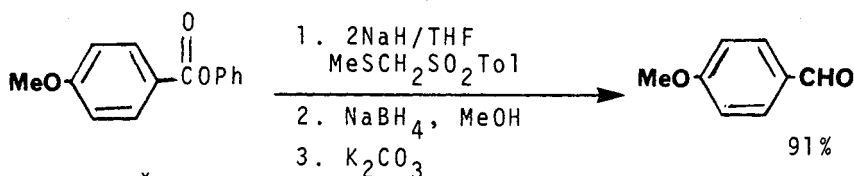
Nishiguchi, I.*; Hirashima, T. J Org Chem, (1985), 50, 539

SECTION 51: Aldehydes from Amides

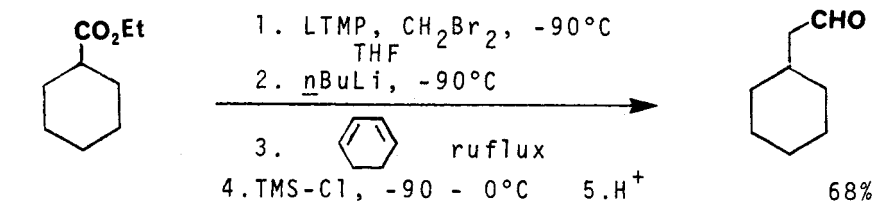
No Additional Examples

SECTION 52: Aldehydes from Amines

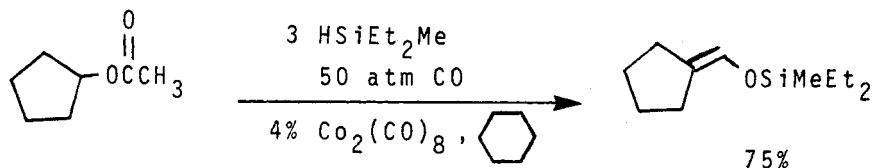
Related Methods: Ketones from Amines (Section 172)

SECTION 53: Aldehydes from Esters

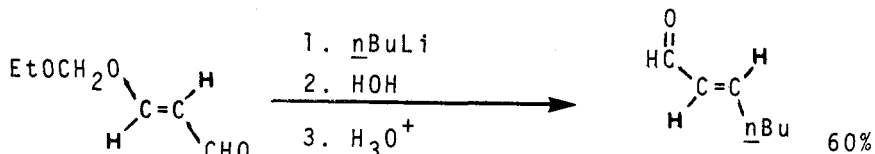
Ogura, K.*; Yahata, N.; Takahashi, K.; Iida, H.
Tetrahedron Lett, (1983), 24, 5761



Kowalski, C.J.*; Haque, M.S. J Am Chem Soc, (1986), 108, 1325

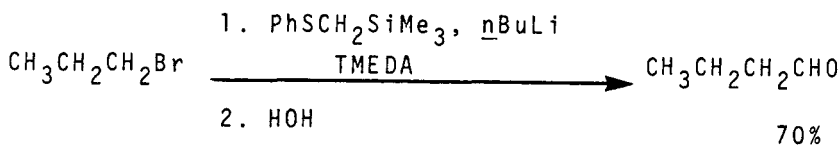


Chatani, N.; Fujii, S.; Yamasaki, Y.; Murai, S.*; Sonoda, N.
J Am Chem Soc, (1986), 108, 7361

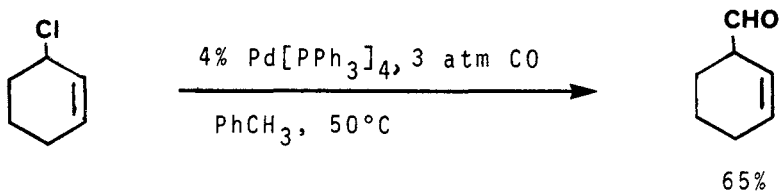
SECTION 54: Aldehydes from Ethers, Epoxides, and Thioethers

Maddaluno, J.; d'Angelo, J.* Tetrahedron Lett., (1983), **24**, 895

Related Methods: Ketones from Ethers and Epoxides (Section 174)

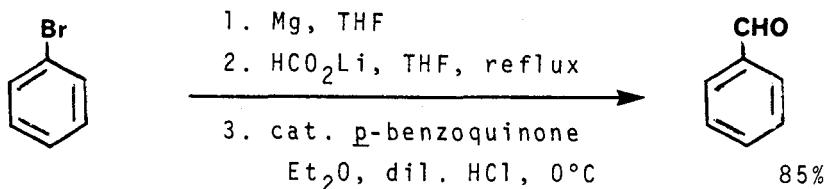
SECTION 55: Aldehydes from Halides and Sulfonates

Ager, D.J. JCS Perkin I, (1983), 1131



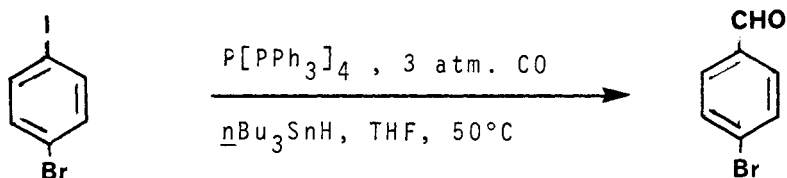
Baillargeon, V.P.; Stille, J.K.*

J Am Chem Soc., (1983), **105**, 7175



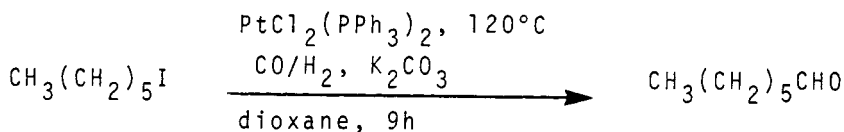
Bogavac, M.; Arsenijević, L.; Pavlov, S.; Arsenijević, V.*

Tetrahedron Lett., (1984), **25**, 1843



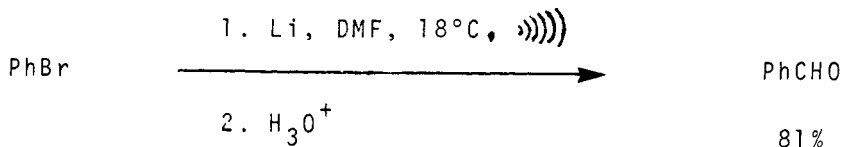
Baillargeon, V.P.; Stille, J.K.*
J Am Chem Soc, (1986), 108, 452

70%



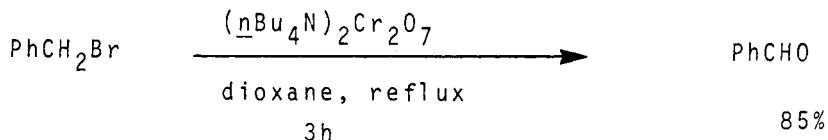
86%

Takeuchi, R.; Tsuji, Y.; Watanabe, Y.*
JCS Chem Comm, (1986), 351



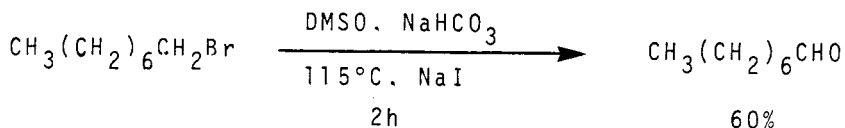
81%

Einhorn, J.; Luche, J.L.*
Tetrahedron Lett, (1986), 27, 1791, 1793



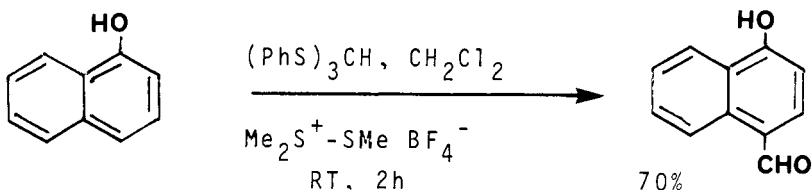
85%

Ferraboschi, P.; Azadoni, M.N.; Santaniello, E.*; Trave, S.
Syn Commun, (1986), 16, 43



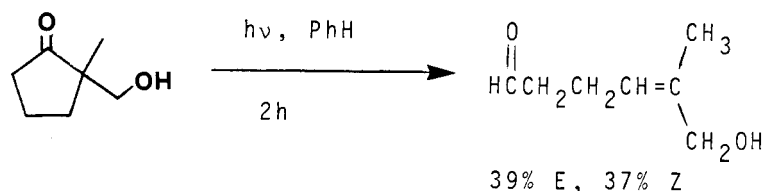
Dave, P.; Byun, H.-S.; Engel, R.* Syn Commun, (1986), **16**, 1343

SECTION 56: Aldehydes from Hydrides

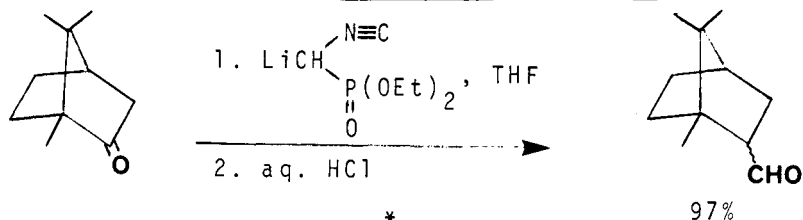


Smith, R.A.J.*; Bin Manas, A.R. Synthesis, (1984), 166

SECTION 57: Aldehydes from Ketones



Tortajada, J.; van Hemelryck, B.; Morizur, J.-P.
Tetrahedron, (1984), **40**, 613

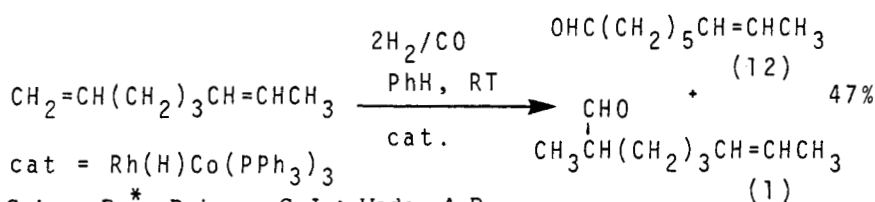


Moskal, J.; van Leusen, A.M.*

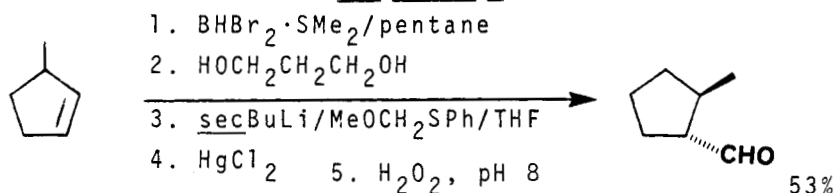
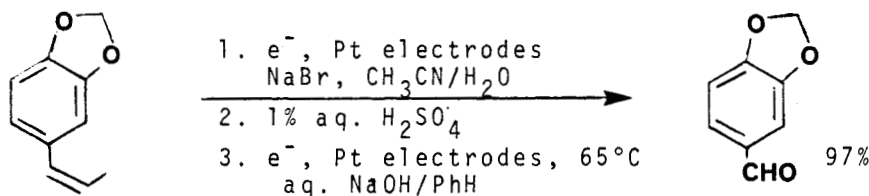
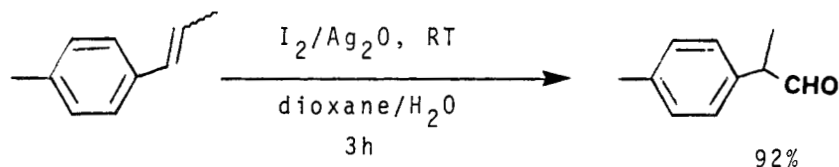
Rec Trav Chim Pays Bas, (1986), **105**, 141

SECTION 58: Aldehydes from Nitriles

No Additional Examples

SECTION 59: Aldehydes from Olefins

Grigg, R.*; Reimer, G.J.; Wade, A.R.

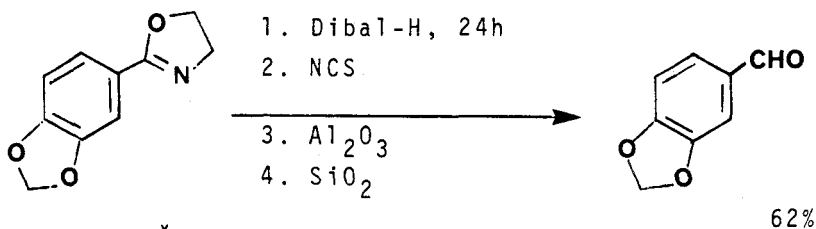
JCS Perkin I, (1983), 1929Brown, H.C.*; Imai, T. J Am Chem Soc, (1983), **105**, 6285Torii, S.; Uneyama, K.; Ueda, K. J Org Chem, (1984), **49**, 1830

Kikuchi, H.*; Kogure, K.; Toyoda, M.

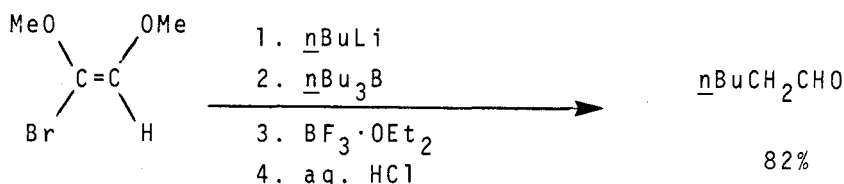
Chem Lett, (1984), 341

Related Methods: Ketones from Olefins (Section 179)

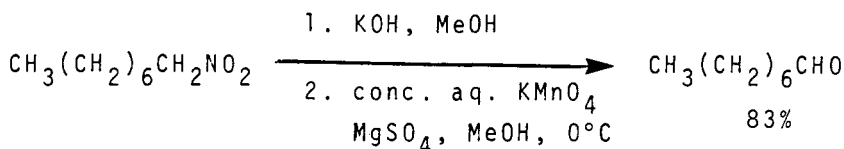
SECTION 60: Aldehydes Miscellaneous Compounds



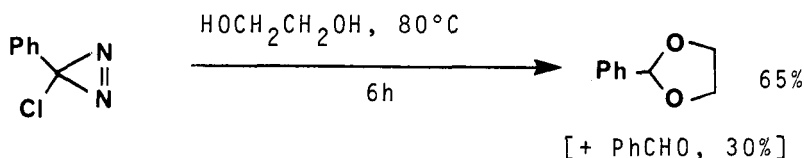
Meyers, A.I.*; Himmelsbach, R.J.; Reuman, M.
J Org Chem, (1983), **48**, 4053



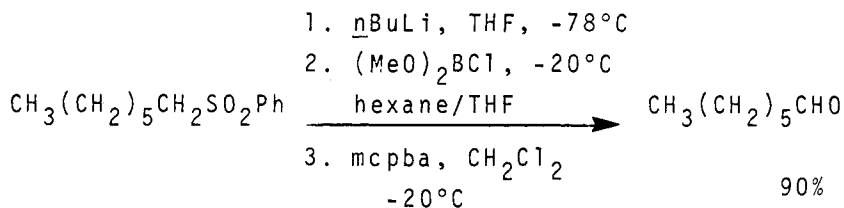
Koshino, J.; Sugawara, T.; Yogo, T.; Suzuki, A.*
Syn Commun, (1983), **13**, 1149



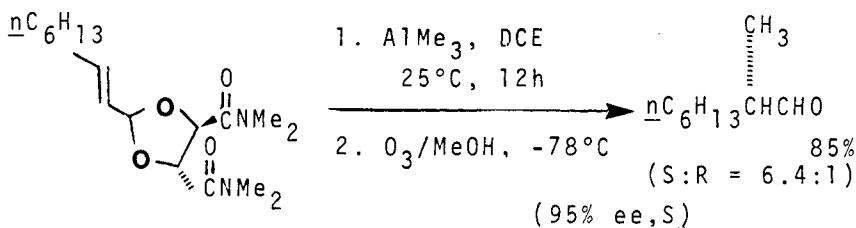
Steliou, K.*; Poupart, M.A. J Org Chem, (1985), **50**, 4971



Liu, M.T.H.; Kokosi, J. Heterocycles, (1985), **23**, 3049

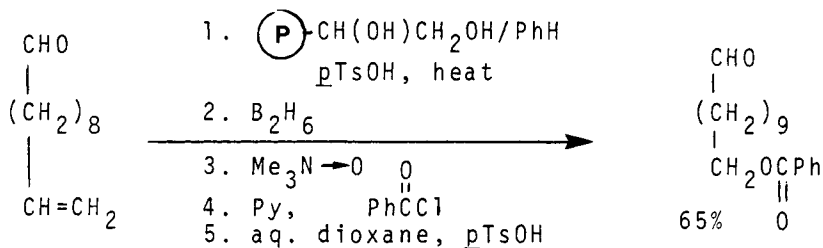


Baudin, J.-B.; Julia, M.*; Rolando, C.
Tetrahedron Lett., (1985), 26, 2333

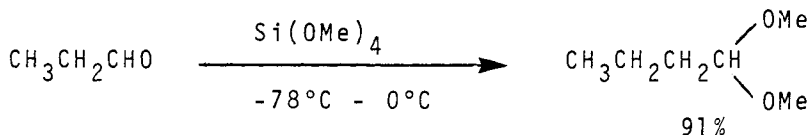


Maruoka, K.; Nakai, S.; Sakurai, M.; Yamamoto, H.*
Synthesis, (1986), 130

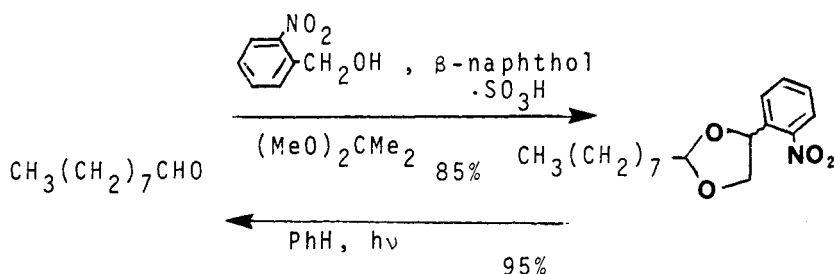
SECTION 60A: Protection of Aldehydes



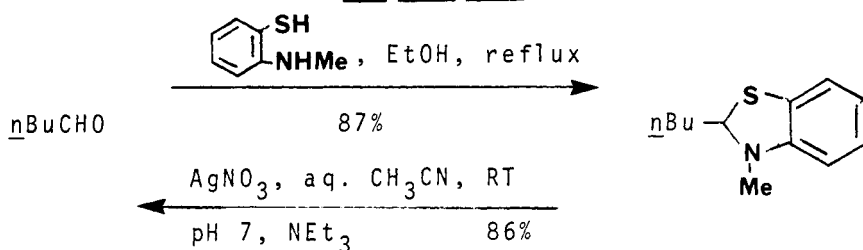
Hodge, P.*; Waterhouse, J. JCS Perkin I, (1983), 2319



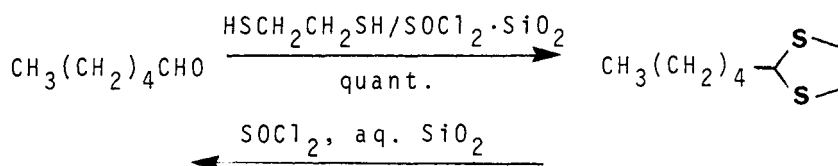
Sakurai, H.*; Sasaki, K.; Hayashi, J.; Hosomi, A.
J Org Chem, (1984), 49, 2808



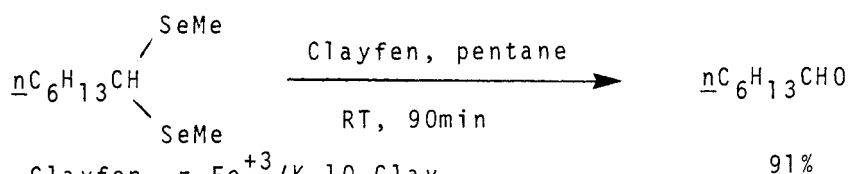
Gravel, D.*; Murray, S.; Ladouceur, G.
JCS Chem Comm, (1985), 1828



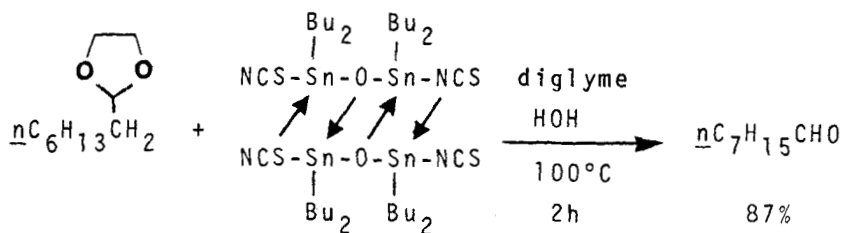
Chikashita, H.*; Ishimoto, N.; Kamazawa, S.; Itoh, K.
Heterocycles, (1985), 23, 2509



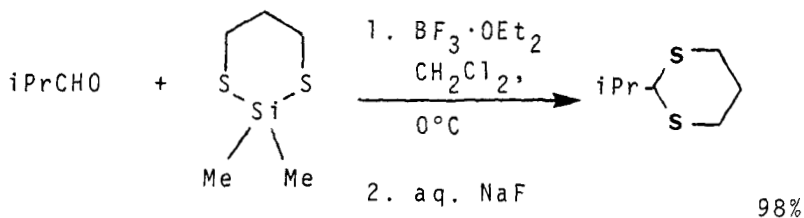
Kamitori, Y.; Hojo, M.*; Masuda, R.; Kimura, T.; Yoshida, T.
J Org Chem, (1986), 51, 1427



Clayfen = Fe³⁺/K-10 Clay
 Laszlo, P.*; Pennetreau, P.; Krief, A.
Tetrahedron Lett, (1986), 27, 3153



Otera, J.*; Nozaki, H. Tetrahedron Lett., (1986), 27, 5743



Soderquist, J.A.*; Miranda, E.I. Tetrahedron Lett., (1986), 27, 6305

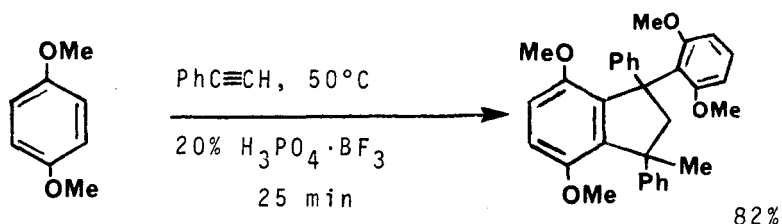
See Section 367 (Ether - Olefin) for the formation of enol ethers. Many of the methods in Section 180A (Protection of Ketones) are also applicable to aldehydes.

CHAPTER 5

PREPARATION OF ALKYL, METHYLENES, AND ARYL

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

SECTION 61: Alkyls, Methylene, and Aryls from Acetylenes

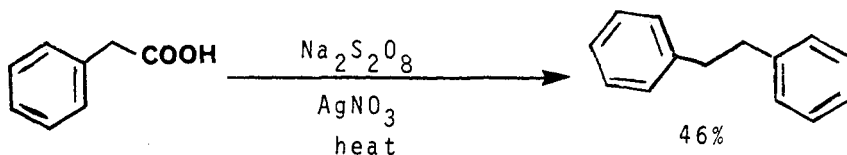


Zinov'eva, L.V.; Ryabov, V.D. J Org Chem USSR, (1984), 20, 540

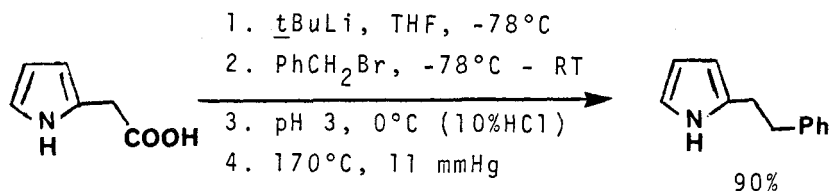
Review: "Cobalt Mediated 2+2+2 Cycloadditions: A Maturing Synthetic Strategy"

Vollhardt, K.P.C.* Angew Chem Int Ed Engl, (1984), 23, 539

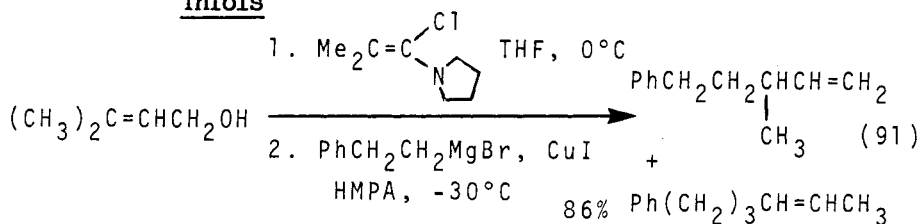
SECTION 62: Alkyls, Methylene, and Aryls from Acid Derivatives



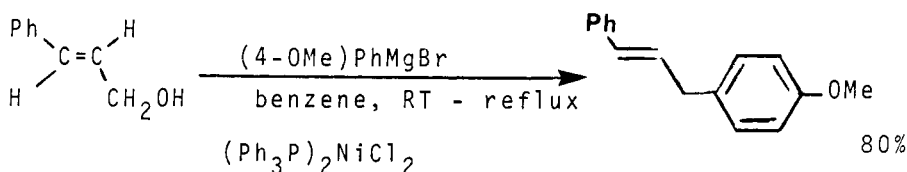
Fristad, W.E.; Klang, J.A. Tetrahedron Lett, (1983), 24, 2219



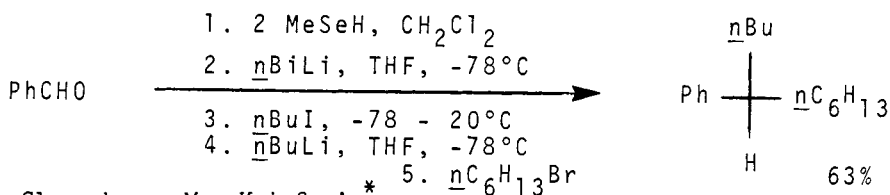
Muchowski, J.M.*; Solas, D.R. Syn Commun, (1984), 14, 453

SECTION 63: Alkyls, Methylenes, and Aryls from Alcohols and Thiols

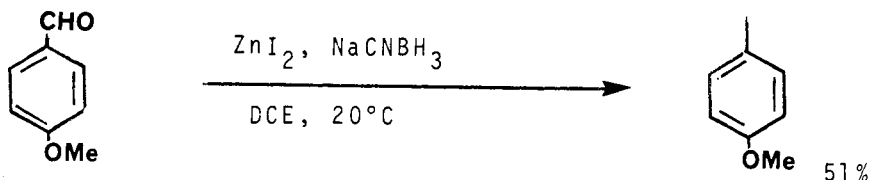
Fujisawa, T.*; Iida, S.; Yukizaki, H.; Sato, T. (9)
Tetrahedron Lett., (1983), **24**, 5745



Wenkert, E.*; Fernandes, J.B.; Michelotti, E.L.; Swindell, C.S.
Synthesis, (1983), 701

SECTION 64: Alkyls, Methylenes, and Aryls from Aldehydes

Clarembau, M.; Krief, A.*
Tetrahedron Lett., (1986), **27**, 1719, 1723

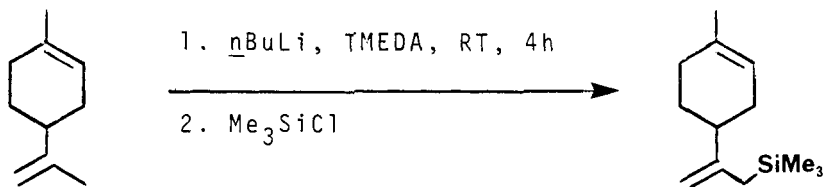


Lau, C.K.*; Dufresne, C.; Bélanger, P.C.; Piétre, S.; Scheigetz, J.

J Org Chem, (1986), **51**, 3038

Related Methods: Alkyls, Methylenes, and Aryls from Ketones
(Section 72)

SECTION 65: Alkyls, Methylenes, and Aryls from Alkyls, Methylenes, and Aryls



Andrianome, M.; Delmond, B.*

Tetrahedron Lett., (1985), 26, 6341

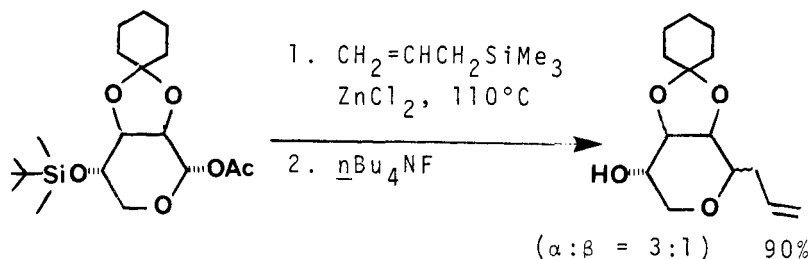
SECTION 66: Alkyls, Methylenes, and Aryls from Amides

No Additional Examples

SECTION 67: Alkyls, Methylenes, and Aryls from Amines

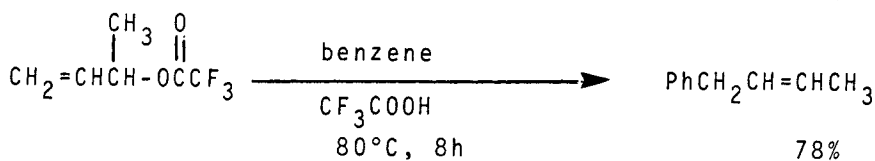
No Additional Examples

SECTION 68: Alkyls, Methylenes, and Aryls from Esters

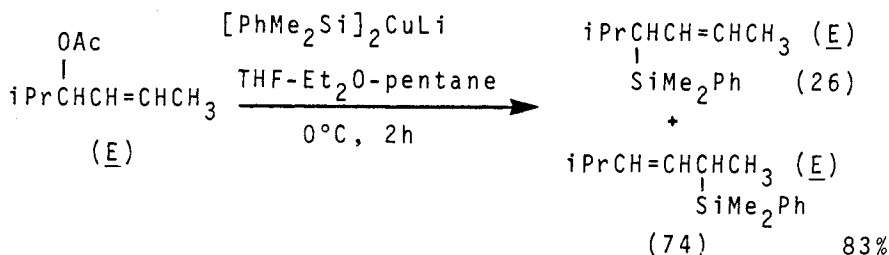


Kozikowski, A.P.*; Sorgi, K.L.; Wang, B.L.; Xu, Z.

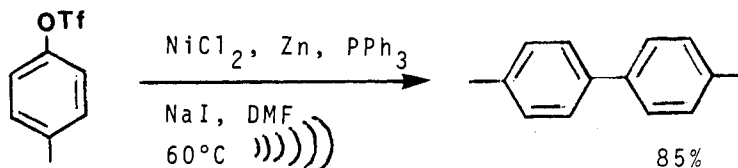
Tetrahedron Lett., (1983), 24, 1563



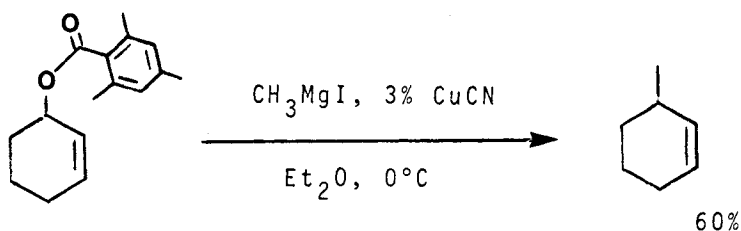
Fujiwara, Y.*; Kuromaru, H.; Taniguchi, H.
J Org Chem, (1984), **49**, 4309



Fleming, I.*; Thomas, A.P. JCS Chem Comm, (1985), 411



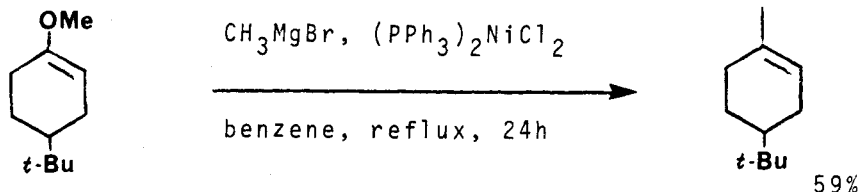
Yamashita, J.*; Inoue, Y.; Kondo, T.; Hashimoto, H.
Chem Lett, (1986), 407



Tseng, C.C.; Paisley, S.D.; Goering, H.L.*; Yen, S.-J.
J Org Chem, (1986), **51**, 2884, 2892

SECTION 69: Alkyls, Methylene, and Aryls from Ethers, Epoxides, and Thioethers

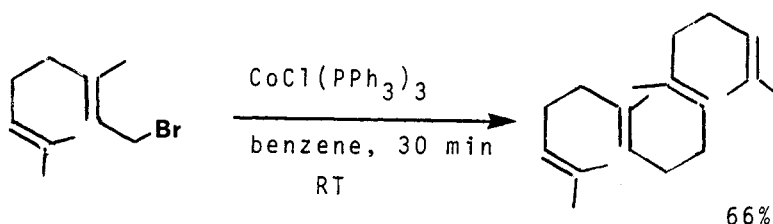
The conversion $ROR \rightarrow RR'$ ($R' = \text{alkyl, aryl}$) is included in this section.



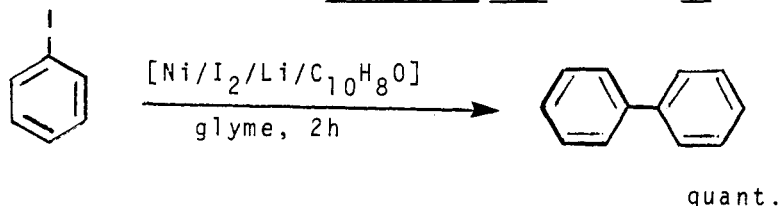
Wenkert, E.*; Michelotti, E.L.; Swindell, C.S.; Tingoli, M.
J Org Chem, (1984), 49, 4894

SECTION 70: Alkyls, Methylene, and Aryls from Halides and Sulfonates

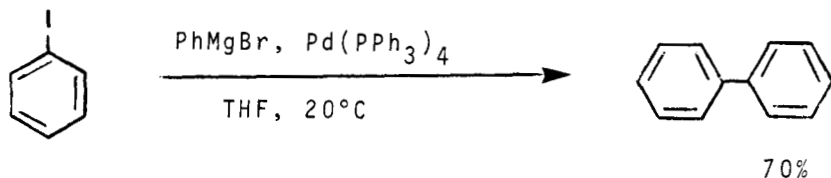
The replacement of halogen by alkyl or aryl groups is included in this section. For the conversion of $\text{RX} \rightarrow \text{RH}$ ($\text{X} = \text{halo}$) see Section 160 (Hydrides from Halides and Sulfonates).



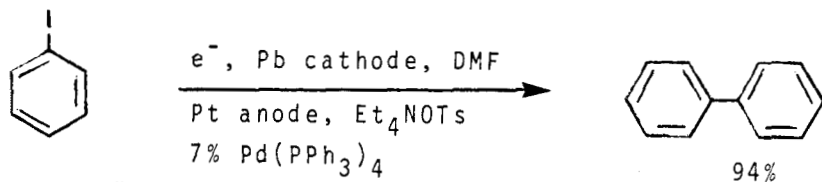
Momosi, D.; Iguchi, K.; Sugujama, T.; Yamada, Y.*
Tetrahedron Lett, (1983), 24, 921



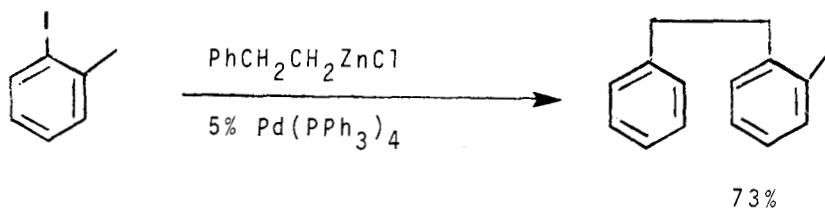
Matsumoto, H.; Inaba, S.; Rieke, R.D.*
J Org Chem, (1983), 48, 840



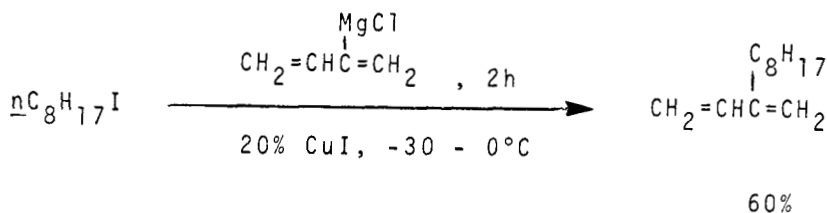
Widdowson, D.A.*; Zhang, Y.-A. Tetrahedron, (1986), **42**, 2111



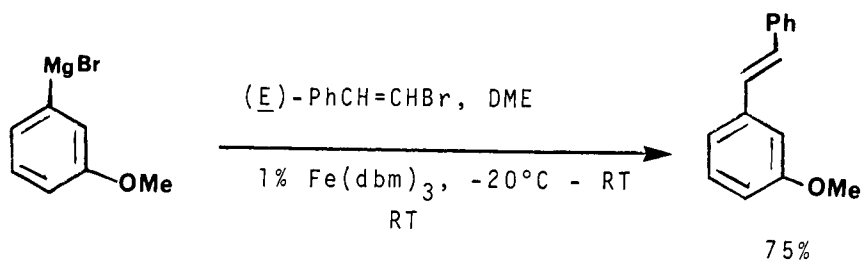
Torii, S.*; Tanaka, H.; Morisaki, K.
Tetrahedron Lett, (1985), **26**, 1655



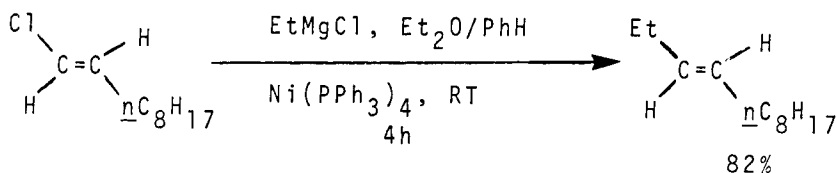
Negishi, E.*; Matsushita, H.; Kobayashi, M.; Rand, C.L.
Tetrahedron Lett, (1983), **24**, 3823



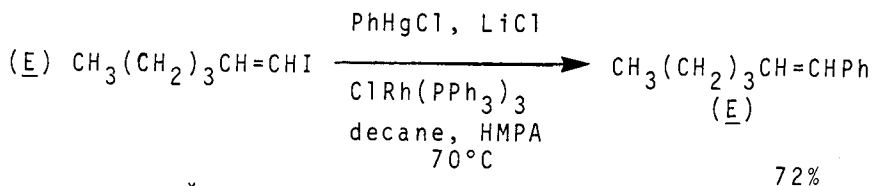
Nunomoto, S.*; Kawakami, Y.*; Yamashita, Y.
J Org Chem, (1983), **48**, 1912



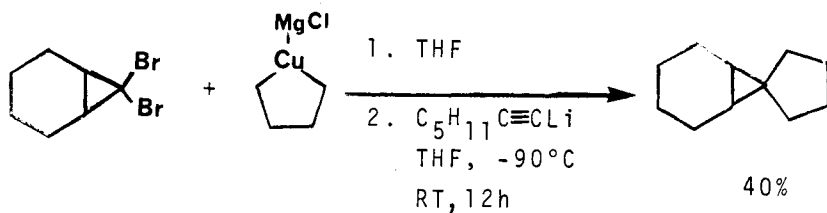
Molander, G.A.*; Rahn, B.J.; Shubert, D.C.; Bonde, S.E.
Tetrahedron Lett., (1983), 24, 5449



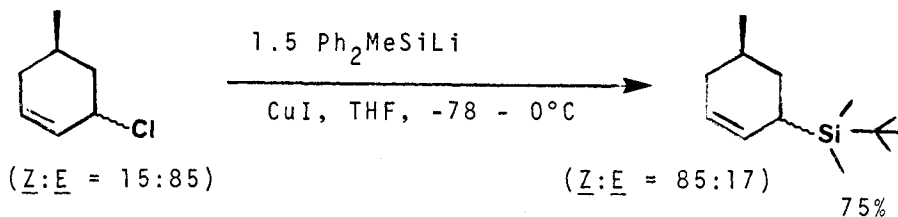
Ratovelomanana, V.; Linstrumelle, G.
Syn Commun., (1984), 14, 179



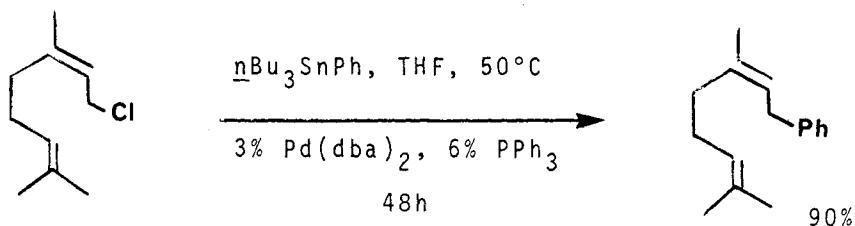
Larock, R.C.*; Narayanan, K.; Hershberger, S.S.
J Org Chem., (1983), 48, 4377



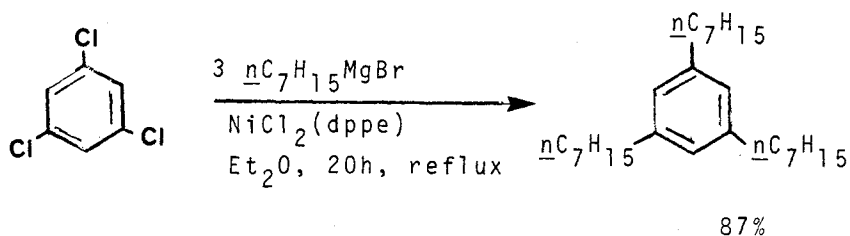
Scott, F.*; Mafunda, B.G.; Normant, J.F.; Alexakis, A.
Tetrahedron Lett., (1983), 24, 5767



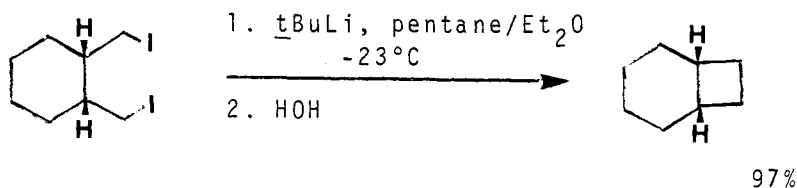
Laycock, B.; Kitching, W.*; Wickham, G.
Tetrahedron Lett., (1983), **24**, 5785



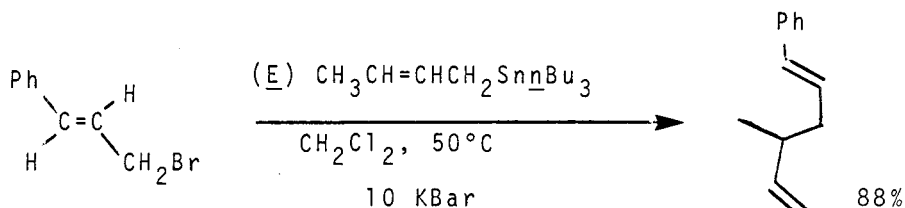
Sheffy, F.K.; Stille, J.K.* J Am Chem Soc., (1983), **105**, 7173



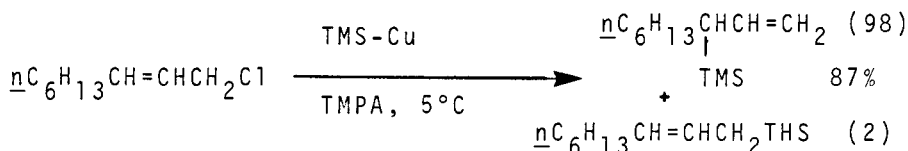
Eapen, K.C.; Dua, S.S.; Tamborski, C.*
J Org Chem., (1984), **49**, 478



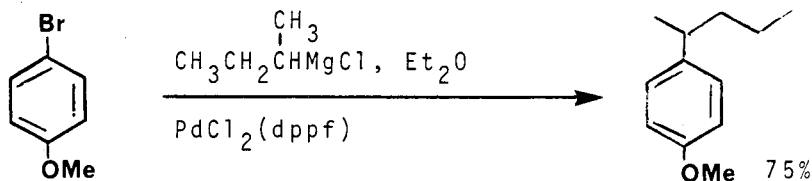
Bailey, W.F.*; Gagnier, R.P.; Patricia, J.J.
J Org Chem., (1984), **49**, 2098



Yamamoto, Y.*; Muruyama, K.; Matsumoto, K.
JCS Chem Comm, (1984), 548

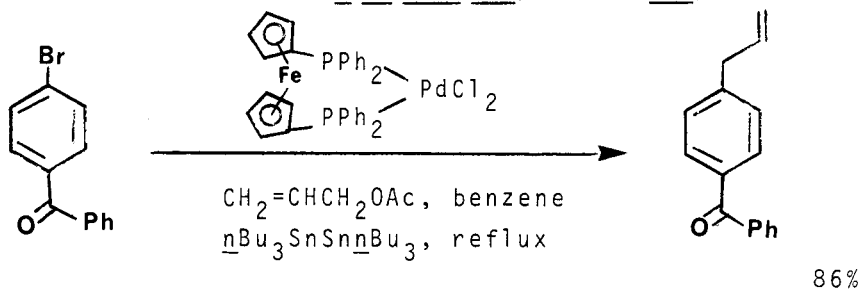


Smith, J.G.*; Drozda, S.E.; Petraglia, S.P.; Quinn, N.K.; Rice, E.M.; Taylor, B.S.; Viswanathan, M.
J Org Chem, (1984), 49, 4112

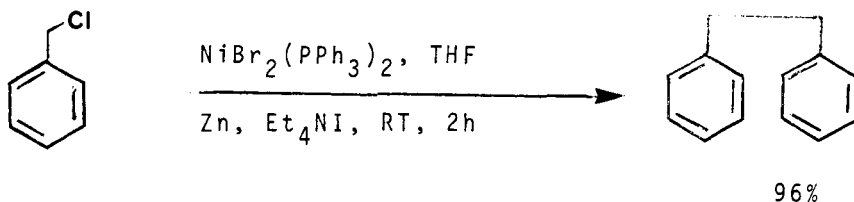


Hayashi, T.*; Konishi, M.; Kobori, Y.; Kumada, M.; Higuchi, T.; Hirotsu, K.

J Am Chem Soc, (1984), 106, 158

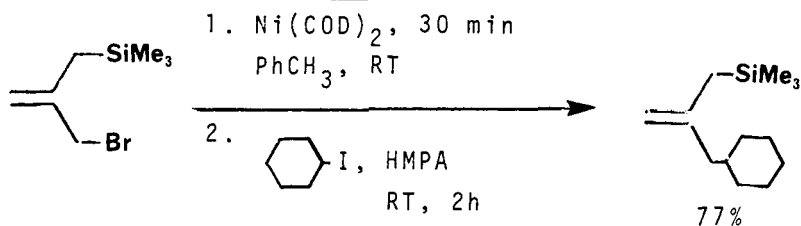


Yokoyama, Y.; Ito, S.; Takahashi, Y.; Murakami, Y.*
Tetrahedron Lett, (1985), 26, 6457



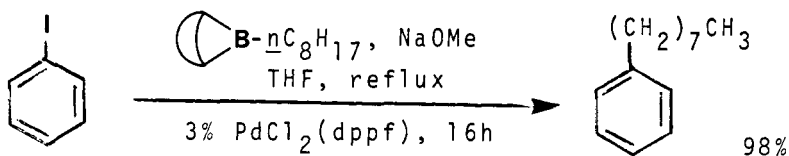
Iyoda, M.*; Sakaitani, M.; Otsuka, H.; Oda, M.*

Chem Lett, (1985), 127



Molander, G.A.*; Shubert, D.C.

Tetrahedron Lett, (1986), 27, 787



Miyaura, N.; Ishiyama, T.; Ichikawa, M.; Suzuki, A.*

Tetrahedron Lett, (1986), 27, 6369

Reviews:

"Copper Assisted Nucleophilic Substitution of Aryl Halogen"

Lindley, J.* Tetrahedron, (1984), 40, 1433

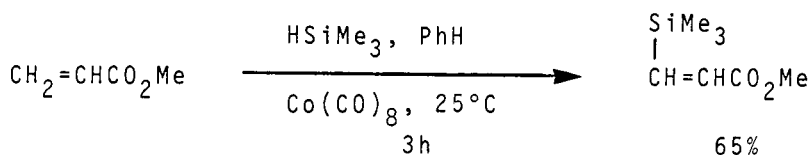
"The Chemistry of Higher Order Cuprates"

Lipshutz, B.H.*; Wilhelm, R.S.; Kozlowski, J.A.

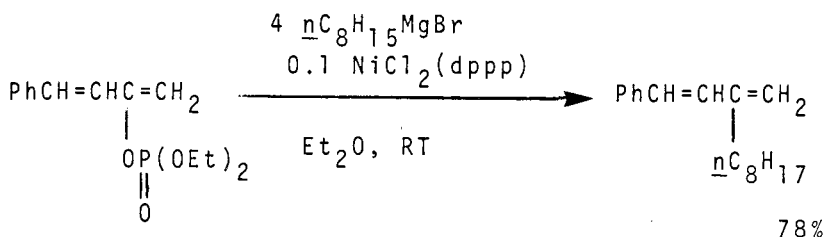
Tetrahedron, (1984), 40, 5005

SECTION 71: Alkyls, Methylenes, and Aryls from Hydrides

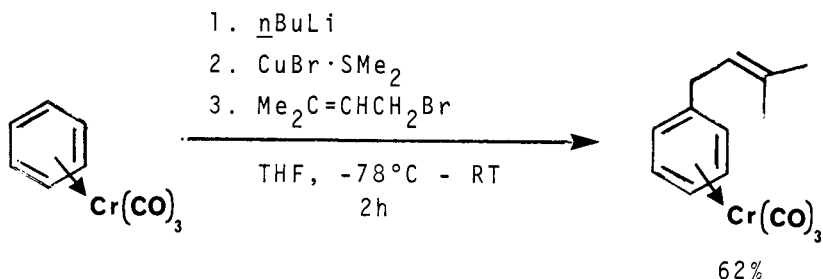
This section lists examples of the reaction $RH \rightarrow RR'$ ($R, R' =$ alkyl or aryl). For the reaction $C=CH \rightarrow C=CR$ ($R =$ alkyl or aryl) see Section 209 (Olefins from Olefins). For alkylations of ketones and esters, see Section 177 (Ketones from Ketones) and Section 113 (Esters from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



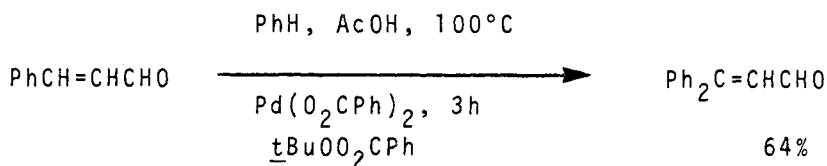
Takeshita, K.; Seki, Y.*; Kawamoto, K.; Murai, S.*; Sonoda, N.
JCS Chem Comm, (1983), 1193



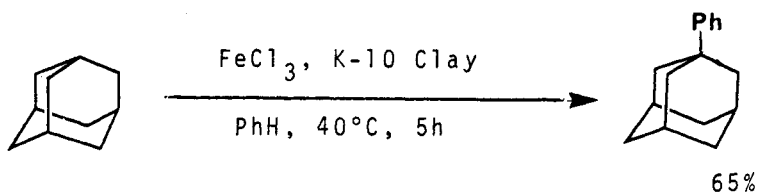
Sahlberg, C.; Quader, A.; Claesson, A.*
Tetrahedron Lett, (1983), 24, 5137



Beswick, P.J.; Leach, S.J.; Masters, N.F.; Widdowson, D.A.*
JCS Chem Comm, (1984), 46

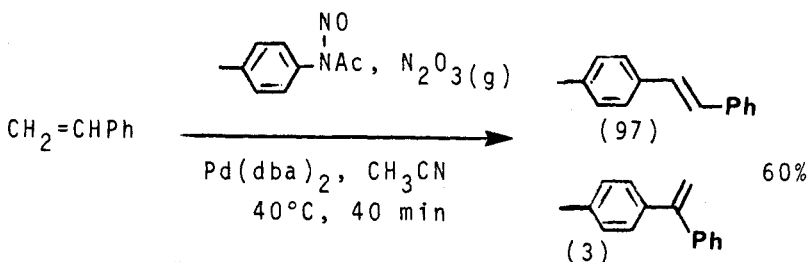


Tsuji, J.*; Nagashima, H. Tetrahedron, (1984), **40**, 2699



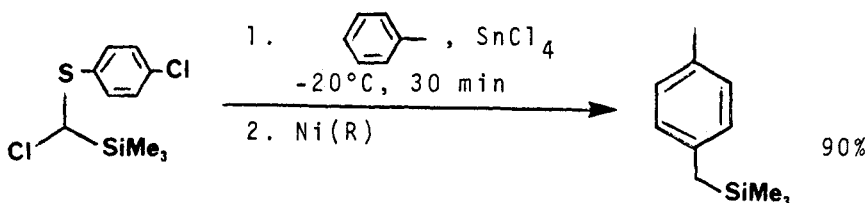
Chalais, S.*; Cornelis, A.; Gerstmans, A.; Kolodziejewski, W.; Laszlo, P.*; Mathy, A.; Metra, P.

Helv Chim Acta, (1985), **68**, 1196



Kikukawa, K.*; Naritomi, M.; He, G.-X.; Wada, F.; Matsuda, T.

J Org Chem, (1985), **50**, 299

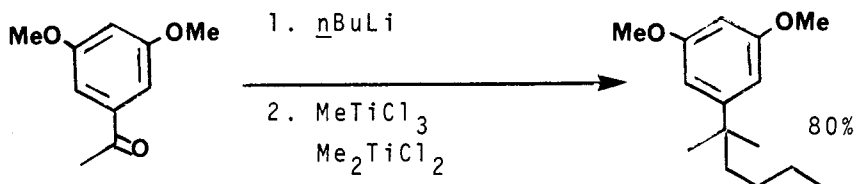


Ishibashi, H.*; Nakatani, H.; Umei, Y.; Ikeda, M.

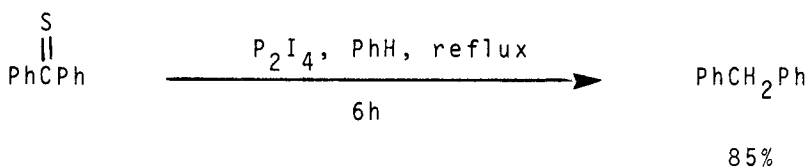
Tetrahedron Lett, (1985), **26**, 4373

SECTION 72: Alkyls, Methylene, and Aryls from Ketones

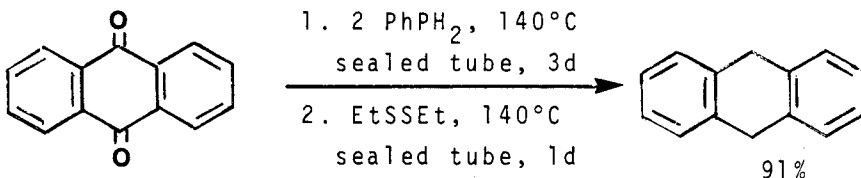
The conversions $R_2CO \rightarrow RR$, R_2CH_2 , R_2CHR' , etc. are listed in this section.



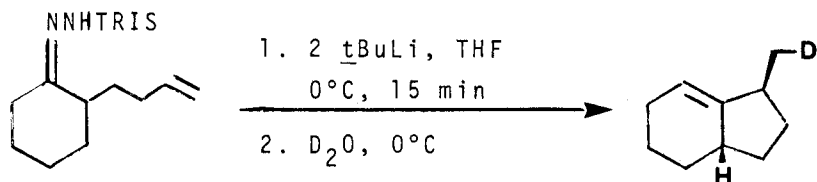
Reetz, M.T.*; Westermann, J. J Org Chem, (1983), **48**, 254



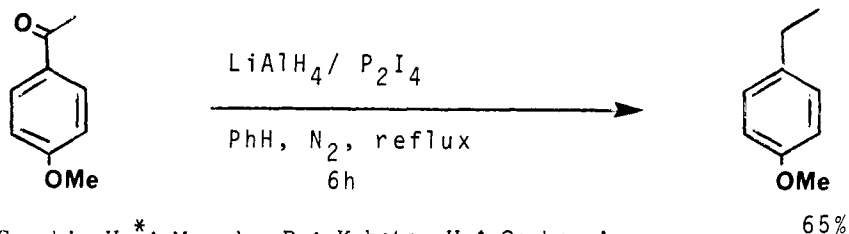
Suzuki, H.*; Tani, H.; Takeuchi, S. Bull Chem Soc Jpn, (1985), **58**, 2421



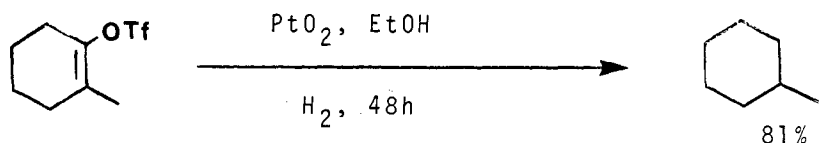
Tamano, M.; Koketsu, J.* Bull Chem Soc Jpn, (1985), **58**, 2577



Chamberlin, A.R.*; Bloom, S.H. Tetrahedron Lett, (1986), **27**, 551



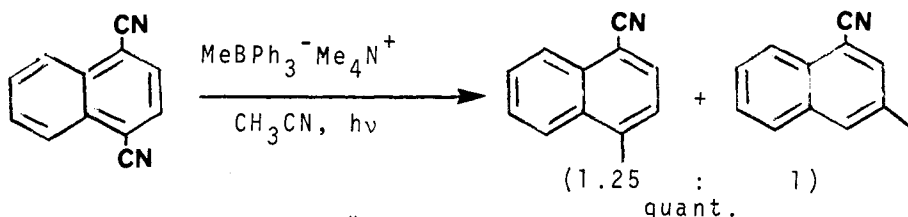
Suzuki, H.*; Masuda, R.; Kubota, H.; Osuka, A.
Chem Lett, (1983), 909



Subramanian, L.R.*; Garcia Martinez, A.*; Herrera Fernandez, A.;
 Martinez Alvarez, R.

Synthesis, (1984), 481

SECTION 73: Alkyls, Methylenes, and Aryls from Nitriles



Lan, J.Y.; Schuster, G.B.* Tetrahedron Lett, (1986), 27, 4261

SECTION 74: Alkyls, Methylenes, and Aryls from Olefins

The following reaction types are included in this section:

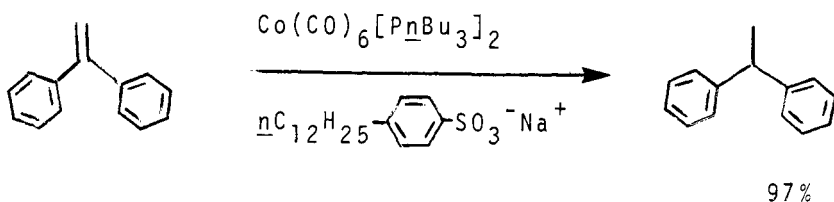
- A. Hydrogenation of Olefins (and Aryls).
- B. Formation of Aryls.
- C. Alkylations and Arylations of Olefins.
- D. Conjugate Reduction of Conjugated Aldehydes, Ketones, Acids, Esters, and Nitriles.

E. Conjugate Alkylations.

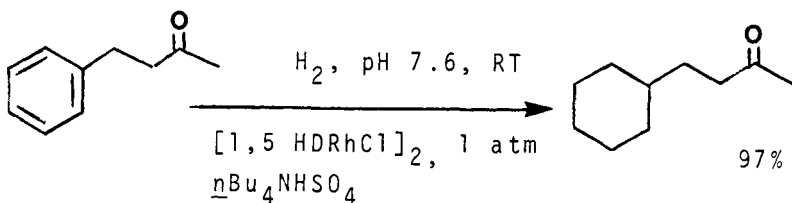
F. Cyclopropanations, including halocyclopropanations.

SECTION 74A: Hydrogenation of Olefins (and Aryls)

Reduction of aryls to dienes are listed in Section 377 (Olefin - Olefin).

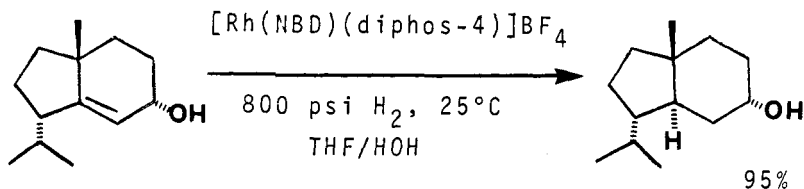


Alper, H.*; Heveling, J. JCS Chem Comm, (1983), 365

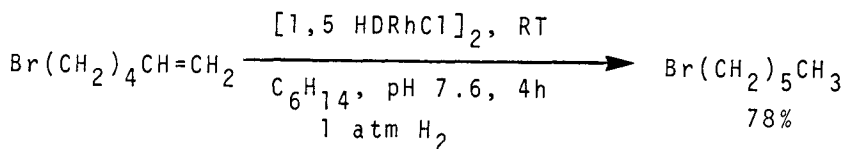


Januszkiewicz, K.R.; Alper, H.*

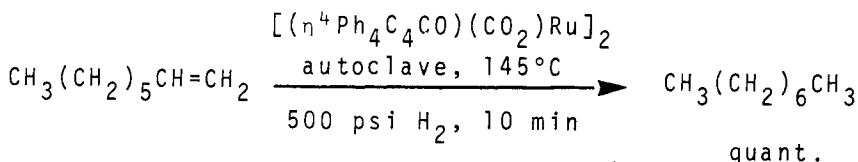
Organometallics, (1983), 2, 1055



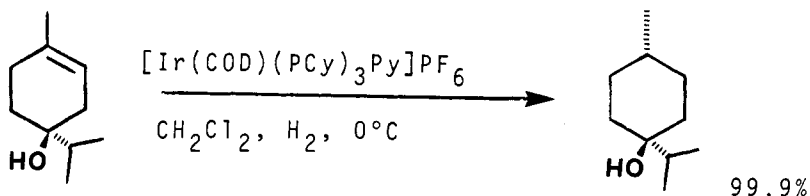
Evans, D.A.*; Morrissey, M.M. J Am Chem Soc, (1984), 106, 3866



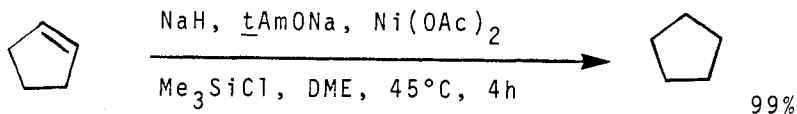
Januszkiewicz, K.R.; Alper, H.* Can J Chem, (1984), **62**, 1031



Blum, Y.; Czarkie, D.; Rahamim, Y.; Shvo, Y.*
Organometallics, (1985), **4**, 1459



Crabtree, R.H.*; Davis, M.W. J Org Chem, (1986), **51**, 2655



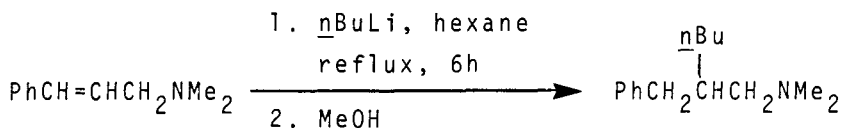
Fort, Y.; Vanderesse, R.; Caubere, P.*
Tetrahedron Lett, (1986), **27**, 5487

Review: "cis-Aky1 and cis-Acylrhodium and Iridium Hydrides:
Model Intermediates in Homogeneous Catalysis"

Milstein, D.* Accts Chem Res, (1984), **17**, 221

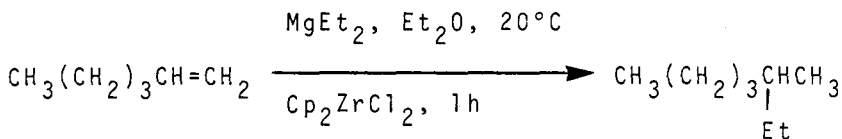
SECTION 74B: Dehydrogenation to form Aryls

No Additional Examples

SECTION 74C: Alkylations and Arylations of Olefins

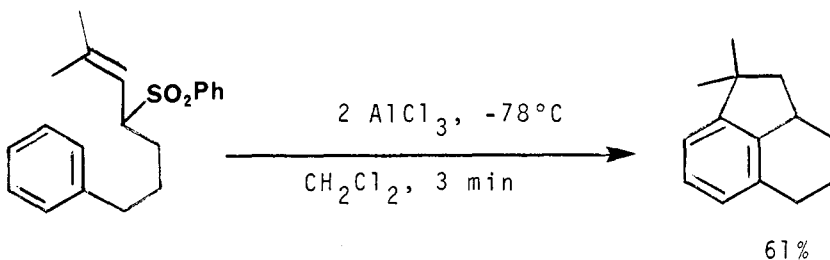
52%

Richey Jr., H.G.*; Heyn, A.S.; Erickson, W.F.
J Org Chem, (1983), 48, 3821



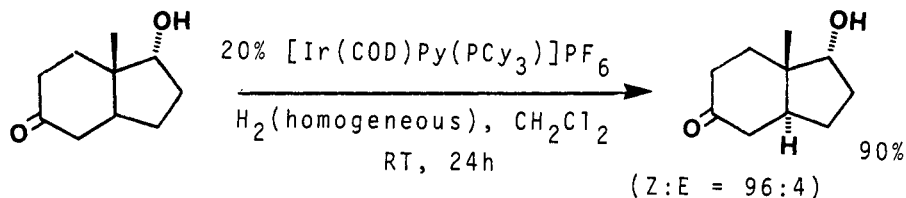
93%

Dzhemilev, U.M.; Vostrikova, O.S.; Sultanov, R.M.
Bull Acad Sci USSR, (1983), 32, 193

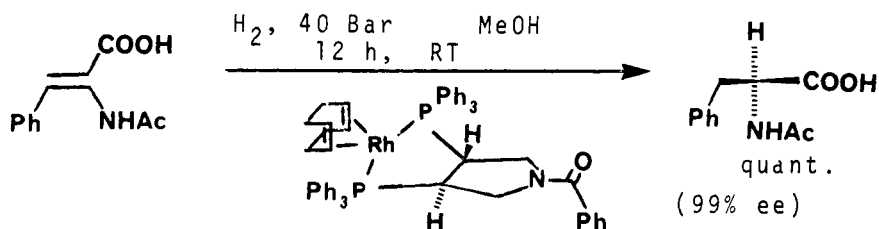


61%

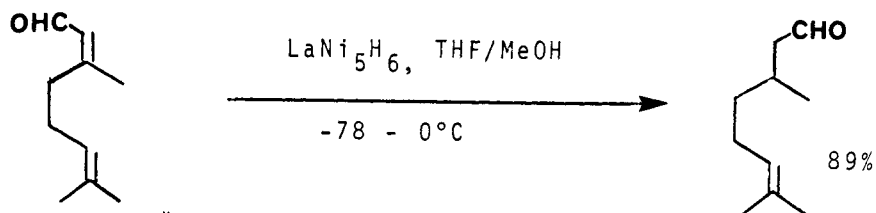
Trost, B.M.*; Ghadiri, M.R. J Am Chem Soc, (1984), 106, 7260

SECTION 74D: Conjugate Reductions

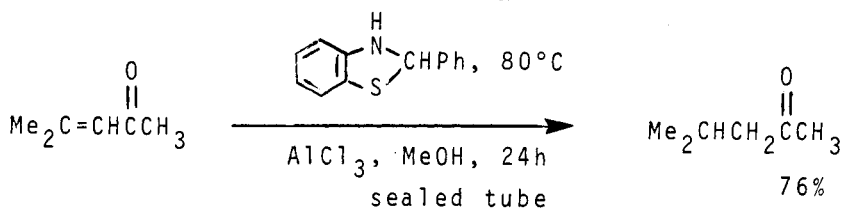
Stork, G.*; Kahne, D.E. J Am Chem Soc, (1983), 105, 1072



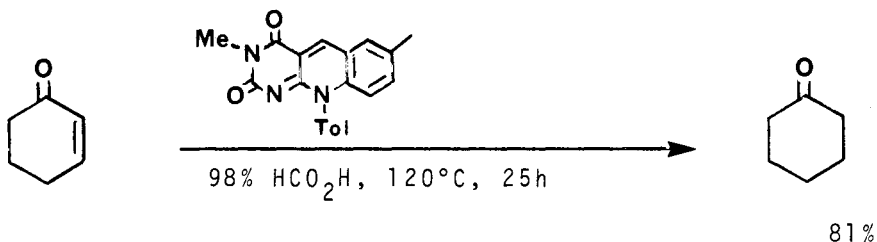
Nagel, U.* Angew Chem Int Ed Engl, (1984), 23, 435



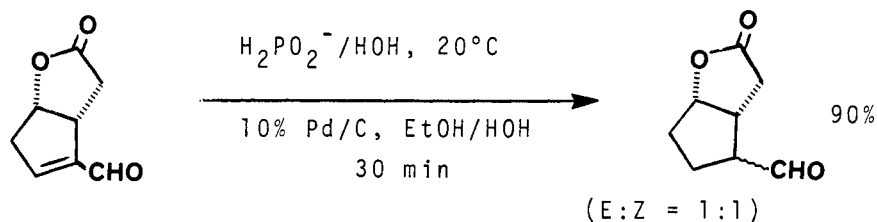
Inamoto, T.*; Mita, T.; Yokoyama, M.
JCS Chem Comm, (1984), 163



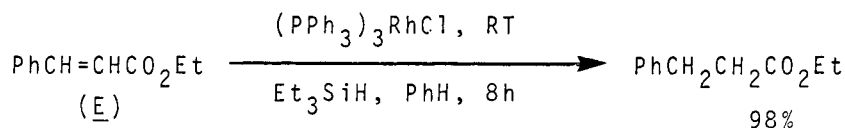
Chikashita, H.*; Miyazaki, M.; Itoh, K. Synthesis, (1984), 308



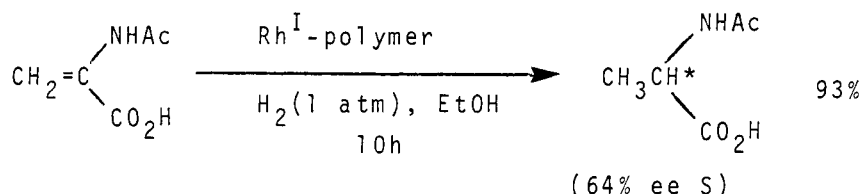
Yoneda, F.*; Kuroda, K.; Tanaka, K.
JCS Chem Comm, (1984), 1194



Sala, R.*; Doria, G.; Passarotti, C.
Tetrahedron Lett, (1984), 25, 4565

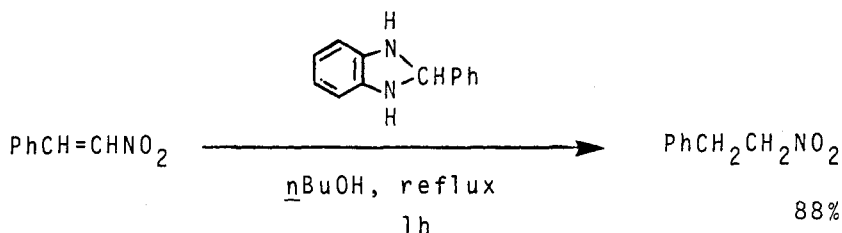


Liu, H.-J.*; Ramani, B. Syn Commun, (1985), 15, 965

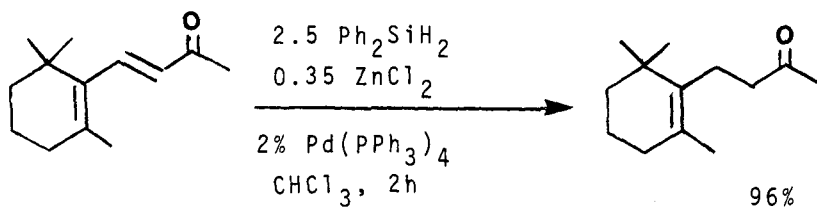


(64% ee S)
 polymer - 2,2-O-isopropylidene-2,3-dihydroxy-1,4-bis(diphenylphosphino)butane

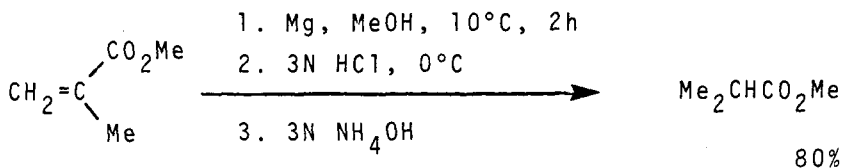
Deschenaux, R.; Stille, J.K.* J Org Chem, (1985), 50, 2299



Chikashita, H.*; Morita, Y.; Itoh, K.
Syn Commun, (1985), 15, 527

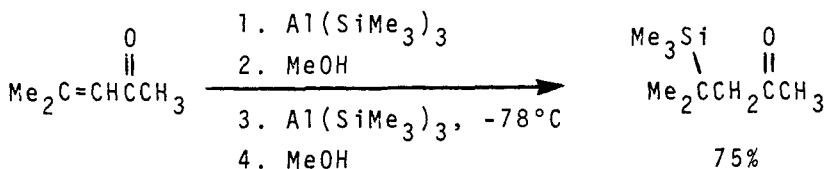


Keinan, E.*; Greenspoon, N. Tetrahedron Lett, (1985), 26, 1353

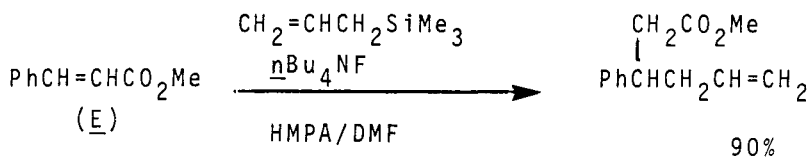


Youn, I.K.; Yon, G.H.; Pak, C.S.*
Tetrahedron Lett, (1986), 27, 2409

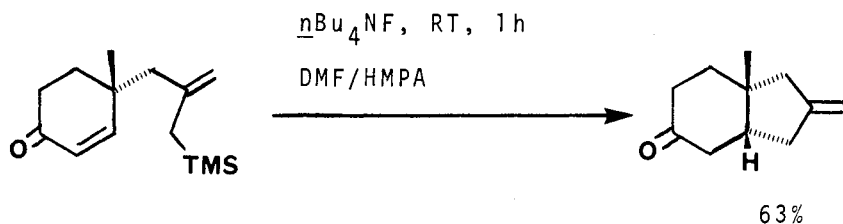
SECTION 74E: Conjugate Alkylations



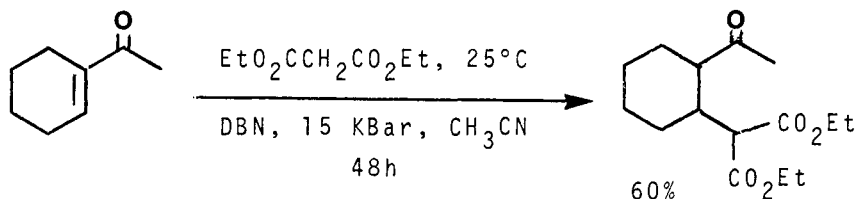
Altnau, G.; Rösch, L.* Tetrahedron Lett, (1983), 24, 45



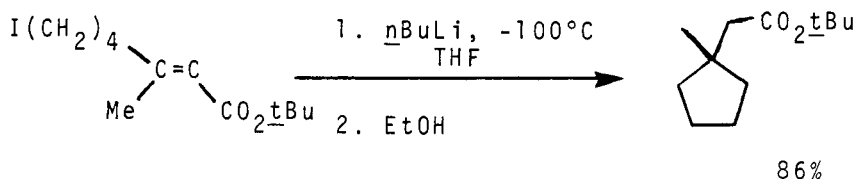
Majetich, G.*; Casares, A.M.; Chapman, D.; Behnke, M.
Tetrahedron Lett., (1983), 24, 1909



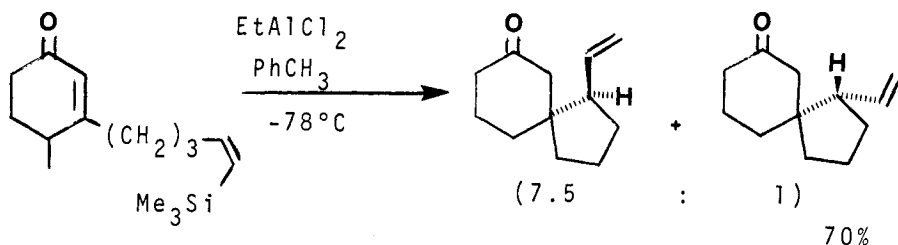
Majetich, G.*; Desmond, R.; Casares, A.M.
Tetrahedron Lett., (1983), 24, 1913



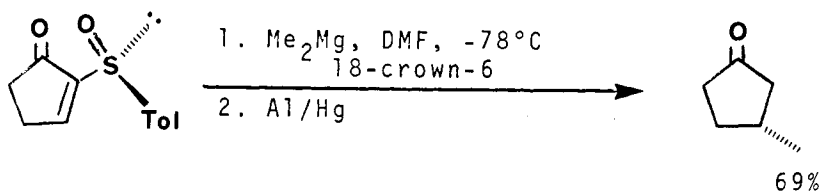
Dauben, W.G.*; Gerdes, J.M. Tetrahedron Lett., (1983), 24, 3841



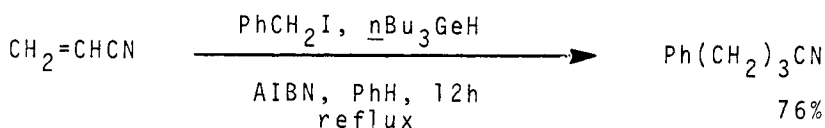
Cooke Jr., M.P.* J Org Chem., (1984), 49, 1144



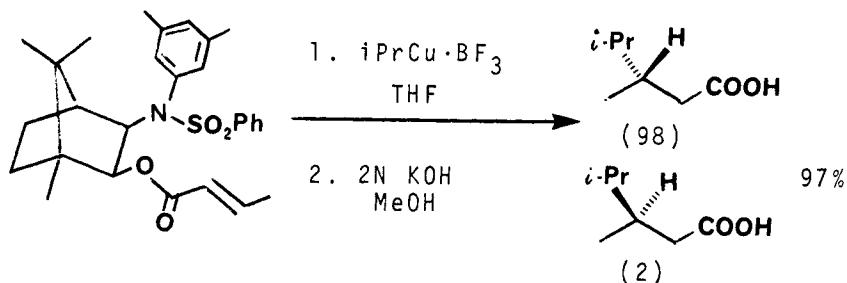
Schinzer, D.* Angew Chem Int Ed Engl, (1984), **23**, 308



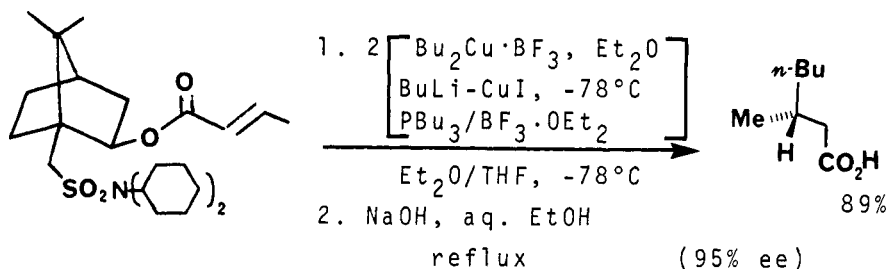
Posner, G.H.*; Hulce, M. (97% ee)
Tetrahedron Lett, (1984), **25**, 379, 383



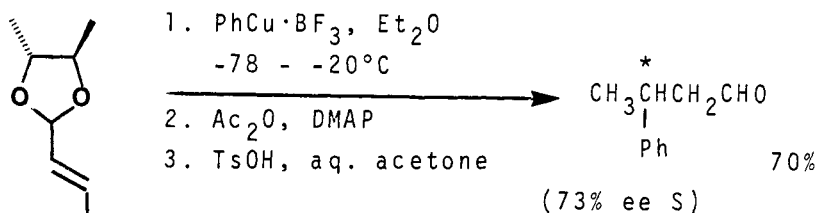
Pike, P.; Hershberger, S.; Hershberger, J.*
Tetrahedron Lett, (1985), **26**, 6289



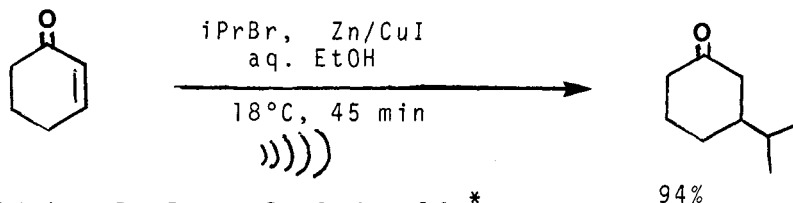
Helmchen, G.*; Wegner, G. Tetrahedron Lett, (1985), **26**, 6051



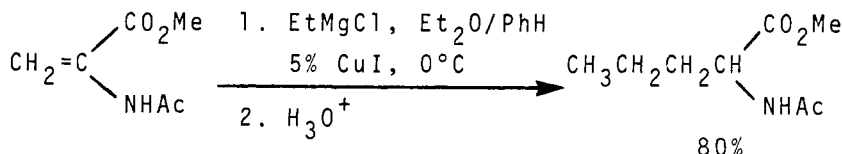
Oppolzer, W.*; Dudfield, P.; Stevenson, T.; Godel, T.
Helv Chim Acta, (1985), **68**, 212, 216



Mangeney, P.; Alexakis, A.; Normant, J.F.*
Tetrahedron Lett., (1986), **27**, 3143

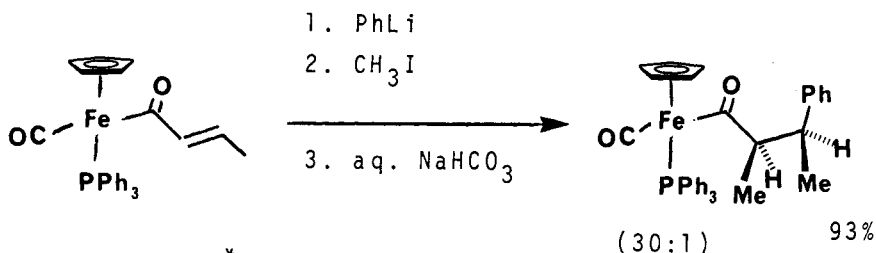


Petrier, C.; Dupuy, C.; Luche, J.L.*
Tetrahedron Lett., (1986), **27**, 3149
 de Souza Barboza, J.C.; Petrier, C.; Luche, J.-L.*
Tetrahedron Lett., (1985), **26**, 829



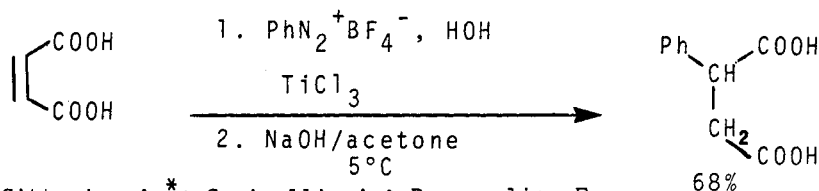
Cardellicchio, C.; Fiandanese, V.; Marchese, G.; Naso, F.*;
 Ronzini, L.

Tetrahedron Lett., (1985), **26**, 4387



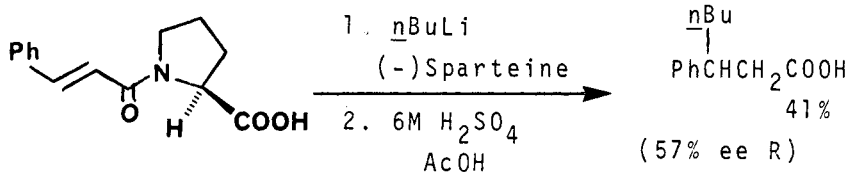
Liebeskind, L.S.*; Welker, M.E.

Tetrahedron Lett., (1985), 26, 3079

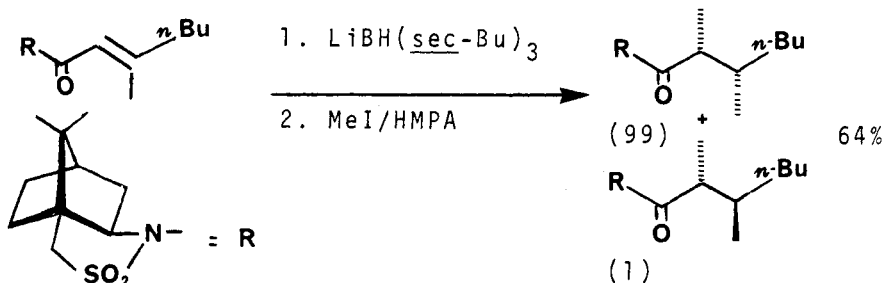


Citterio, A.*; Cominelli, A.; Bonavoglia, F.

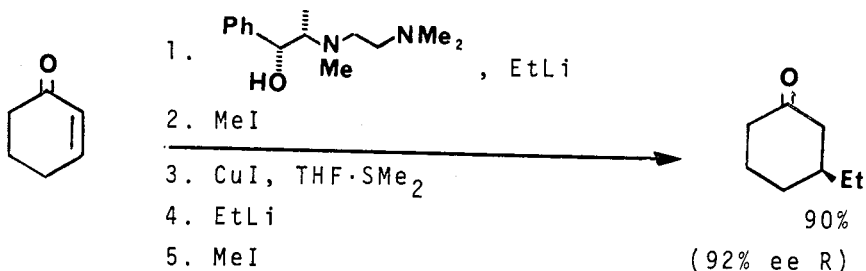
Synthesis, (1986), 308



Soai, K.*; Ookawa, A. JCS Perkin I, (1986), 759

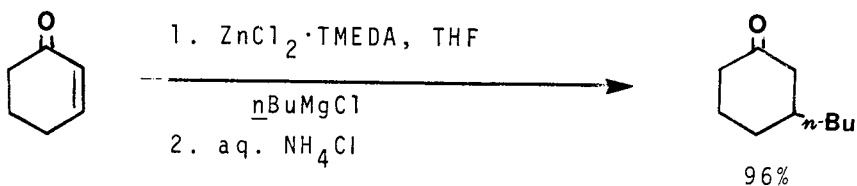


Oppolzer, W.*; Poli, G. Tetrahedron Lett., (1986), 27, 4717

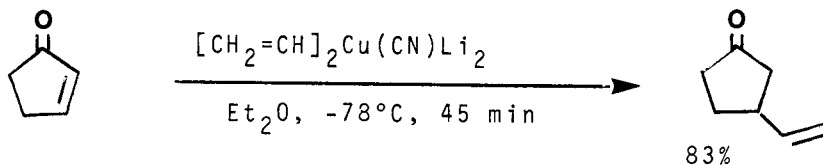


Corey, E.J.*; Naef, R.; Hannon, F.J.

J Am Chem Soc, (1986), **108**, 7114

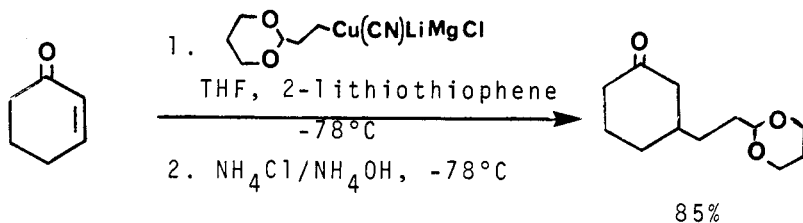


Kjonaas, R.A.*; Vawter, E.J. J Org Chem, (1986), **51**, 3993



Lipshutz, B.H.*; Wilhelm, R.S.; Kozlowski, J.A.

J Org Chem, (1984), **49**, 3938



Lipshutz, B.H.*; Parker, D.A.; Nguyen, S.L.; McCarthy, K.E.;
 Barton, J.C.; Whitney, S.E.; Kotsuki, H.

Tetrahedron, (1986), **42**, 2873

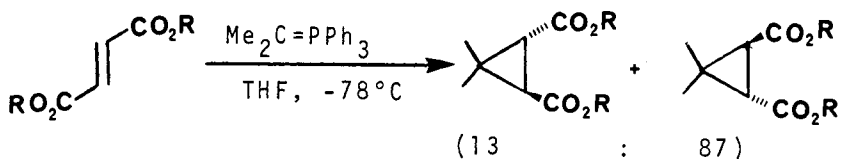
Reviews:

"The Chemistry of Higher Order Cuprates"

Lipshutz, B.H.*; Wilhelm, R.S.; Kozlowski, J.A.
Tetrahedron, (1984), 40, 5005

"Selective Synthesis by Use of Lewis Acids in the
 Presence of Organocopper and Related Reagents"

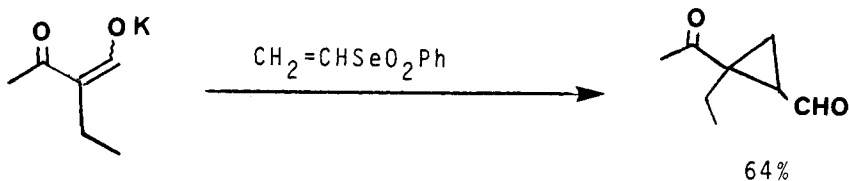
Yamamoto, Y.* Angew Chem Int Ed Engl, (1986), 25, 947

SECTION 74F: Cyclopropanations

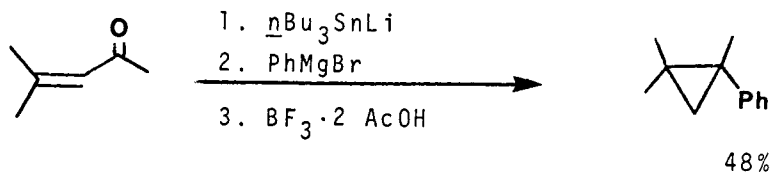
R = menthyl

(74% ee) 85%

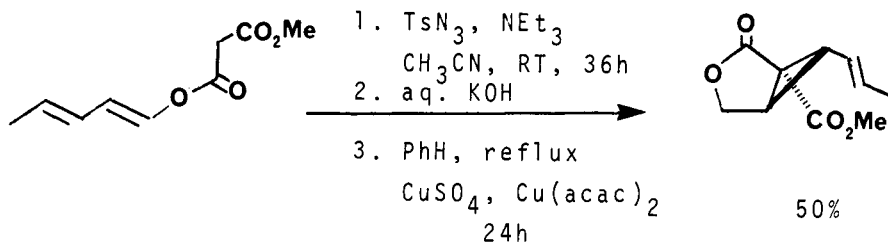
de Vos, M.J.; Krief, A.* Tetrahedron Lett, (1983), 24, 103



Ando, R.; Sugawara, T.; Kuwajima, I.*
JCS Chem Comm, (1983), 1514

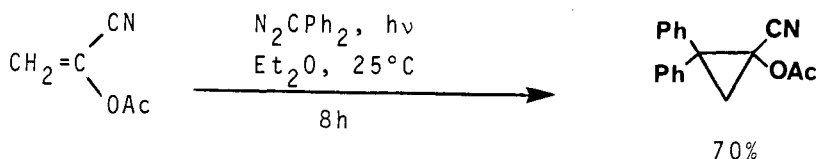


Fleming, I.*; Urch, C.J. Tetrahedron Lett, (1983), 24, 4591



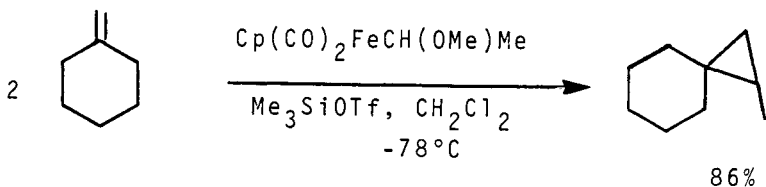
Hudlicky, T.*; Reddy, D.B.; Govindan, S.V.; Kulp, T.; Still, B.; Sheth, J.P.

J Org Chem, (1983), 48, 3423



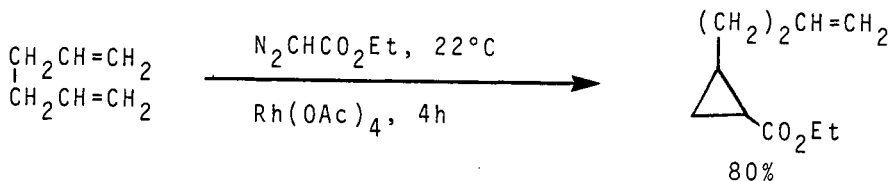
Oku, A.*; Yokoyama, T.; Harada, T.

J Org Chem, (1983), 48, 5333



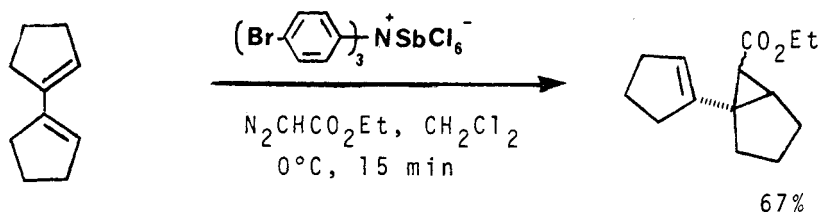
Brookhart, M.*; Tucker, J.R.; Husk, G.R.*

J Am Chem Soc, (1983), 105, 258

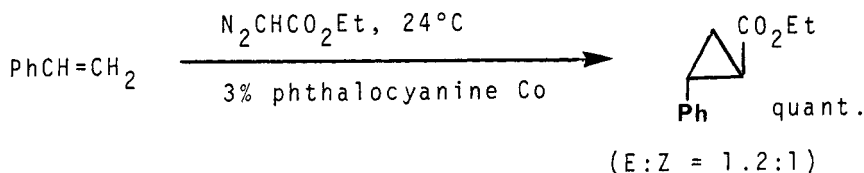


Anciaux, A.J.; Demonceau, A.; Noels, A.F.; Warin, R.; Hubert, A.J.; Teyssie, P.

Tetrahedron, (1983), 39, 2169



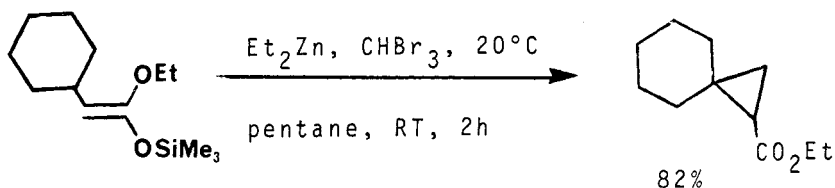
Stufflebeme, G.; Lorenz, K.T.; Bauld, N.L.*
J Am Chem Soc, (1986), **108**, 4234



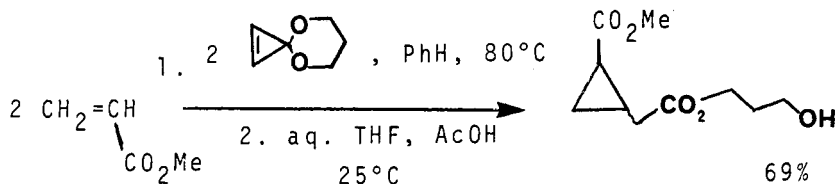
Pazynina, G.V.; Luk'yanets, E.A.; Bolesov, I.G.
J Org Chem USSR, (1984), **20**, 1731

$\text{Pd}(\text{OAc})_2$ catalyst, PhH, 40°C 76%

($\underline{\text{E}}:\underline{\text{Z}} = 1:2$)
 Majchrzak, M.W.*; Kotelko, A.; Lambert, J.B.
Synthesis, (1983), 469



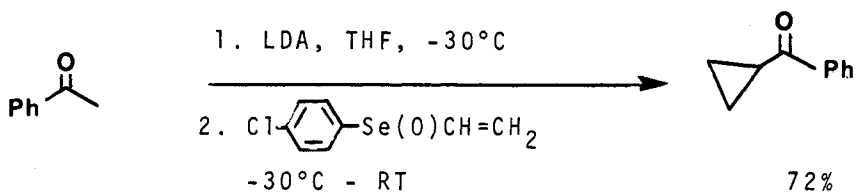
Rousseau, G.*; Slougui, N. J Am Chem Soc, (1984), **106**, 7283



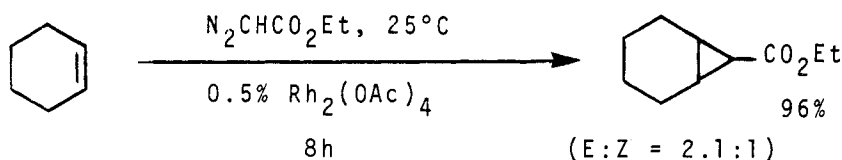
($\underline{\text{Z}}:\underline{\text{E}} = 95:1$)

Boger, D.L.*; Brotherton, C.E.

Tetrahedron Lett, (1984), **25**, 5611

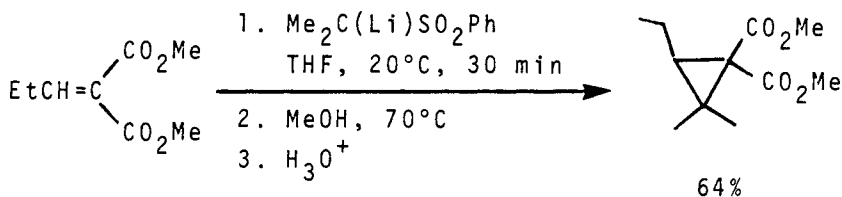


Ando, R.; Sugawara, T.; Shimizu, M.; Kuwajima, I.*
Bull Chem Soc Jpn, (1984), 57, 2897

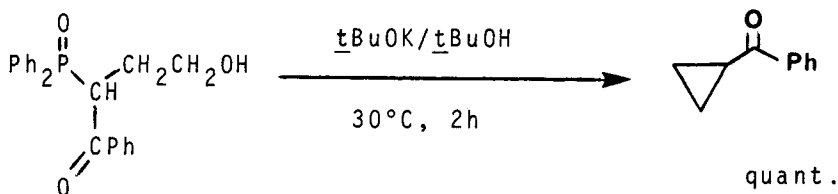


Doyle, M.P.*; Dorow, R.L.; Buhro, W.E.; Griffin, J.H.; Tamblyn, W.H.; Trudell, M.L.

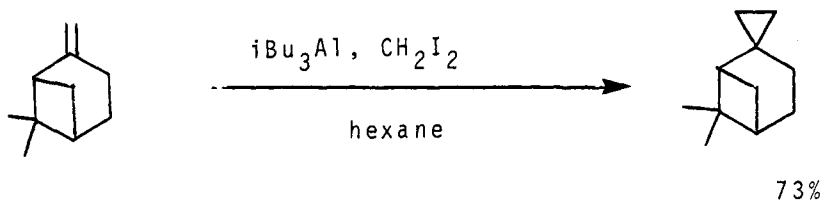
Organometallics, (1984), 3, 44



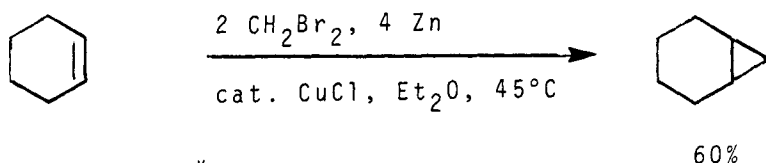
Krief, A.*; de Vos, M.J. Tetrahedron Lett, (1985), 26, 6115



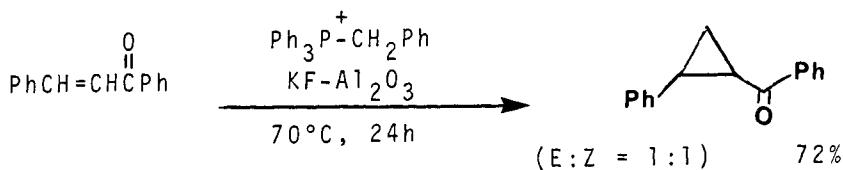
Wallace, P.; Warren, S.* Tetrahedron Lett, (1985), 26, 5713



Maruoka, K.; Fukutani, Y.*; Yamamoto, H.
J Org Chem, (1985), 50, 4412

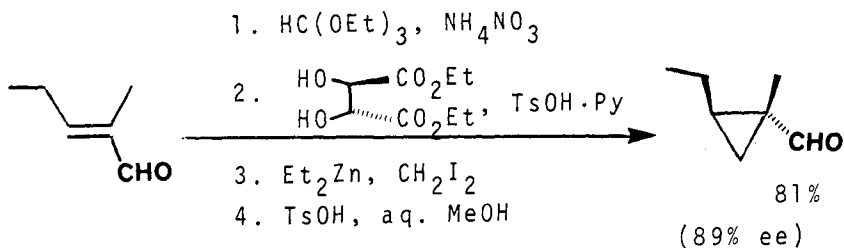


Friedrich, E.C.*; Domek, J.M.; Pong, R.Y.
J Org Chem, (1985), 50, 4640



Texier-Boullet, F.*; Villemin, D.; Ricard, M.; Moison, H.;
 Foucaud, A.

Tetrahedron, (1985), 41, 1259



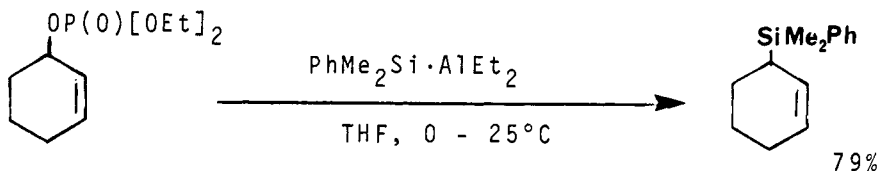
Arai, I.; Mori, A.; Yamamoto, H.*
J Am Chem Soc, (1985), 107, 8254
Tetrahedron, (1986), 42, 6447

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Murai, S.*; Ryu, I.; Sonoda, N.

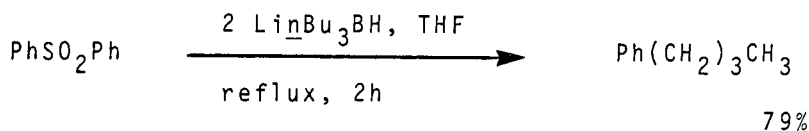
J Organomet Chem, (1983), 250, 121

SECTION 75: Alkyls, Methylenes, and Aryls from Miscellaneous Compounds



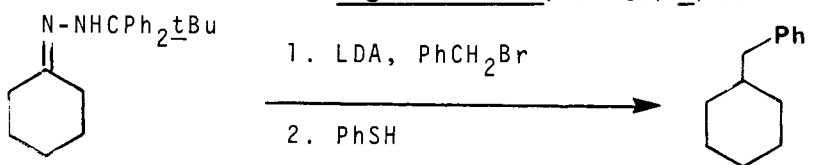
Okuda, Y.; Sato, M.; Oshima, K.; Nozaki, H.

Tetrahedron Lett, (1983), 24, 2015



Brown, H.C.*; Kim, S.-C.; Krishnamurthy, S.

Organometallics, (1983), 2, 779



Baldwin, J.C.*; Adlington, R.M.; Newington, I.M.

JCS Chem Comm, (1986), 176

Reviews:

"Copper(I) Catalyzed Reactions of Organolithiums and Grignard Reagents"

Erdik, E.* Tetrahedron, (1984), 40, 641

"Syntheses with Radicals: C-C Bond Formation via Organotin and Organomercury Compounds"

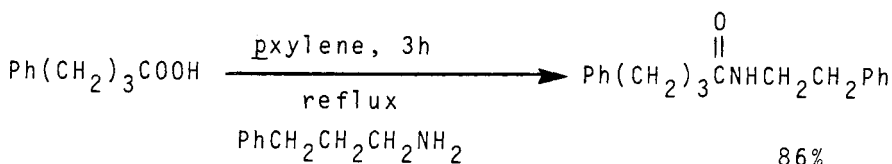
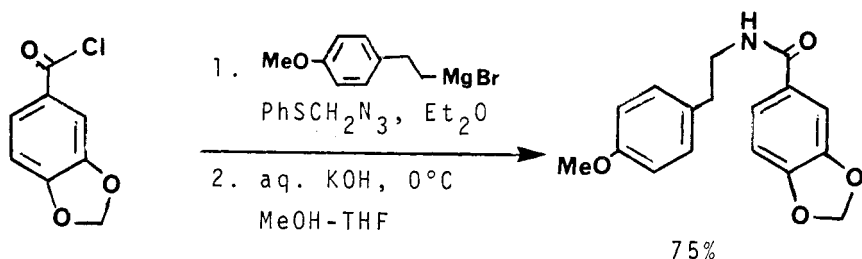
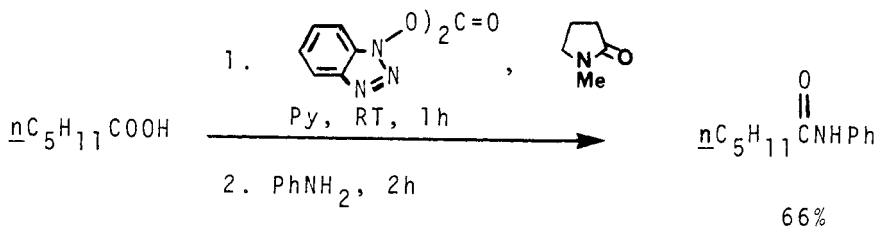
Giese, B.* Angew Chem Int Ed Engl, (1985), 24, 553

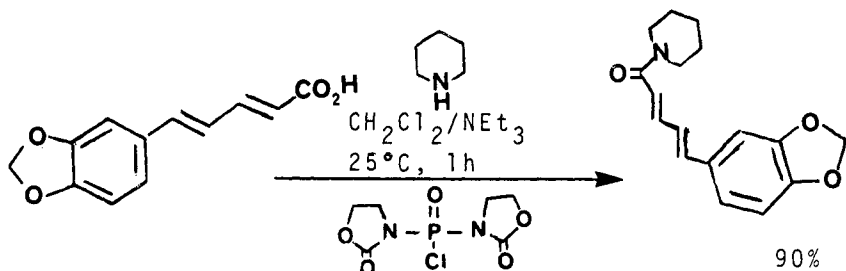
CHAPTER 6

PREPARATION OF AMIDES

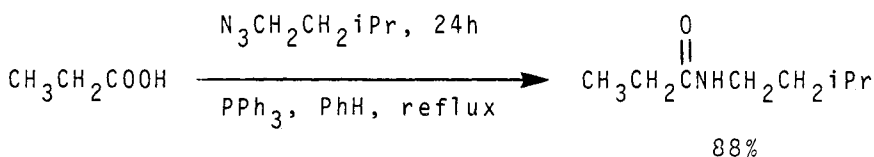
SECTION 76: Amides from Acetylenes

No Additional Examples

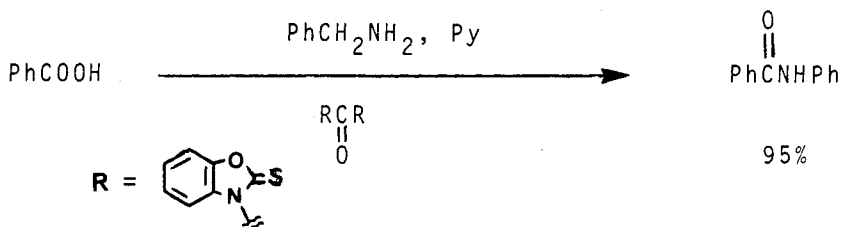
SECTION 77: Amides from Acid DerivativesMukaiyama, T.*; Ichikawa, J.; Asami, M. Chem Lett, (1983), 683Trost, B.M.*; Pearson, W.W. J Am Chem Soc, (1983), 105, 1054Ueda, M.*; Oikawa, H.; Teshirogi, J. Synthesis, (1983), 908



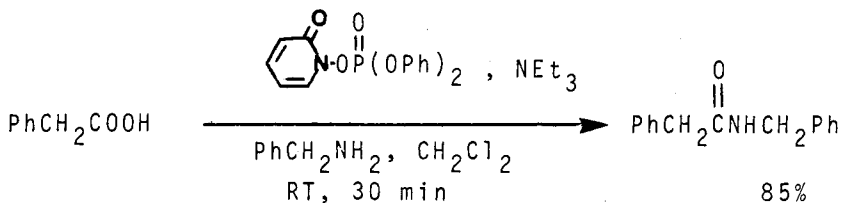
Cabré, J.; Palomo, A.L.* Synthesis, (1984), 413



Garcia, J.; Urfí, F.; Vilarrasa, J.* Tetrahedron Lett., (1984), 25, 4841



Ueda, M.*; Kawaharasaki, N.; Imai, Y. Bull Chem Soc Jpn., (1984), 57, 85

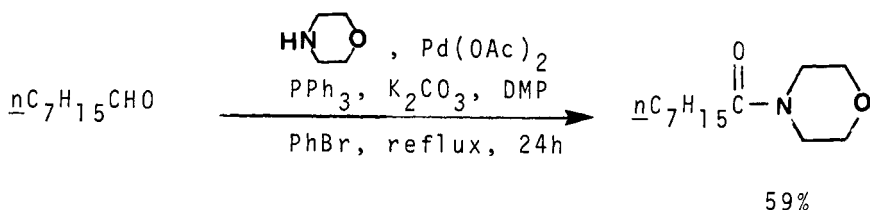
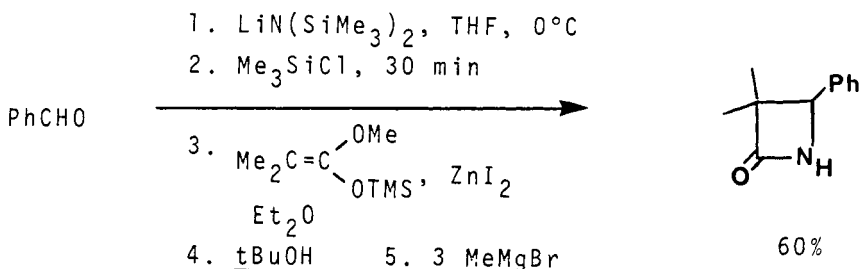


Kim, S.*; Kim, S.S. JCS Chem Comm, (1986), 719

Related Methods: Amides from Amines (Section 82)

SECTION 78: Amides from Alcohols and Thiols

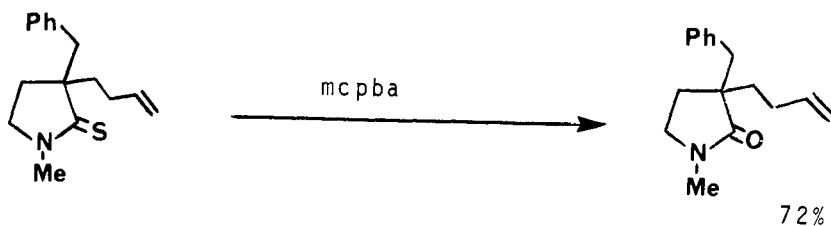
No Additional Examples

SECTION 79: Amides from AldehydesTamaru, Y.; Yamada, Y.; Yoshida, Z.* **Synthesis**, (1983), 474Colvin, E.W.*; McGarry, D.G. **JCS Chem Comm**, (1985), 539**SECTION 80: Amides from Alkyl, Methylenes, and Aryls**

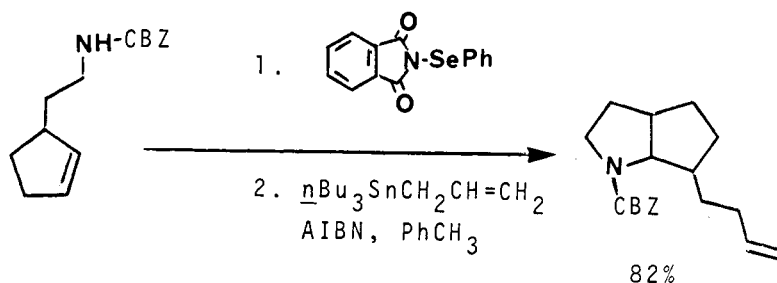
No Additional Examples

SECTION 81: Amides from Amides

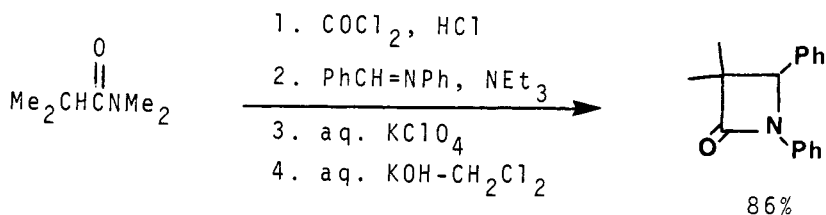
Conjugate reductions of unsaturated amides are listed in Section 74d (Alkyls from Olefins).



Kochhar, K.S.; Cottrell, D.A.; Pinnick, H.W.*
Tetrahedron Lett., (1983), 24, 1323

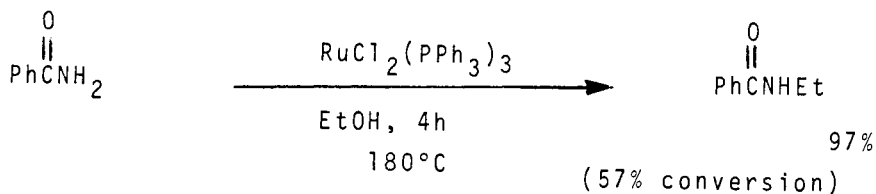


Webb II, R.R.; Danishefsky, S.*
Tetrahedron Lett., (1983), 24, 1357

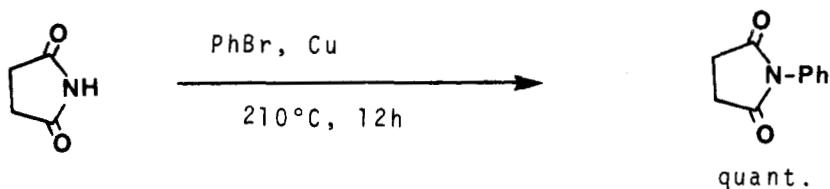


Marchand-Brynaert, J.; Moya-Portuguez, M.; Huber, I.; Chosez, L.*

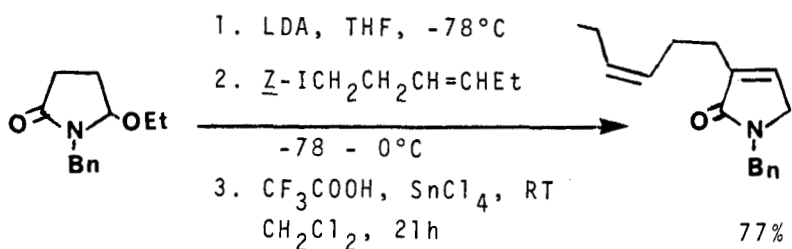
JCS Chem Comm., (1983), 818



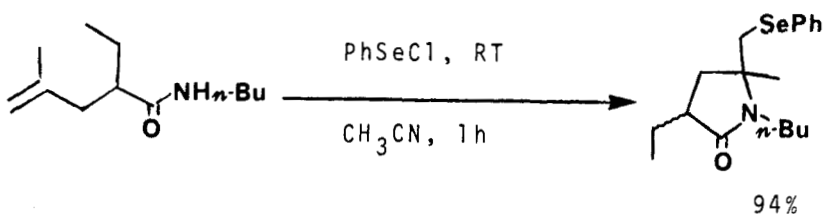
Watanabe, Y.*; Ohta, T.; Tsuji, Y.
Bull Chem Soc Jpn., (1983), 56, 2647



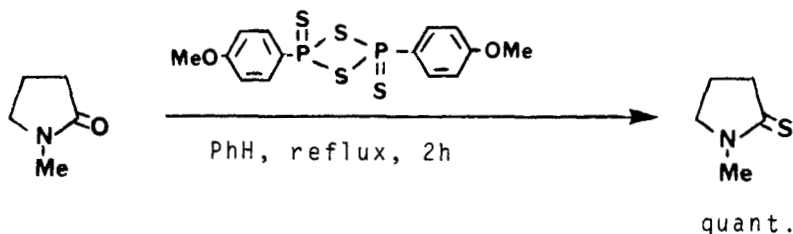
Yamamoto, T.*; Kurata, Y. Can J Chem, (1983), 61, 86



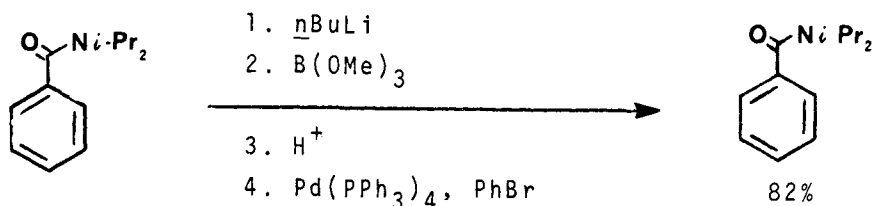
Hiemstra, H.*; Klaver, W.J.; Speckamp, W.N.
J Org Chem, (1984), 49, 1149



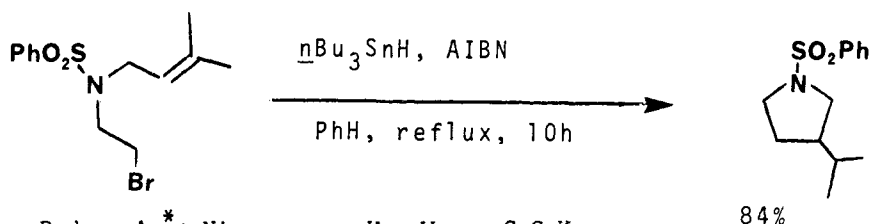
Toshimitsu, A.*; Terao, K.; Uemura, S.
Tetrahedron Lett, (1984), 25, 5917



Thomsen, I.; Clausen, K.; Scheibye, S.; Lawesson, S.-O.*
Org Syn, (1984), 62, 158



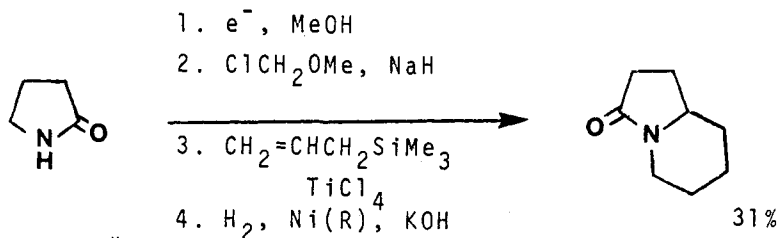
Sharp, M.J.; Snieckus, V.* Tetrahedron Lett., (1985), **26**, 5997



Padwa, A.*; Nimmesgern, H.; Wong, G.S.K.

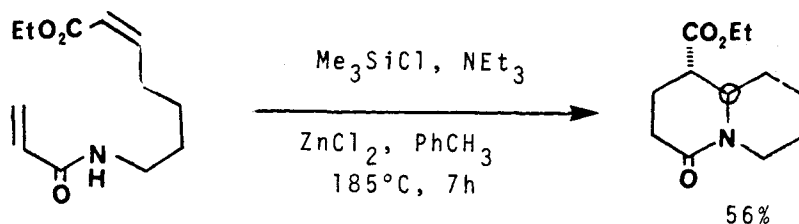
J Org Chem, (1985), **50**, 5620

Tetrahedron Lett., (1985), **26**, 957



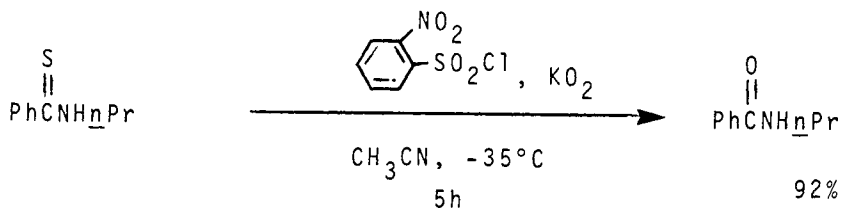
Shono, T.*; Matsumura, Y.; Uchida, K.; Kobayashi, H.

J Org Chem, (1985), **50**, 3243

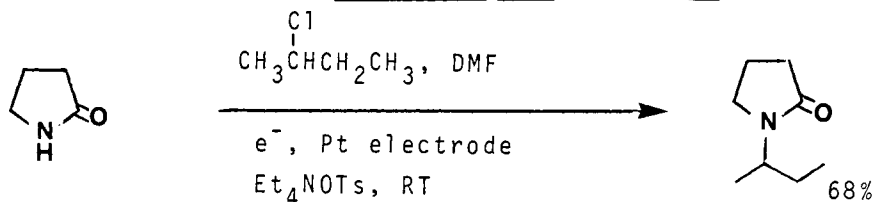


Ihara, M.; Kirihaara, T.; Fukumoto, K.*; Kametani, T.

Heterocycles, (1985), **23**, 1097

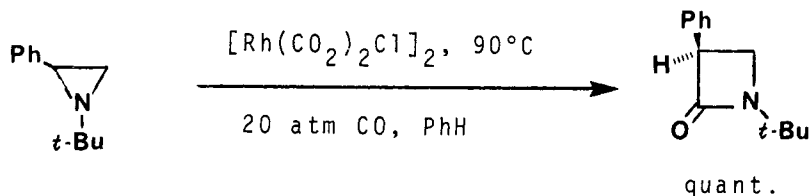


Kim, Y.H.*; Chung, B.C.; Chang, H.S.
Tetrahedron Lett., (1985), 26, 1079

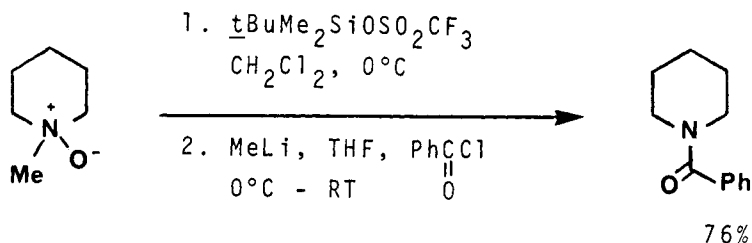


Shono, T.*; Kashimura, S.; Nagusa, H. Chem Lett., (1986), 425

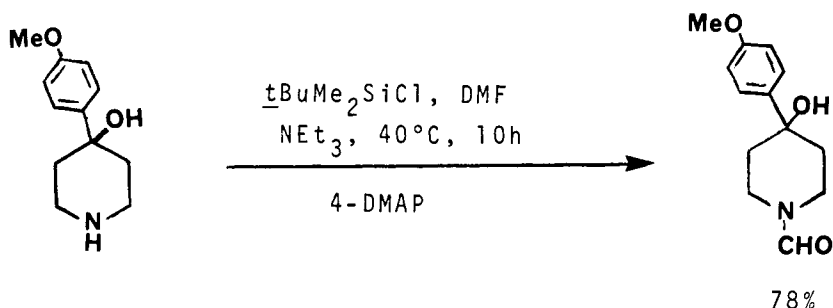
SECTION 82: Amides from Amines



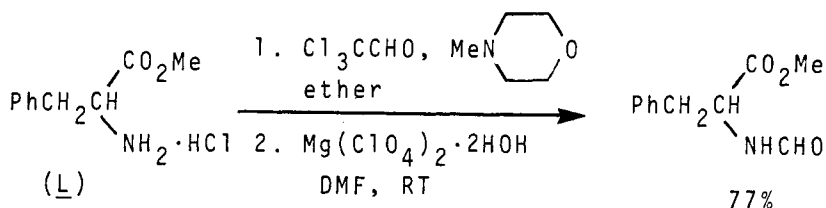
Alper, H.*; Urso, F.; Smith, D.J.H.
J Am Chem Soc., (1983), 105, 6737



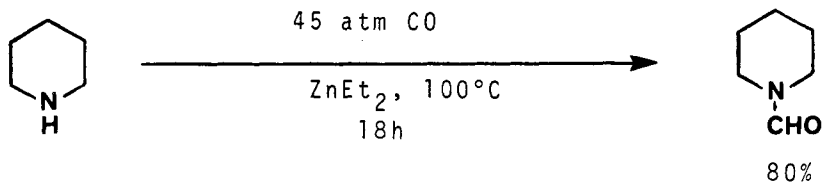
Okazaki, R.*; Takitoh, N. JCS Chem Comm., (1984), 192



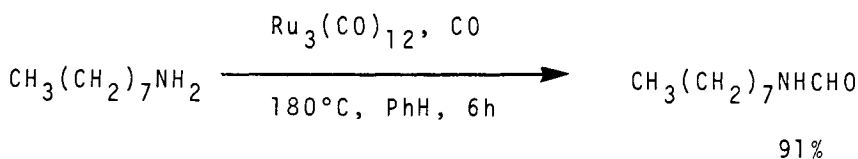
Djurii, S.W.* J Org Chem, (1984), **49**, 1311



Giesemann, G.; Ugi, I. Synthesis, (1983), 788

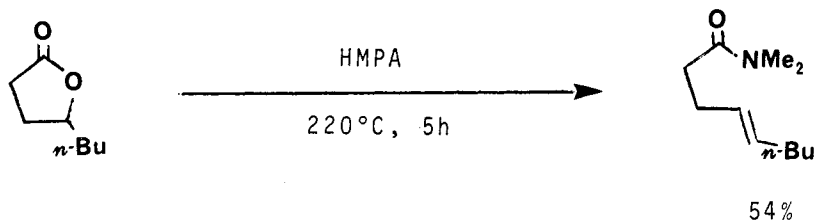


Yoshida, Y.*; Asano, S.; Inoue, S. Chem Lett, (1984), 1073

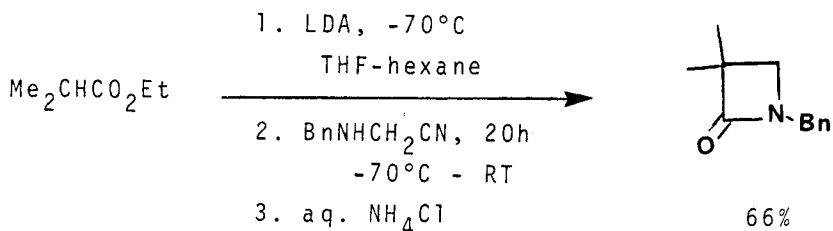


Tsuji, Y.; Ohsumi, T.; Kondo, T.; Watanabe, Y.*
J Organomet Chem, (1986), **309**, 333

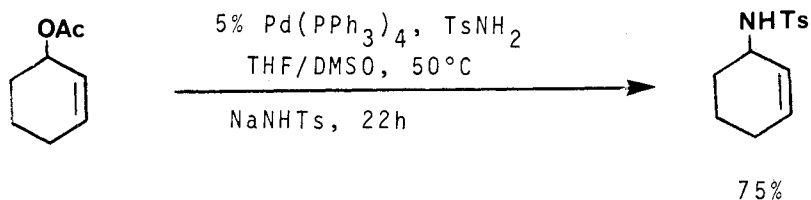
Related Methods: Amides from Carboxylic Acids (Section 77)
 Protection of Amines (Section 105A)

SECTION 83: Amides from Esters

Gupton, J.T.; Baran, D.; Bennett, R.; Hertel, G.R.; Idoux, J.P.*
Syn Commun, (1984), 14, 1001



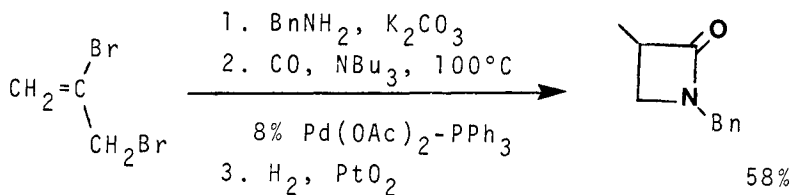
Overman, L.E.*; Osawa, T. J Am Chem Soc, (1985), 107, 1698



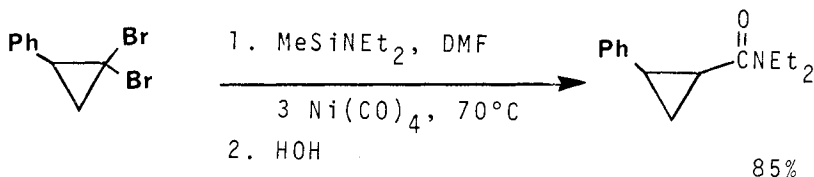
Byström, S.E.; Aslanian, R.; Bäckvall, J.-E.*
Tetrahedron Lett, (1985), 26, 1749

SECTION 84: Amides from Ethers, Epoxides, and Thioethers

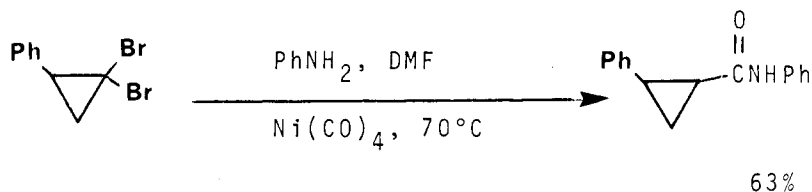
No Additional Examples

SECTION 85: Amides from Halides and Sulfonates

Mori, M.*; Chiba, K.; Okita, M.; Kayo, I.; Ban, Y.
Tetrahedron, (1985), **41**, 375

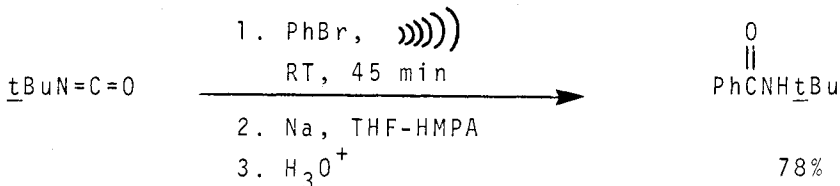


Hirao, T.*; Nagata, S.; Yamana, Y.; Agawa, T.
Tetrahedron Lett., (1985), **26**, 5061



Hirao, T.*; Harano, Y.; Yamana, Y.; Hamada, Y.; Nagata, S.;
 Agawa, T.

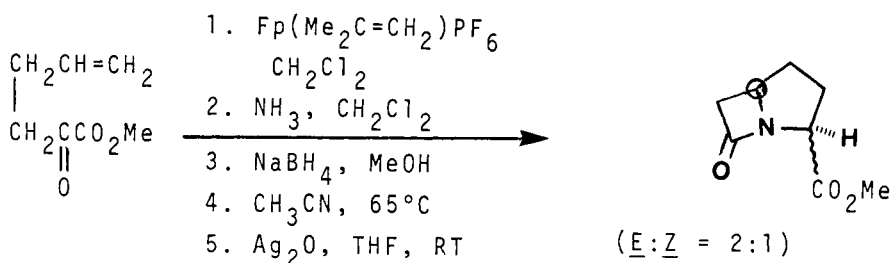
Bull Chem Soc Jpn., (1986), **59**, 1341



Einhorn, J.; Luche, J.L.* Tetrahedron Lett., (1986), **27**, 501

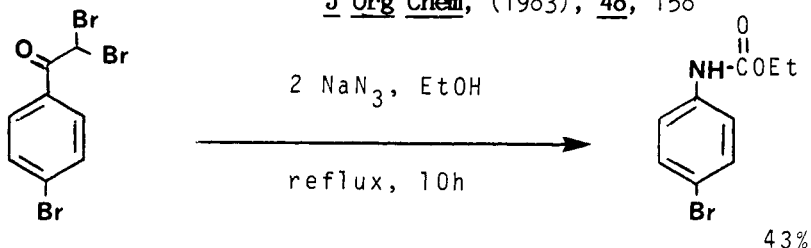
SECTION 86: Amides from Hydrides

No Additional Examples

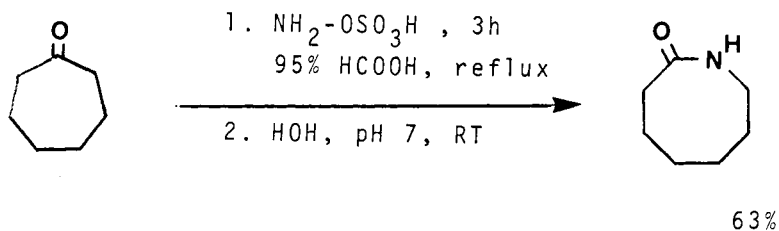
SECTION 87: Amides from Ketones

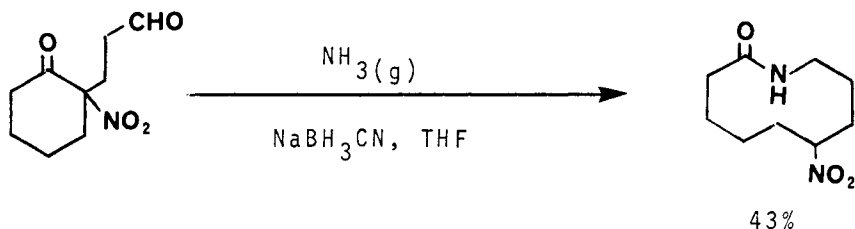
Berryhill, S.R.; Price, T.; Rosenblum, M.*

11% overall

J Org Chem, (1983), **48**, 158

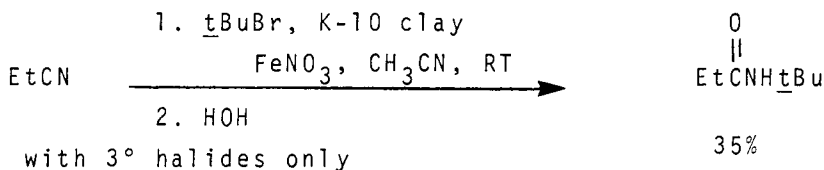
Weber, G.; Hauptmann, S.; Wilde, H.; Mann, G.*

Synthesis, (1983), 191Olah, G.A.*; Fung, A.P. Org Syn, (1984), **63**, 188

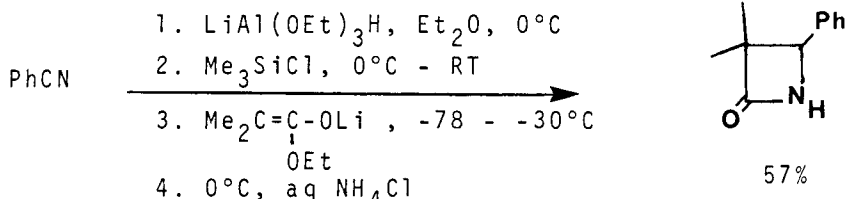


Wälchli, R.; Bienz, S.; Hesse, M.*
Helv Chim Acta, (1985), 68, 484

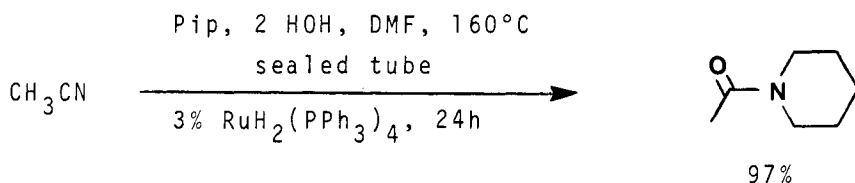
SECTION 88: Amides from Nitriles



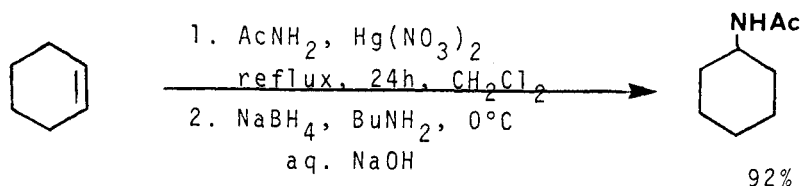
Polla, E.* Bull Chem Soc Belg, (1985), 94, 81



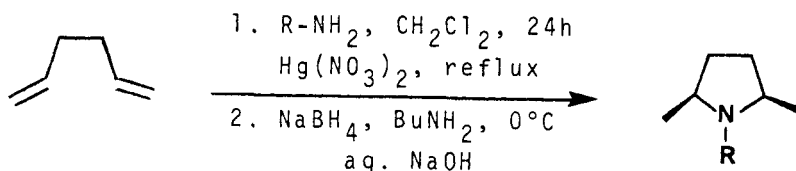
Andreoli, P.; Cainelli, G.*; Contento, M.; Giacomini, D.;
 Martelli, G.; Panunzio, M.*
Tetrahedron Lett, (1986), 27, 1695



Murahashi, S.-I.*; Naota, T.; Saito, E.
J Am Chem Soc, (1986), 108, 7846

SECTION 89: Amides from Olefins

Barluenga, J.*; Jiménez, C.; Nájera, C.; Yus, M.
JCS Perkin I, (1983), 591



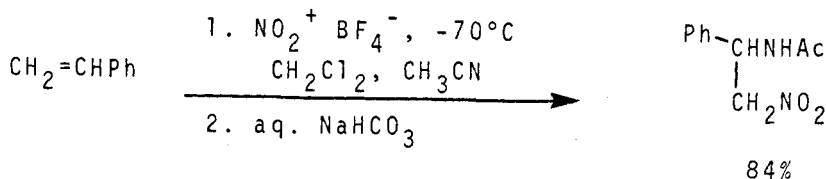
$\text{R} = \text{CO}_2\text{Me}$

Barluenga, J.*; Jimenez, C.; Nájera, C.; Yus, M.
J Heterocyclic Chem, (1983), 20, 1733

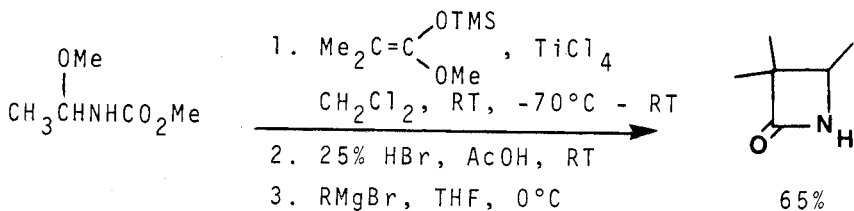
$\text{R} = \text{Ts}$

63%

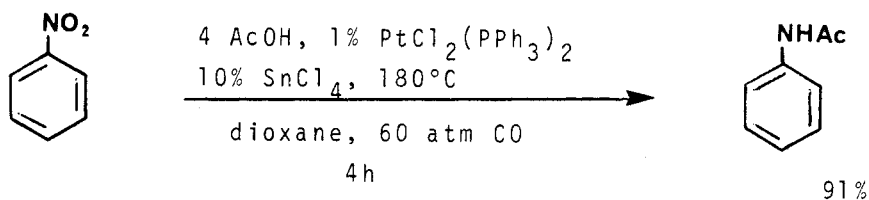
Barluenga, J.*; Jiménez, C.; Nájera, C.; Yus, M.
JCS Perkin I, (1984), 721



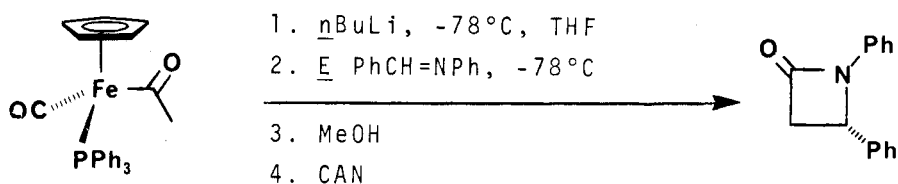
Bloom, A.J.; Fleischmann, M.; Mellor, J.M.*
JCS Perkin I, (1984), 2357

SECTION 90: Amides from Miscellaneous Compounds

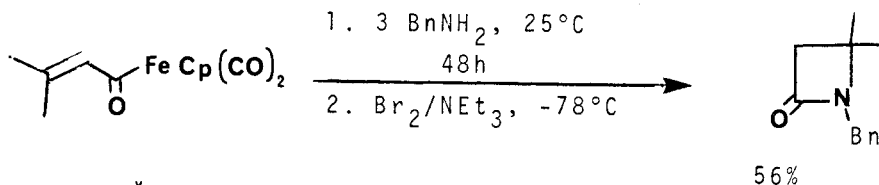
Shono, T.*; Tsubata, K.; Okinaga, N.

J Org Chem, (1984), 49, 1056

Watanabe, Y.*; Tsuji, Y.; Kondo, T.; Takeuchi, R.

J Org Chem, (1984), 49, 4451no yield
reported

Broadley, K.; Davies, S.G.*

Tetrahedron Lett, (1984), 25, 1743

Ojima, I.*; Kwon, H.B.

Chem Lett, (1985), 1327

Reviews:

"Synthesis and Reactions of Sulfamides"

McDermott, S.D.; Spillane, W.J.

Org Prep Proc Int, (1984), 16, 49

" α -Amide Alkylation at Carbon: Recent Advances"

Zaugg, H.E.* Synthesis, (1984), 85, 181

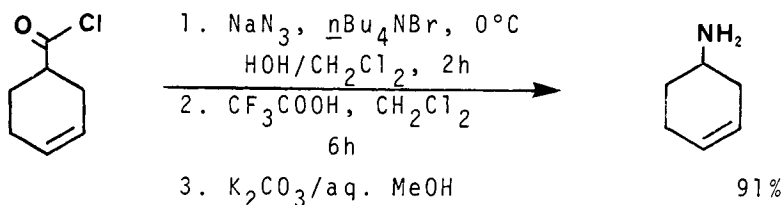
CHAPTER 7

PREPARATION OF AMINES

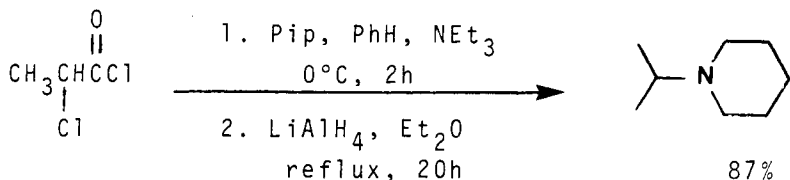
SECTION 91: Amines from Acetylenes

No Additional Examples

SECTION 92: Amines from Acid Derivatives

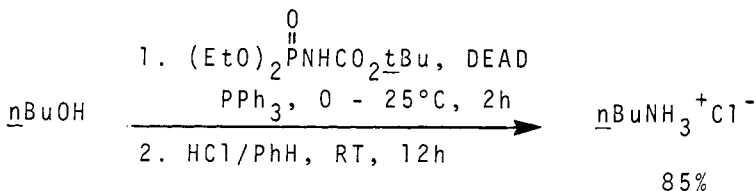


Pfister, J.R.*; Wymann, W.E. Synthesis, (1983), 38

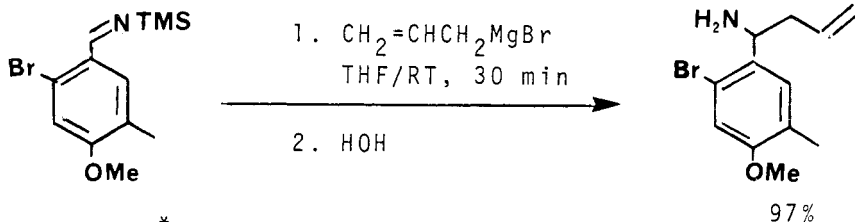


Suzuki, K.; Okano, K.; Nakai, K.; Terao, Y.; Sekiya, M.*
Synthesis, (1983), 723

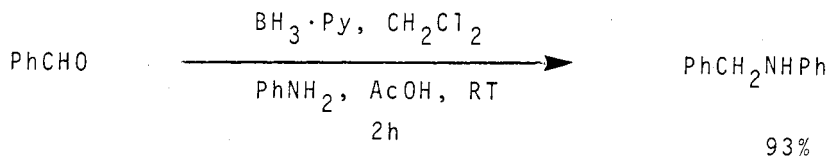
SECTION 93: Amines from Alcohols and Thiols



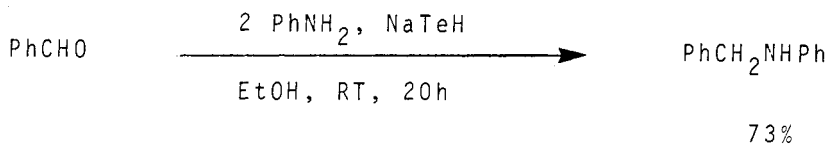
Ślusarska, E.; Zwierzak, A.* Liebigs Ann Chem, (1986), 402

SECTION 94: Amines from Aldehydes

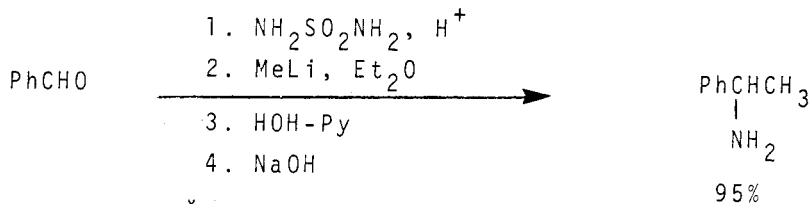
Hart, D.J.*; Kanai, K.; Thomas, D.G.; Yang, T.-K.
J Org Chem, (1983), 48, 289



Pelter, A.; Rosser, R.M.; Mills, S.
JCS Perkin I, (1984), 717



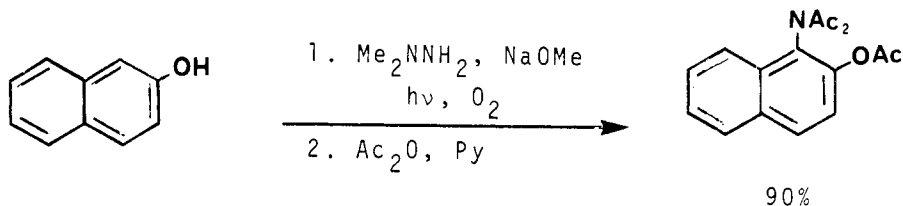
Yamashita, M.*; Kadokura, M.; Suemitsu, R.
Bull Chem Soc Jpn, (1984), 57, 3359



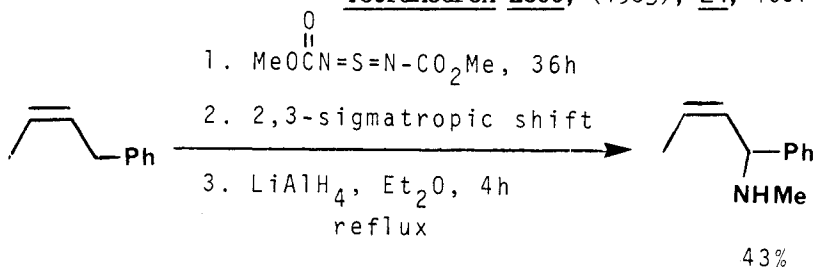
Davies, F.A.*; Giangiordano, M.A.; Starnier, W.E.
Tetrahedron Lett, (1986), 27, 3957

Related Methods: Amines from Ketones (Section 102)

SECTION 95: Amines from Alkyl, Methylenes, and Aryls

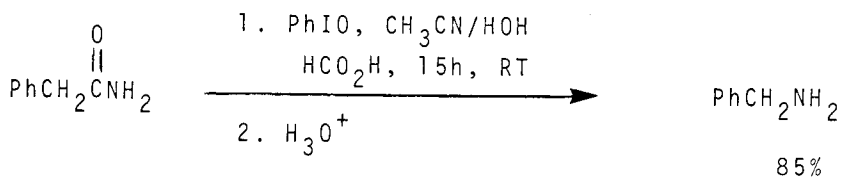


Barton, D.H.R.; LeGreneur, S.; Motherwell, W.B.*
Tetrahedron Lett., (1983), 24, 1601



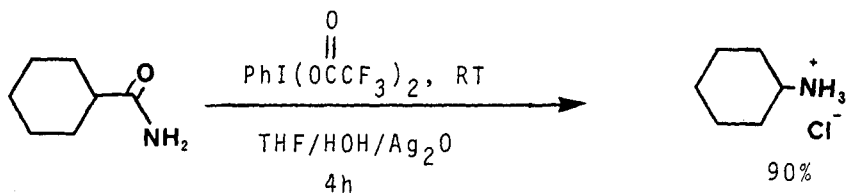
Kresze, G.*; Münsterer, H. J Org Chem, (1983), 48, 3561

SECTION 96: Amines from Amides



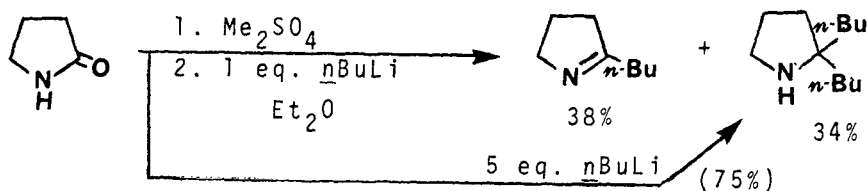
Radhakrishna, A.S.; Rao, C.G.; Varma, R.K.; Singh, B.B.;
 Bhatnagar, S.P.*

Synthesis, (1983), 538



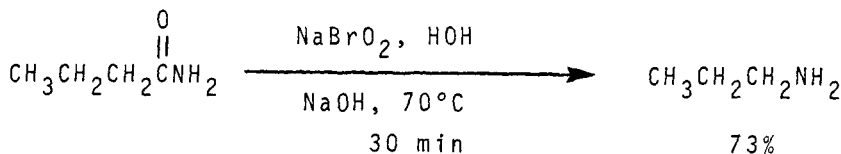
Loudon, G.M.*; Radhakrishna, A.S.; Almond, M.R.; Blodgett, J.K.; Boutin, R.H.

J Org Chem, (1984), 49, 4272



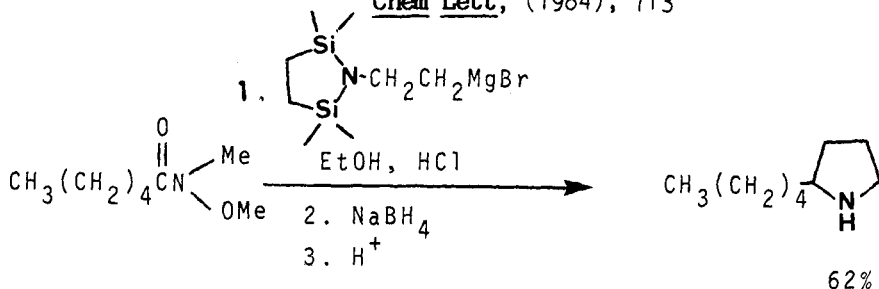
Zezza, C.A.; Smith, M.B.*; Ross, B.A.; Arhin, A.; Cronin, P.L.E.

J Org Chem, (1984), 49, 4397



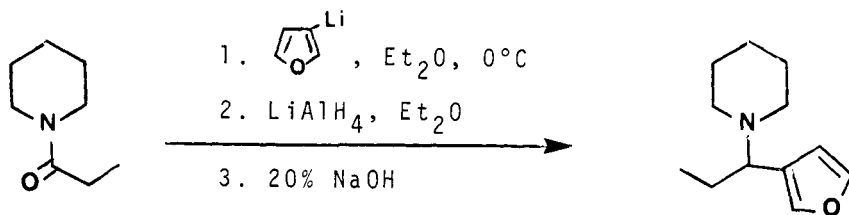
Kajigaeshi, S.*; Nakagawa, T.; Fujisaki, S.

Chem Lett, (1984), 713

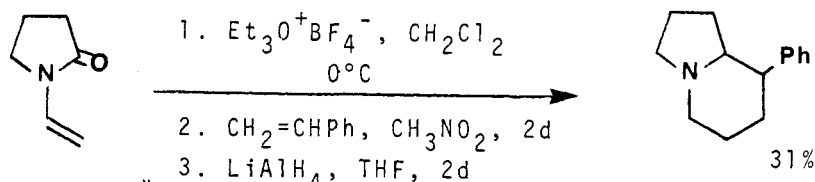


Basha, F.Z.; DeBernardis, J.F.*

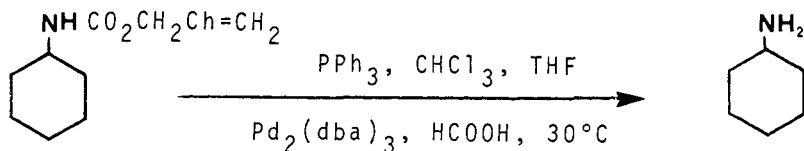
Tetrahedron Lett, (1984), 25, 5271



Hwang, Y.C.; Chu, M.; Fowler, F.W.*
J Org Chem, (1985), **50**, 3885



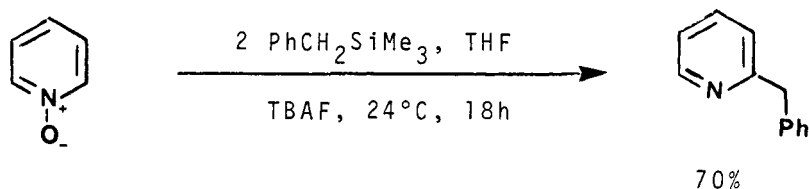
Smith, M.B.*; Shroff, H.N. Heterocycles, (1985), **23**, 2229



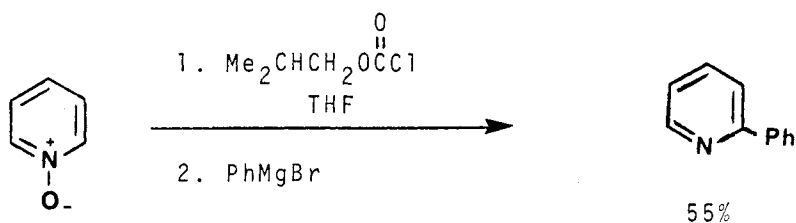
Minami, I.; Ohashi, Y.; Shimizu, I.; Tsuji, J.*
Tetrahedron Lett, (1985), **26**, 2449

Related Methods: Protection of Amines (Section 105A)

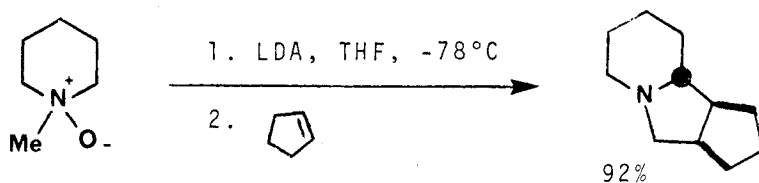
SECTION 97: Amines from Amines



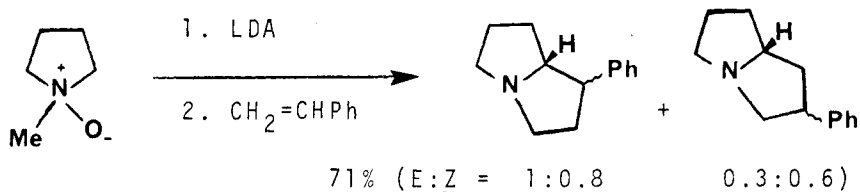
Vorbrüggen, H.*; Krolukiewicz, K.
Tetrahedron Lett, (1983), **24**, 889



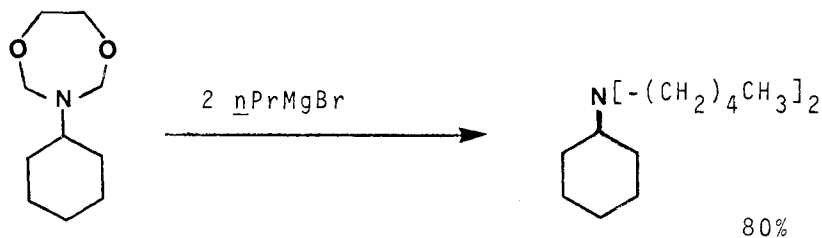
Webb, T.R.* Tetrahedron Lett., (1985), 26, 3191



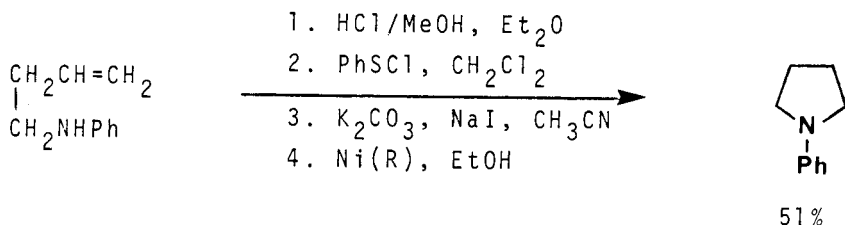
Chastanet, J.; Roussi, G.* J Org Chem, (1985), 50, 2910



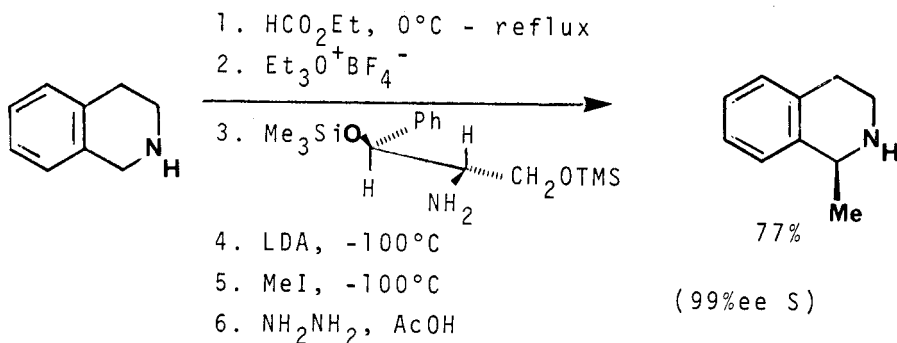
Chastanet, J.; Roussi, G. Heterocycles, (1985), 23, 653



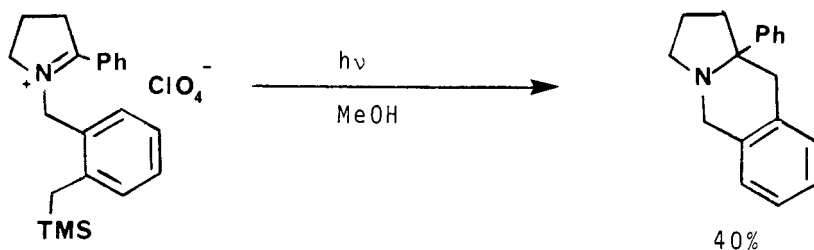
Kapnang, H.; Charles, G.* Tetrahedron Lett., (1983), 24, 1597



Ohsawa, T.; Ihara, M.; Fukumoto, K.; Kametani, T.
J Org Chem, (1983), **48**, 3644



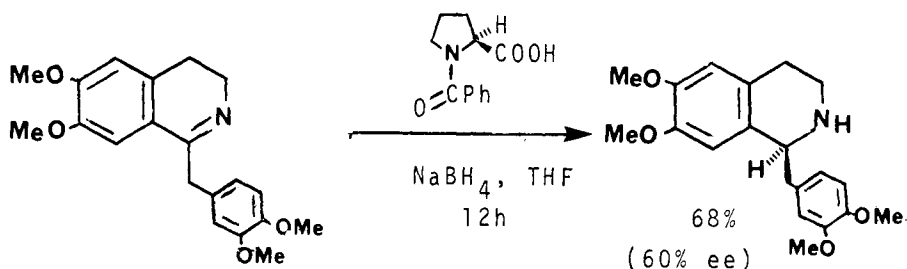
Meyers, A.I.*; Fuentes, L.M. J Am Chem Soc, (1983), **105**, 117



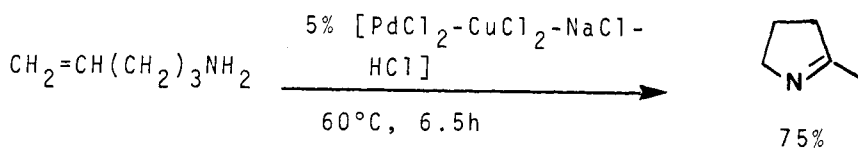
Lan, A.J.Y.; Quillen, S.L.; Heuckeroth, R.O.; Mariano, P.S.*
J Am Chem Soc, (1984), **106**, 6439

Yoon, U.C.; Quillen, S.L.; Mariano, P.S.*; Swanson, R.;
 Stavinoha, J.L.; Bay, E.

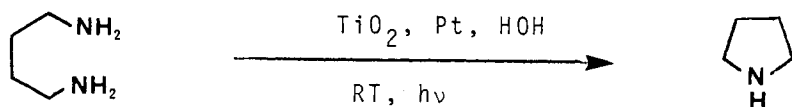
J Am Chem Soc, (1983), **105**, 1204



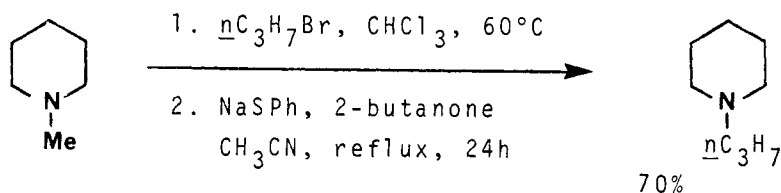
Yamada, K.; Takeda, M.; Iwakuma, T.* JCS Perkin I, (1983), 265



Pugin, B.; Venanzi, L.M.* J Am Chem Soc, (1983), 105, 6877

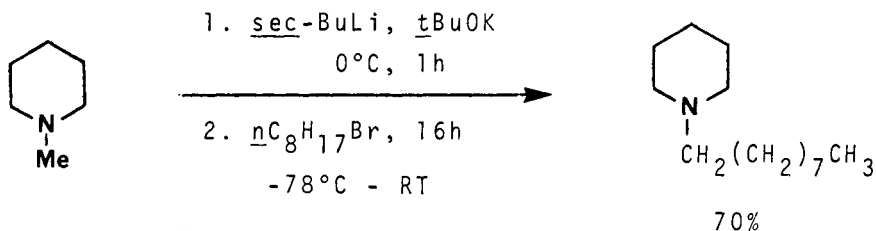


Nishimoto, S.; Ohtani, B.; Yoshikawa, T.; Kagiya, T.*
J Am Chem Soc, (1983), 105, 7180



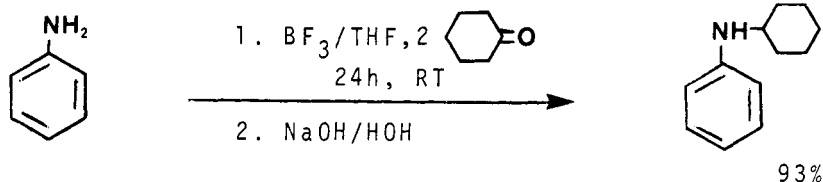
Manoharan, T.S.; Madyastha, K.M.*; Singh, B.B.; Bhatnagar, S.P.;
Weiss, U.

Synthesis, (1983), 809
Ind J Chem B, (1984), 23, 5



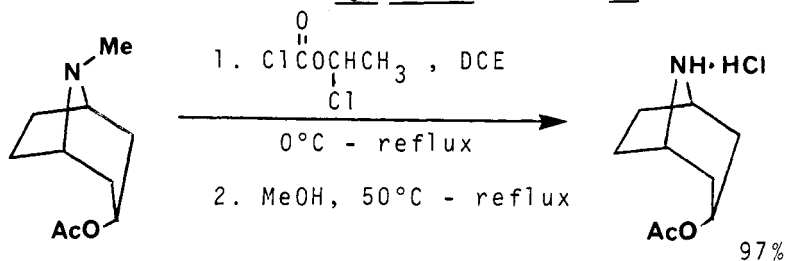
Ahlbrecht, H.*; Dollinger, H.

Tetrahedron Lett., (1984), **25**, 1353



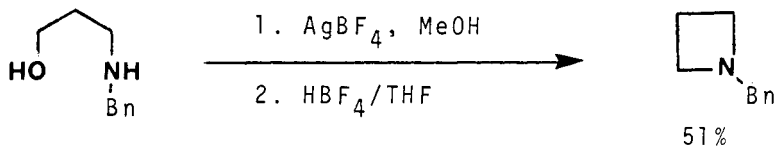
Morales, H.R.*; Pérez-Juárez, M.; Cuélla, L.; Mendoza, L.;
Fernández, H.; Contreras, R.

Syn Commun., (1984), **14**, 1213

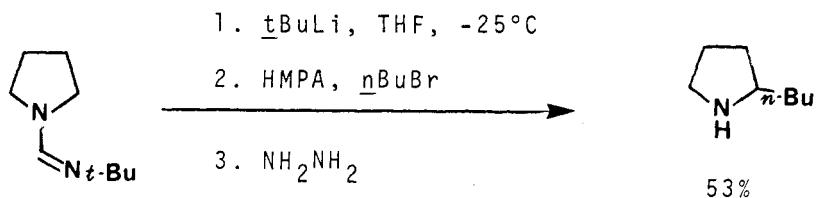


Olofson, R.A.*; Martz, J.T.; Senet, J.-P.*; Piteau, M.;
Malfroot, T.

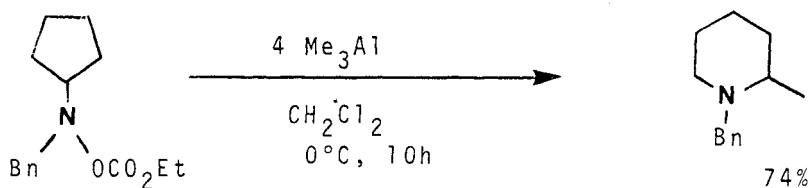
J Org Chem., (1984), **49**, 2081



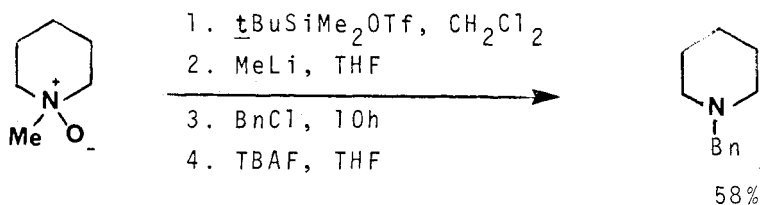
Sammes, P.G.*; Smith, S. JCS Perkin I, (1984), 2415



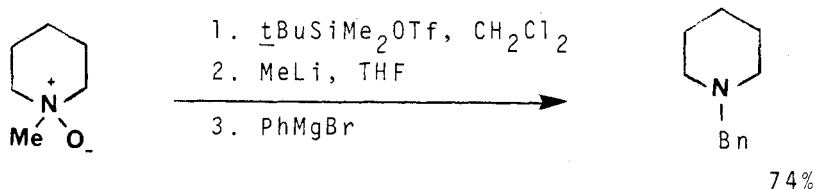
Meyers, A.I.*; Edwards, P.D.; Rieker, W.F.; Bailey, T.R.
J Am Chem Soc, (1984), **106**, 3270
 Meyers, A.I.*; Edwards, P.D.; Bailey, T.R.; Jagdmann Jr., G.E.
J Org Chem, (1985), **50**, 1019



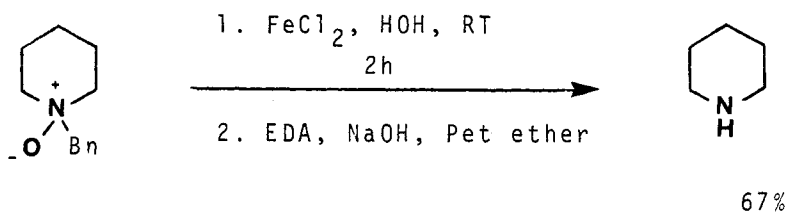
Fujiwara, J.; Sano, H.; Maruoka, K.; Yamamoto, H.*
Tetrahedron Lett, (1984), **25**, 2367



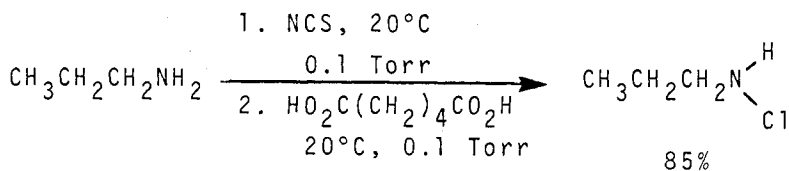
Tokitoh, N.; Okazaki, R.*; Suzuki, H.*; Manabe, H.
Chem Lett, (1984), 1937



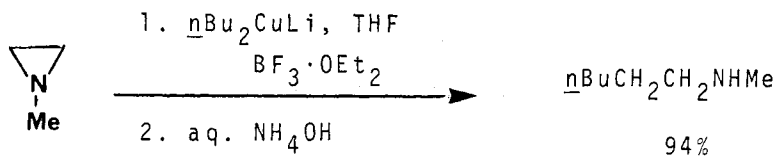
Tokitoh, N.; Okazaki, R.* Tetrahedron Lett, (1984), **25**, 4677



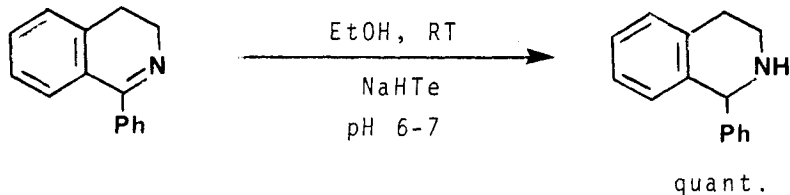
Monkovic, I.; Wong, H.; Bachand, C. Synthesis, (1985), 770



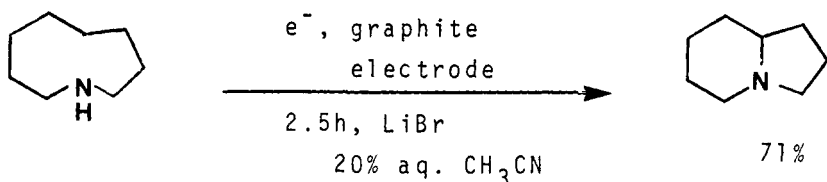
Guillemin, J.C.; Denis, J.M.* Synthesis, (1985), 1131



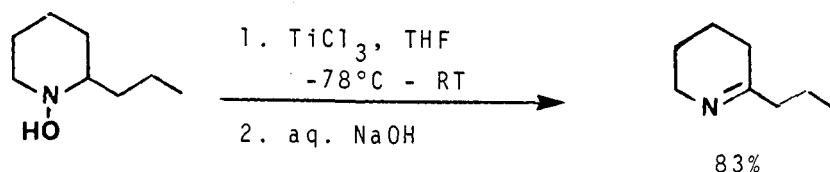
Eis, M.J.; Ganem, B.* Tetrahedron Lett, (1985), 26, 1153



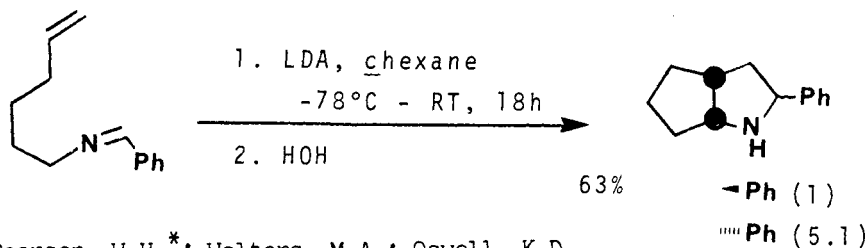
Barton, D.H.R.*; Fekih, A.; Lusinchi, X.
Tetrahedron Lett, (1985), 26, 3693



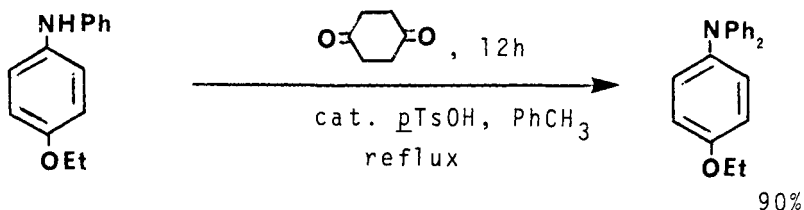
Elofson, R.M.; Gadallah, F.F.; Laidler, J.K.
Can J Chem, (1985), **63**, 1170



Murahashi, S.*; Kodera, Y. Tetrahedron Lett., (1985), **26**, 4633



Pearson, W.H.*; Walters, M.A.; Oswell, K.D.
J Am Chem Soc, (1986), **108**, 2769

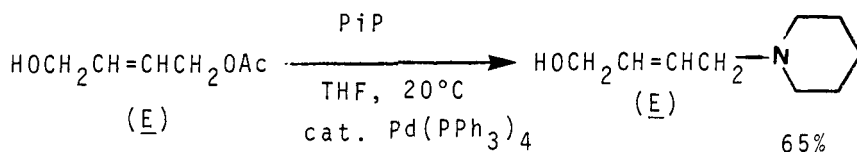


Haga, K.*; Iwaya, K.; Kaneko, R.
Bull Chem Soc Jpn, (1986), **59**, 803
 Haga, K.*; Oohashi, M.; Kaneko, R.
Bull Chem Soc Jpn, (1984), **57**, 1586

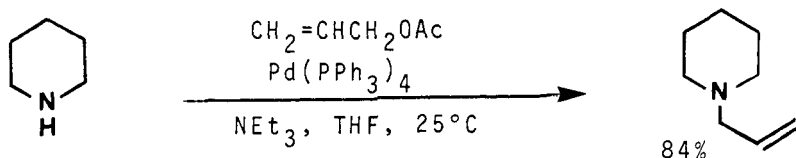
Review: "Nucleophilic Additions to Tetrahydropyridinium Salts: Applications to Alkaloid Syntheses"

Stevens, R.V.* Accts Chem Res, (1984), 17, 289

SECTION 98: Amines from Esters



1 h
Genêt, J.P.*; Balabane, M.*; Bäckvall, J.E.*; Nyström, J.E.
Tetrahedron Lett, (1983), 24, 2745

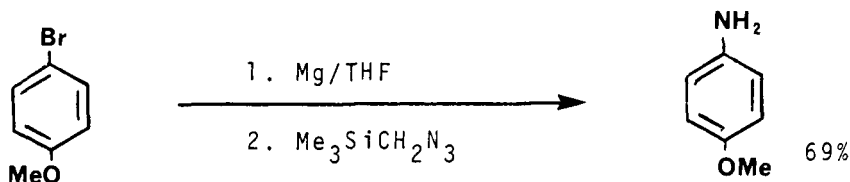


Bergbreiter, D.E.*; Chen, B. JCS Chem Comm, (1983), 1238

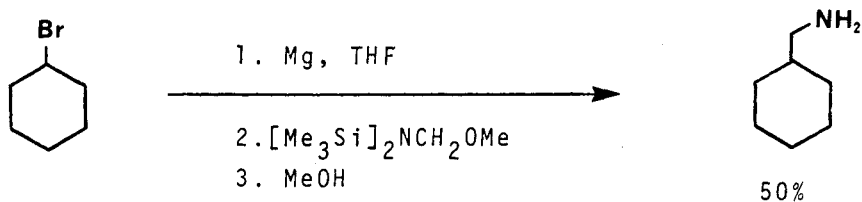
SECTION 99: Amines from Ethers, Epoxides, and Thioethers

No Additional Examples

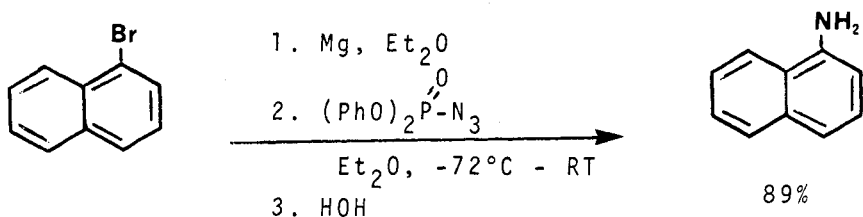
SECTION 100: Amines from Halides and Sulfonates



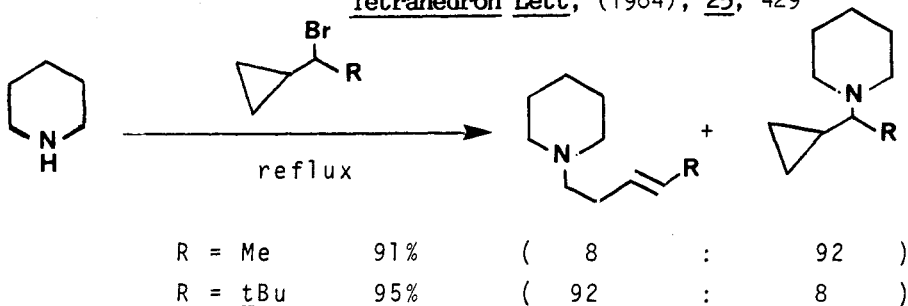
Nishiyama, K.*; Tanaka, N. JCS Chem Comm, (1983), 1322



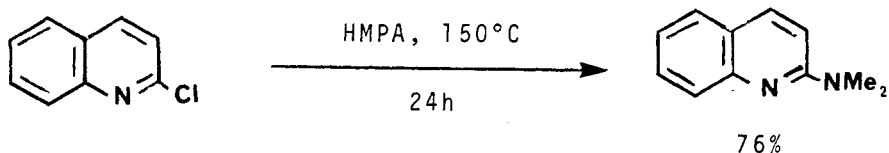
Morimoto, T.; Takahashi, T.; Sekiya, M.*
JCS Chem Comm, (1984), 794



Mori, S.; Aoyama, T.; Shioiri, T.*
Tetrahedron Lett, (1984), 25, 429

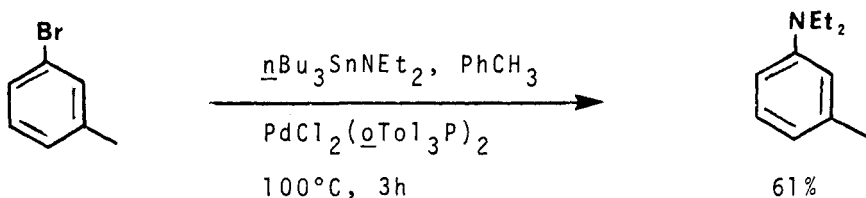


Hrubiec, R.T.; Smith, M.B.*
Tetrahedron Lett, (1983), 24, 5031

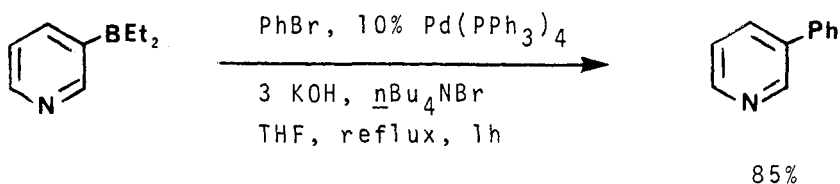


Gupton, J.T.*; Idoux, J.P.*; Baker, G.; Colon, C.; Crews, A.D.;
Jurss, C.D.; Rampi, R.C.

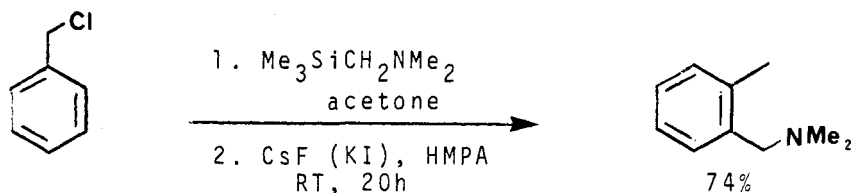
J Org Chem, (1983), 48, 2933



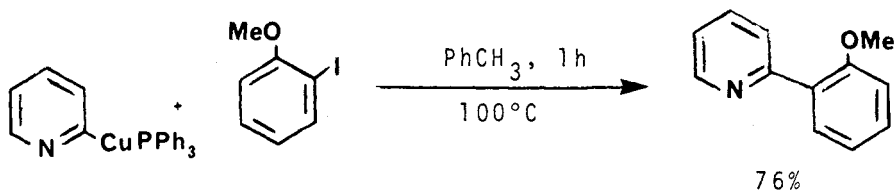
Kosugi, M.; Kameyama, M.; Migita, T.* Chem Lett, (1983), 927



Ishikura, M.; Kamada, M.; Terashima, M.*
Heterocycles, (1984), 22, 265



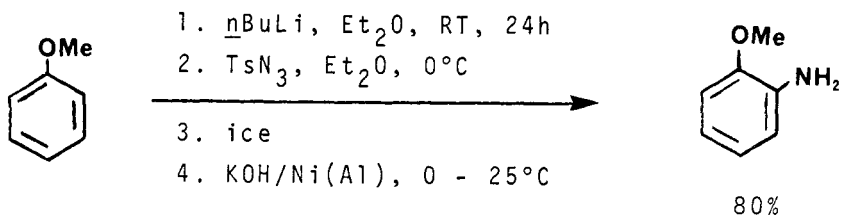
Nakano, M.; Sato, Y.* JCS Chem Comm, (1985), 1684



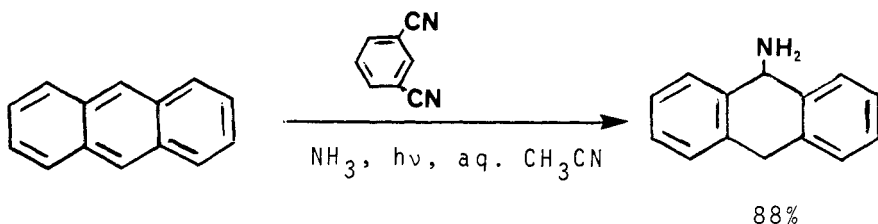
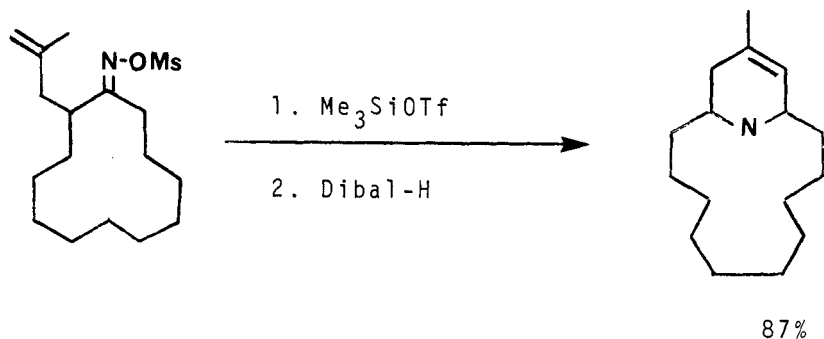
Malmberg, H.; Nilsson, M.* Tetrahedron, (1986), 42, 3981

Review: "Copper Assisted Nucleophilic Substitution of Aryl Halogen"

Lindley, J.* Tetrahedron, (1984), 40, 1433

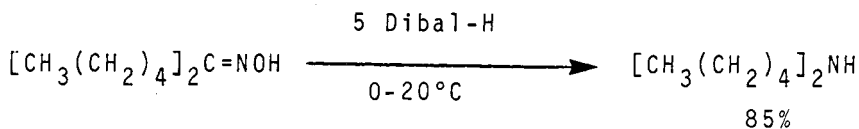
SECTION 101: Amines from Hydrides

Narasimhan, N.S.; Ammanamanchi, R.

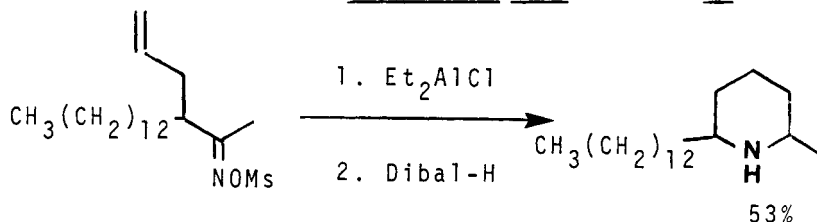
Tetrahedron Lett., (1983), 24, 4733Yasuda, M.*; Yamashita, T.; Matsumoto, T.; Shima, K.; Pac, C.*
J Org Chem, (1985), 50, 3667SECTION 102: Amines from Ketones

Sakane, S.; Maruoka, K.; Yamamoto, H.*

Tetrahedron Lett., (1983), 24, 943

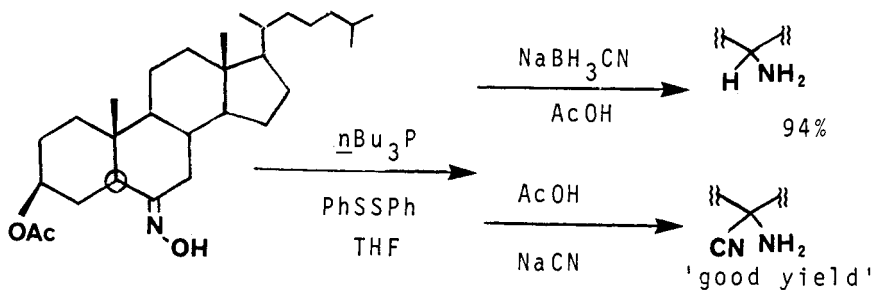


Sasatani, S.; Miyazaki, T.; Maruoka, K.; Yamamoto, H.*
Tetrahedron Lett., (1983), **24**, 4711

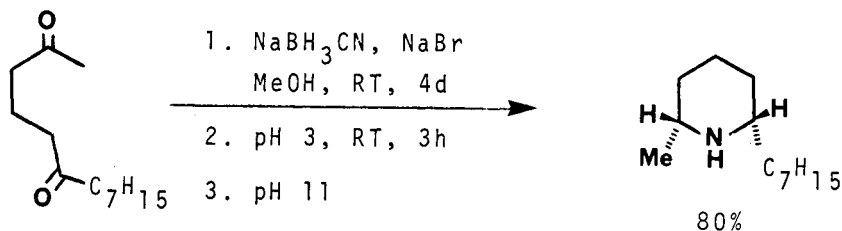


Sakane, S.; Matsumura, Y.; Yamamura, Y.; Ishida, Y.; Muruoka, K.; Yamamoto, H.*

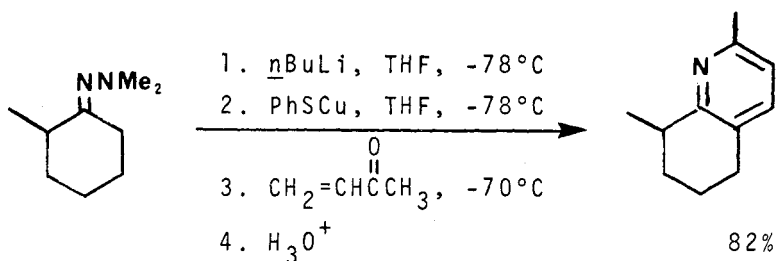
J Am Chem Soc., (1983), **105**, 672



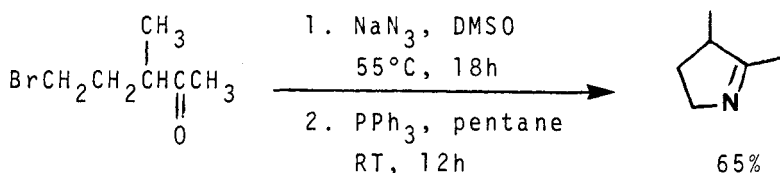
Barton, D.H.R.; Motherwell, W.B.; Simon, E.S.; Zard, S.Z.*
JCS Chem Comm., (1984), 337



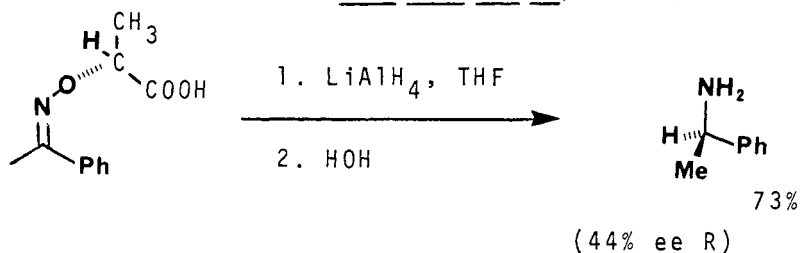
Abe, K.; Okumura, H.; Tsugoshi, T.; Nakamura, N.
Synthesis, (1984), 597



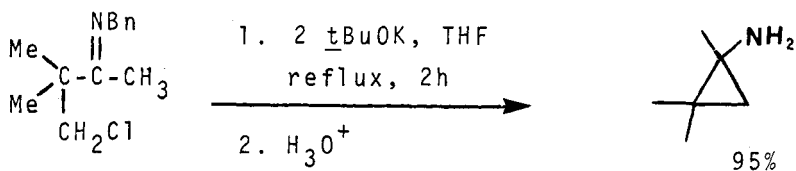
Kelly, T.R.*; Liu, H. J Am Chem Soc, (1985), 107, 4998



Vaultier, M.; Lambert, P.H.; Carri , R.*
Bull Chem Soc Fr, (1986), II083

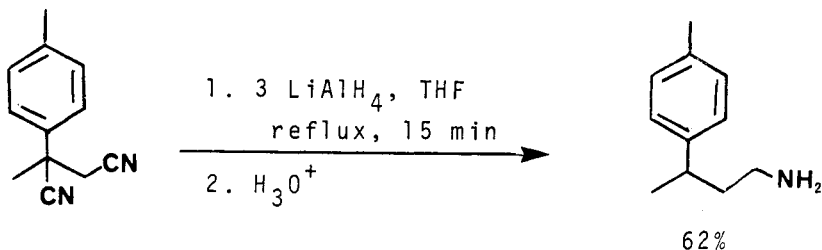


Itsuno, S.*; Tanaka, K.; Ito, K. Chem Lett, (1986), 1133

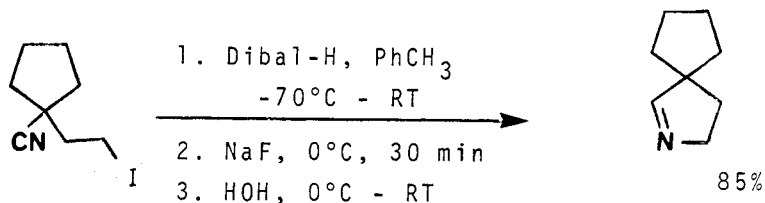


Sulmon, P.; De Kimpe, N.*; Schamp, N.
JCS Chem Comm, (1986), 1677

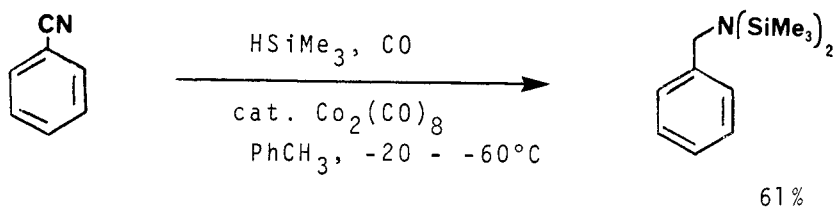
Related Methods: Amines from Aldehydes (Section 94)

SECTION 103: Amines from Nitriles

New, J.S.*; Yevich, J.P. Synthesis, (1983), 388

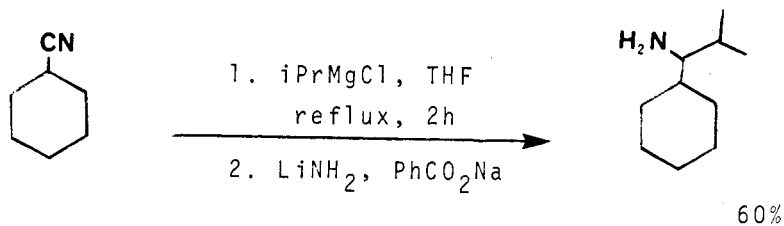


Overman, L.E.*; Burk, R.M. Tetrahedron Lett., (1984), 25, 5737

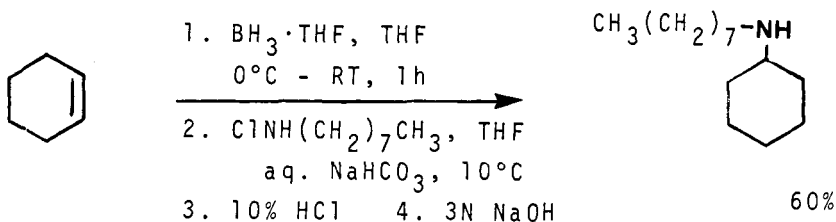


Murai, T.*; Sakane, T.; Kato, S.

Tetrahedron Lett., (1985), 26, 5145



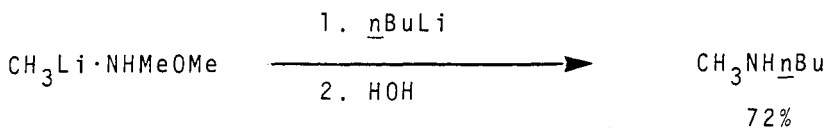
Weiberth, F.J.; Hall, S.S.* J Org Chem, (1986), 51, 5338

SECTION 104: Amines from Olefins

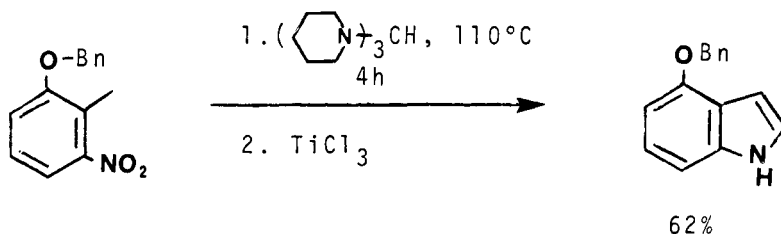
Kabalka, G.W.*; McCollum, G.W.; Kunda, S.A.
J Org Chem, (1984), 49, 1656

Review: "Amination of Alkenes"

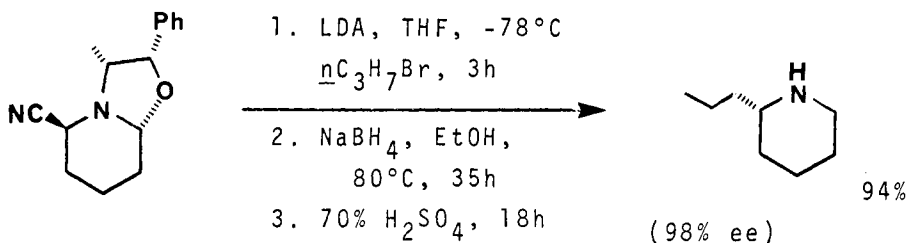
Gasc, M.B.; Lattes, A.; Perie, J.J.
Tetrahedron, (1983), 39, 703

SECTION 105: Amines from Miscellaneous Compounds

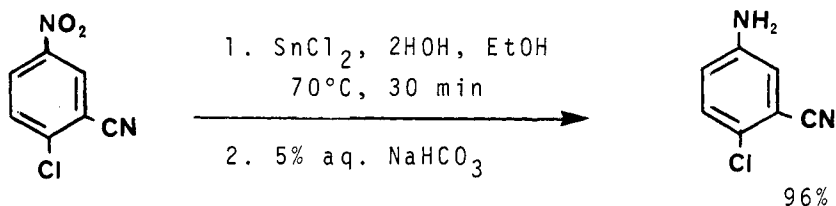
Kokko, B.J.; Beak, P.* Tetrahedron Lett, (1983), 24, 561



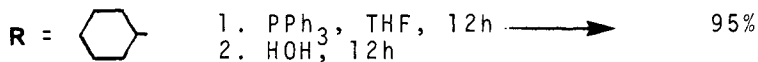
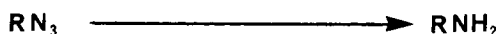
Lloyd, D.H.; Nichols, D.E.* Tetrahedron Lett, (1983), 24, 4561



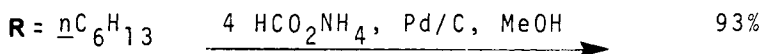
Guerrier, L.; Royer, J.; Grierson, D.S.; Husson, H.-P.*
J Am Chem Soc, (1983), 105, 7754



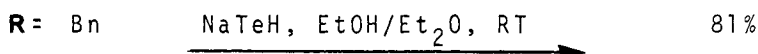
Bellamy, F.D.*; Ou, K. Tetrahedron Lett, (1984), 25, 839



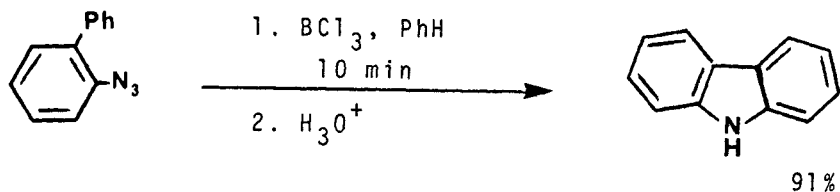
Vaultier, M.; Knouzi, N.; Carrie, R.
Tetrahedron Lett, (1983), 24, 763



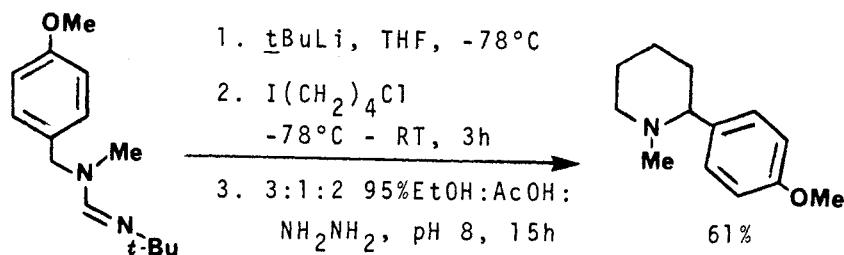
Gartiser, T.; Selve, C.*; Delpeuch, J.-J.
Tetrahedron Lett, (1983), 24, 1609



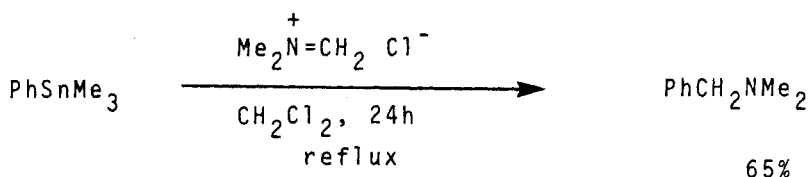
Suzuki, H.*; Takaoka, K. Chem Lett, (1984), 1733



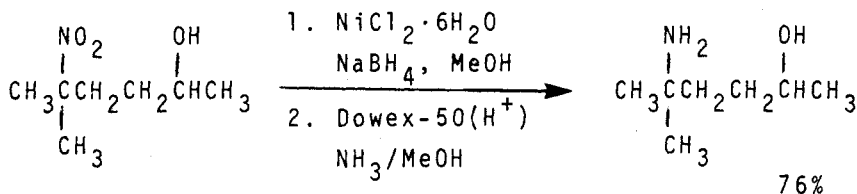
Zanirato, P.* JCS Chem Comm, (1983), 1065



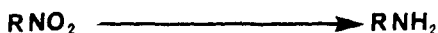
Meyers, A.I.*; Marra, J.M. Tetrahedron Lett, (1985), 26, 5863



Cooper, M.S.; Heaney, H.* Tetrahedron Lett, (1986), 27, 5011

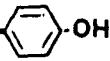


Osby, J.O.; Ganem, B.* Tetrahedron Lett, (1985), 26, 6413



$\text{R} =$ 
 $\xrightarrow{\text{Na}_2\text{Te/aq. NaOH/dioxane/50}^\circ\text{C}}$ 95%
 Suzuki, H.*; Manabe, H.; Inouye, M. Chem Lett, (1985), 1671

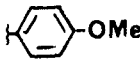
$\text{R} = \text{Ph}$
 $\xrightarrow[2. \text{TiCl}_4/\text{CH}_2\text{Cl}_2 \quad 3. \text{HOH}]{1. \text{iBu}_2\text{Te}}$ 74%
 Suzuki, H.*; Hanazaki, Y. Chem Lett, (1986), 549

$\text{R} =$ 
 $\xrightarrow[2. \text{aq. HCl} \quad 3. \text{Na}_2\text{CO}_3]{1. \text{P}(\text{NMe}_3)\text{Bn}, \text{HFe}(\text{CO})_4^-}$ 80%
 Boldrini, G.P.; Cainelli, G.; Umani-Ronchi, A.
J Organomet Chem, (1983), 243, 195

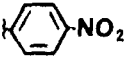
$\text{R} =$ 
 $\xrightarrow[2. \text{TiCl}_4, \text{tBuOH}, 0^\circ\text{C}]{1. [\text{HgCl}_2/\text{THF/Mg}, \text{RT}]}$ 94%
 George, J.; Chandrasekaran, S.* Syn Commun, (1983), 13, 495

$\text{R} = -\text{CH}_2\text{CH}_2\text{CHMe}_2$
 $\xrightarrow[\text{MeOH}, \text{RT}, 40 \text{ min}]{\text{HCO}_2\text{NH}_4, 10\% \text{Pd/C}}$ 82%
 Ram, S.; Ehrenkauf, R.E.* Tetrahedron Lett, (1984), 25, 3415

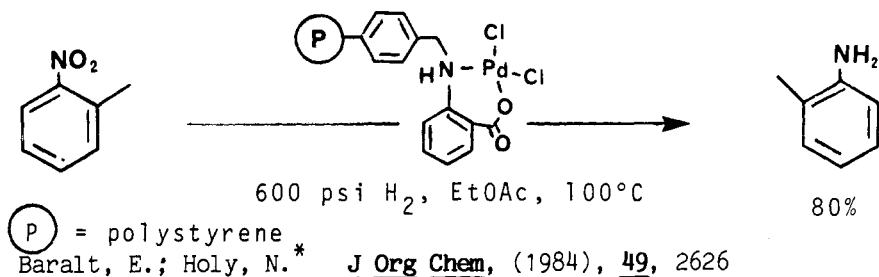
$\text{R} = \text{Ph}$
 $\xrightarrow[\text{EtOH/HOH}, 80^\circ\text{C}]{[\text{PhTeTePh/NaBH}_4], \text{PhH}}$ 72%
 Ohira, N.; Aso, Y.; Otsubo, T.; Ogura, F.*
Chem Lett, (1984), 853

$\text{R} =$ 
 $\xrightarrow[\text{NEt}_3, \text{EtOH}, 125^\circ\text{C}, 5 \text{h}]{\text{RuCl}_2(\text{PPh}_3)_3, \text{HCOOH}}$ 97%

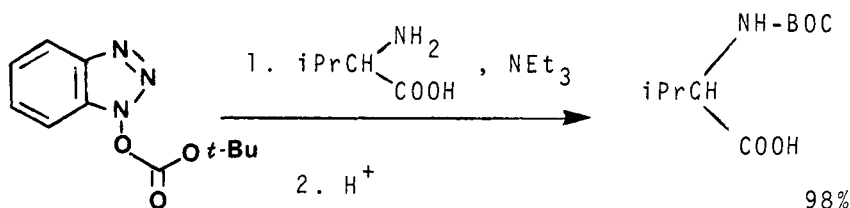
Watanabe, Y.*; Ohta, T.; Tsuji, Y.; Hiyoshi, T.; Tsuji, Y.
Bull Chem Soc Jpn, (1984), 57, 2440

$\text{R} =$ 
 $\xrightarrow[\text{NEt}_3, \text{aq. dioxane}, \text{CO}]{\text{PtCl}_2(\text{PPh}_3)_2, \text{SnCl}_4}$ quant.
 RT

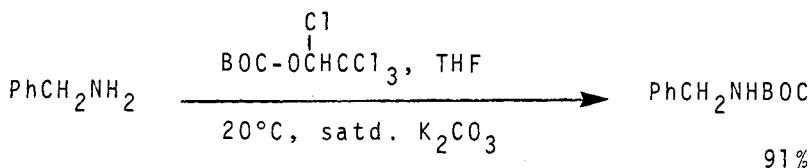
Watanabe, Y.*; Tsuji, Y.; Ohsumi, T.; Takeuchi, R.
Bull Chem Soc Jpn, (1984), 57, 2867

**SECTION 105A: Protection of Amines**

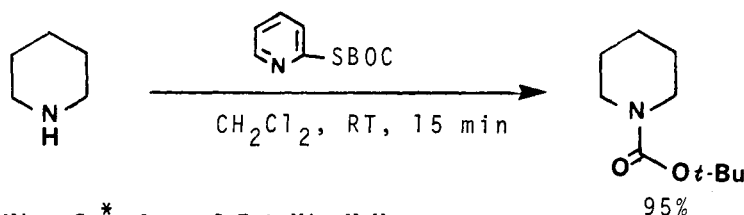
Related Methods: Amides from Amines (Section 82)
Amines from Amides (Section 96)



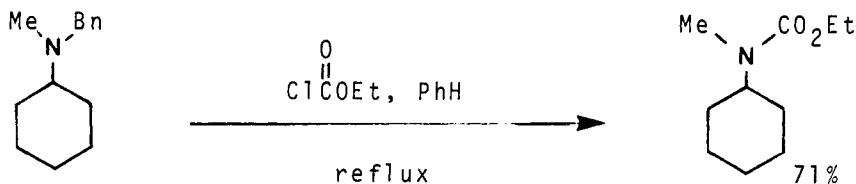
Kim, S.*; Chang, H. JCS Chem Comm, (1983), 1357



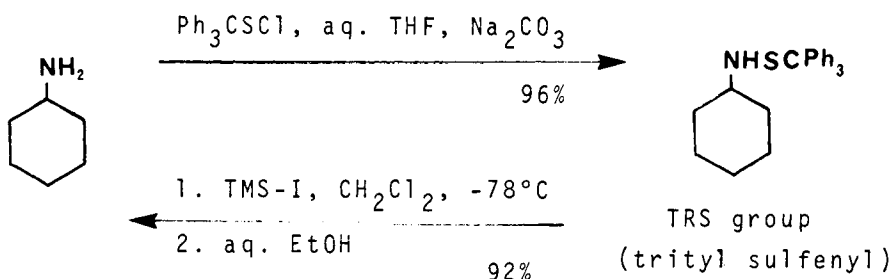
Barcelo, G.; Senet, J.-P.; Sennyey, G.*
J Org Chem, (1985), 50, 3951



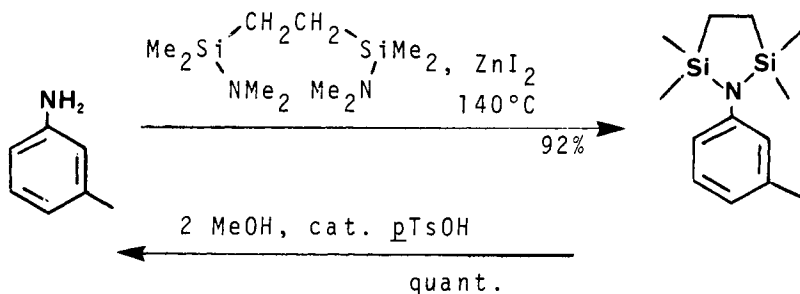
Kim, S.*; Lee, J.I.; Yi, K.Y.
Bull Chem Soc Jpn, (1985), 58, 3570



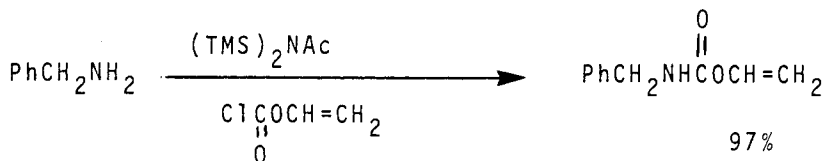
Kapnang, H.; Charles, G.* Tetrahedron Lett., (1983), **24**, 3233



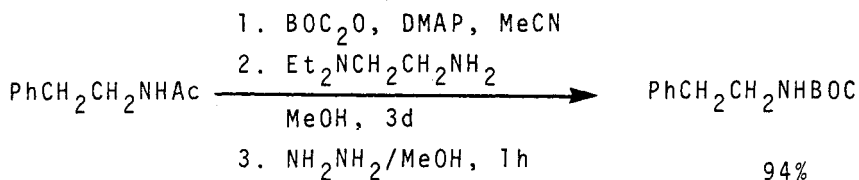
Branchaud, B.P.* J Org Chem, (1983), **48**, 3538



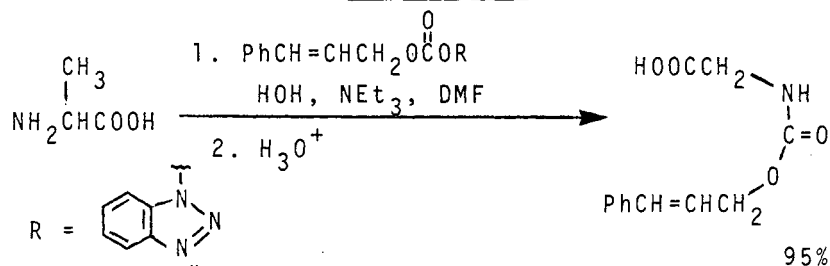
Guggenheim, T.L.* Tetrahedron Lett., (1984), **25**, 1253

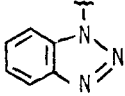


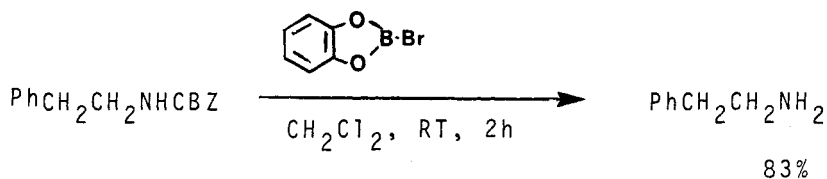
Raucher, S.*; Jones, D.S. Syn Commun, (1985), **15**, 1025



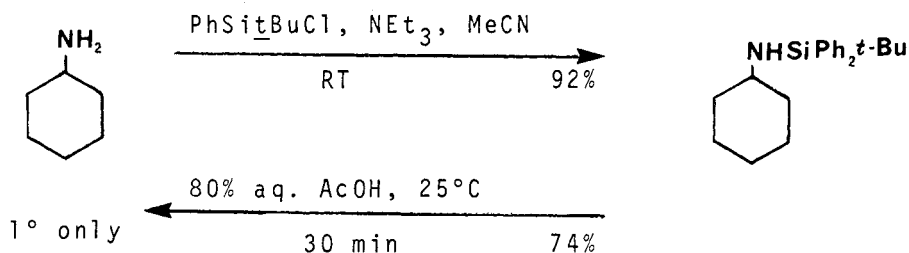
Grehn, L.; Gunnarsson, K.; Ragnarsson, U.
JCS Chem Comm, (1985), 1317



R =  Kinoshita, H.*; Inomata, K.; Kameda, T.; Kotake, H.
Chem Lett, (1985), 515



King, P.F.*; Stroud, S.G. Tetrahedron Lett, (1985), 26, 1415

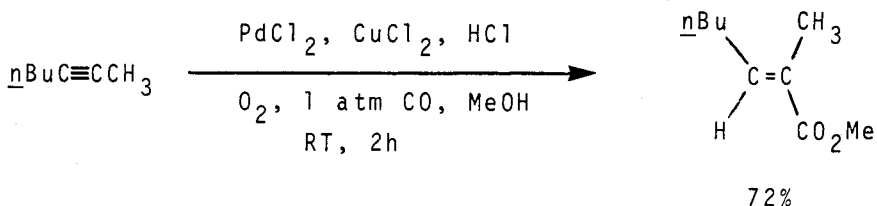


Overman, L.E.*; Okazaki, M.E.; Mishra, P.
Tetrahedron Lett, (1986), 27, 4391

CHAPTER 8

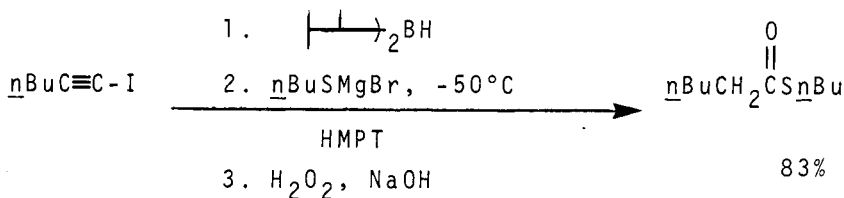
PREPARATION OF ESTERS

SECTION 106: Esters from Acetylenes



Alper, H.*; Despeyroux, B.; Woell, J.B.

Tetrahedron Lett., (1983), 24, 5691

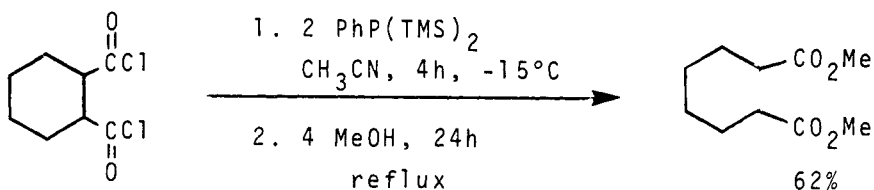


Hoshi, M.; Masuda, Y.; Arase, A.* JCS Chem Comm., (1985), 714

SECTION 107: Esters from Acid Derivatives

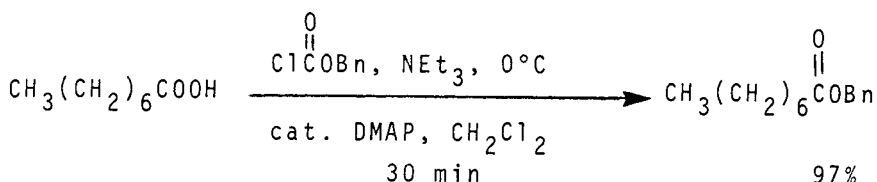
The following types of reactions are found in this section:

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.



Appel, R.*; Hünerbein, J.; Knoch, F.

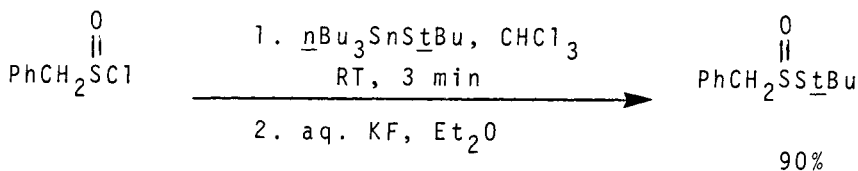
Angew Chem Int Ed Engl, (1983), 22, 61



Kim, S.*; Lee, J.I.; Kim, Y.C.

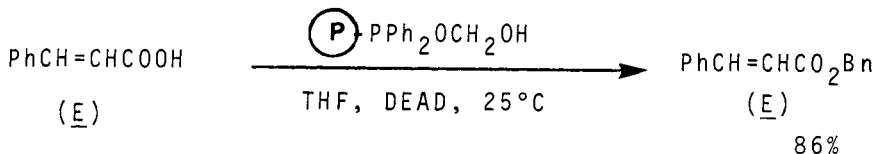
J Org Chem, (1985), 50, 560

Tetrahedron Lett, (1983), 24, 3365



Harpp, D.N.*; Aida, T.; Chan, T.H.

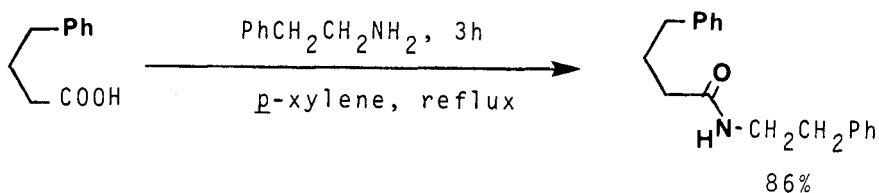
Tetrahedron Lett, (1983), 24, 5173



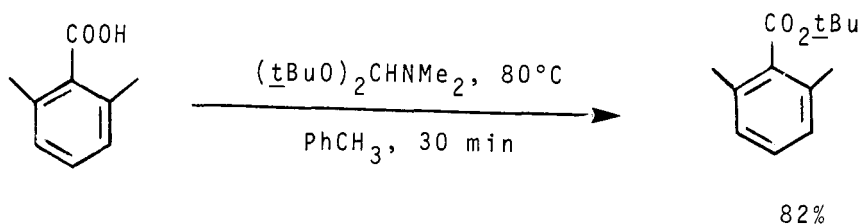
(P) = polystyryl

Amos, R.A.*; Emblidge, R.W.; Havens, N.

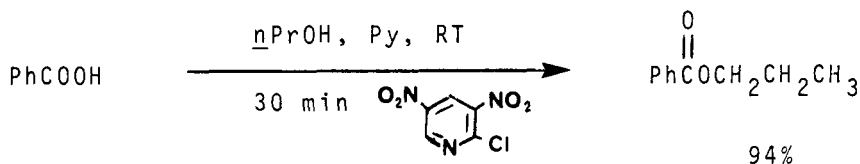
J Org Chem, (1983), 48, 3598



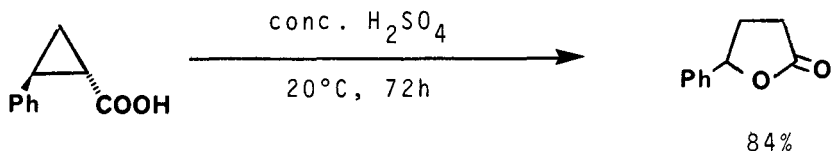
Mukaiyama, T.*; Ichikawa, J.; Asami, M. Chem Lett, (1983), 683



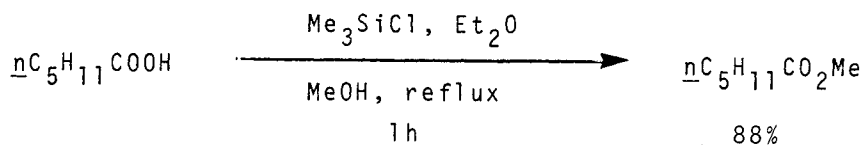
Widmer, U.* Synthesis, (1983), 135



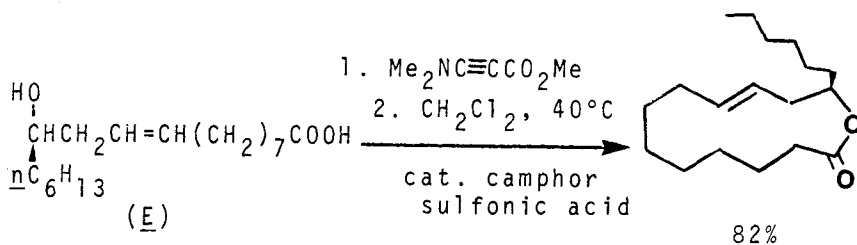
Takimoto, S.*; Abe, N.; Koder, Y.; Ohta, H.
Bull Chem Soc Jpn, (1983), 56, 639



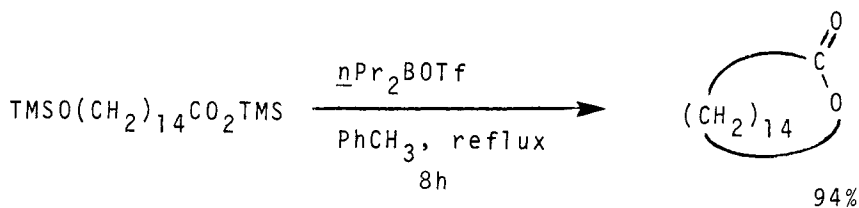
Sychkova, L.D.; Kharitonova, O.V.; Shabarov, Yu.S.
J Org Chem USSR, (1983), 19, 1298



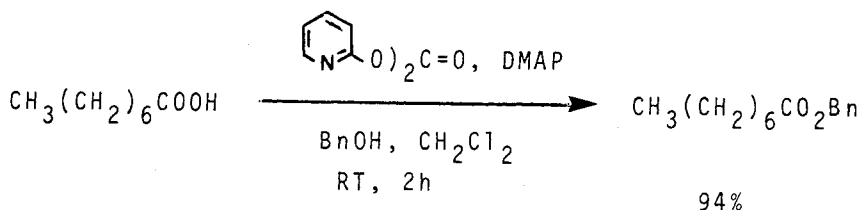
Mandal, A.K.* Ind J Chem B, (1983), 22, 505



Gais, H.-J.* Tetrahedron Lett, (1984), 25, 273

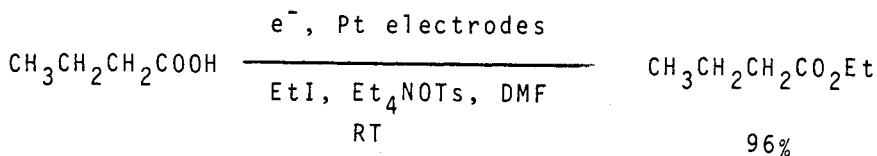


Taniguchi, N.; Kinoshita, H.; Inomata, K.*; Kotake, H.
Chem Lett, (1984), 1347



Kim, S.*; Lee, J.I.; Ko, Y.K.

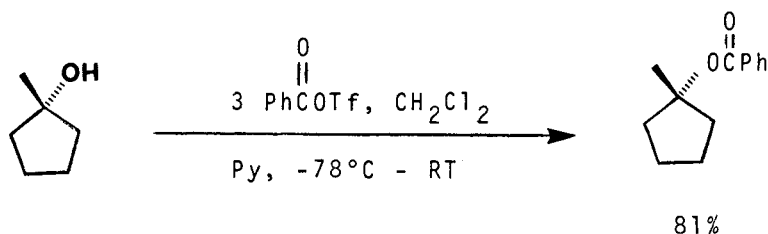
Tetrahedron Lett, (1984), 25, 4943



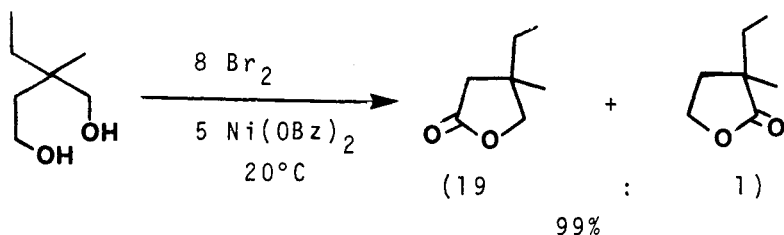
Awata, T.; Baizer, M.M.; Nonaka, T.*; Fuchigami, T.
Chem Lett, (1985), 371

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).

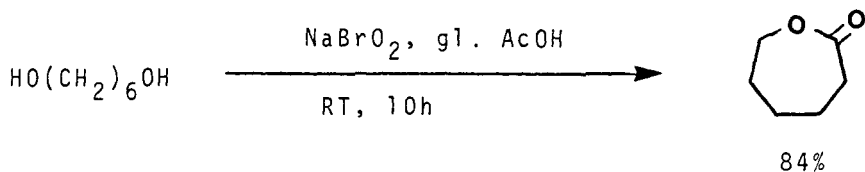
SECTION 108: Esters from Alcohols and Thiols



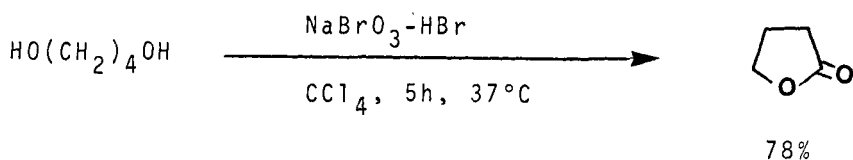
Brown, L.; Koreeda, M.* J Org Chem, (1984), 49, 3875
JCS Chem Comm, (1983), 1113



Doyle, M.P.*; Dow, R.L.; Bagheri, V.; Patrie, W.J.
J Org Chem, (1983), 48, 476

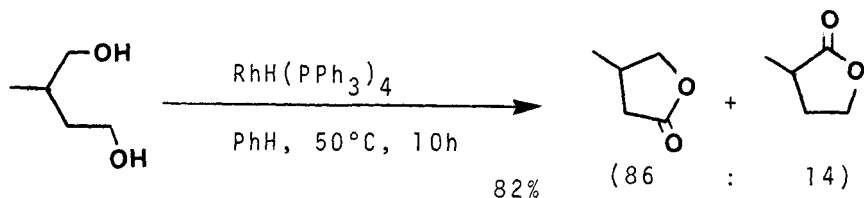


Kageyama, T.*; Kawahara, S.; Kitamura, K.; Ueno, Y.; Okawara, M.
Chem Lett, (1983), 1097



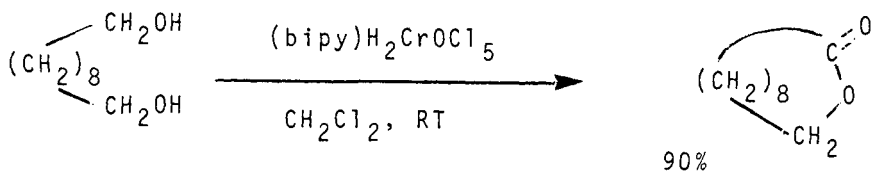
Kajigaeshi, S.*; Nakagawa, T.; Nazasaki, N.; Yamasaki, H.;
 Fujisaki, S.

Bull Chem Soc Jpn, (1986), 59, 747

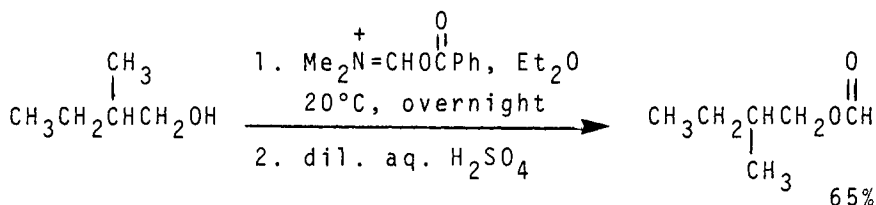


Ishii, Y.; Suzuki, K.; Ikariya, T.; Saburi, M.*; Yoshikawa, S.*
J Org Chem, (1986), 51, 2822

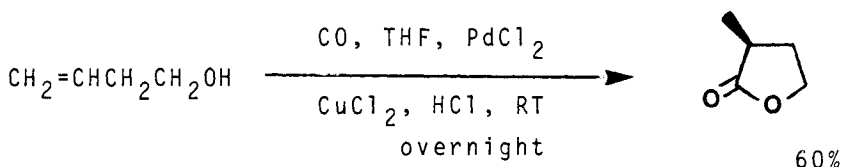
Ishii, Y.; Osakada, K.; Ikariya, T.; Saburi, M.*; Yoshikawa, S.*
J Org Chem, (1986), 51, 2034



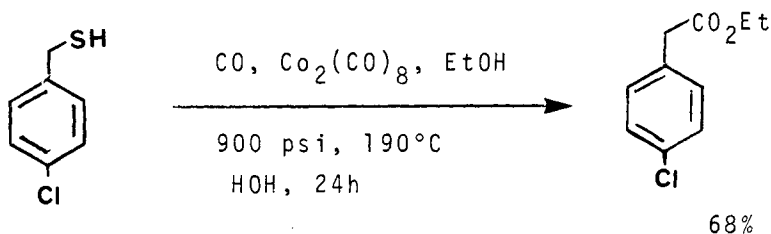
Chakraborty, T.K.; Bhushan, V.; Chandrasekaran, S.*
Ind J Chem B, (1983), 22, 9



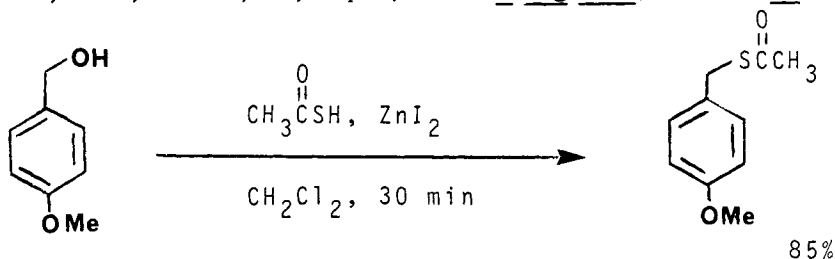
Barluenga, J.*; Campos, P.J.; Gonzalez-Núñez, C.; Asensio, G.
Synthesis, (1985), 426



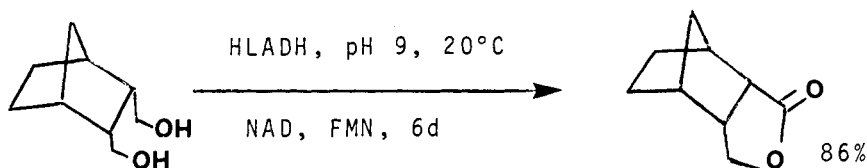
Alper, H.*; Leonard, D. JCS Chem Comm, (1985), 511



Shim, S.C.; Antebi, S.; Alper, H.* J Org Chem, (1985), 50, 147



Gauthier, J.Y.*; Bourdon, F.; Young, R.N.
Tetrahedron Lett, (1986), 27, 15



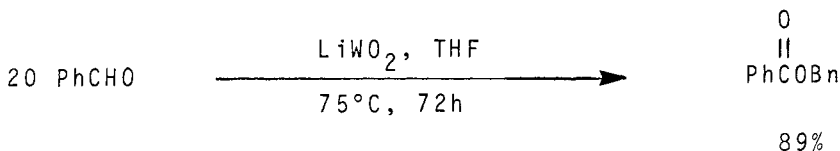
HLADH = Horse Liver Alcohol Dehydrogenase (97% ee)

Lok, K.P.; Jakovac, I.J.; Jones, J.B.*

J Am Chem Soc, (1985), 107, 2521

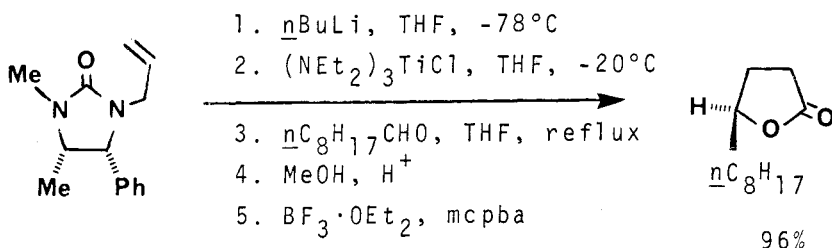
Further examples of the reaction $ROH \rightarrow R'COOR$ are included in Section 107 (Esters from Carboxylic Acids and Acid Halides) and Section 45A (Protection of Alcohols and Phenols).

SECTION 109: Esters from Aldehydes



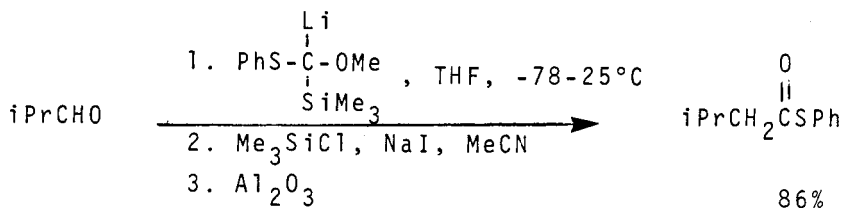
Villacorta, G.M.; Filippo Jr., J.S.*

J Org Chem, (1983), 48, 1151



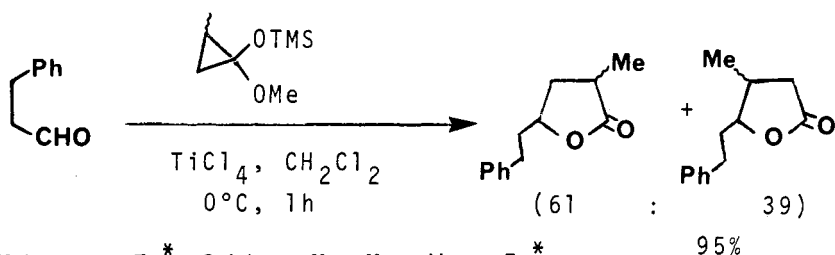
Roder, H.; Helmchen, G.*; Peters, E.-M.; Peters, K.; van Schnering, H.-G.

Angew Chem Int Ed Engl, (1984), 23, 898



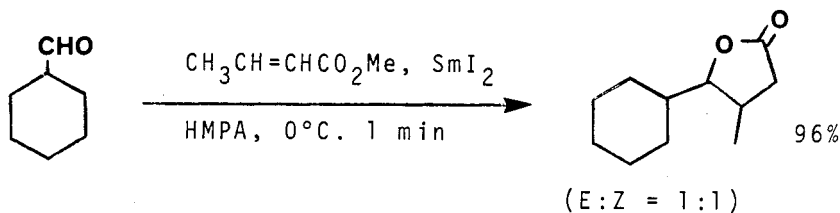
Hackett, S.; Livinghouse, T.*

Tetrahedron Lett., (1984), 25, 3539



Nakamura, E.*; Oshino, H.; Kuwajima, I.*

J Am Chem Soc., (1986), 108, 3745



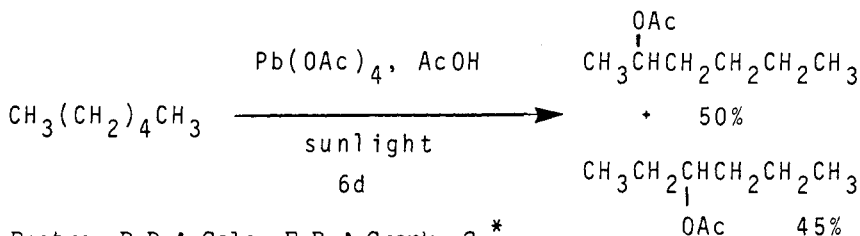
Otsubo, K.; Inanaga, J.*; Yamaguchi, M.

Tetrahedron Lett., (1986), 27, 5763

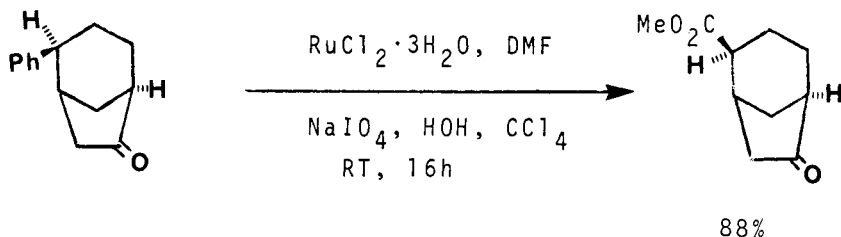
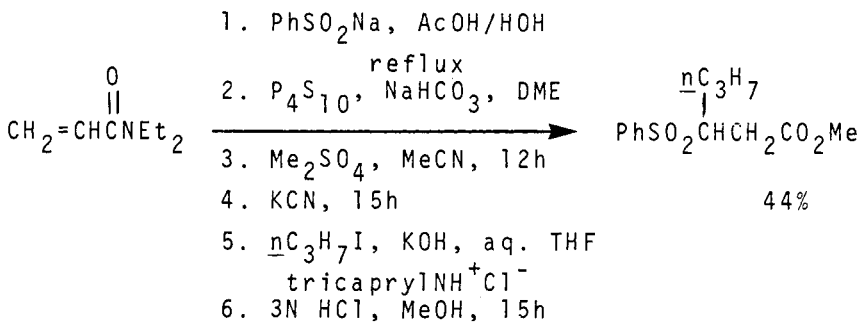
Related Methods: Esters from Ketones (Section 117)

SECTION 110: Esters from Alkyl, Methylenes, 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).

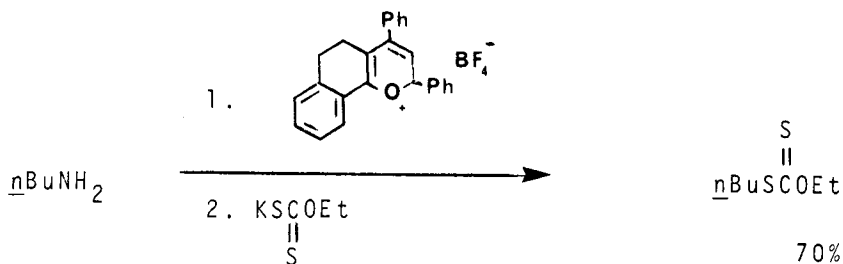


Bestre, R.D.; Cole, E.R.; Crank, G.*

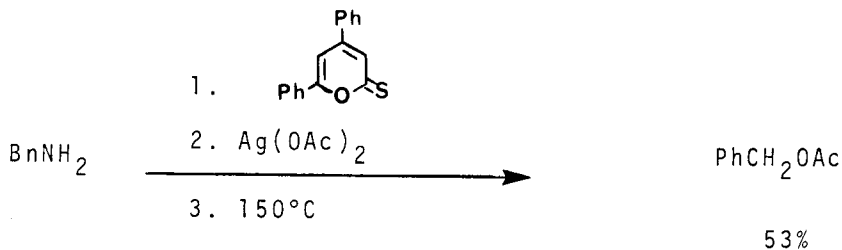
Tetrahedron Lett., (1983), **24**, 3891Chakraborti, A.K.; Ghatak, U.R. Synthesis, (1983), 746SECTION 111: Esters from Amides

De Lombaert, S.; Ghosez, L.*

Tetrahedron Lett., (1984), **25**, 3475

SECTION 112: Esters from Amines

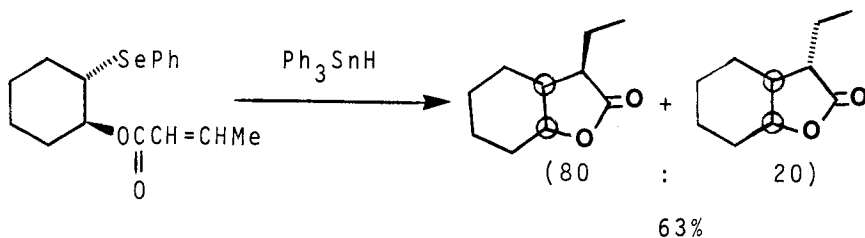
Elshafie, S.M.M.* Org Prep Proc Int, (1983), **15**, 225



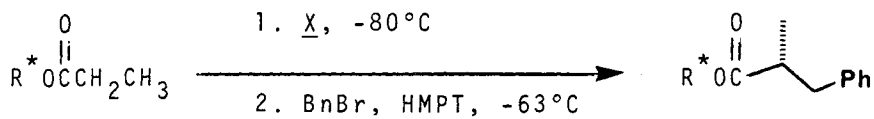
Molina, P.*; Alajarin, M.; De Vega, M.J.P.
Syn Commun, (1983), **13**, 501

SECTION 113: Esters from Esters

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

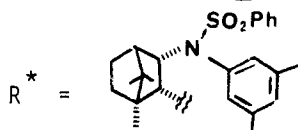


Clive, D.L.J.*; Beaulieu, P.L. JCS Chem Comm, (1983), 307



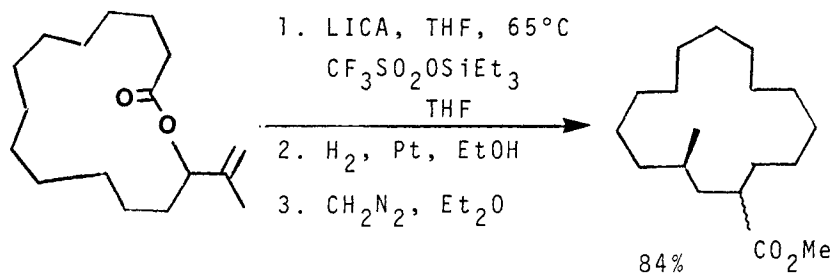
$\underline{\text{X}}$ = LICA/THF/2HMPT 89% ($2\text{S}:2\text{R}$ = 3:97)

$\underline{\text{X}}$ = LICA/THF/HMPT 94% ($2\text{S}:2\text{R}$ = 95:5)



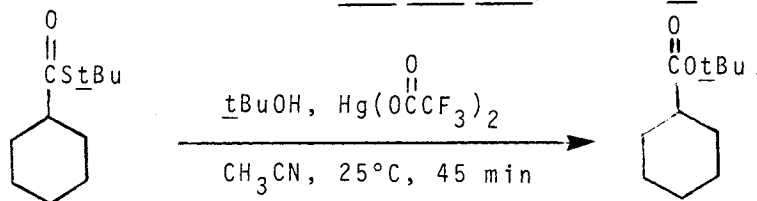
Helmchen, G.*; Selim, A.; Dorsch, D.; Taufer, I.

Tetrahedron Lett., (1983), 24, 3213



Brunner, R.K.; Borschberg, H.J.

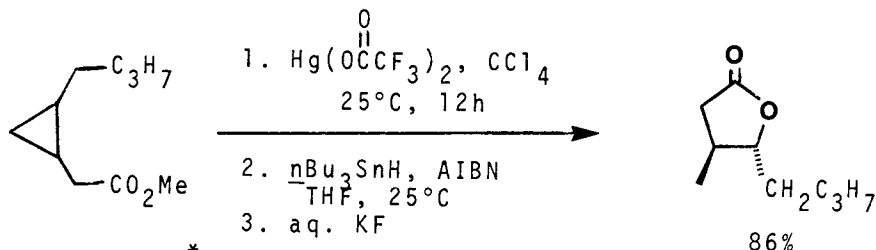
Helv Chim Acta, (1983), 66, 2608



90%

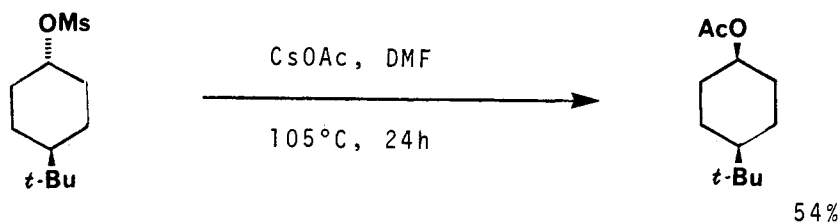
Chan, W.K.*; Masamune, S.*; Spessard, G.O.

Org Syn, (1983), 61, 48

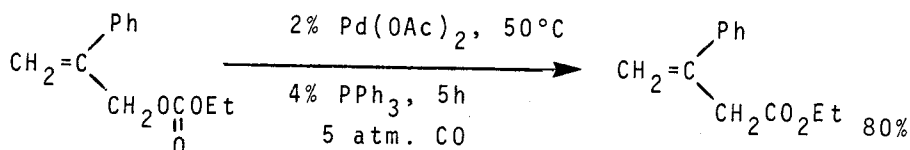


Collum, D.B.*; Mohamadi, F.; Hallock, J.S.

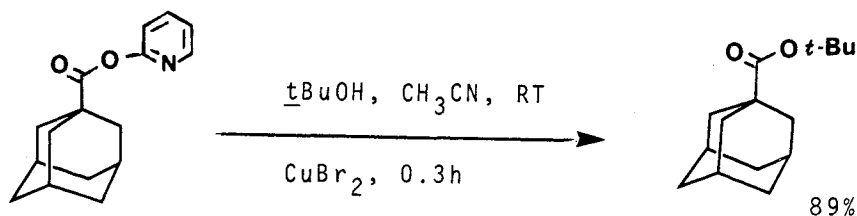
J Am Chem Soc, (1983), 105, 6882



Huffman, J.W.*; Desai, R.C. Syn Commun, (1983), 13, 553

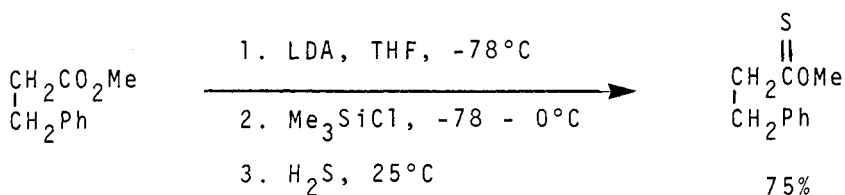


Tsuji, J.*; Sato, K.; Okumoto, H. J Org Chem, (1984), 49, 1341

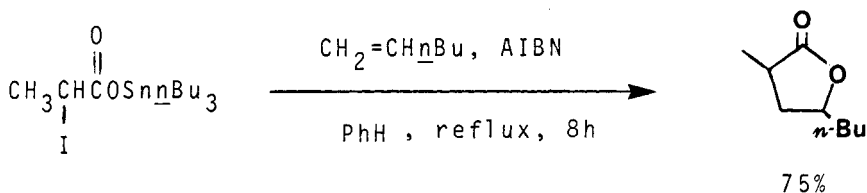


for the preparation of hindered esters

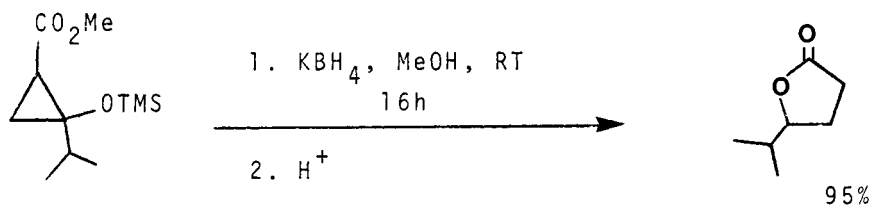
Kim, S.*; Lee, J.I. J Org Chem, (1984), 49, 1712



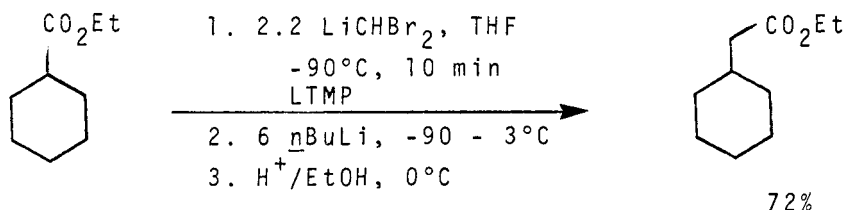
Corey, E.J.*; Wright, S.W. Tetrahedron Lett., (1984), 25, 2639



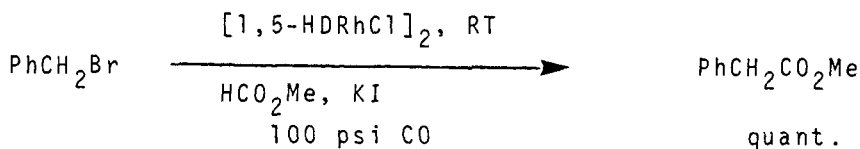
Kraus, G.A.*; Landgrebe, K. Tetrahedron Lett., (1984), 25, 3939



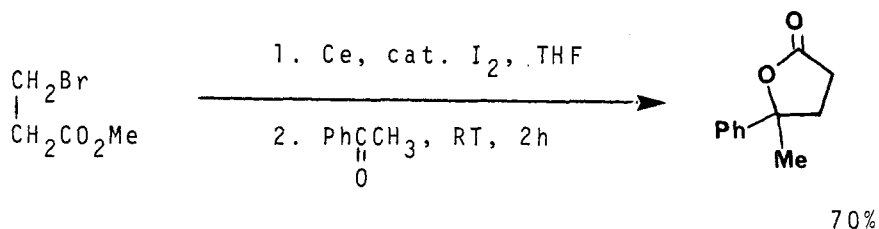
Grimm, E.L.; Reissig, H.-U.*
J Org Chem., (1985), 50, 242



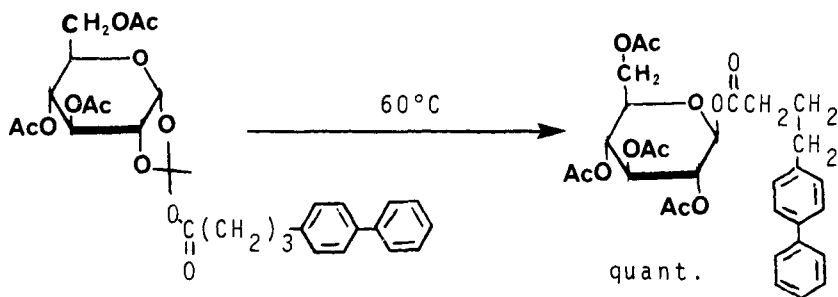
Kowalski, C.J.*; Haque, M.S.; Fields, K.W.
J Am Chem Soc., (1985), 107, 1429



Buchan, C.; Hamel, N.; Woell, J.B.; Alper, H.*
JCS Chem Comm, (1986), 167



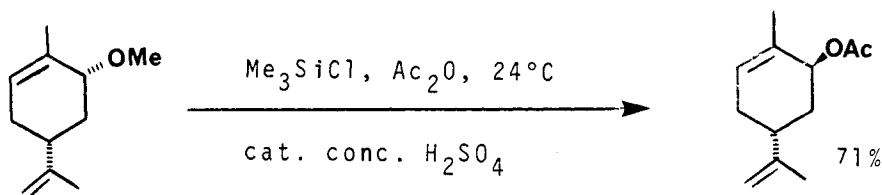
Fukuzawa, S.*; Fujinami, T.; Sakai, S.
JCS Chem Comm, (1986), 475



Wulff, G.; Patt, H.; Wichelhaus, J.
Nouv J Chem, (1986), 10, 143

Review: "Sulfur Mediated Ring Expansions in Total Synthesis"

Vedejs, E.* Accts Chem Res, (1984), 17, 358

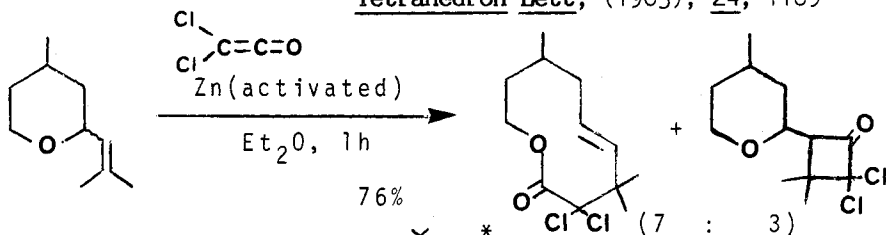
SECTION 114: Esters from Ethers, Epoxides, and Thioethers

Sarma, J.C.; Barbaruah, M.; Sarma, D.N.; Barua, N.C.; Sharma, R.P.*

Tetrahedron, (1986), **42**, 3999

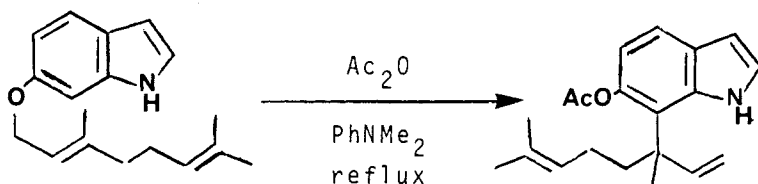
Barua, N.C.; Sharma, R.P.*; Baruah, J.N.

Tetrahedron Lett, (1983), **24**, 1189



Marherbe, R.; Rist, G.; Belluš, D.*

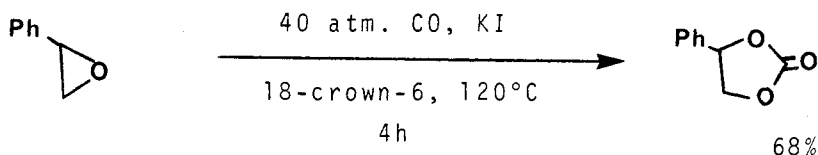
J Org Chem, (1983), **48**, 860



Moody, C.J.*

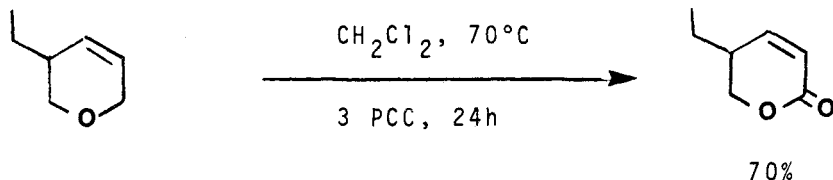
JCS Chem Comm, (1983), 1129

70%

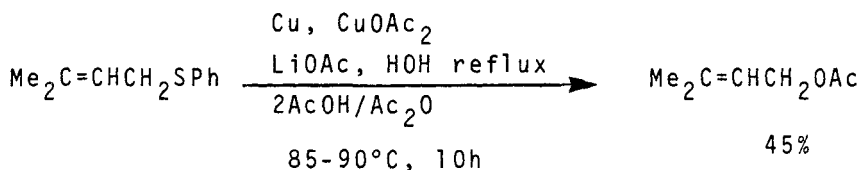


Rokicki, G.; Kuran, W.*; Pogorzelska-Marciniak, B.

Monatsh Chem, (1983), **114**, 205

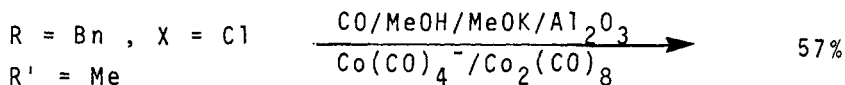
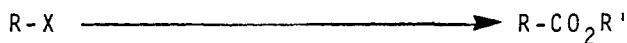


Bonadies, F.*; DiFabio, R.; Bonini, C.*
J Org Chem, (1984), 1491, 2647

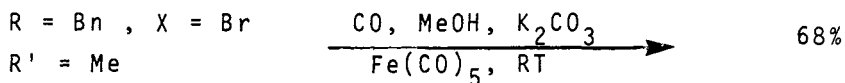


Uguen, D.* Tetrahedron Lett, (1984), 25, 541

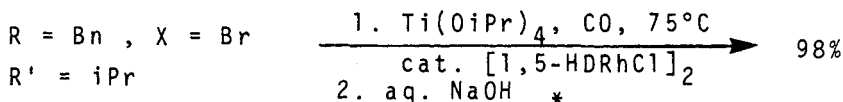
SECTION 115: Esters from Halides and Sulfonates



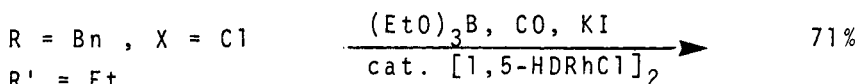
Sawicki, R.A.* J Org Chem, (1983), 48, 5382



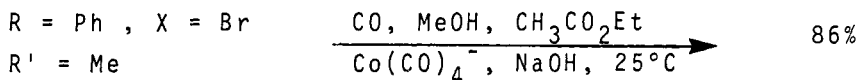
Tustin, G.C.*; Hembre, R.T.
J Org Chem, (1984), 49, 1761



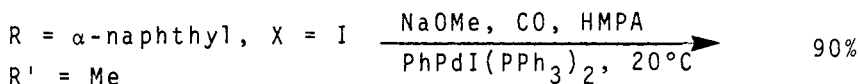
2. aq. NaOH
 Woell, J.B.; Fergusson, S.B.; Alper, H.*
J Org Chem, (1985), 50, 2134



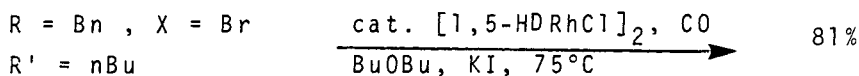
$\xrightarrow[\text{cat. [1,5-HDRhCl]}_2]{(\text{EtO})_3\text{B}, \text{CO}, \text{KI}}$ 71%
 Alper, H.; Hamel, N.; Smith, D.J.H.; Woell, J.B.
Tetrahedron Lett., (1985), **26**, 2273



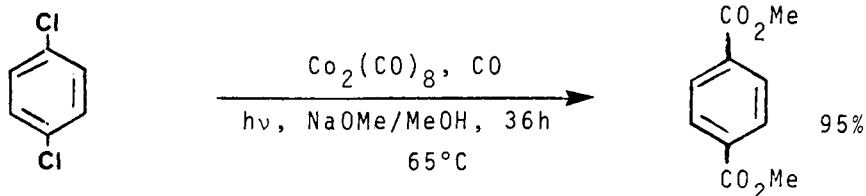
$\xrightarrow[\text{Co(CO)}_4^-, \text{NaOH}, 25^\circ\text{C}]{\text{CO}, \text{MeOH}, \text{CH}_3\text{CO}_2\text{Et}}$ 86%
 Foà, M.; Francalanci, F.; Bencini, E.; Gardano, A.
J Organomet Chem., (1985), **285**, 293



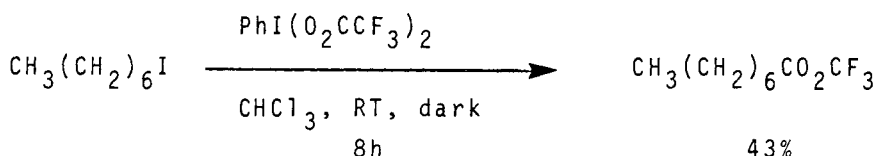
$\xrightarrow[\text{PhPdI(PPh}_3)_2, 20^\circ\text{C}]{\text{NaOMe}, \text{CO}, \text{HMPA}}$ 90%
 Bumagin, N.A.; Gulevich, Yu.V.; Beletskaya, I.P.*
J Organomet Chem., (1985), **285**, 415



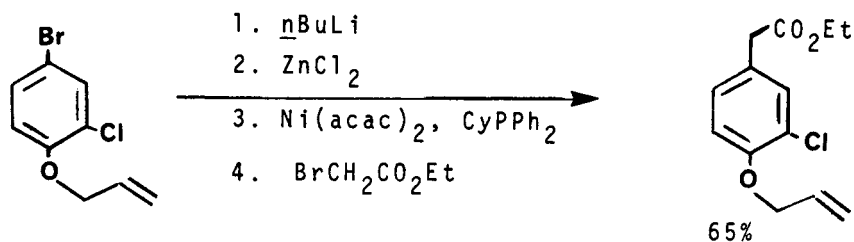
$\xrightarrow[\text{BuOBu}, \text{KI}, 75^\circ\text{C}]{\text{cat. [1,5-HDRhCl]}_2, \text{CO}}$ 81%
 Buchan, C.; Hamel, N.; Woell, J.B.; Alper, H.*
Tetrahedron Lett., (1985), **26**, 5743



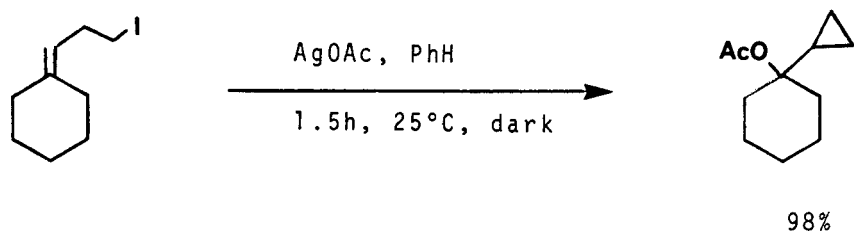
Kashimura, T.*; Kudo, K.; Mori, S.; Sugita, N.
Chem Lett., (1986), 851



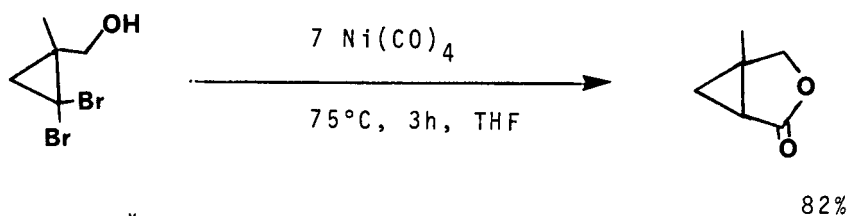
Gallos, J.; Varvoglis, A.* JCS Perkin I, (1983), 1999



Klingstedt, T.; Frejd, T.* Organometallics, (1983), 2, 598



Previtera, L.; Monaco, P.; Mangoni, L.
Tetrahedron Lett, (1984), 25, 1293



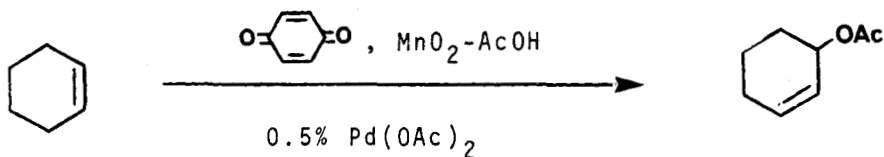
Hirao, T.*; Harano, Y.; Yamana, Y.; Hamada, Y.; Nagata, S.;
Agawa, T.

Bull Chem Soc Jpn, (1986), 59, 1341

Related Methods: Carboxylic Acids from Halides (Section 25)

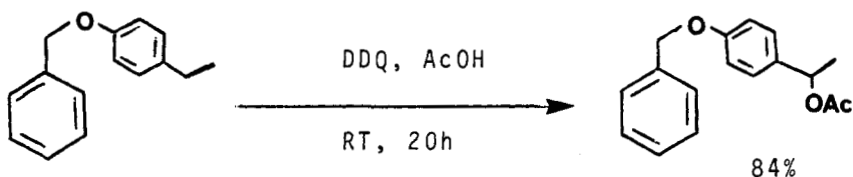
SECTION 116: Esters from Hydrides

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



Heumann, A.*; Åkermark, B.*

95%

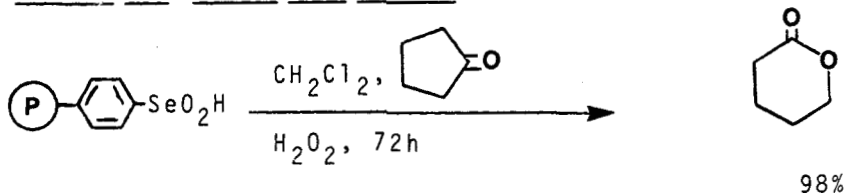
Angew Chem Int Ed Engl, (1984), **23**, 453

84%

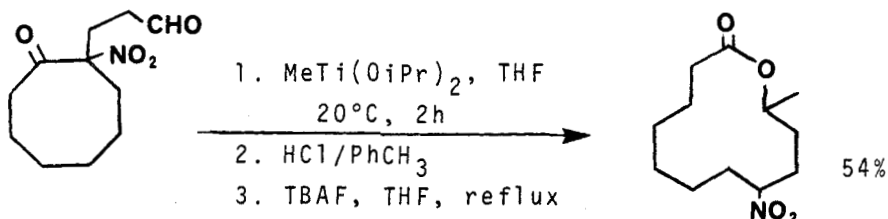
Bouquet, M.; Guy, A.; Lemaire, M.; Guetté, J.P.

Syn Commun, (1985), **15**, 1153

Also via: Carboxylic Acids (Section 26); Alcohols (Section 41)

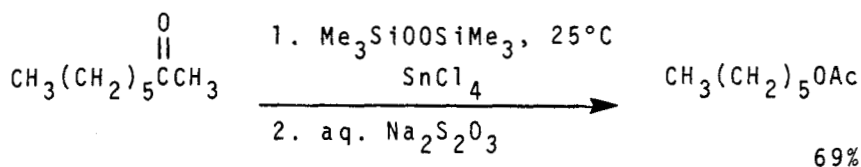
SECTION 117: Esters from Ketones

98%

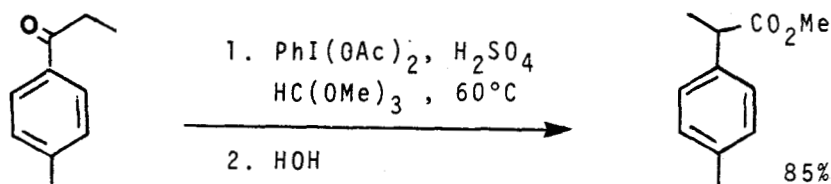
Taylor, R.T.*; Flood, L.A. J Org Chem, (1983), **48**, 5160

54%

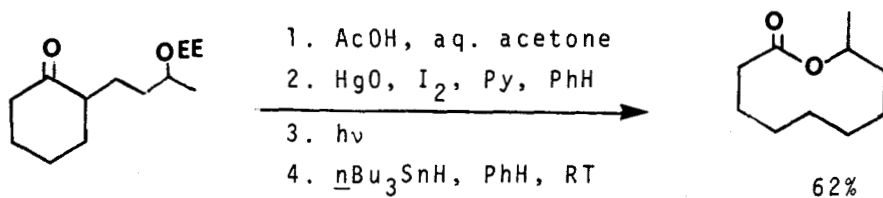
Kostova, K.; Hesse, M.* Helv Chim Acta, (1983), **66**, 741Aono, T.; Hesse, M.* Helv Chim Acta, (1984), **67**, 1448



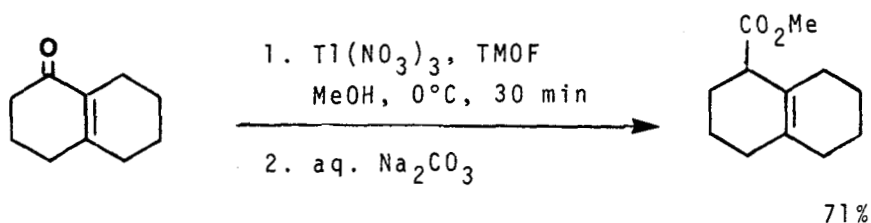
Matsubara, S.; Takai, K.*; Nozaki, H.
Bull Chem Soc Jpn, (1983), 56, 2029



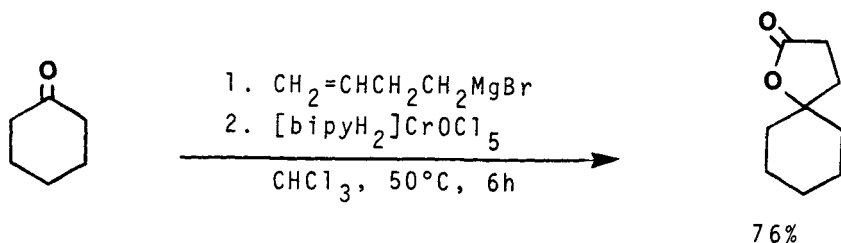
Tamura, Y.*; Shirouchi, Y.; Haruta, J. Synthesis, (1984), 231



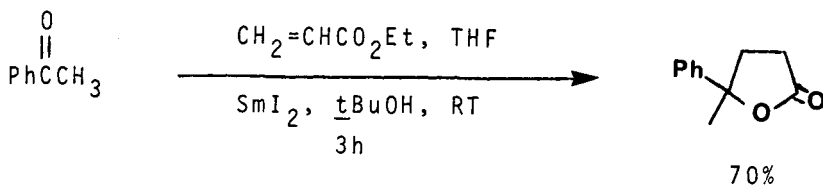
Suginome, H.*; Yamada, S. Tetrahedron Lett, (1985), 26, 3715



Mincione, E.*; Bovicelli, P.; Gil, J.B.; Forcelllese, M.L.
Gazz Chim Ital, (1985), 115, 37



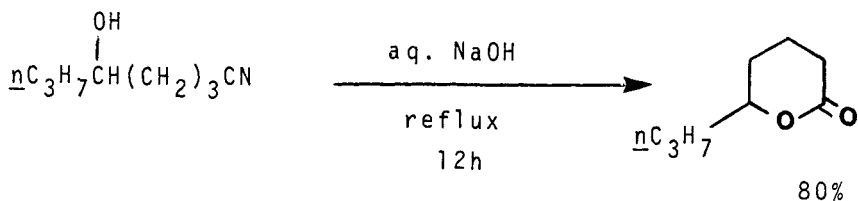
Rathore, R.; Vankar, P.S.; Chandrasekaran, S.*
Tetrahedron Lett., (1986), 27, 4079



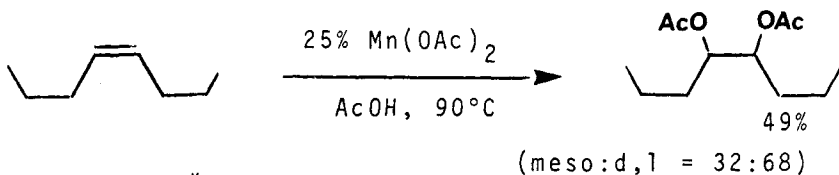
Fukuzawa, S.*; Nakanishi, A.; Fujinami, T.; Sakai, S.
JCS Chem Comm., (1986), 624

Also via: Carboxylic Acids (Section 27)

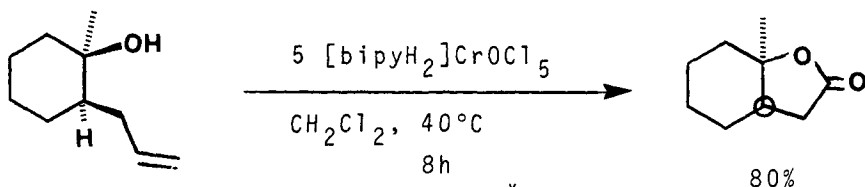
SECTION 118: Esters from Nitriles



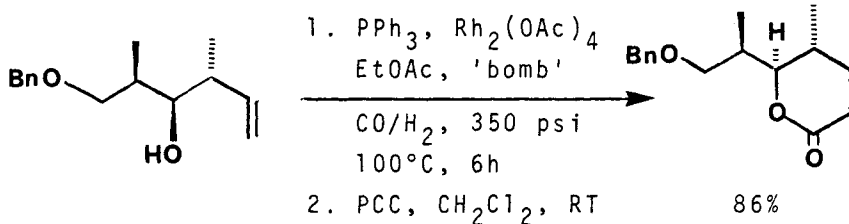
Giese, B.*; Hasskerl, T.; Lüning, U.
Chem Ber., (1984), 117, 859

SECTION 119: Esters from Olefins

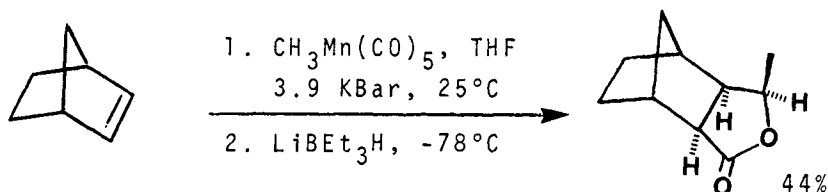
Fristad, W.E.*; Peterson, J.R.

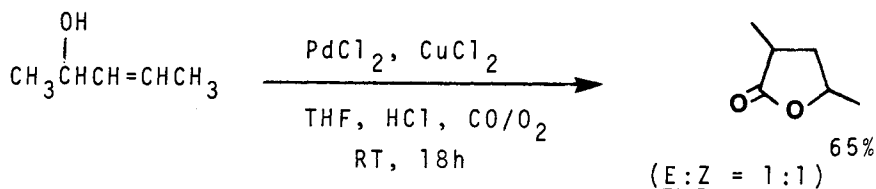
Tetrahedron Lett., (1983), 24, 4547

Chakraborty, T.K.; Chandrasekaran, S.*

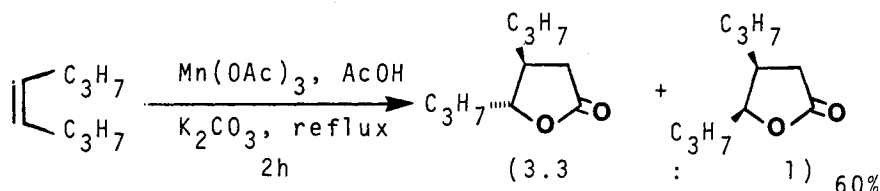
Tetrahedron Lett., (1984), 25, 2895Chem Lett., (1985), 551

Wuts, P.G.M.*; Obrzut, M.L.; Thompson, P.A.

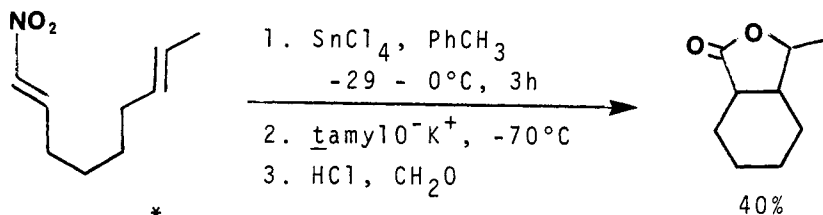
Tetrahedron Lett., (1984), 25, 4051DeShong, P.*; Slough, G.A. Organometallics, (1984), 3, 636



Alper, H.*; Leonard, D. Tetrahedron Lett., (1985), 26, 5639



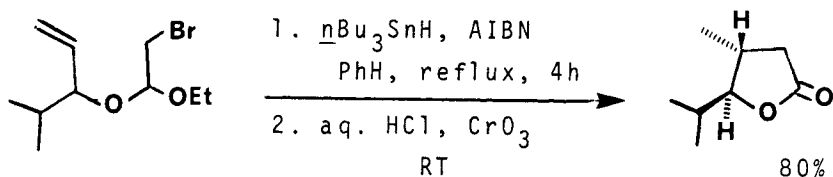
Fristad, W.E.*; Peterson, J.R. J Org Chem, (1985), 50, 10



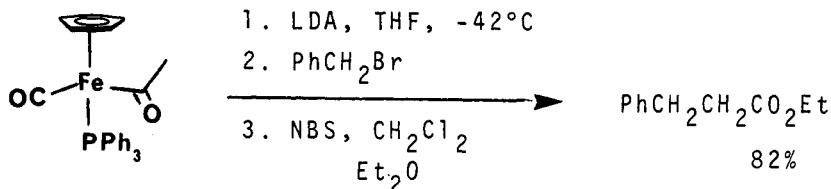
Denmark, S.E.*; Dappen, M.S.; Cramer, C.J. J Am Chem Soc., (1986), 108, 1306

Also via: Alcohols (Section 44)

SECTION 120: Esters from Miscellaneous Compounds



Stork, G.*; Mook Jr., R.; Biller, S.A.; Rychnovsky, S.D. J Am Chem Soc., (1983), 105, 3741

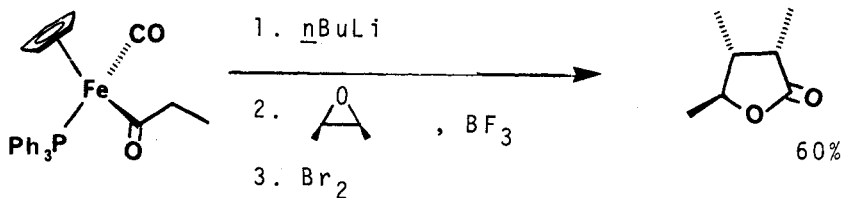


Liebeskind, L.S.*; Welker, M.E.; Fengl, R.W.

J Am Chem Soc, (1986), 108, 6328

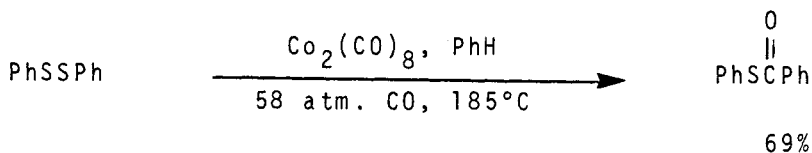
Liebeskind, L.S.*; Welker, M.E.

Organometallics, (1983), 2, 194



(RRS,SSR:RSR,SRS:RSS,SRR = 88:8:4)

Davies, S.G.*; Warner, P. Tetrahedron Lett, (1985), 26, 4815



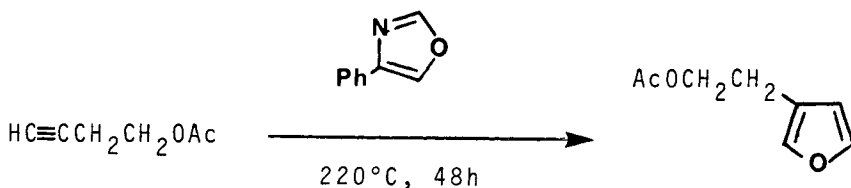
Antebi, S.; Alper, H.*

Tetrahedron Lett, (1985), 26, 2609

CHAPTER 9

PREPARATION OF ETHERS, EPOXIDES, AND THIOETHERS

SECTION 121: Ethers, Epoxides, and Thioethers from Acetylenes



Liotta, D.*; Saindone, M.; Ott, W.

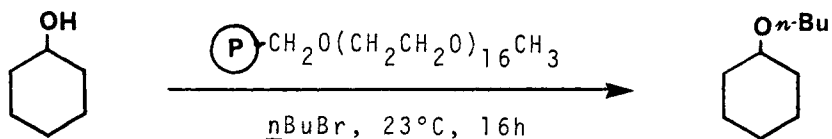
Tetrahedron Lett., (1983), 24, 2473

70%

SECTION 122: Ethers, Epoxides, and Thioethers from Acid Derivatives

No Additional Examples

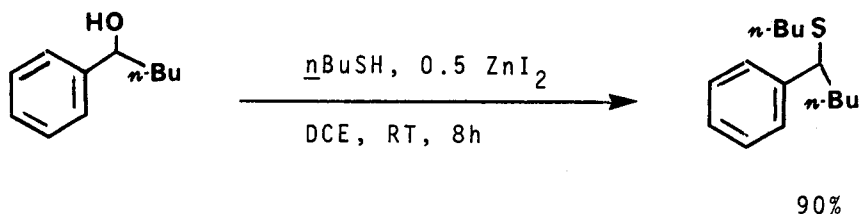
SECTION 123: Ethers, Epoxides, and Thioethers from Alcohols and Thiols



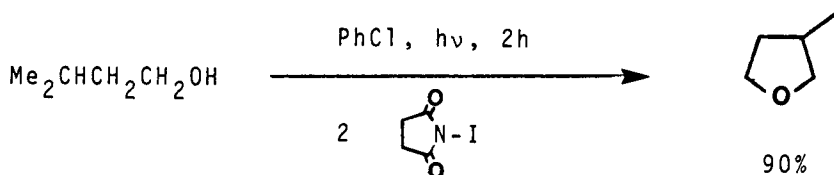
77%

Kimura, Y.; Kirszensztejn, P.; Regen, S.L.*

J Org Chem., (1983), 48, 385

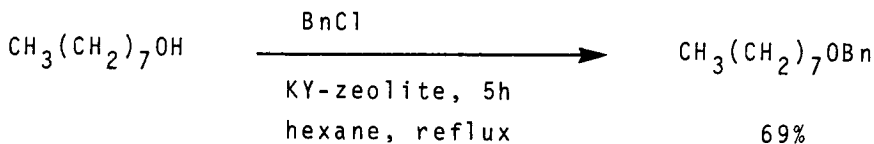


Guindon, Y.*; Frenette, R.*; Fortin, R.; Rokach, J.
J Org Chem, (1983), 48, 1357

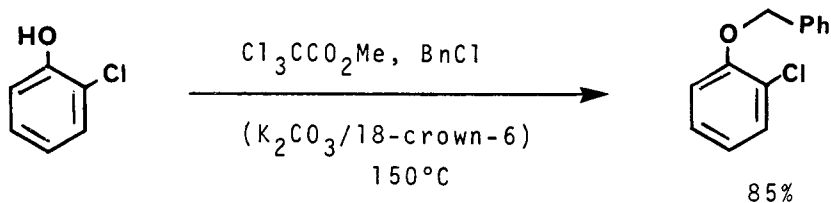


Beebe, T.R.*; Adkins, R.L.; Bogardus, C.C.; Champney, B.; Hii, P.S.; Reinking, P.; Shadday, J.; Weatherford III, W.D.; Webb, M.W.; Yates, S.W.

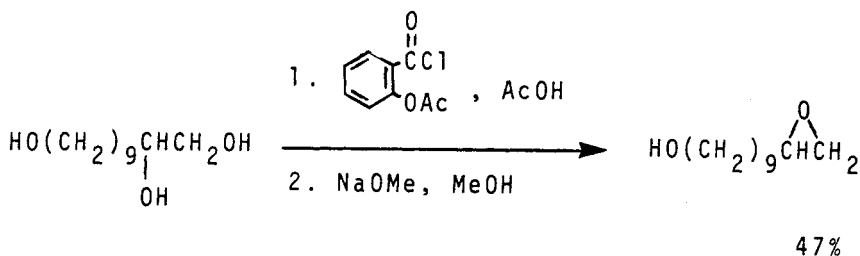
J Org Chem, (1983), 48, 3126



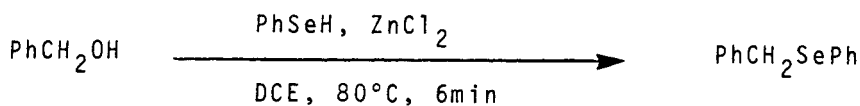
Onaka, M.*; Kawai, M.; Izumi, Y. Chem Lett, (1983), 1101



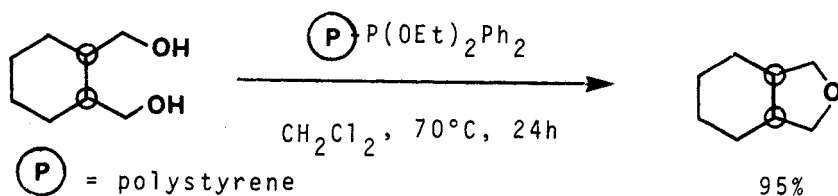
Renga, J.M.*; Wang, P.-C. Syn Commun, (1984), 14, 69



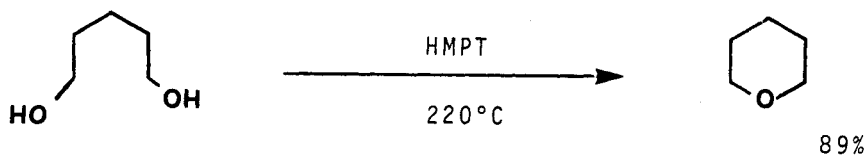
Bhat, K.S.; Joshi, P.L.; Rao, A.S.* Synthesis, (1984), 142



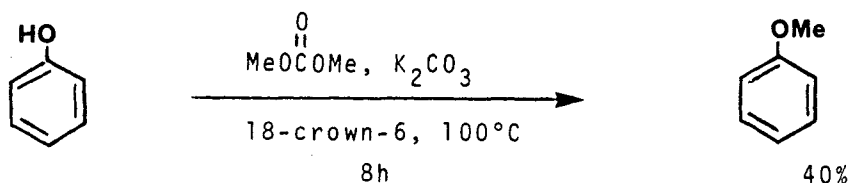
Clarembau, M.; Krief, A.* 81%
Tetrahedron Lett., (1984), 25, 3625



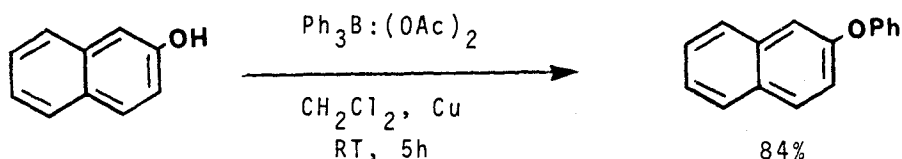
Kelly, J.W.; Robinson, P.L.; Evans Jr., S.A.*
J Org Chem, (1985), 50, 5007
 Robinson, P.L.; Barry, C.N.; Kelly, J.W.; Evans Jr., S.A.
J Am Chem Soc, (1985), 107, 5210



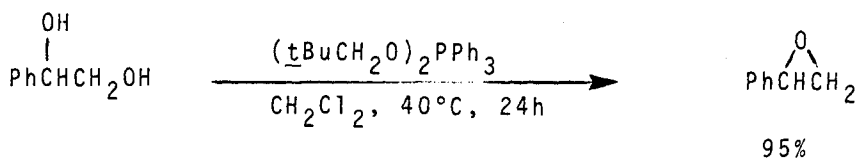
Diab, J.; Abou-Assali, M.; Gervais, C.; Anker, D.*
Tetrahedron Lett., (1985), 26, 1501



Lissel, M.*; Schmidt, S.; Neumann, B. Synthesis, (1986), 382

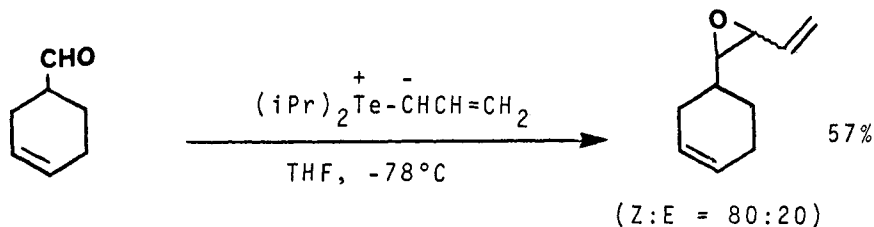


Barton, D.H.R.*; Finet, J.-P.; Khamsi, J.; Pichon, C.
Tetrahedron Lett., (1986), 27, 3619

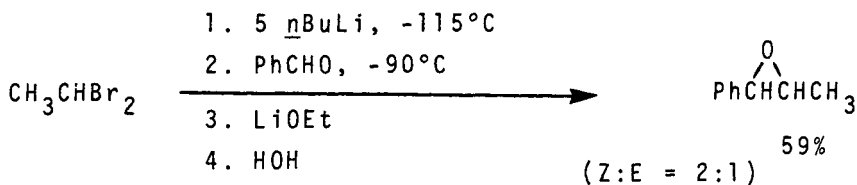


Kelly, J.W.; Evans Jr., S.A. J Org Chem, (1986), 51, 5490

SECTION 124: Ethers, Epoxides, and Thioethers from Aldehydes



Osuka, A.; Suzuki, H. Tetrahedron Lett., (1983), 24, 5109

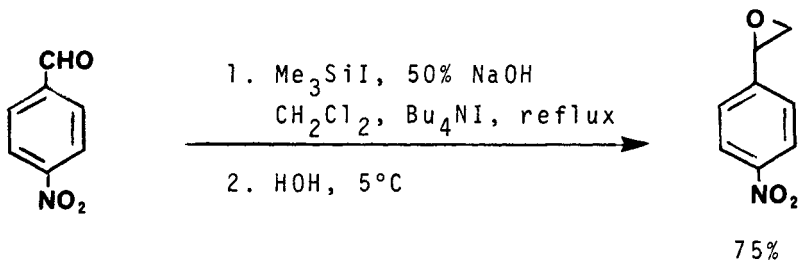
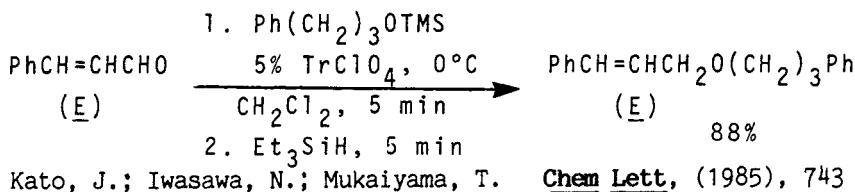


Tarhouni, R.; Kirschleger, B.; Villieras, J.

J Organomet Chem, (1984), 272, c1

Tarhouni, R.; Kirschleger, B.; Rambaud, M.; Villieras, J.

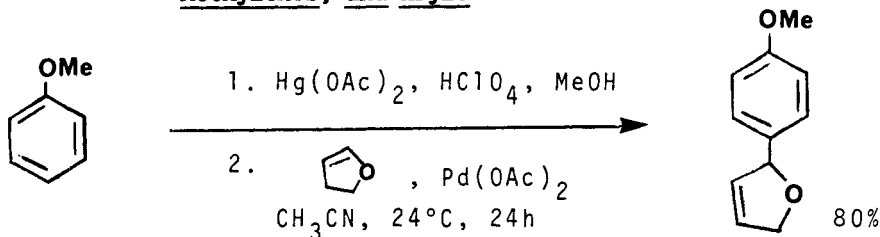
Tetrahedron Lett, (1984), 25, 835



Rafizadeh, K.; Yates, K.

Org Prep Proc Int, (1985), 17, 140

SECTION 125: Ethers, Epoxides, Thioethers from Alkyls, Methylenes, and Aryls

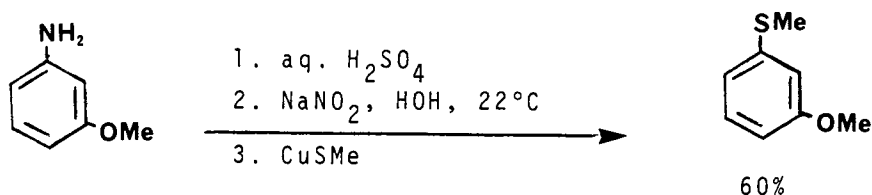
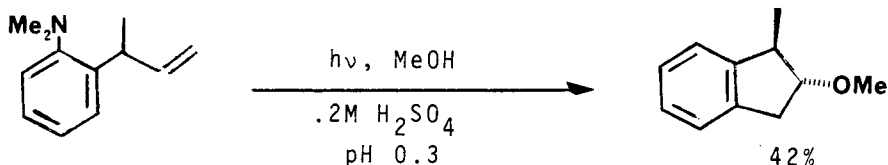
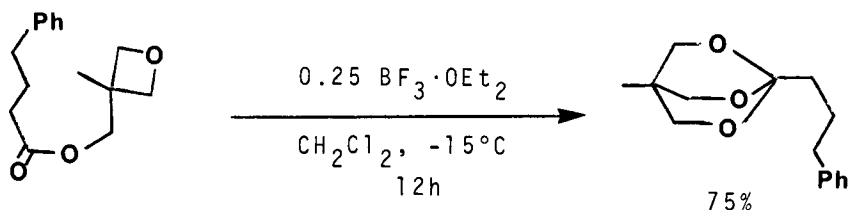


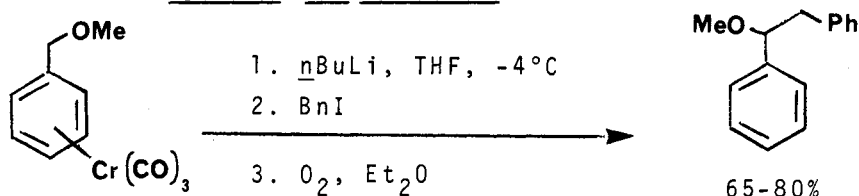
Lee, T.D.; Daves Jr., G.D.*

J Org Chem, (1983), 48, 399

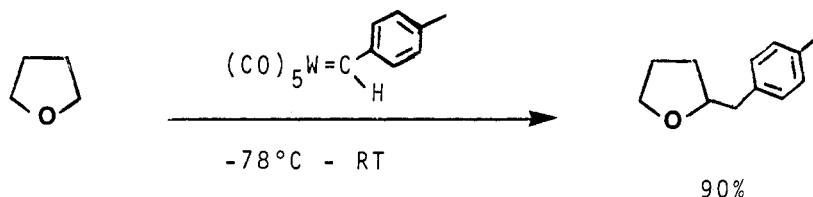
SECTION 126: Ethers, Epoxides, and Thioethers from Amides

No Additional Examples

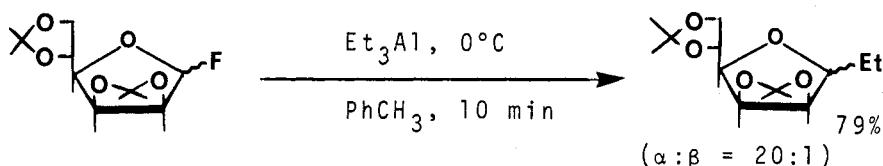
SECTION 127: Ethers, Epoxides, and Thioethers from AminesBaleja, J.D.* Syn Commun, (1984), 14, 215Scholl, B.; Jolidon, S.; Hansen, H.-J.
Helv Chim Acta, (1986), 69, 184**SECTION 128: Ethers, Epoxides, and Thioethers from Esters**Corey, E.J.*; Raju, N. Tetrahedron Lett, (1983), 24, 5571

SECTION 129: Ethers, Epoxides, and Thioethers from Ethers, Epoxides, and Thioethers

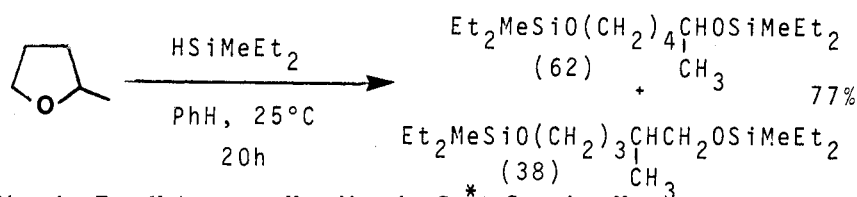
Davies, S.G.*; Holman, N.J.; Laughton, C.A.; Mobbs, B.E.
JCS Chem Comm, (1983), 1316



Fischer, H.*; Schmid, J.; Märkl, R.
JCS Chem Comm, (1985), 572

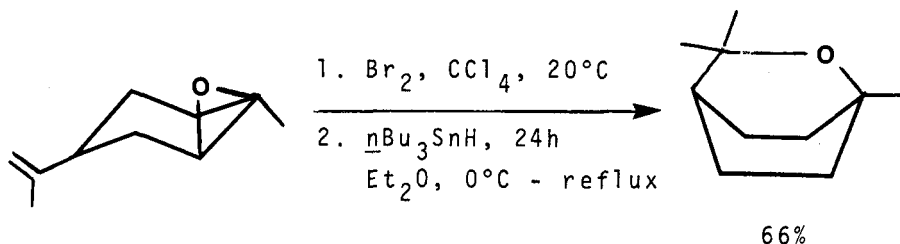


Posner, G.H.*; Haines, S.R. Tetrahedron Lett, (1985), 26, 1823



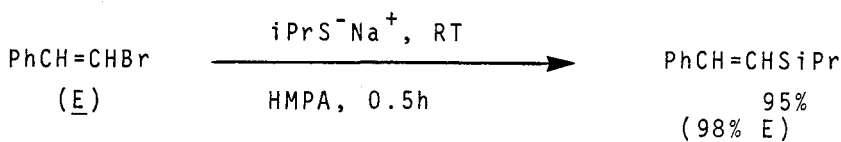
Murai, T.; Hatayama, Y.; Murai, S.*; Sonoda, N.
Organometallics, (1983), 2, 1883

Murai, T.; Furuta, K.; Kato, S.
J Organomet Chem, (1986), 302, 249



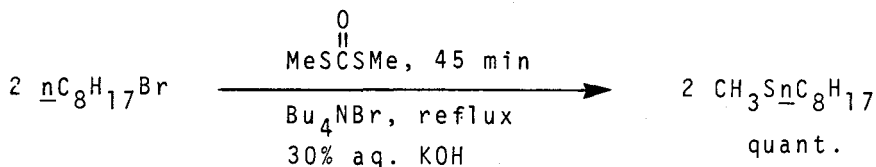
Davies, S.G.*; Polywka, M.E.C.; Thomas, S.E.
JCS Perkin I, (1986), 1277

SECTION 130: Ethers, Epoxides, and Thioethers from Halides and Sulfonates

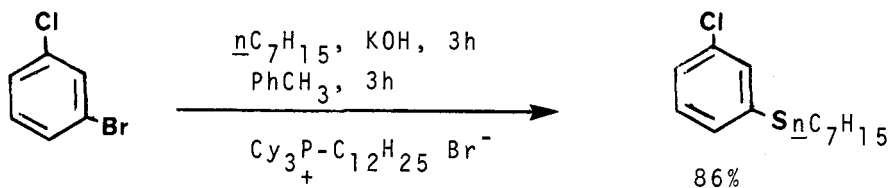


Tiecco, M.*; Testaferri, L.*; Tingoli, M.; Chianelli, D.;
 Montanucci, M.

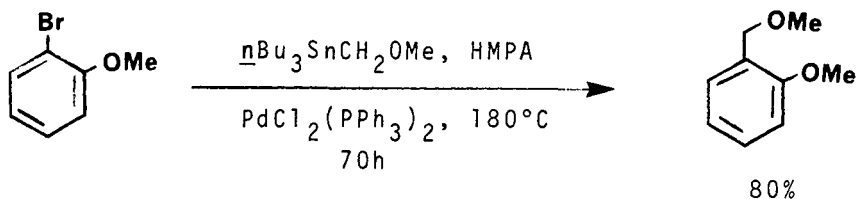
J Org Chem, (1983), 48, 4795



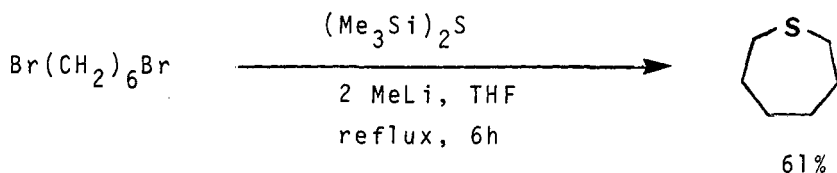
Degani, I.; Fochi, R.; Regondi, V. Synthesis, (1983), 630



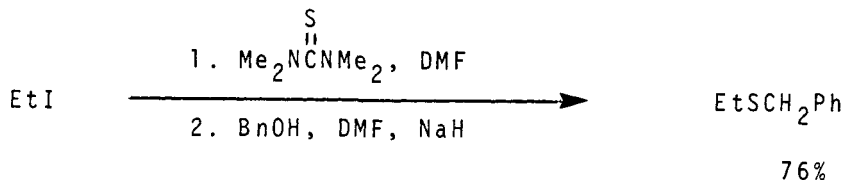
Brunelle, D.J.* J Org Chem, (1984), 49, 1288



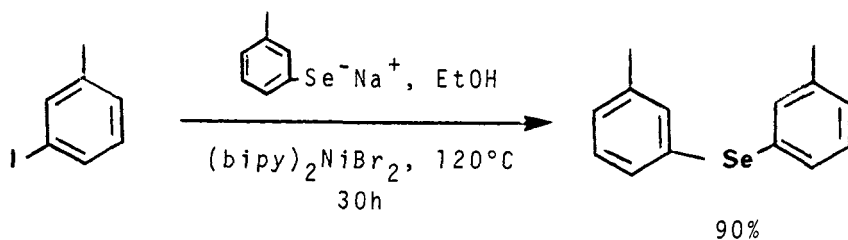
Kosugi, M.; Sumiya, T.; Ogata, T.; Sano, H.; Migita, T.*
Chem Lett, (1984), 1225



Steliou, K.*; Salama, P.; Corriveau, J.
J Org Chem, (1985), 50, 4969



Fujisaki, S.; Fujiwara, I.; Norisue, Y.; Kajigaeshi, S.*
Bull Chem Soc Jpn, (1985), 58, 2429



Cristau, H.J.*; Chabaud, B.*; Labaudiniere, R.; Christol, H.
Organometallics, (1985), 4, 657

Review: "Copper Assisted Nucleophilic Substitution of Aryl Halogen"

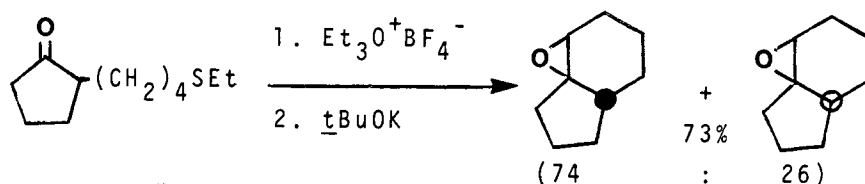
Lindley, J.* Tetrahedron, (1984), **40**, 1433

Related Methods: Ethers from Alcohols (Section 123)

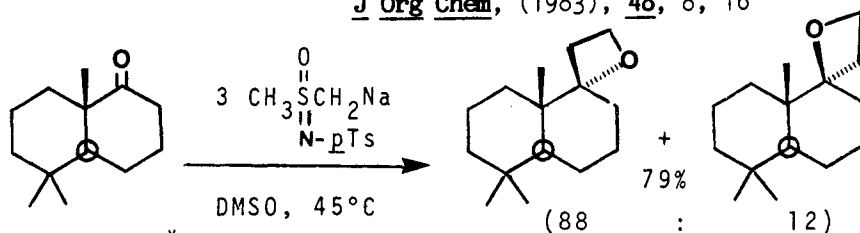
SECTION 131: Ethers, Epoxides, and Thioethers from Hydrides

No Additional Examples

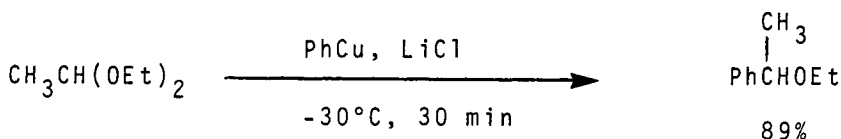
SECTION 132: Ethers, Epoxides, and Thioethers from Ketones



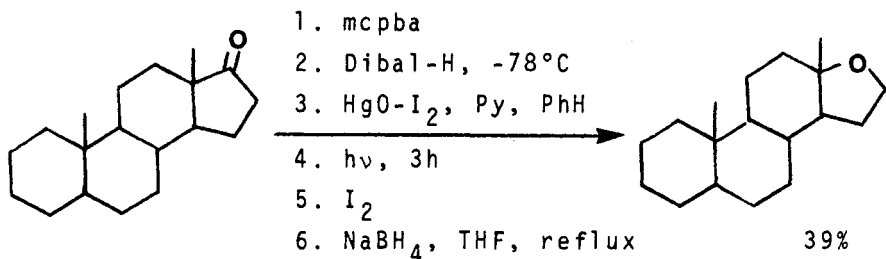
Garst, M.E.*; McBride, B.J.; Johnson, A.T.; Arrhenius, P.
J Org Chem, (1983), **48**, 8, 16



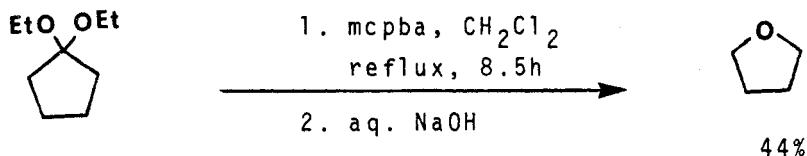
Welch, S.C.*; Prakasa Rao, A.S.C.; Lyon, J.T.; Assercq, J.-M.
J Am Chem Soc, (1983), **105**, 252



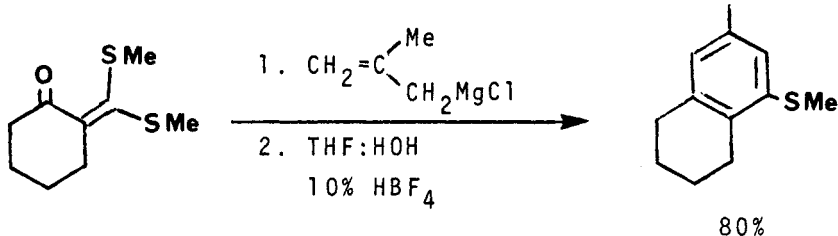
Ghribi, A.; Alexakis, A.*; Normant, J.F.
Tetrahedron Lett, (1984), **25**, 3075, 3079, 3083



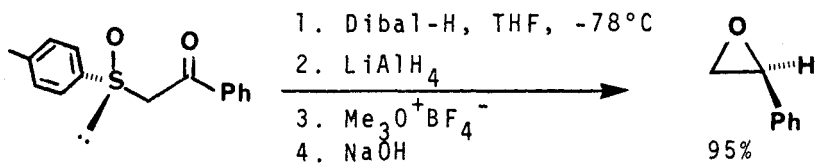
Suginome, H.*; Yamada, S. Tetrahedron Lett., (1984), 25, 3995



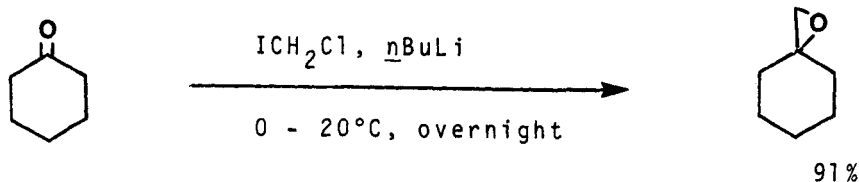
Bailey, W.F.*; Bischoff, J.J. J Org Chem, (1985), 50, 3009



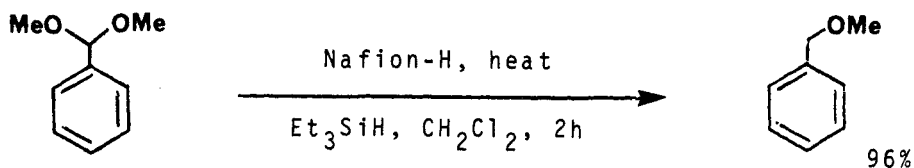
Dieter, R.K.*; Lin, Y.L. Tetrahedron Lett., (1985), 26, 39



Salladie, G.*; Demailly, G.; Greck, C.
Tetrahedron Lett., (1985), 26, 435



Sadhu, K.M.; Matteson, D.S.* Tetrahedron Lett., (1986), 27, 795



Olah, G.A.*; Yamato, T.; Iyer, P.S.; Surya Prakash, G.K.
J Org Chem, (1986), 51, 2826

Review: "Recent Advances in the Preparation and Synthetic Applications of Oxiranes"

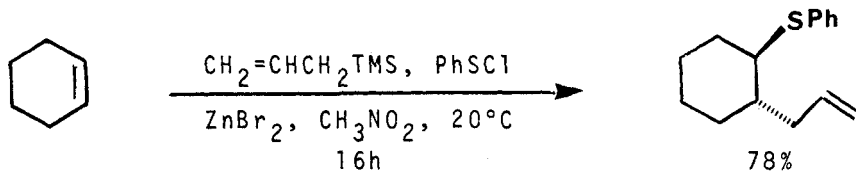
Rao, A.S.*; Paknikar, S.K.; Kirtane, J.G.
Tetrahedron, (1983), 39, 2323

Related Methods: Epoxides from Aldehydes (Section 124)

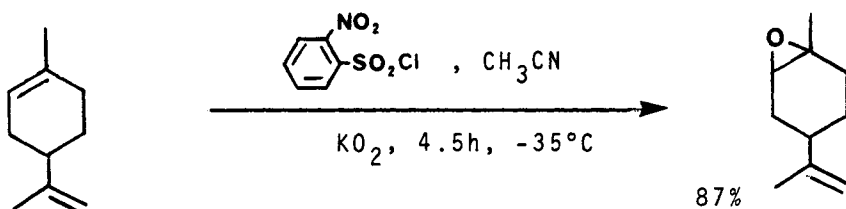
SECTION 133: Ethers, Epoxides, and Thioethers from Nitriles

No Additional Examples

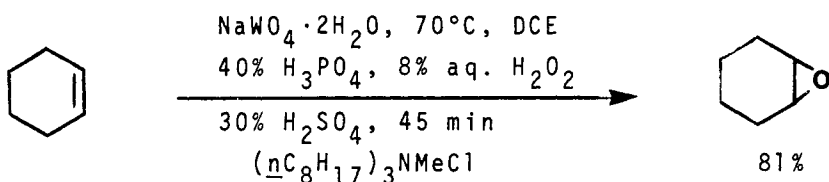
SECTION 134: Ethers, Epoxides, and Thioethers from Olefins



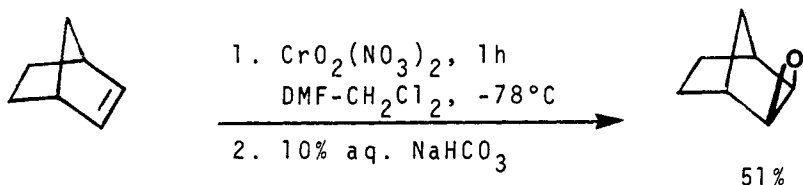
Alexander, R.; Paterson, I.*
Tetrahedron Lett., (1983), 24, 5911



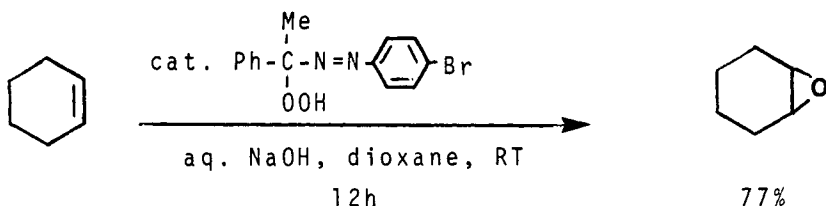
Kim, Y.H.*; Chung, B.C. J Org Chem, (1983), 48, 1562



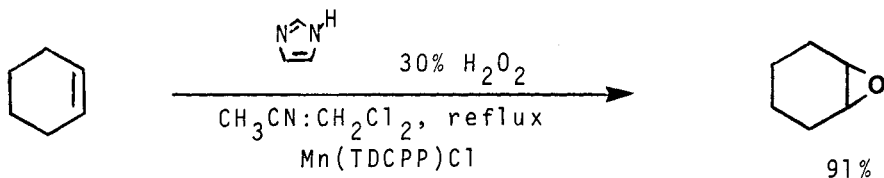
Venturello, C.*; Alneri, E.; Ricci, M.
J Org Chem, (1983), 48, 3831



Miyaura, N.; Kochi, J.K.* J Am Chem Soc, (1983), 105, 2368



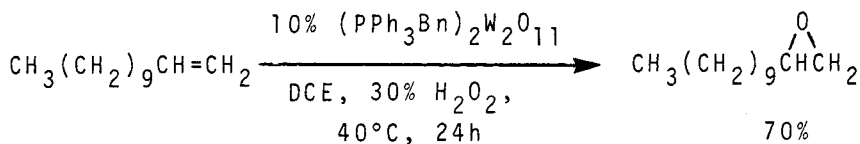
Tezuka, T.*; Iwaki, M. JCS Perkin I, (1984), 2507
Heterocycles, (1984), 22, 725



TDCPP = tetra-2,6-dichlorophenyl porphyrin

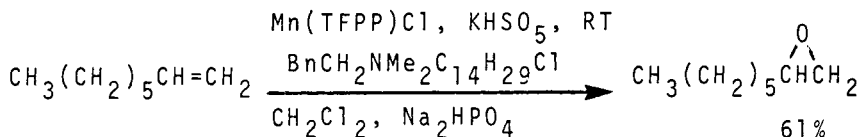
Renaud, J.-P.; Battioni, P.; Bartoli, J.F.; Mansuy, D.

JCS Chem Comm, (1985), 888



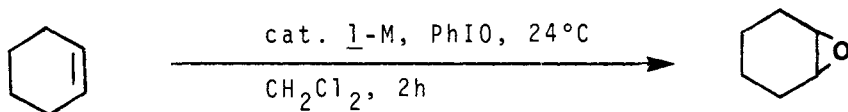
Prandi, J.; Kagan, H.B.; Mimoun, H.

Tetrahedron Lett, (1986), 27, 2617



TFPP = 5,10,15,20-tetraperfluorophenylporphyrinato⁻²

De Poorter, B.; Meunier, B.* Nouv J Chem, (1985), 9, 393

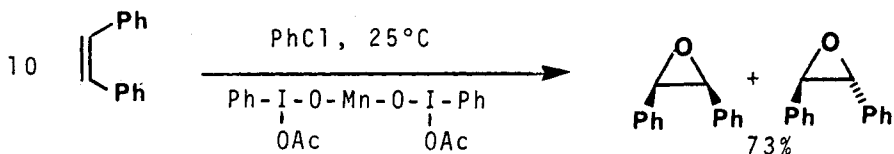


$\text{l-M} = (\text{nBu}_4\text{N})_4\text{HMPW}_{11}\text{O}_{39}$ M = Co 82%
Hill, C.L.*; Brown Jr., R.B. J Am Chem Soc, (1986), 108, 536

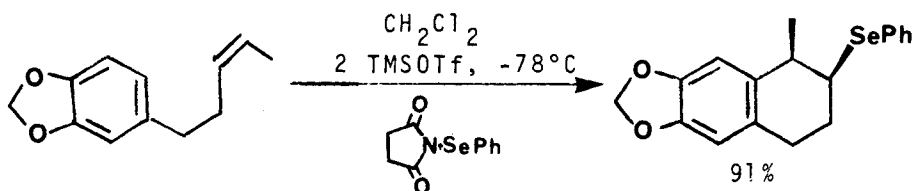
M = Fe (cyclooctene) 84%

Groves, J.T.*; Nemo, T.E.

J Am Chem Soc, (1983), 105, 5786, 5791

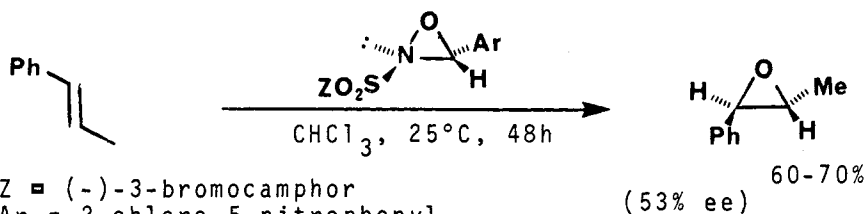


Smegal, J.A.; Hill, C.L.* J Am Chem Soc., (1983), 105, 2920



Edstrom, E.D.; Livinghouse, T.*

Tetrahedron Lett., (1986), 27, 3483

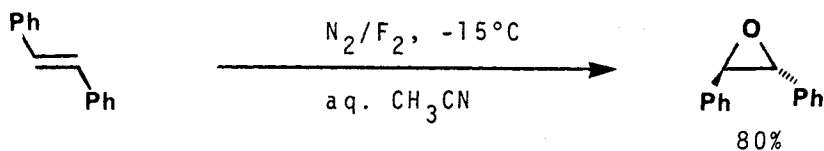


Z = (-)-3-bromocamphor

Ar = 2-chloro-5-nitrophenyl

Davis, F.A.*; Chattopadhyay, S.

Tetrahedron Lett., (1986), 27, 5079



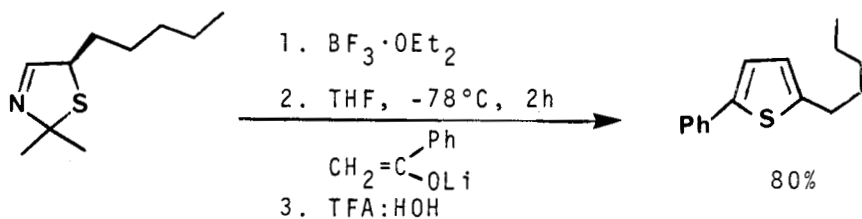
Rozen, S.*; Brand, M. Angew Chem Int Ed Engl., (1986), 25, 554

Review: "Preparation and Synthetic Applications of Oxiranes"

Rao, A.S.*; Paknikar, S.K.; Kirtane, J.G.

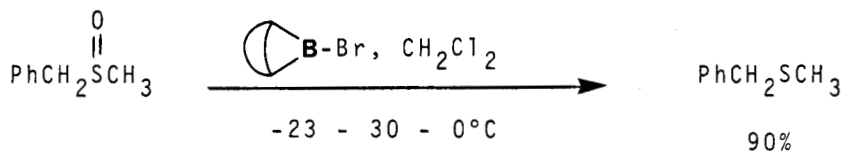
Tetrahedron, (1983), 39, 2323

SECTION 135: Ethers, Epoxides, and Thioethers from Miscellaneous Compounds



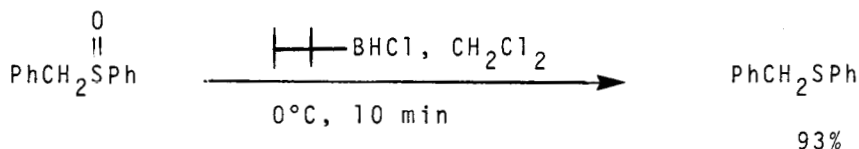
Meltz, C.N.; Volkmann, R.A.*

Tetrahedron Lett., (1983), 24, 4507



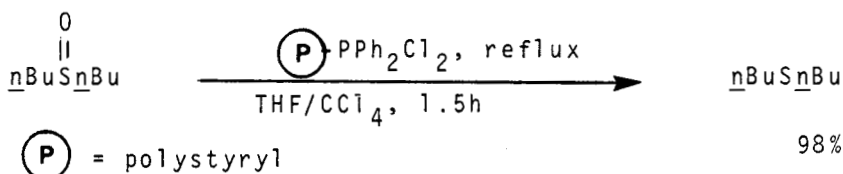
Guindon, Y.*; Atkinson, J.G.; Morton, H.E.

J Org Chem, (1984), 49, 4538



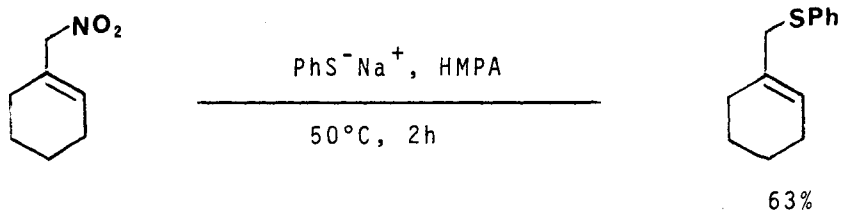
Cha, J.S.*; Kim, J.E.; Kim, J.D.

Tetrahedron Lett., (1985), 26, 6453

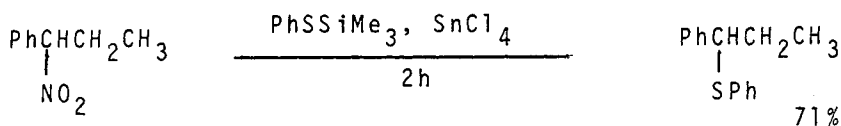


Amos, R.A.*

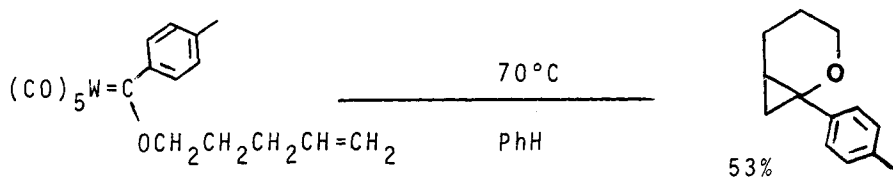
J Org Chem, (1985), 50, 1311



Ono, N.*; Hamamoto, J.; Yanai, T.; Kaji, A.
JCS Chem Comm, (1985), 523

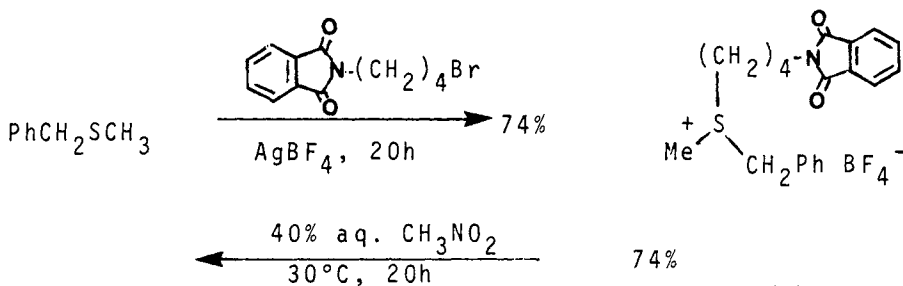


Ono, N.*; Yanai, T.; Kaji, A. JCS Chem Comm, (1986), 1040



Casey, C.P.*; Shusterman, A.J. Organometallics, (1985), 4, 736

SECTION 135A: Protection of Ethers, Epoxides, and Thioethers



Doi, J.T.; Luehr, G.W. Tetrahedron Lett, (1985), 26, 6143

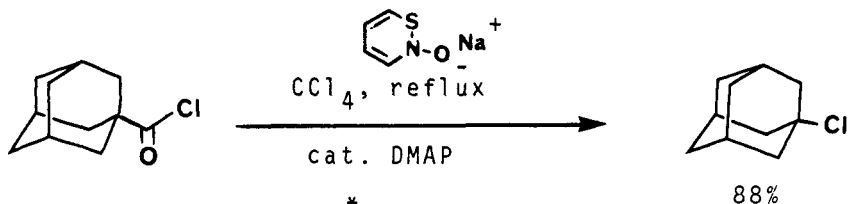
CHAPTER 10

PREPARATION OF HALIDES AND SULFONATES

SECTION 136: Halides and Sulfonates from Acetylenes

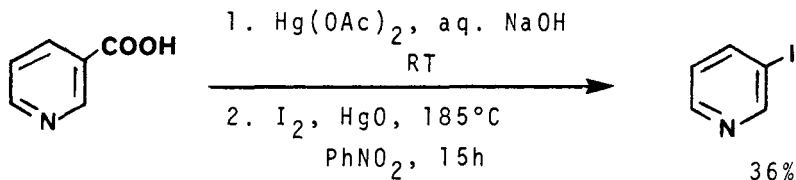
No Additional Examples

SECTION 137: Halides and Sulfonates from Acid Derivatives



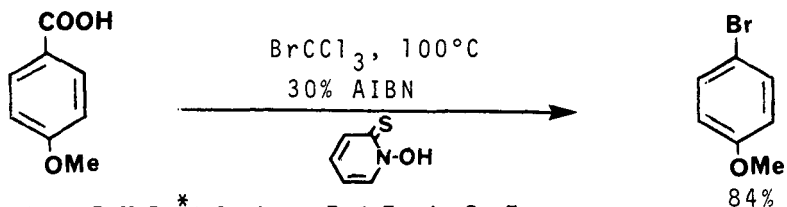
Barton, D.H.R.; Crich, D.*; Motherwell, W.B.

Tetrahedron Lett, (1983), 24, 4979



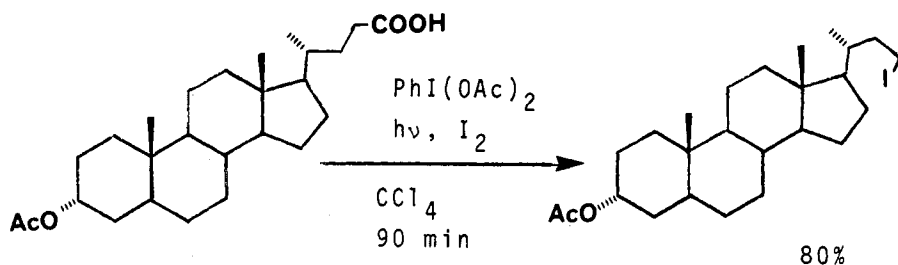
Uemura, S.; Tanaka, S.; Okano, M.*

J Org Chem, (1983), 48, 3297



Barton, D.H.R.*; Lacher, B.; Zard, S.-Z.

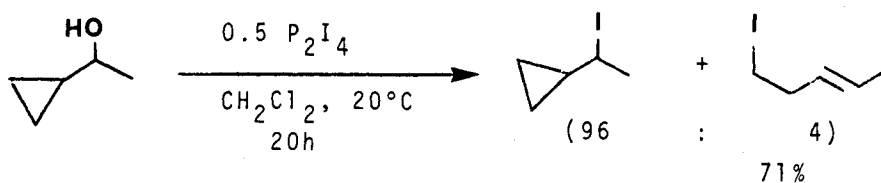
Tetrahedron Lett, (1985), 26, 5939



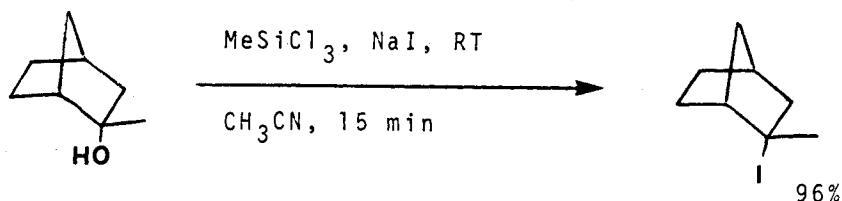
Concepción, J.I.; Francisco, C.G.; Freire, R.; Hernández, R.; Salazar, J.A.; Suárez, E.

J Org Chem, (1986), 51, 402

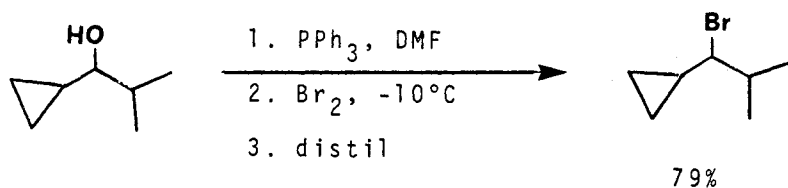
SECTION 138: Halides and Sulfonates from Alcohols and Thiols



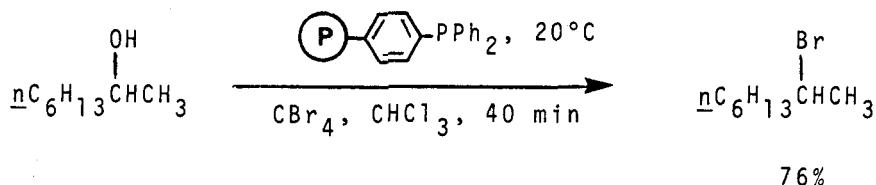
Denis, J.N.; Krief, A.* JCS Chem Comm, (1983), 229



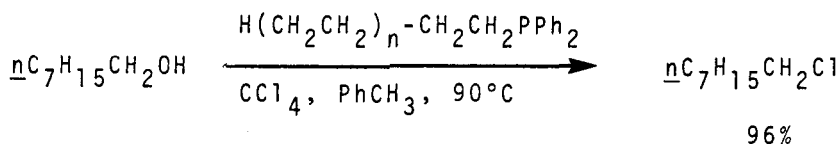
Olah, G.A.*; Husain, A.; Singh, B.P.; Mehrota, A.K.
J Org Chem, (1983), 48, 3667



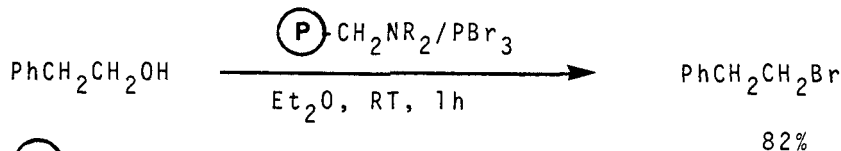
Hrubiec, R.T.; Smith, M.B.* J Org Chem, (1984), 49, 431



Hodge, P.*; Khoshdel, E. JCS Perkin I, (1984), 195



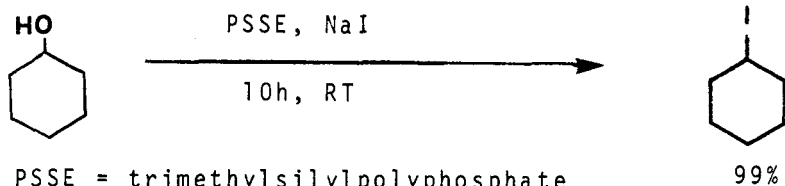
Bergbreiter, D.E.*; Blanton, J.R. JCS Chem Comm, (1985), 337



P = Amberlite IRA93

Cainelli, G.; Contento, M.; Manescalchi, F.; Plessi, L.; Panunzio, M.

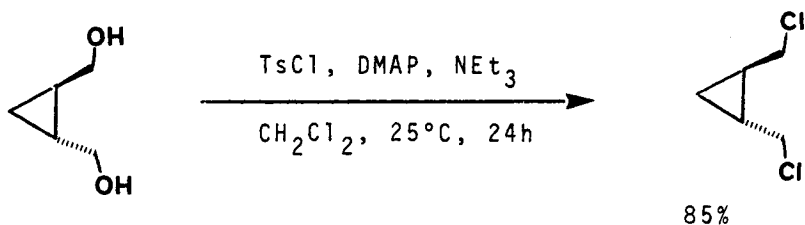
Synthesis, (1983), 306



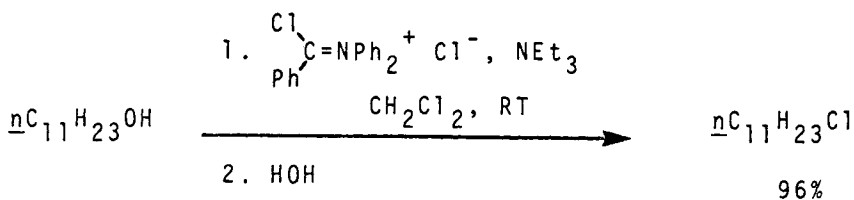
PSSE = trimethylsilyl polyphosphate

Imamoto, T.*; Matsumoto, T.; Kusumoto, T.; Yokoyama, M.

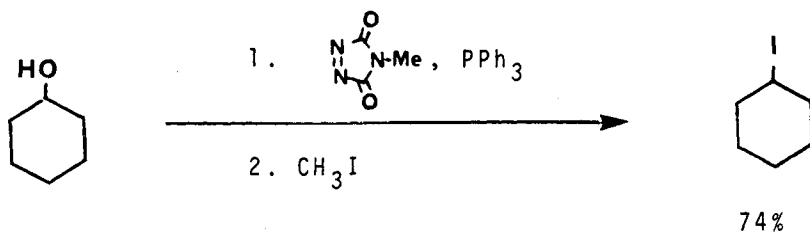
Synthesis, (1983), 460



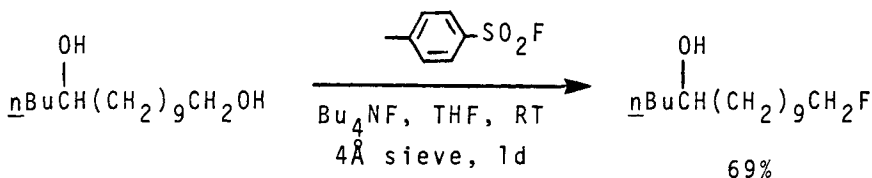
Hwang, C.K.; Li, W.S.; Nicolaou, K.C. Tetrahedron Lett., (1984), 25, 2295



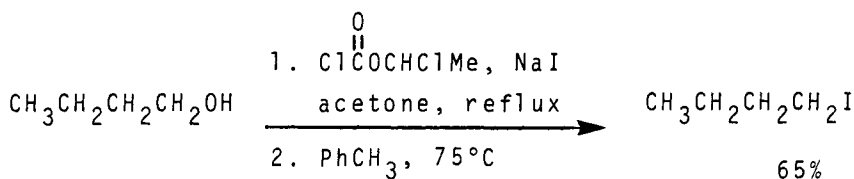
Fujisawa, T.*; Iida, S.; Sato, T. Chem Lett., (1984), 1173



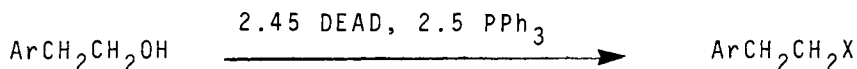
Oshikawa, T.*; Yamashita, M. Bull Chem Soc Jpn., (1984), 57, 2675



Shimizu, M.*; Nakahara, Y.; Yoshioka, H.* Tetrahedron Lett., (1985), 26, 4207

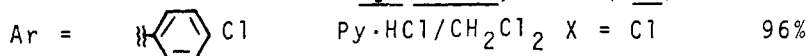


Brunet, J.J.; Laurent, H.; Caubere, P.*
Tetrahedron Lett., (1985), 26, 5445

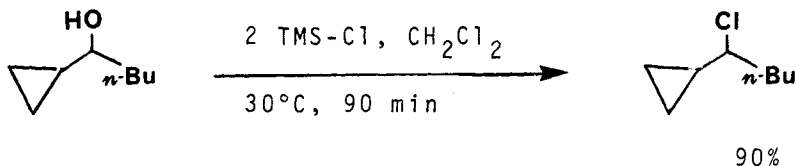


Ar = Ph 5 LiBr/THF X = Br 95%

Manna, S.; Falck, J.R.*; Mioskowski, C.
Syn Commun., (1985), 15, 663

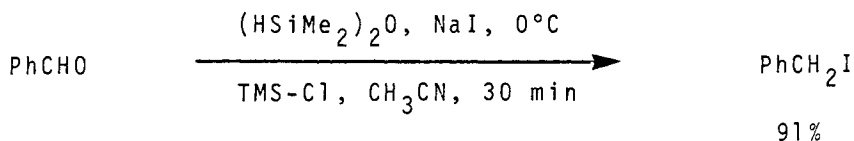


Alpegiani, M.; Bedeschi, A.; Perrone, E.
Gazz Chim Ital., (1985), 115, 393

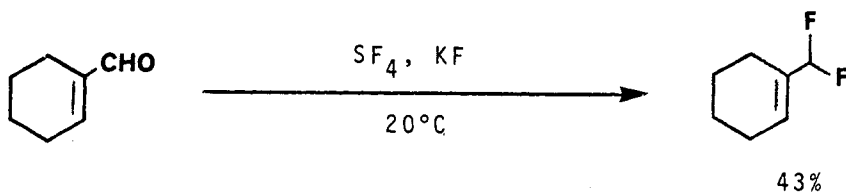


Balme, G.*; Fournet, G.; Gore, J.
Tetrahedron Lett., (1986), 27, 1907

SECTION 139: Halides and sulfonates from Aldehydes



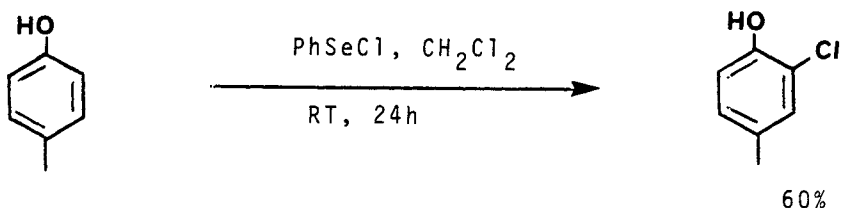
Aizpurua, J.M.; Palomo, C.* Tetrahedron Lett., (1984), 25, 1103



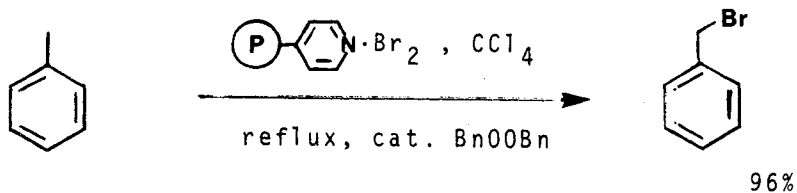
Haas, A.*; Plümer, R.; Schiller, A.
Chem Ber, (1985), 118, 3004

SECTION 140: Halides and Sulfonates from Alkyls, Methylene, and Aryls

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



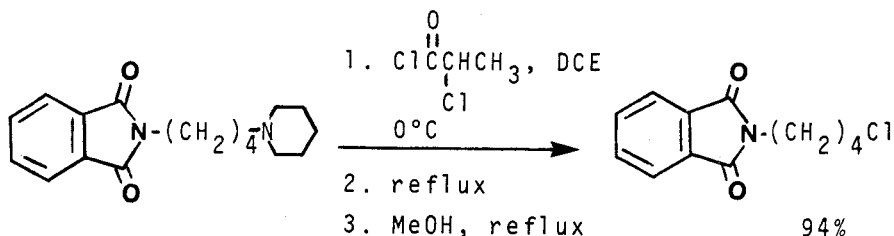
Ayorinde, F.O.* Tetrahedron Lett, (1983), 24, 2077



Šket, B.; Zupan, M.* J Org Chem, (1986), 51, 929

SECTION 141: Halides and Sulfonates from Amides

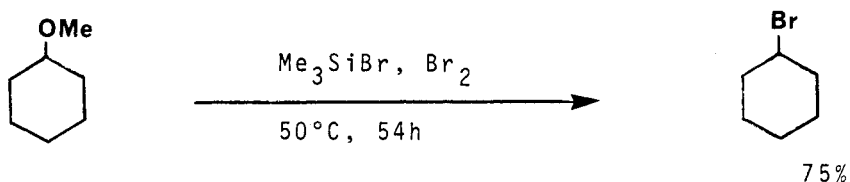
No Additional Examples

SECTION 142: Halides and Sulfonates from Amines

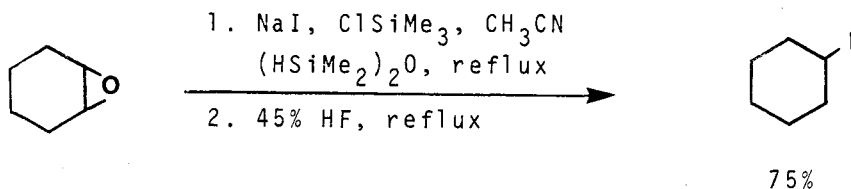
Olofson, R.A.*; Abbott, D.E. J Org Chem, (1984), 49, 2795

SECTION 143: Halides and Sulfonates from Esters

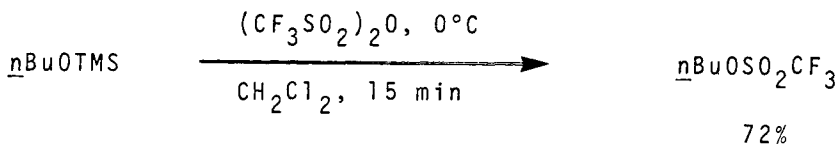
No Additional Examples

SECTION 144: Halides and Sulfonates from Ethers, Epoxides, and Thioethers

Friedrich, E.C.*; DeLucca, G. J Org Chem, (1983), 48, 1678

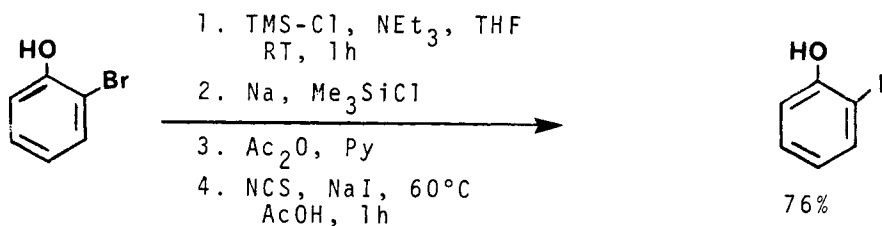


Aizpurua, J.M.; Palomo, C.* Tetrahedron Lett, (1984), 25, 3123

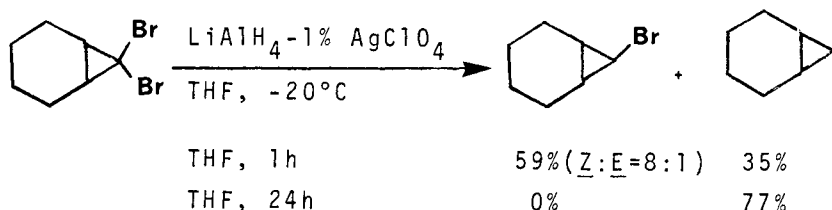


Aubert, C.; Bégue, J.-P.* Synthesis, (1985), 759

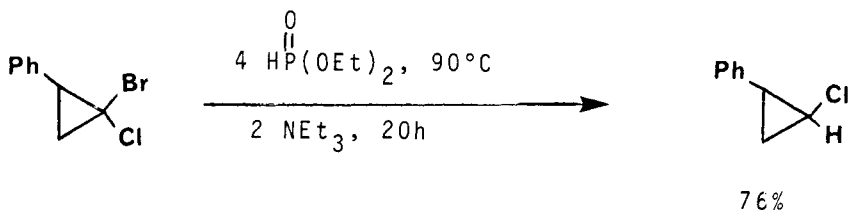
SECTION 145: Halides and Sulfonates from Halides and Sulfonates



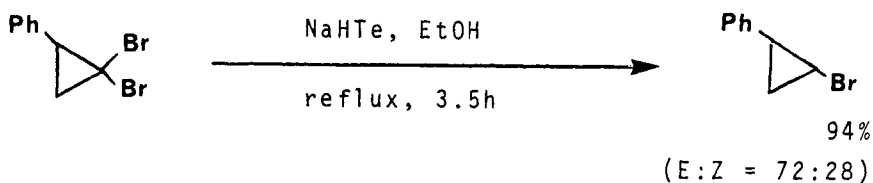
Wilbur, D.S.*; Stone, W.E.; Anderson, K.W.
J Org Chem, (1983), 48, 1542



Shimizu, N.*; Watanabe, K.; Tsuno, Y. Chem Lett, (1983), 1877

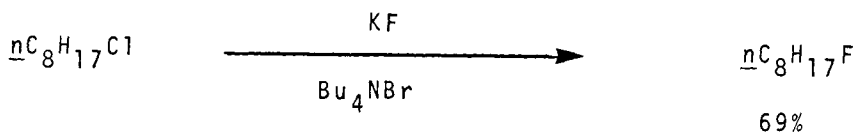


Hirao, T.; Kohno, S.; Ohshiro, Y.*; Agawa, T.
Bull Chem Soc Jpn, (1983), 56, 1881



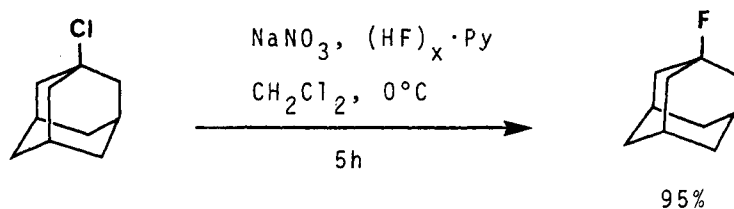
Osuka, A.*; Takechi, K.*; Suzuki, H.*

Bull Chem Soc Jpn, (1984), 57, 303



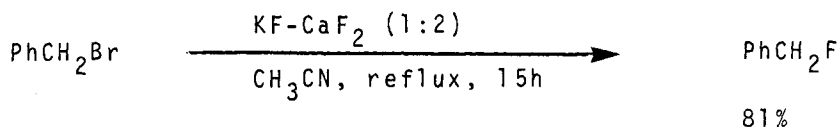
Escoula, B.; Rico, I.; Lattes, A.

Tetrahedron Lett, (1986), 27, 1499



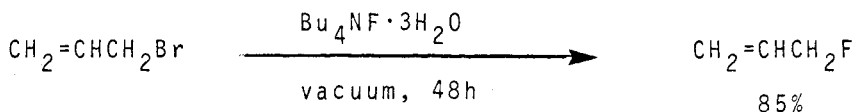
Olah, G.A.*; Shih, J.G.; Singh, B.P.; Gupta, B.G.B.

Synthesis, (1983), 713

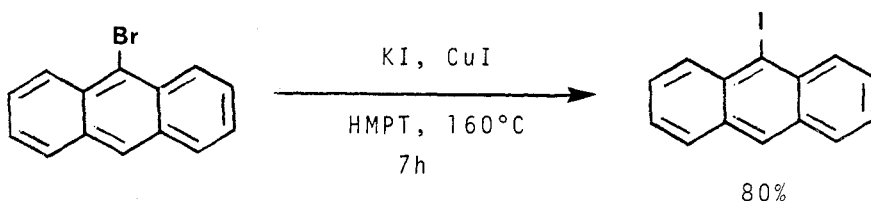


Ichihara, J.*; Matsuo, T.; Hanafusa, T.; Ando, T.

JCS Chem Comm, (1986), 793



Cox, D.P.*; Terpinski, J.; Lawrynowicz, W.
J Org Chem, (1984), 49, 3216



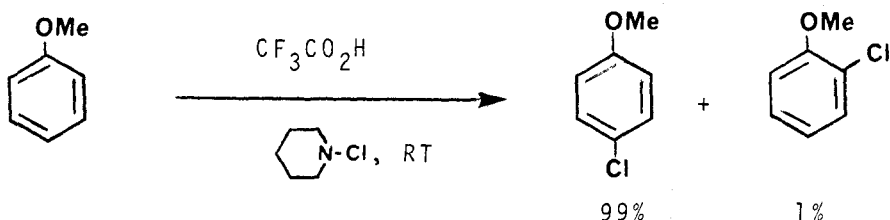
Suzuki, H.*; Kondo, A.; Inouye, M.; Ogawa, T.
Synthesis, (1986), 121
 Suzuki, H.*; Kondo, A.; Ogawa, T. Chem Lett, (1985), 411

Review: "Radical Brominations of Alkyl Bromides and the Nature of β -Bromoalkyl Radicals"

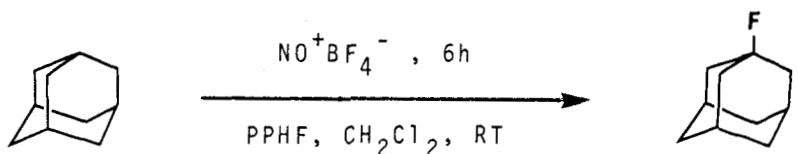
Skell, P.S.*; Traynham, J.E.* Accts Chem Res, (1984), 17, 160

SECTION 146: Halides and Sulfonates from Hydrides

α -Halogenations of Aldehydes, Ketones, and Acids are found in Sections 338 (Haloaldehydes), 369 (Haloketones), 359 (Halo-Esters), and 319 (Haloacids).



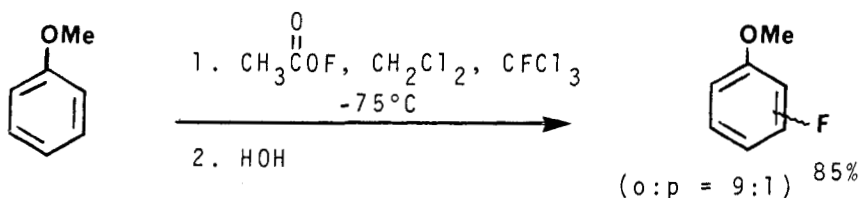
Lindsay-Smith, J.R.*; McKeer, L.C.
Tetrahedron Lett, (1983), 24, 3117



PPHF = pyridinepolyhydrogen fluoride

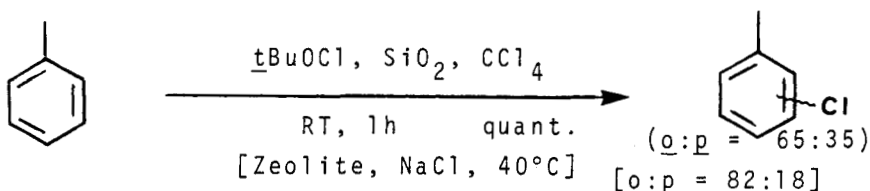
Olah, G.A.*; Shih, J.G.; Singh, B.P.; Gupta, B.G.B.

J Org Chem, (1983), 48, 3356



Lerman, O.; Tor, Y.; Hebel, D.; Rozen, S.*

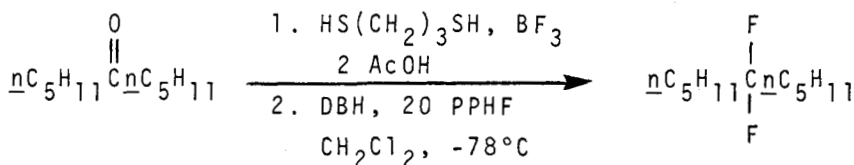
J Org Chem, (1984), 49, 806



Smith, K.*; Butlers, M.; Paget, W.E.

Synthesis, (1985), 1155, 1157

SECTION 147: Halides and Sulfonates from Ketones



DBH = 1,3-dibromo-5,5-dimethylhydantoin

97%

PPHF = pyridinium poly(hydrogen) fluoride

Sondej, S.C.; Katzenellenbogen, J.A.

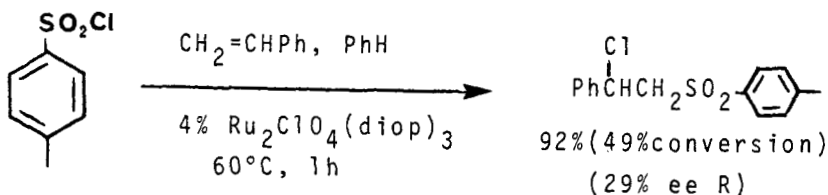
J Org Chem, (1986), 51, 3508

SECTION 148: Halides and Sulfonates from Nitriles

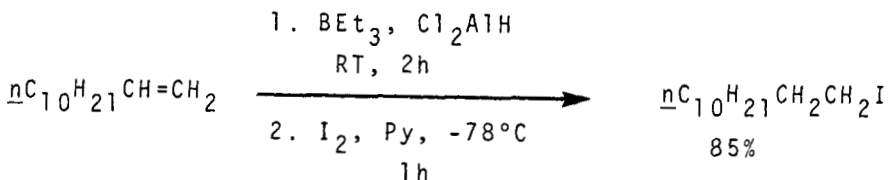
No Additional Examples

SECTION 149: Halides and Sulfonates from Olefins

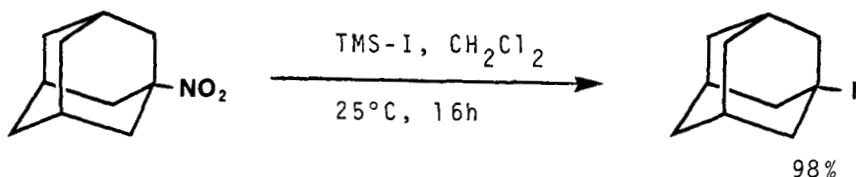
For halocyclopropanations see Section 74E (Alkyls from Olefins).



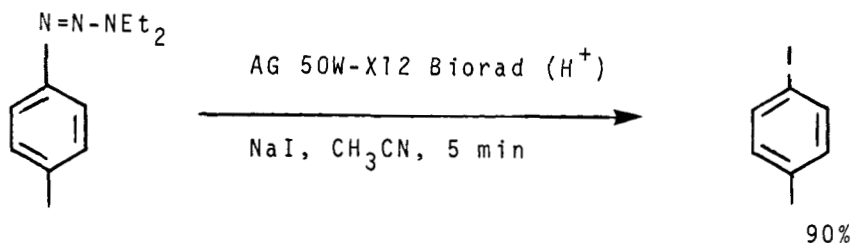
Kameyama, M.; Kamigata, N.*; Kobayashi, M.
Chem Lett, (1986), 527



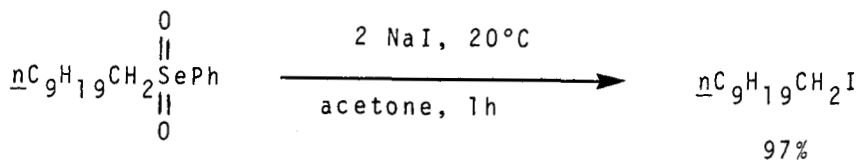
Maruoka, K.; Sano, H.; Shinoda, K.; Nakai, S.; Yamamoto, H.*
J Am Chem Soc, (1986), 108, 6036

SECTION 150: Halides and Sulfonates from Miscellaneous Compounds

Olah, G.A.*; Narang, S.C.; Field, L.D.; Fung, A.P.
J Org Chem, (1983), 48, 2766



Satyamurthy, N.; Barrio, J.R.* J Org Chem, (1983), 48, 4394



Krief, A.*; Dumont, W.; Denis, J.-N.

JCS Chem Comm, (1985), 571

CHAPTER 11

PREPARATION OF HYDRIDES

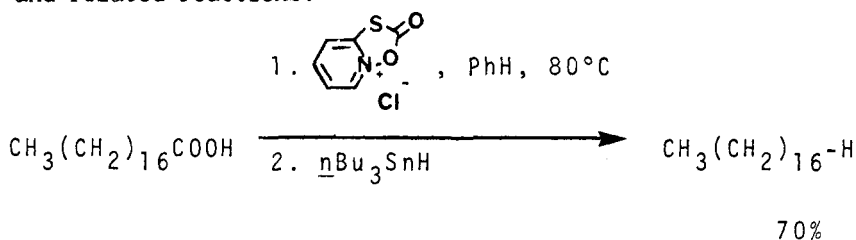
This chapter lists hydrogenolysis and related reactions by which functional groups are replaced by hydrogens, e.g. $\text{RCH}_2\text{X} \rightarrow \text{RCH}_2\text{-H}$ or R-H .

SECTION 151: Hydrides from Acetylenes

No Additional Examples

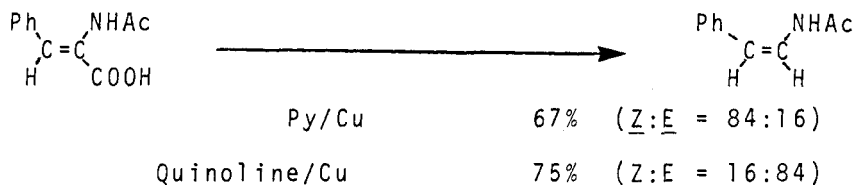
SECTION 152: Hydrides from Acid Derivatives

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



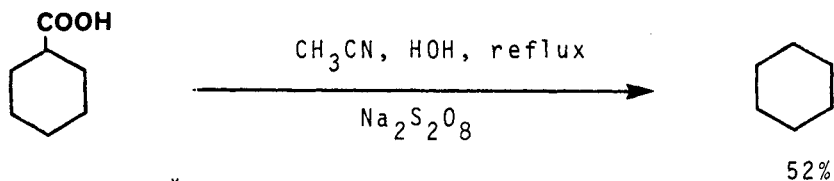
Barton, D.H.R.*; Crich, D.; Motherwell, W.B.

JCS Chem Comm, (1983), 939



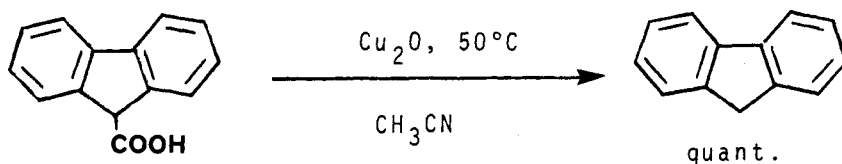
Schmidt, U.*; Lieberknecht, A.

Angew Chem Int Ed Engl, (1983), 22, 550



Fristad, W.E.*; Fry, M.A.; Klang, J.A.

J Org Chem, (1983), 48, 3575

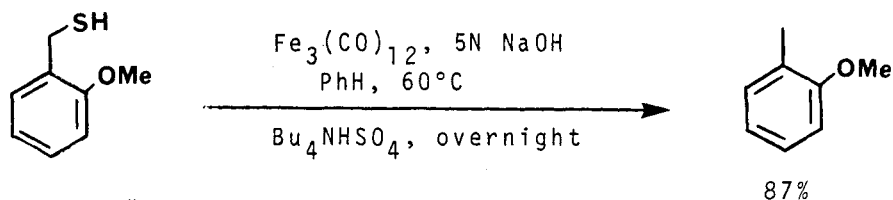


Toussaint, O.; Capdevielle, P.; Maumy, M.

Tetrahedron, (1984), 40, 3229

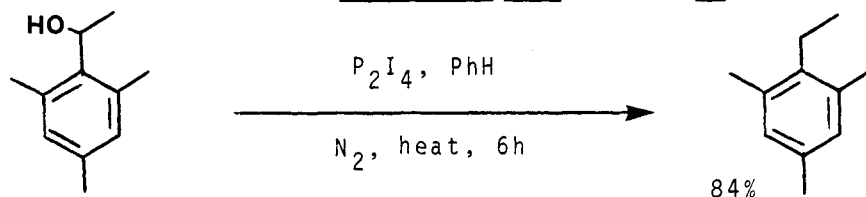
SECTION 153: Hydrides from Alcohols and Thiols

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



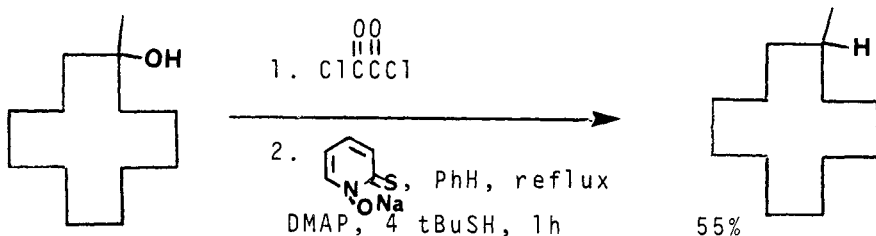
Alper, H.*; Sibtain, F.; Heveling, J.

Tetrahedron Lett, (1983), 24, 5329

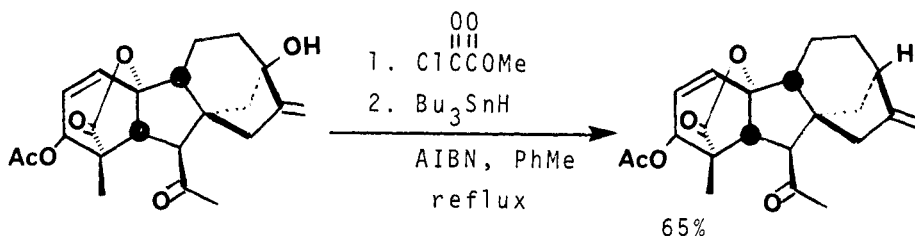


Suzuki, H.; Tani, H.; Kubota, H.; Sato, N.; Tsuiji, J.; Osuka, A.

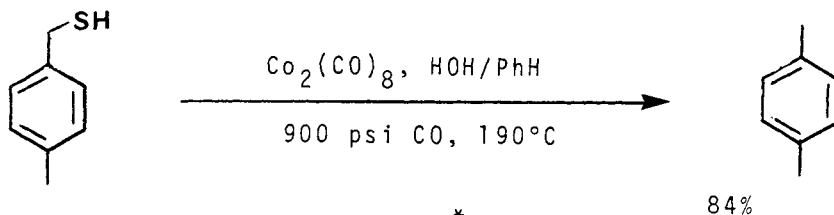
Chem Lett, (1983), 247



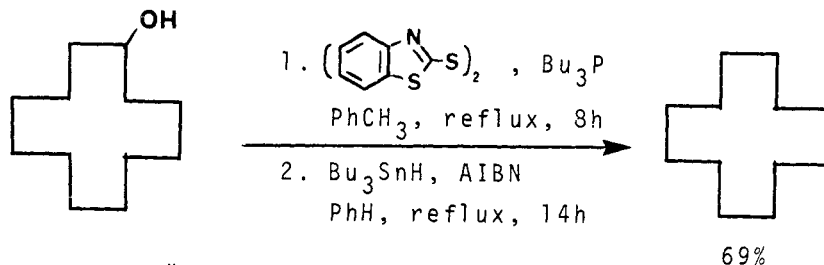
Barton, D.H.R.*; Crich, D. JCS Chem Comm, (1984), 774



Dolan, S.C.; MacMillan, J. JCS Chem Comm, (1985), 1588



Shim, S.C.; Antebi, S.; Alper, H.*
Tetrahedron Lett, (1985), 26, 1935



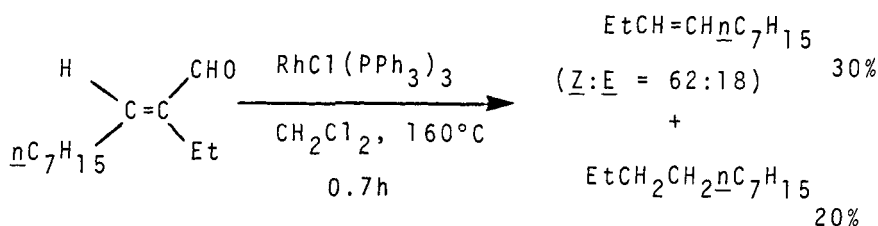
Watanabe, Y.*; Araki, T.; Ueno, Y.; Endo, T.
Tetrahedron Lett, (1986), 27, 5385

Review: "Radical Deoxygenation of Alcohols"

Hartwig, W.* Tetrahedron, (1983), 39, 2609

Also via: Halides and Sulfonates (Section 160)

SECTION 154: Hydrides from Aldehydes



Grigor'eva, N.Ya.; Pinsker, O.A.; Semenovskii, A.V.*
Bull Acad Sci USSR, (1983), 32, 593

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

SECTION 155: Hydrides from Alkyls, Methylenes, and Aryls

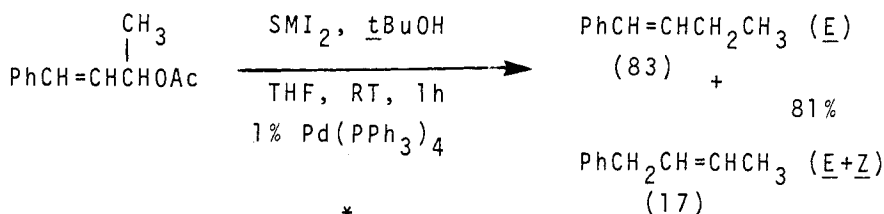
No Additional Examples

SECTION 156: Hydrides from Amides

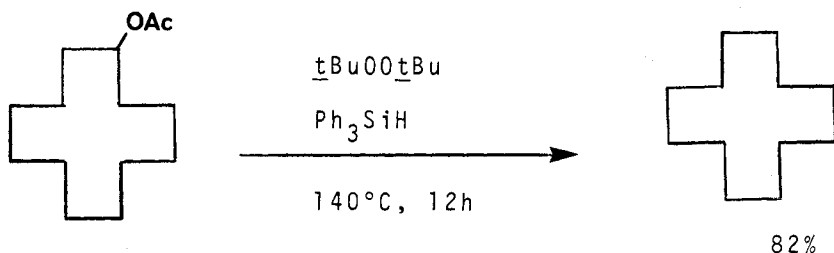
No Additional Examples

SECTION 157: Hydrides from Amines

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



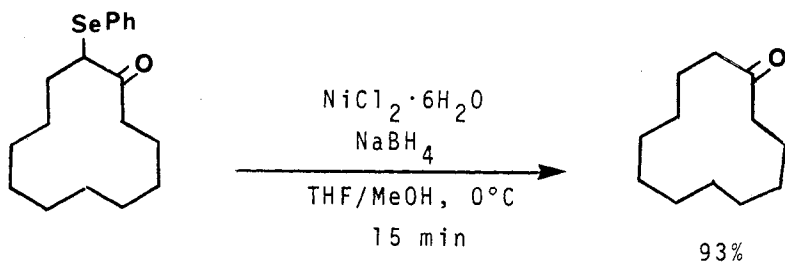
Tabuchi, T.; Inanaga, J.*; Yamaguchi, M.
Tetrahedron Lett., (1986), 27, 601



Sano, H.*; Ogata, M.; Migita, T.* Chem Lett., (1986), 77

SECTION 159: Hydrides from Ethers, Epoxides, and Thioethers

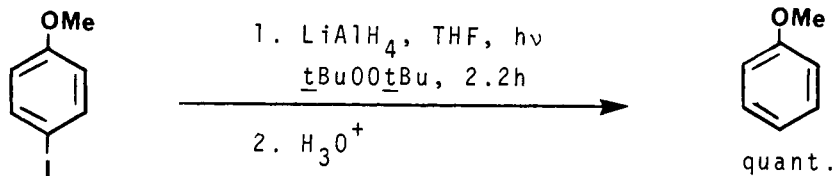
This section lists examples of the reaction of $\text{R-O-R}' \rightarrow \text{R-H}$.



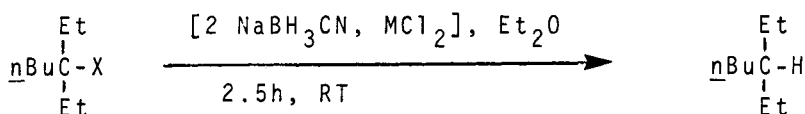
Back, T.G.* JCS Chem Comm., (1984), 1417

SECTION 160: Hydrides from Halides and Sulfonates

This section lists the reductions of halides and sulfonates, $\text{RX} \rightarrow \text{RH}$.



Beckwith, A.L.J.*; Goh, S.H. JCS Chem Comm, (1983), 907



X = Cl, M = Zn

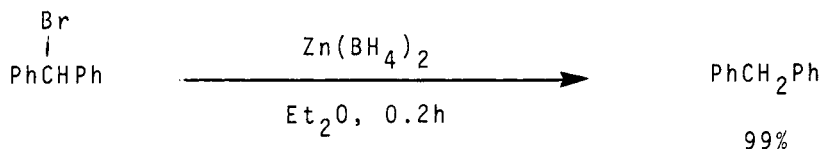
Kim, S.*; Kim, Y.J.; Ahn, K.H.

Tetrahedron Lett, (1983), 24, 3369

X = Br, M = Sn

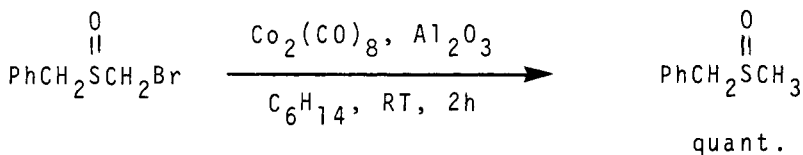
95%

Kim, S.*; Ko, J.S. Syn Commun, (1985), 15, 603

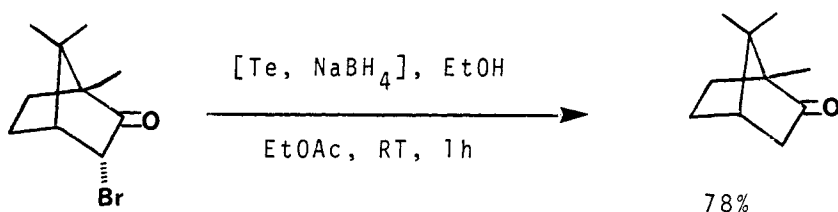


Kim, S.*; Hong, C.Y.; Yang, S.

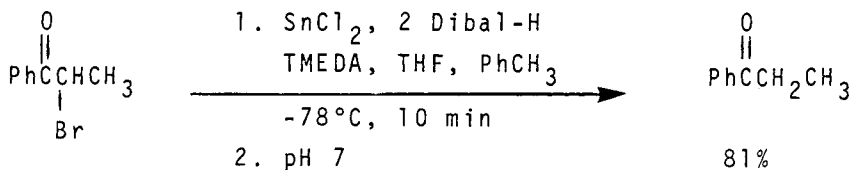
Angew Chem Int Ed Engl, (1983), 22, 562



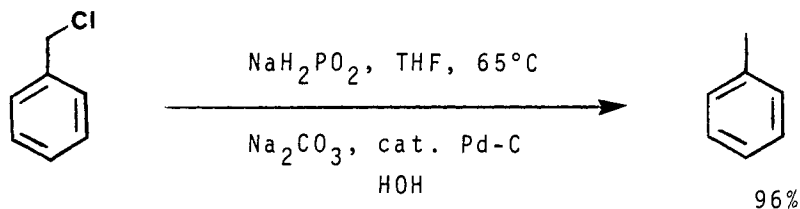
Alper, H.*; Gopal, M. J Org Chem, (1983), 48, 4390



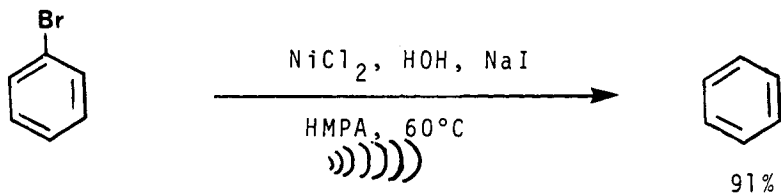
Osuka, A.; Suzuki, H. Chem Lett, (1983), 119



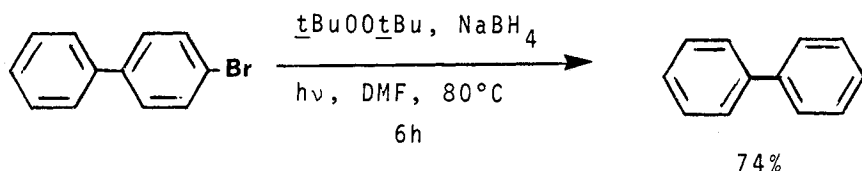
Oriyama, T.; Mukaiyama, T. Chem Lett, (1984), 2069



Boyer, S.K.*; Bach, J.; McKenna, J.; Jagdmann Jr., E.
J Org Chem, (1985), 50, 3408

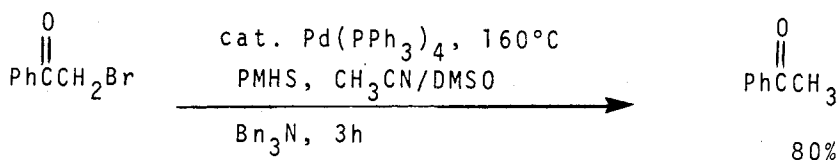


Yamashita, J.*; Inoue, Y.; Kondo, T.; Hashimoto, H.
Bull Chem Soc Jpn, (1985), 58, 2709



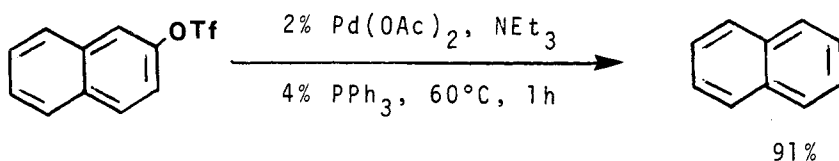
Abeywickrema, A.N.; Beckwith, A.L.J.

Tetrahedron Lett., (1986), 27, 109



PMHS = polymethyl hydrosiloxane

Pri-Bar, I.*; Buchman, O. J Org Chem, (1986), 51, 734



Cacchi, S.; Ciattini, P.G.; Morera, E.; Ortar, G.*

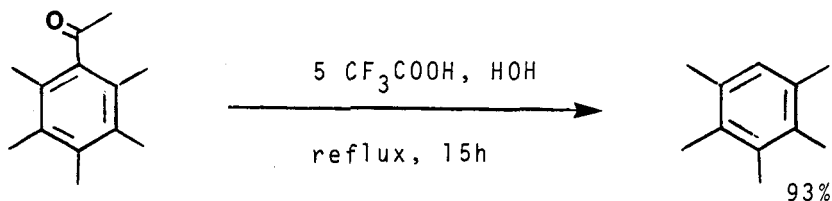
Tetrahedron Lett., (1986), 27, 5541

SECTION 161: Hydrides from Hydrides

No Additional Examples

SECTION 162: Hydrides from Ketones

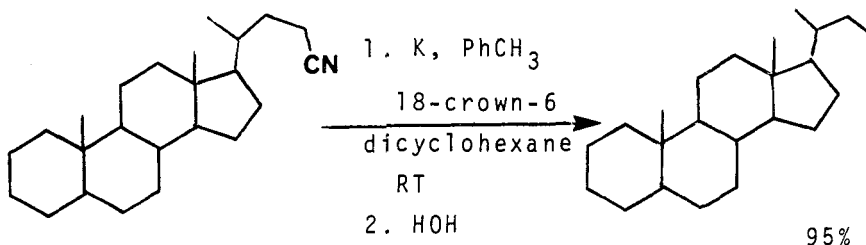
This section lists examples of the reaction $\text{R}_2\text{CCOR} \rightarrow \text{R}_2\text{C-H}$.



Keumi, T.*; Morita, T.; Inui, Y.; Teshima, N.; Kitajima, H.
Synthesis, (1985), 979

SECTION 163: Hydrides from Nitriles

This section lists examples of the reaction $\text{RCN} \rightarrow \text{RH}$.

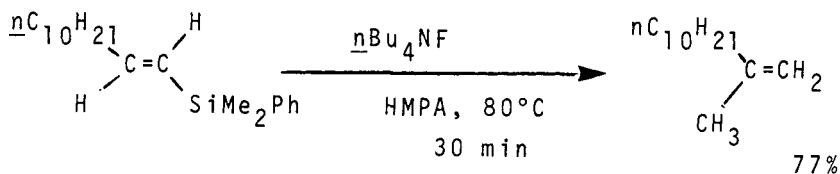


Onsawa, T.*; Kobayashi, T.; Mizuguchi, Y.; Saitoh, T.; Oishi, T.*

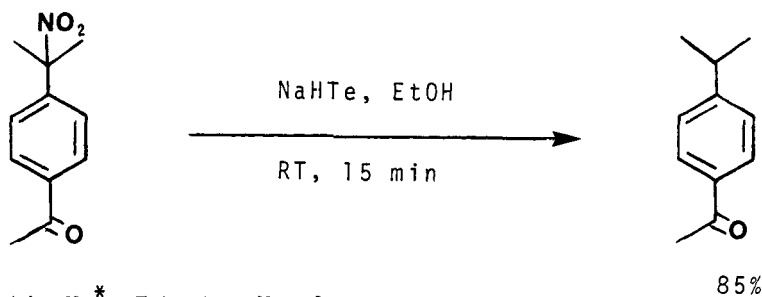
Tetrahedron Lett., (1985), 26, 6103

SECTION 164: Hydrides from Olefins

No Additional Examples

SECTION 165: Hydrides from Miscellaneous Compounds

Oda, H.; Sato, M.; Morizawa, Y.; Oshima, K.*; Nozaki, H.
Tetrahedron Lett., (1983), 24, 2877

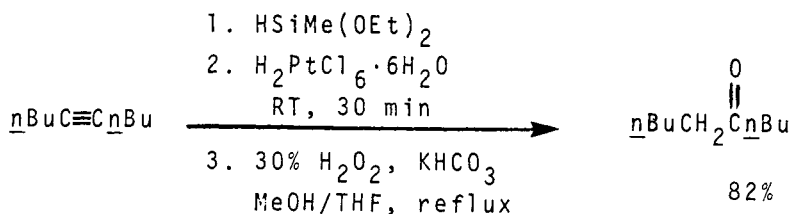


Suzuki, H.*; Takaoka, K.; Osuka, A.
Bull Chem Soc Jpn., (1985), 58, 1067

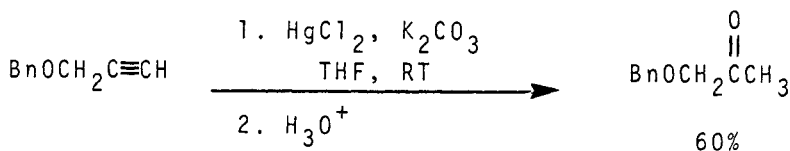
CHAPTER 12

PREPARATION OF KETONES

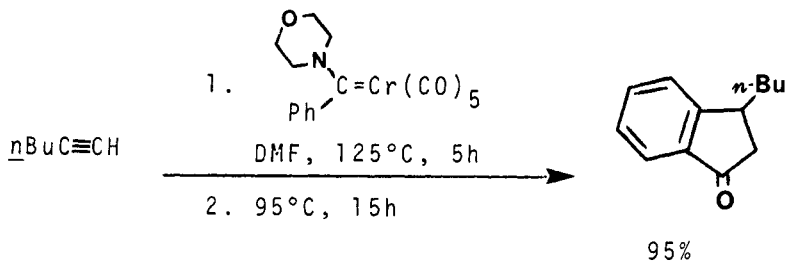
SECTION 166: Ketones from Acetylenes



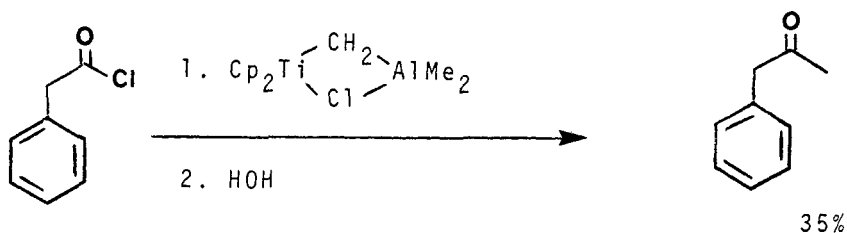
Tamao, K.*; Ishida, N.; Tanaka, T.; Kumada, M.
Organometallics, (1983), 2, 1694



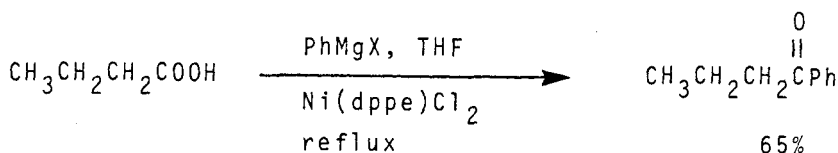
Barluenga, J.*; Aznar, F.; Liz, R. Synthesis, (1984), 304



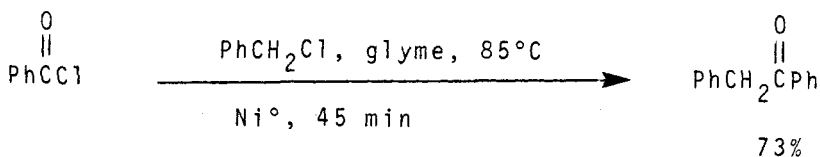
Yamashita, A.* Tetrahedron Lett., (1986), 27, 5915

SECTION 167: Ketones from Acid Derivatives

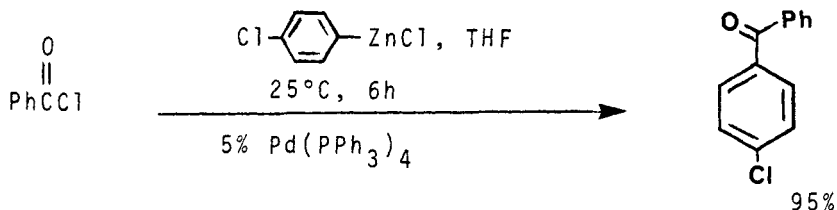
Chou, T.-S.*; Huang, S.-B. Tetrahedron Lett., (1983), **24**, 2169



Fiandanese, V.; Marchese, G.*; Ronzini, L. Tetrahedron Lett., (1983), **24**, 3677

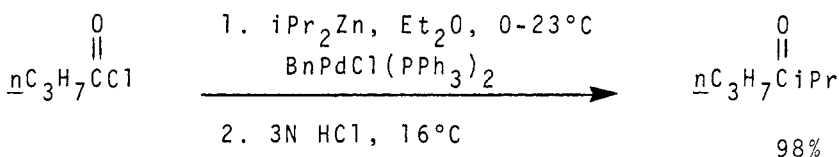


Inaba, S.; Rieke, R.D.* J Org Chem., (1985), **50**, 1373

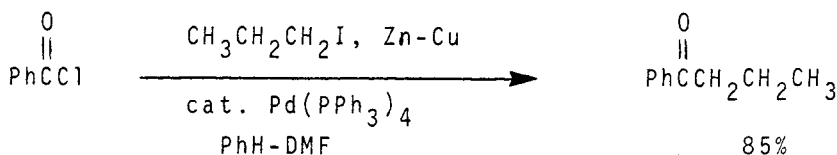


Negishi, E.*; Bagheri, V.; Chatterjee, S.; Luo, F.-T.; Miller, J.A.; Stoll, A.T.

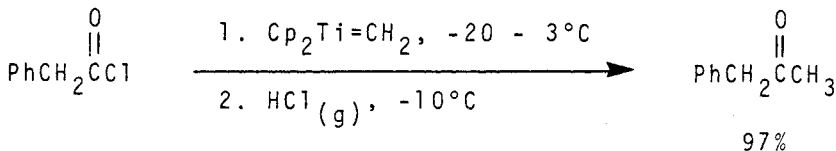
Tetrahedron Lett., (1983), **24**, 5181



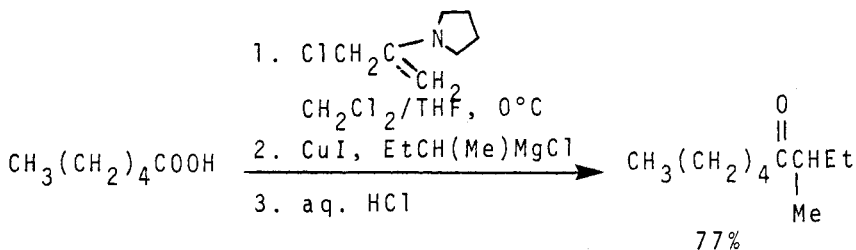
Grey, R.A. J Org Chem, (1984), 49, 2288



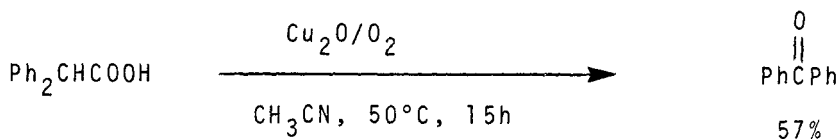
Tamaru, Y.; Ochiai, H.; Sanda, F.; Yoshida, Z.*
Tetrahedron Lett, (1985), 26, 5529



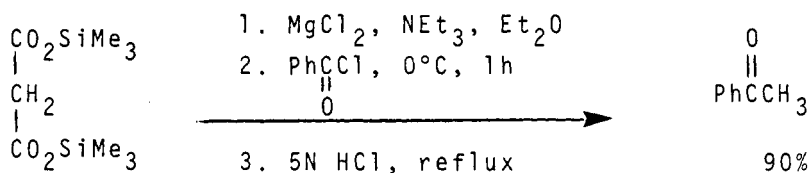
Stille, J.R.; Grubbs, R.H.* J Am Chem Soc, (1983), 105, 1664



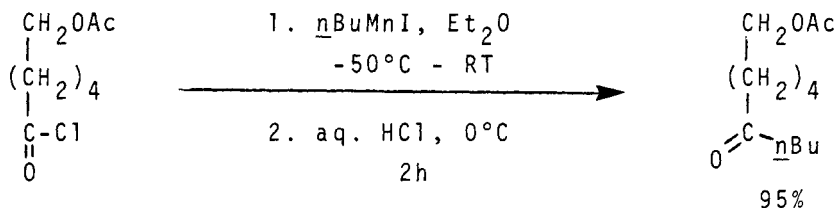
Fujisawa, T.*; Mori, T.; Higuchi, K.; Sato, T.
Chem Lett, (1983), 1791



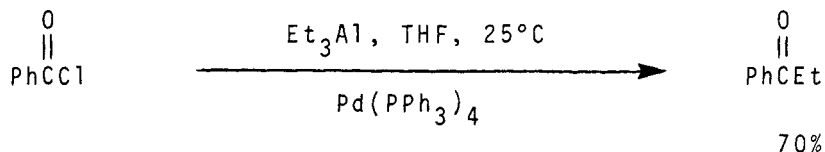
Toussaint, O.; Capdevielle, P.; Maumy, M.
Tetrahedron Lett., (1984), 25, 3819



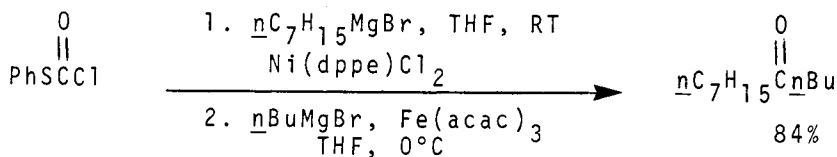
Rathke, M.W.*; Nowak, M.A. Syn Commun., (1985), 15, 1039



Friour, G.; Cahiez, G.*; Normant, J.F. Synthesis, (1985), 50

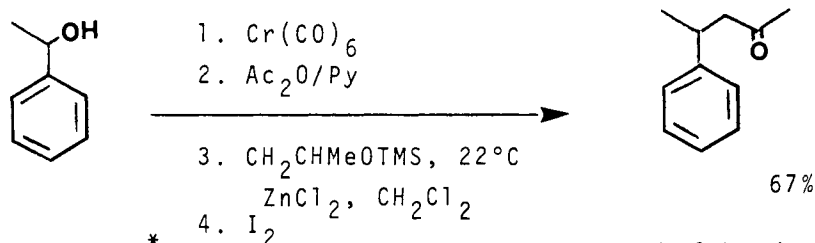


Wakamatsu, K.; Okuda, Y.; Oshima, K.*; Nozaki, H.
Bull Chem Soc Jpn., (1985), 58, 2425

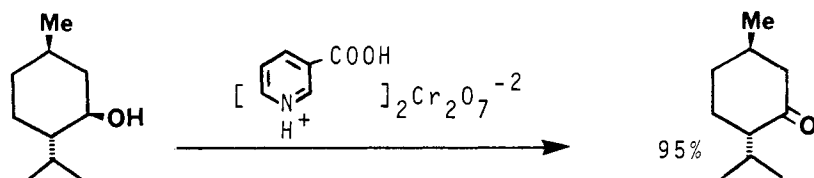


Cardellicchio, C.; Fiandanese, V.; Marchese, G.*; Ronzini, L.
Tetrahedron Lett, (1985), 26, 3595

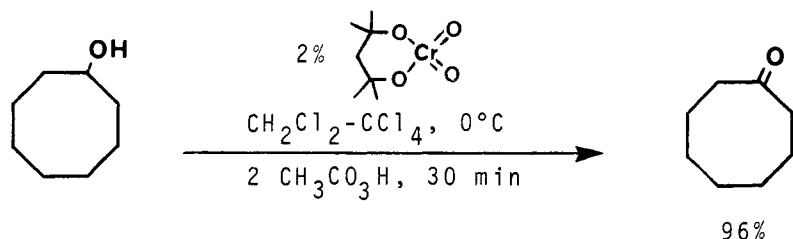
SECTION 168: Ketones from Alcohols and Thiols



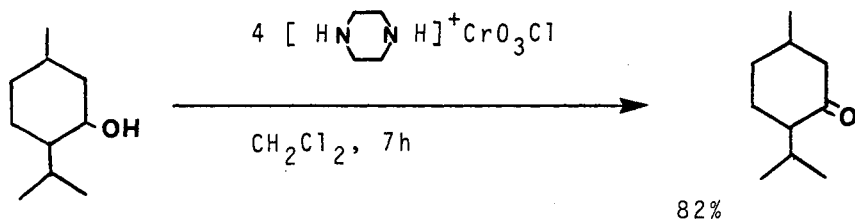
Reetz, M.T.*; Sauerwald, M. **Tetrahedron Lett.** (1983), 24, 2837



Lopez, C.; Gonzalez, A.; Cossio, F.P.; Palomo, C.*
Syn Commun, (1985), 15, 1197

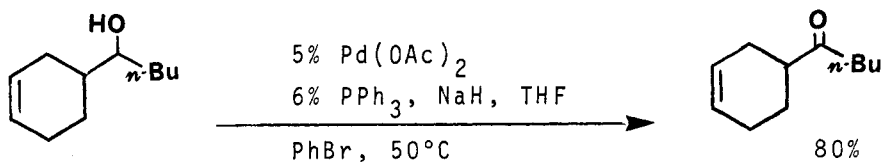


Corey, E.J.*; Barrette, E.P.; Magriotis, P.A.
Tetrahedron Lett, (1985), **26**, 5855

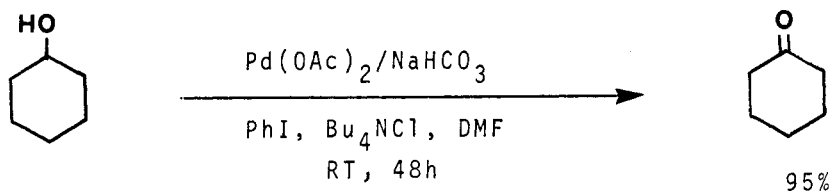


Davis, H.B.; Sheets, R.M.; Brannfors, J.M.; Paudler, W.W.; Gard, G.L.

Heterocycles, (1983), 20, 2029

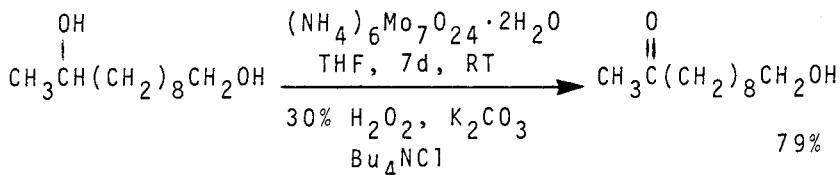


Tamaru, Y.; Yamada, Y.; Inoue, K.; Yamamoto, Y.; Yoshida, Z.*
J Org Chem, (1983), 48, 1286

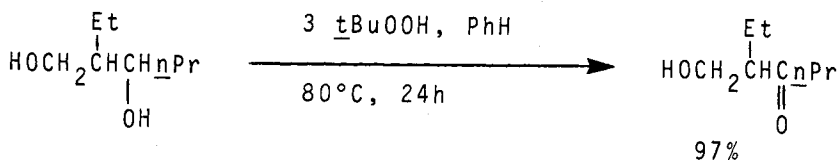


Choudary, B.M.*; Reddy, N.P.; Kantam, M.L.; Jamil, Z.

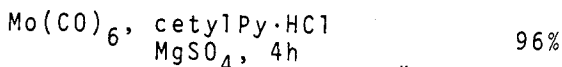
Tetrahedron Lett, (1985), 26, 6257



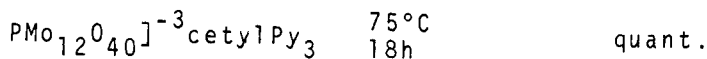
Trost, B.M.*; Masuyama, Y. Tetrahedron Lett, (1984), 25, 173



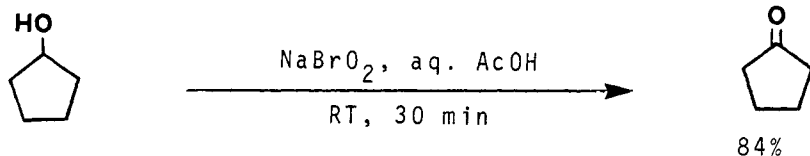
Kaneda, K.; Kawanishi, Y.; Jitsukawa, K.; Teranishi, S.
Tetrahedron Lett., (1983), **24**, 5009



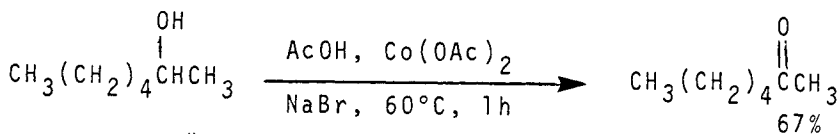
Yamawaki, K.; Yoshida, T.; Suda, T.; Ishii, Y.*; Ogawa, M.
Synthesis, (1986), 59



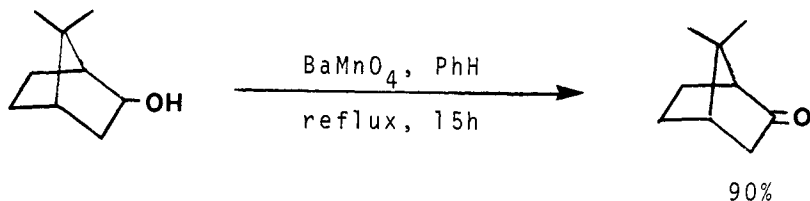
Yamawaki, K.; Yoshida, T.; Nishihara, H.; Ishii, Y.*; Ogawa, M.*
Syn Commun, (1986), **16**, 537



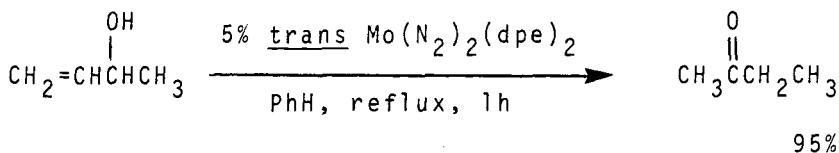
Kageyama, T.; Ueno, Y.*; Okawara, M. Synthesis, (1983), 815



Morimoto, T.*; Hirano, M.; Wachi, M.; Murakami, T.
JCS Perkin II, (1983), 1949

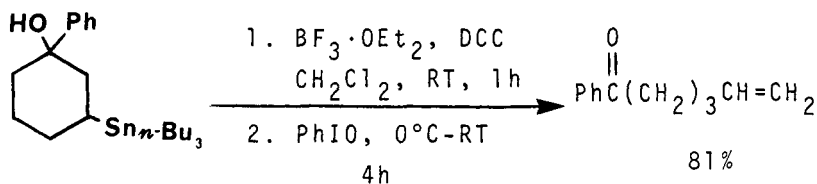


Firouzabadi, H.*; Mostafavipoor, Z.
Bull Chem Soc Jpn, (1983), **56**, 914



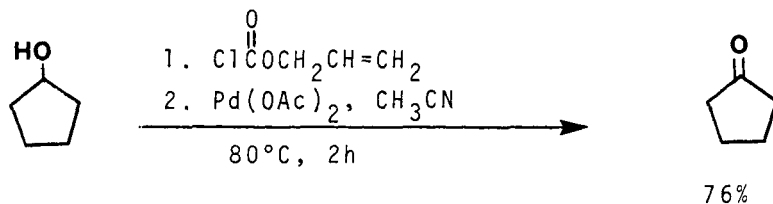
Tatsumi, T.; Hashimoto, K.; Tominaga, H.; Mizuta, Y.; Hata, K.; Hidai, M.; Uchida, Y.

J Organomet Chem, (1983), 252, 105



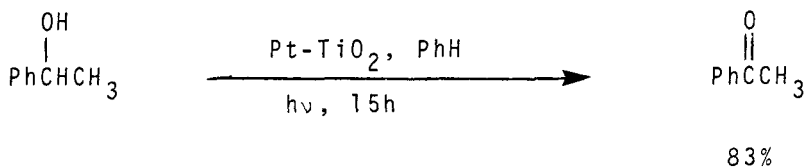
Ochiai, M.; Ukita, T.; Nagao, Y.; Fujita, E.*

JCS Chem Comm, (1984), 1007



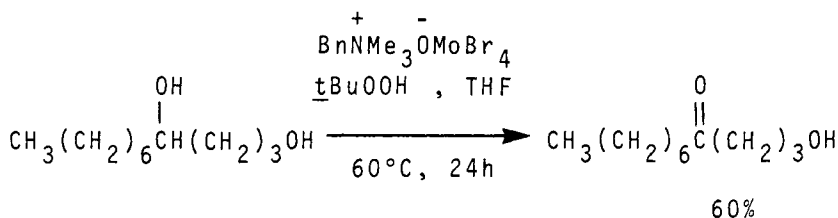
Tsuji, J.*; Minami, I.; Shimizu, I.

Tetrahedron Lett, (1984), 25, 2791



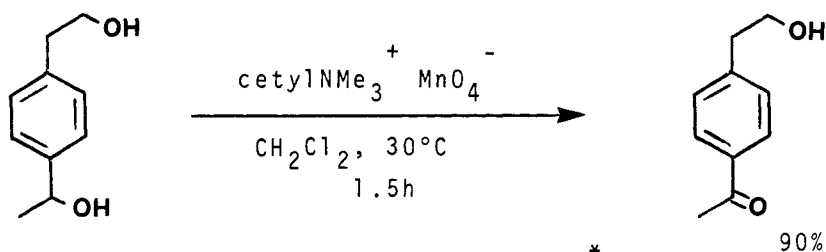
Hussein, F.H.; Pattenden, G.*; Rudham, R.; Russell, J.J.

Tetrahedron Lett, (1984), 25, 3363



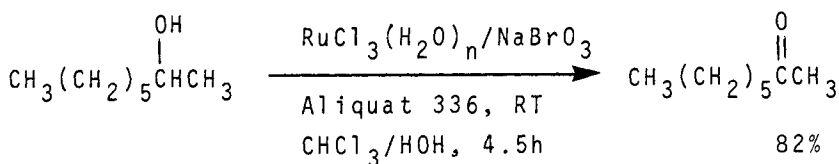
Masuyama, Y.*; Takahashi, M.; Kurusu, Y.

Tetrahedron Lett., (1984), 25, 4417



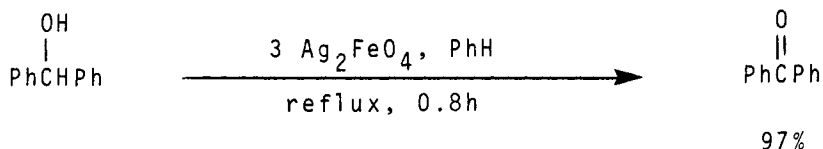
Rathore, R.; Bhushan, V.; Chandrasekaran, S.*

Chem Lett., (1984), 2131



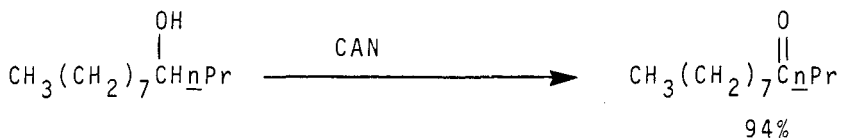
Yamamoto, Y.; Suzuki, H.*; Moro-Oka, Y.*

Tetrahedron Lett., (1985), 26, 2107

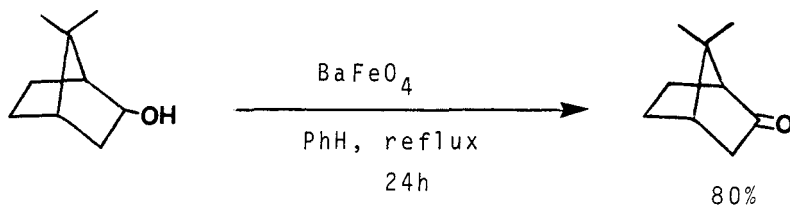


Firouzabadi, H.; Mohajer, D.; Moghaddam, M.E.

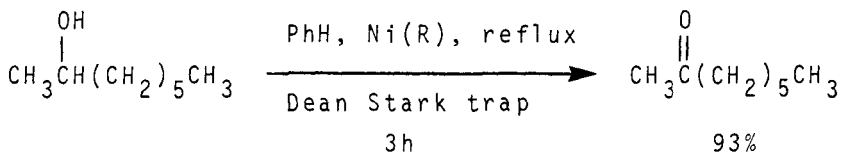
Syn Commun., (1986), 16, 211



Kanemoto, S.; Tomioka, H.; Oshima, K.*; Nozaki, H.
Bull Chem Soc Jpn, (1986), 59, 105



Firouzabadi, H.*; Mohajer, D.; Enterzari-Moghaddam, M.
Syn Commun, (1986), 16, 723

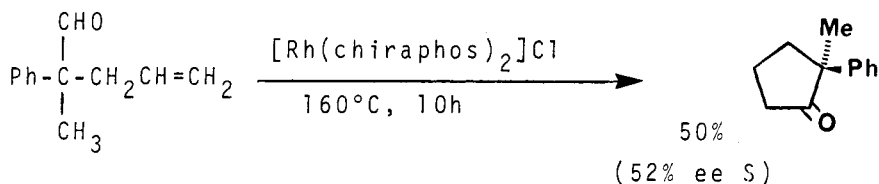


Krafft, M.E.*; Zorc, B. J Org Chem, (1986), 51, 5482

Review: "Chromium (VI) Based Oxidants"

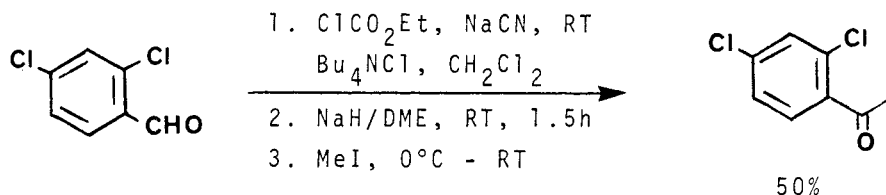
Firouzabadi, H.*; Iranpoor, N.; Kiaeezadeh, F.; Toofan, J.
Tetrahedron, (1986), 42, 719

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

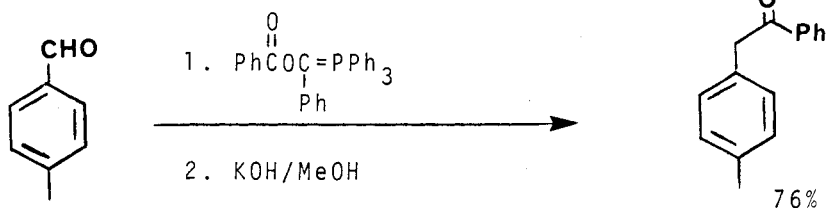
SECTION 169: Ketones from Aldehydes

chiraphos = 2S, 3S-bis-(diphenylphosphino) butane

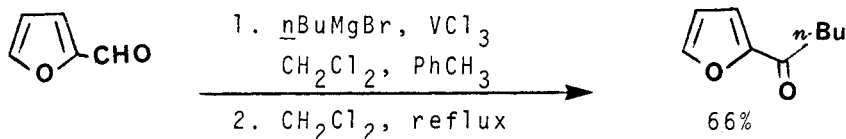
James, B.R.*; Young, C.G. JCS Chem Comm, (1983), 1215



Au, A.T.* Syn Commun, (1984), 14, 743, 749

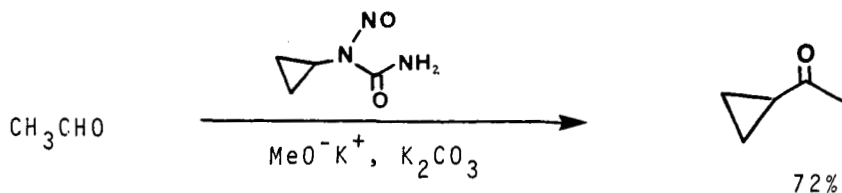


Anders, E.*; Gassner, T. Chem Ber, (1984), 117, 1034



Hirao, T.*; Misu, D.; Agawa, T.

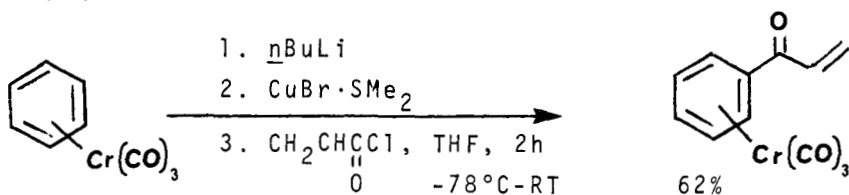
J Am Chem Soc, (1985), 107, 7179



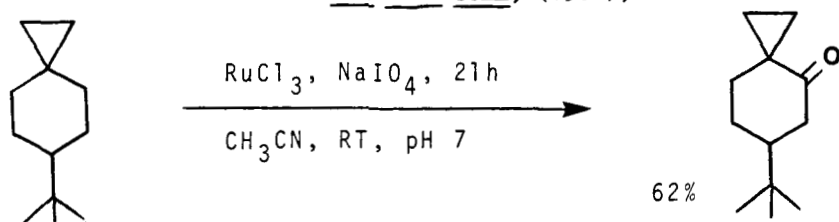
Kirmse, W.*; Hellwig, G.; Van Chiem, P.
Chem Ber, (1986), 119, 1511

SECTION 170: Ketones from Alkyls, Methylene, and Aryls

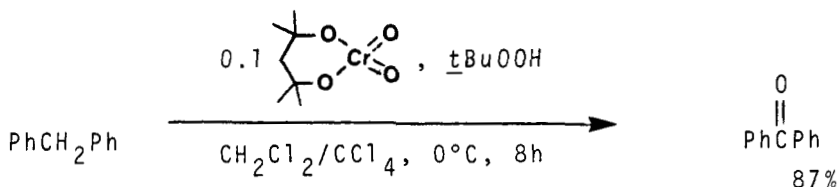
This section lists examples of the reaction $\text{R-CH}_2\text{-R}' \rightarrow \text{R-C(=O)-R}'$



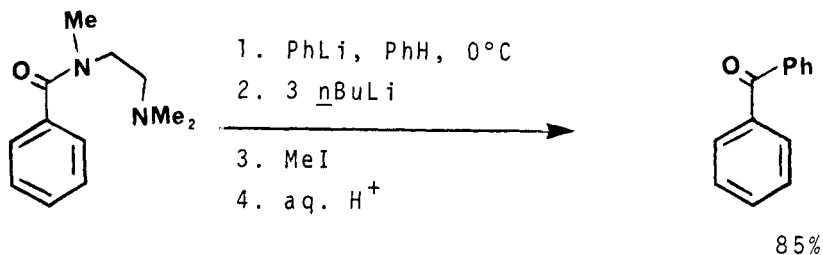
Beswick, P.J.; Leach, S.J.; Masters, N.F.; Widdowson, D.A.*
JCS Chem Comm, (1984), 46



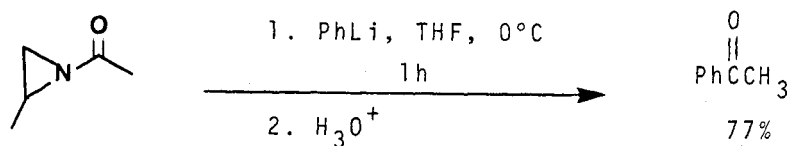
Hasegawa, T.; Niwa, H.; Yamada, K.* Chem Lett, (1985), 1385



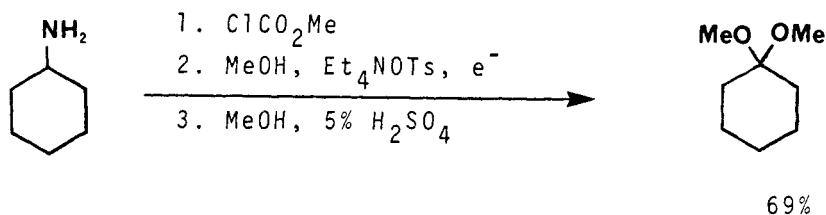
Muzart, J. Tetrahedron Lett, (1986), 27, 3139 (46% conversion)

SECTION 171: Ketones from Amides

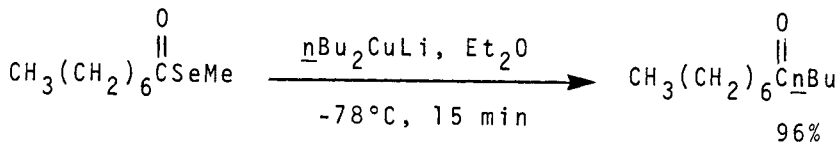
Comins, D.L.*; Brown, J.D. Tetrahedron Lett., (1983), 24, 5465



Wattanasin, S.; Kathawala, F.G.
Tetrahedron Lett., (1984), 25, 811

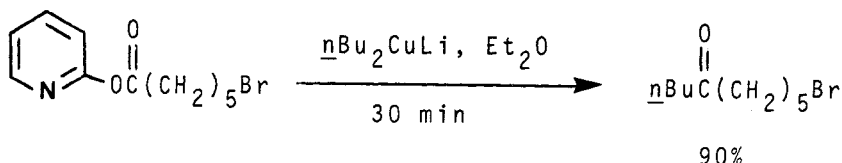
SECTION 172: Ketones from Amines

Shono, T.*; Matsumura, Y.; Kashimura, S.
J Org Chem., (1983), 48, 3338

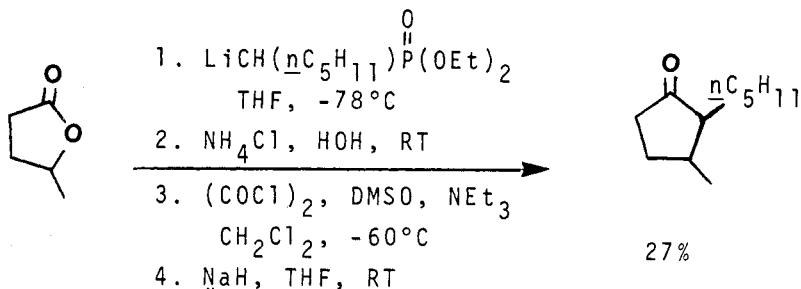
SECTION 173: Ketones from Esters

Sviridov, A.F.; Ermolenko, M.S.; Yashunsky, D.V.; Kochetkov, N.K.

Tetrahedron Lett., (1983), 24, 4355, 4359

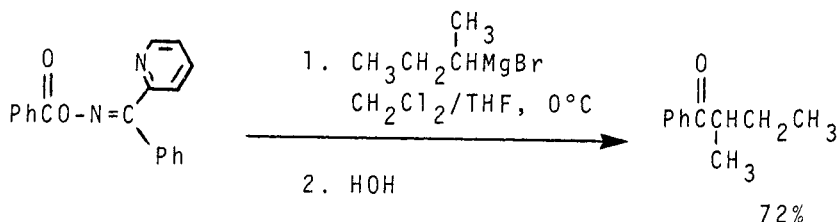


Kim, S.*; Lee, J.I. J Org Chem., (1983), 48, 2608

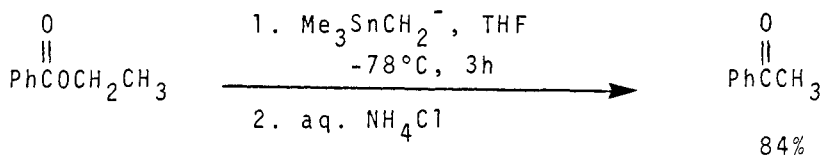


Attenbach, H.-J.*; Holzapfel, W.; Smeret, G.; Finkler, S.H.

Tetrahedron Lett., (1985), 26, 6329

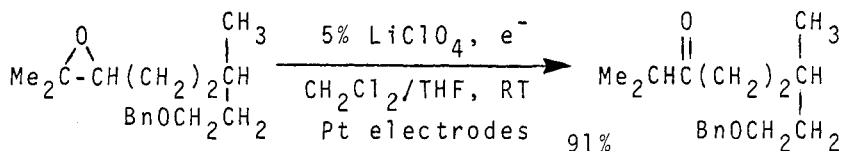


Miyasaka, T.*; Monobe, H.; Noguchi, S. Chem Lett., (1986), 449

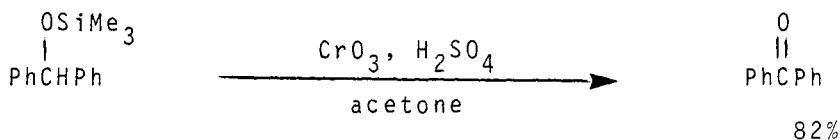


Sato, T.*; Matsuoka, H.; Igarashi, T.; Murayama, E.
Tetrahedron Lett., (1986), 27, 4339

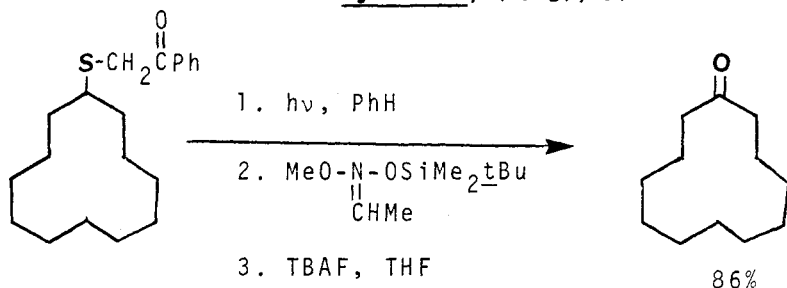
SECTION 174: Ketones from Ethers, Epoxides, and Thioethers



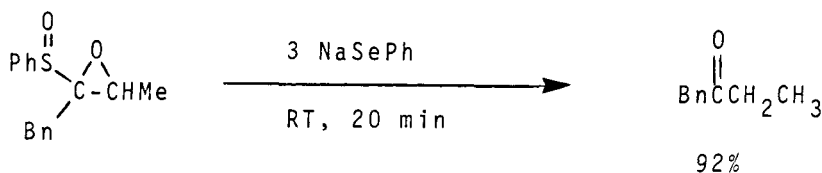
Uneyama, K.; Isimura, A.; Fujii, K.; Torii, S.*
Tetrahedron Lett., (1983), 24, 2857



Baker, R.*; Rao, V.B.; Ravenscroft, P.D.; Swain, C.J.
Synthesis, (1983), 572



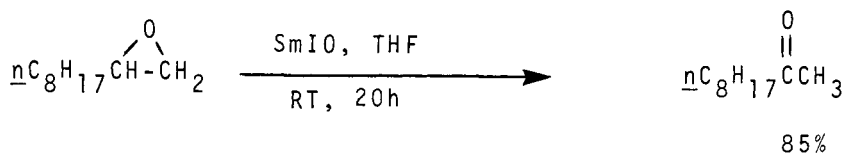
Vedejs, E.*; Perry, D.A. J Org Chem, (1984), 49, 573



Satoh, T.; Kaneko, Y.; Kumagawa, T.; Izawa, T.; Sakata, K.; Yamakawa, K.*

Chem Lett, (1984), 1957

Satoh, T.; Kaneko, Y.; Izawa, T.; Sakata, K.; Yamakawa, K.*
Bull Chem Soc Jpn, (1985), 58, 1983

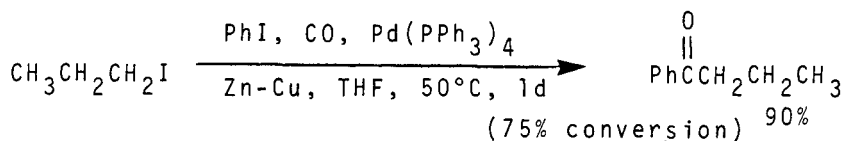


$\text{SmIO} = 2 \text{ SmI}_2 + 1/2 \text{ O}_2$

Prandi, J.; Namy, J.L.; Menoret, G.; Kagan, H.B.*

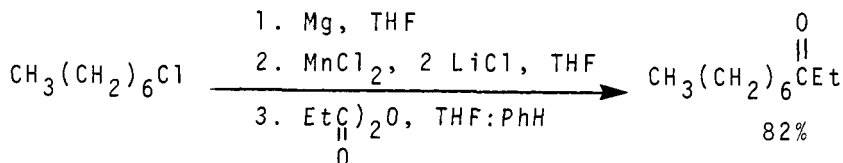
J Organomet Chem, (1985), 285, 449

SECTION 175: Ketones from Halides and Sulfonates



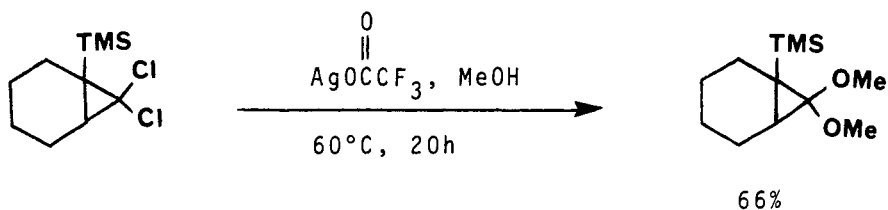
Tamaru, Y.; Ochiai, H.; Yamada, Y.; Yoshida, Z.*

Tetrahedron Lett, (1983), 24, 3869



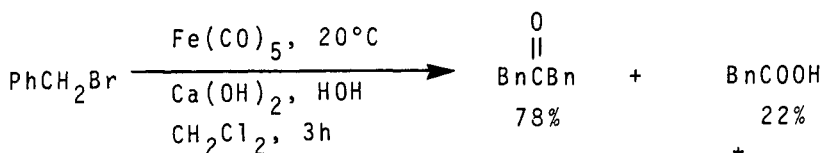
Friour, G.; Alexakis, A.; Cahiez, G.*; Normant, J.*

Tetrahedron, (1984), 40, 683



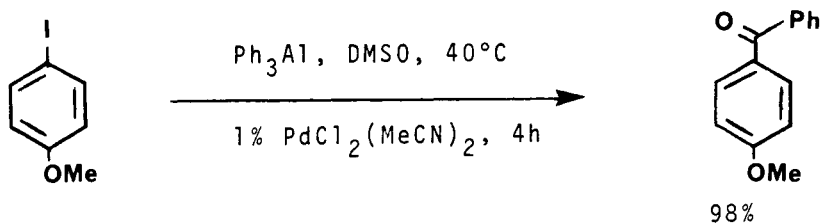
Ishihara, T.*; Kudaka, T.; Ando, T.

Tetrahedron Lett., (1984), 25, 4765



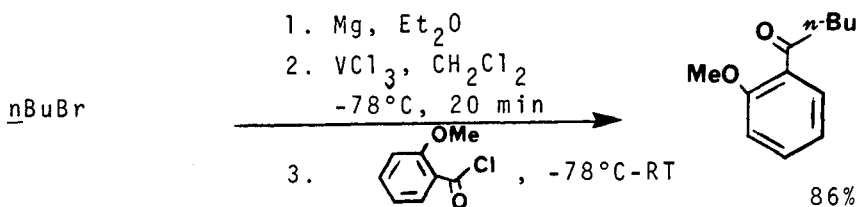
Tanguay, G.; Weinberger, B.; Des Abbayes, H.*

Tetrahedron Lett., (1984), 25, 5529



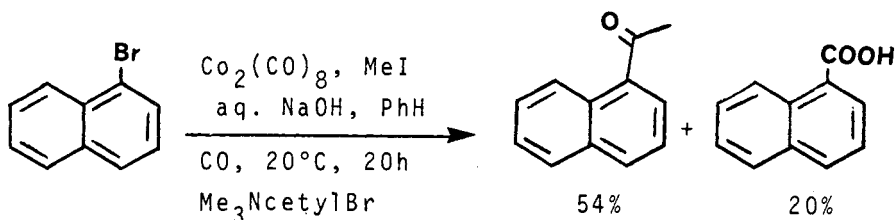
Bumagin, N.A.; Ponomaryov, A.B.; Beletskaya, I.P.*

Tetrahedron Lett., (1985), 26, 4819

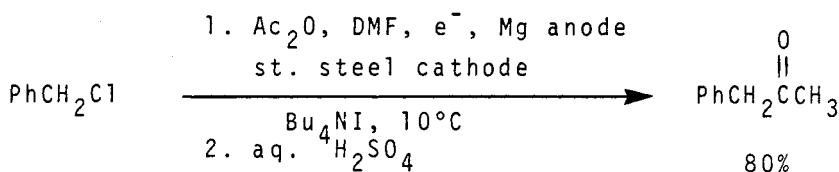


Hirao, T.*; Misu, D.; Yao, K.; Agawa, T.

Tetrahedron Lett., (1986), 27, 929



Miura, M.*; Akase, F.; Nomura, M. JCS Chem Comm, (1986), 241



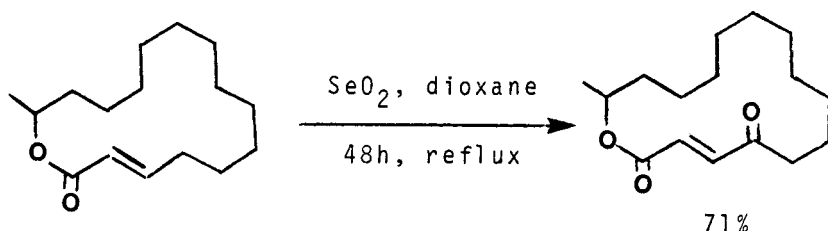
d'Incan, E.; Sibille, S.; Perichon, J.

Tetrahedron Lett, (1986), 27, 4175

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).



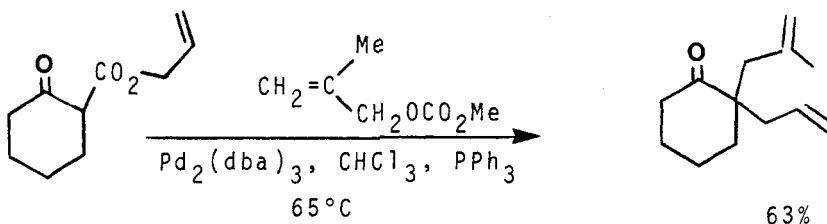
Bestmann, H.J.*; Schobert, R.

Angew Chem Int Ed Engl, (1985), 24, 791

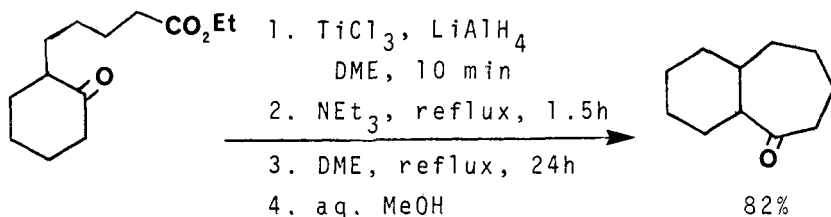
SECTION 177: Ketones from Ketones

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).

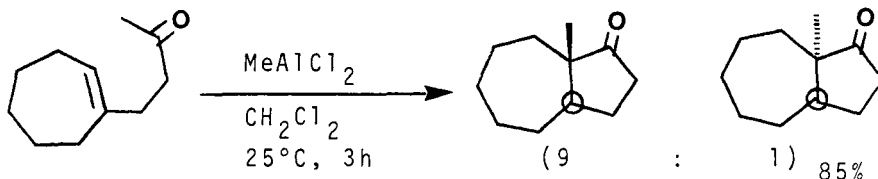
For the preparation of enamines or imines from ketones see Section 356 (Amine - Olefin).



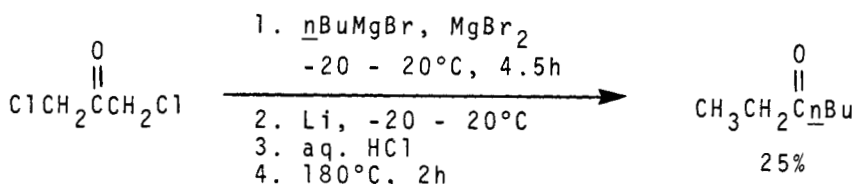
Shimizu, I.; Ohashi, Y.; Tsuji, J.*
Tetrahedron Lett., (1983), 24, 3865



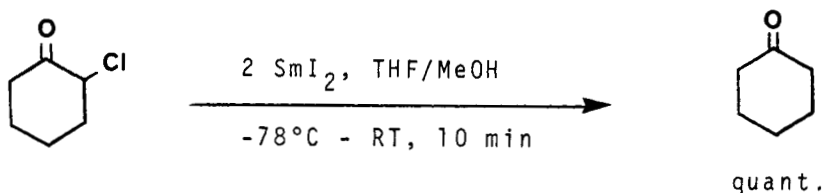
McMurry, J.E.*; Miller, D.D. J Am Chem Soc., (1983), 105, 1660



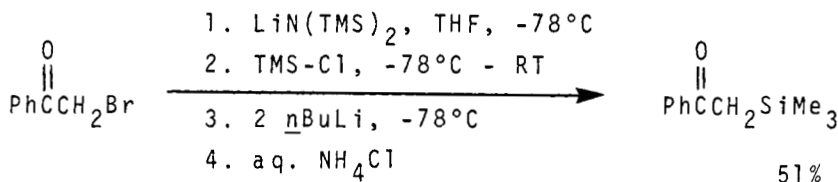
Snider, B.B.*; Cartaya-Marin, C.P. J Org Chem., (1984), 49, 153
 Snider, B.B.*; Kirk, T.C. J Am Chem Soc., (1983), 105, 2364



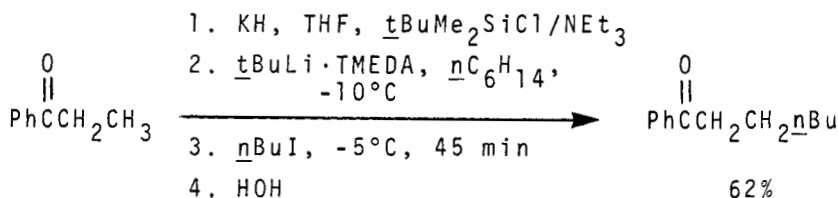
Barluenga, J.*; Florez, J.; Yus, M. Synthesis, (1983), 647



Molander, G.A.*; Hahn, G. J Org Chem, (1986), 51, 1135

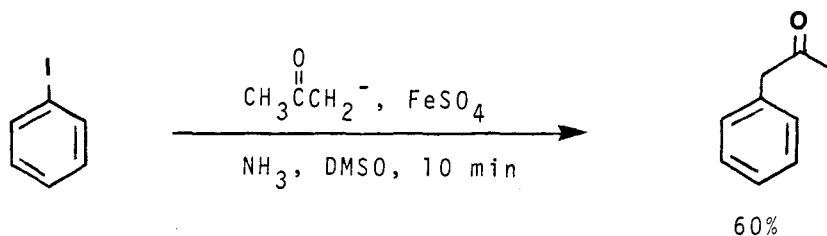


Sampson, P.; Hammond, G.B.; Wiemer, D.F.*
J Org Chem, (1986), 51, 4342

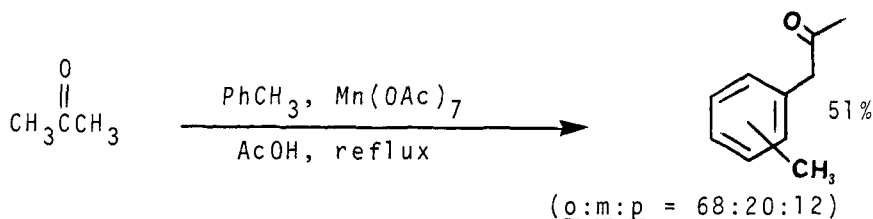


Trimitsis, G.*; Beers, S.; Ridella, J.; Carlon, M.; Cullin, D.; High, J.; Brutts, D.

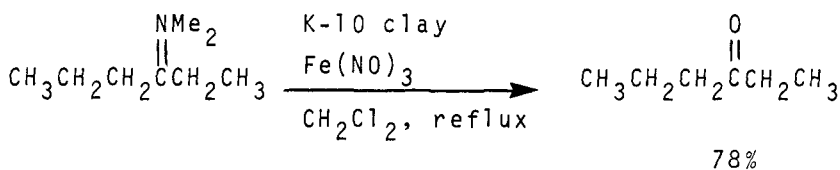
JCS Chem Comm, (1984), 1088



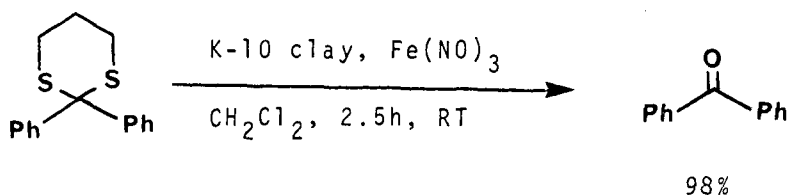
Galli, C.; Bunnett, J.F.* J Org Chem, (1984), 49, 3041



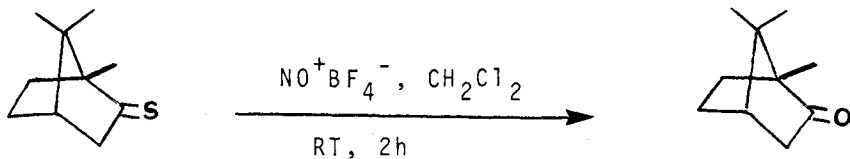
Gardrat, C. Bull Chem Soc Belg, (1984), 93, 897



Laszlo, P.*; Polla, E. Tetrahedron Lett, (1984), 25, 3309

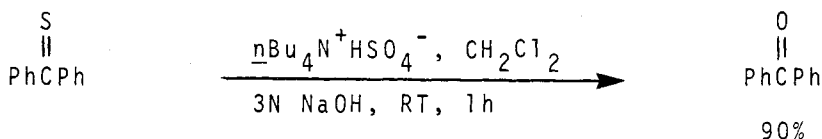


Balogh, M.; Cornelis, A.*; Laszlo, P.*
Tetrahedron Lett, (1984), 25, 3313



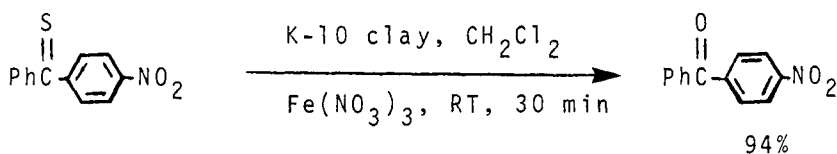
88%

Olah, G.A.*; Arvanaghi, M.; Ohannesian, L.; Prakash, G.K.S.
Synthesis, (1984), 785



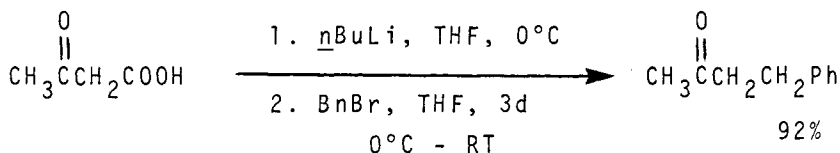
90%

Alper, H.; Kwiatkowska, C.; Petrignani, J.-F.; Sibtain, F.
Tetrahedron Lett., (1986), 27, 5449



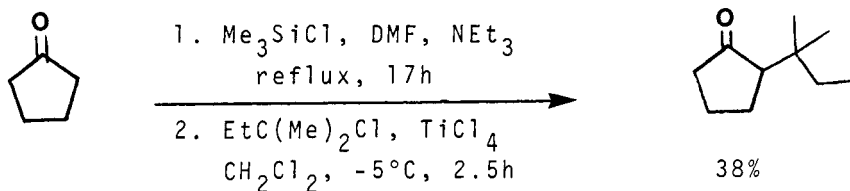
94%

Chalais, S.; Cornelis, A.; Laszlo, P.*; Mathy, A.
Tetrahedron Lett., (1985), 26, 2327

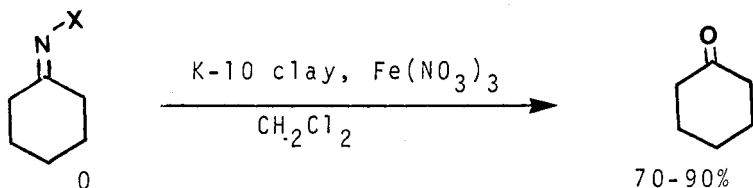


92%

Kjonaas, R.A.*; Patel, D.D. Tetrahedron Lett., (1984), 25, 5467

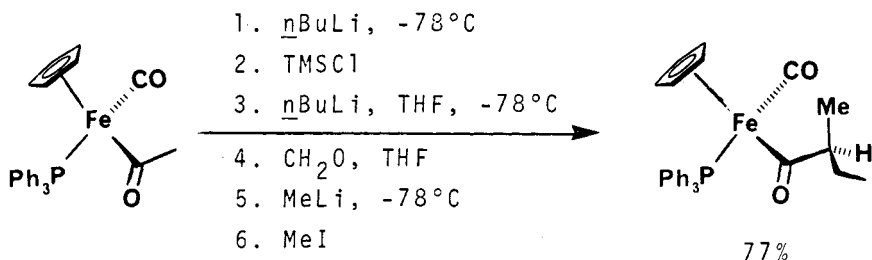


Reetz, M.T.*; Chatziosifidis, I.; Hubner, F.; Heimbach, H.
Org Syn, (1984), 62, 95

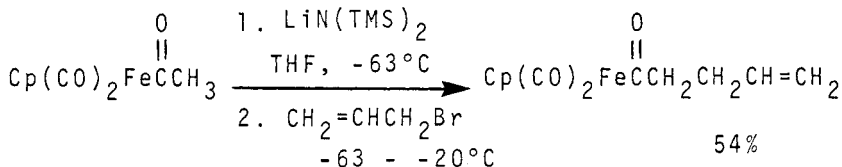


$\text{X} = \text{NHCNH}_2$, NHSO_2ToI , NPhPh

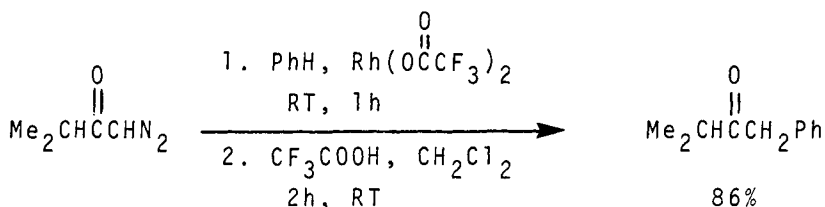
Laszlo, P.*; Polla, E. Synthesis, (1985), 439



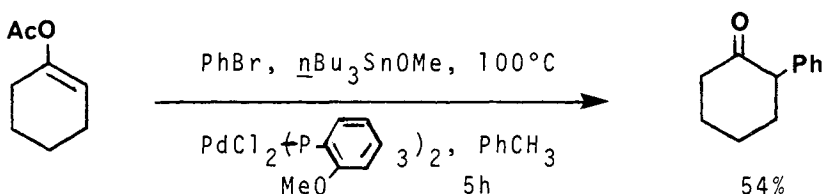
Davies, S.G.*; Walker, J.C. JCS Chem Comm, (1985), 209



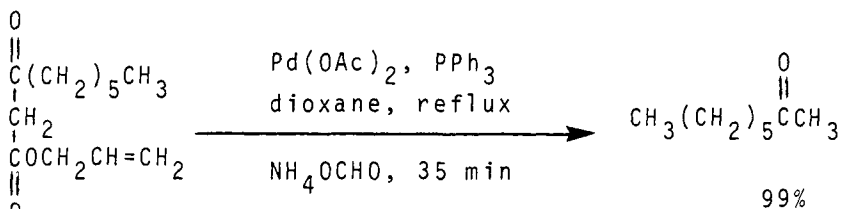
Brinkman, K.; Helquist, P.* Tetrahedron Lett, (1985), 26, 2845



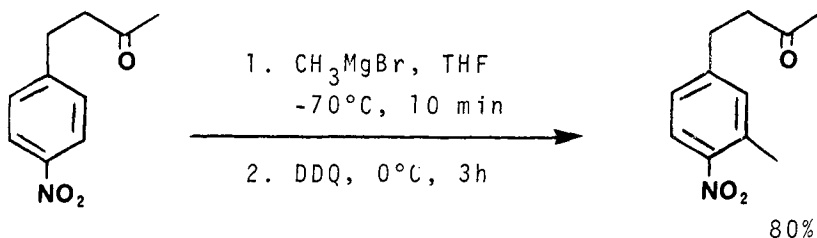
McKervey, M.A.*; Russell, D.N.; Twohig, M.F.
JCS Chem Comm, (1985), 491



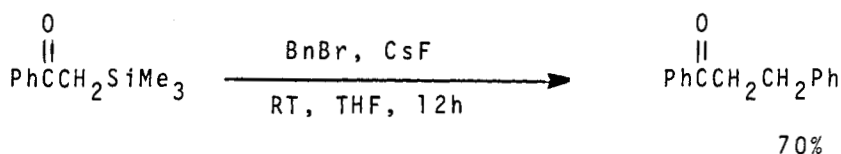
Kosugi, M.; Hagiwara, I.; Sumiya, T.; Migita, T.*
Bull Chem Soc Jpn, (1984), 57, 242



Tsuji, J.*; Nisar, M.; Shimizu, I.
J Org Chem, (1985), 50, 3416

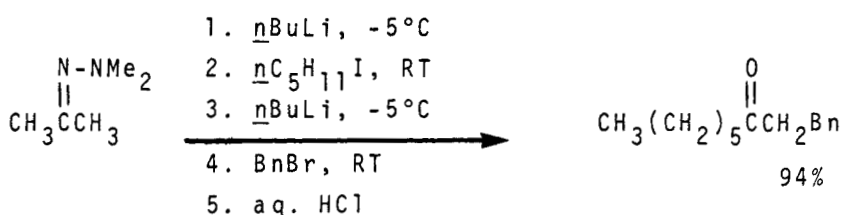


Bartoli, G.*; Bosco, M.; Dalpozzo, R.
Tetrahedron Lett, (1985), 26, 115



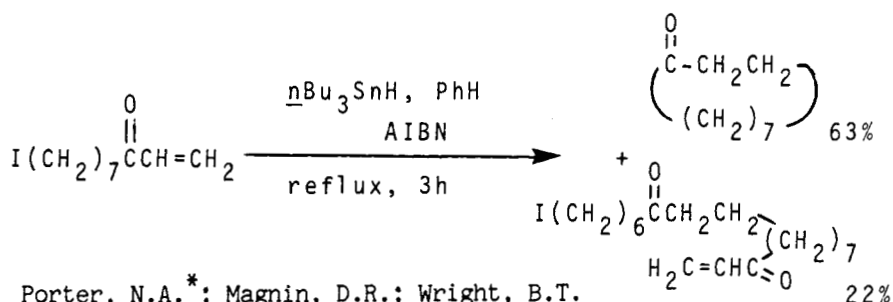
Fiorenza, M.*; Mordini, A.; Papaleo, S.; Pastorelli, S.; Ricci, A.

Tetrahedron Lett, (1985), 26, 787



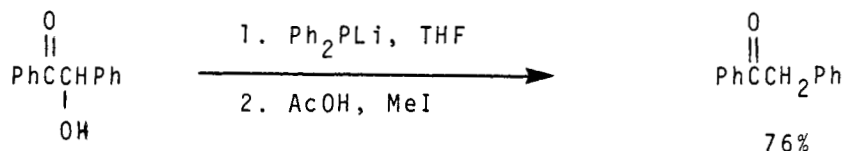
Yamashita, M.*; Matsumiya, K.; Tanabe, M.; Suemitsu, R.

Bull Chem Soc Jpn, (1985), 58, 407

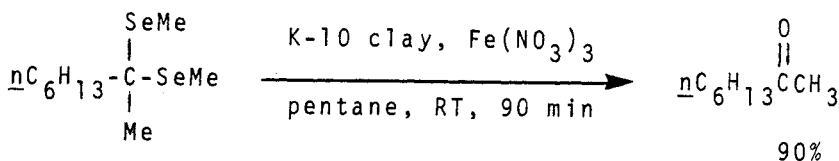


Porter, N.A.*; Magnin, D.R.; Wright, B.T.

J Am Chem Soc, (1986), 108, 2787

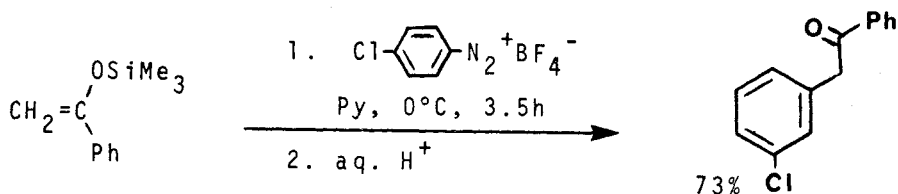


Leone-Bay, A.* J Org Chem, (1986), 51, 2378



Laszlo, P.*; Pennetreau, P.; Krief, A.

Tetrahedron Lett., (1986), 27, 3153



Sakakura, T.; Hara, M.; Tanaka, M.*

JCS Chem Comm., (1985), 1545

Reviews:

"Homoenolate Anions"

Werstiuk, N.H.* Tetrahedron, (1983), 39, 205

"1,2-Carbonyl Transpositions"

Kane, V.V.*; Singh, V.; Martin, A.; Doyle, D.L.
Tetrahedron, (1983), 39, 345

"Alkylation of Ketones and Aldehydes via Nitrogen Derivatives"

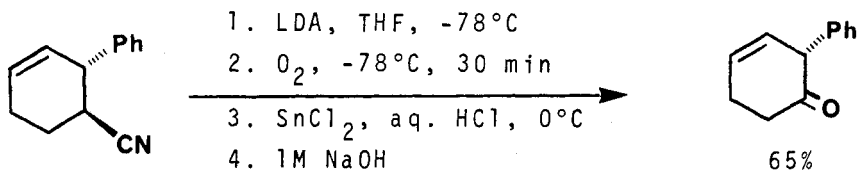
Whitesell, J.K.; Whitesell, M.A. Synthesis, (1983), 517

"Reactive Enolates from Enol Silyl Ethers"

Kuwajima, I.; Nakamura, E. Accts Chem Res, (1985), 18, 181

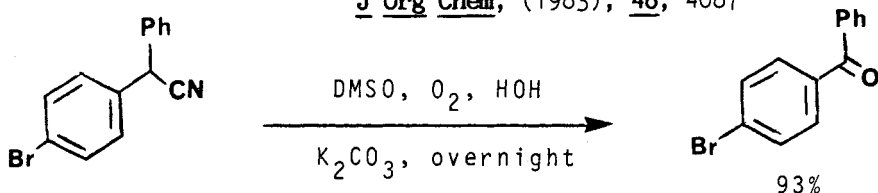
Ketones may also be alkylated or homologated via olefinic ketones (Section 374).

Related Methods: Aldehydes from Aldehydes (Section 49)

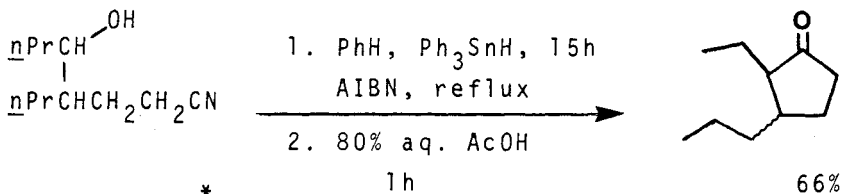
SECTION 178: Ketones from Nitriles

Freerksen, R.W.*; Selikson, S.J.; Wroble, R.R.; Kyler, K.S.; Watt, D.S.

J Org Chem, (1983), **48**, 4087

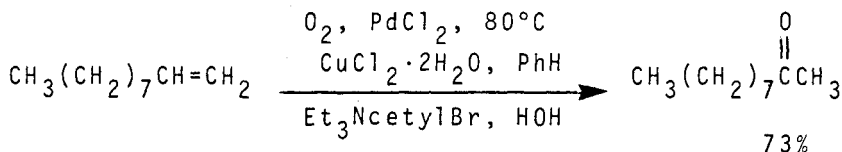


Kulp, S.S.*; McGee, M.J. J Org Chem, (1983), **48**, 4097



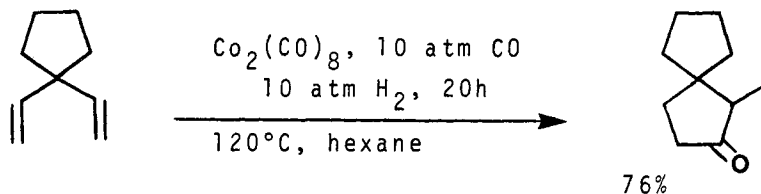
Clive, D.L.J.*; Beaulieu, P.L.; Set, L.

J Org Chem, (1984), **49**, 1313

SECTION 179: Ketones from Olefins

Januskiewicz, K.; Alper, H.*

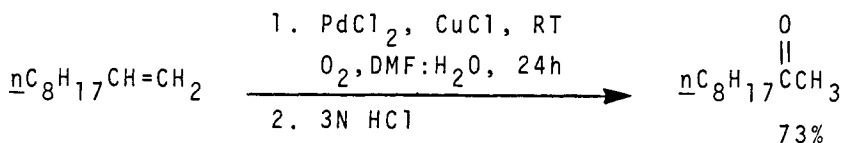
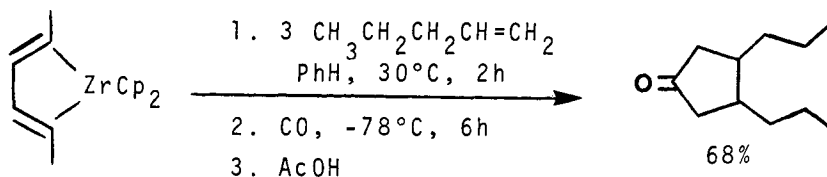
Tetrahedron Lett, (1983), **24**, 5159



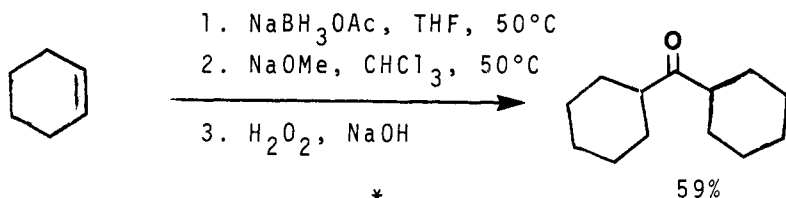
Eilbracht, P.*; Acker, M.; Totzauer, W.

Chem Ber, (1983), **116**, 238

Eilbracht, P.*; Balss, E.; Acker, M.

Tetrahedron Lett, (1984), **25**, 1131Tsuji, J.; Nagashima, H.; Nemoto, H.* Org Syn, (1984), **62**, 9

Yasuda, H.; Nagasuna, K.; Akita, M.; Lee, K.; Nakamura, A.*

Organometallics, (1984), **3**, 1470

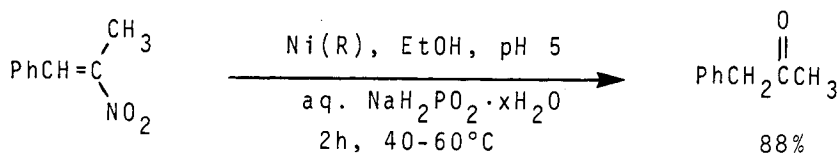
Narayana, C.; Periasamy, M.*

Tetrahedron Lett, (1985), **26**, 6361**Review:** "Synthetic Applications of the Palladium Catalyzed Oxidation of Olefins to Ketones"Tsuji, J.* Synthesis, (1984), 369

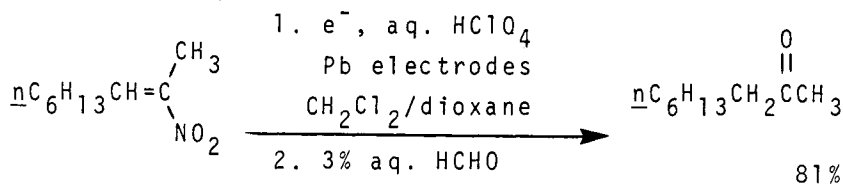
See also: Ethers and Epoxides from Olefins (Section 134) and Ketones from Ethers and Epoxides (Section 174).

SECTION 180: Ketones from Miscellaneous Compounds

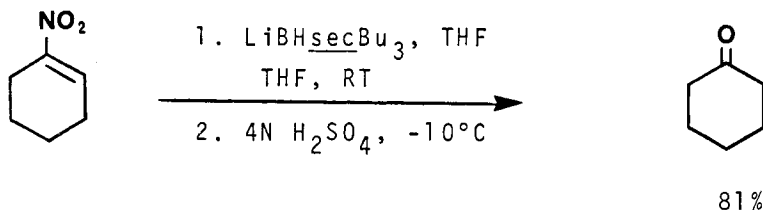
Conjugate reductions and reductive alkylations of enones are listed in Section 74 (Alkyls from Olefins).



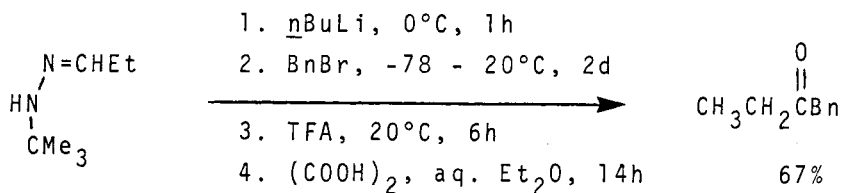
Monti, D.*; Gramatica, P.; Speranza, G.; Manitto, P.
Tetrahedron Lett., (1983), 24, 417



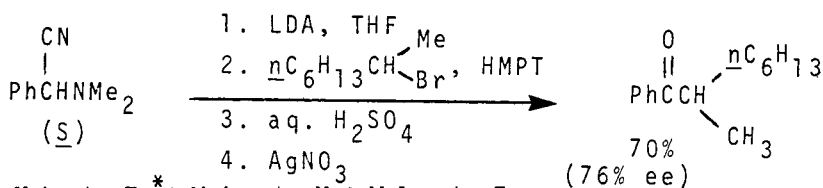
Torii, S.*; Tanaka, H.; Katoh, T. Chem Lett., (1983), 607



Mourad, M.S.; Varma, R.S.; Kabalka, G.W.*
Synthesis, (1985), 654

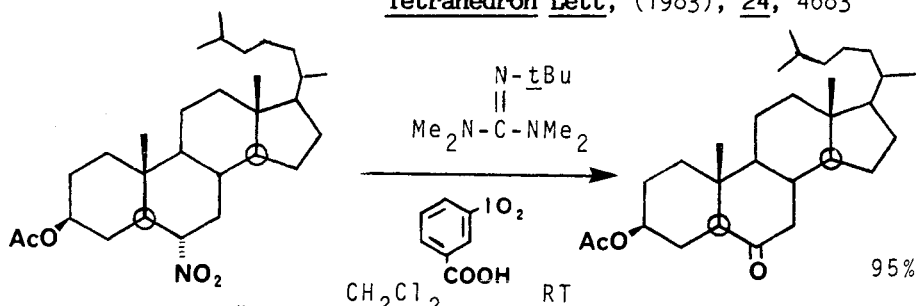


Adlington, R.M.; Baldwin, J.E.*; Bottaro, J.C.; Perry, M.W.D.
JCS Chem Comm, (1983), 1040



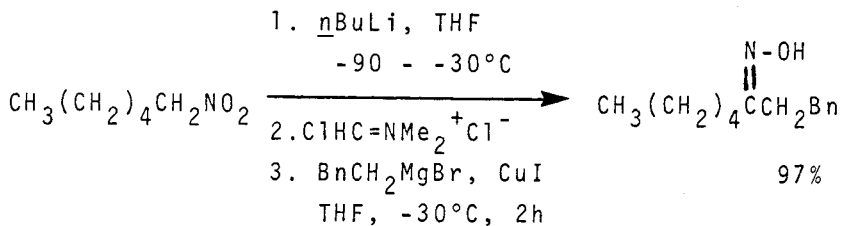
Hebert, E.*; Maigrot, N.; Welvert, Z.

Tetrahedron Lett., (1983), **24**, 4683

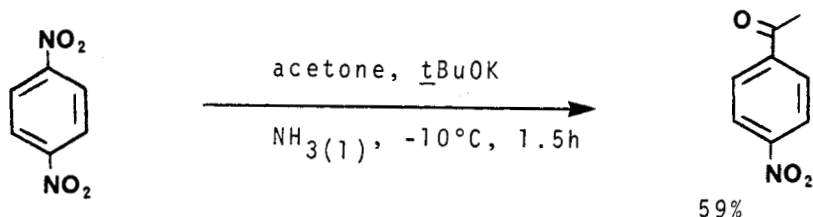


Barton, D.H.R.*; Motherwell, W.B.; Zard, S.Z.

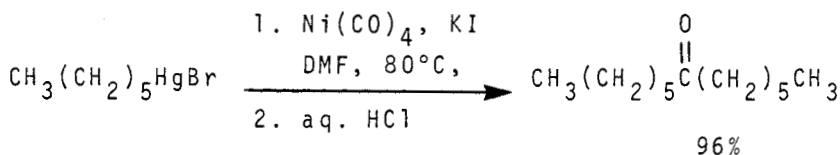
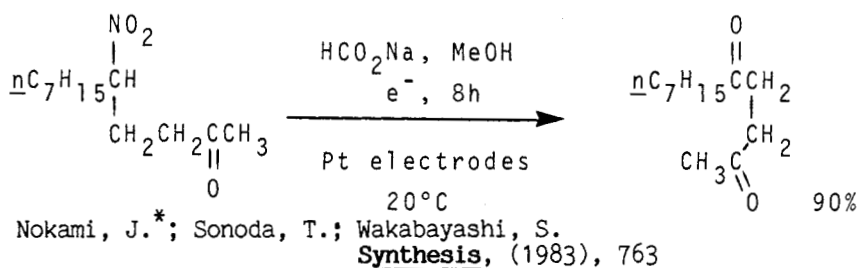
Tetrahedron Lett., (1983), **24**, 5227



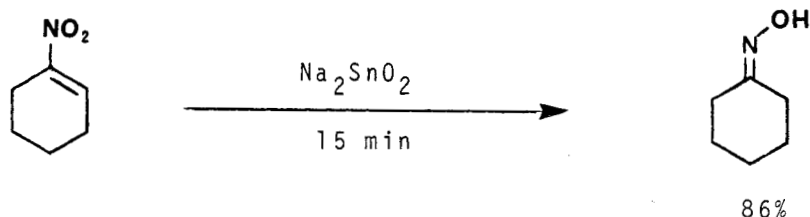
Fujisawa, T.*; Kurita, Y.; Sato, T. Chem Lett., (1983), 1537



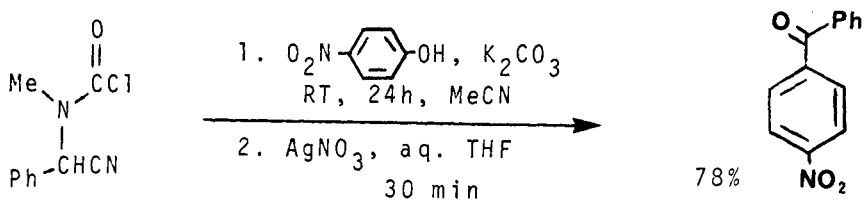
Iwasaki, G.; Saeki, S.; Hamana, M.* **Chem Lett**, (1986), 31



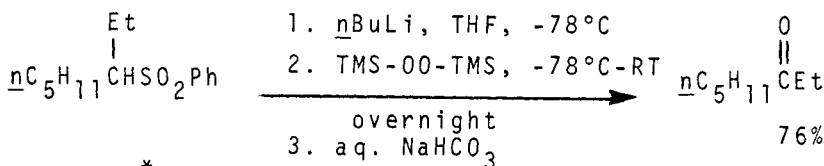
Ryu, I.; Ryang, M.; Rhee, I.; Omura, H.; Murai, S.*; Sonoda, N.
Syn Commun, (1984), **14**, 1175



Varma, R.S.; Varma, M.; Kabalka, G.W.*
Tetrahedron Lett, (1985), 26, 6014



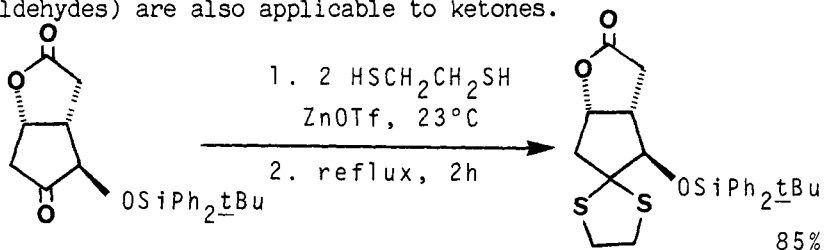
Kay, I.T.; Glue, S.E.J. Tetrahedron Lett., (1986), 27, 113



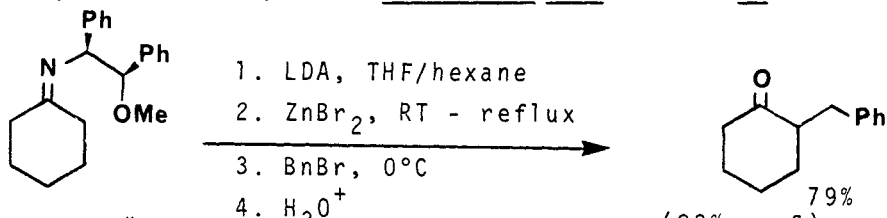
Hwu, J.R.* J Org Chem, (1983), 48, 4432

SECTION 180A: Protection of Ketones

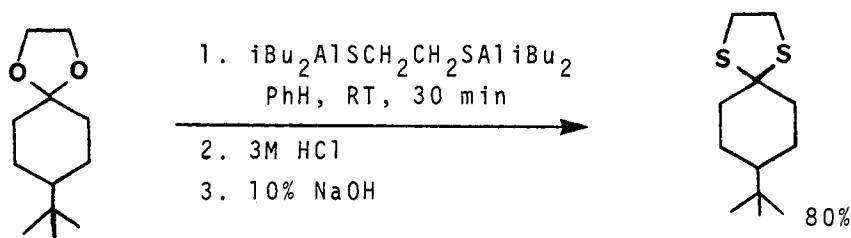
See Section 362 (Ester-Olefin) for the formation of enol ethers and Section 367 (Ether-Olefins) for the formation of enol ethers. May of the methods in Section 60A (Protection of Aldehydes) are also applicable to ketones.



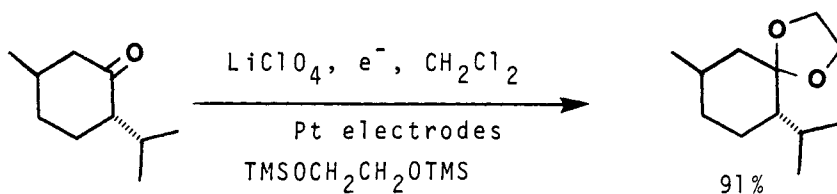
Corey, E.J.*; Shimoji, K. Tetrahedron Lett., (1983), 24, 169



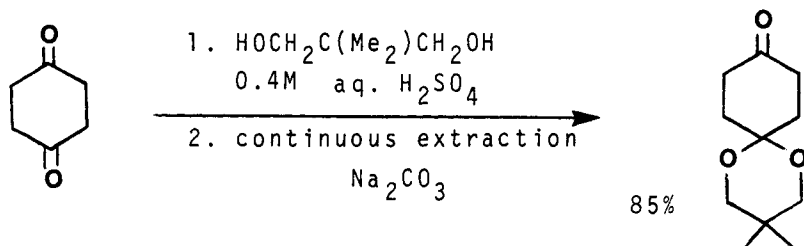
Saigo, K.*; Kasahara, A.; Ogawa, S.; Nohira, H. (82% ee S)
Tetrahedron Lett., (1983), 24, 511



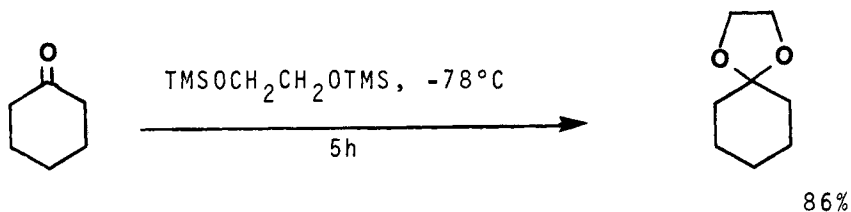
Satoh, T.; Uwaya, S.; Yamakawa, K.* Chem Lett, (1983), 667



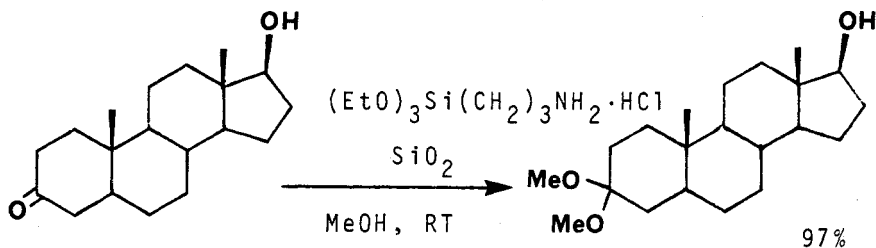
Torii, S.*; Inokuchi, T. Chem Lett, (1983), 1349



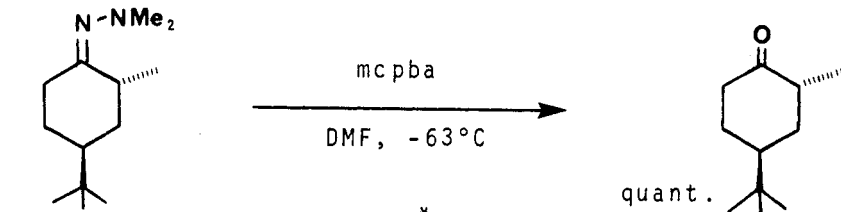
Babler, J.H.*; Spina, K.P. Syn Commun, (1984), 14, 39



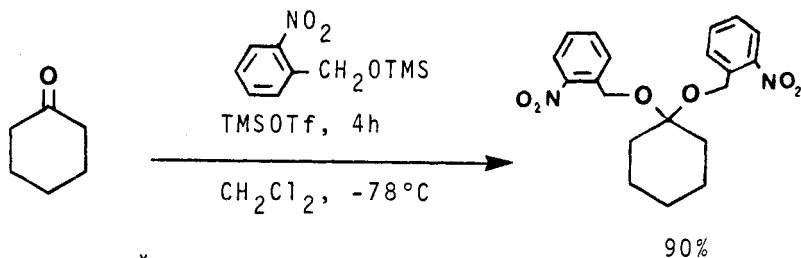
Sakurai, H.*; Sasaki, K.; Hayashi, J.; Hosomi, A.
J Org Chem, (1984), 49, 2808



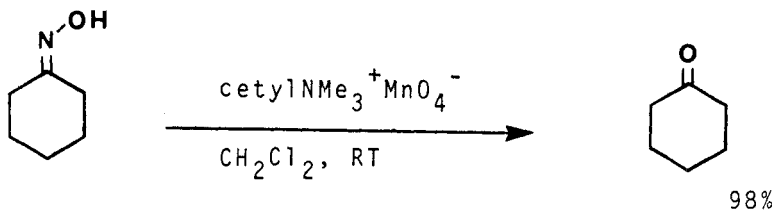
Gasparri, F.; Giovannoli, M.; Misiti, D.; Palmieri, G.
Tetrahedron, (1984), **40**, 1491



Duraisamy, M.; Walborsky, H.M.*
J Org Chem, (1984), **49**, 3410



Gravel, D.*; Murray, S.; Ladouceur, G.
JCS Chem Comm, (1985), 1828



Vankar, P.; Rathore, R.; Chandrasekaran, S.
J Org Chem, (1986), **51**, 3063

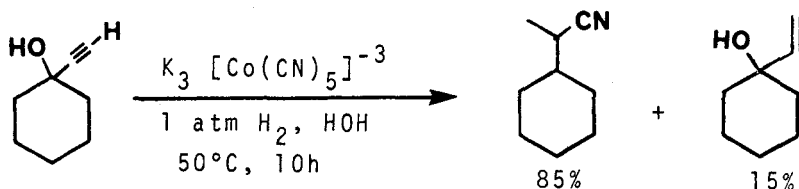
$\text{PhI}(\text{OAc})_2, \text{CH}_2\text{Cl}_2$

Moriarty, R.M.*; Prakash, O.; Vavilikolanu, P.R.
Syn Commun, (1986), **16**, 1247

CHAPTER 13

PREPARATION OF NITRILES

SECTION 181: Nitriles from Acetylenes



Funabiki, T.*; Yamazaki, Y.; Sato, Y.; Yoshida, S.
JCS Perkin II, (1983), 1915

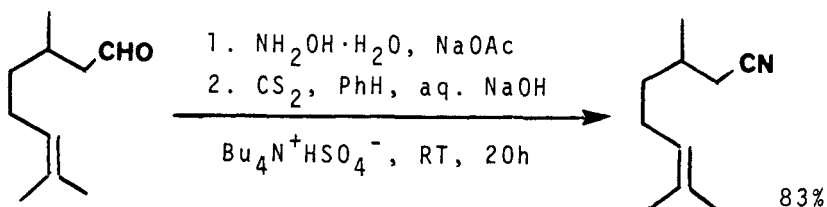
SECTION 182: Nitriles from Acid Derivatives

No Additional Examples

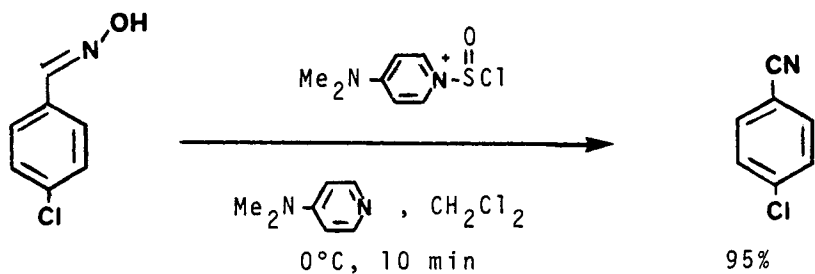
SECTION 183: Nitriles from Alcohols and Thiols

No Additional Examples

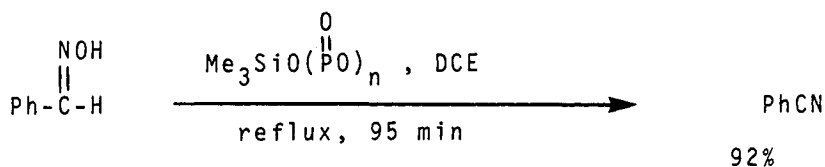
SECTION 184: Nitriles from Aldehydes



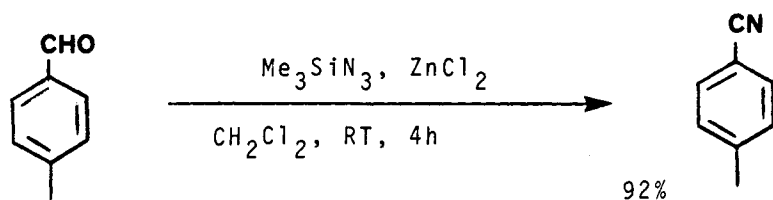
Shinozaki, H.*; Imaizumi, M.; Tajima, M.
Chem Lett, (1983), 929



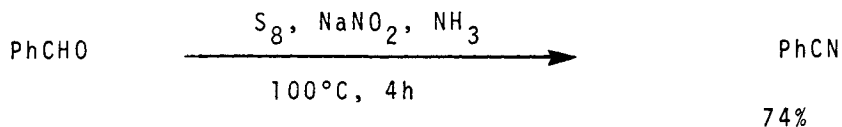
Arrieta, A.; Palomo, C.* Synthesis, (1983), 472



Aizpurua, J.M.; Palomo, C. Nouv J Chem, (1983), **7**, 465

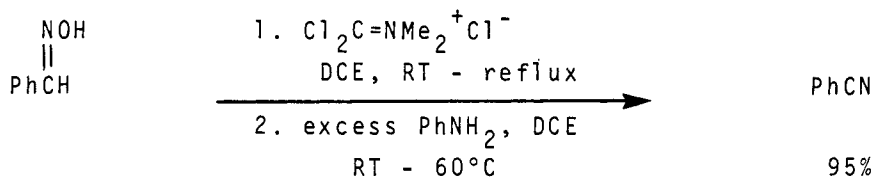


Nishiyama, K.*; Watanabe, A. Chem Lett, (1984), 773

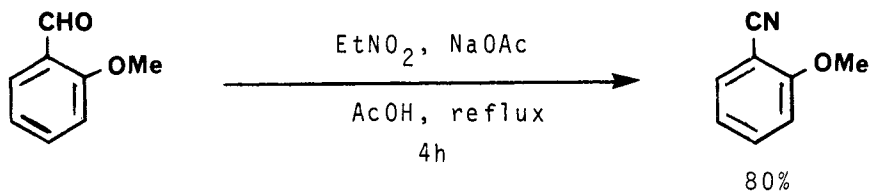


Sato, R.*; Itoh, Kao.; Itoh, Kaz.; Nishina, H.; Goto, T.; Saito, M.

Chem Lett, (1984), 1913



Kokel, B.*; Menichi, G.; Hubert-Habart, M.
Synthesis, (1985), 201

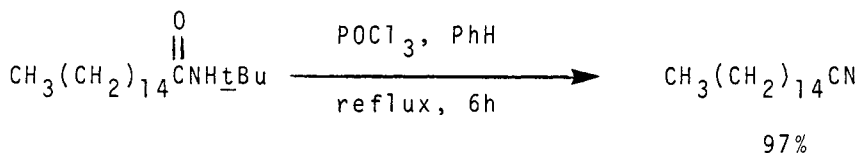


Karmarkar, S.N.; Kelkar, S.L.; Wadia, M.S.*
Synthesis, (1985), 510

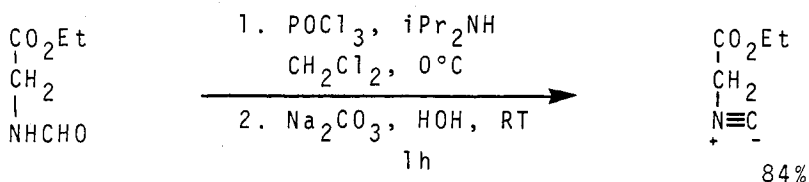
SECTION 185: Nitriles from Alkyls, Methylenes, and Aryls

No Additional Examples

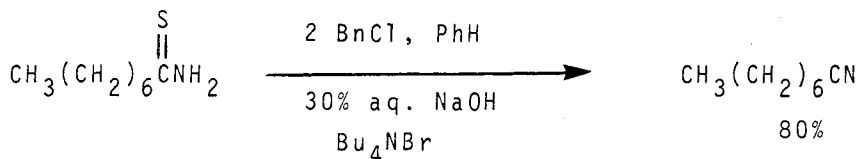
SECTION 186: Nitriles from Amides



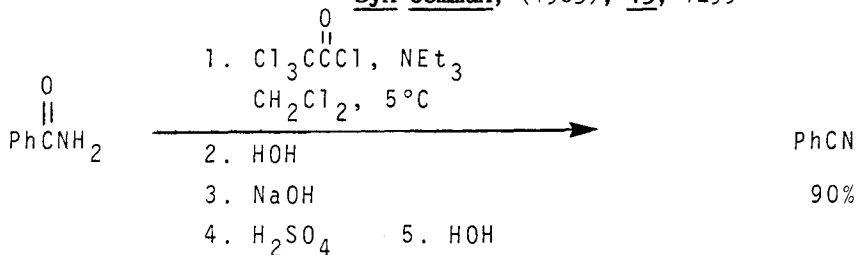
Perni, R.B.; Gribble, G.W.* Org Prep Proc Int, (1983), 15, 297



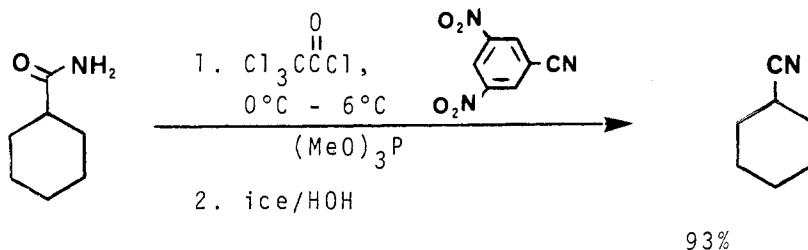
Obrecht, R.; Herrmann, R.; Ugi, I.* Synthesis, (1985), 400



Funakoshi, Y.; Takido, T.*; Itabashi, K.
Syn Commun, (1985), 15, 1299



Saednya, A.* Synthesis, (1985), 184



Mai, K.*; Patil, G. Tetrahedron Lett, (1986), 27, 2203

SECTION 187: Nitriles from Amines

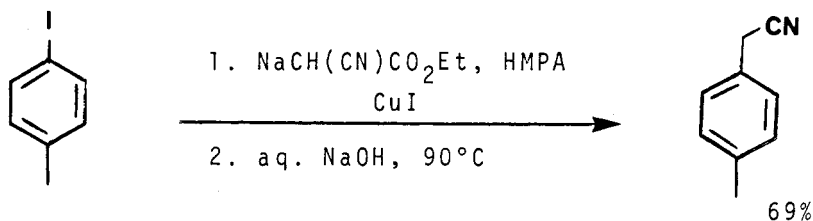
No Additional Examples

SECTION 188: Nitriles from Esters

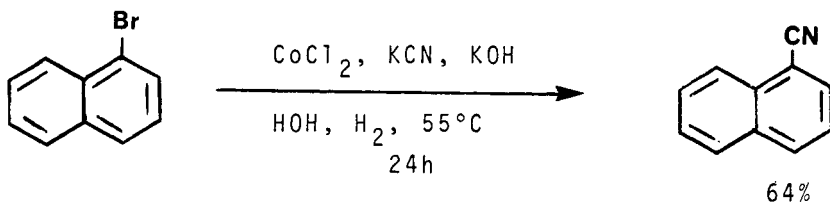
No Additional Examples

SECTION 189: Nitriles from Ethers, Epoxides, and Thioethers

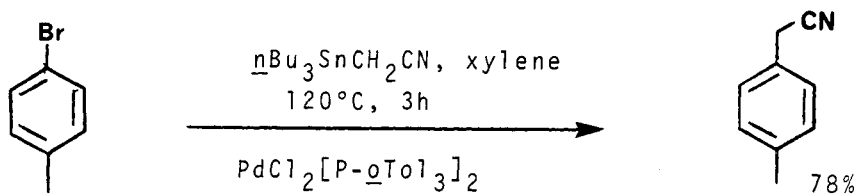
No Additional Examples

SECTION 190: Nitriles from Halides and Sulfonates

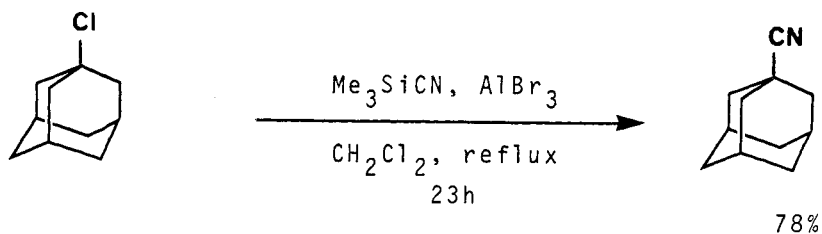
Suzuki, H.*; Kobayashi, T.; Yoshida, Y.; Osuka, A.*
Chem Lett, (1983), 193



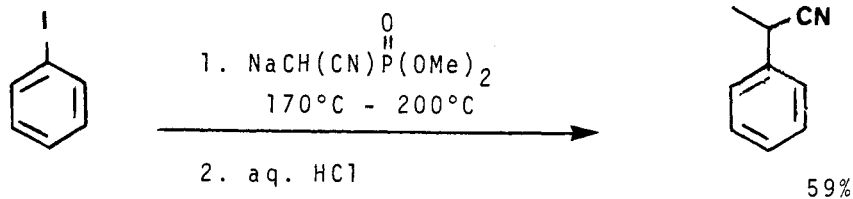
Funabiki, T.*; Nakamura, H.; Yoshida, S.
J Organomet Chem, (1983), 243, 95



Kosugi, M.; Ishiguro, M.; Negishi, Y.; Sano, H.; Migita, T.*
Chem Lett, (1984), 1511

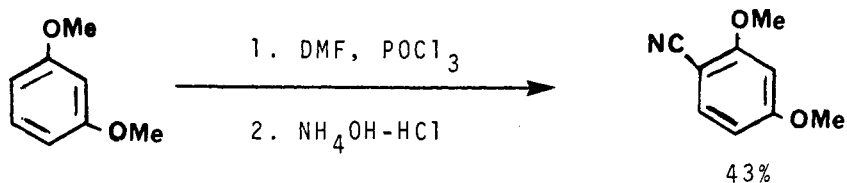


Olah, G.A.*; Farooq, O.; Surya Prakash, G.K.
Synthesis, (1985), 1140

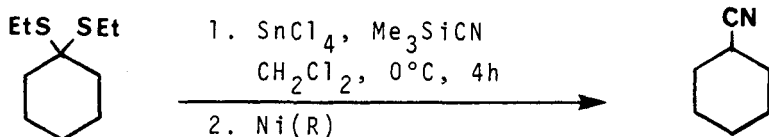


Suzuki, H.*; Watanabe, K.; Yi, Q. Chem Lett, (1985), 1779

SECTION 191: Nitriles from Hydrides



Liebscher, J.; Bechstein, U. Zeit Chemie, (1983), **23**, 214

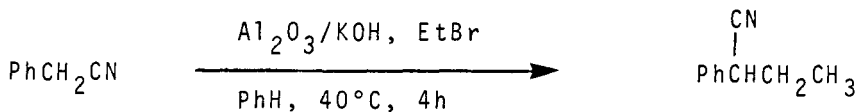
SECTION 192: Nitriles from Ketones

Reetz, M.T.*; Müller-Starke, H.

30%

Tetrahedron Lett., (1984), 25, 3301SECTION 193: Nitriles from Nitriles

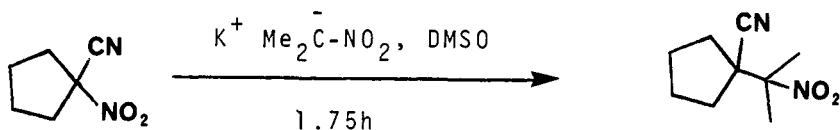
Conjugate reductions and Michael alkylations of olefinic nitriles are found in Section 74D (Alkyls from Olefins).



Sukata, K.*

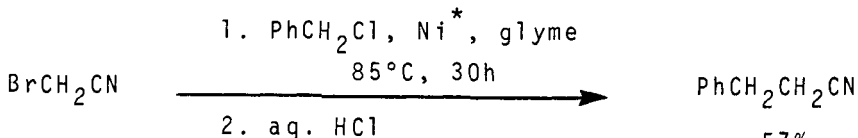
Bull Chem Soc Jpn., (1983), 56, 3306

91%



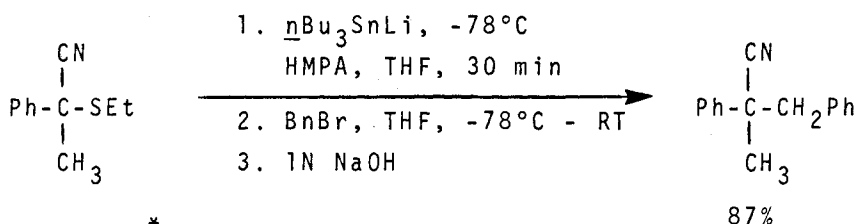
74%

Kornblum, N.*; Singh, H.K.; Boyd, S.D.

J Org Chem., (1984), 49, 358

57%

 Ni^* = activated nickelInaba, S.; Rieke, R.D.* Synthesis, (1984), 842

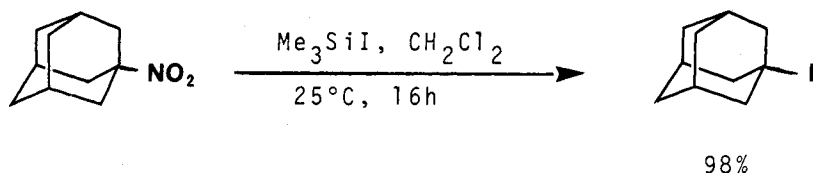


Takeda, T.*; Ando, K.; Mamada, A.; Fujiwara, T.
Chem Lett, (1985), 1149

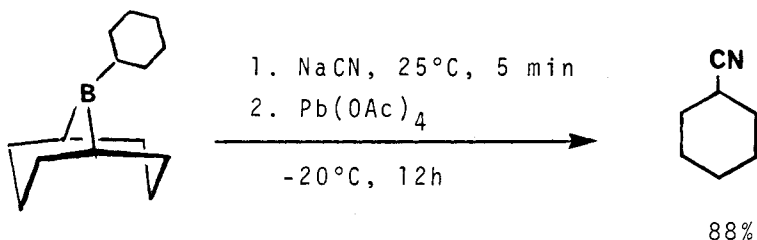
SECTION 194: Nitriles from Olefins

No Additional Examples

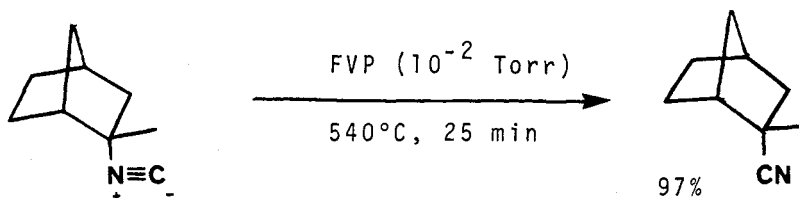
SECTION 195: Nitriles from Miscellaneous Compounds



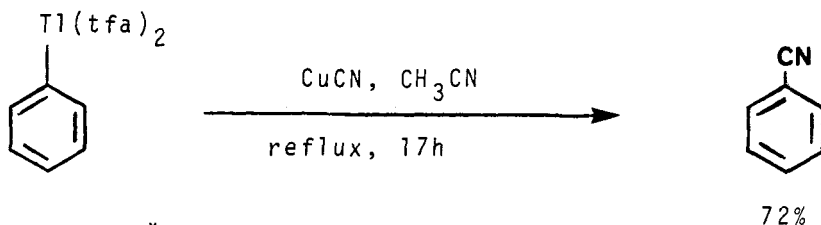
Olah, G.A.*; Narang, S.C.; Field, L.D.; Fung, A.P.
J Org Chem, (1983), **48**, 2766



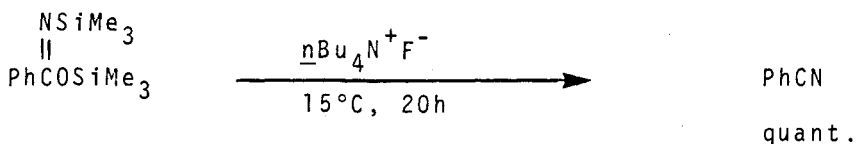
Masuda, Y.; Hoshi, M.; Yamada, T.; Arase, A.*
JCS Chem Comm, (1984), 398



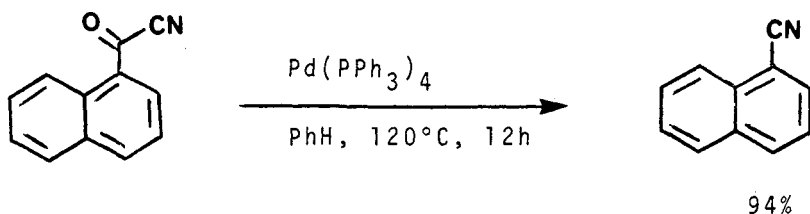
Meier, M.; Rüchardt, C.* Tetrahedron Lett., (1984), 25, 3441



Taylor, E.C.*; Katz, A.H.; McKillop, A.
Tetrahedron Lett., (1984), 25, 5473

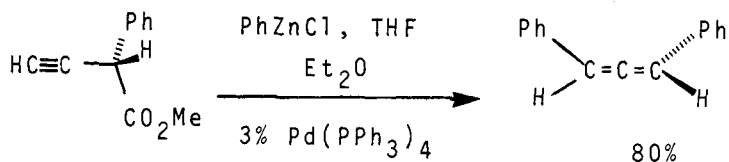


Rigo, B.*; Lespagnol, C.; Pauly, M.
Tetrahedron Lett., (1986), 27, 347

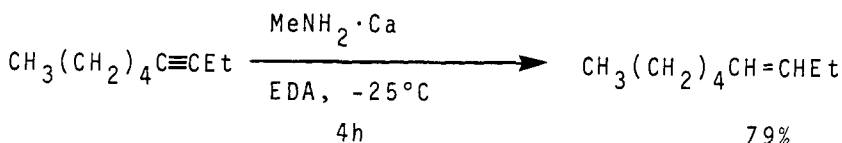


Murahashi, S.-I.*; Naota, T.; Nakajima, N.
J Org Chem, (1986), 51, 898

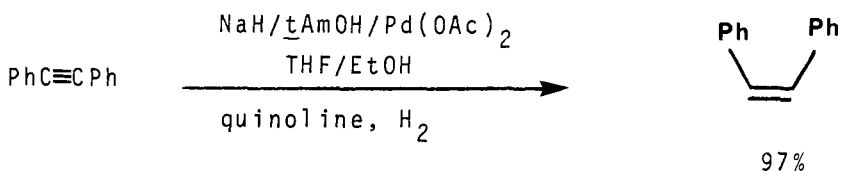
SECTION 196: Olefins from Acetylenes



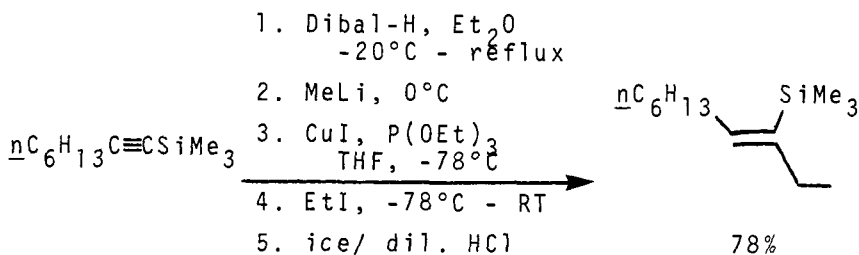
Elsevier, C.J.; Stehouwer, P.M.; Westmijze, H.; Vermeer, P.*
J Org Chem, (1983), 48, 1103



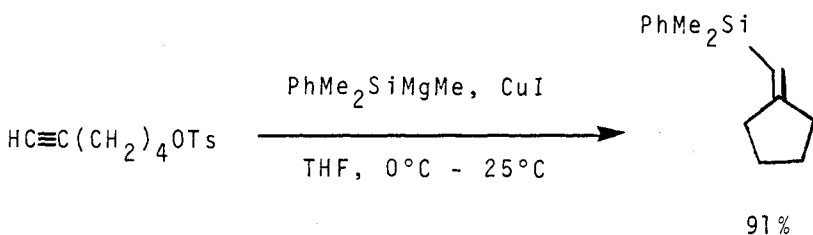
Benkeser, R.A.*; Belmonte, F.G. J Org Chem, (1984), 49, 1662



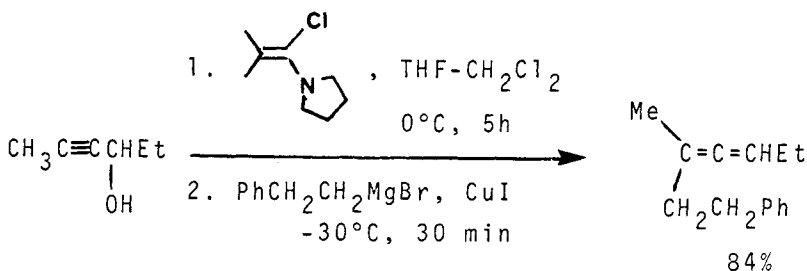
Brunet, J.-J.; Caubere, P.* J Org Chem, (1984), 49, 4058



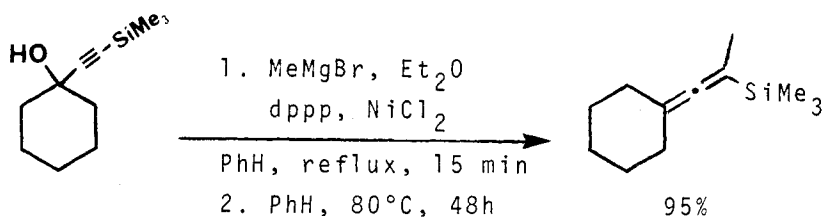
Ziegler, F.E.*; Mikami, K. Tetrahedron Lett, (1984), 25, 131



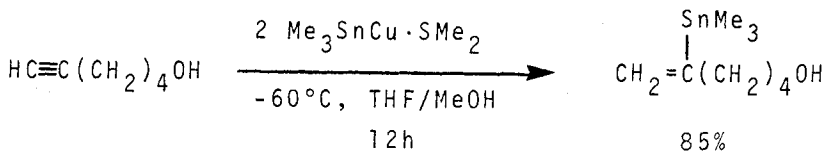
Okuda, Y.; Morizawa, Y.; Oshima, K.*; Nozaki, H.
Tetrahedron Lett., (1984), 25, 2483



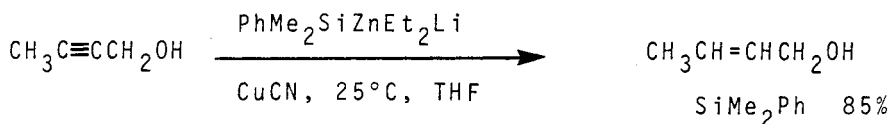
Fujisawa, T.*; Iida, S.; Sato, T.
Tetrahedron Lett., (1984), 25, 4007



Wenkert, E.*; Leftin, M.H.; Michelotti, E.L.
J Org Chem., (1985), 50, 1122

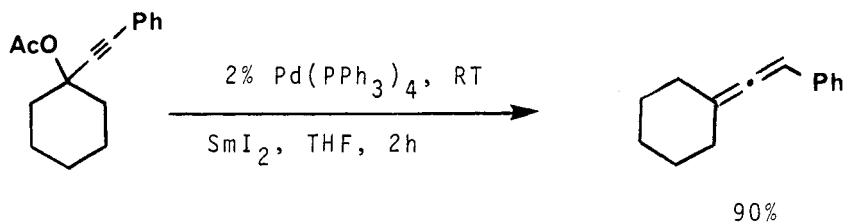


Piers, E.*; Chong, J.M. JCS Chem Comm., (1983), 934



Okuda, Y.; Wakamatsu, K.; Tückmantel, W.; Oshima, K.*; Nozaki, H.

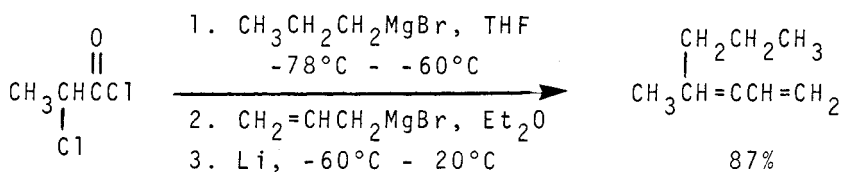
Tetrahedron Lett., (1985), 26, 4629



Tabuchi, T.; Inanaga, J.*; Yamaguchi, M.

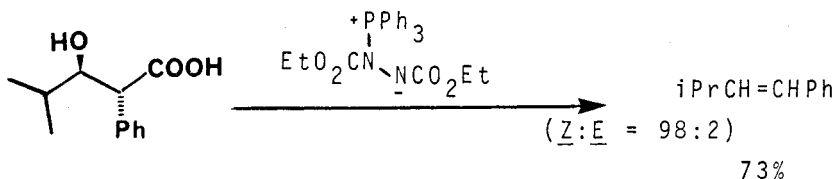
Tetrahedron Lett., (1986), 27, 5237

SECTION 197: Olefins from Acid Derivatives



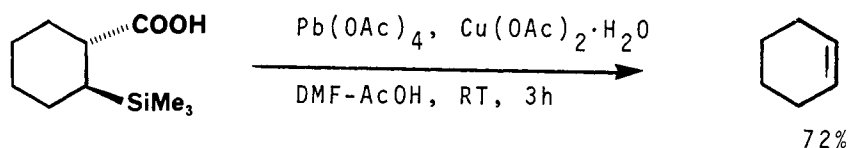
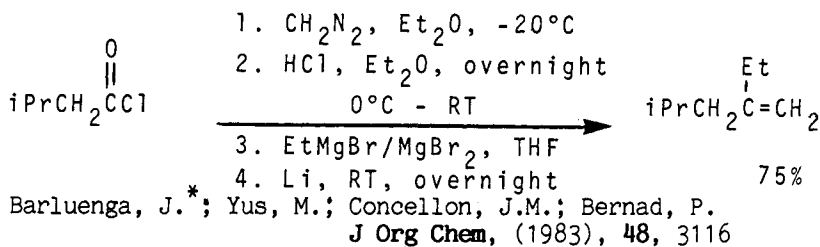
Barluenga, J.*; Yus, M.; Concellón, J.M.; Bernad, P.

J Org Chem., (1983), 48, 609



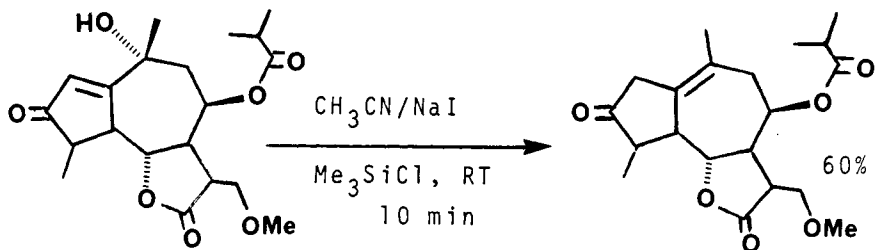
Mulzer, J.*; Lammer, O.

Angew Chem Int Ed Engl., (1983), 22, 628

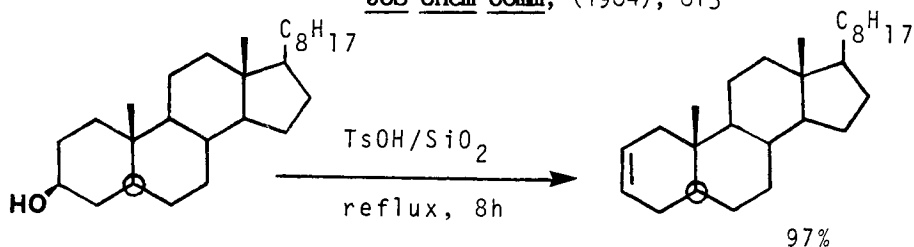


Nishiyama, H.*; Matsumoto, M.; Arai, H.; Sakaguchi, H.; Itoh, K.
Tetrahedron Lett, (1986), 27, 1599

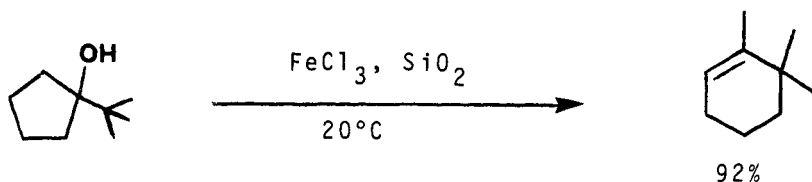
SECTION 198: Olefins from Alcohols and Thiols



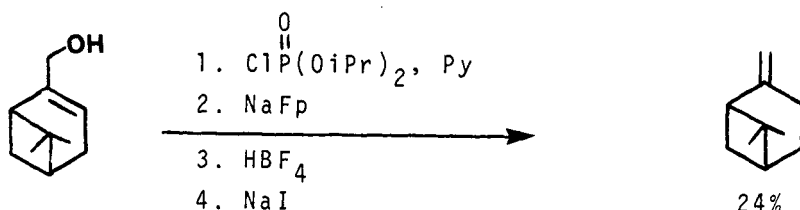
Sarma, D.N.; Sarma, J.C.; Barua, N.C.; Sharma, R.P.*
JCS Chem Comm, (1984), 813



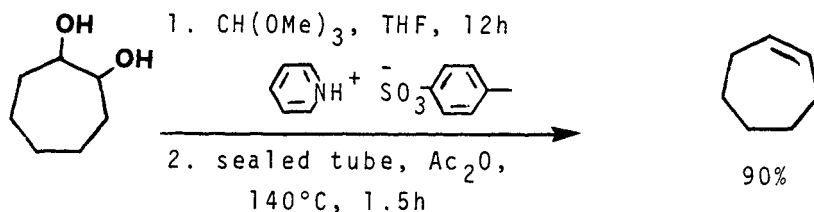
D'Onofrio, F.; Scettri, A.* Synthesis, (1985), 1159



Fadel, A.; Salaun, J.* Tetrahedron, (1985), **41**, 1267
Tetrahedron, (1985), **41**, 413

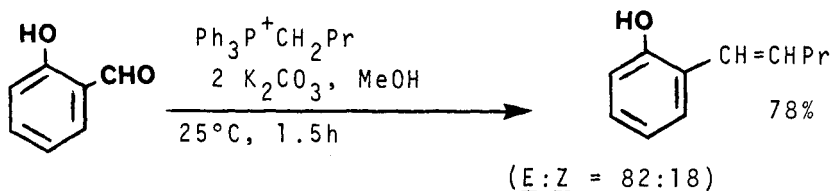


Araki, S.; Hatano, M.; Butsugan, Y.*
J Org Chem, (1986), **51**, 2126

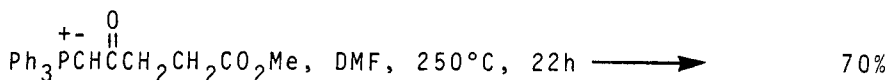


Ando, M.*; Ohhara, H.; Takase, K. Chem Lett, (1986), 879

SECTION 199: Olefins from Aldehydes



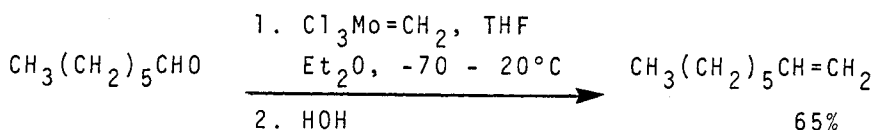
Le Bigot, Y.; Delmas, M.; Gaset, A.
Tetrahedron Lett, (1983), **24**, 193



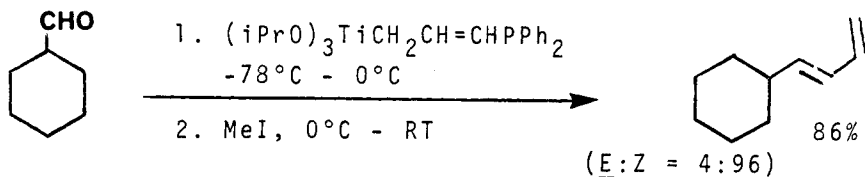
Ronald, R.C.; Wheeler, C.J.* J Org Chem, (1983), 48, 138



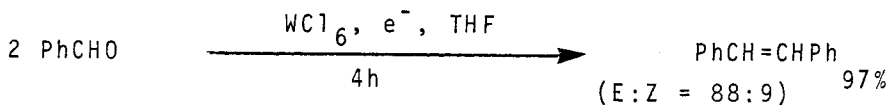
Kauffmann, T.*; Fiegenbaum, P.; Wieschollek, R.
Angew Chem Int Ed Engl, (1984), 23, 531



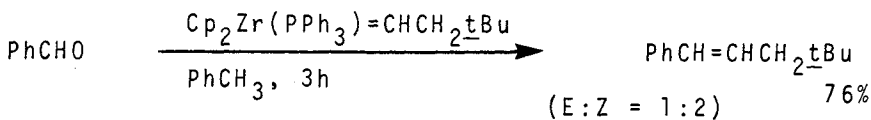
Kauffmann, T.; Enner, B.; Sandler, J.; Wieschollek, R.
Angew Chem Int Ed Engl, (1983), 22, 244



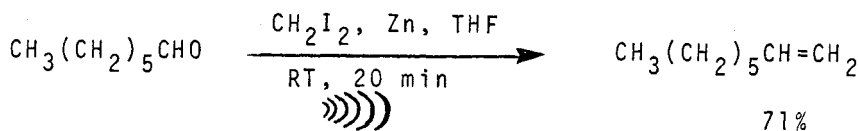
Ukai, J.; Ikeda, Y.; Ikeda, N.; Yamamoto, H.*
Tetrahedron Lett, (1983), 24, 4029



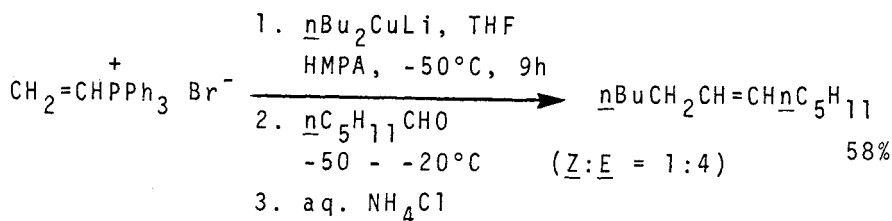
Petit, M.; Mortreux, A.; Petit, F.* JCS Chem Comm, (1984), 341



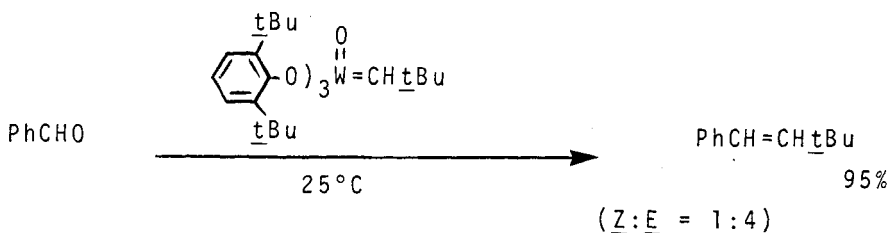
Clift, S.M.; Schwartz, J.* J Am Chem Soc, (1984), 106, 8300



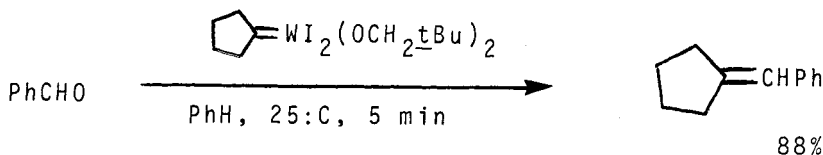
Yamashita, J.*; Inoue, Y.; Kondo, T.; Hasimoto, H.
Bull Chem Soc Jpn, (1984), 57, 2335



Just, G.; O'Connor, B. Tetrahedron Lett, (1985), 26, 1799



Freudenberger, J.H.*; Shrock, R.R.*
Organometallics, (1986), 5, 398

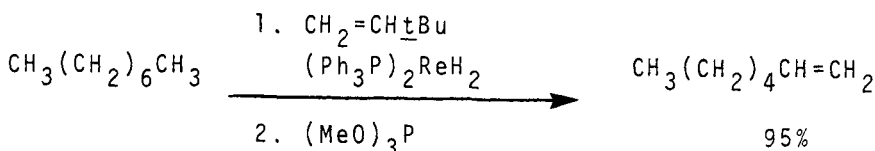


Aguero, A.; Kress, J.; Osborn, J.A. JCS Chem Comm, (1986), 531

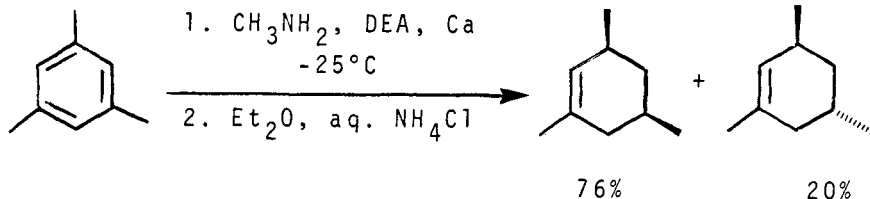
Related Methods: Olefins from Ketones (Section 207)

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. Reduction of aryls to dienes is found in Section 377 (Olefin-Olefin). Hydrogenation of aryls to alkanes and dehydrogenations to form aryls are included in Section 74 (Alkyls, Methylenes, and Aryls from Olefins).



Baudry, D.*; Ephritikhine, M.*; Felkin, H.; Zakrzewski, J.
Tetrahedron Lett, (1984), 25, 1283
 Baudry, D.*; Ephritikhine, M.*; Felkin, H.; Holmes-Smith, R.
JCS Chem Comm, (1983), 788



Benkeser, R.A.*; Belmonte, F.G.; Kang, J.
J Org Chem, (1983), 48, 2796

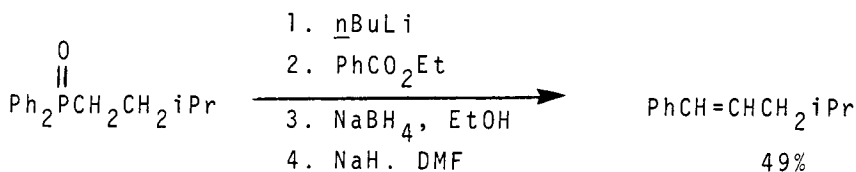
SECTION 201: Olefins from Amides

No Additional Examples

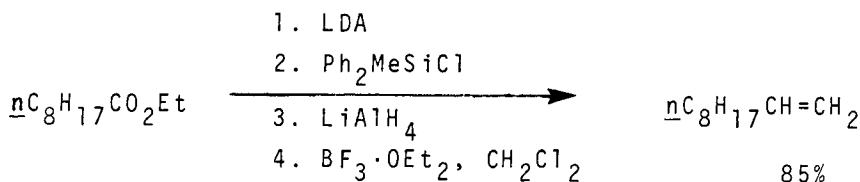
Related Methods: Alkyls and Aryls from Alkyls and Aryls
 (Section 65)
 Alkyls and Aryls from Olefins (Section 74)

SECTION 202: Olefins from Amines

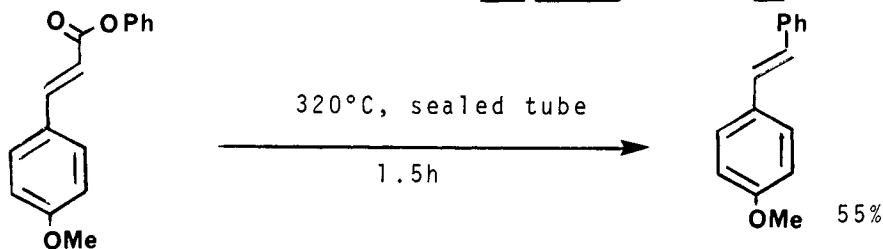
No Additional Examples

SECTION 203: Olefins from Esters

Buss, A.D.; Mason, R.; Warren, S.*

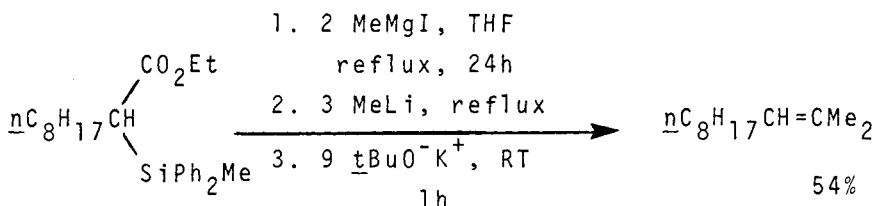
Tetrahedron Lett., (1983), 24, 5293

De Maldonado, V.C.; Larson, G.L.*

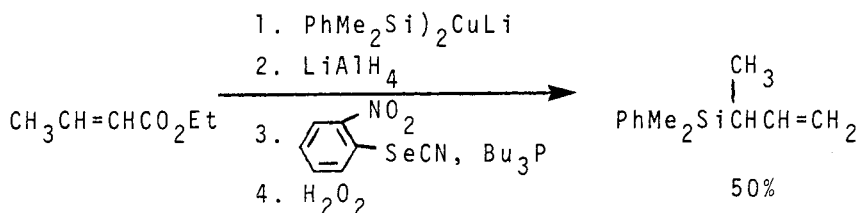
Syn Commun., (1983), 13, 1163

Chamchaang, W.; Chantarasiri, N.; Chaona, S.; Thebtaranonth, C.*; Thebtaranonth, Y.

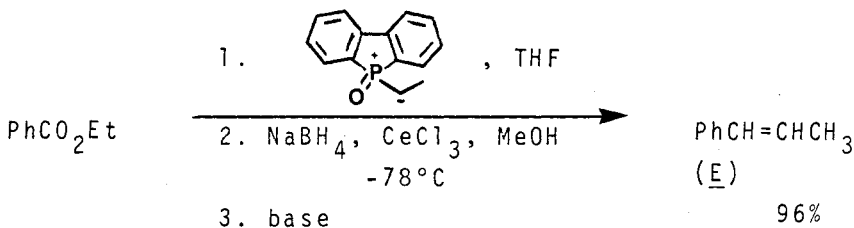
Tetrahedron, (1984), 40, 1727



Hernández, D.; Larson, G.L.* J Org Chem, (1984), 49, 4285

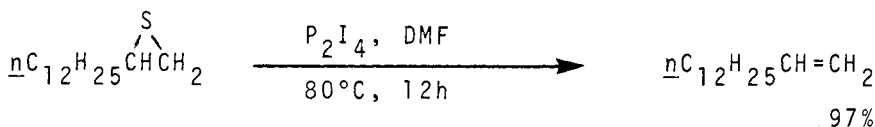


Fleming, I.*; Waterson, D. JCS Perkin I, (1984), 1809

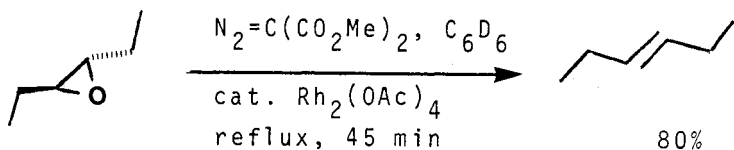


Elliott, J.; Warren, S.* Tetrahedron Lett, (1986), 27, 645

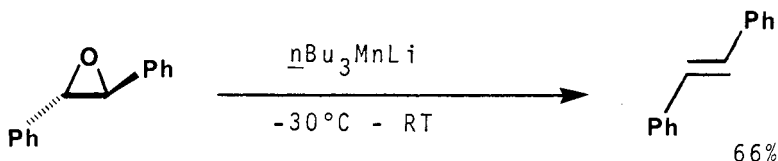
SECTION 204: Olefins from Ethers, Epoxides, and Thioethers



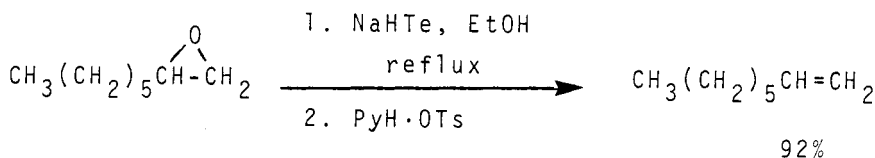
Schauder, J.R.; Denis, J.N.; Krief, A.*
Tetrahedron Lett, (1983), 24, 1657



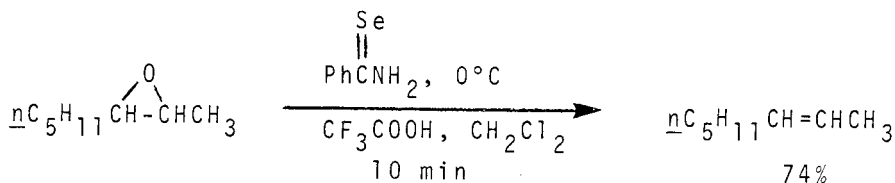
Martin, M.G.; Ganem, B.* Tetrahedron Lett., (1984), 25, 251



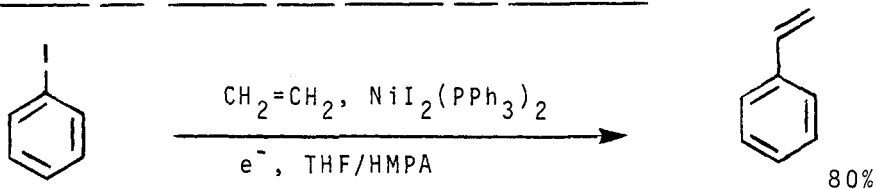
Kauffmann, T.*; Bisling, M. Tetrahedron Lett., (1984), 25, 293



Barton, D.H.R.*; Fekih, A.; Lusinchi, X.
Tetrahedron Lett., (1985), 26, 6197

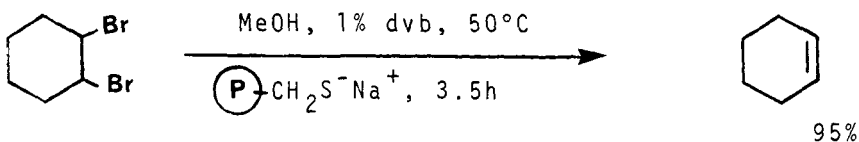


Ogawa, A.; Miyake, J.; Murai, S.; Sonoda, N.*
Tetrahedron Lett., (1985), 26, 669

SECTION 205: Olefins from Halides and Sulfonates

Rollin, Y.; Meyer, G.; Troupel, M.; Fauvarque, J.-F.; Perichon, J.

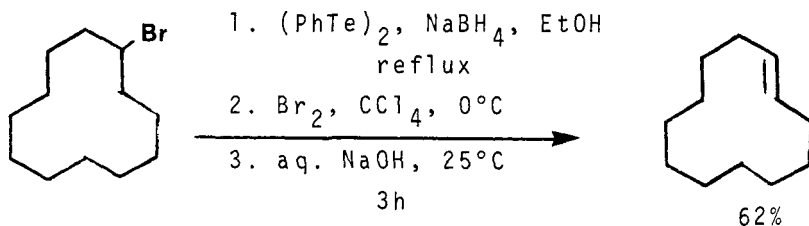
JCS Chem Comm, (1983), 793



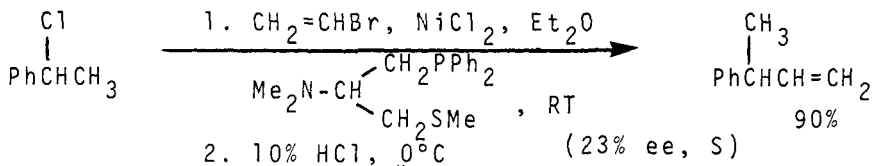
P = poly[styrene (99) co-divinylbenzene]

Janout, V.; Čefelín, P.

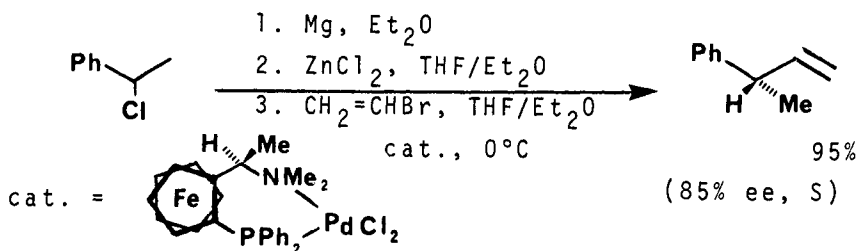
Tetrahedron Lett, (1983), 24, 3913



Uemura, S.*; Fukuzawa, S. J Am Chem Soc, (1983), 105, 2748



Griffin, J.H.; Kellogg, R.M.* J Org Chem, (1985), 50, 3261

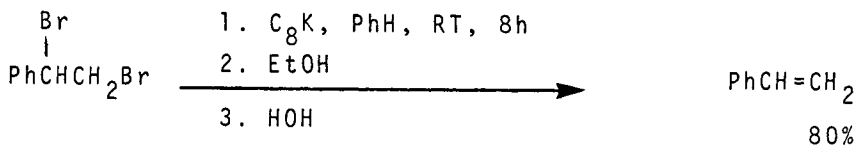


Hayashi, T.; Hagihara, T.; Katsuro, Y.; Kumada, M.*

Bull Chem Soc Jpn, (1983), 56, 363

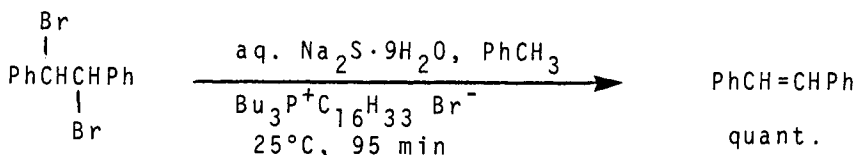
Hayashi, T.*; Konishi, M.; Okamoto, Y.; Kabeta, K.; Kumada, M.

J Org Chem, (1986), 51, 3772



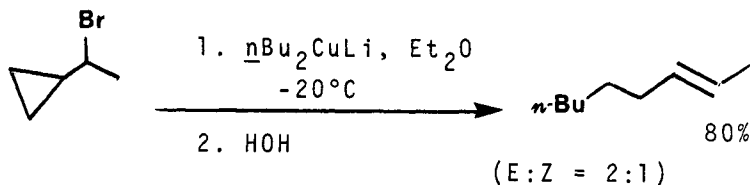
C_8K = graphite powder/ 200°C/K

Rabinovitz, M.*; Tamarkin, D. Syn Commun, (1984), 14, 377



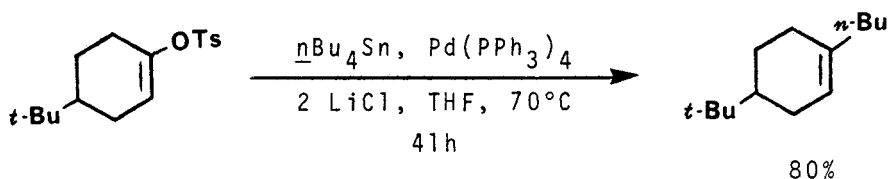
Landini, D.*; Milesi, L.; Quadri, M.L.; Rolla, F.

J Org Chem, (1984), 49, 152

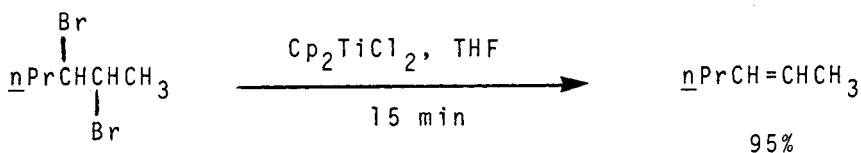


Hrubiec, R.T.; Smith, M.B.*

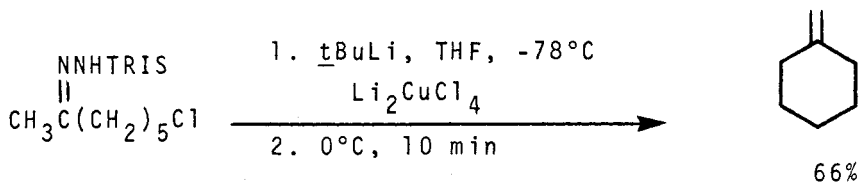
J Org Chem, (1984), 49, 385



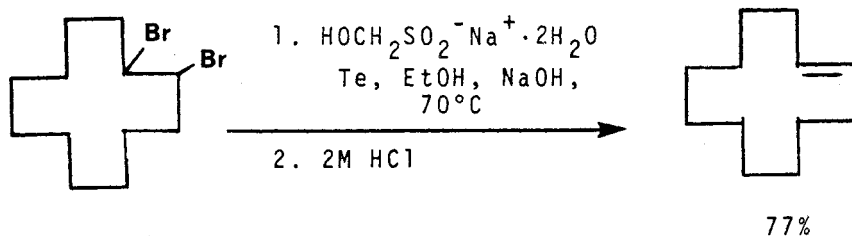
Scott, W.J.; Crisp, G.T.; Stille, J.K.*
J Am Chem Soc, (1984), 106, 4630



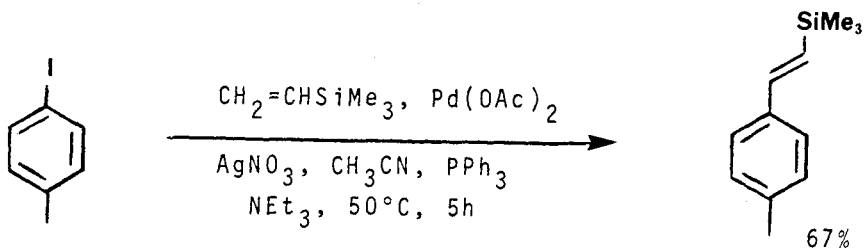
Davies, S.G.*; Thomas, S.E. Synthesis, (1984), 1027



Chamberlin, A.R.*; Bloom, S.H.
Tetrahedron Lett, (1984), 25, 4901

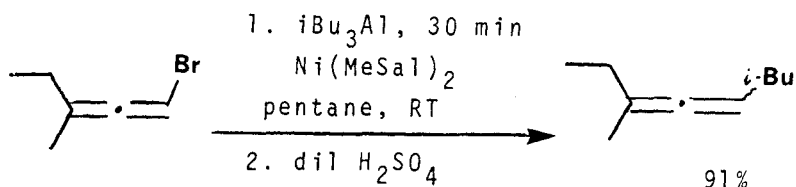


Suzuki, H.*; Inouye, M. Chem Lett, (1985), 225



Karabelas, K.; Hallberg, A.*

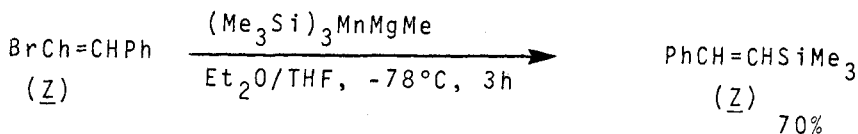
Tetrahedron Lett., (1985), 26, 3131



MeSal = N-methylsalicylaldimine

Caporusso, A.M.*; Da Settimo, F.; Lardioci, L.

Tetrahedron Lett., (1985), 26, 5101



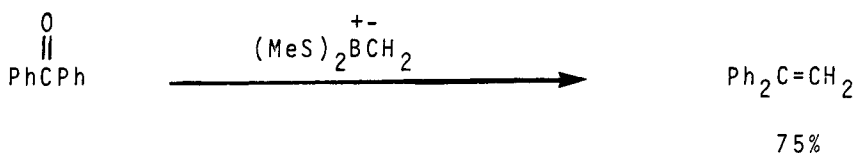
Fugami, K.; Oshima, K.*; Utimoto, K.; Nozaki, H.

Tetrahedron Lett., (1986), 27, 2161

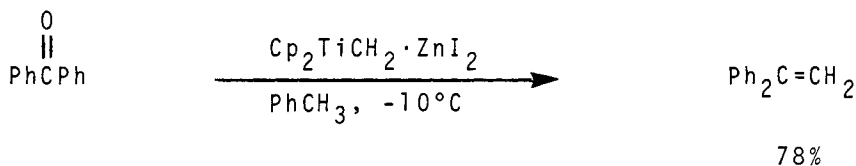
SECTION 206: Olefins from Hydrides

No Additional Examples

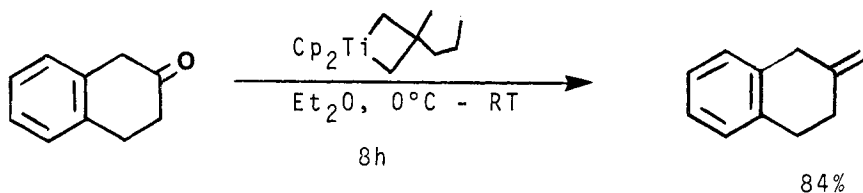
For conversions of methylenes to olefins ($\text{RCH}_2\text{R}' \rightarrow \text{RR}'\text{C}=\text{CH}_2$, see Section 200.

SECTION 207: Olefins from Ketones

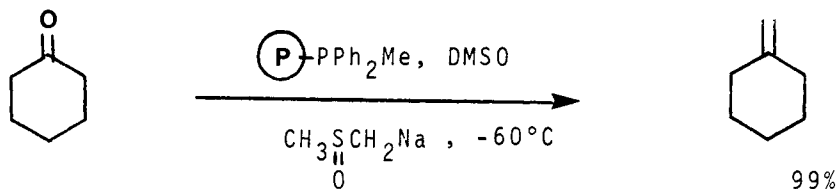
Pelter, A.; Singaram, B.; Wilson, J.W.

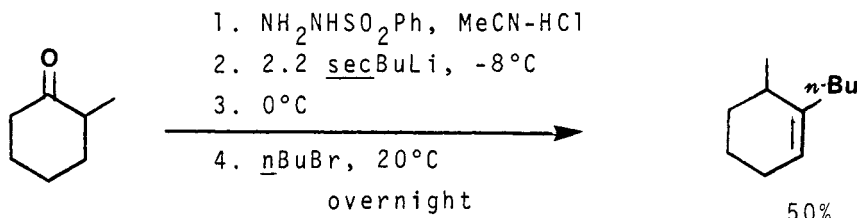
Tetrahedron Lett., (1983), 24, 635

Eisch, J.J.*; Piotrowski, A.

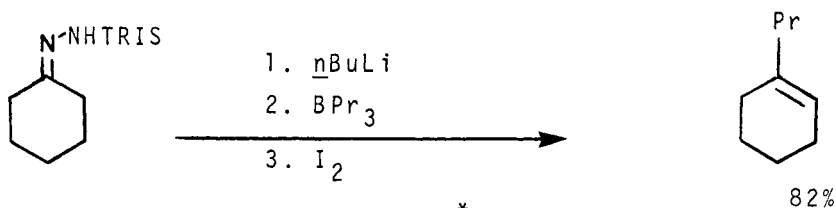
Tetrahedron Lett., (1983), 24, 2043

Clawson, L.; Buchwald, S.L.; Grubbs, R.H.*

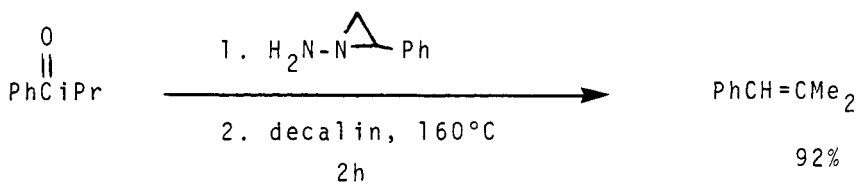
Tetrahedron Lett., (1984), 25, 5733Bernard, M.; Ford, W.J.* J Org Chem., (1983), 48, 326



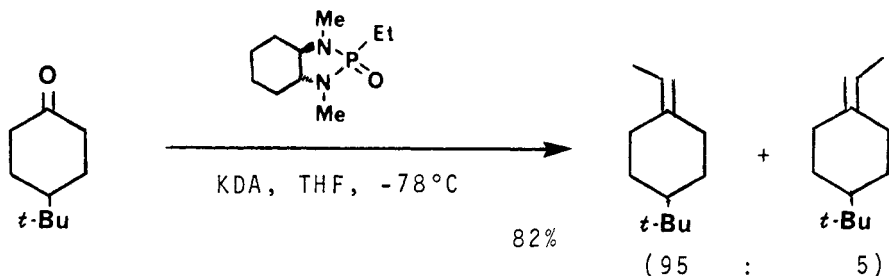
Chamberlin, A.R.*; Liotta, E.L.; Bond, F.T.
Org Syn, (1983), **61**, 141



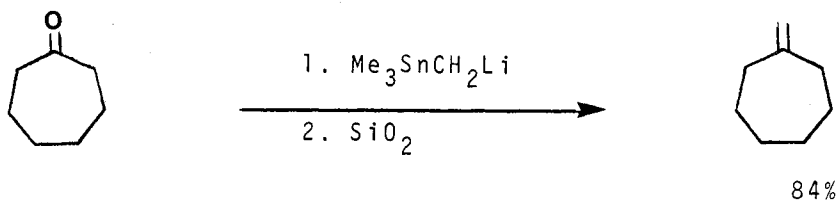
Baba, T.; Avasthi, K.; Suzuki, A.*
Bull Chem Soc Jpn, (1983), **56**, 1571



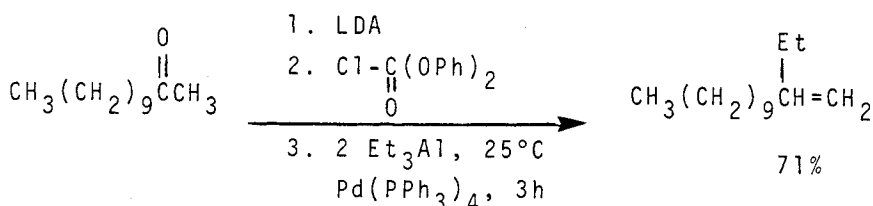
Mohamadi, F.; Collum, D.B.* Tetrahedron Lett, (1984), **25**, 271



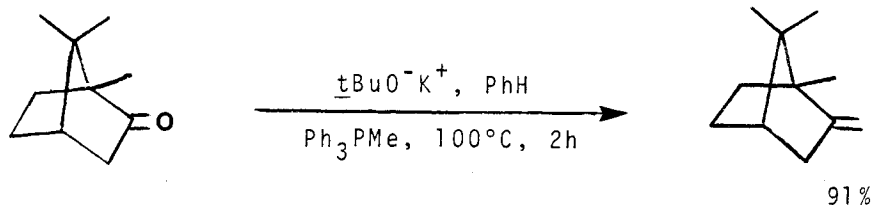
Hanessian, S.*; Delorme, D.; Beaudoin, S.; Leblanc, Y.
J Am Chem Soc, (1984), **106**, 5754



Murayama, E.; Kikuchi, T.; Sasaki, K.; Sootome, N.; Sato, T.*
Chem Lett, (1984), 1897

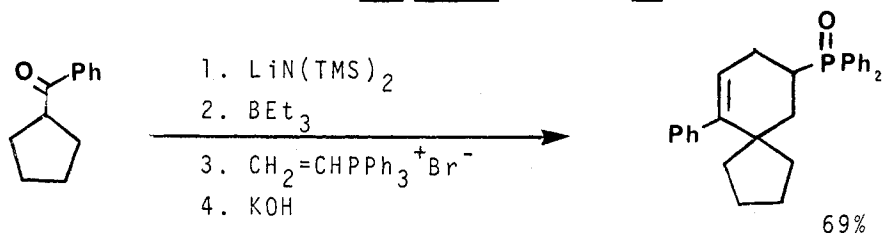


Takai, K.; Sato, M.; Oshima, K.*; Nozaki, H.
Bull Chem Soc Jpn, (1984), 57, 108

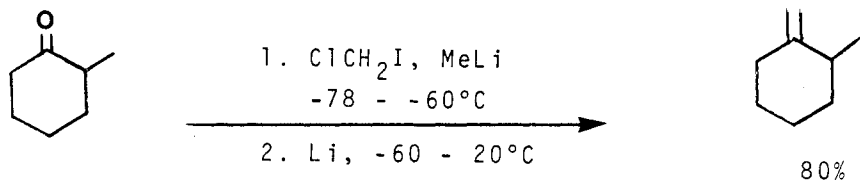


add ketone to mixture

Fitjer, L.*; Quabeck, U. Syn Commun, (1985), 15, 855



Posner, G.H.*; Lu, S.-B. J Am Chem Soc, (1985), 107, 1424



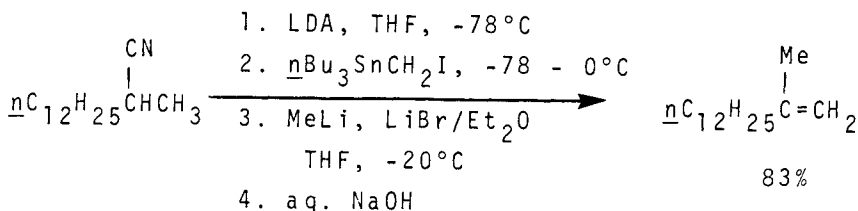
Barluenga, J.*; Fernandez-Simon, J.L.; Concellon, J.M.; Yus, M.
JCS Chem Comm, (1986), 1665

Review: "Titanium Induced Dicarboxyl-Coupling Reactions"

McMurry, J.E.* Accts Chem Res, (1983), 16, 405

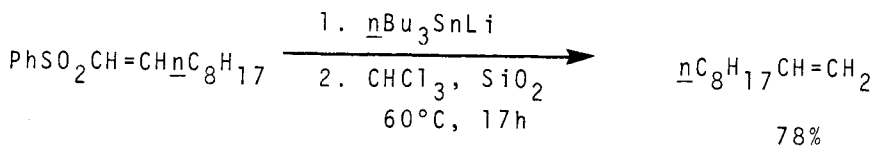
Related Methods: Olefins from Aldehydes (Section 199)

SECTION 208: Olefins from Nitriles

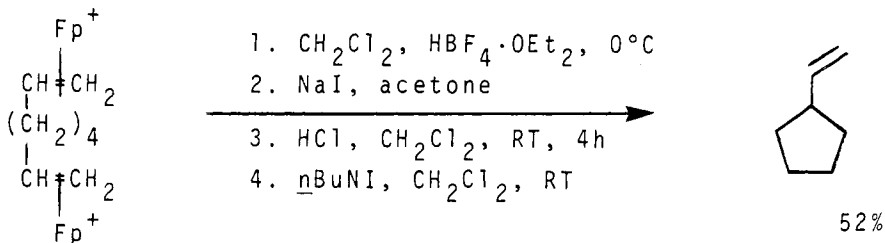


Pearlman, B.A.*; Putt, S.R.; Fleming, J.A.
J Org Chem, (1985), 50, 3625

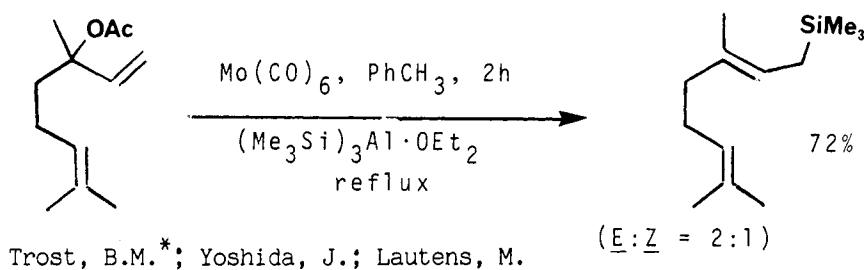
SECTION 209: Olefins from Olefins



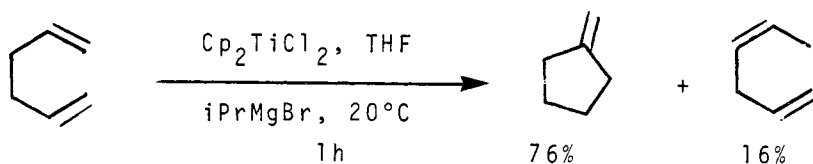
Ochiai, M.; Ukita, T.; Fujita, E.* JCS Chem Comm, (1983), 619
Chem Lett, (1983), 1457



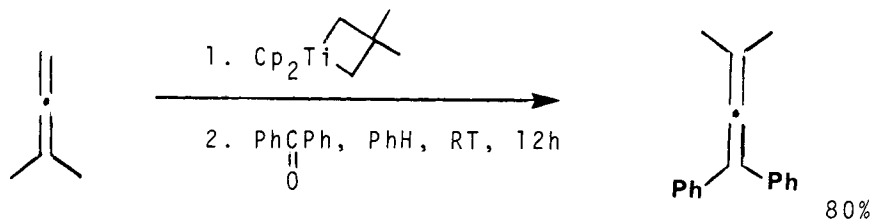
Lennon, P.; Rosenblum, M.* J Am Chem Soc, (1983), 105, 1233



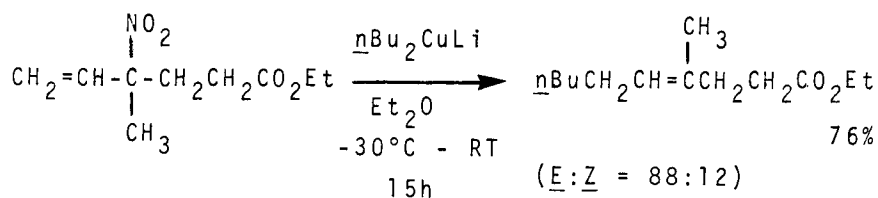
Trost, B.M.*; Yoshida, J.; Lautens, M.
J Am Chem Soc, (1983), 105, 4494



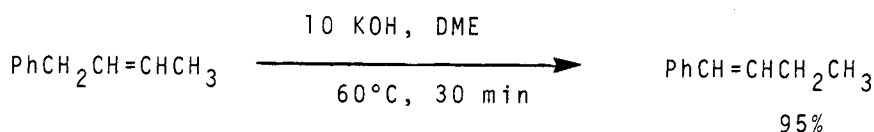
Lehmkuhl, H.*; Tsien, Y.-L.* Chem Ber, (1983), 116, 2437



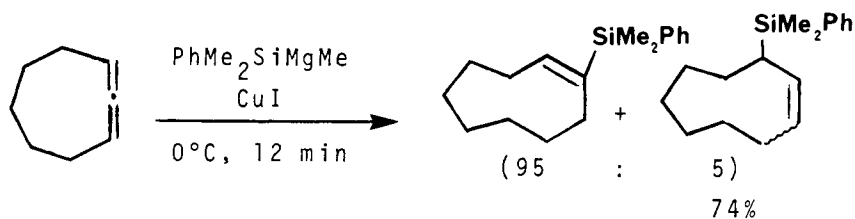
Buchwald, S.L.*; Grubbs, R.H.* J Am Chem Soc, (1983), 105, 5490



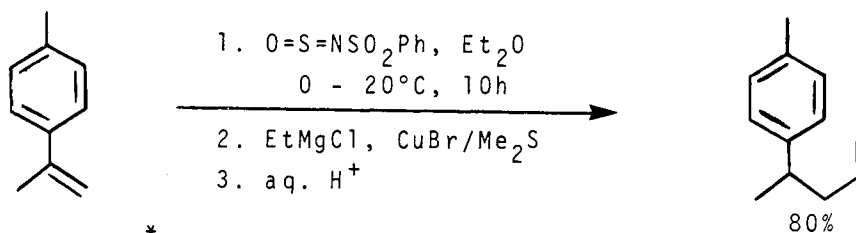
Ono, N.*; Hamamoto, I.; Kaji, A. JCS Chem Comm, (1984), 274



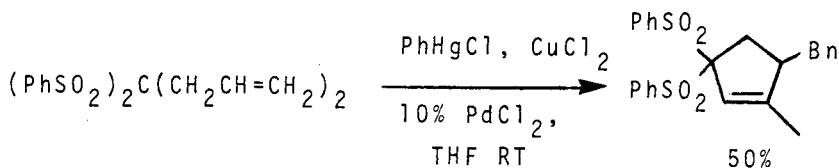
D'Incan, E.*; Viout, P. Tetrahedron, (1984), 40, 4321



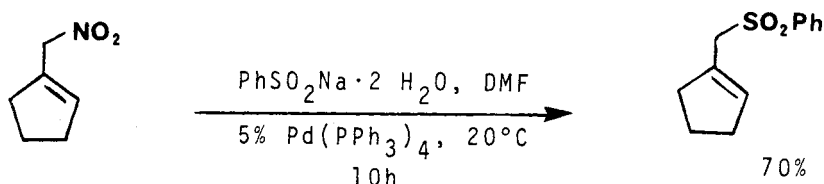
Morizawa, Y.; Oda, H.; Oshima, K.*; Nozaki, H.
Tetrahedron Lett, (1984), 25, 1163



Deleris, G.*; Dunogues, J.; Gadras, A.
Tetrahedron Lett, (1984), 25, 2135



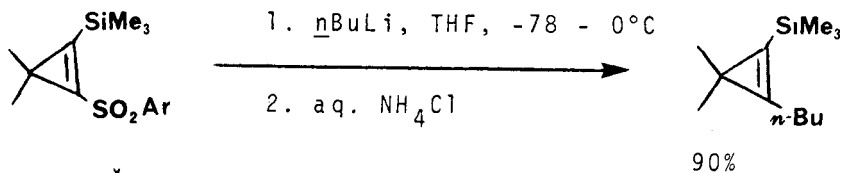
Trost, B.M.*; Burgess, K. JCS Chem Comm, (1985), 1084



Ono, N.*; Hamamoto, I.; Kawai, T.; Kaji, A.; Tamura, R.*; Kakihana, M.

Bull Chem Soc Jpn, (1986), 59, 405
Tamura, R.*; Hayashi, K.; Kakihana, M.; Tsuji, M.; Oda, D.; Scholz, D.

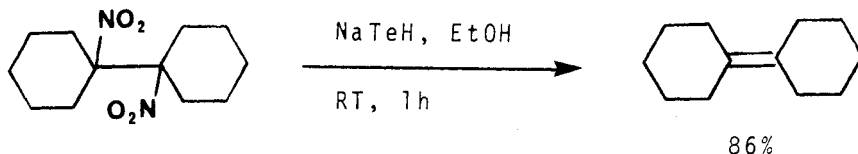
Tetrahedron Lett, (1985), 26, 851



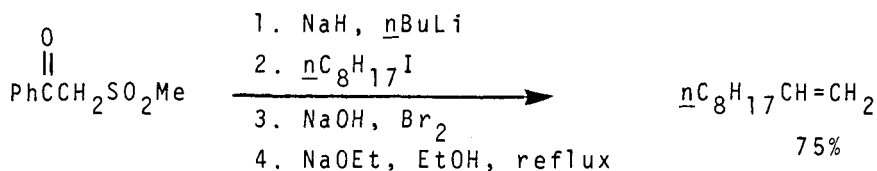
Padwa, A.*; Wannamaker, M.W.

Tetrahedron Lett, (1986), 27, 5817

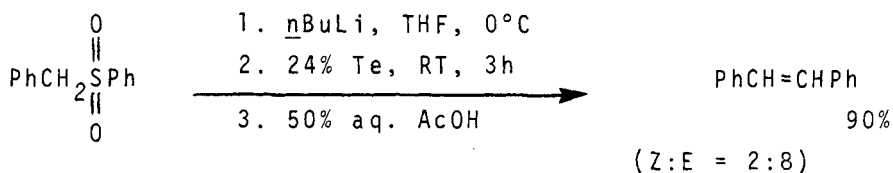
SECTION 210: Olefins from Miscellaneous Compounds



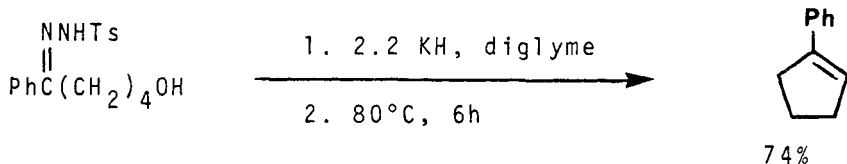
Osuka, A.*; Shimizu, H.; Suzuki, H.* Chem Lett, (1983), 1373



Scholz, D.* Liebigs Ann Chem, (1983), 98



Engman, L.* J Org Chem, (1984), 49, 3559



Harada, T.; Akiba, E.; Oku, A.* Tetrahedron Lett, (1985), 26, 651

Reviews:

"Carbene Complexes in Organic Synthesis"

Dötz, K.H. Angew Chem Int Ed Engl, (1984), 23, 587

"The Peterson Reaction"

Ager, D.J.* Synthesis, (1984), 384

"Recent Developments in Alkene Chemistry"

Pasto, D.J.* Tetrahedron, (1984), 40, 2805

CHAPTER 15

PREPARATION OF OXIDES

This Chapter contains reactions which prepare the oxides of nitrogen, sulfur, and selenium. Included are N-oxides, nitroso, nitro compounds, nitrile oxides, sulfoxides, selenoxides, and sulfones. Oximes are found in Sections 60A (Protection of Aldehydes) and 180A (Protection of Ketones). Preparation of sulfonic acid derivatives are found in Chapter Two and the preparation of sulfonates in Chapter Ten.

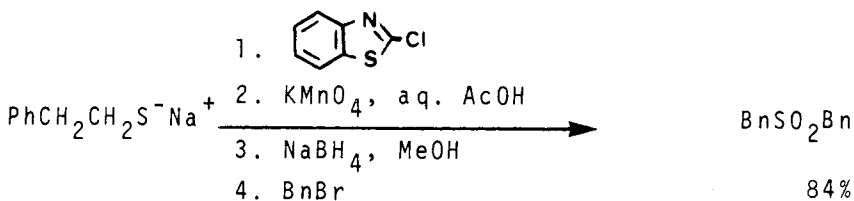
SECTION 211: Oxides from Acetylenes

No Additional Examples

SECTION 212: Oxides from Acid Derivatives

No Additional Examples

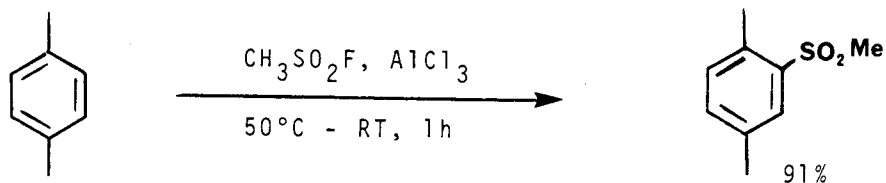
SECTION 213: Oxides from Alcohols and Thiols



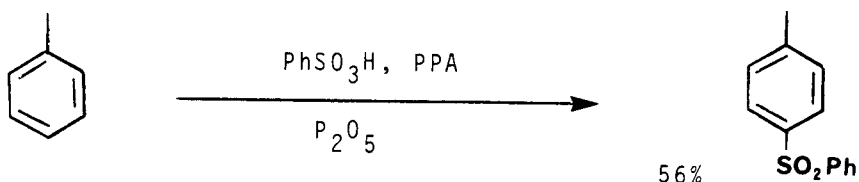
Ueno, Y.*; Kojima, A.; Okawara, M. Chem Lett, (1984), 2125

SECTION 214: Oxides from Aldehydes

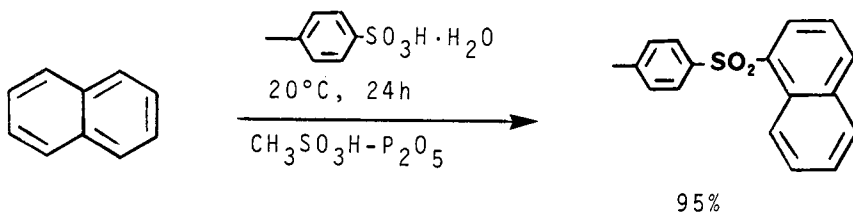
No Additional Examples

SECTION 215: Oxides from Alkyls, Methylenes, and Aryls

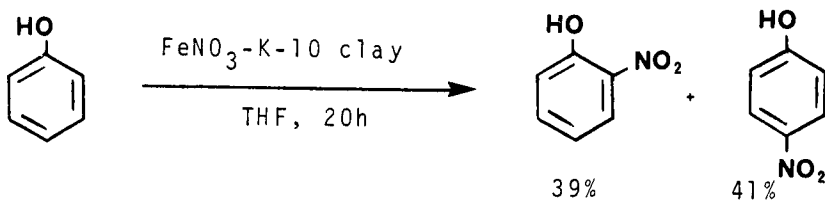
Hyatt, J.A.*; White, A.W. Synthesis, (1984), 214



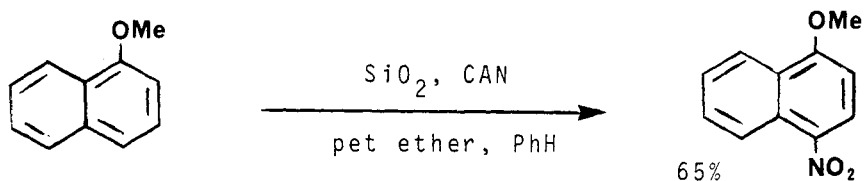
Sipe Jr., H.J.*; Clary, D.W.; White, S.B.
Synthesis, (1984), 283



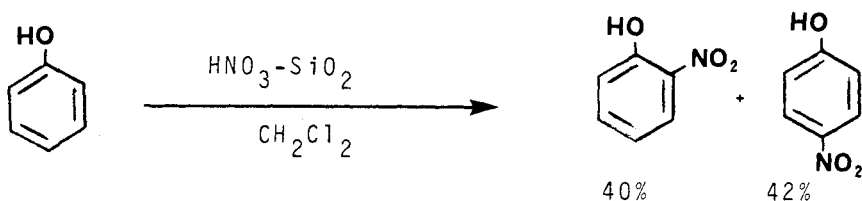
Ueda, M.*; Uchiyama, K.; Kano, T.
Synthesis, (1984), 323



Cornelis, A.; Laszlo, P.*; Pennetreau, P.
Bull Chem Soc Belg, (1984), 93, 961



Chawla, H.M.*; Mittal, R.S. Synthesis, (1985), 70

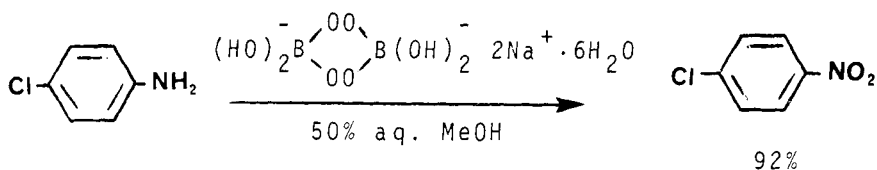


Tapia, R.; Torres, G.; Valderrama, J.A.
Syn Commun, (1986), 16, 681

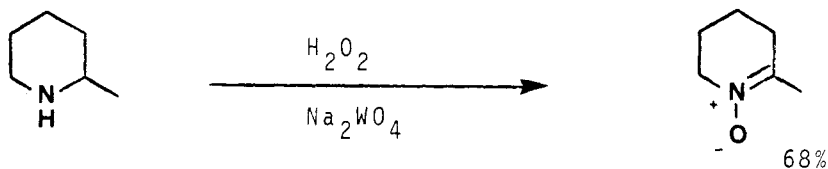
SECTION 216: Oxides from Amides

No Additional Examples

SECTION 217: Oxides from Amines



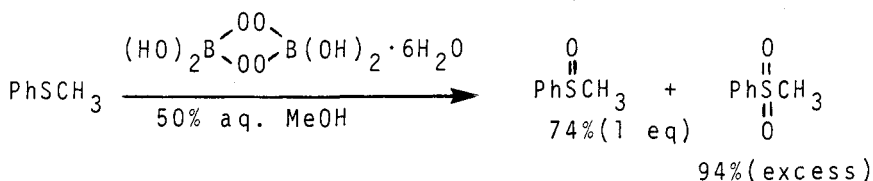
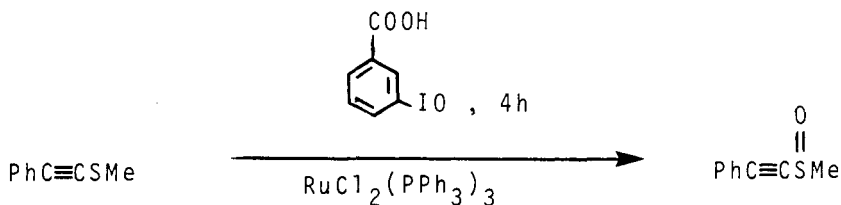
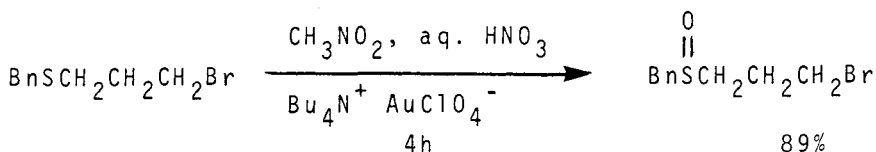
McKillop, A.*; Tarbin, J.A. Tetrahedron Lett, (1983), 24, 1505



Mitsui, H.; Zenki, S.; Shiota, T.; Murahashi, S.*
JCS Chem Comm, (1984), 874

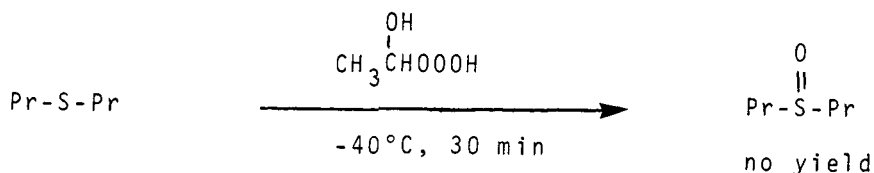
SECTION 218: Oxides from Esters

No Additional Examples

SECTION 219: Oxides from Ethers, Epoxides, and ThioethersMcKillop, A.*; Tarbin, J.A. Tetrahedron Lett., (1983), 24, 1505Müller, P.; Godoy, J. Helv Chim Acta, (1983), 66, 1790

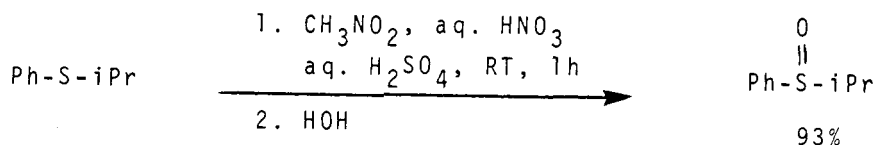
Gasparrini, F.; Giovannoli, M.; Misiti, D.; Natile, G.; Palmieri, G.

Tetrahedron, (1983), 39, 3181



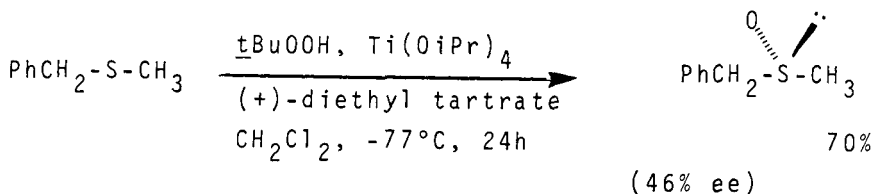
Shereshovets, V.V.; Komissarov, V.D.; Shafikov, N.Ya.;
 Bachanova, L.A.; Kolosnitsin, V.S.; Nikitin, Yu.E.; Tolstikov,
 G.A.

J Org Chem USSR, (1983), 19, 207

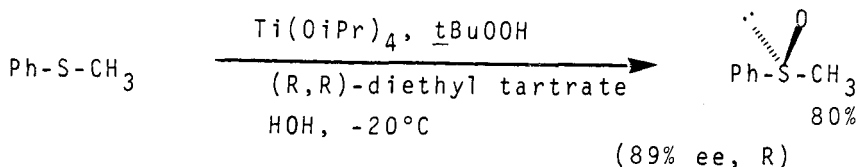


Gasparri, F.*; Giovannoli, M.; Maresca, L.; Natile, G.;
 Palmieri, G.

Syn Commun, (1984), 14, 1111



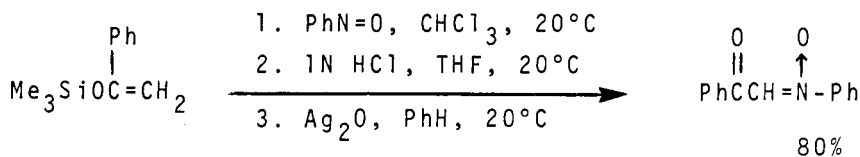
DiFuria, F.; Modena, G.; Seraglia, R. Synthesis, (1984), 325



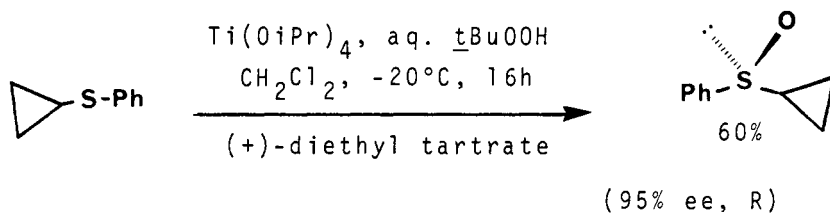
Pitchen, P.; Duñach, E.; Deshmukh, M.N.; Kagan, H.B.*

J Am Chem Soc, (1984), 106, 8188

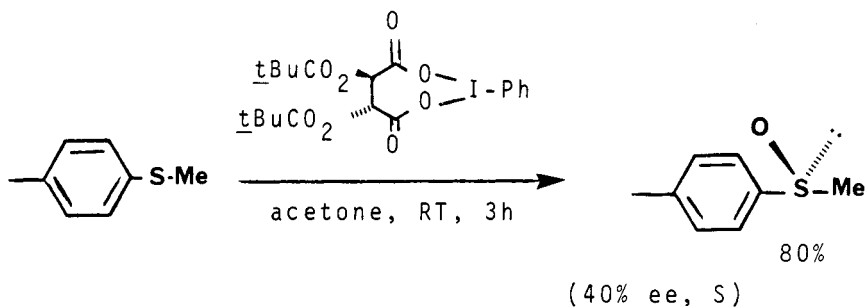
Pitchen, P.; Kagan, H.B.* Tetrahedron Lett, (1984), 25, 1049



Sasaki, T.; Mori, K.; Ohno, M.* Synthesis, (1985), 279



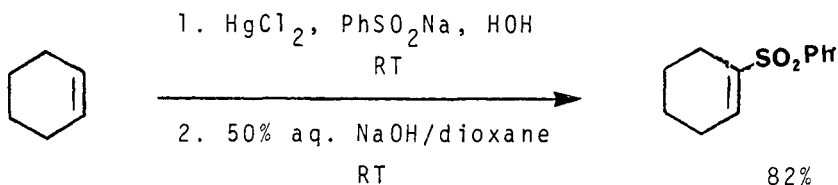
Dunach, E.; Kagan, H.B.* Nouv J Chem, (1985), 9, 1



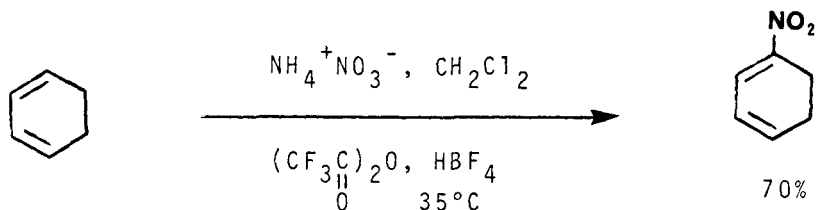
Imamoto, T.*; Koto, H. Chem Lett, (1986), 967

SECTION 220: Oxides from Alkyl Halides and Sulfonates

No Additional Examples

SECTION 221: Oxides from Hydrides

Sas, W. JCS Chem Comm, (1984), 862



Bloom, A.J.; Mellor, J.M.* Tetrahedron Lett, (1986), 27, 873

SECTION 222: Oxides from Ketones

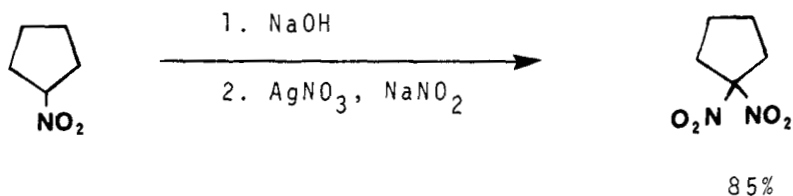
No Additional Examples

SECTION 223: Oxides from Nitriles

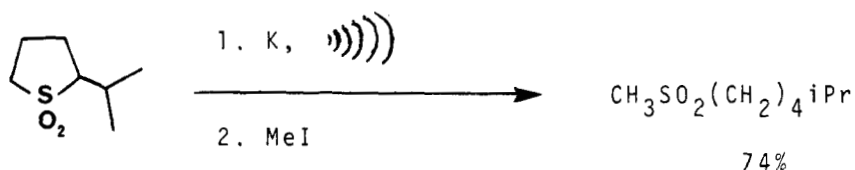
No Additional Examples

SECTION 224: Oxides from Olefins

No Additional Examples

SECTION 225: Oxides from Miscellaneous Compounds

Kornblum, N.*; Singh, H.K.; Kelly, W.J.
J Org Chem, (1983), 48, 332

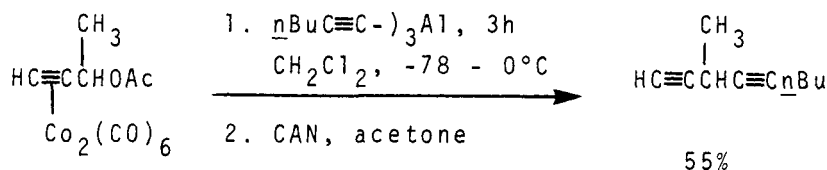


Chou, T.*; You, M. Tetrahedron Lett, (1985), 26, 4495

CHAPTER 16

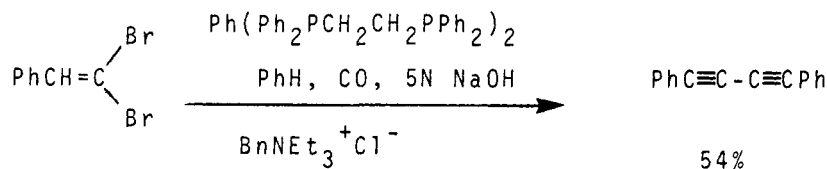
PREPARATION OF DIFUNCTIONAL COMPOUNDS

SECTION 300: Acetylene - Acetylene



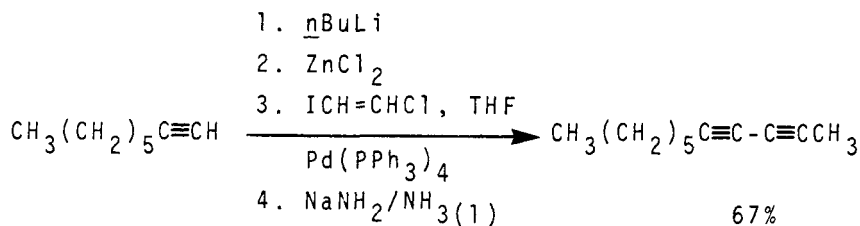
Padmanabhan, S.; Nicholas, K.M.*

Tetrahedron Lett., (1983), 24, 2239



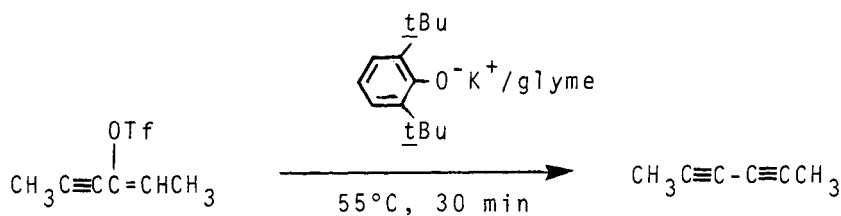
Galamb, V.; Gopal, M.; Alper, H.*

Organometallics, (1983), 2, 801

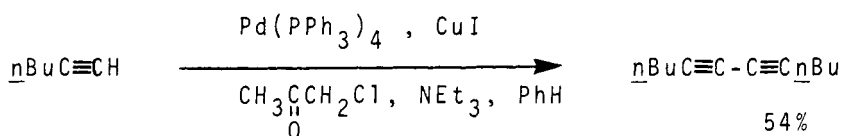


Negishi, E.*; Okukado, N.; Lovich, S.F.; Luo, F.T.

J Org Chem, (1984), 49, 2629

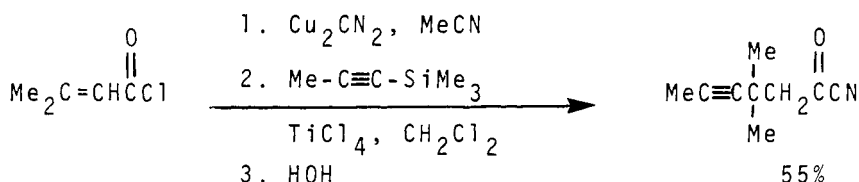


Stang, P.J.*; Dixit, V. Synthesis, (1985), 962

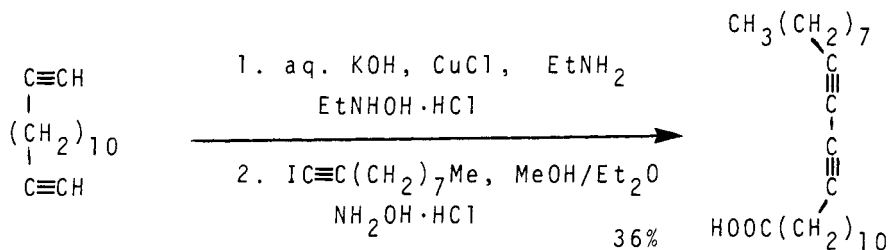


Rossi, R.; Carpita, A.; Bigelli, C. Tetrahedron Lett, (1985), 26, 523

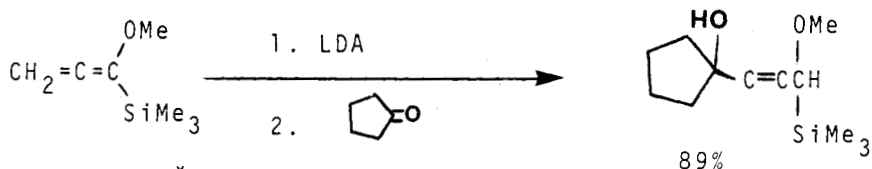
SECTION 301: Acetylene - Carboxylic Acid



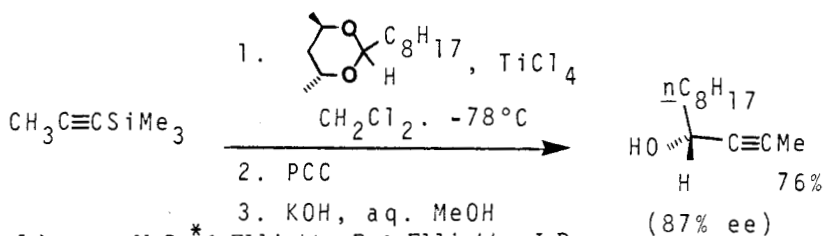
Jellal, A.; Zahra, J.-P.; Santelli, M.* Tetrahedron Lett, (1983), 24, 1395



Singh, A.*; Schnur, J.M. Syn Commun, (1986), 16, 847

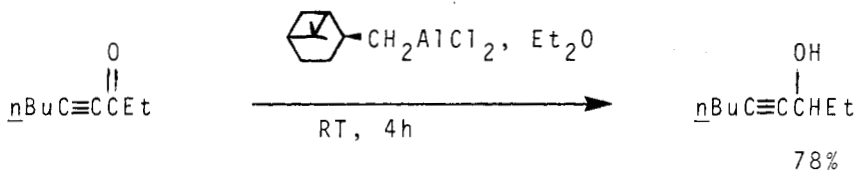
SECTION 302: Acetylene - Alcohol, Thiol

Kuwajima, J.*; Sugahara, S.; Enda, J.
Tetrahedron Lett., (1983), 24, 1061



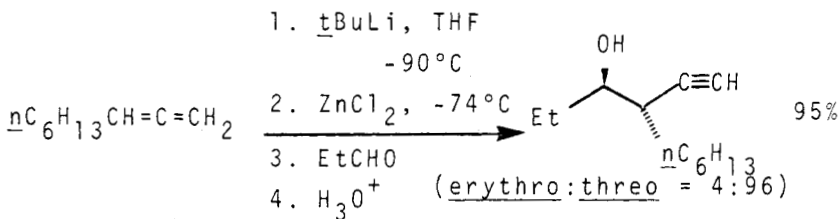
Johnson, W.S.*; Elliott, R.; Elliott, J.D.

J Am Chem Soc., (1983), 105, 2904



Giacomelli, G.*; Lardicci, L.; Palla, F. (64% ee, R)

J Org Chem., (1984), 49, 310

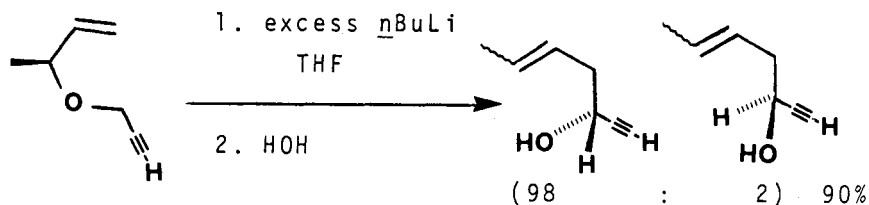


Zweifel, G.*; Hahn, G.*

J Org Chem., (1984), 49, 4565

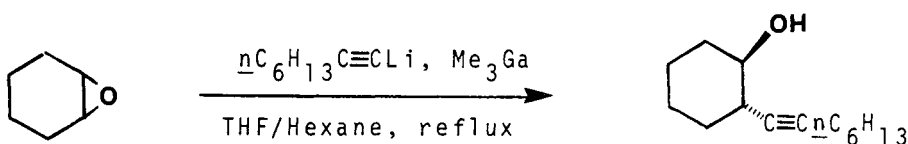
Hahn, G.; Zweifel, G.*

Synthesis, (1983), 883



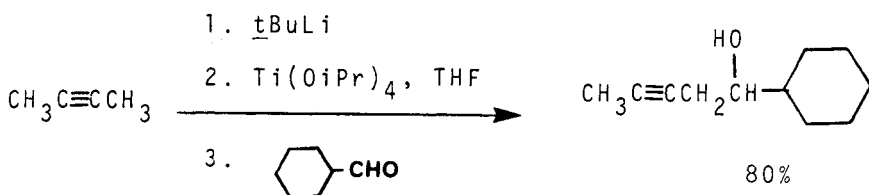
Sayo, N.; Shirai, F.; Nakai, T.*; Kitahara, E.

Chem Lett, (1984), 255, 259



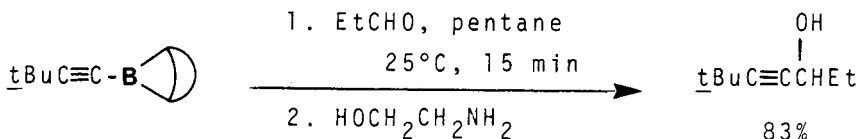
Utimoto, K.*; Lambert, C.; Fukuda, Y.

Tetrahedron Lett, (1984), 25, 5423



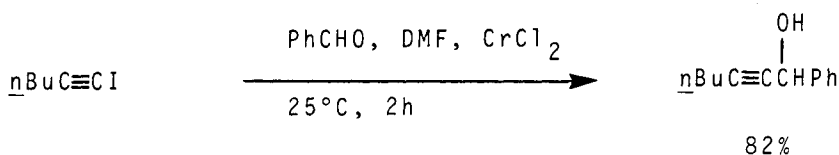
Furuta, K.; Ishiguro, M.; Haruta, R.; Ikeda, N.; Yamamoto, H.*

Bull Chem Soc Jpn, (1984), 57, 2768

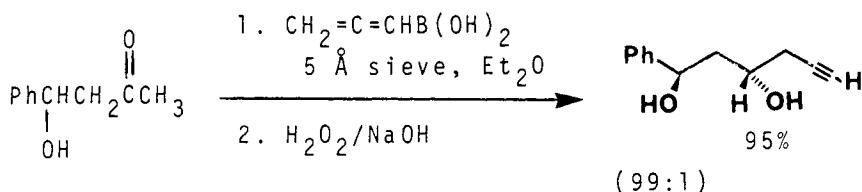


Brown, H.C.*; Molander, G.A.; Singh, S.M.; Rocherla, U.S.

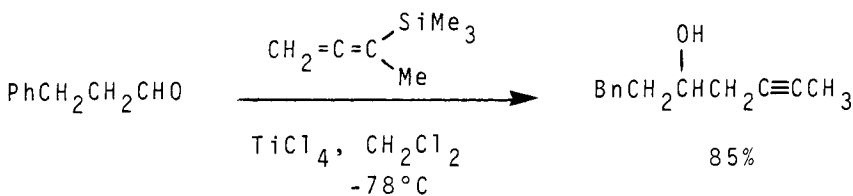
J Org Chem, (1985), 50, 1577



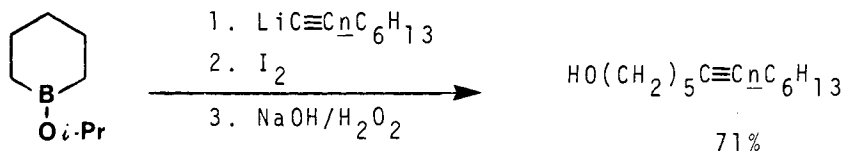
Takai, K.*; Kuroda, T.; Nakatsukasa, S.; Oshima, K.*; Nozaki, H.
Tetrahedron Lett., (1985), 26, 5585



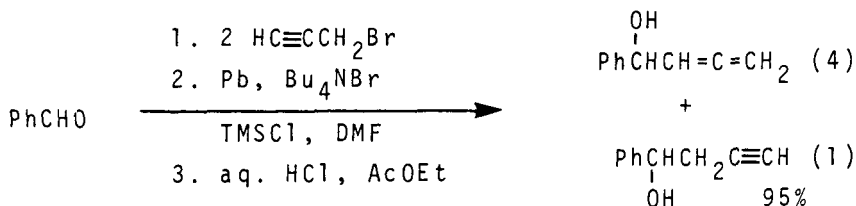
Ikeda, N.; Omori, K.; Yamamoto, H.*
Tetrahedron Lett., (1986), 27, 1175



Danheiser, R.L.*; Carini, D.J.; Kwasigroch, C.A.
J Org Chem., (1986), 51, 3870



Brown, H.C.*; Basavaiah, D.; Bhat, N.G.
J Org Chem., (1986), 51, 4518



Tanaka, H.; Hamatani, T.; Yamashita, S.; Torii, S.*
Chem Lett, (1986), 1461

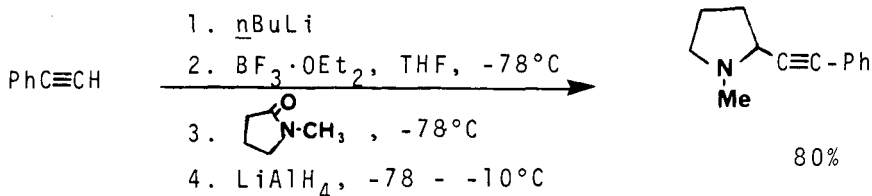
SECTION 303: Acetylene - Aldehyde

No Additional Examples

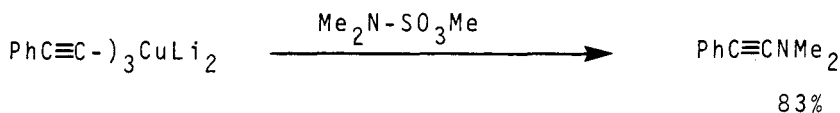
SECTION 304: Acetylene - Amide

No Additional Examples

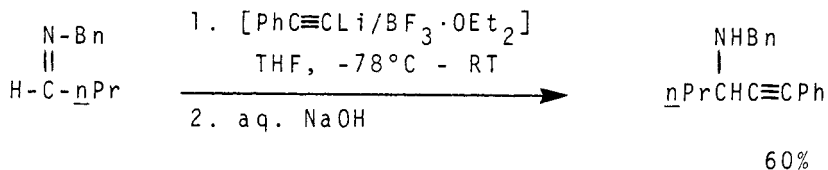
SECTION 305: Acetylene - Amine



Yamaguchi, M.*; Hirao, I. Tetrahedron Lett, (1983), 24, 1719



Boche, G.*; Bernheim, M.; Niessner, M.
Angew Chem Int Ed Engl, (1983), 22, 53

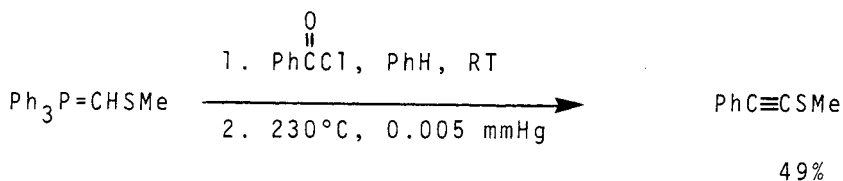


Wada, M.; Sakurai, Y.; Akiba, K.*
Tetrahedron Lett., (1984), 25, 1083

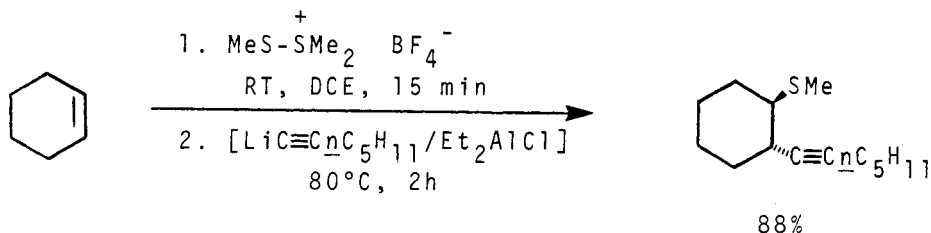
SECTION 306: Acetylene - Ester

No Additional Examples

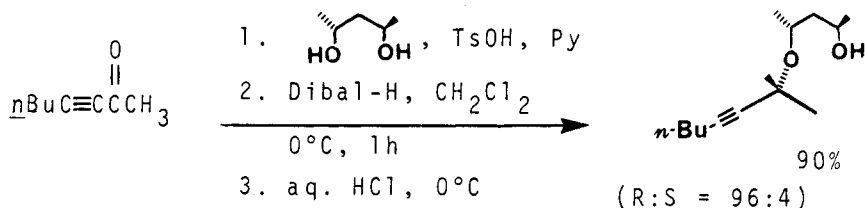
SECTION 307: Acetylene - Ether, Epoxide, Thioether



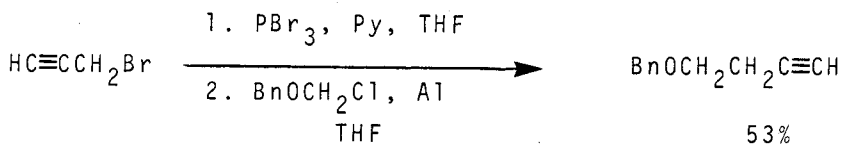
Braga, A.L.; Comasseto, J.V.*; Petragnani, N.
Tetrahedron Lett., (1984), 25, 1111



Trost, B.M.*; Martin, S.J. J Am Chem Soc., (1984), 106, 4263

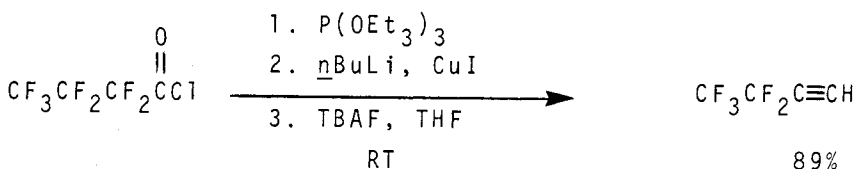


Ishihara, K.; Mori, A.; Arai, I.; Yamamoto, H.*
Tetrahedron Lett., (1986), 27, 983

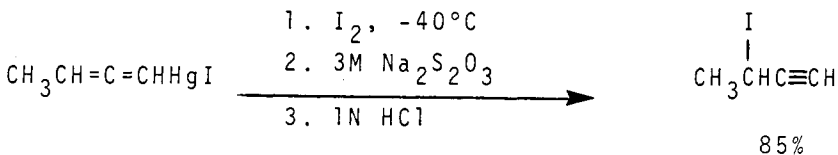


Guedin-Vuong, D.; Nakatani, Y. Bull Chem Soc Fr, (1986), II245

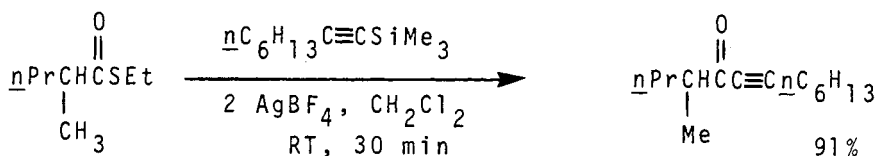
SECTION 308: Acetylene - Halide



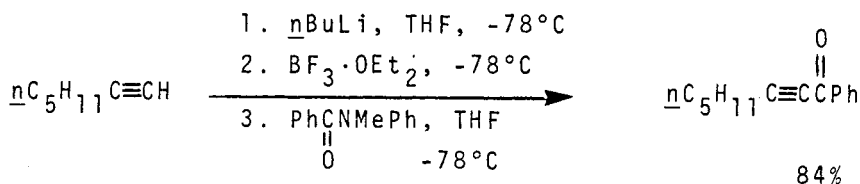
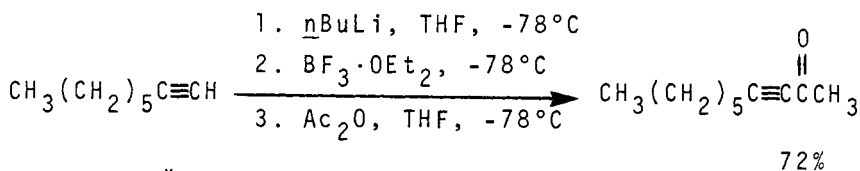
Ishihara, T.*; Maekawa, T.; Ando, T.
Tetrahedron Lett., (1984), 25, 1377



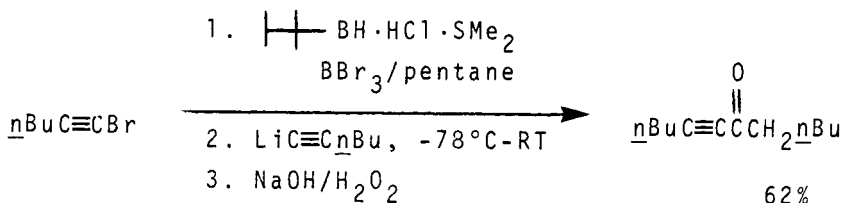
Larock, R.C.*; Chow, M.-S. Organometallics, (1986), 5, 603

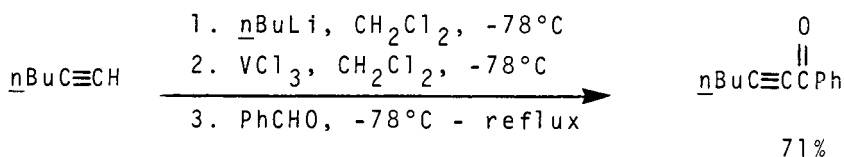
SECTION 309: Acetylene - Ketone

Kawanami, Y.; Katsuki, T.; Yamaguchi, M.*

Tetrahedron Lett., (1983), 24, 5131Yamaguchi, M.*; Waseda, T.; Hirao, I. Chem Lett., (1983), 35

Brown, H.C.*; Rocherla, U.S.; Singh, S.M.

Tetrahedron Lett., (1984), 25, 2411Brown, H.C.*; Bhat, N.G.; Basavaiah, D. Synthesis, (1983), 885Israel J Chem., (1984), 24, 72



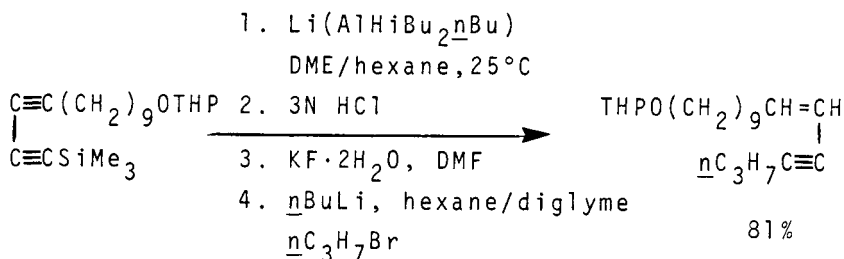
Hirao, T.*; Misu, D.; Agawa, T.

Tetrahedron Lett, (1986), 27, 933

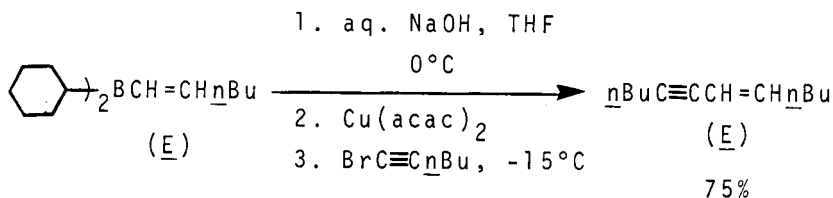
SECTION 310: Acetylene - Nitrile

No Additional Examples

SECTION 311: Acetylene - Olefin

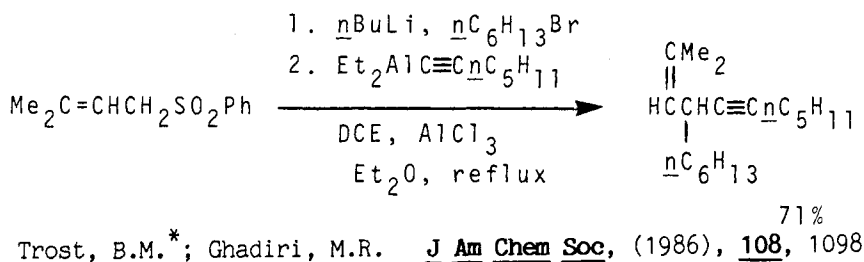
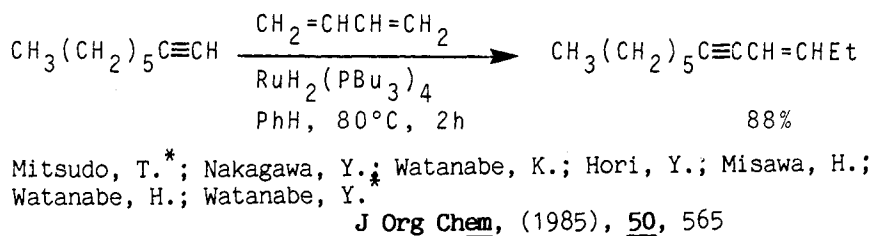
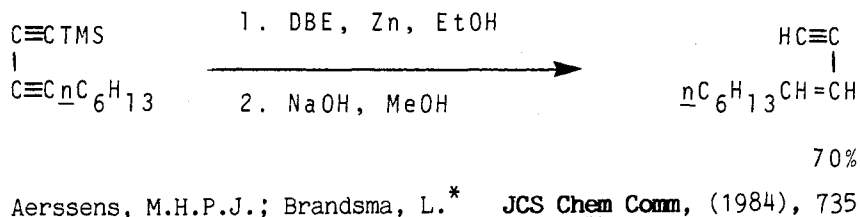
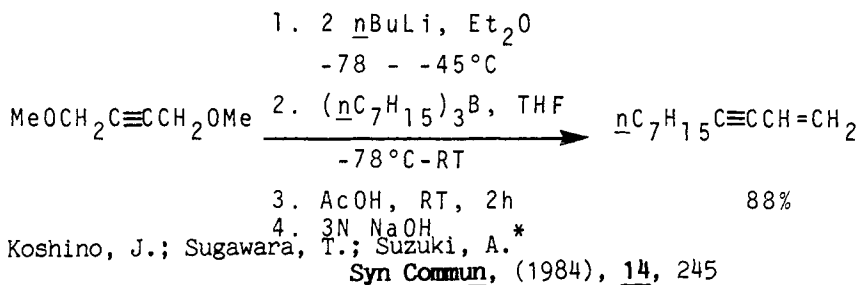


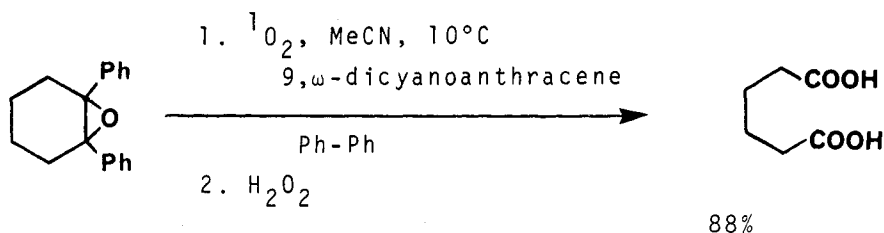
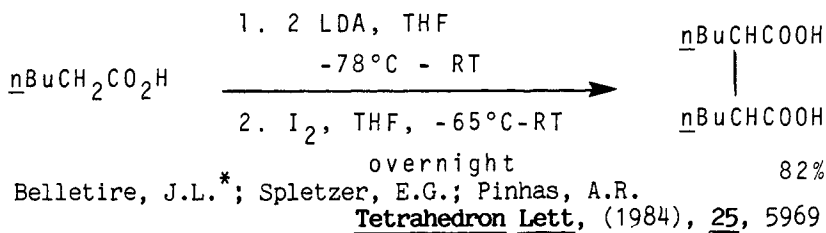
Miller, J.A.; Zweifel, G.* J Am Chem Soc, (1983), 105, 1383



Hoshi, M.; Masuda, Y.; Arase, A.*

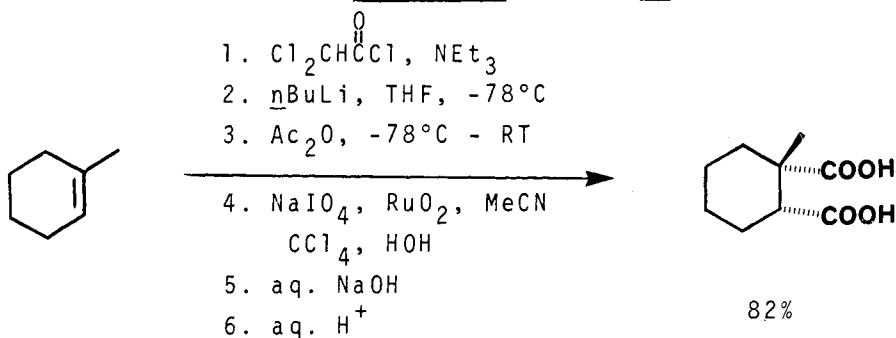
Bull Chem Soc Jpn, (1983), 56, 2855



SECTION 312: Carboxylic Acid - Carboxylic Acid

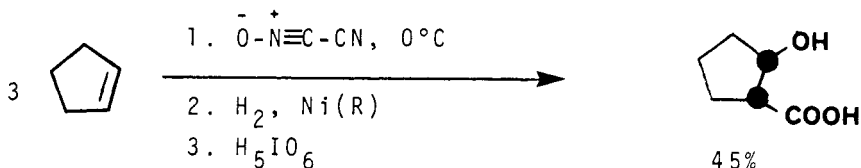
Schaap, A.P.*; Siddiqui, S.; Prasad, G.; Palomino, E.; Sandison, M.

Tetrahedron, (1985), 41, 2229

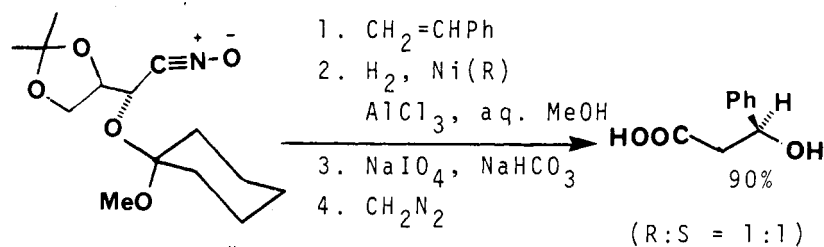


Depres, J.-P.; Coelho, F.; Greene, A.E.*

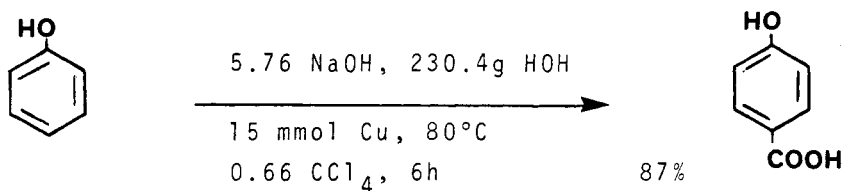
J Org Chem, (1985), 50, 1972

SECTION 313: Carboxylic Acid - Alcohol, Thiol

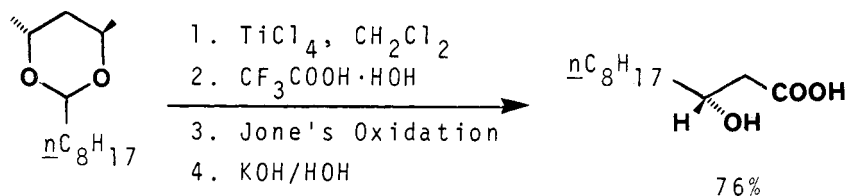
Kozikowski, A.P.*; Adamczyk, M. J Org Chem, (1983), **48**, 366



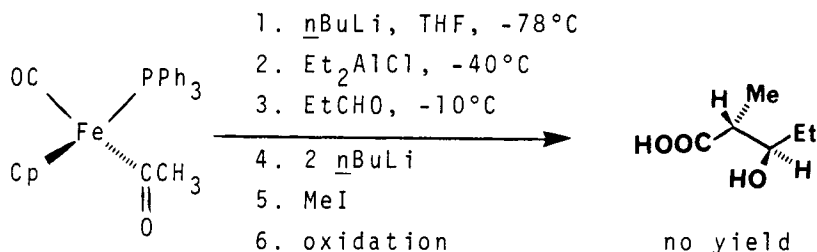
Kozikowski, A.P.*; Kitagawa, Y.; Springer, J.P.
JCS Chem Comm, (1983), 1460



Sasson, Y.*; Razintsky, M. JCS Chem Comm, (1985), 1134



Elliott, J.D.*; Steele, J.; Johnson, W.S.
Tetrahedron Lett, (1985), **26**, 2535



Davies, S.G.*; Dordor-Hedgecock, I.M.; Warner, P.; Ambler, P.W.

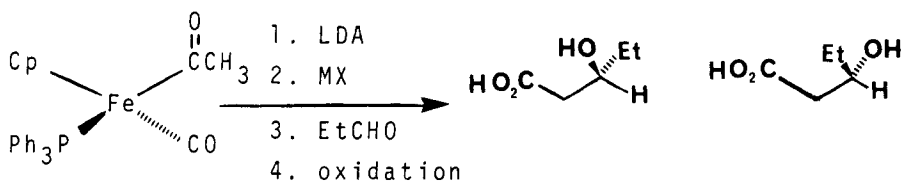
Tetrahedron Lett., (1985), 26, 2125, 2129

Davies, S.G.*; Dordor, I.M.; Walker, J.C.; Warner, P.

Tetrahedron Lett., (1984), 25, 2709

Davies, S.G.*; Dordor, I.M.; Warner, P.

JCS Chem Comm, (1984), 956

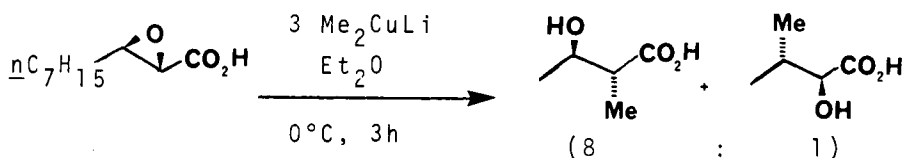


MX = $i\text{Bu}_2\text{AlCl}$ (5.2 : 1) 73%

MX = SnCl_2 (1 : 11.6) 66%

Liebeskind, L.S.*; Welker, M.E.

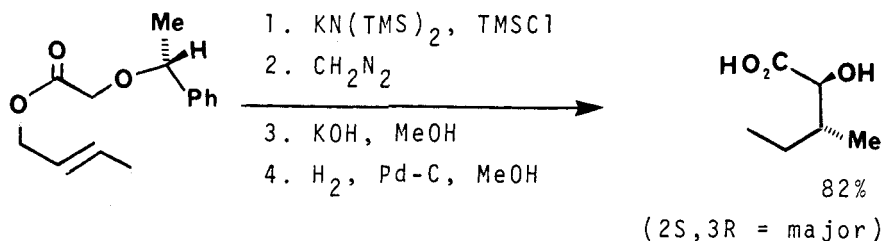
Tetrahedron Lett., (1984), 25, 4341



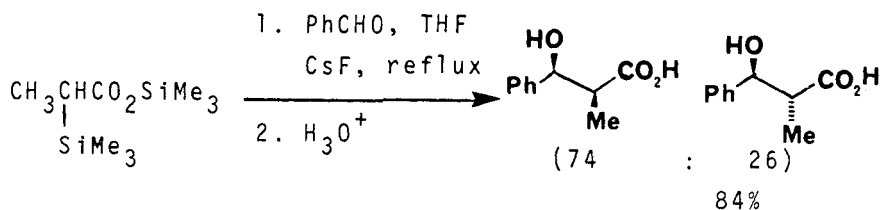
91%

Chong, J.M.; Sharpless, K.B.*

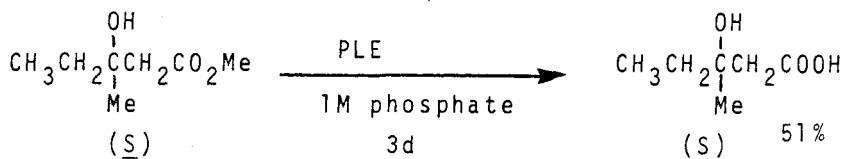
Tetrahedron Lett., (1985), 26, 4683



Kallmerten, J.*; Gould, T.J. J Org Chem, (1986), 51, 1152



Bellasoued, M.; Dubois, J.-E.; Bertounesque, E.
Tetrahedron Lett, (1986), 27, 2623



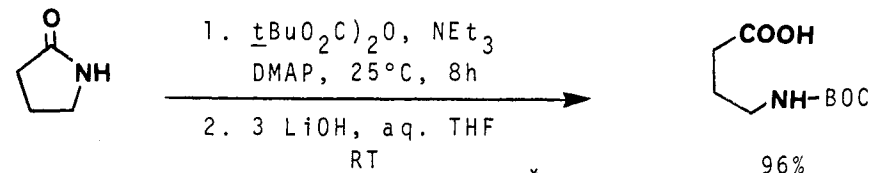
PLE = Pig Liver Esterase

Wilson, W.K.*; Baca, S.B.; Barber, Y.J.; Scallen, T.J.; Morrow, C.J.

J Org Chem, (1983), 48, 3960

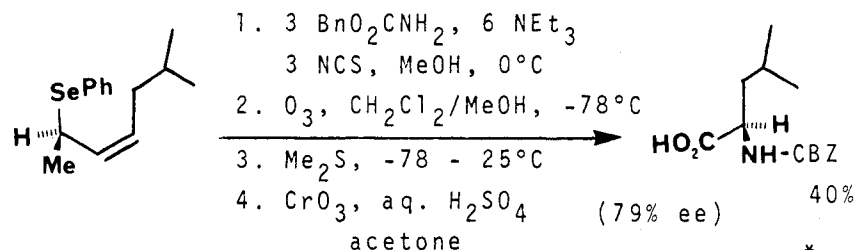
SECTION 314: Carboxylic Acid - Aldehyde

No Additional Examples

SECTION 315: Carboxylic Acid - Amide

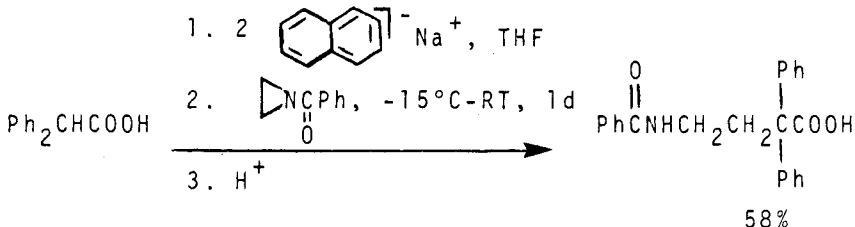
Flynn, D.L.; Zelle, R.E.; Grieco, P.A.*

J Org Chem, (1983), 48, 2424

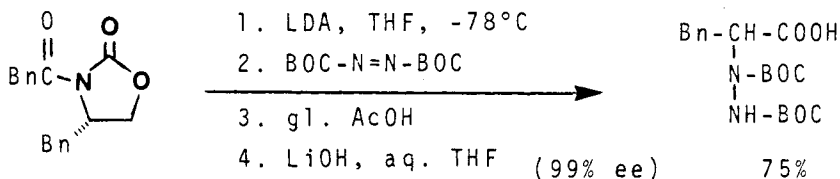


Fitzner, J.N.; Shea, R.G.; Fankhauser, J.E.; Hopkins, P.B.*

J Org Chem, (1985), 50, 419

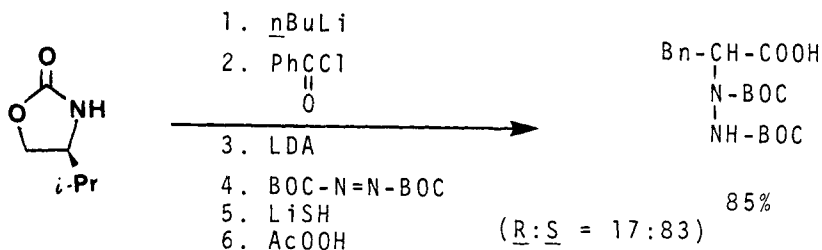


Stamm, H.*; Weiss, R. Synthesis, (1986), 395



Evans, D.A.*; Britton, T.C.; Dorow, R.L.; Dellaria, J.F.

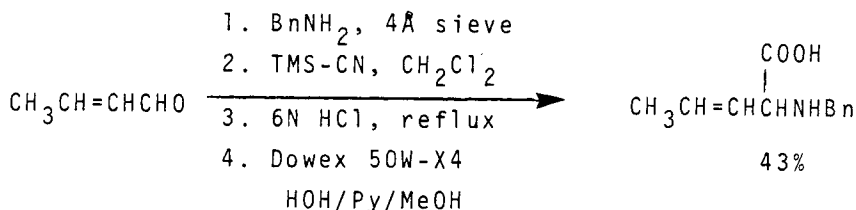
J Am Chem Soc, (1986), 108, 6395



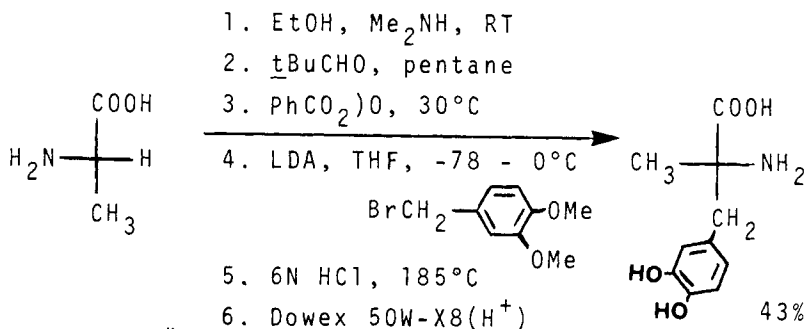
Trimble, L.A.; Vederas, J.C.* J Am Chem Soc, (1986), **108**, 6397

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

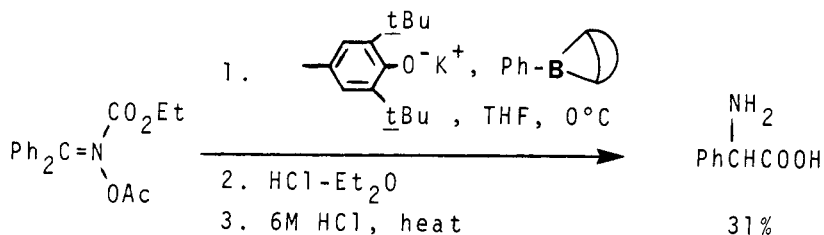
SECTION 316: Carboxylic Acid - Amine



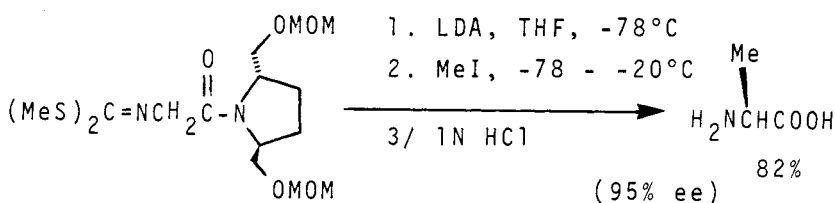
Greenlee, W.J.* J Org Chem, (1984), **49**, 2632



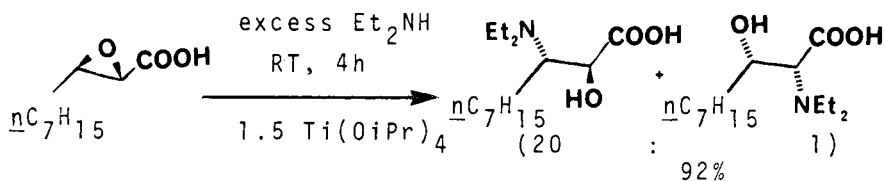
Seebach, D.*; Aebi, J.D.; Naef, R.; Weber, T.
Helv Chim Acta, (1985), **68**, 144



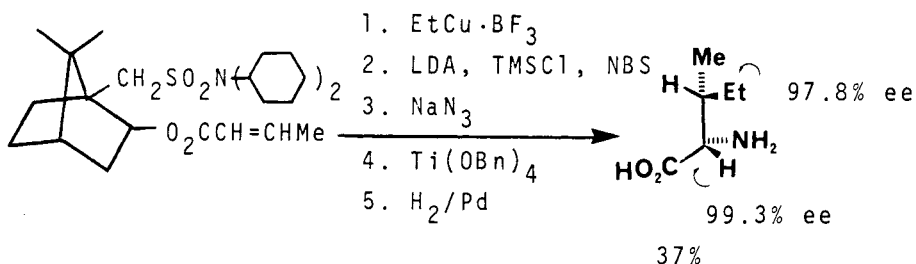
O'Donnell, M.J.*; Falmagne, J.-B. JCS Chem Comm, (1985), 1168



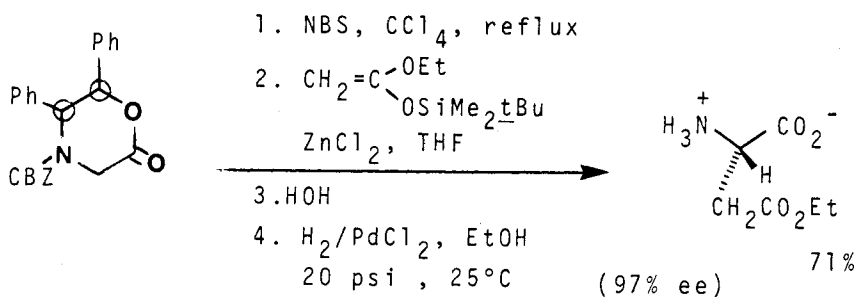
Ikegami, S.; Hayama, T.; Katsuki, T.*; Yamaguchi, M.
Tetrahedron Lett, (1986), **27**, 3403



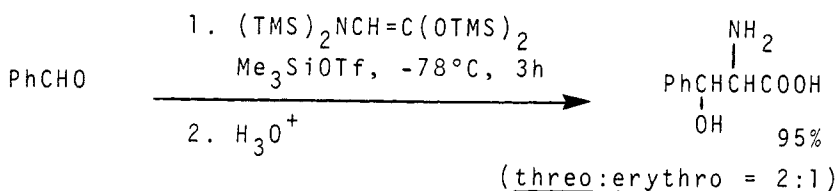
Chong, J.M.; Sharpless, K.B.* J Org Chem, (1985), **50**, 1560



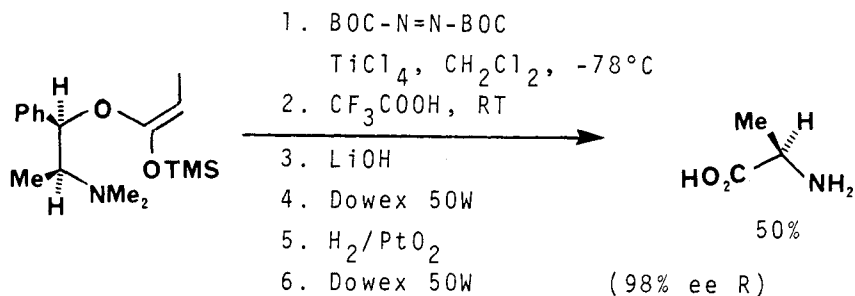
Oppolzer, W.*; Pedrosa, R.; Moretti, R.
Tetrahedron Lett, (1986), **27**, 831



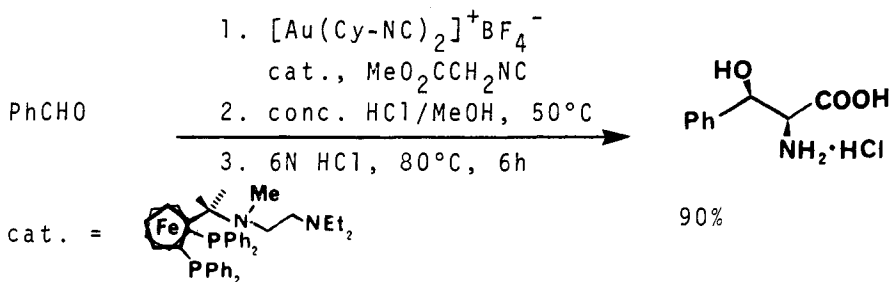
Sinclair, P.J.; Zhai, D.; Reibenspies, J.; Williams, R.M.*
J Am Chem Soc., (1986), 108, 1103



Hvidt, T.; Martin, O.R.; Szarek, W.A.*
Tetrahedron Lett., (1986), 27, 3807



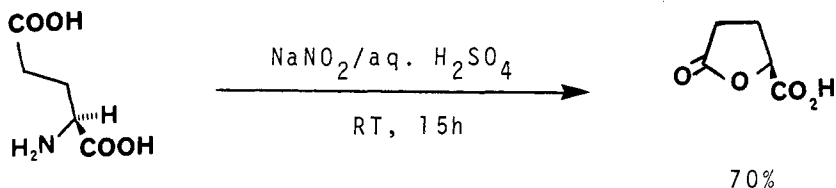
Gennari, C.*; Colombo, L.; Bertolini, G.
J Am Chem Soc., (1986), 108, 6394



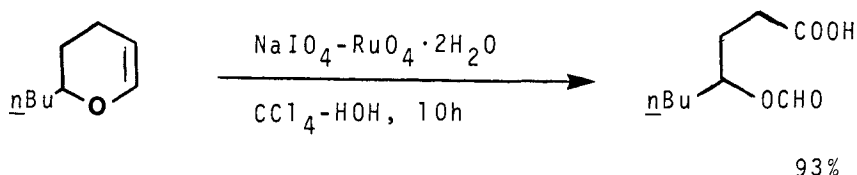
Ito, Y.*; Sawamura, M.; Hayashi, T.*
J Am Chem Soc, (1986), 108, 6405

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

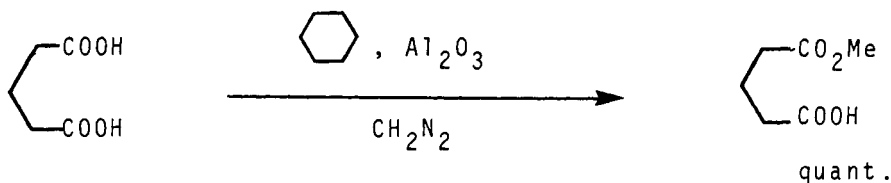
SECTION 317: Carboxylic Acid - Ester



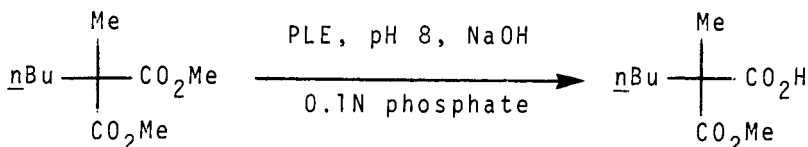
Gringore, O.H.; Rouessac, F.P. Org Syn, (1984), 63, 121



Torii, S.*; Inokuchi, T.; Kondo, K.
J Org Chem, (1985), 50, 4980



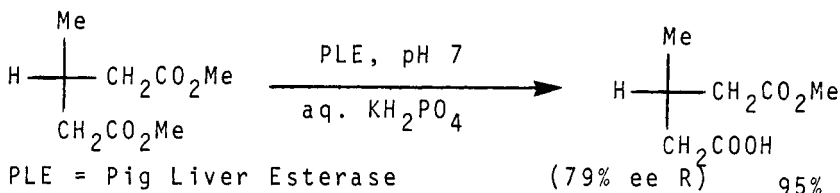
Ogawa, H.; Chihara, T.; Taya, K.*

J Am Chem Soc, (1985), 107, 1365

PLE = Pig Liver Esterase

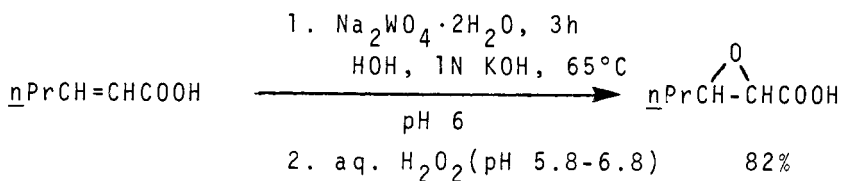
(R:S = 25:75)

Schneider, M.*; Engel, N.; Boensmann, H.

Angew Chem Int Ed Engl, (1984), 23, 66

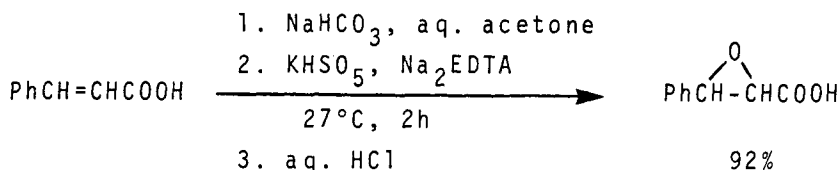
PLE = Pig Liver Esterase

Lam, L.K.P.; Hui, R.A.H.F.; Jones, J.B.*

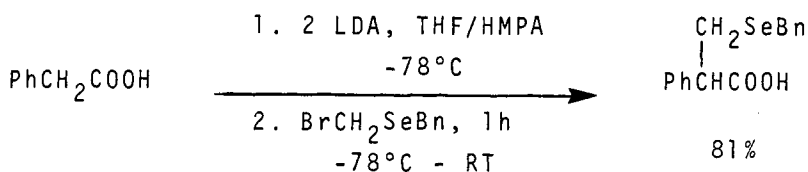
J Org Chem, (1986), 51, 2047SECTION 318: Carboxylic Acid - Ether, Epoxide, Thioether

Kirshenbaum, K.S.; Sharpless, K.B.*

J Org Chem, (1985), 50, 1979

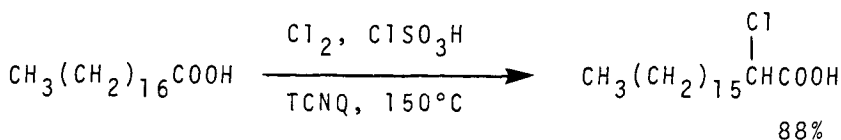


Corey, P.F.*; Ward, F.E. J Org Chem, (1986), 51, 1925



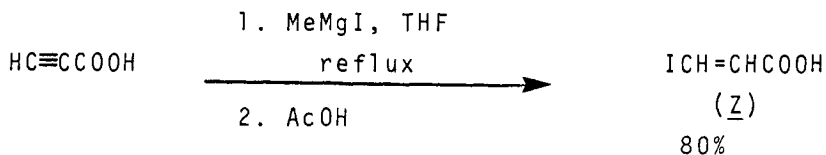
Reich, H.J.*; Jasperse, C.P.; Renga, J.M.
J Org Chem, (1986), 51, 2981

SECTION 319: Carboxylic Acid - Halide, Sulfonate

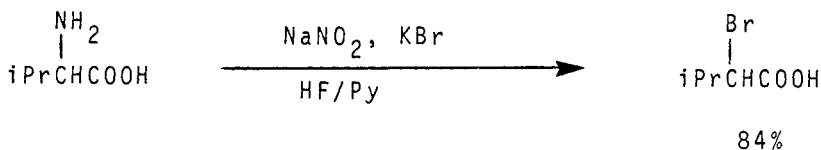


TCNQ = 7,7,8,8-tetracyanoquinodimethane

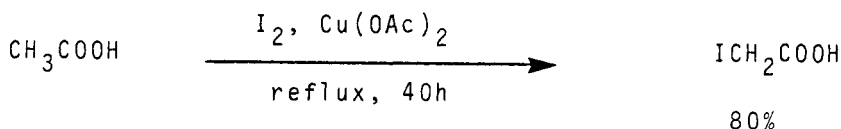
Crawford, R.J.* J Org Chem, (1983), 48, 1364



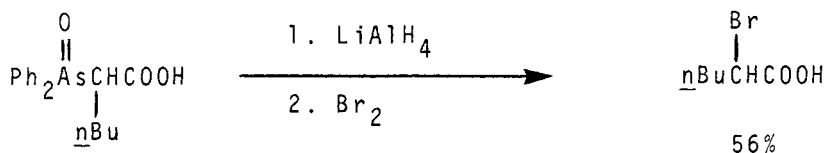
Jung, M.E.*; Hagenak, J.A.; Long-Mei, Z.
Tetrahedron Lett, (1983), 24, 3973



Olah, G.A.; Shih, J.; Surya Prakash, G.K.
Helv Chim Acta, (1983), **66**, 1028

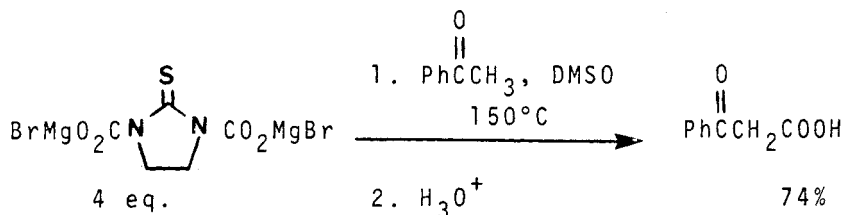


Horiuchi, C.A.*; Satoh, J.Y. Chem Lett, (1984), 1509

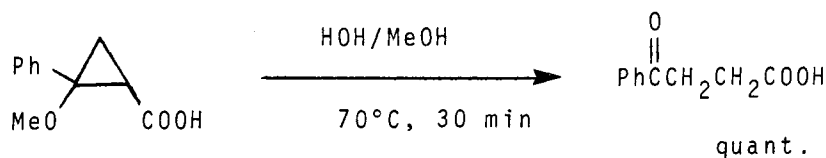


Kauffmann, T.*; Joussen, R.; Woltermann, A.
Chem Ber, (1986), **119**, 2135

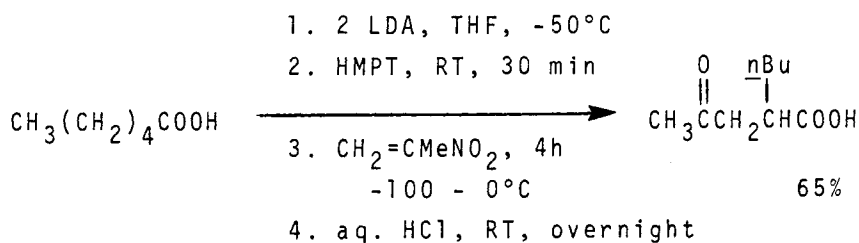
SECTION 320: Carboxylic Acid - Ketone



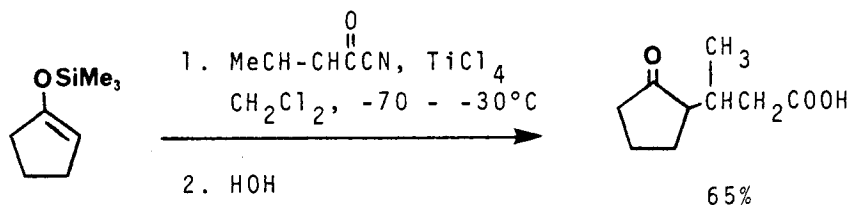
Matsumura, N.*; Asai, N.; Yoneda, S.*
JCS Chem Comm, (1983), 1487



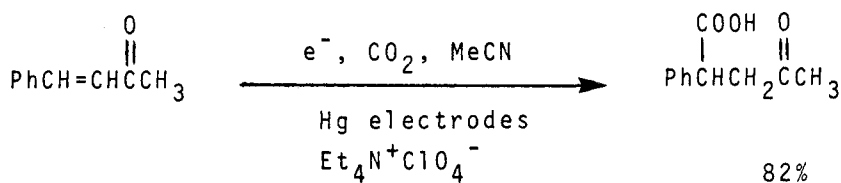
Kunz, H.*; Lindig, M. Chem Ber., (1983), **116**, 220



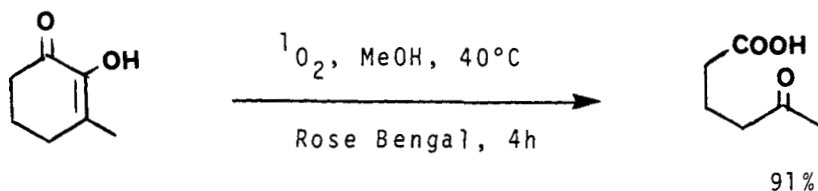
Miyashita, M.; Yamaguchi, R.; Yoshikoshi, A.*
J Org Chem., (1984), **49**, 2857



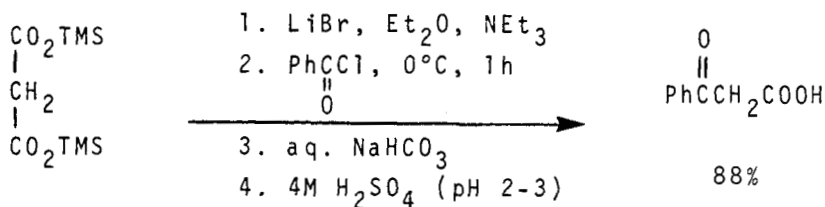
El-Abed, D.; Jellal, A.; Santelli, M.*
Tetrahedron Lett., (1984), **25**, 4503



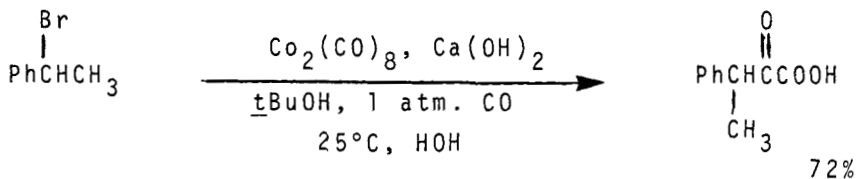
Harada, J.; Sakakibara, Y.; Kunai, A.*; Sasaki, K.
Bull Chem Soc Jpn., (1984), **57**, 611



Utaka, M.; Nakatani, M.; Takeda, A.*
Tetrahedron, (1985), 41, 2163



Rathke, M.W.*; Nowak, M.A. Syn Commun, (1985), 15, 1039

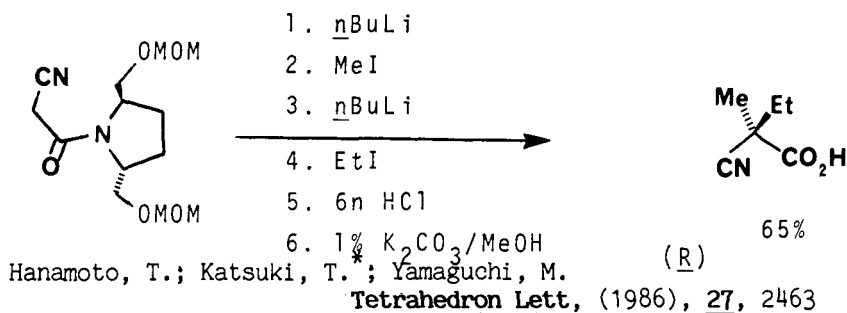


Francalanci, F.; Bencini, E.; Gardano, A.; Vincenti, M.; Foa, M.
J Organomet Chem, (1986), 301, c027

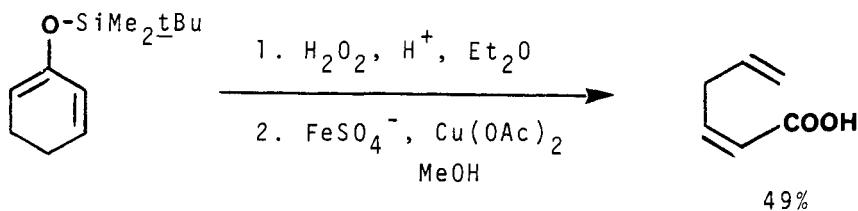
Review: "Synthesis and Properties of α -Keto-Acids"

Cooper, A.J.L.; Ginos, J.Z.; Meister, A.
Chem Rev, (1983), 83, 321

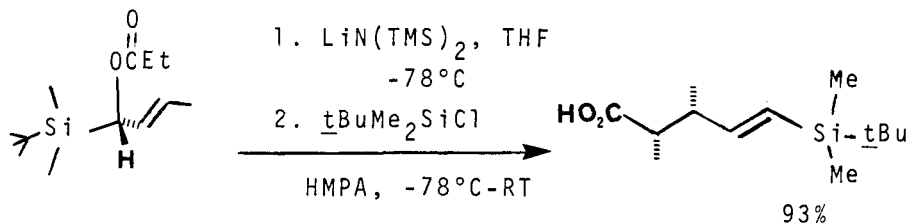
Also via: Ketoesters (Section 360)

SECTION 321: Carboxylic Acid - Nitrile

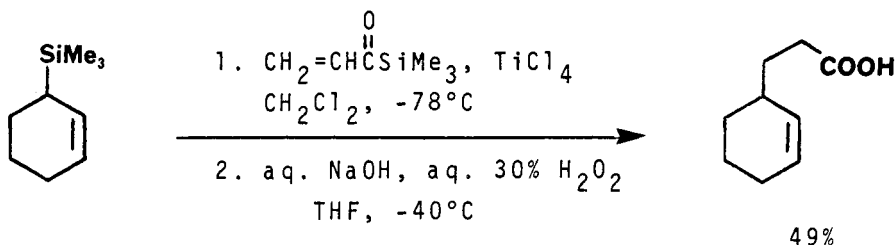
Also via: Cyanoesters (Section 361)

SECTION 322: Carboxylic Acid - Olefin

Saito, I.*; Nagata, R.; Yuba, K.; Matsuura, T.
Tetrahedron Lett., (1983), 24, 1737, 4439

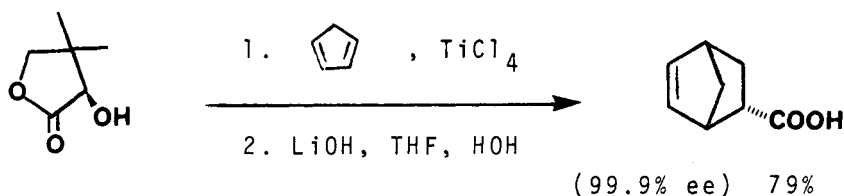


Ireland, R.E.*; Varney, M.D. J Am Chem Soc., (1984), 106, 3668



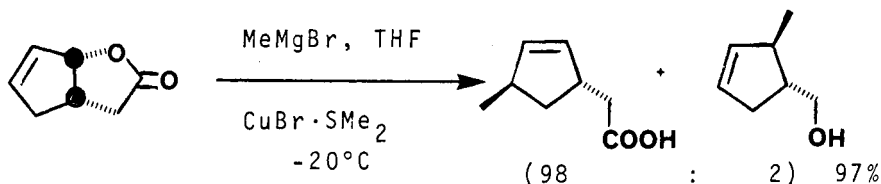
Danheiser, R.L.*; Fink, D.M.

Tetrahedron Lett., (1985), 26, 2509, 2513



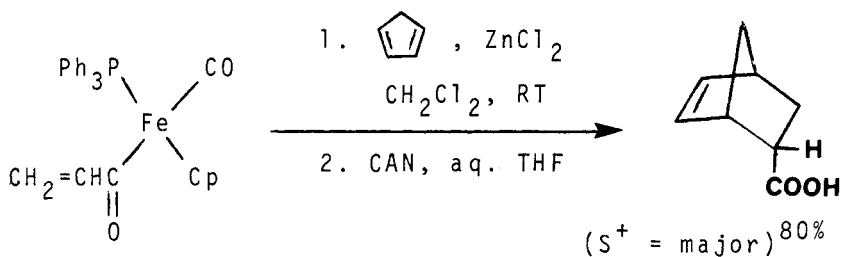
Poll, T.; Sobczak, A.; Hartmann, H.; Helmchen, G.*

Tetrahedron Lett., (1985), 26, 3095



Curran, D.P.*; Chen, M.-H.; Leszczweski, D.; Elliott, R.L.; Rakiewicz, D.M.

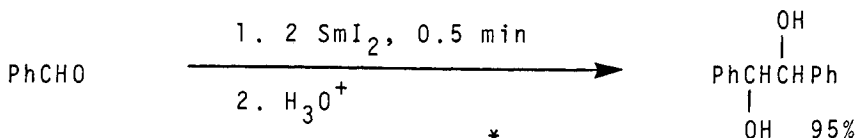
J Org Chem., (1986), 51, 1612



Davies, S.G.*; Walker, J.C. JCS Chem Comm., (1986), 609

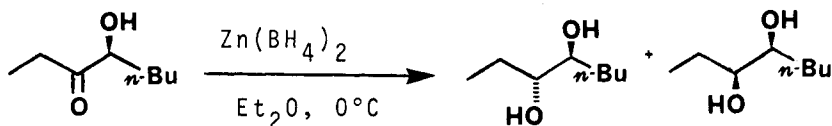
Also via: Hydroxy acids (Section 313); Olefinic amides (Section 349); Olefinic esters (Section 362); Olefinic nitriles (Section 376).

SECTION 323: Alcohol, Thiol - Alcohol, Thiol



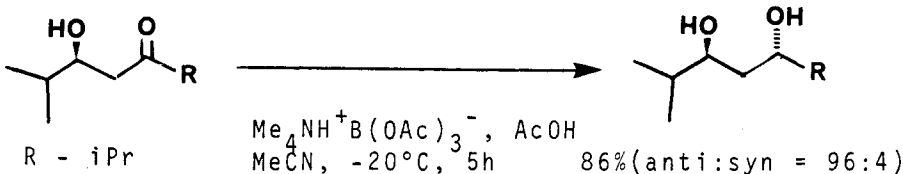
Namy, J.L.; Souppe, J.; Kagan, H.B.*

Tetrahedron Lett., (1983), 24, 765



(87 : 13) no yield
Nakata, T.*; Tanaka, T.; Oishi, T.*

Tetrahedron Lett., (1983), 24, 2653



R = iPr 86% (anti:syn = 96:4)
Evans, D.A.*; Chapman, K.T. Tetrahedron Lett., (1986), 27, 5939

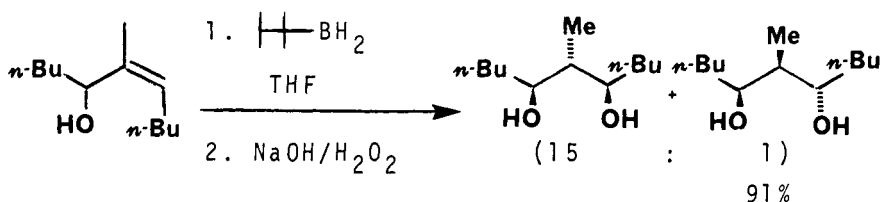
1. Dibal-H, THF
R = Ph 87% (syn:anti = 93:7)
2. 10% HCl

Kiyooka, S.*; Kuroda, H.; Shimasaki, Y.

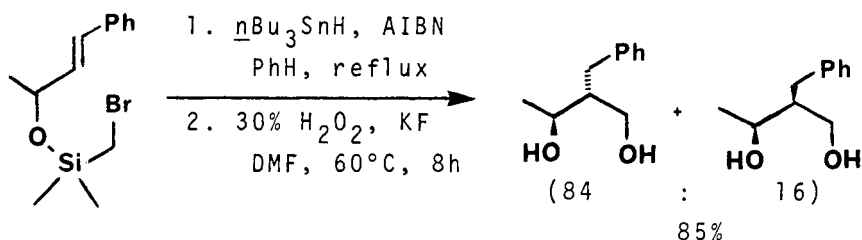
Tetrahedron Lett., (1986), 27, 3009

1. iPr₂SiHCl, Py, Ph
R = Me 61%
2. SnCl₄, CH₂Cl₂, -80°C
3. aq.* HF, MeCN

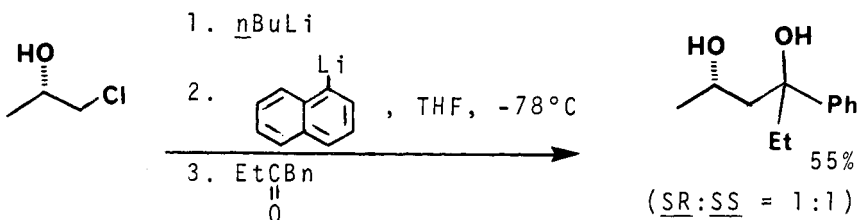
Anwar, S.; Davis, A.P. JCS Chem Comm., (1986), 831



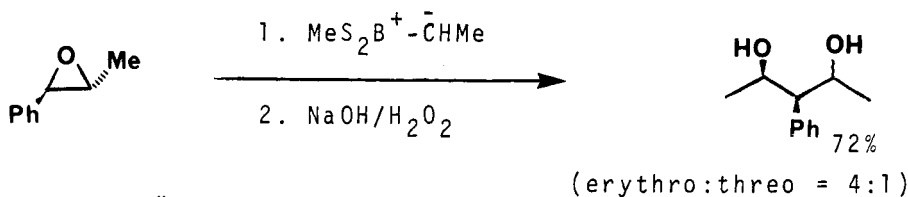
Still, W.C.*; Barrish, J.C. J Am Chem Soc, (1983), 105, 2487



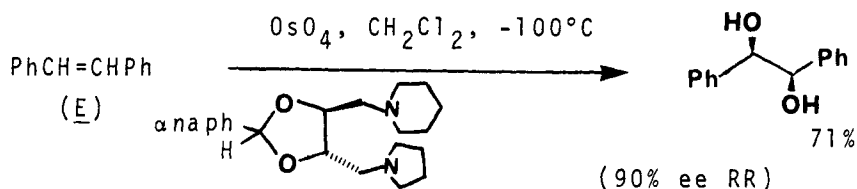
Nishiyama, H.*; Katajima, T.; Matsumoto, M.; Itoh, K.
J Org Chem, (1984), 49, 2298



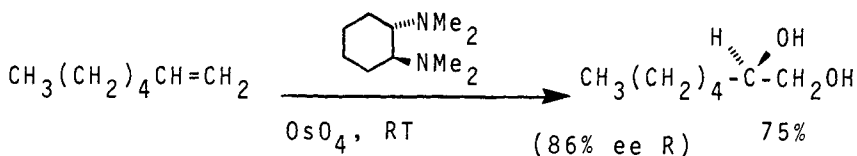
Nájera, C.; Yus, M.; Seebach, D.*
Helv Chim Acta, (1984), 67, 289



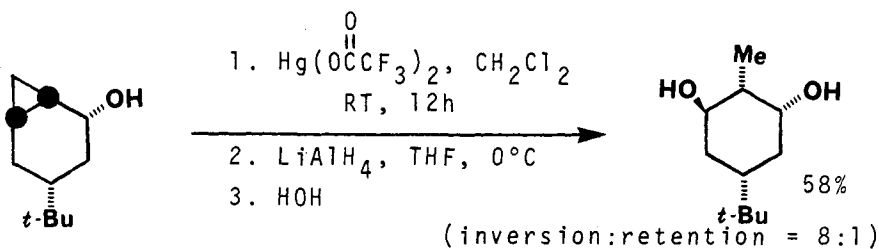
Pelter, A.*; Bugden, G.; Rosser, R.
Tetrahedron Lett, (1985), 26, 5097



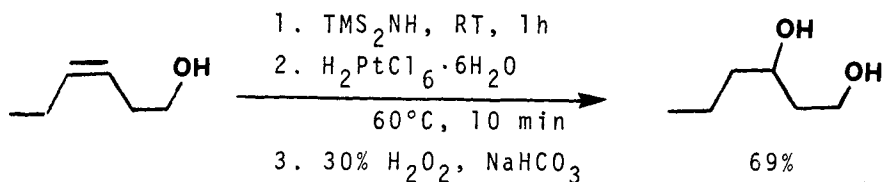
Yamada, T.; Narasaka, K. Chem Lett, (1986), 131



Tokles, M.; Snyder, J.K.* Tetrahedron Lett, (1986), 27, 3957



Collum, D.B.; Still, W.C.; Mohamadi, F.*
J Am Chem Soc, (1986), 108, 2094



Tamao, K.*; Tanaka, T.; Nakajima, T.; Sumiya, R.; Arai, H.; Ito, Y.*

Tetrahedron Lett, (1986), 27, 3377

Tamao, K.*; Nakajima, T.; Sumiya, R.; Arai, H.; Higuchi, N.; Ito, Y.*

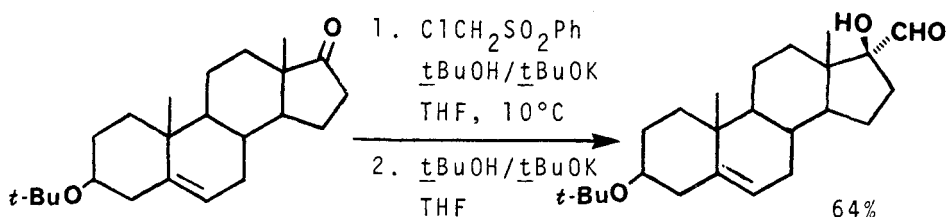
J Am Chem Soc, (1986), 108, 6090

Review: "Stereoselective Reduction of β -Hydroxy Ketones to 1,3-Diols"

Narasaka, K.*; Pai, F.-C. Tetrahedron, (1984), **40**, 2233

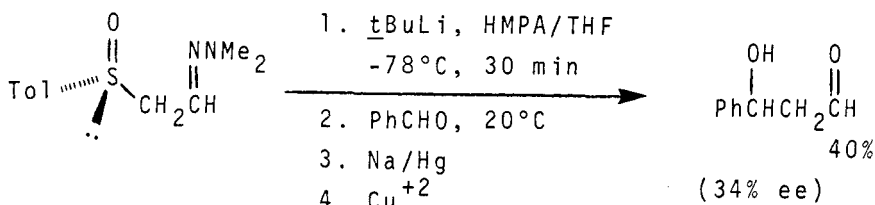
Also via: Hydroxyesters (Section 327); Diesters (Section 357)

SECTION 324: Alcohol, Thiol - Aldehyde



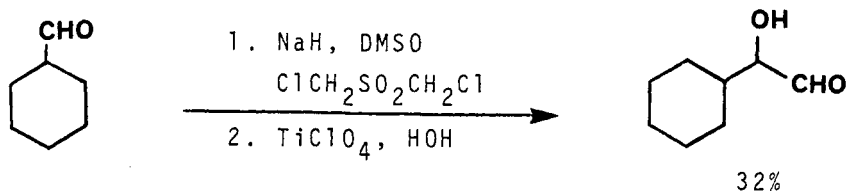
tr. HOH, 25°C
 Adamczyk, M.; Dolence, E.K.; Watt, D.S.*; Christy, M.R.;
 Reibenspies, J.H.; Anderson, O.P.

J Org Chem, (1984), **49**, 1378

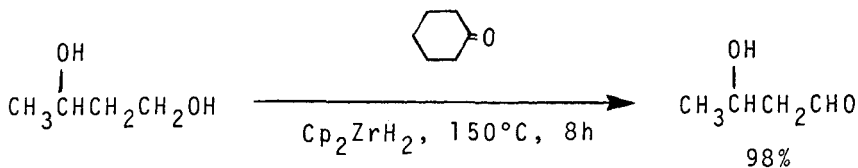


Annunziata, R.; Cozzi, F.; Cinquini, M.*; Colombo, L.; Gennari, C.; Poli, G.; Scolastico, C.

JCS Perkin I, (1985), 251



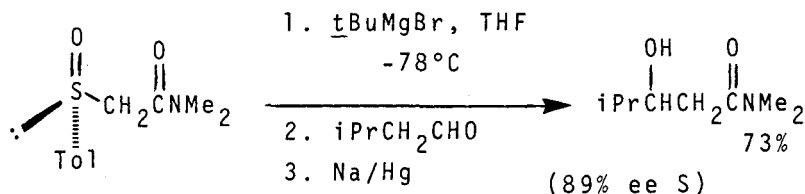
Nagashima, E.; Suzuki, K.; Ishikawa, M.; Sekiya, M.*
Heterocycles, (1985), **23**, 1873



Nakano, T.; Terada, T.; Ishi, Y.*; Ogawa, M.
Synthesis, (1986), 774

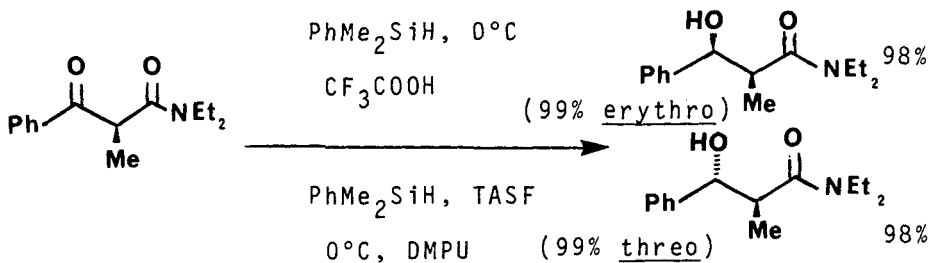
Related Methods: Alcohol-Ketone (Section 330)

SECTION 325: Alcohol, Thiol - Amide



Annunziata, R.; Cinquini, M.; Cozzi, F.; Montanari, F.; Restelli A.

JCS Chem Comm, (1983), 1138



TASF = tris(diethylamino)sulfonium difluorotrimethyl silicate

DMPU = 1,3-dimethyl-3,4,5,6-tetrahydro-2(1H) pyrimidinone*

Fujita, M.; Hiyama, T. J Am Chem Soc, (1985), **107**, 8294

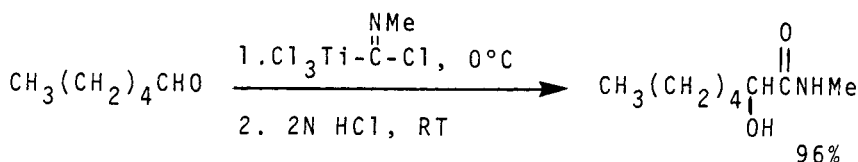


$\text{R} = \text{Me}, \text{R}^1 = \text{H}$ 1. $\text{Zn}(\text{BH}_4)_2, \text{Et}_2\text{O}, -78^\circ\text{C}$ 97%
 $\text{R}^2 = \text{Bn}$ 2. 3% aq. H_2PO_4 (syn:anti = 97:3)

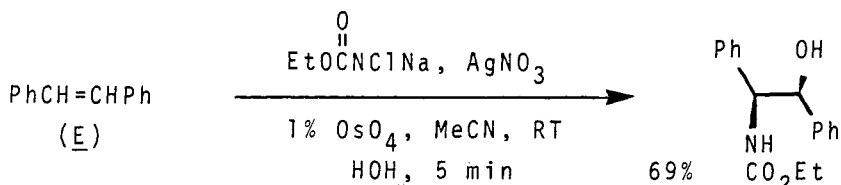
Ito, Y.; Yamaguchi, M.* Tetrahedron Lett., (1983), **24**, 5385

$\text{R} = \text{iPr}, \text{R}^1 = \text{Me}$ $\text{KBet}_3\text{H}, \text{Et}_2\text{O}$ 95%
 $\text{R}^2 = \text{CH}_2\text{CH}_2\text{OSiMe}_2\text{tBu}$ 0°C (syn:anti = 1:80)

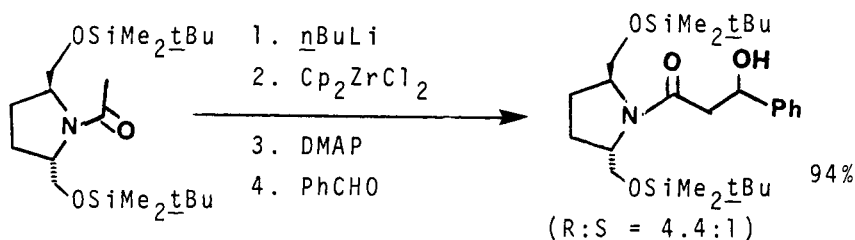
Ito, Y.; Katsuki, T.; Yamaguchi, M.*
Tetrahedron Lett., (1985), **26**, 4643



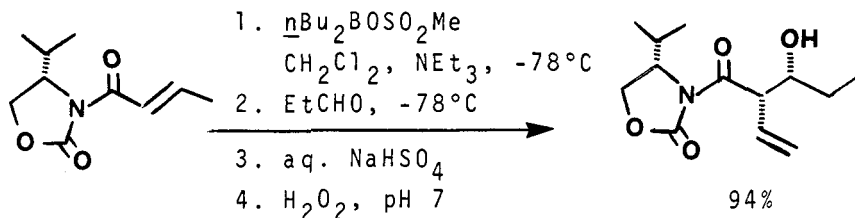
Schiess, M.; Seebach, D. Helv Chim Acta, (1983), **66**, 1618



Herranz, E.; Sharpless, K.B.* Org Syn, (1983), **61**, 93

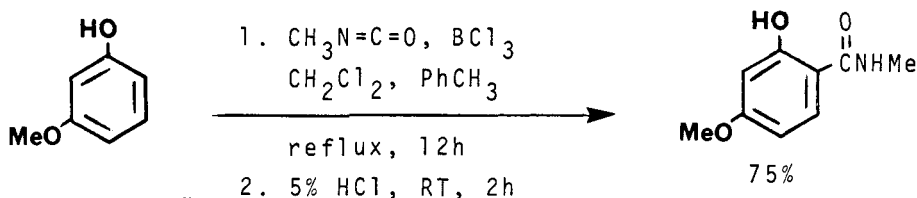


Katsuki, T.; Yamaguchi, M.* Tetrahedron Lett., (1985), **26**, 5807



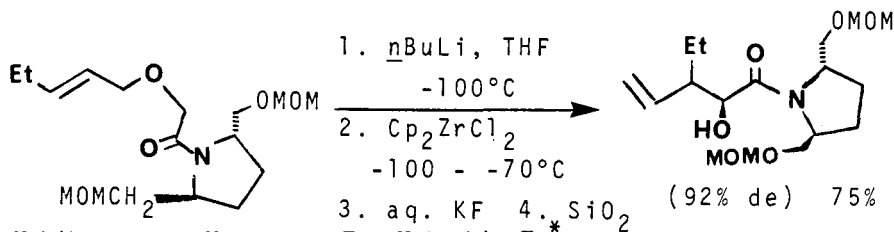
Evans, D.A.*; Sjogren, E.B.; Bartroli, J.; Dow, R.L.

Tetrahedron Lett, (1986), 27, 4957



Piccolo, O.*; Filippini, L.; Tinucci, L.; Valoti, E.; Citterio, A.*

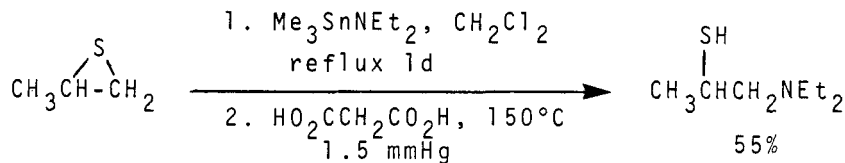
Tetrahedron, (1986), 42, 885



Uchikawa, M.; Hanamoto, T.; Katsuki, T.*; Yamaguchi, M.

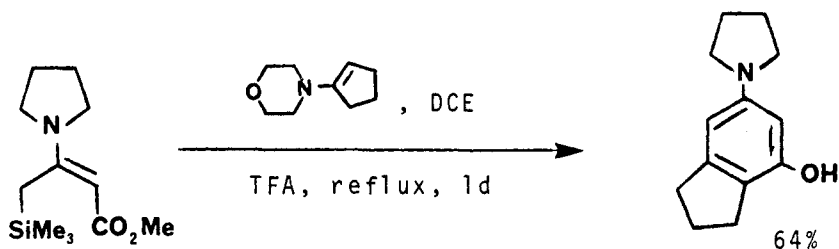
Tetrahedron Lett, (1986), 27, 4577 4581

SECTION 326: Alcohol, Thiol - Amine

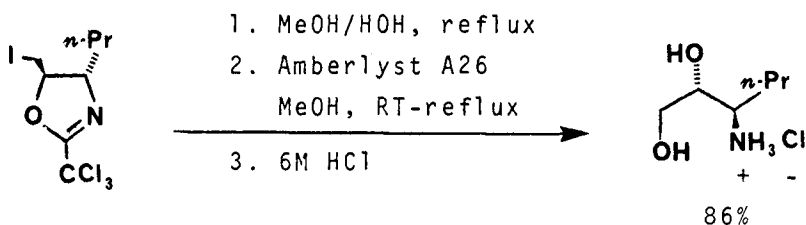


Taddei, M.; Papini, A.; Fiorenza, M.; Ricci, A.

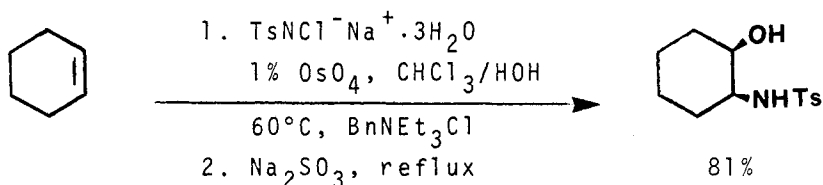
Tetrahedron Lett, (1983), 24, 2311



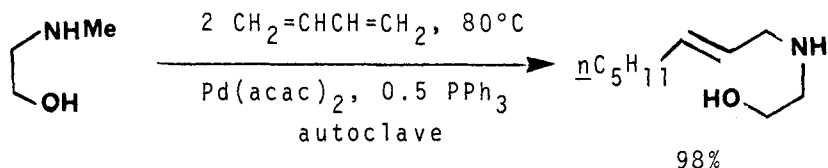
Chan, T.H.; Kang, G.J. Tetrahedron Lett., (1983), 24, 3051



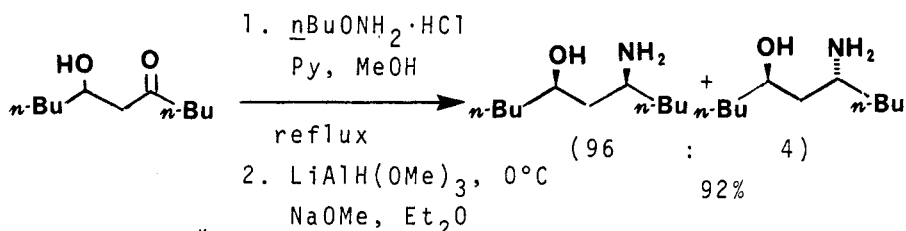
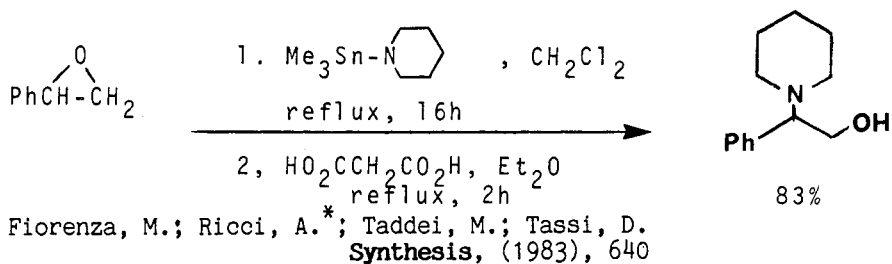
Cardillo, G.*; Orena, M.; Sandri, S.
JCS Chem Comm., (1983), 1489



Herranz, E.; Sharpless, K.B.* Org Syn., (1983), 61, 85



Groult, A.; Guy, A. Tetrahedron, (1983), 39, 1543

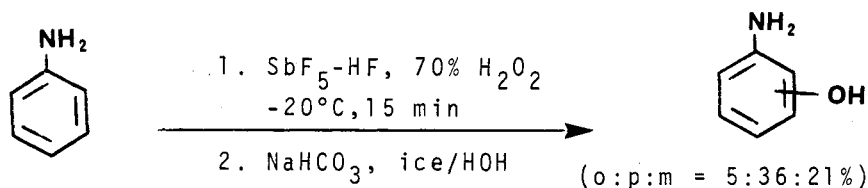


Narasaka, K.*; Ukaji, Y.; Yamazaki, S.

Bull Chem Soc Jpn, (1986), 59, 525

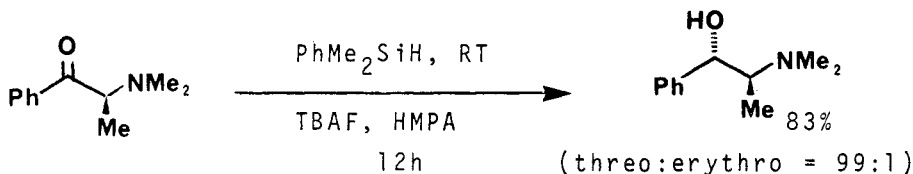
Narasaka, K.*; Ukaji, Y. Chem Lett, (1984), 147

Narasaka, K.; Yamazaki, S.; Ukaji, Y. Chem Lett, (1984), 2065



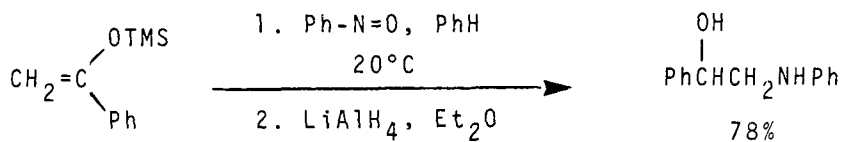
Jacquesy, J.-C.; Jouannetaud, M.-P.; Morellet, G.; Vidal, Y.

Tetrahedron Lett, (1984), 25, 1479

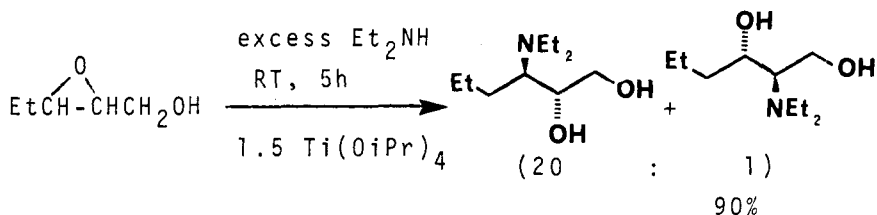


Fujita, M.; Hiyama, T.*

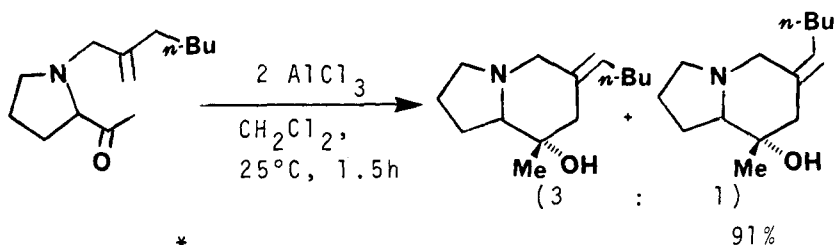
J Am Chem Soc, (1984), 106, 4629



Sasaki, T.; Mori, K.; Ohno, M.* Synthesis, (1985), 280

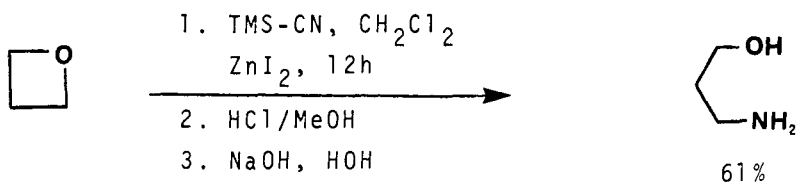


Caron, M.; Sharpless, K.B.* J Org Chem, (1985), 50, 1557



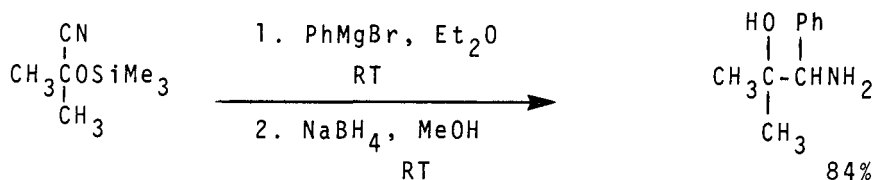
Overman, L.E.*; Lesuisse, D.

Tetrahedron Lett, (1985), 26, 4167



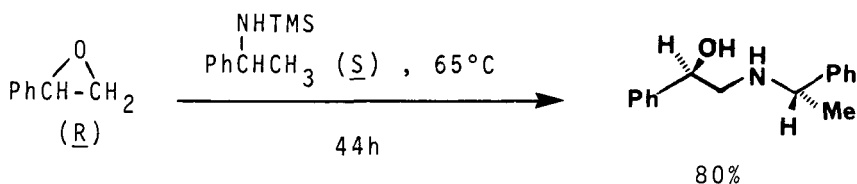
Gassman, P.G.*; Haberman, L.M.

Tetrahedron Lett, (1985), 26, 4971

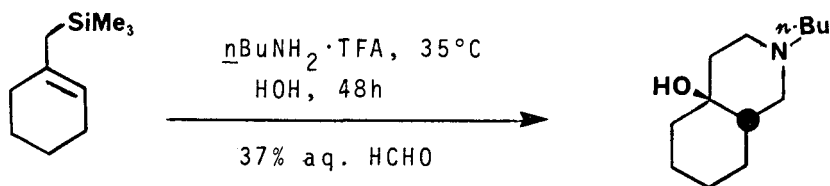


84%

Krepski, L.R.*; Jensen, K.M.*; Heilmann, S.M.*; Rasmussen, J.K.*
Synthesis, (1986), 301

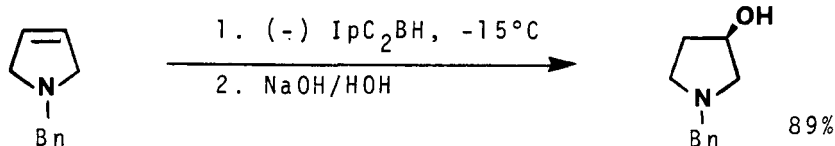


Atkins, R.K.*; Frazier, J.*; Moore, L.L.*; Weigel, L.O.*
Tetrahedron Lett, (1986), 27, 2451



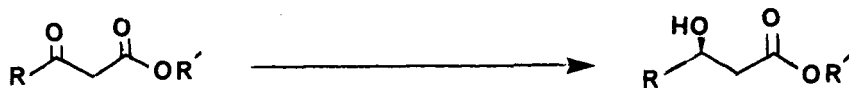
94%

Larsen, S.D.*; Grieco, P.A.*; Fobare, W.F.
J Am Chem Soc, (1986), 108, 3512



IpC₂BH = isopinocampheylborane (84% ee)

Brown, H.C.*; Prasad, J.V.N.V.*; Gupta, A.K.*
J Org Chem, (1986), 51, 4296

SECTION 327: Alcohol, Thiol - Ester

R = $\text{CH}_2\text{CH}=\text{CMe}_2$ Baker's Yeast, MgSO_4 73%
 R' = Me $\underline{\text{D-glucose}}$, KH_2PO_4 , HOH (92% ee)

Hirama, M.*; Shimizu, M.; Iwashita, M.
JCS Chem Comm, (1983), 599

R = Et Thermoanaerobium brockii 80%
 R' = Et Trypton, Na_2S , yeast extract
 $\underline{\text{D-glucose}}$ (84% ee S)

Seebach, D.*; Züger, M.F.; Giovannini, F.; Sonnleitner, B.; Fiechter, A.

Angew Chem Int Ed Engl, (1984), 23, 151

R = Me Baker's Yeast, HOH
 E' = Et $\xrightarrow{\text{sucrose, } 30^\circ\text{C}}$ (S:R = 93:7)

Seebach, D.*; Sutler, M.A.; Weber, R.H.; Züger, M.F.

Org Syn, (1984), 63, 1

Seebach, D.*; Giovannini, F.; Lamatsch, B.

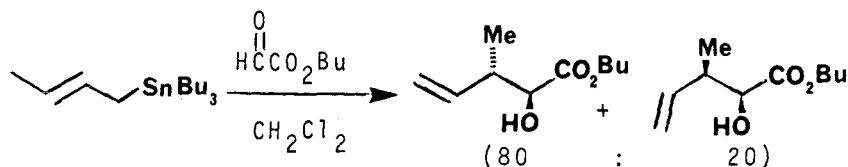
Helv Chim Acta, (1985), 68, 958

R = Ph LiBH_4 , $t\text{BuOH}$, THF 94%

R' = Et $\xrightarrow{(\text{RR}')\text{NN'dibenzoyl cystine, } -78^\circ\text{C} \rightarrow -30^\circ\text{C}}$ (87% ee R)

Soai, K.*; Yamanai, T.; Hikima, H.; Oyamada, H.

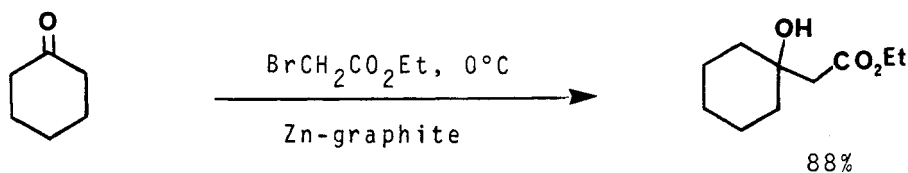
JCS Chem Comm, (1985), 138



90%

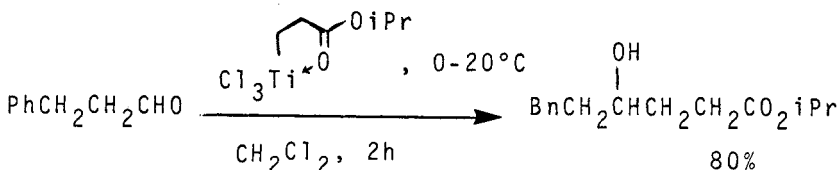
Yamamoto, Y.*; Maeda, N.; Maruyama, K.

JCS Chem Comm, (1983), 774



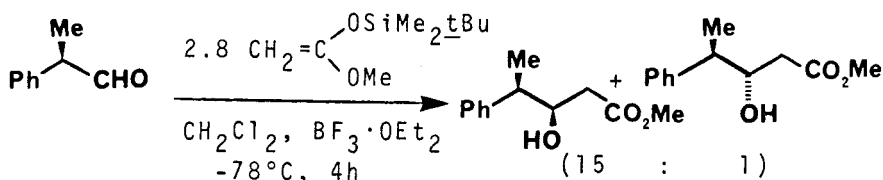
Boldrini, G.P.; Savoia, D.; Tagliavini, E.; Trombini, C.*;
Umani-Ronchi, A.*

J Org Chem, (1983), 48, 4108



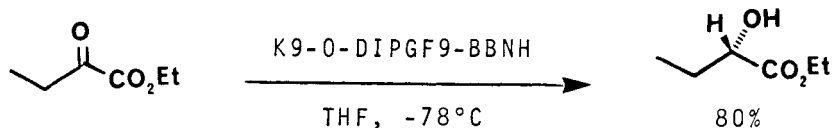
Nakamura, E.; Kuwajima, I.* J Am Chem Soc, (1983), **105**, 651

J Am Chem Soc, (1983), 105, 651

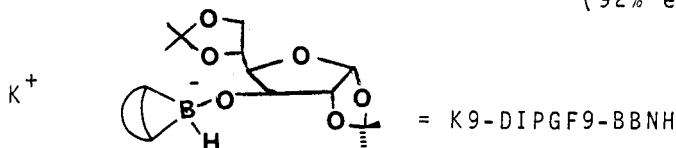


Heathcock, C.H.*; Flippin, L.A.

J Am Chem Soc, (1983), 105, 1667

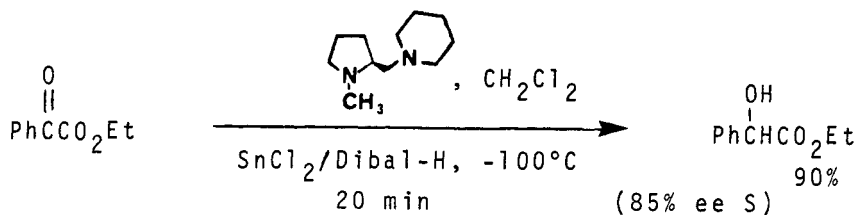


(92% ee S)

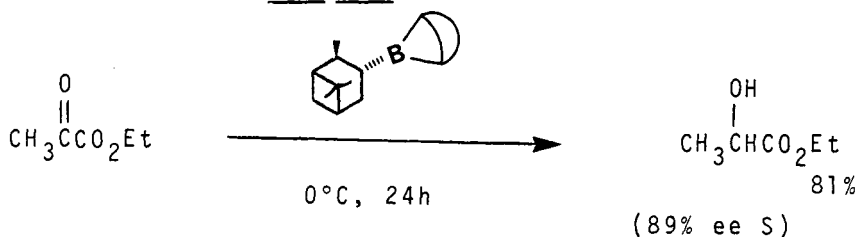


Brown, H.C.*; Cho, B.T.; Park, W.S.

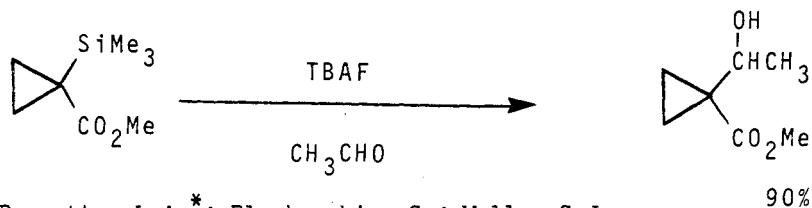
J Org Chem, (1986), 51, 3396



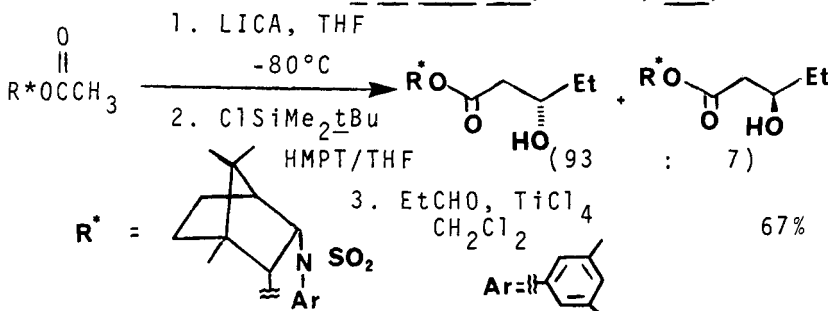
Mukaiyama, T.; Tomimori, K.; Oriyama, T.
Chem Lett, (1985), 813, 1359



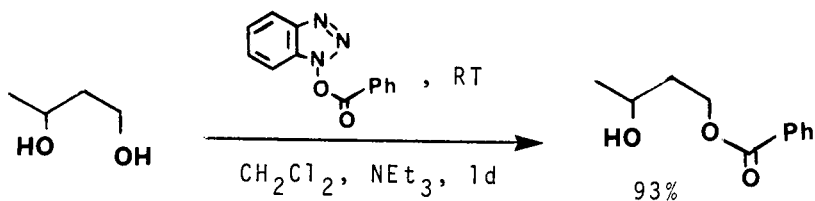
Brown, H.C.*; Pai, G.G.; Jadhav, P.K.
J Am Chem Soc, (1984), **106**, 1531



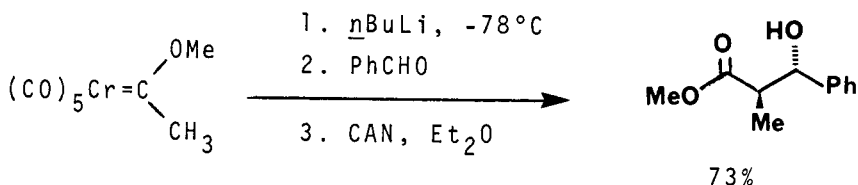
Paquette, L.A.*; Blankenship, C.; Wells, G.J.
J Am Chem Soc, (1984), **106**, 6442



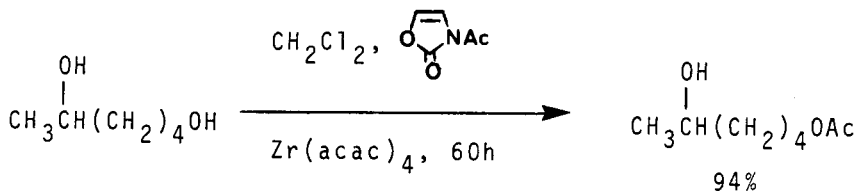
Helmchen, G.*; Leikauf, U.; Taufer-Knöpfel, I.
Angew Chem Int Ed Engl, (1985), **24**, 874



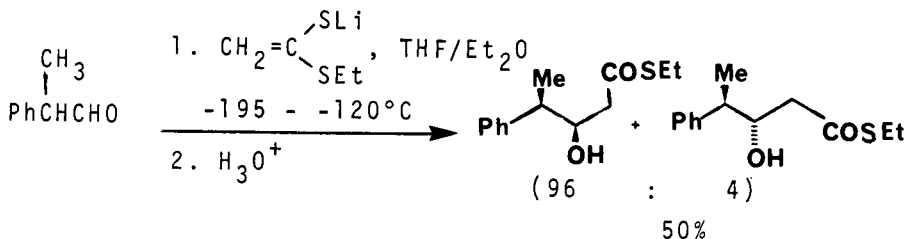
Kim, S.*; Chang, H.; Kim, W.J. J Org Chem, (1985), 50, 1751



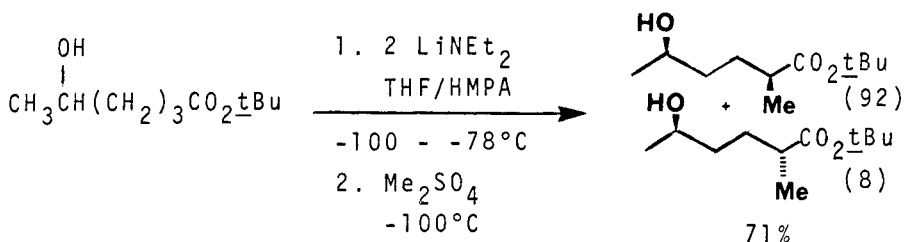
Wulff, W.D.*; Gilbertson, S.R. J Am Chem Soc, (1985), 107, 503



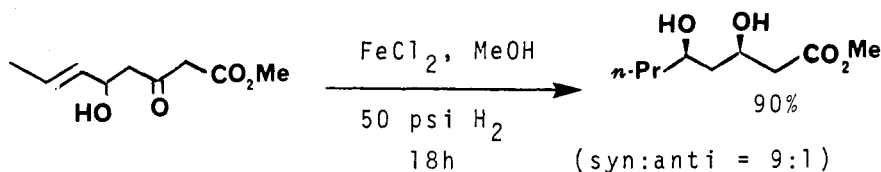
Kunieda, T.*; Mori, T.; Higuchi, T.; Hirobe, M.*
Tetrahedron Lett, (1985), 26, 1977



Meyers, A.I.*; Walkup, R.D. Tetrahedron, (1985), 41, 5089

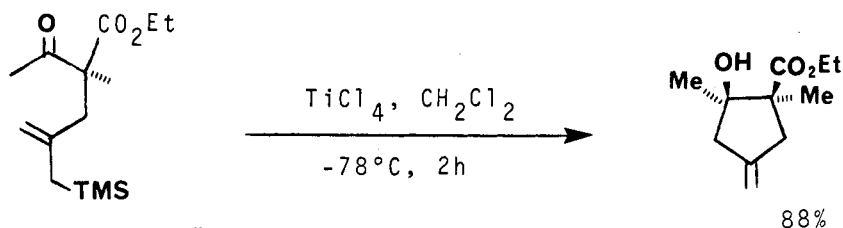


Narasaka, K.; Ukaji, Y. Chem Lett, (1986), 81



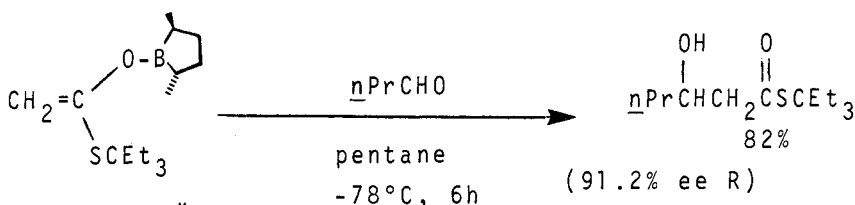
Kathawala, F.G.; Prager, B.; Prasad, K.*; Repič, O.; Shapiro, M.J.; Stabler, R.S.; Widler, L.

Helv Chim Acta, (1986), 69, 803



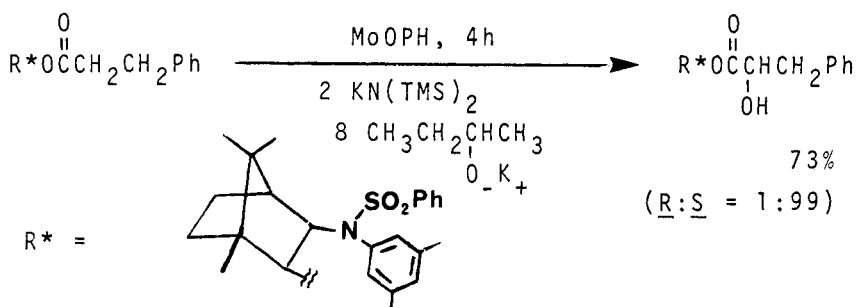
Molander, G.A.*; Andrews, S.W.

Tetrahedron Lett, (1986), 27, 3115

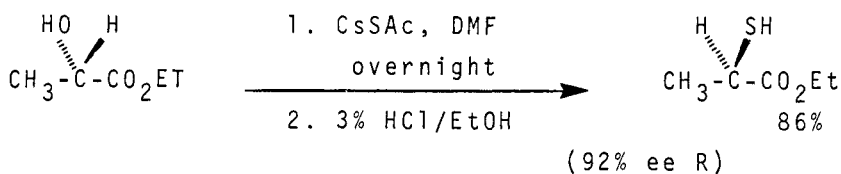


Masamune, S.*; Sato, T.; Kim, B.M.; Wollmann, T.A.

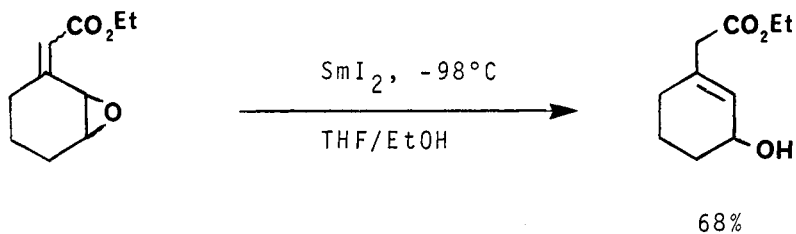
J Am Chem Soc, (1986), 108, 8279



Gamboni, R.; Tamm, C.* Tetrahedron Lett., (1986), 27, 3999

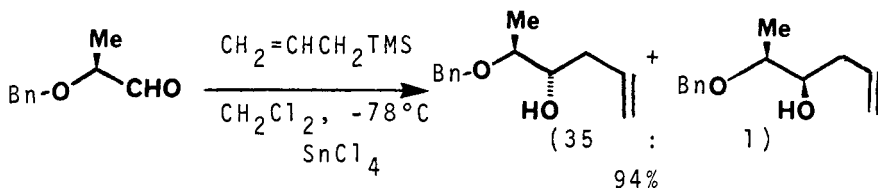


Strijtveen, B.; Kellogg, R.M.* J Org Chem, (1986), 51, 3664



Molander, G.A.*; LaBelle, B.E.; Hahn, G.
J Org Chem, (1986), 51, 5259

Also via: Hydroxyacids (Section 313)

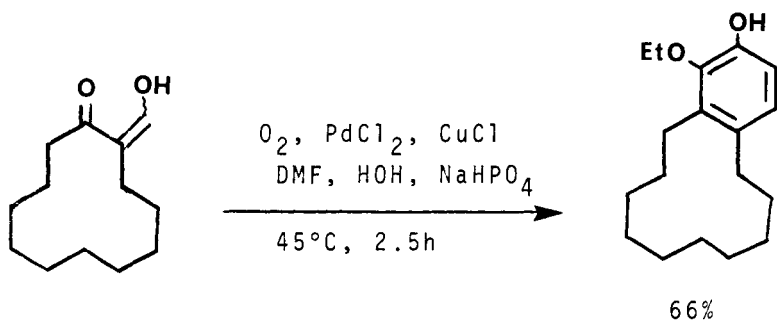
SECTION 328: Alcohol, Thiol - Ether, Epoxide, Thioether

Heathcock, C.H.*; Kiyooka, S.; Blumenkopf, T.A.

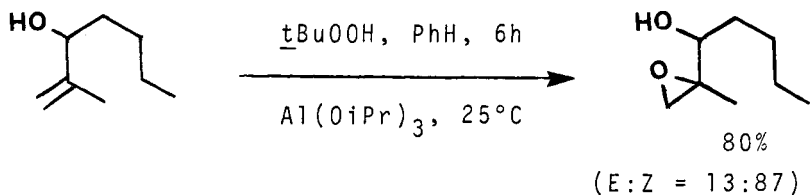
J Org Chem, (1984), 49, 4214

Kiyooka, S.; Heathcock, C.H.

Tetrahedron Lett, (1983), 24, 4765

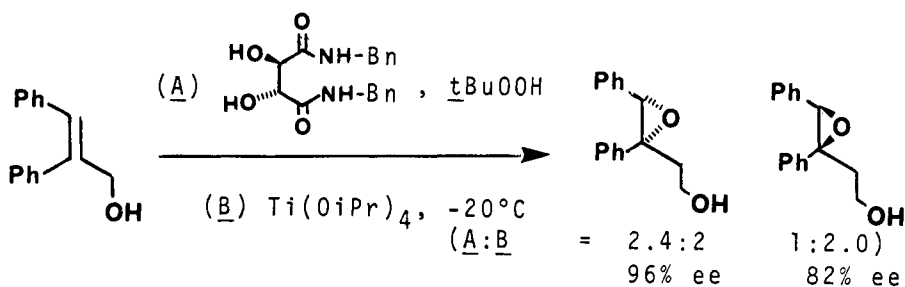


Tius, M.A.*; Thurkauf, A. J Org Chem, (1983), 48, 3839

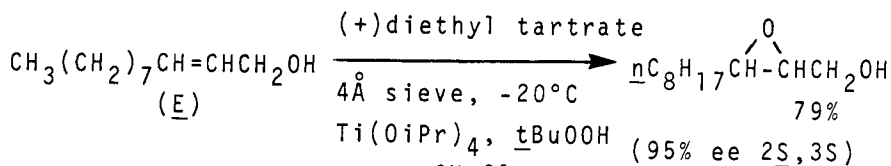


Takai, K.; Oshima, K.*; Nozaki, H.

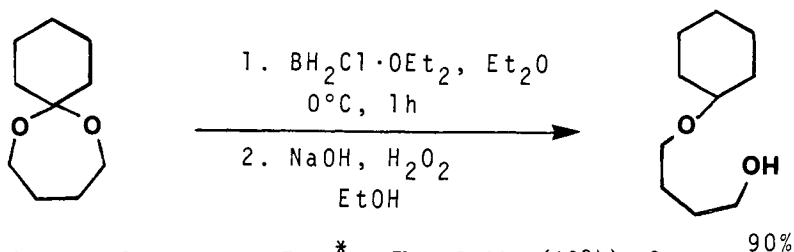
Bull Chem Soc Jpn, (1983), 56, 3791



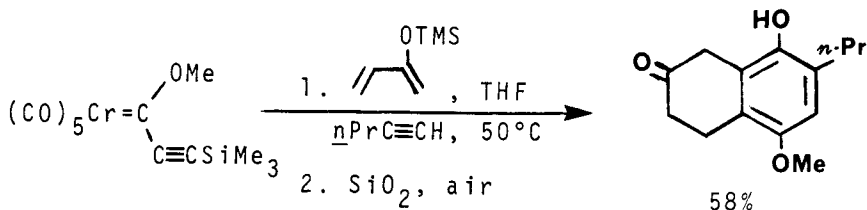
Lu, L.D.L.; Johnson, R.A.; Finn, M.G.; Sharpless, K.B.*
J Org Chem, (1984), 49, 728



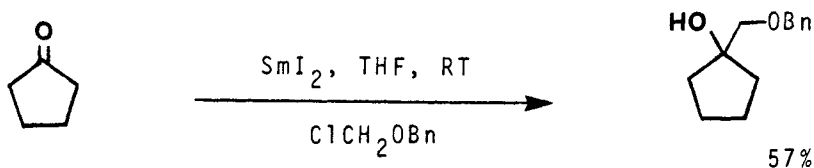
Hanson, R.M.; Sharpless, K.B.* J Org Chem, (1986), 51, 1922
 Hill, J.G.; Sharpless, K.B.*; Exon, C.M.; Regenye, R.
Org Syn, (1984), 63, 66



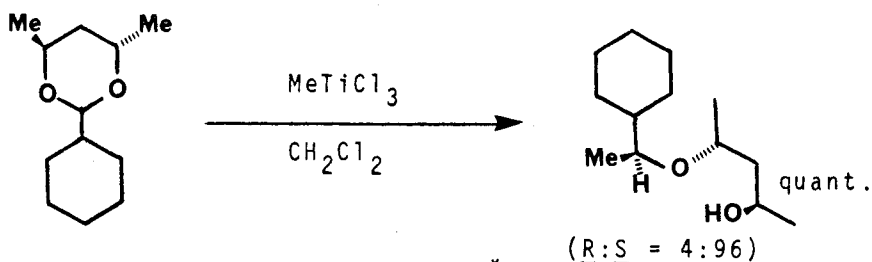
Borders, R.J.; Bryson, T.A.* Chem Lett, (1984), 9



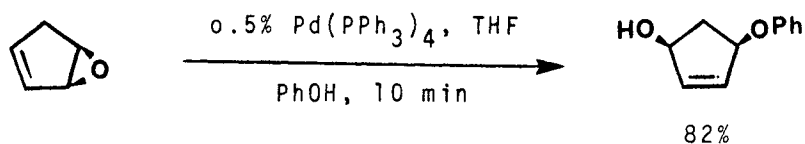
Wulff, W.D.*; Yang, D.C. J Am Chem Soc, (1984), 106, 7565



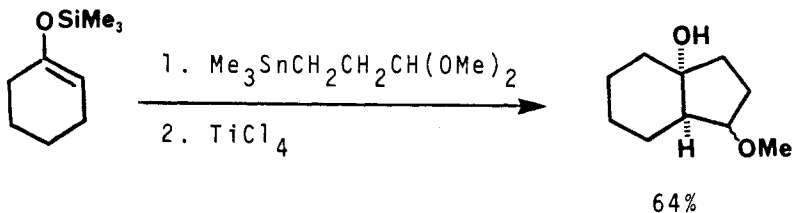
Imamoto, T.*; Takeyama, T.; Yokoyama, M.
Tetrahedron Lett., (1984), 25, 3225



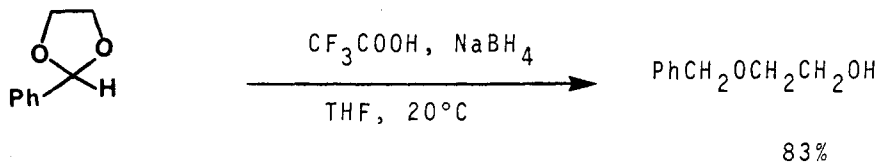
Mori, A.; Maruoka, K.; Yamamoto, H.*
Tetrahedron Lett., (1984), 25, 4421



Deardorff, D.R.*; Myles, D.C.; MacFerrin, K.D.
Tetrahedron Lett., (1985), 26, 5615

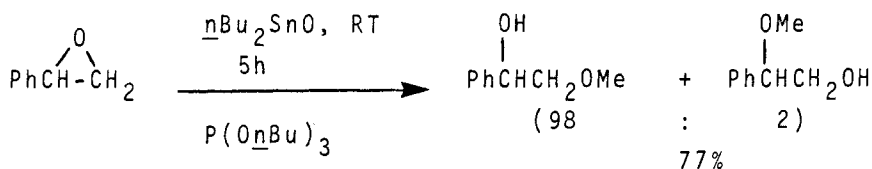


Lee, T.V.*; Richardson, K.A.
Tetrahedron Lett., (1985), 26, 3629



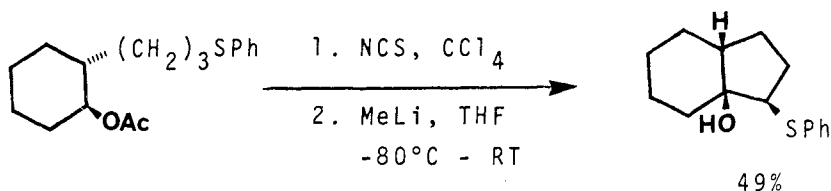
Nutaitis, C.F.; Gribble, G.W.*

Org Prep Proc Int, (1985), 17, 11



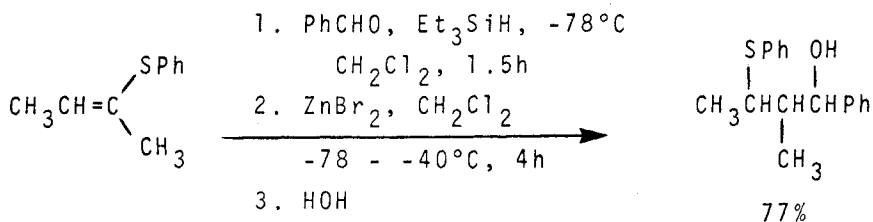
Otera, J.*; Yoshinaga, Y.; Hirakawa, K.

Tetrahedron Lett, (1985), 26, 3219



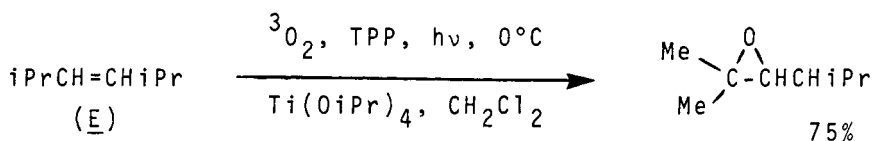
Harada, T.; Akiba, E.; Tsujimoto, K.; Oku, A.*

Tetrahedron Lett, (1985), 26, 4483

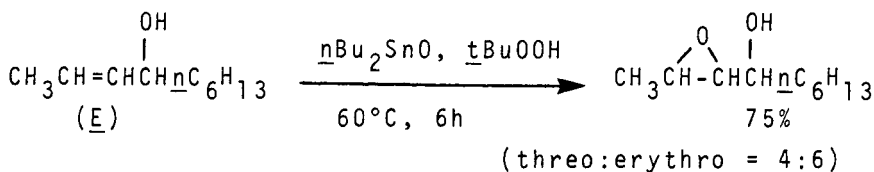


Takeda, T.*; Tsuchida, T.; Nakagawa, I.; Ogawa, S.; Fujiwara, T.

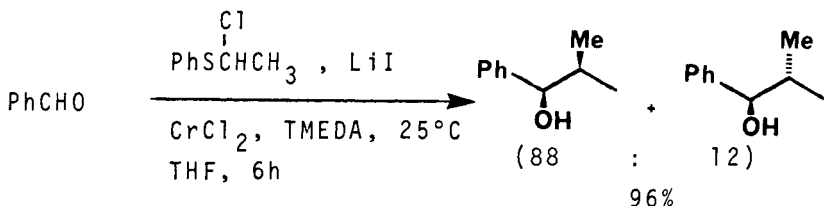
Tetrahedron Lett, (1985), 26, 5313



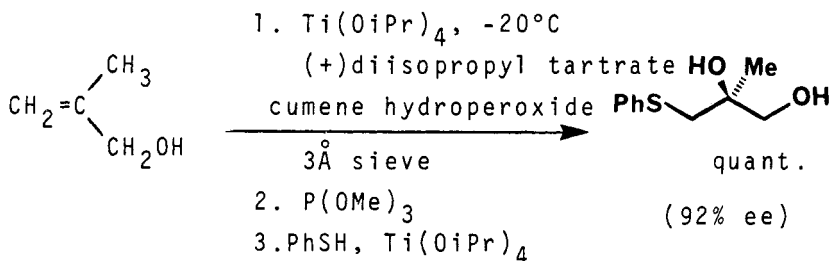
TPP = tetraphenyl porphine (erythro:threo = 9:1)
 Adam, W.*; Griesbeck, A.; Staab, E.
Tetrahedron Lett., (1986), 27, 2839



Kanemoto, S.; Nonaka, T.; Oshima, K.*; Utimoto, K.
Tetrahedron Lett., (1986), 27, 3387



Nakatsukasa, S.; Takai, K.*; Utimoto, K.
J Org Chem, (1986), 51, 5045



Ko, S.Y.; Sharpless, K.B.* J Org Chem, (1986), 51, 5413

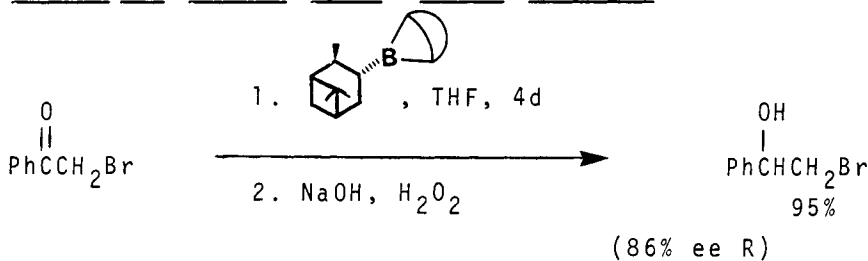
Reviews:

"Chelation or Non-chelation Control in Addition Reactions of Chiral α and β -Alkoxy Carbonyl Compounds"

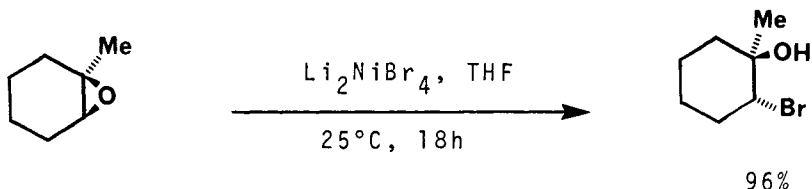
Reetz, M.T.* Angew Chem Int Ed Engl, (1984), 23, 556

"Asymmetric Epoxidation of Allylic Alcohols: The Sharpless Reaction"

Pfenniger, A.* Synthesis, (1986), 89

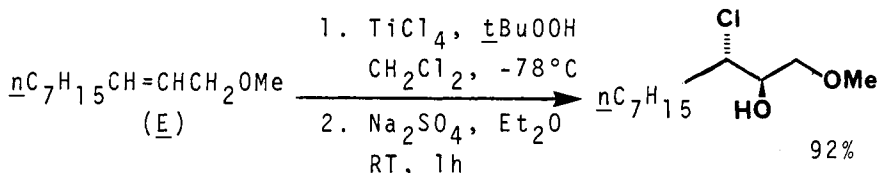
SECTION 329: Alcohol, Thiol - Halide, Sulfonate

Brown, H.C.*; Pai, G.G. J Org Chem, (1983), 48, 1784



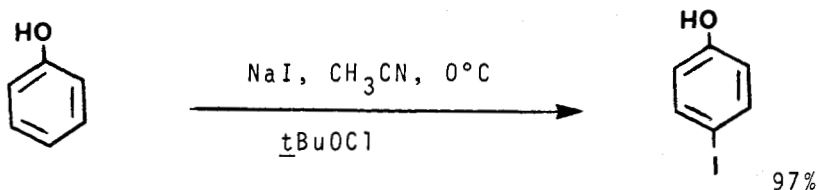
Dawe, R.D.*; Molinski, T.F.*; Turner, J.V.*

Tetrahedron Lett, (1984), 25, 2061

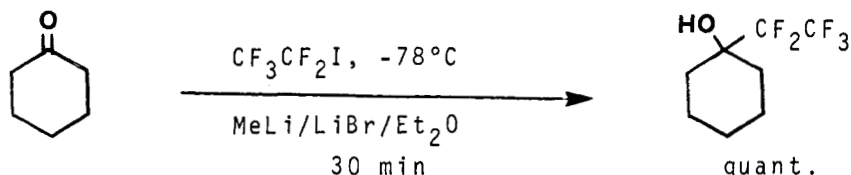


Klunder, J.M.*; Caron, M.*; Uchiyama, M.*; Sharpless, K.B.*

J Org Chem, (1985), 50, 912

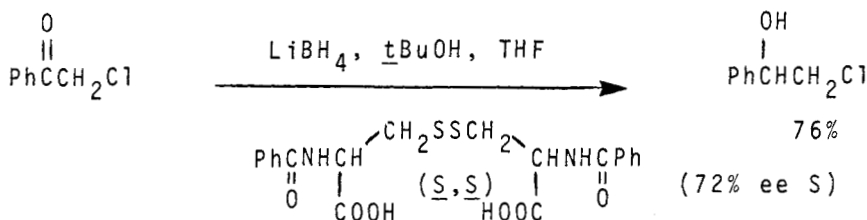


Kometani, T.*; Watt, D.S.*; Ji, T.; Fitz, T.
J Org Chem, (1985), 50, 5384



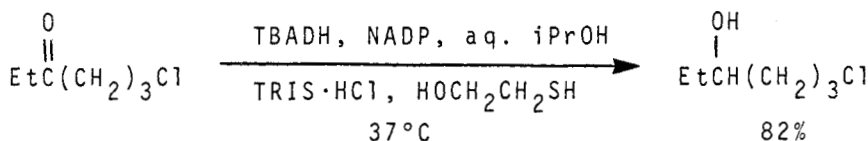
Gassman, P.G.*; O'Reilly, N.J.

Tetrahedron Lett, (1985), 26, 5243



Soai, K.*; Yamanoi, T.; Hikima, H.

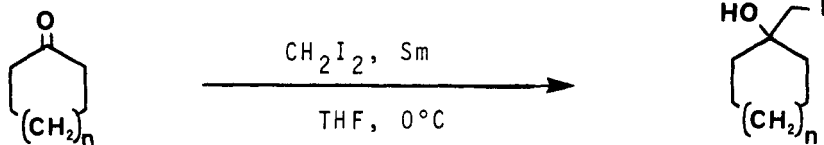
J Organomet Chem, (1985), 290, c023



$\text{TBADH} = \text{Thermoanaerobium brockii}$ (99% ee S)
 alcohol dehydrogenase

Keinan, E.*; Seth, K.K.; Lamed, R.

J Am Chem Soc, (1986), 108, 3474



$n = 1$

81%

Imamoto, T.*; Takeyama, T.; Koto, H.

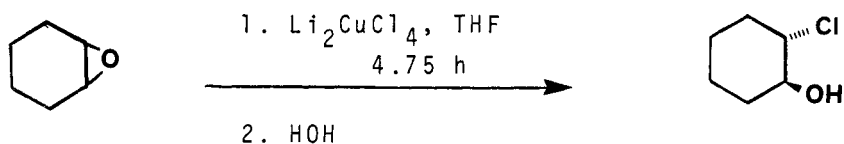
Tetrahedron Lett., (1986), 27, 3243

$n = 0$

82%

Tabuchi, T.; Inanaga, J.*; Yamaguchi, M.

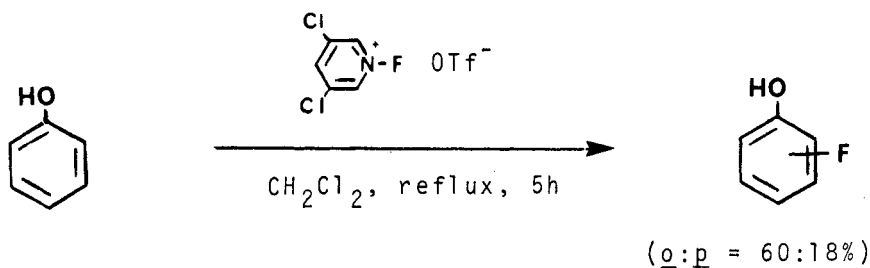
Tetrahedron Lett., (1986), 27, 3891



98%

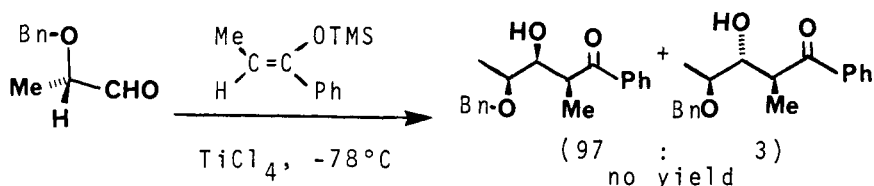
Ciaccio, J.A.; Address, K.J.; Bell, T.W.*

Tetrahedron Lett., (1986), 27, 3697



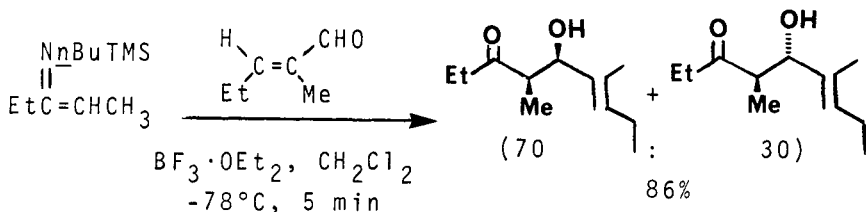
Umemoto, T.*; Kawada, K.; Tomita, K.

Tetrahedron Lett., (1986), 27, 4465

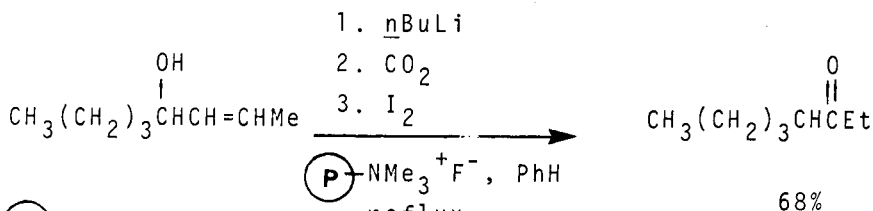
SECTION 330: Alcohol, Thiol - Ketone

Reetz, M.T.*; Kessler, K.; Schmidtberger, S.; Wenderoth, B.; Steinbach, R.

Angew Chem Int Ed Engl, (1983), 22, 989



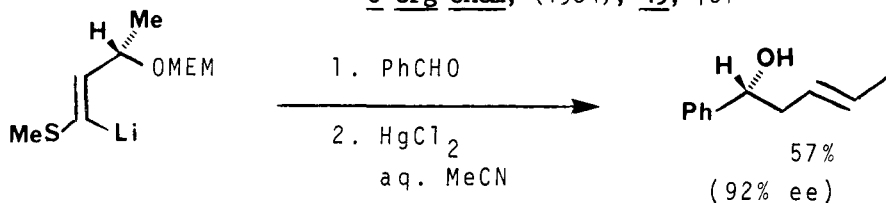
Ando, W.*; Tsumaki, H. Chem Lett, (1983), 1409



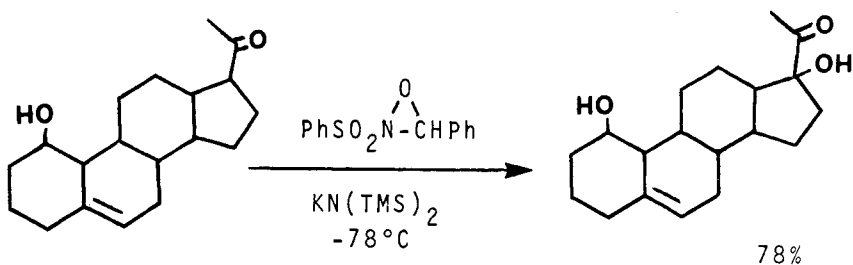
(P) = Amberlyst A26(F⁻)_{reflux}

Cardillo, G.*; Orena, M.; Porzi, G.; Sandri, S.; Tomasini, C.

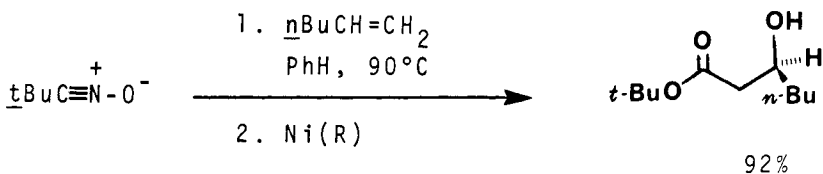
J Org Chem, (1984), 49, 701



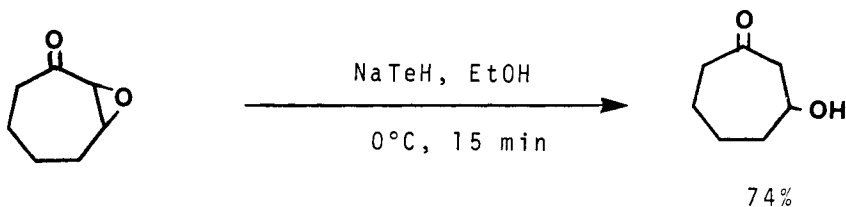
Braun, M.*; Hild, W. Angew Chem Int Ed Engl, (1984), 23, 723



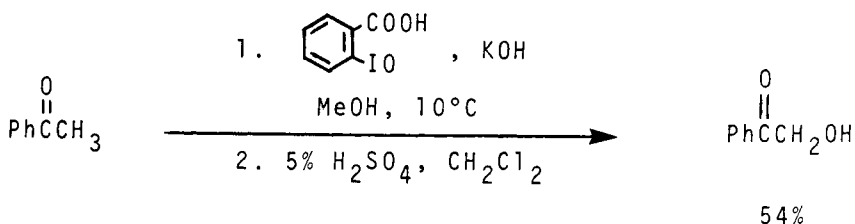
Davis, F.A.*; Vishwakarma, L.C.; Billmers, J.M.; Finn, J.*
J Org Chem, (1984), 49, 3241



Curran, D.P.*; Scanga, S.A.; Fenk, C.J.
J Org Chem, (1984), 49, 3474



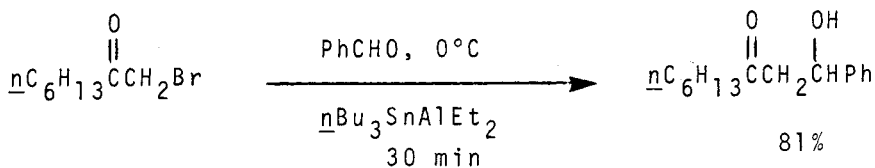
Osuka, A.*; Taka-Oka, K.; Suzuki, H.* Chem Lett, (1984), 271



Moriarty, R.M.; Hou, K.-C.; Prahash, I.

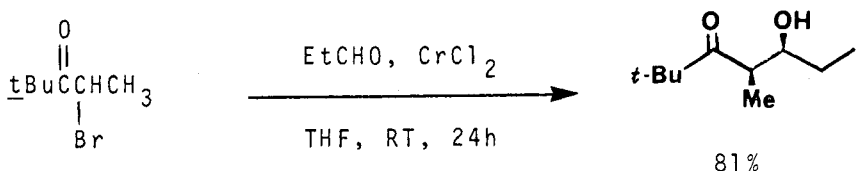
Org Syn, (1985), 64, 138

Moriarty, R.M.; Hou, K.-C. Tetrahedron Lett, (1984), 25, 691



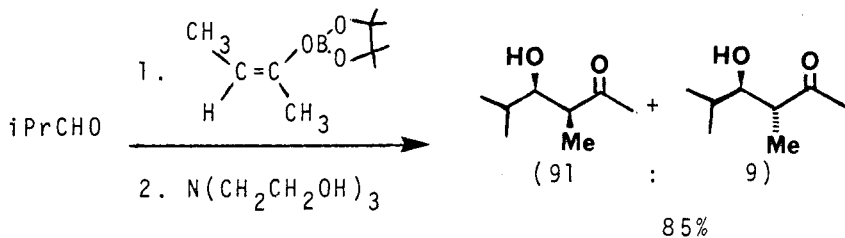
Tsuboniwa, N.; Matsubara, S.; Morizawa, Y.; Oshima, K.*; Nozaki, H.

Tetrahedron Lett., (1984), 25, 2569



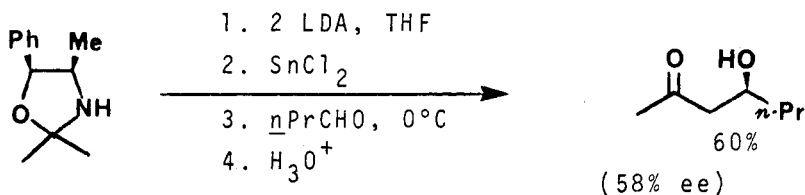
Dubois, J.-E.*; Axiotis, G.; Bertounesque, E.

Tetrahedron Lett., (1985), 26, 4371



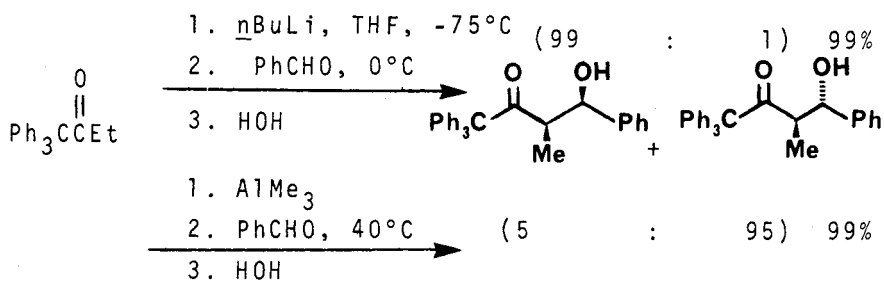
Hoffmann, R.W.*; Ditrach, K.

Tetrahedron Lett., (1984), 25, 1781

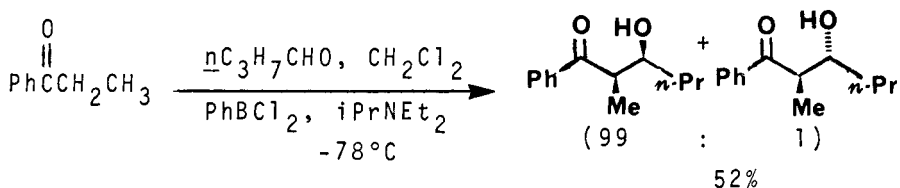


Narasaka, K.; Miwa, T.; Hayashi, H.; Ohta, M.

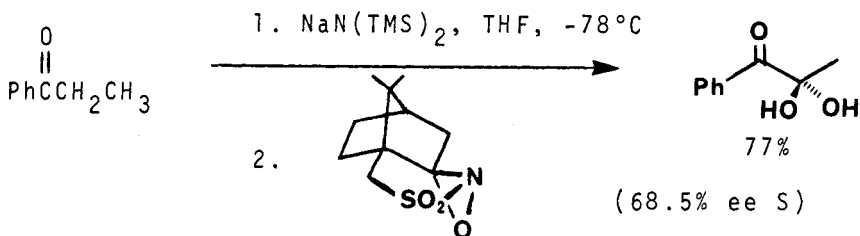
Chem Lett., (1984), 1399



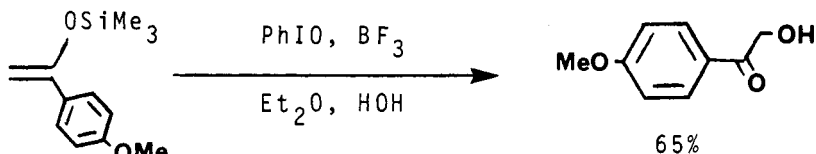
Ertas, M.; Seebach, D.* Helv Chim Acta, (1985), **68**, 961



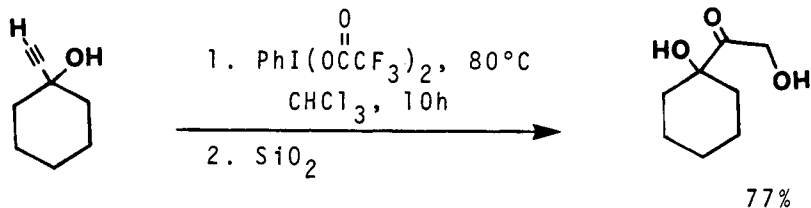
Hamana, H.*; Sasakura, K.; Sugasawa, T.
Chem Lett, (1984), 1729



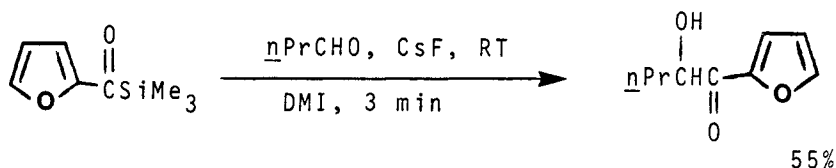
Davis, F.A.*; Haque, M.S. J Org Chem, (1986), **51**, 4083



Moriarty, R.M.*; Prakash, O.; Duncan, M.P.
Synthesis, (1985), 943



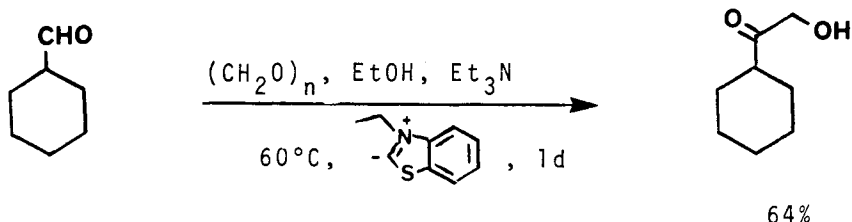
Tamura, Y.*; Yakura, T.; Haruta, J.; Kita, Y.
Tetrahedron Lett., (1985), 26, 3837



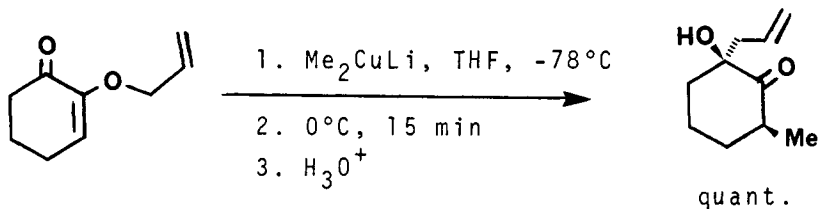
DMI = 1,3-dimethylimidazolidin-2-one

Ricci, A.; Degl'Innocenti, A.*; Chimichi, S.; Fiorenza, M.;
 Rossini, G.; Bestmann, H.J.

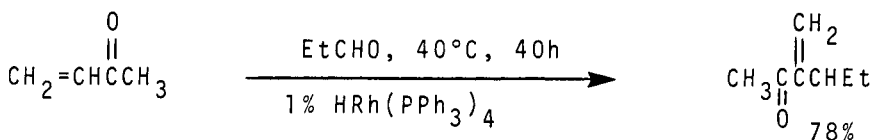
J Org Chem, (1985), 50, 130



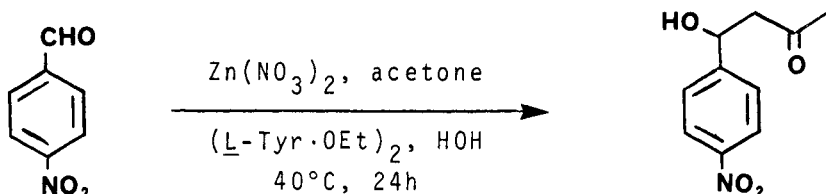
Matsumoto, T.; Ohishi, M.; Inoue, S.*
J Org Chem, (1985), 50, 603



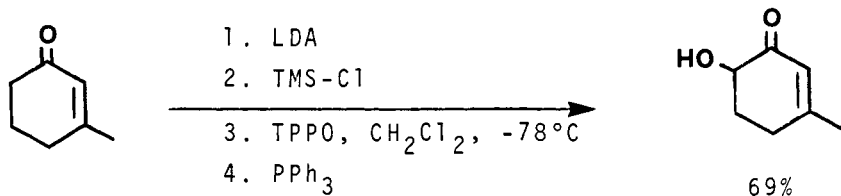
Koreeda, M.*; Luengo, J.I. J Am Chem Soc, (1985), 107, 5572



Sato, S.*; Matsuda, I.*; Izumi, Y. Chem Lett, (1985), 1875

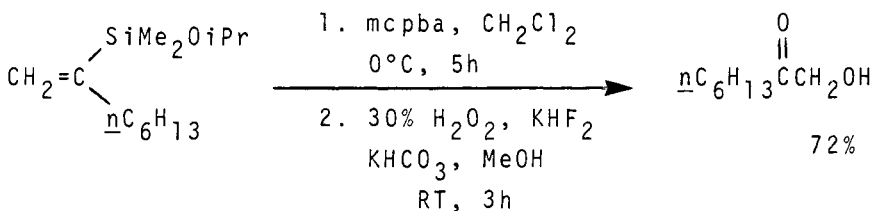


Watanabe, K.*; Yamada, Y.; Goto, K.
Bull Chem Soc Jpn, (1985), 58, 1401

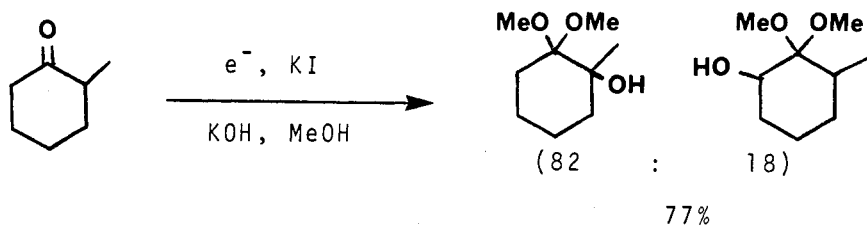


TPPO = triphenylphosphite ozonide

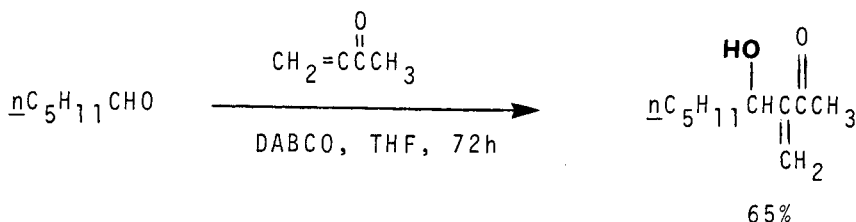
Iwata, C.*; Takemoto, Y.; Nakamura, A.; Imanishi, T.
Tetrahedron Lett, (1985), 26, 3227



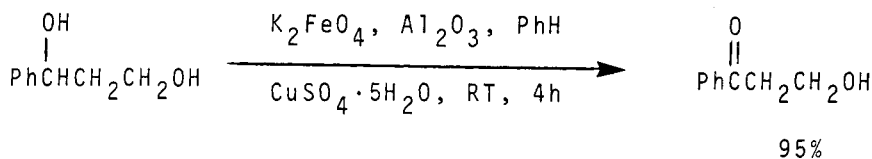
Tamao, K.*; Maeda, K. Tetrahedron Lett, (1986), 27, 65



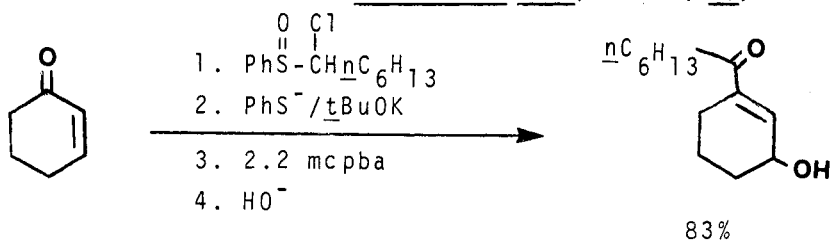
Shono, T.*; Matsumura, Y.; Inoue, K.; Iwasaki, F.
JCS Perkin I, (1986), 73



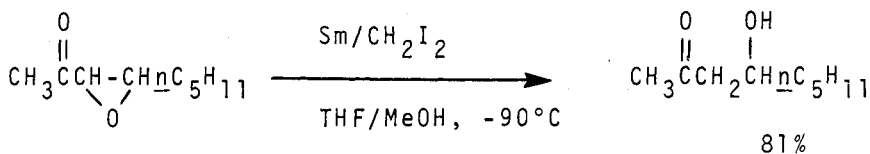
Basavaiah, D.*; Gowriswari, V.V.L.
Tetrahedron Lett, (1986), 27, 2031



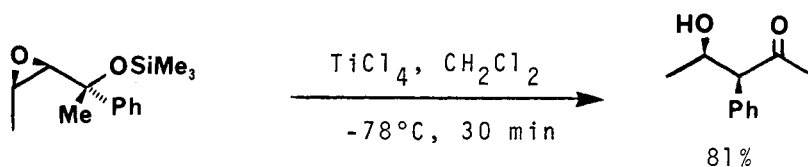
Kim, K.S.*; Song, Y.H.; Lee, N.H.; Hahn, C.S.
Tetrahedron Lett, (1986), 27, 2875



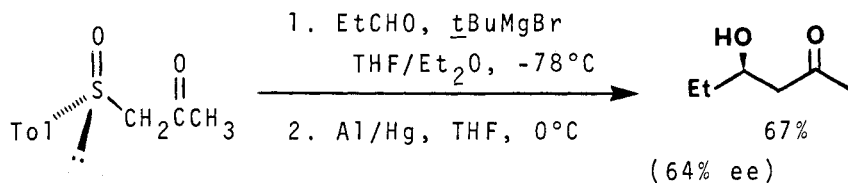
Sato, T.; Motohashi, S.; Yamakawa, K.*
Tetrahedron Lett, (1986), 27, 2889



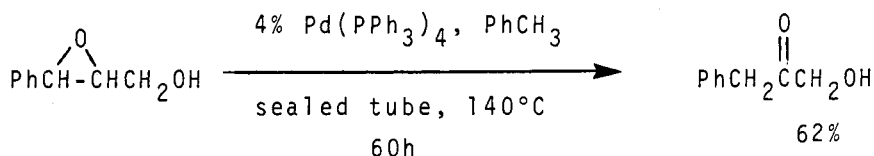
Molander, G.A.*; Hahn, G. J Org Chem, (1986), 51, 2596



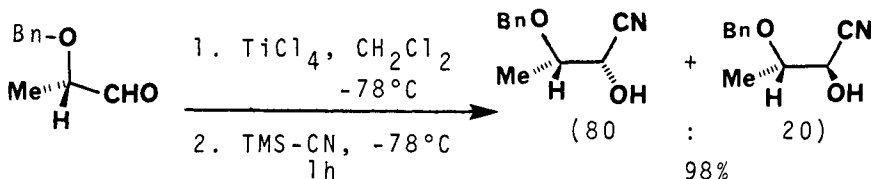
Maruoka, K.; Hasegawa, M.; Yamamoto, H.*
J Am Chem Soc, (1986), 108, 3827



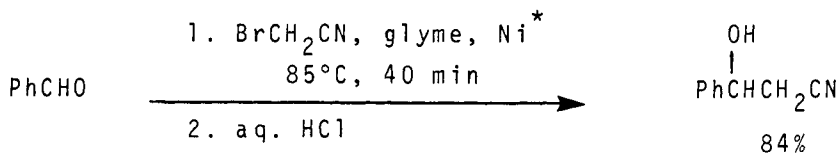
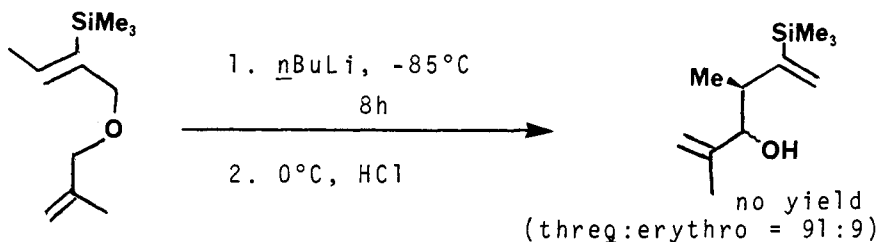
Schneider, F.*; Simon, R. Synthesis, (1986), 582



Vankar, Y.D.*; Chaudhuri, N.C.; Singh, S.P.
Syn Commun, (1986), 16, 1621

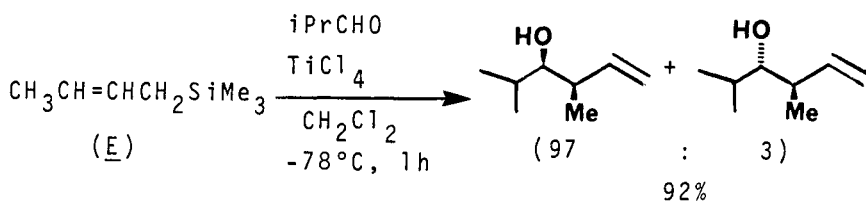
SECTION 331: Alcohol, Thiol - Nitrile

Reetz, M.T.*; Kessler, K.; Jung, A.

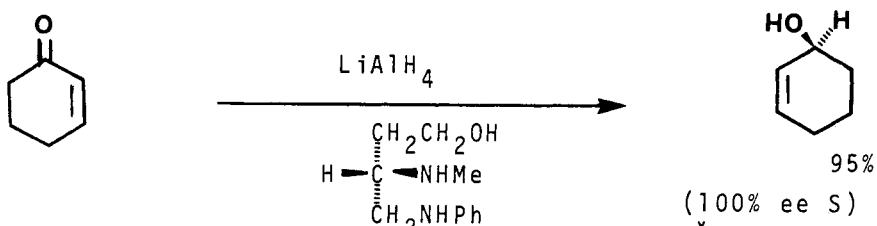
Angew Chem Int Ed Engl, (1985), **24**, 989 $\text{Ni}^* = \text{NiI/Li/naphthalene/glyme/RT/12h}$ Inaba, S.; Rieke, R.D.* Tetrahedron Lett, (1985), **26**, 155**Review:** "Newly Developed Equivalents from Cyanohydrins, and Related Cyanohydrins and α -Dialkylaminonitriles"Albright, J.D.* Tetrahedron, (1983), **39**, 3207**SECTION 332: Alcohol, Thiol - Olefin**Allylic and benzylic hydroxylation ($\text{C}=\text{C}-\text{CH} \rightarrow \text{C}=\text{C}-\text{C}-\text{OH}$, etc. is listed in Section 41 (Alcohols and Phenols from Hydrides).

Mikami, K.; Kimura, Y.; Kishi, N.; Nakai, T.

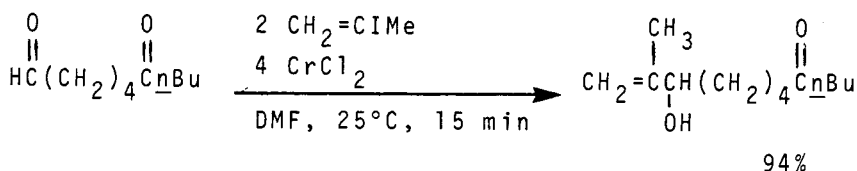
J Org Chem, (1983), **48**, 279



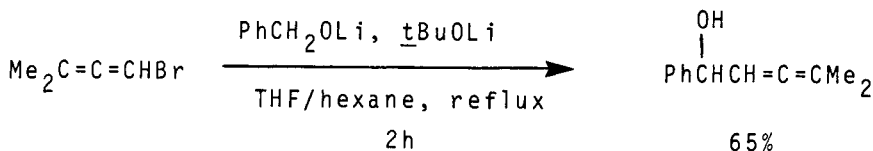
Hayashi, T.*; Kabeta, K.; Hamachi, I.; Kumada, M.*
Tetrahedron Lett., (1983), 24, 2865



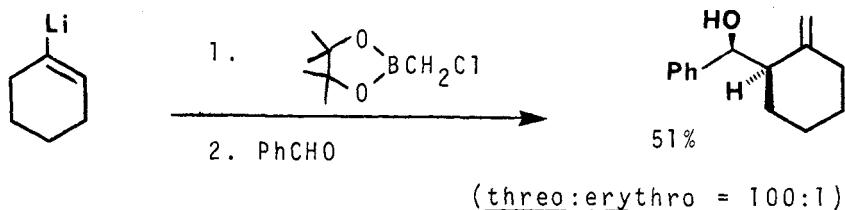
Sato, T.; Gotoh, Y.; Wakabayashi, Y.; Fujisawa, T.*
Tetrahedron Lett., (1983), 24, 4123



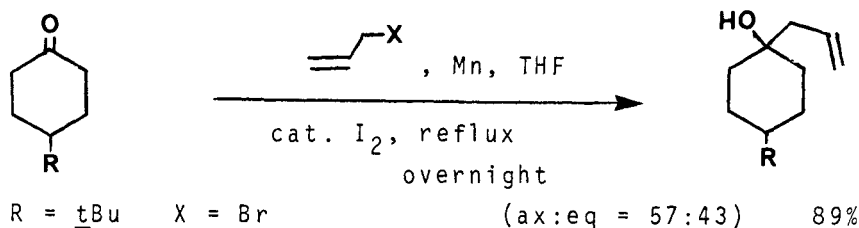
Takai, K.*; Kimura, K.; Kuroda, T.; Hiyama, T.*; Nozaki, H.
Tetrahedron Lett., (1983), 24, 5281



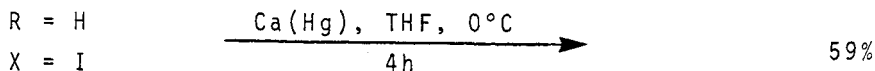
Harada, T.; Nozaki, Y.; Oku, A.*
Tetrahedron Lett., (1983), 24, 5665



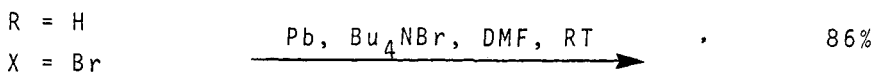
Wuts, P.G.M.*; Thompson, P.A.; Callen, G.R.
J Org Chem, (1983), **48**, 5398



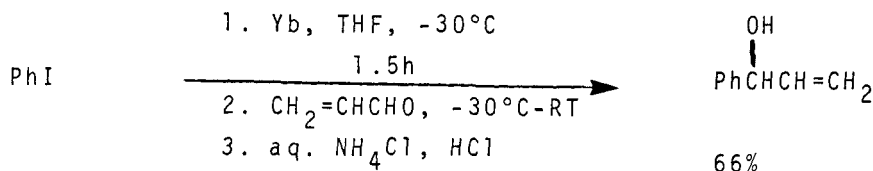
Hiyama, T.*; Sawahata, M.; Obayashi, M.
Chem Lett, (1983), 1237



Imamoto, T.*; Kusumoto, T.; Tawarayama, Y.; Sugiura, Y.; Mita, T.; Hatanaka, Y.; Yokoyama, M.
J Org Chem, (1984), **49**, 3904

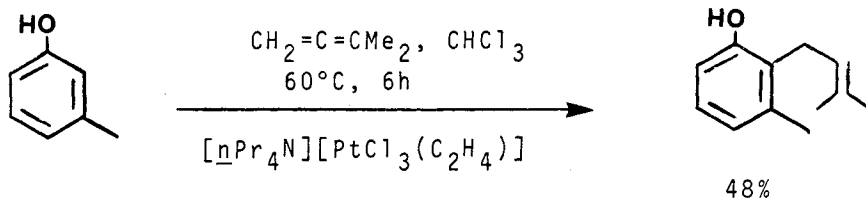


Tanaka, H.; Yamashita, S.; Hamatani, T.; Ikemoto, Y.; Torii, S.*
Chem Lett, (1986), 1611

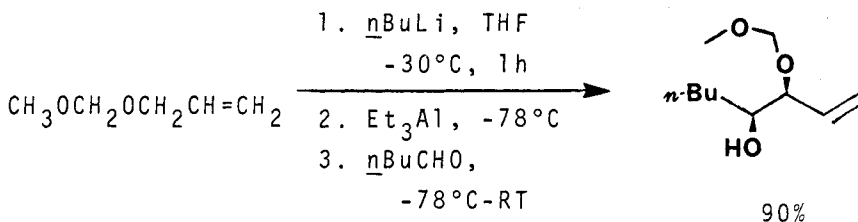


Yokoo, K.; Yamanaka, Y.; Fukagawa, T.; Taniguchi, H.; Fujiwara, Y.*

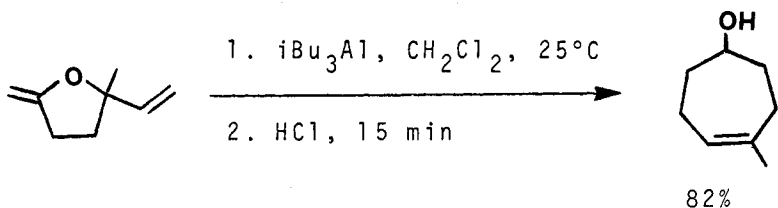
Chem Lett, (1983), 1301



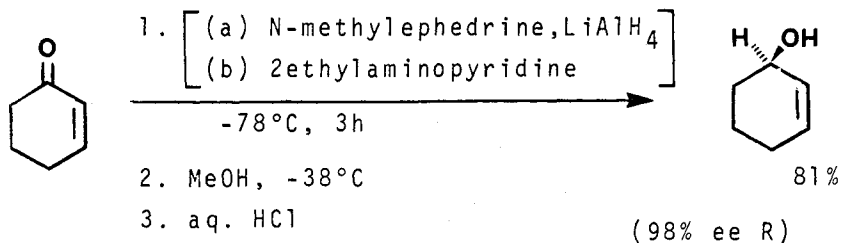
DeRenzi, A.; Panunzi, A.*; Saporito, A.; Vitagliano, A.
JCS Perkin II, (1983), 993



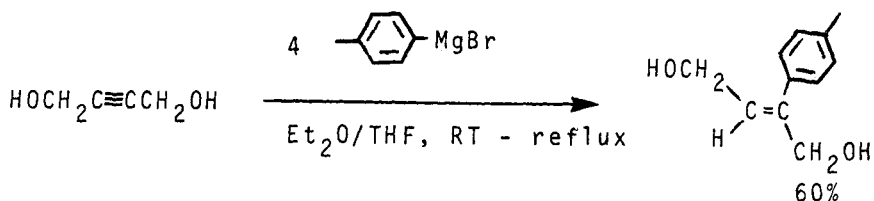
Yamamoto, Y.*; Yatagai, H.; Saito, Y.; Maruyama, K.
J Org Chem, (1984), **49**, 1096



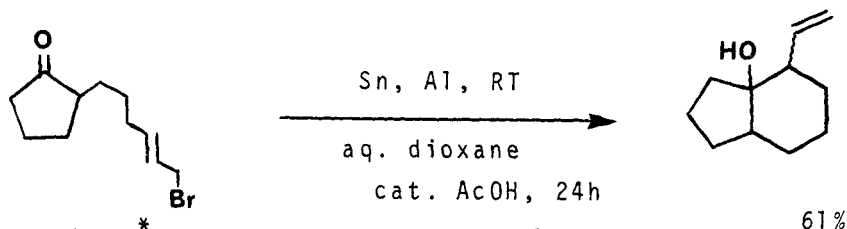
Mori, I.; Takai, K.; Oshima, K.; Nozaki, H.
Tetrahedron, (1984), **40**, 4013



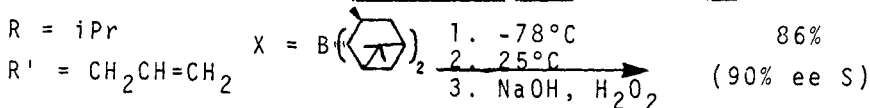
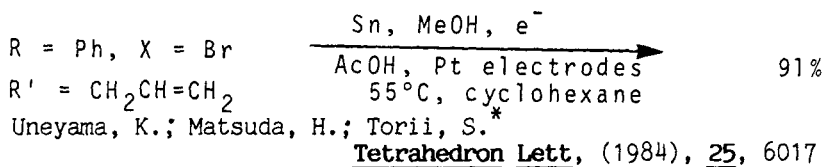
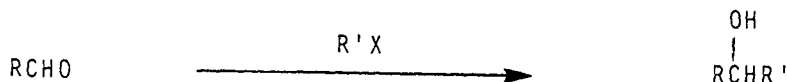
Kawasaki, M.; Suzuki, Y.; Terashima, S.*
Chem Lett, (1984), 239



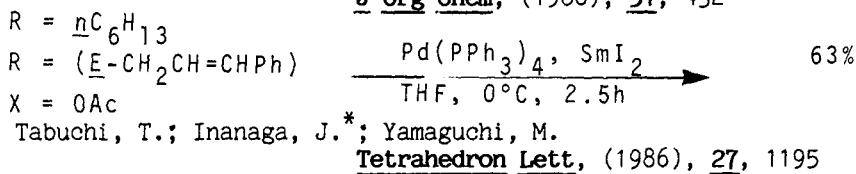
Ishino, Y.*; Wakamoto, K.; Hirashima, T.
Chem Lett, (1984), 765

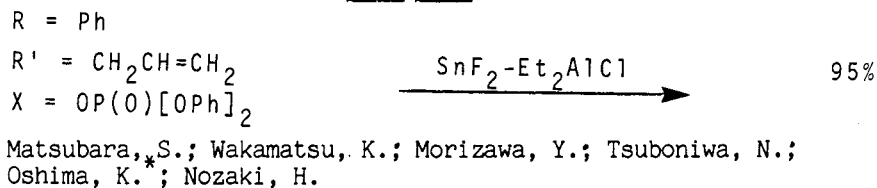
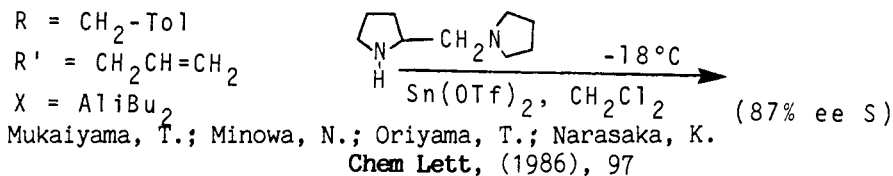


Nokami, J.*; Wakabayashi, S.; Okawara, R.
Chem Lett, (1984), 869

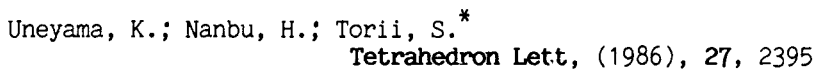
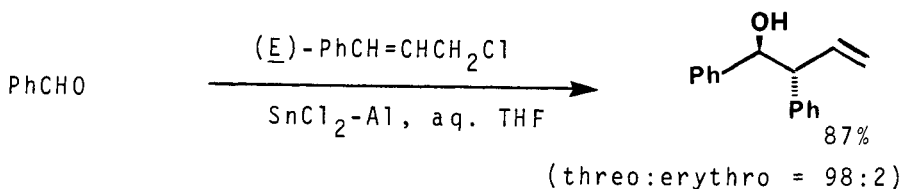
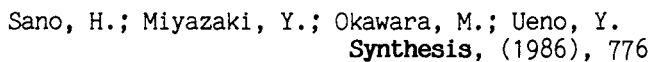
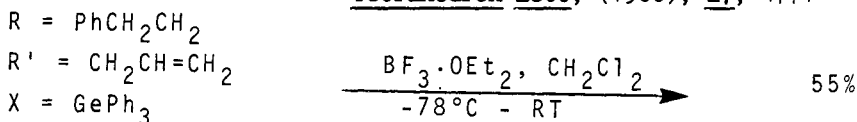
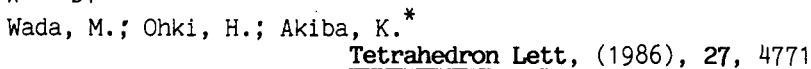
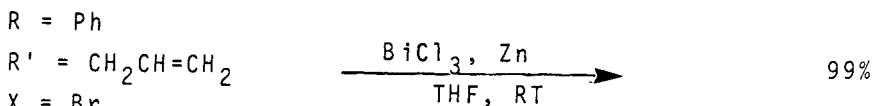
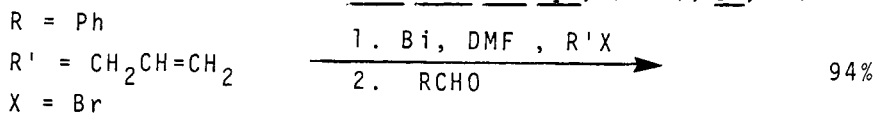


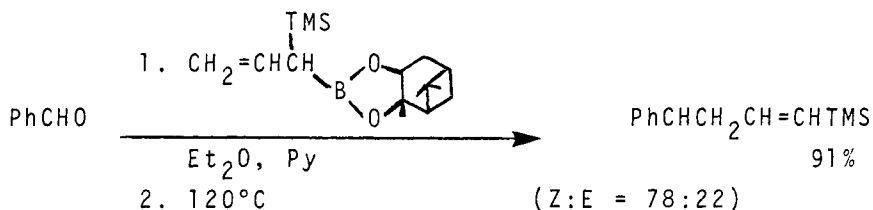
Jadhav, P.K.; Bhat, K.S.; Perumal, P.T.; Brown, H.C.*
J Org Chem, (1986), 51, 432



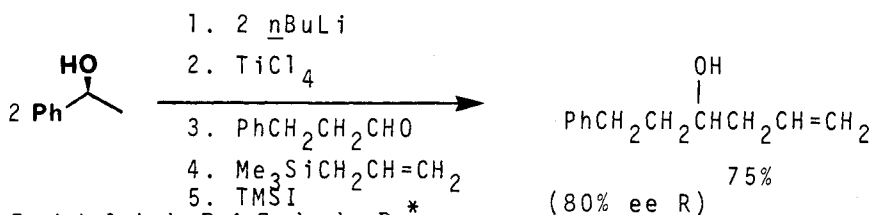


Bull Chem Soc Jpn, (1985), 58, 1196



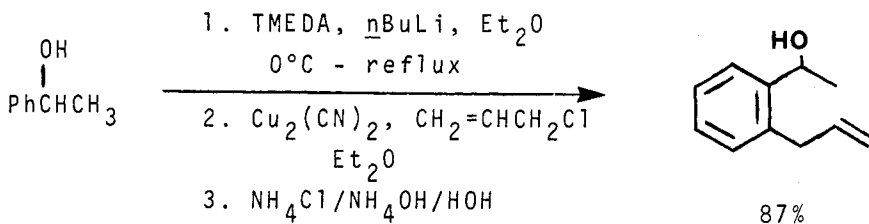


Tsai, D.J.S.; Matteson, D.S. Organometallics, (1983), 2, 236



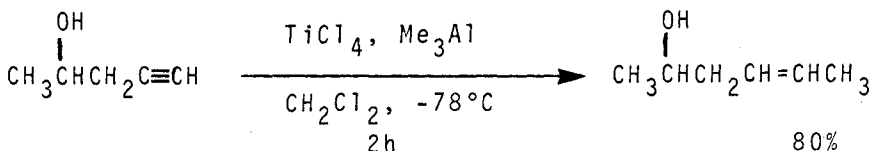
Imwinkelried, R.; Seebach, D.*

Angew Chem Int Ed Engl, (1985), 24, 765



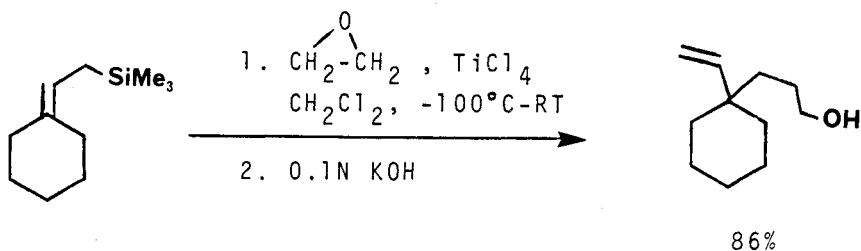
Taber, D.F.*; Dunn, B.S.; Mack, J.F.; Saleh, S.A.

J Org Chem, (1985), 50, 1987

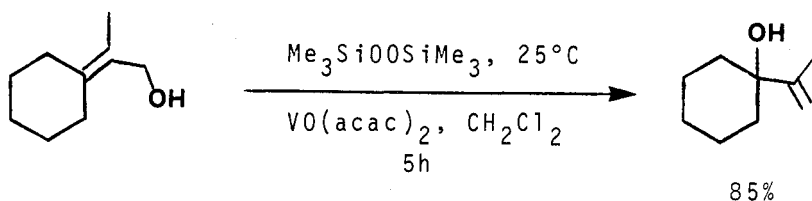


Ewing, J.C.; Ferguson, G.S.; Moore, D.W.; Schultz, F.W.;
Thompson, D.W.*

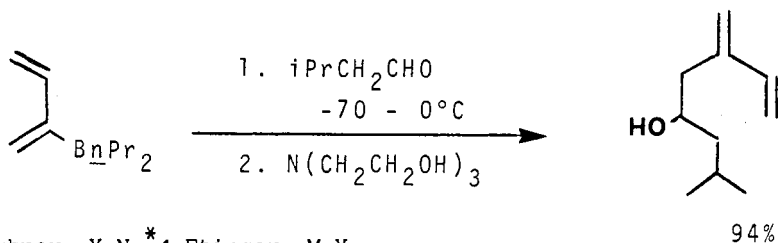
J Org Chem, (1985), 50, 2124



Carr, S.A.; Weber, W.P.* J Org Chem, (1985), 50, 2782

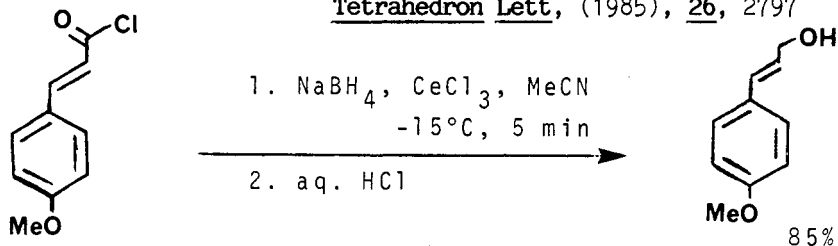


Matsubara, S.; Okazoe, T.; Oshima, K.; Takai, K.*; Nozaki, H.
Bull Chem Soc Jpn, (1985), 58, 844



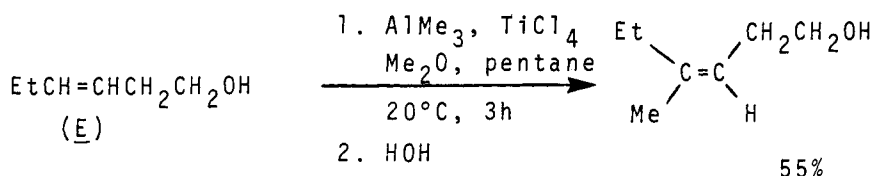
Bubnov, Y.N.*; Etinger, M.Yu.

Tetrahedron Lett, (1985), 26, 2797

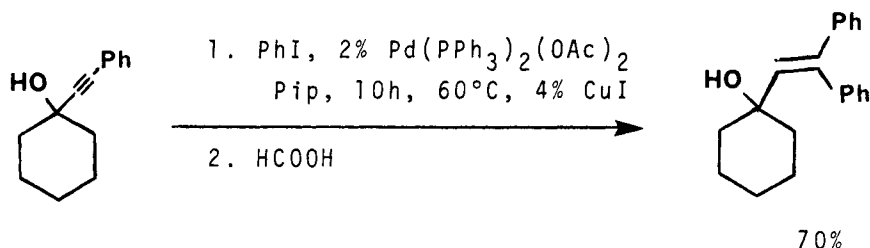


Lakshmy, K.V.; Mehta, P.G.; Sheth, J.P.; Trivedi, G.K.*

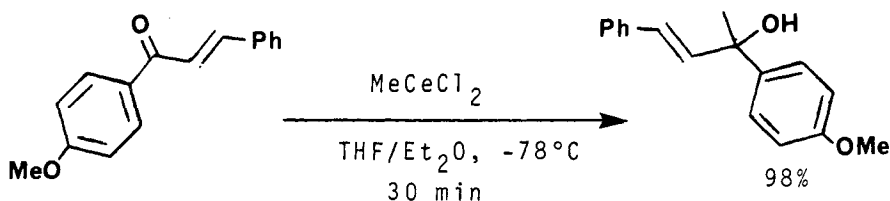
Org Prep Proc Int, (1985), 17, 251



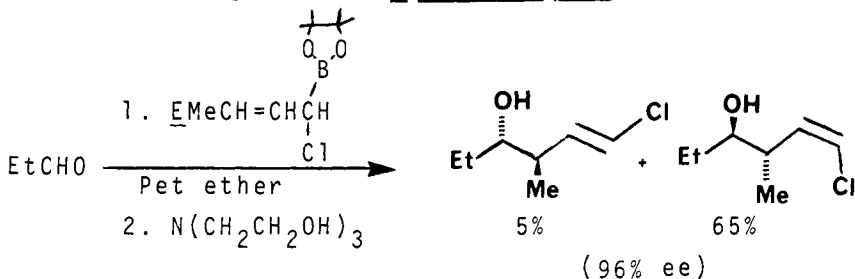
Moret, E.; Schlosser, M.* Tetrahedron Lett., (1985), 26, 4423



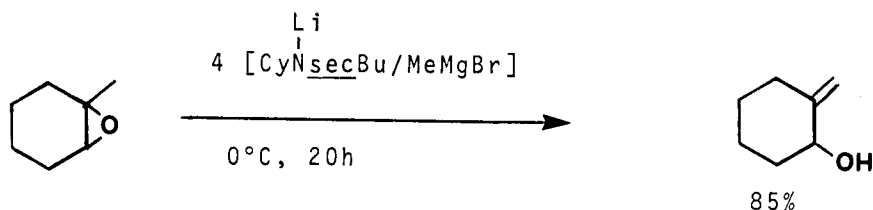
Arcadi, A.; Cacchi, S.*; Marinelli, F.
Tetrahedron, (1985), 41, 5121



Imamoto, T.*; Sugiura, Y. J Organomet Chem, (1985), 285, c021

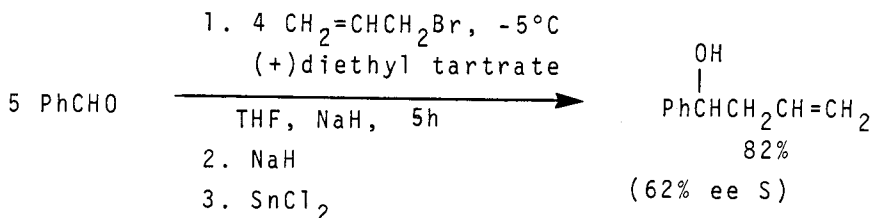


Hoffmann, R.W.*; Dresely, S.
Angew Chem Int Ed Engl, (1986), 25, 189



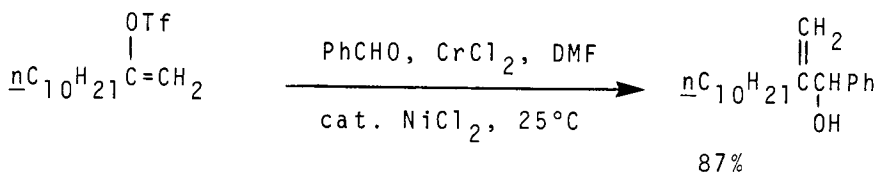
Masset, P.; Manna, S.; Viala, J.; Falck, J.R.*

Tetrahedron Lett., (1986), 27, 299



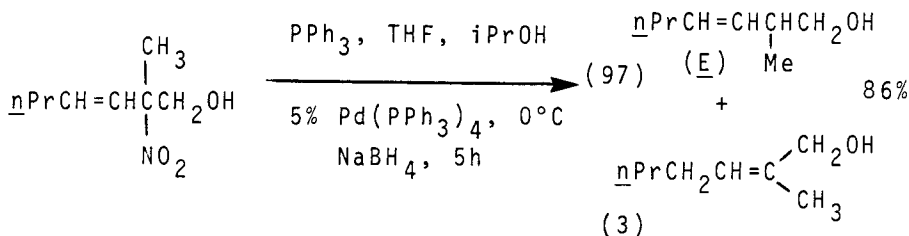
Boldrini, G.P.; Tagliavini, E.; Trombini, C.; Umani-Ronchi, A.

JCS Chem Comm., (1986), 685



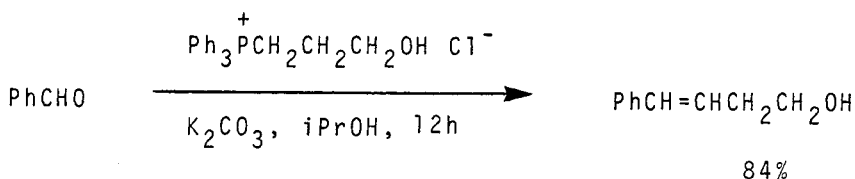
Takai, K.*; Tagashira, M.; Kuroda, T.; Oshima, K.; Utimoto, K.; Nozaki, H.

J Am Chem Soc., (1986), 108, 6048



Ono, N.*; Hamamoto, I.; Kamimura, A.; Kaji, A.

J Org Chem., (1986), 51, 3734



Cheik-Rouhou, F.; Le Bigot, Y.; El Gharbi, R.; Delmas, M.*; Gaset, A.

Syn Commun, (1986), 16, 1617

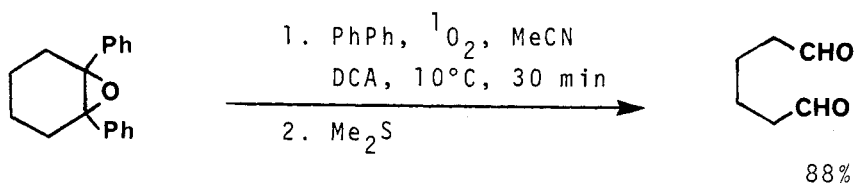
Review: "Double Asymmetric Synthesis and a New Strategy for Stereochemical Control In Organic Synthesis"

Masamune, S.*; Choy, W.; Petersen, J.S.; Suta, L.R.

Angew Chem Int Ed Engl, (1985), 24, 1

Also via: Acetylenes-Alcohols (Section 302)

SECTION 333: Aldehyde - Aldehyde



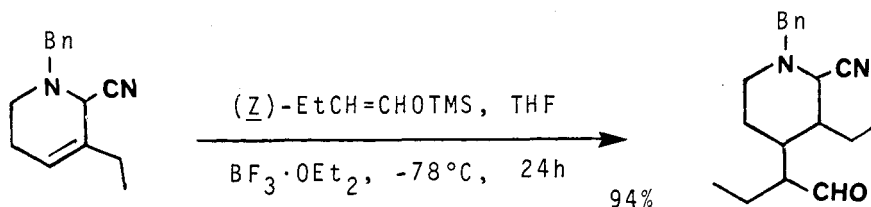
DCA = 9,10-dicyanoanthracene

Schaap, A.P.*; Siddiqui, S.; Prasad, G.; Palomino, E.; Sandison, M.

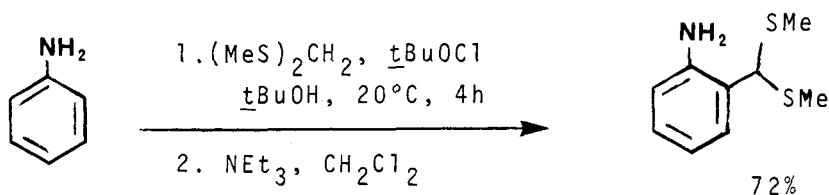
Tetrahedron, (1985), 41, 2229

SECTION 334: Aldehyde - Amide

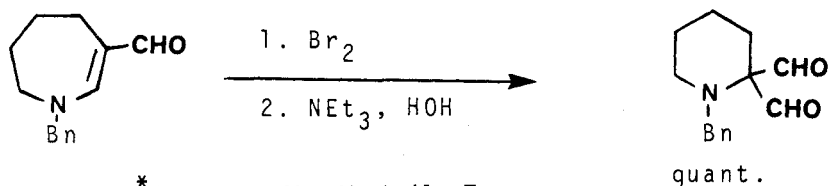
No Additional Examples

SECTION 335: Ald - Amine

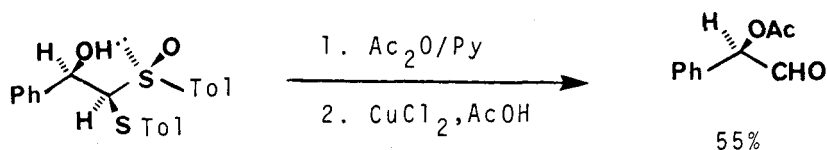
Koskinen, A.; Lounasmaa, M.* JCS Chem Comm, (1983), 821



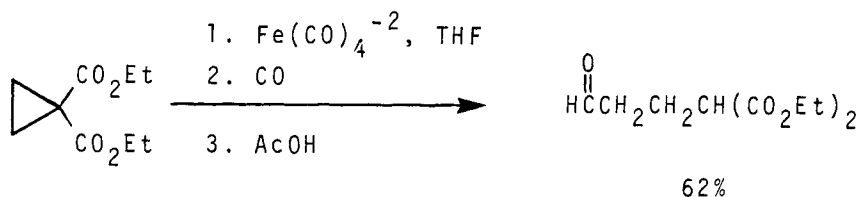
Claus, P.K.*; Jäger, E.; Setzer, A. Monatsh Chem, (1985), 116, 1017



Duhamel, P.*; Kotera, M.; Montell, T. Bull Chem Soc Jpn, (1986), 59, 2353

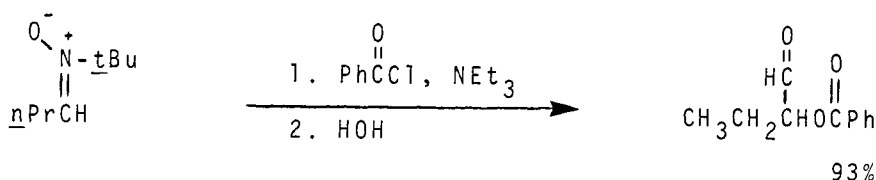
SECTION 336: Aldehyde - Ester

Ogura, K.*; Fujita, M.; Inaba, T.; Takahashi, K.; Iida, H. Tetrahedron Lett, (1983), 24, 503



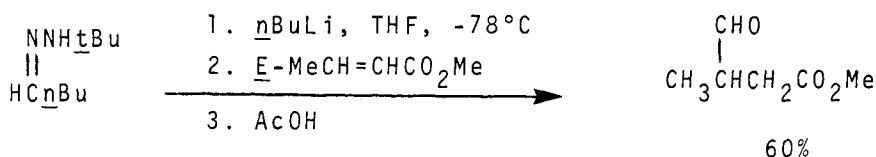
Tamblyn, W.H.*; Waltermire, R.E.

Tetrahedron Lett., (1983), 24, 2803



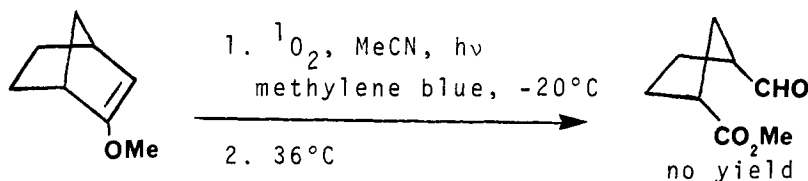
Cummins, C.H.*; Coates, R.M.*

J Org Chem, (1983), 48, 2070



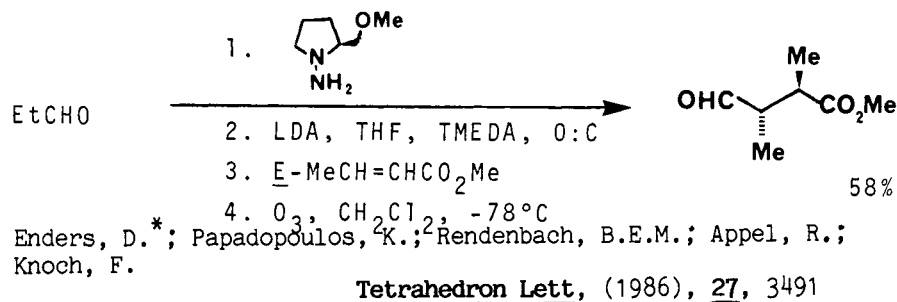
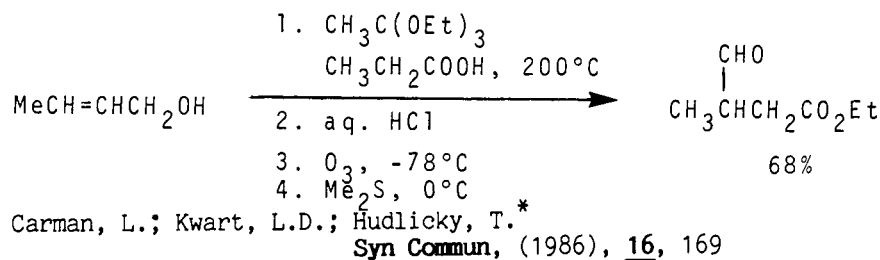
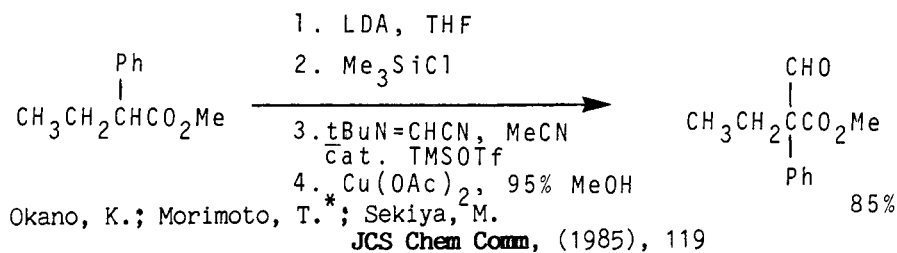
Baldwin, J.E.*; Adlington, R.M.; Bottaro, J.C.; Jain, A.U.;
Kolhe, J.N.; Perry, M.W.D.; Newington, I.M.

JCS Chem Comm, (1984), 1095

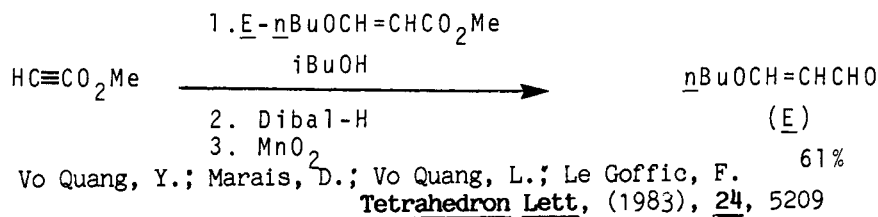


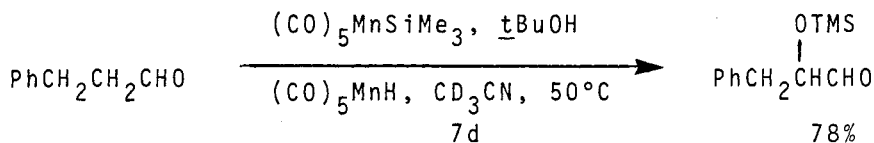
Jefford, C.W.*; Boukouvalas, J.; Kohmoto, S.

Tetrahedron, (1985), 41, 2081



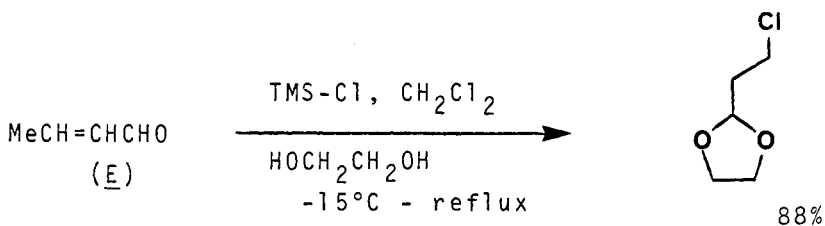
SECTION 337: Aldehyde - Ether, Epoxide, Thioether



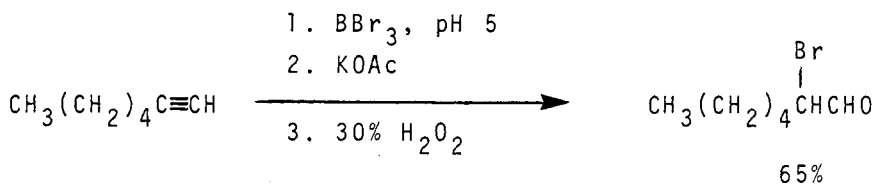


Brinkman, K.C.; Gladysz, J.A.* Organometallics, (1984), 3, 147

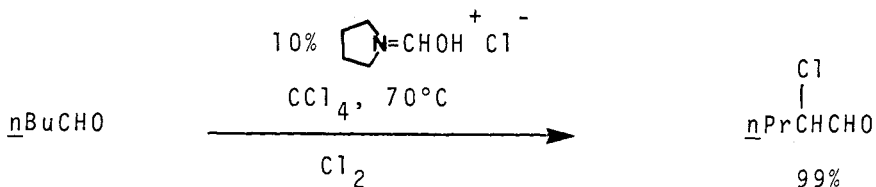
SECTION 338: Aldehyde - Halide, Sulfonate



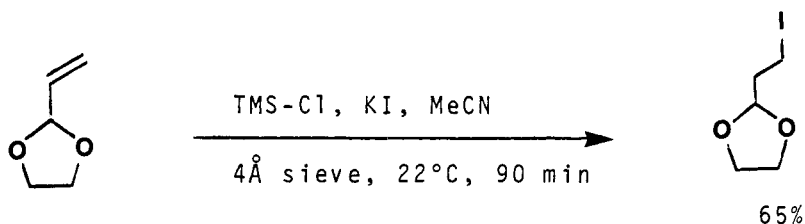
Gil, G.* Tetrahedron Lett., (1984), 25, 3805



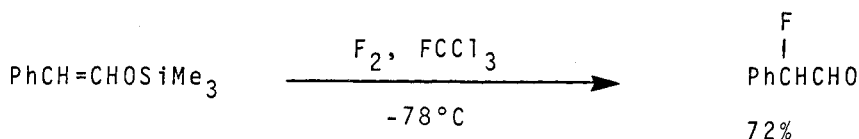
Sato, Y.; Tayano, T.; Koshino, H.; Hara, S.; Suzuki, A.
Synthesis, (1985), 406



Pews, R.G.*; Lysenko, Z.* Syn Commun, (1985), 15, 977

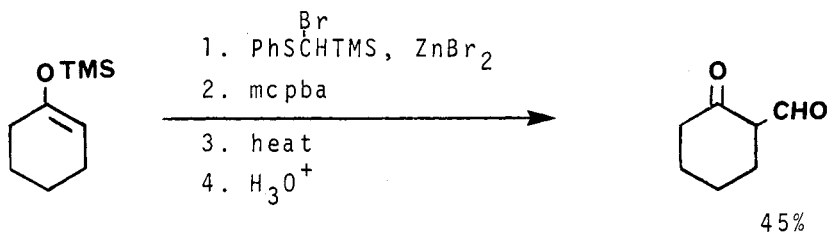


Feringa, B.L.* Syn Commun, (1985), 15, 87

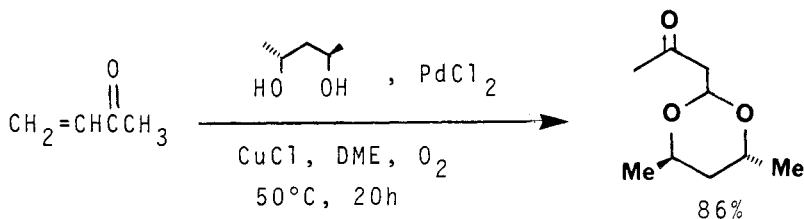


Purrington, S.T.*; Lazaridis, N.V.; Bumgardner, C.L.*
Tetrahedron Lett, (1986), 27, 2715

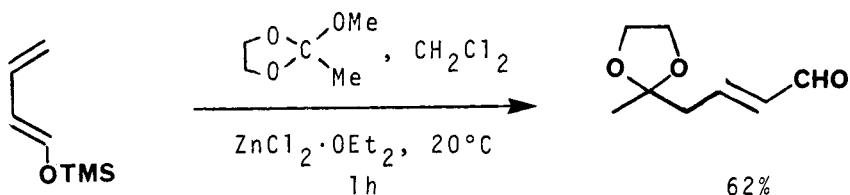
SECTION 339: Aldehyde - Ketone



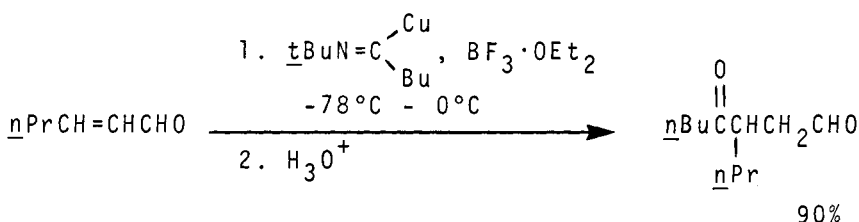
Ager, D.J.* Tetrahedron Lett, (1983), 24, 419



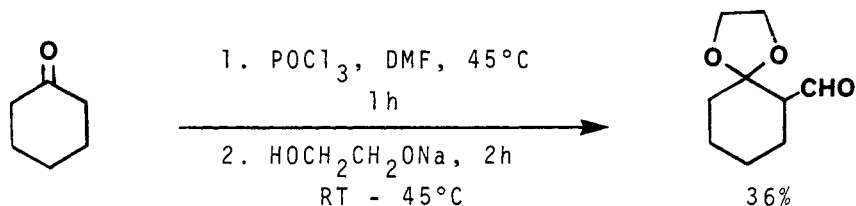
Hosokawa, T.*; Ohta, T.; Murahashi, S.I.*
JCS Chem Comm, (1983), 848



Akgün, E.; Pindur, U.* Synthesis, (1984), 227



Ito, Y.; Imai, H.; Matsuura, T.; Saegusa, T.*
Tetrahedron Lett., (1984), 25, 3091



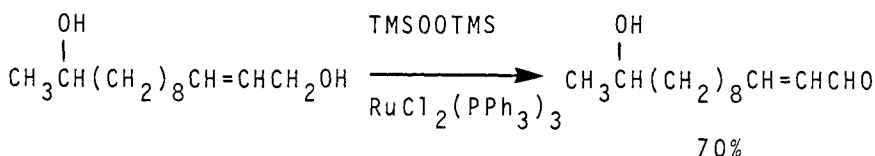
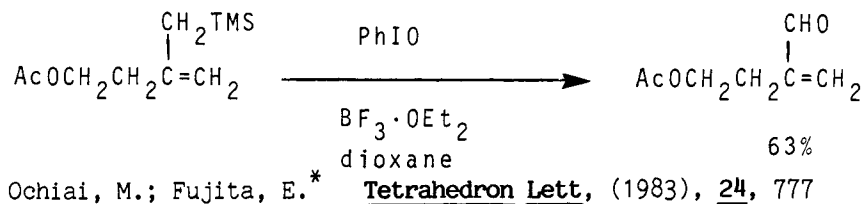
Huet, F.* Synthesis, (1985), 496

SECTION 340: Aldehyde - Nitrile

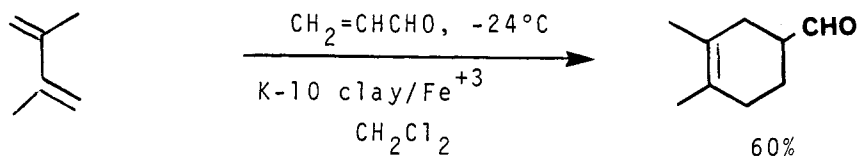
No Additional Examples

SECTION 341: Aldehyde - Olefin

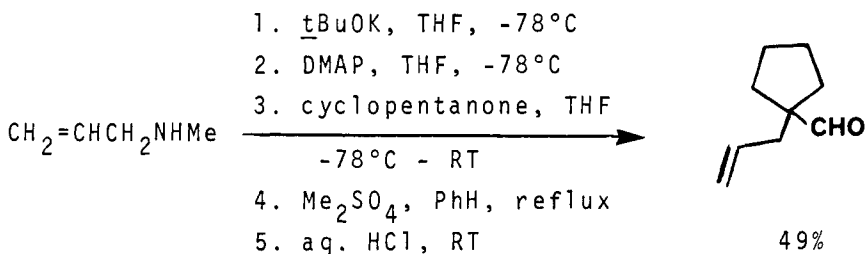
For the oxidation of allylic alcohols to olefinic aldehydes see also Section 48 (Aldehydes from Alcohols).



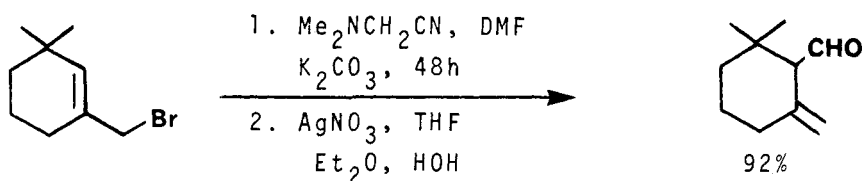
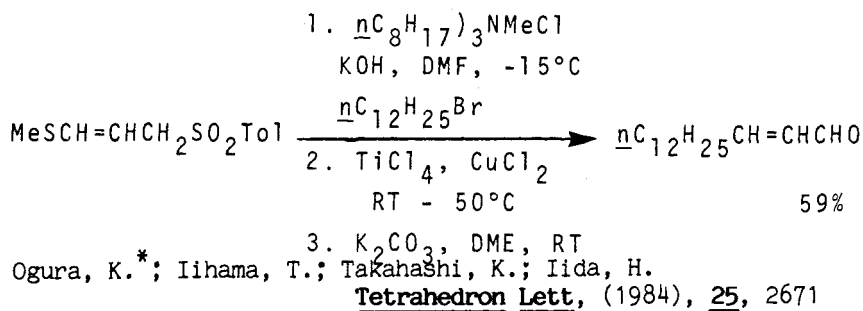
Kanemoto, S.; Oshima, K.*; Matsubara, S.; Takai, K.
Tetrahedron Lett., (1983), 24, 2185



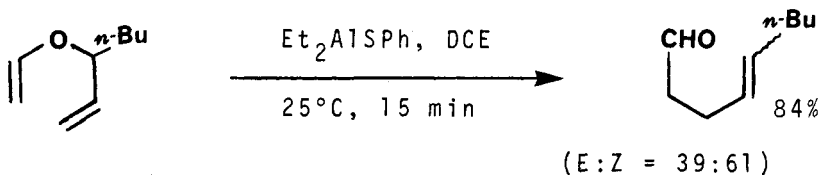
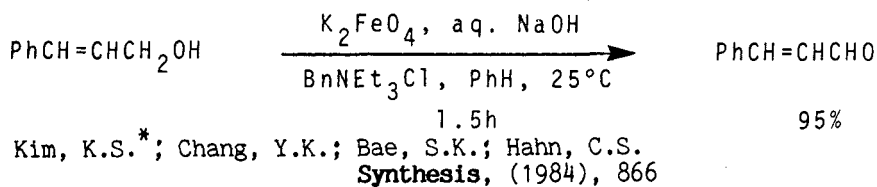
Laszlo, P.*; Lucchetti, J. Tetrahedron Lett., (1984), 25, 2147



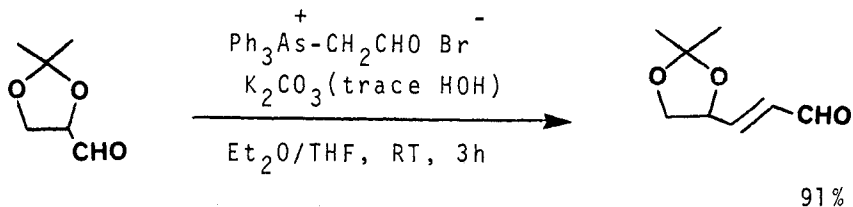
Gilbert, J.C.*; Senaratne, K.P.A.
Tetrahedron Lett., (1984), 25, 2303



Stela, L.* Tetrahedron Lett., (1984), 25, 3457

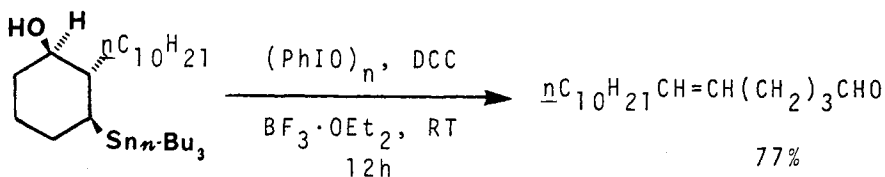


Takai, K.; Mori, I.; Oshima, K.*; Nozaki, H.
Bull Chem Soc Jpn., (1984), 57, 446



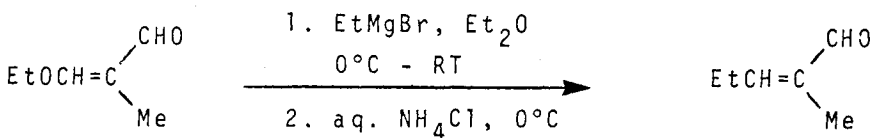
Huang, Y.*; Shi, L.; Yang, J.

Tetrahedron Lett., (1985), 26, 6447



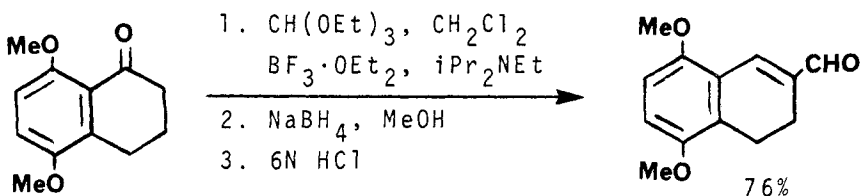
Ochiai, M.; Ukita, T.; Nagao, Y.; Fujita, E.

JCS Chem Comm., (1985), 637



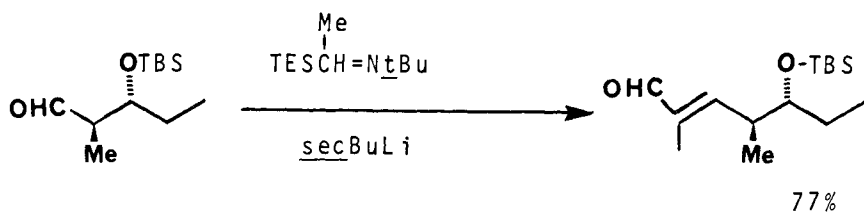
Spangler, C.W.*; Tan, R.P.K.; Gibson, R.S.; McCoy, R.K.

Syn Commun., (1985), 15, 371

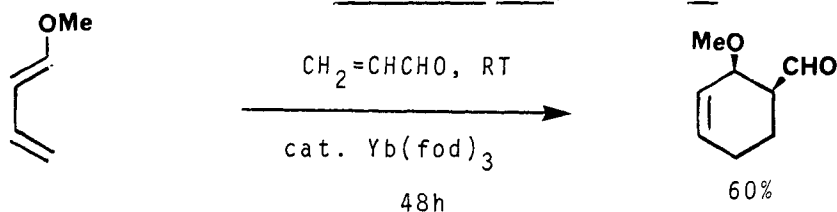


DasGupta, R.; Ghatak, U.R.*

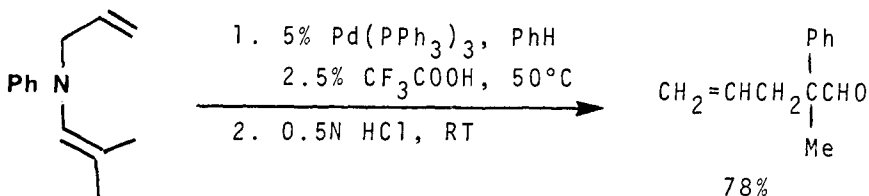
Tetrahedron Lett., (1985), 26, 1581



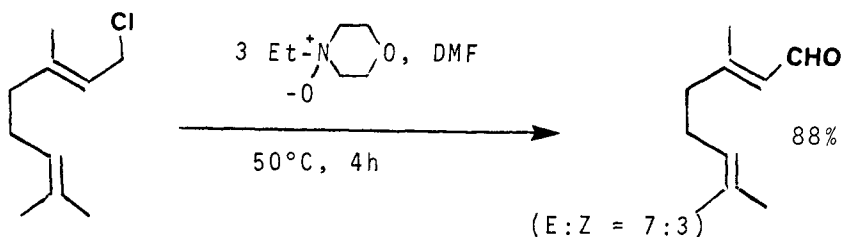
Schlessinger, R.H.*; Poss, M.A.; Richardson, S.; Lin, P.
Tetrahedron Lett., (1985), 26, 2391



Danishefsky, S.*; Bednarski, M.
Tetrahedron Lett., (1985), 26, 2507

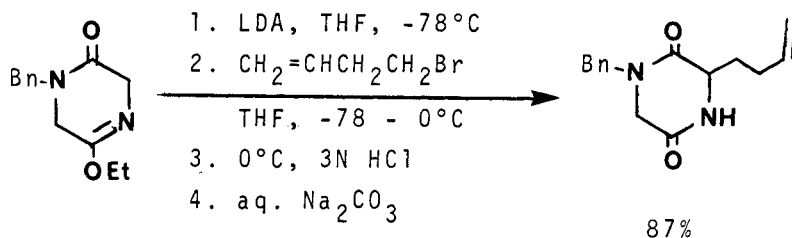


Murahashi, S.*; Makabe, Y. Tetrahedron Lett., (1985), 26, 5563

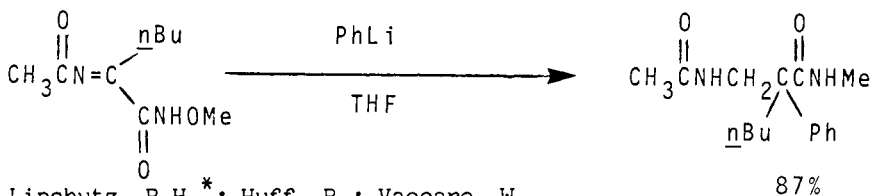


Suzuki, S.; Onishi, T.; Fujita, Y.; Misawa, H.; Otera, J.*
Bull Chem Soc Jpn., (1986), 59, 3287

Also via: β -hydroxyaldehydes (Section 324)

SECTION 342: Amide - Amide

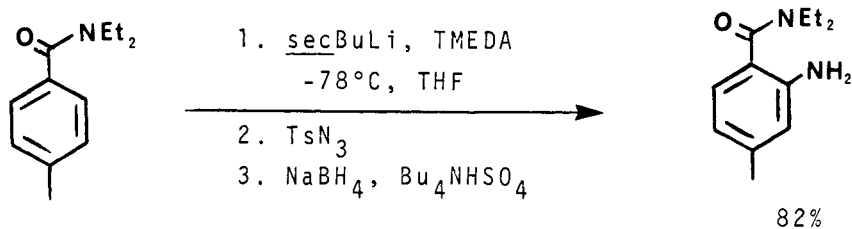
Fukuyama, T.*; Frank, R.K.; Laird, A.A.

Tetrahedron Lett., (1985), 26, 2955

Lipshutz, B.H.*; Huff, B.; Vaccaro, W.

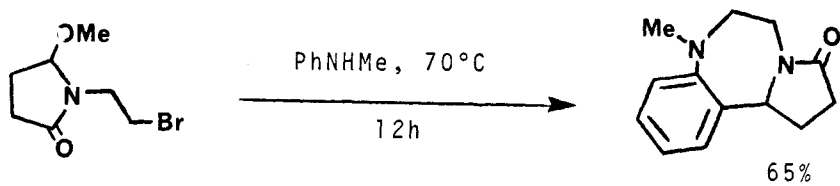
Tetrahedron Lett., (1986), 27, 4241

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

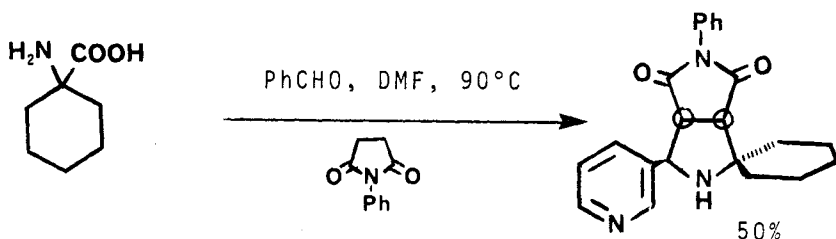
SECTION 343: Amide - Amine

Reed, J.N.; Snieckus, V.*

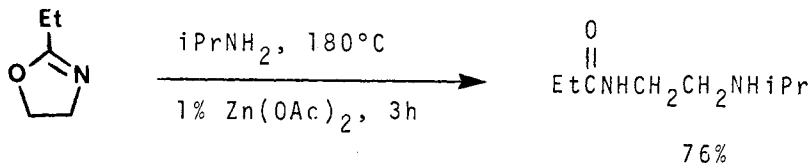
Tetrahedron Lett., (1983), 24, 3795



Kraus, G.A.*; Yue, S. J Org Chem, (1983), 48, 2936

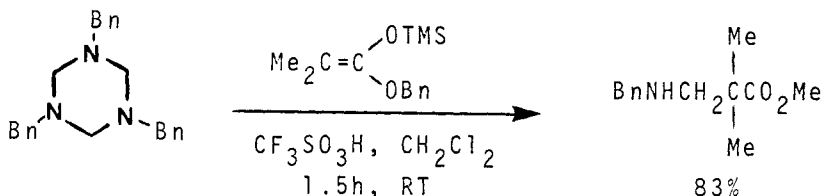


Grigg, R.*; Aly, M.F.; Sridharan, V.; Thianpatanagul, S.
JCS Chem Comm, (1984), 182

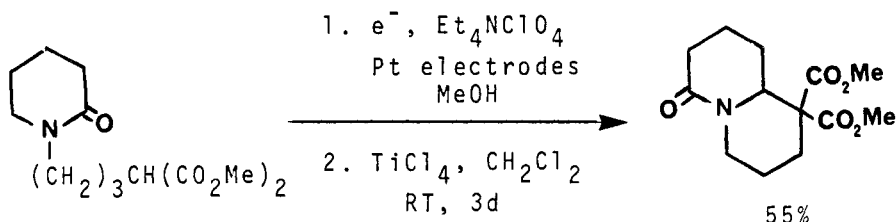


Fazio, M.J.* J Org Chem, (1984), 49, 4889

SECTION 344: Amide - Ester

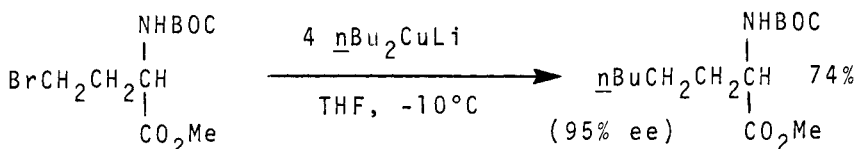


Ikeda, K.; Achiwa, K.; Sekiya, M.
Tetrahedron Lett, (1983), 24, 913



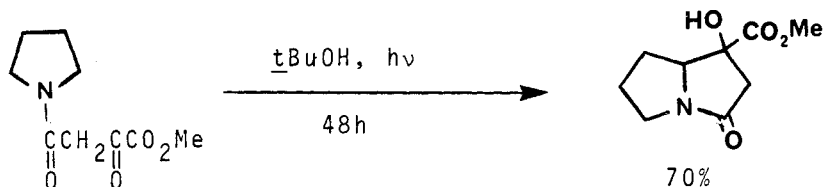
Okita, M.; Wakamatsu, T.; Ban, Y.*

Heterocycles, (1983), 20, 401



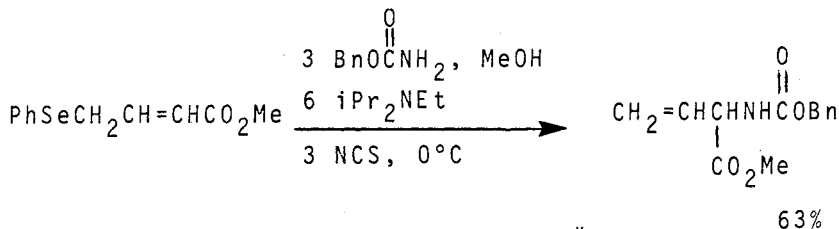
Bajgrowicz, J.A.*; El Hallaouri, A.; Jacquier, R.*; Pigiere, Ch.;
 Viallefont, Ph.*

Tetrahedron Lett., (1984), 25, 2231



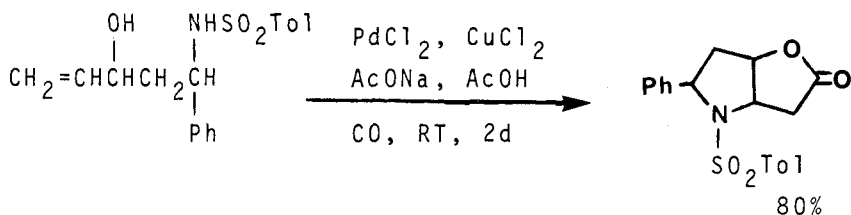
Gramain, J.-C.*; Remuson, R.; Vallée, D.

J Org Chem, (1985), 50, 710

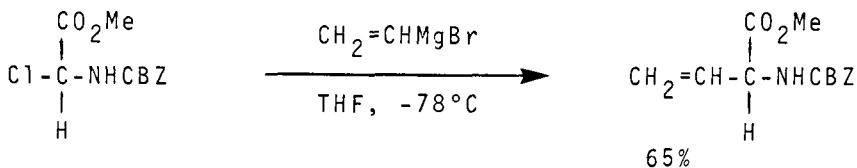


Fitzner, J.N.; Pratt, D.V.; Hopkins, P.B.*

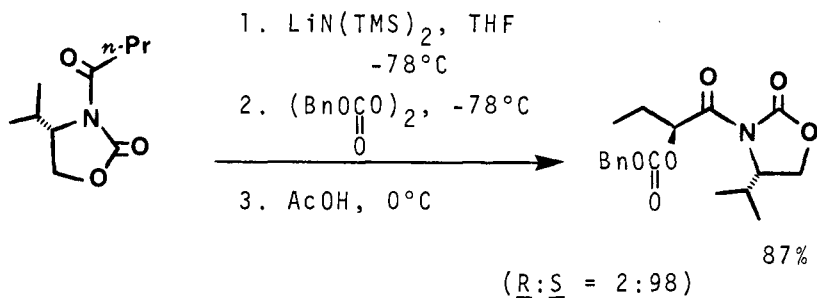
Tetrahedron Lett., (1985), 26, 1959



Tamaru, Y.; Kobayashi, T.; Kawamura, S.; Ochiai, H.; Yoshida, Z.
Tetrahedron Lett., (1985), 26, 4479

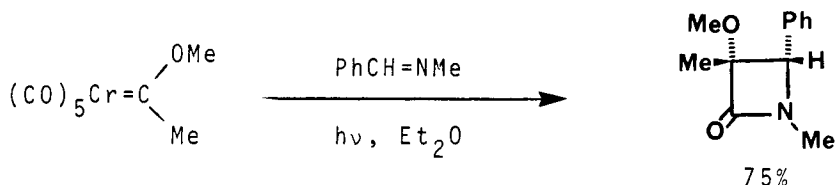


Castelhano, A.L.*; Horne, S.; Billedeau, R.; Krantz, A.*
Tetrahedron Lett., (1986), 27, 2435



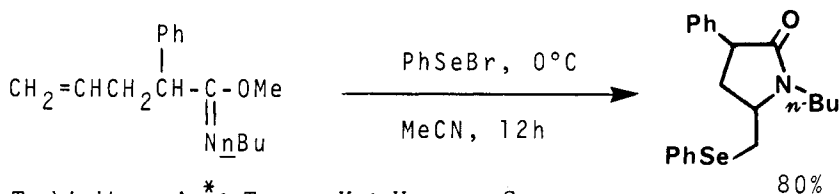
Gore, M.D.; Vederas, J.C.* J Org Chem., (1986), 51, 3700

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

SECTION 345: Amide - Ether, Epoxide, Thioether

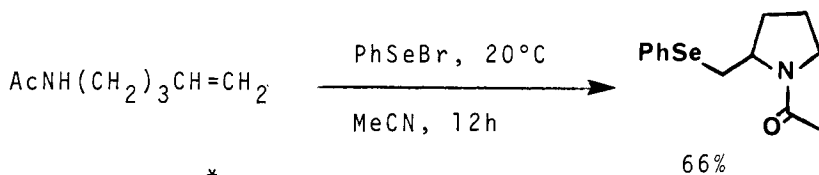
Hegedus, L.S.*; McGuire, M.A.; Schultze, L.M.; Yijun, C.; Anderson, O.P.

J Am Chem Soc, (1984), 106, 2680



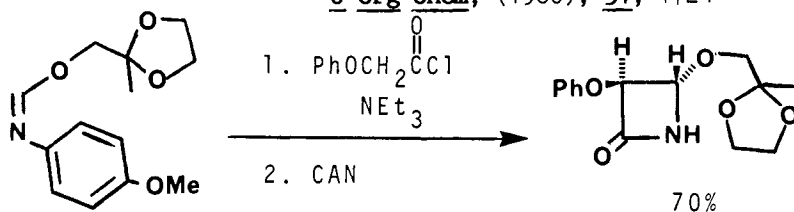
Toshimitsu, A.*; Terao, K.; Uemura, S.

JCS Chem Comm, (1986), 530



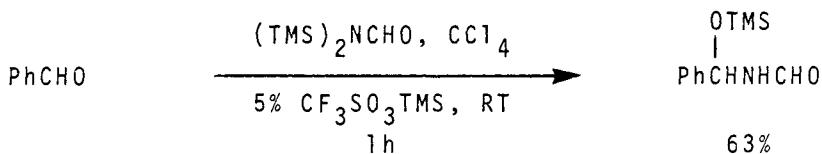
Toshimitsu, A.*; Terao, K.; Uemura, S.

J Org Chem, (1986), 51, 1724



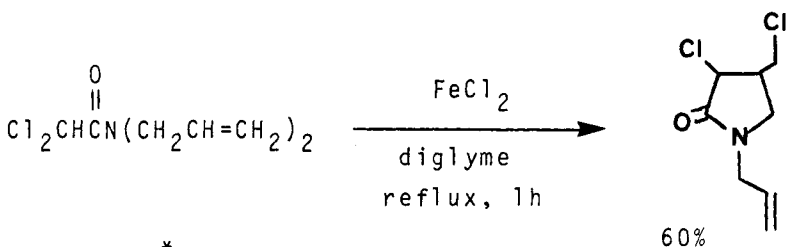
Antonini, I.; Cardellini, M.; Claudi, F.*; Moracci, F.M.

Synthesis, (1986), 379

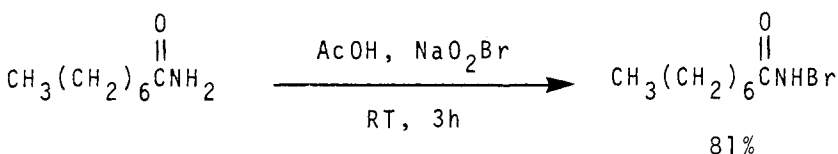


Johnson, A.P.*; Luke, R.W.A.; Steele, R.W.
JCS Chem Comm, (1986), 1658

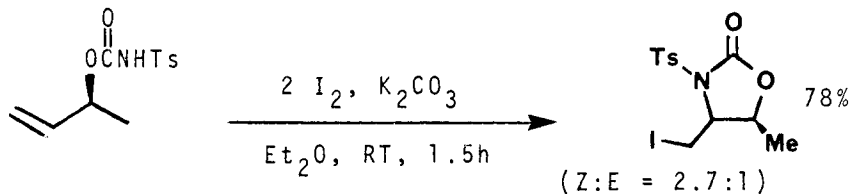
SECTION 346: Amide - Halide, Sulfonate



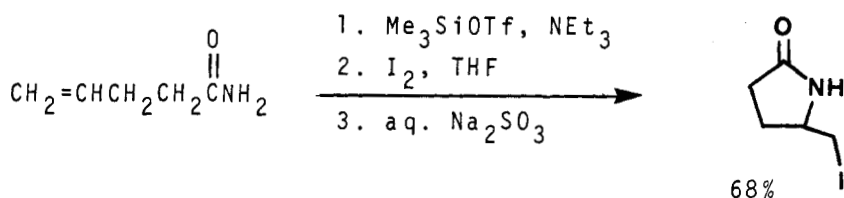
Tseng, C.K.*; Teach, E.G.; Simons, R.W.
Syn Commun, (1984), 14, 1027



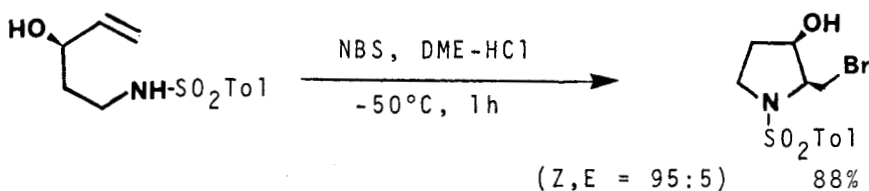
Kajigaeshi, S.*; Nakagawa, T.; Fujisaki, S.
Chem Lett, (1984), 2045



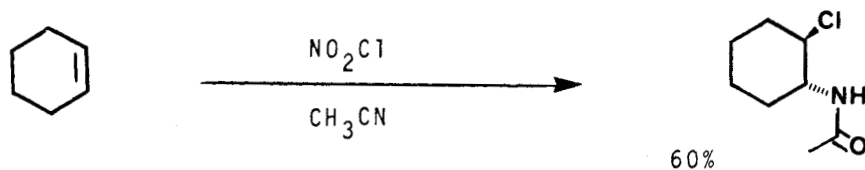
Hirama, M.*; Iwashita, M.; Yamazuki, Y.; Ito, S.*
Tetrahedron Lett, (1984), 25, 4963



Knapp, S.*; Rodriques, K.E. Tetrahedron Lett., (1985), 26, 1803

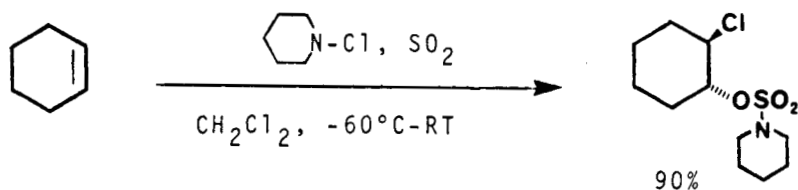


Tamaru, Y.; Kawamura, S.; Tanaka, K.; Yoshida, Z.*
Tetrahedron Lett., (1984), 25, 1063

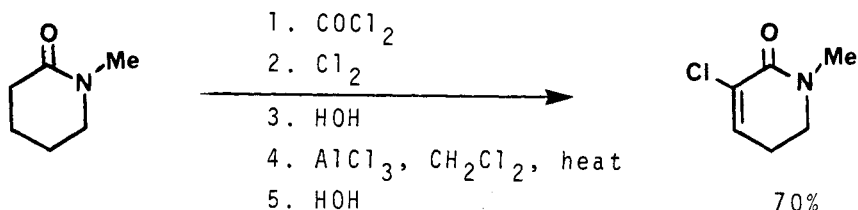


Zyk, N.V.; Nikulin, A.V.; Kolbasenko, S.I.; Kutateladze, A.G.;
 Zefirov, N.S.

J Org Chem USSR, (1984), 20, 1209

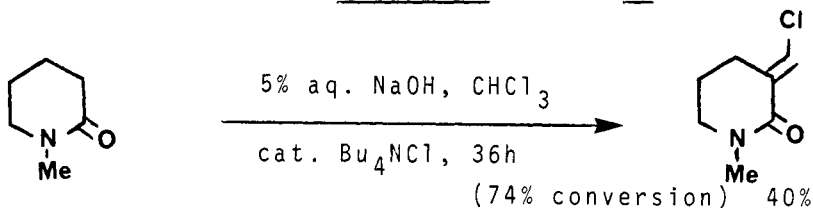


Zefirov, N.S.*; Zyk, N.V.; Kolbasenko, S.I.; Kutaleladze, A.G.
J Org Chem, (1985), 50, 4539



Lambert, C.; Caillaux, B.; Viehe, H.G.*

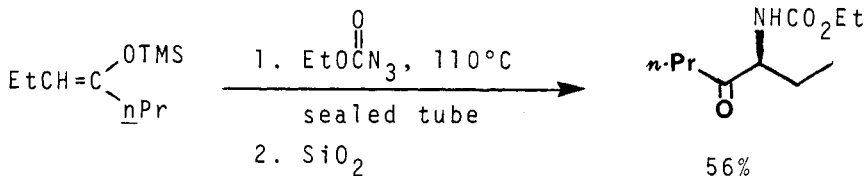
Tetrahedron, (1985), 41, 3331



Marcos, M.; Castro, J.L.; Castedo, L.; Riguera, R.*

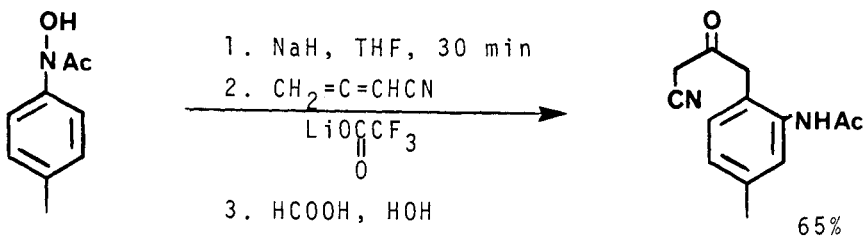
Tetrahedron, (1986), 42, 649

SECTION 347: Amide - Ketone



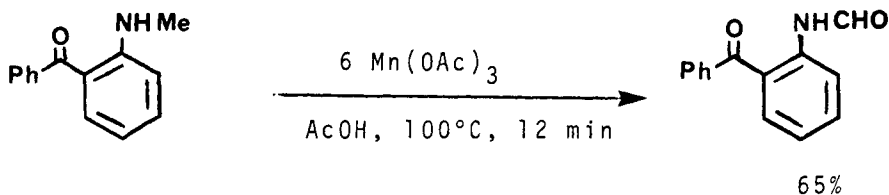
Lociuro, S.; Pellacani, L.*; Tardella, P.A.

Tetrahedron Lett, (1983), 24, 593

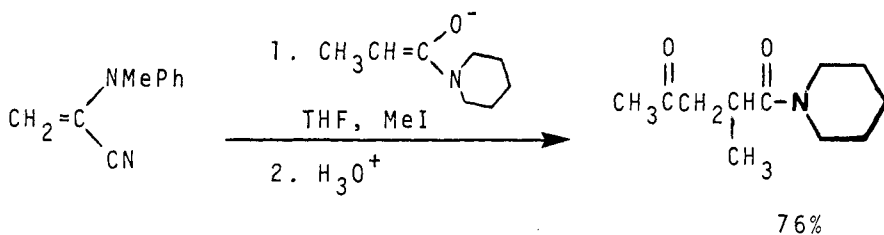


Blechert, S.*

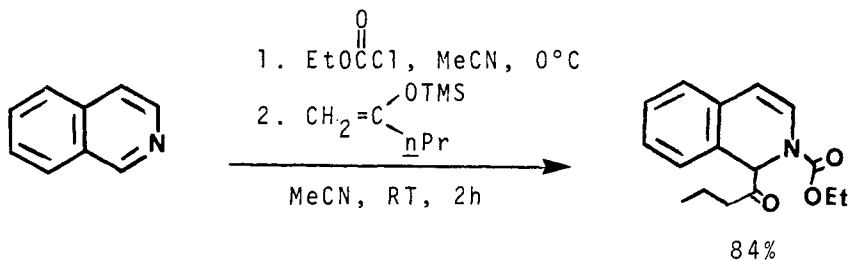
Helv Chim Acta, (1983), 68, 1835



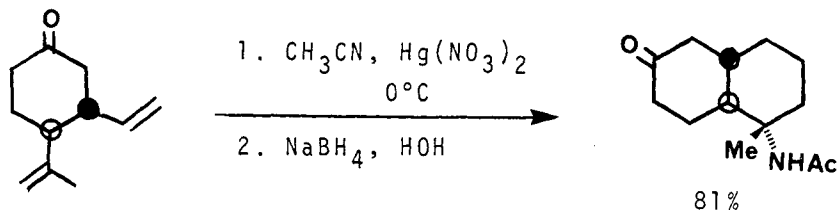
Nishino, H.*; Kurosawa, K. Bull Chem Soc Jpn, (1983), 56, 1682



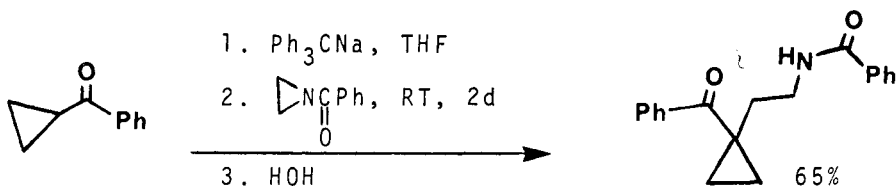
Ahlbrecht, H.*; Dietz, M. **Synthesis**, (1985), 417



Akiba, K.*; Nakatani, M.; Wada, M.; Yamamoto, Y.
J Org Chem, (1985), 50, 63

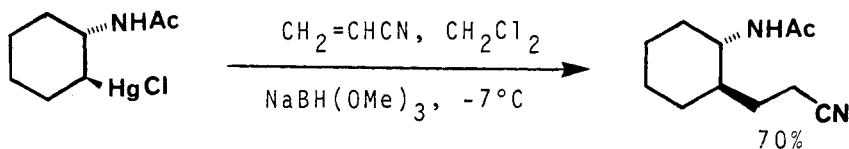


Stevens, R.V.*; Albizati, K.F. **J Org Chem**, (1985), **50**, 632

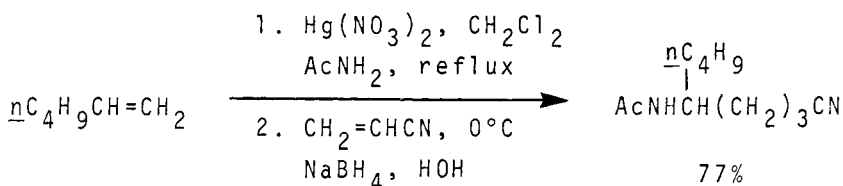


Stamm, H.*; Weiss, R. Synthesis, (1986), 392

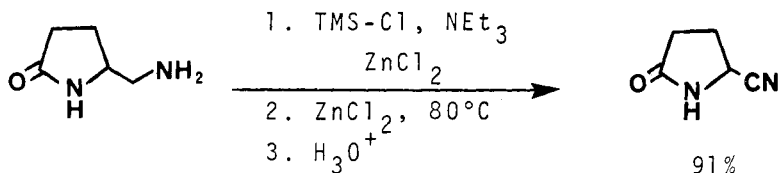
SECTION 348: Amide - Nitrile



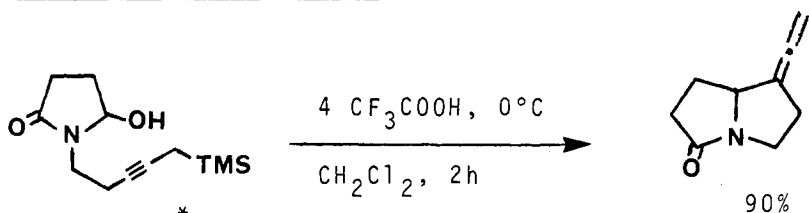
(Z:E = 4:6)
 Kozikowski, A.P.*; Scripko, J.
Tetrahedron Lett., (1983), 24, 2051



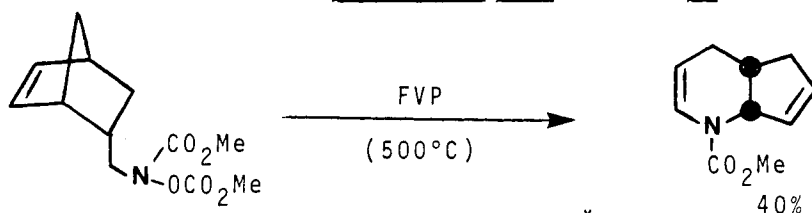
Barluenga, J.*; Ferrera, L.; Nájera, C.; Yus, M.
Synthesis, (1984), 831



Rigo, B.*; Lespagnol, C.; Pauly, M.
J Heterocyclic Chem., (1986), 23, 183

SECTION 349: Amide - Olefin

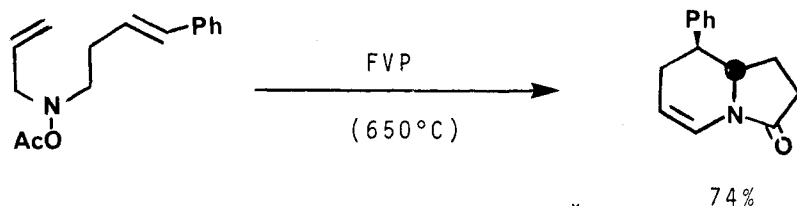
Hiemstra, H.*; Speckamp, W.N.

Tetrahedron Lett., (1983), 24, 1407

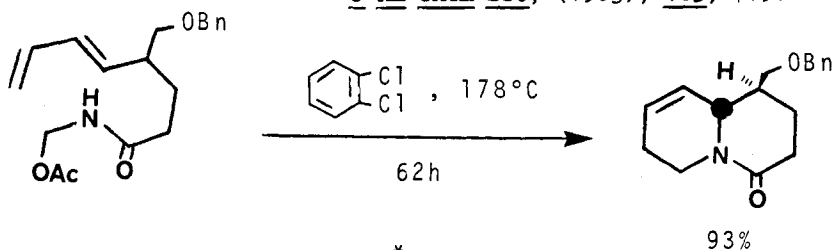
Chu, M.; Wu, P.-L.; Givre, S.; Fowler, F.W.*

Tetrahedron Lett., (1986), 27, 461

Koch, K.; Lin, J.-M.; Fowler, F.W.*

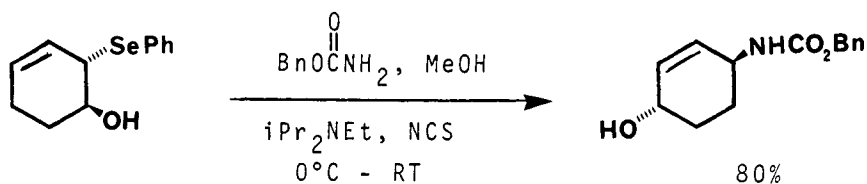
Tetrahedron Lett., (1983), 24, 1581

Cheng, Y.-S.; Lupo Jr., A.T.; Fowler, F.W.*

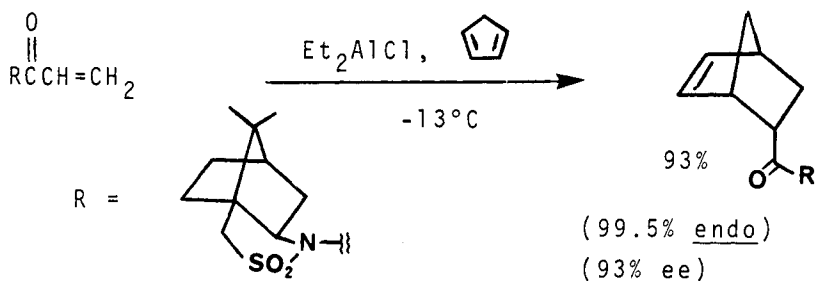
J Am Chem Soc., (1983), 105, 7696

Bremmer, M.L.; Weinreb, S.M.*

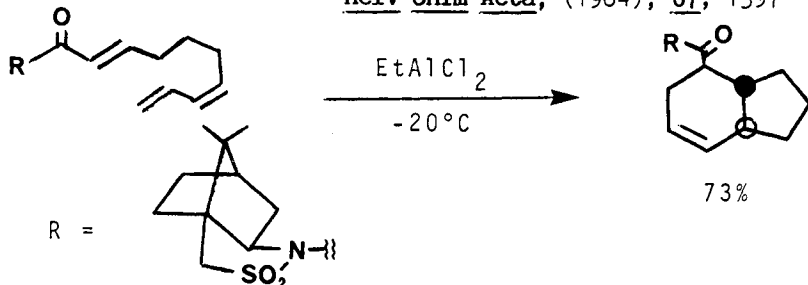
Tetrahedron Lett., (1983), 24, 261



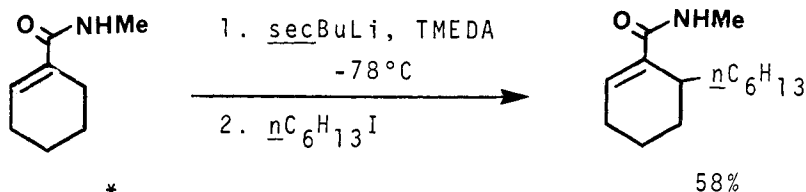
Shea, R.G.; Fitzner, J.N.; Fankhauser, J.E.; Hopkins, P.B.*
J Org Chem, (1984), 49, 3647



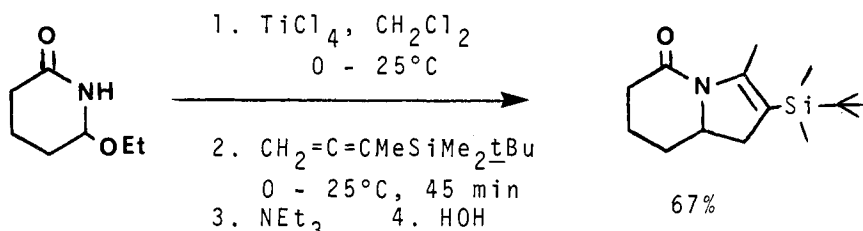
Oppolzer, W.*; Chapuis, C.; Bernardinelli, G.
Helv Chim Acta, (1984), 67, 1397



Oppolzer, W.*; Dupuis, D. Tetrahedron Lett, (1985), 26, 5437

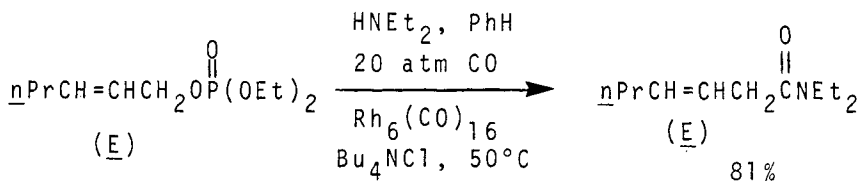


Beak, P.*; Kempf, D.J.; Wilson, K.D.
J Am Chem Soc, (1985), 107, 4745

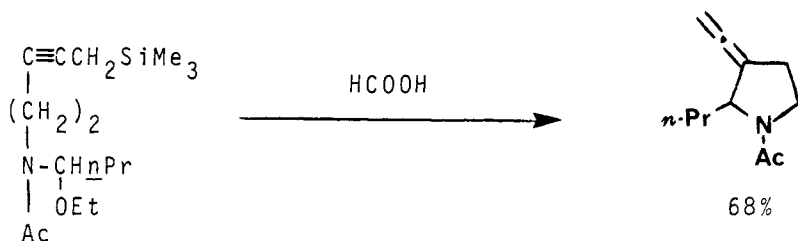


Danheiser, R.L.*; Kwasigroch, C.A.; Tsai, Y.-M.

J Am Chem Soc, (1985), 107, 7233

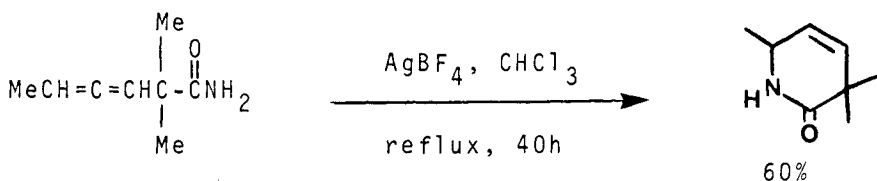


Murahashi, S.*; Imada, Y. Chem Lett, (1985), 1477

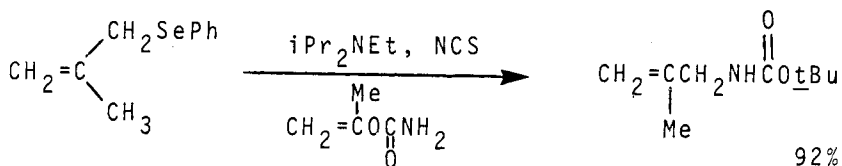


Hiemstra, H.*; Fortgens, H.P.; Stegenga, S.; Speckamp, W.N.*

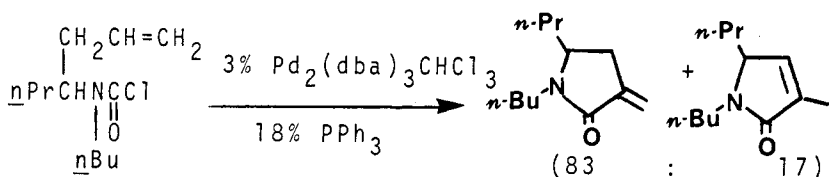
Tetrahedron Lett, (1985), 26, 3151, 3155



Grimaldi, J.*; Cormons, A. Tetrahedron Lett, (1986), 27, 5089



Shea, R.G.; Fitzner, J.N.; Fankhauser, J.E.; Spaltenstein, A.*;
 Carpino, P.A.; Peevey, R.M.; Tenge, B.J.; Hopkins, P.B.
J Org Chem, (1986), 51, 5243



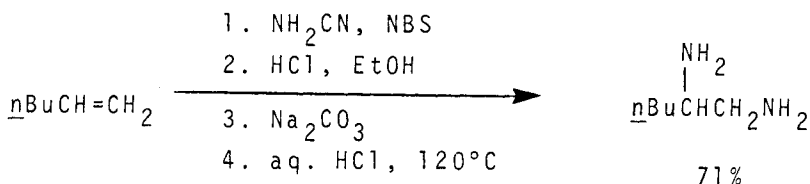
Henin, F.*; Muzart, J.; Pete, J.-P.
Tetrahedron Lett, (1986), 27, 6339

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 Diels Alder Cycloadditions"

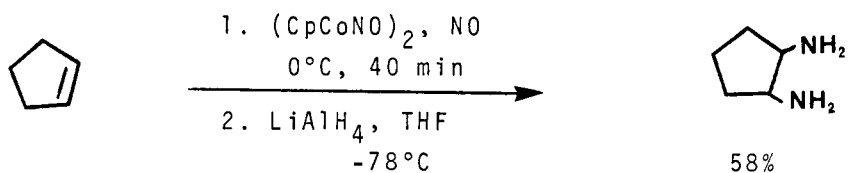
Weinreb, S.M.* Accts Chem Res, (1985), 18, 16

Also via: Olefinic acids (Section 322)

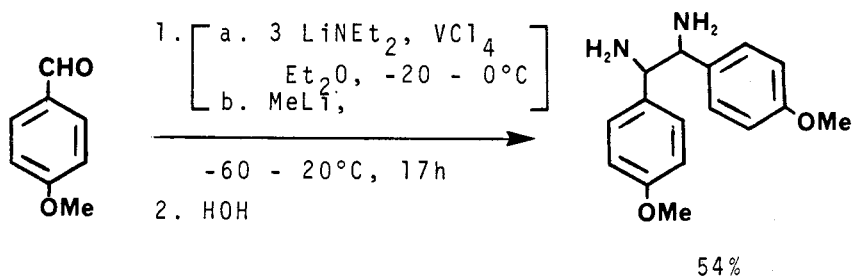
SECTION 350: Amine - Amine



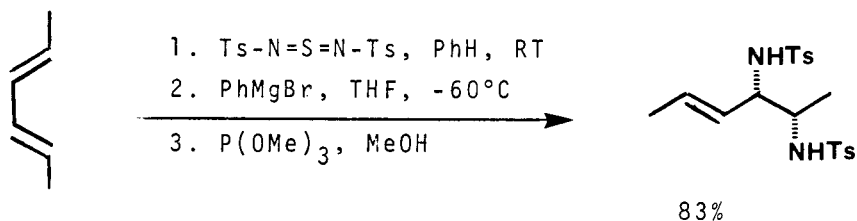
Jung, S.-H.; Kohn, H.*
J Am Chem Soc, (1985), 107, 2931
J Am Chem Soc, (1983), 105, 4106



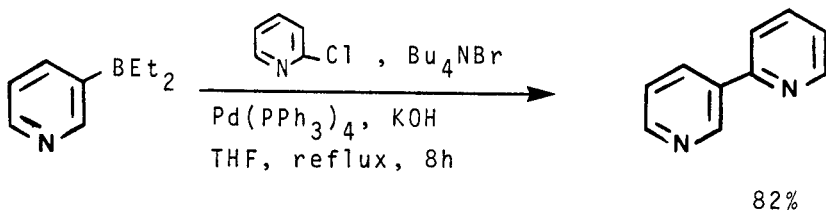
Becker, P.N.; Bergman, R.G.* Organometallics, (1983), **2**, 787



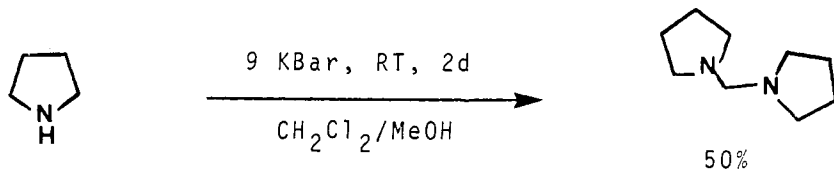
Imwinkelried, R.; Seebach, D.*
Helv Chim Acta, (1984), **67**, 1496



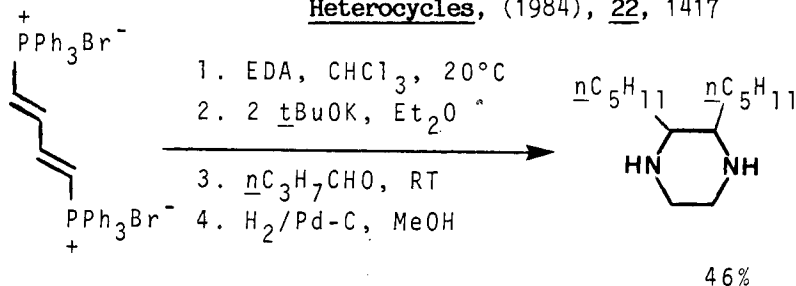
Natsugari, H.; Whittle, R.R.; Weinreb, S.M.*
J Am Chem Soc, (1984), **106**, 7867



Ishikura, M.; Kamada, M.; Terashima, M.*
Synthesis, (1984), 937

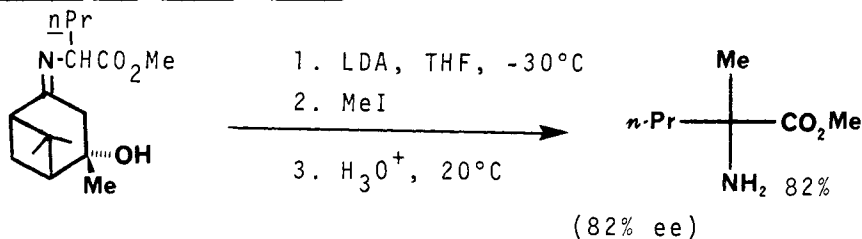


Matsumoto, K.*; Hashimoto, S.; Ikemi, Y.; Otani, S.
Heterocycles, (1984), 22, 1417



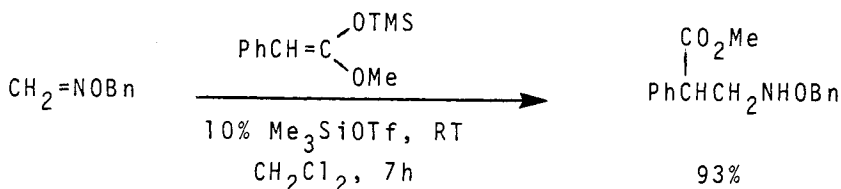
Cristau, H.-J.*; Chiche, L.*; Plenát, F. Synthesis, (1986), 56

SECTION 351: Amine - Ester



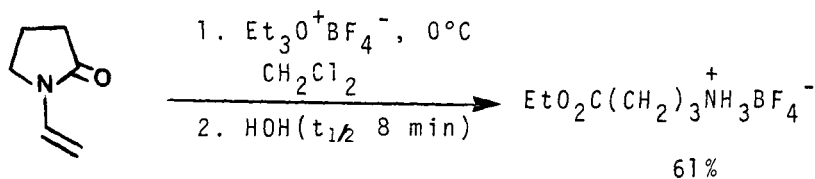
Bajgrowicz, J.A.*; Cossec, B.; Pigiere, C.L.; Jacquier, R.;
 Viallefont, Ph.*

Tetrahedron Lett, (1983), 24, 3721

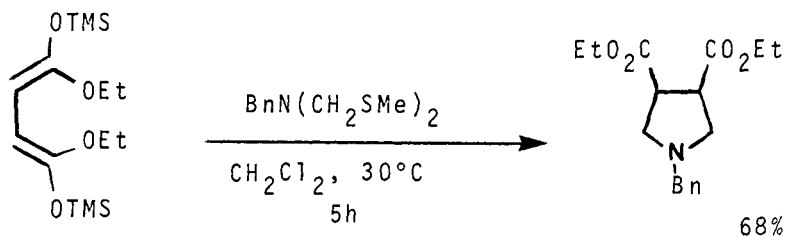


Ikeda, K.; Achiwa, K.; Sekiya, M.

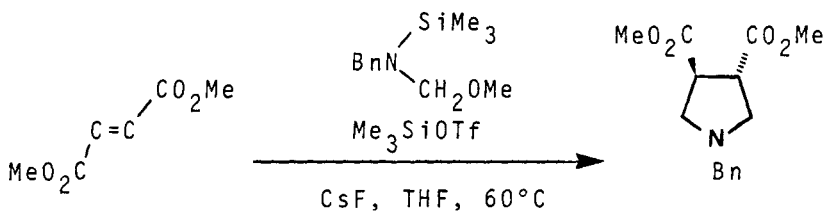
Tetrahedron Lett, (1983), 24, 4707



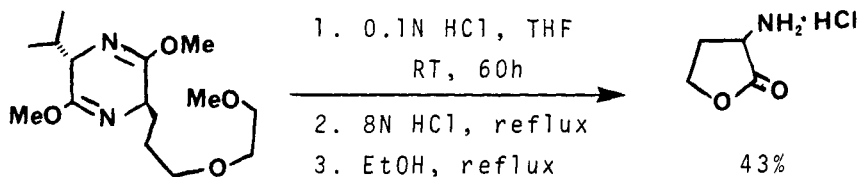
Smith, M.B.*; Shroff, H.N. J Org Chem, (1984), **49**, 2900
Tetrahedron Lett, (1983), **24**, 2091



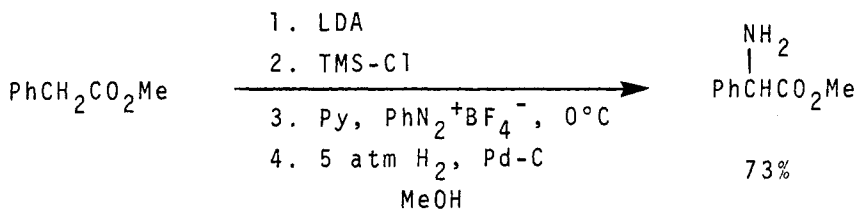
Miyazawa, S.; Ikeda, K.; Achiwa, K.; Sekiya, M.*
Chem Lett, (1984), 785.



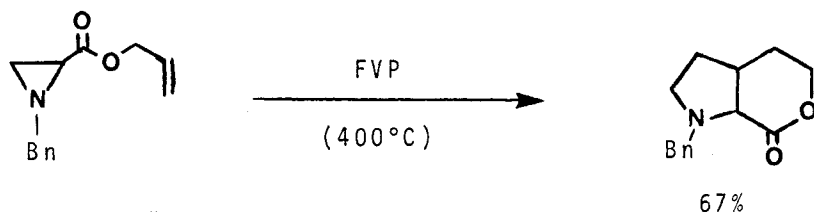
Hosomi, A.*; Sakata, Y.; Sakurai, H.* Chem Lett, (1984), 1117



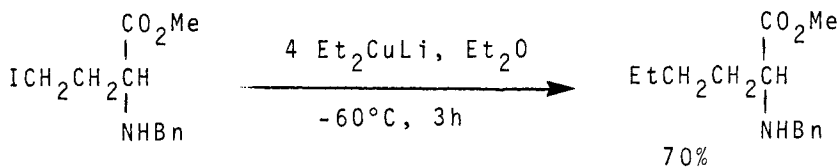
Gull, R.; Schöllkopf, U.* Synthesis, (1985), 1052



Sakakura, T.; Tanaka, M.* JCS Chem Comm, (1985), 1309

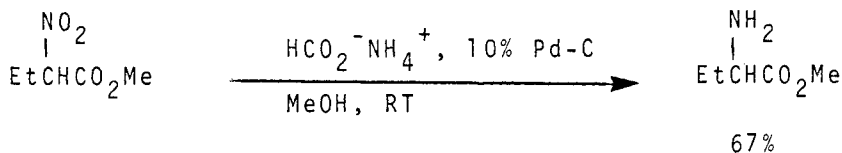


DeShong, P.*; Kell, D.A.; Sidler, D.R.
J Org Chem, (1985), 50, 2309

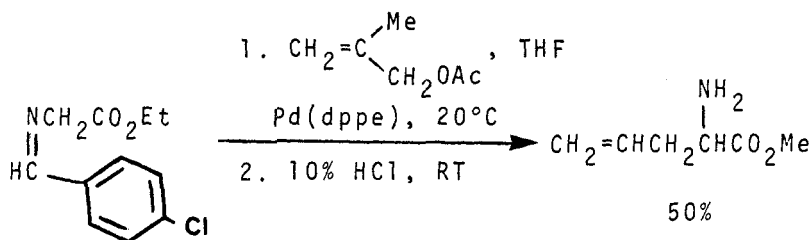


Bajgrowicz, J.A.; El Hallaouri, A.; Jacquier, R.; Pigiere, Ch.;
 Viallefont, Ph.*

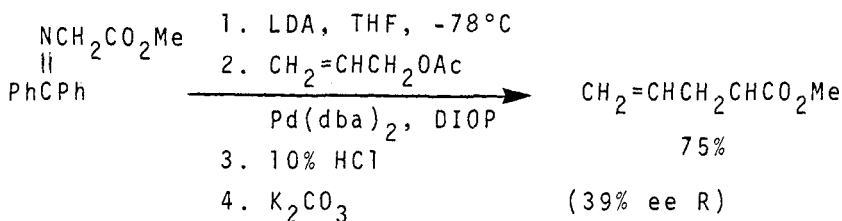
Tetrahedron, (1985), 41, 1833



Ram, S.; Ehrenkauf, R.E.* Synthesis, (1986), 133

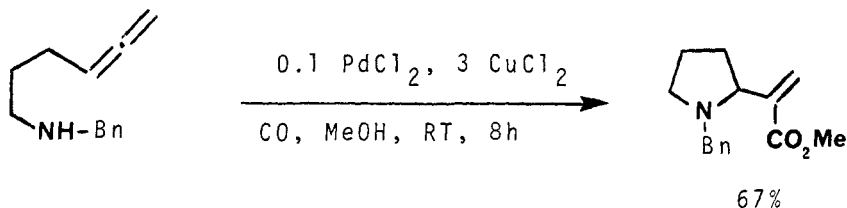


Ferroud, D.; Genet, J.P.*; Kiolle, R.
Tetrahedron Lett., (1986), 27, 23



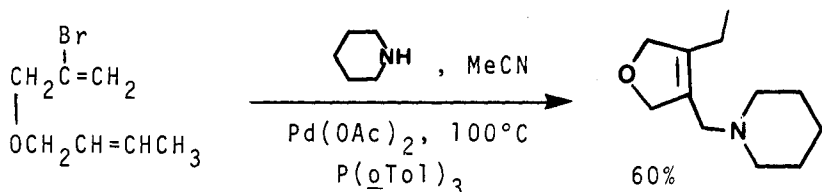
DIOP = (4S, 5S)-(+)-4,5-bis-(diphenylphosphinomethyl)
 2,2-dimethyl-1,3-dioxolane

Genet, J.P.*; Ferroud, D.; Juge, S.; Montes, J.R.
Tetrahedron Lett., (1986), 27, 4573

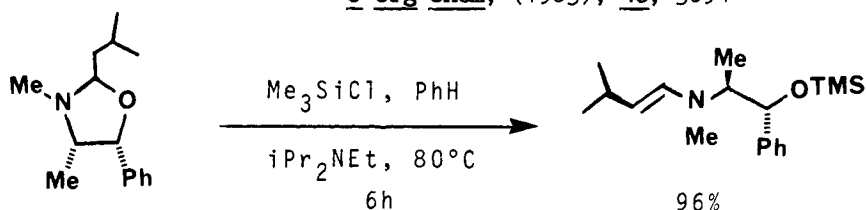


Lathbury, D.; Vernon, P.; Gallagher, T.*
Tetrahedron Lett., (1986), 27, 6009

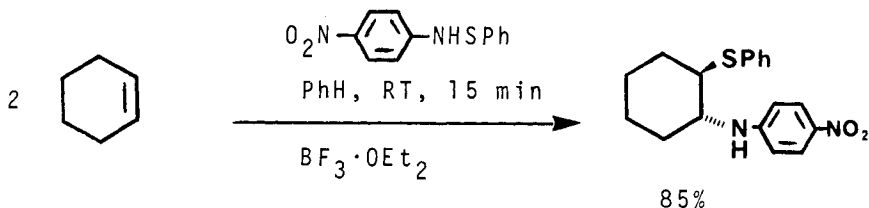
Related Methods: Acid-Amide (Section 315); Acid-Amine (Section 316); Amide-Ester (Section 344)

SECTION 352: Amine - Ether, Epoxide, Thioether

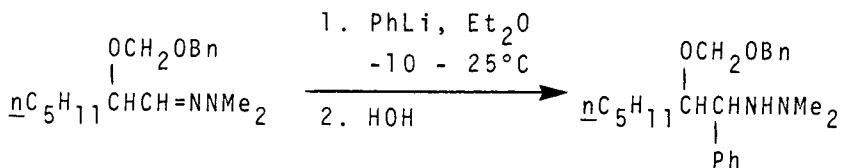
Shi, L.; Narula, C.K.; Mak, K.T.; Kao, L.; Xu, Y.; Heck, R.F.*
J Org Chem, (1983), 48, 3894



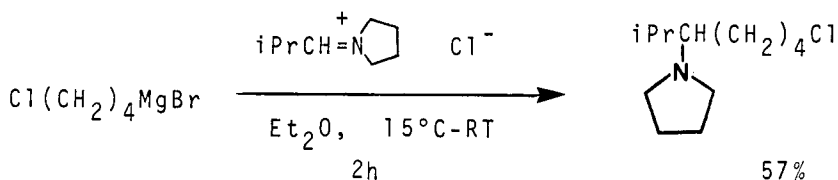
Ito, Y.*; Sawamura, M.; Kominami, K.; Saegusa, T.
Tetrahedron Lett, (1985), 26, 5303



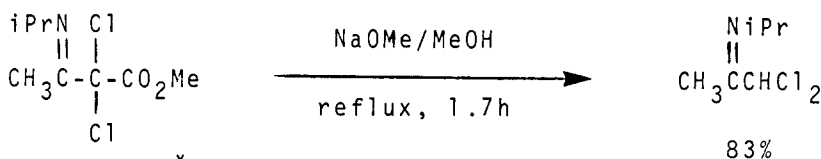
Benati, L.; Montevocchi, P.C.; Spagnolo, P.
Tetrahedron, (1986), 42, 1145



Claremon, D.A.*; Lumma, P.K.; Phillips, B.T.
J Am Chem Soc, (1986), 108, 8265

SECTION 353: Amine - Halide, Sulfonate

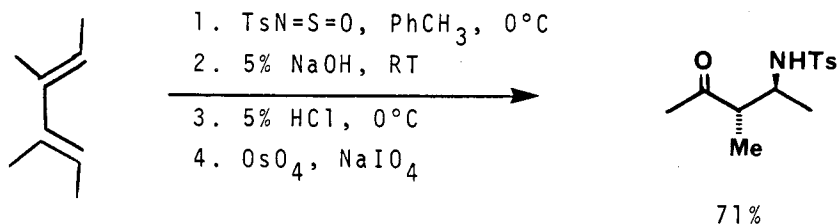
Courtois, G.; Miginiac, P. Bull Chem Soc Fr, (1983), II148



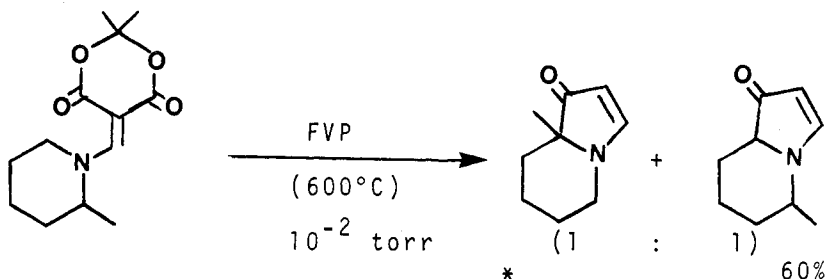
De Kimpe, N.*; Verhe, R.; De Buyck, L.; Schamp, N.
Tetrahedron Lett, (1985), 26, 2709

Review: "Reactions of β-Haloamines"

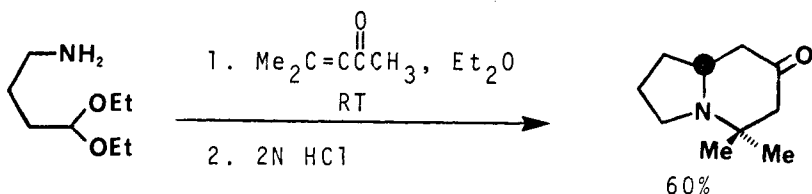
De Kimpe, N.*; Schamp, N. Org Prep Proc Int, (1983), 15, 71

SECTION 354: Amine - Ketone

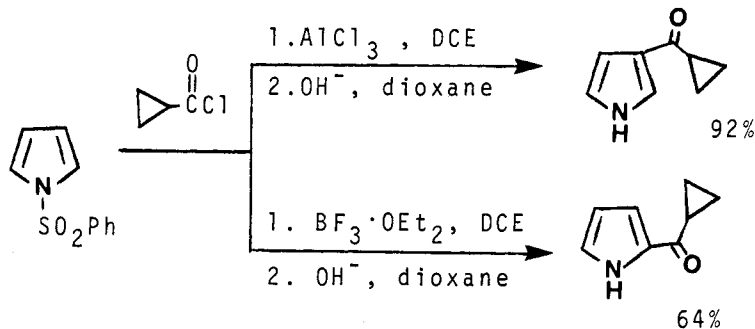
Garigipati, R.S.; Morton, J.A.; Weinreb, S.M.*
Tetrahedron Lett, (1983), 24, 987



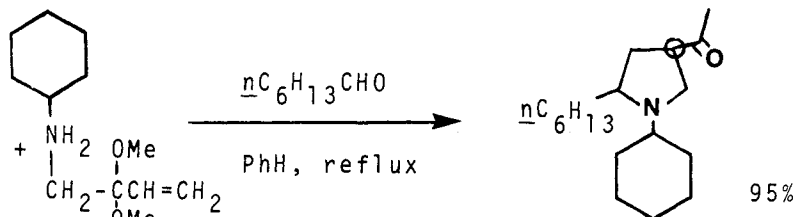
Gordon, H.J.; Martin, J.C.; McNab, H.*
JCS Chem Comm, (1983), 957



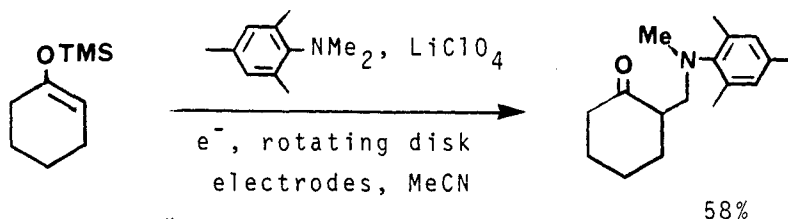
King, F.D.* Tetrahedron Lett, (1983), 24, 3281



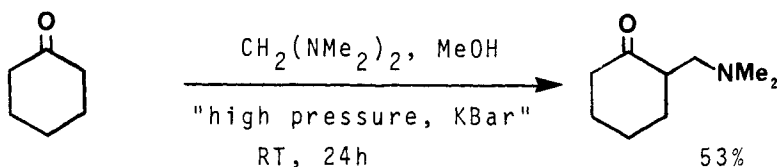
Kakushima, M.*; Hamel, P.; Frenette, R.; Rokach, J.
J Org Chem, (1983), 48, 3214



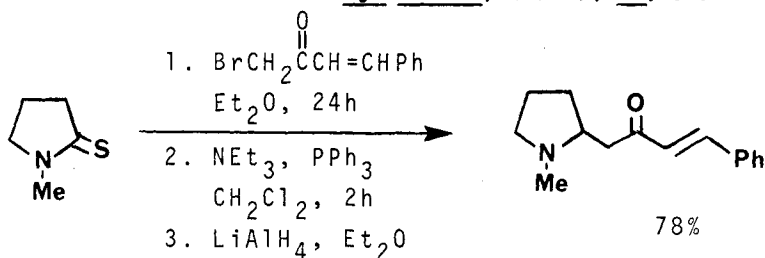
Overman, L.E.*; Kakimoto, M.; Okazaki, M.E.; Meier, G.P.
J Am Chem Soc, (1983), 105, 6622



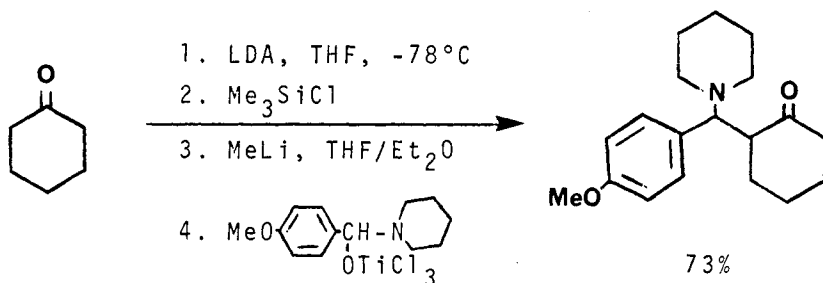
Renaud, R.N.*; Bérubé, D.; Stephens, C.J.
Can J Chem, (1983), **61**, 1379



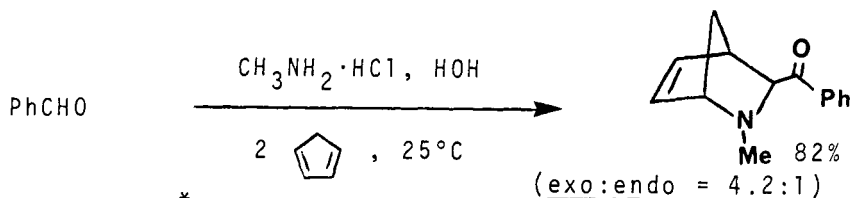
Matsumoto, K.*; Hashimoto, S.; Otani, S.; Amita, F.; Osugi, J.
Syn Commun, (1984), **14**, 585



Ghirlando, R.; Howard, A.S.*; Katz, R.B.; Michael, J.P.*
Tetrahedron, (1984), **40**, 2879

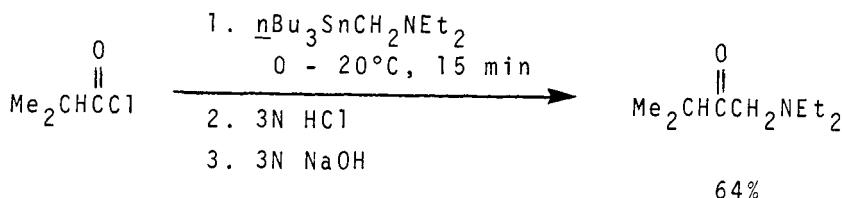


Seebach, D.*; Betschart, C.; Schiess, M.
Helv Chim Acta, (1984), **67**, 1593



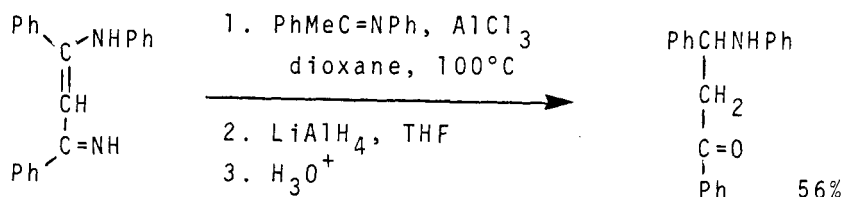
Grieco, P.A.*; Larsen, S.D.; Fobare, W.F.

Tetrahedron Lett., (1986), 27, 1975



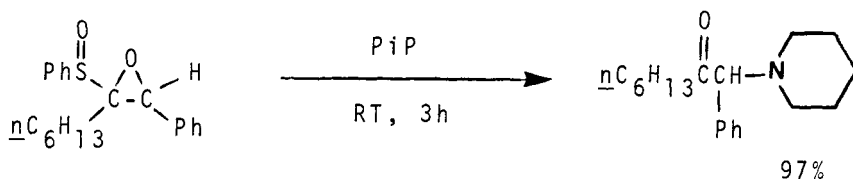
Verlhac, J.-B.; Quintard, J.-P.

Tetrahedron Lett., (1986), 27, 2361



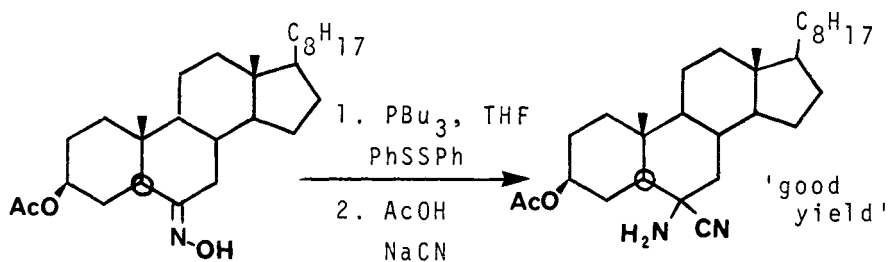
Barluenga, J.*; Cuervo, H.; Olano, B.; Fustero, S.; Gotor, V.

Synthesis, (1986), 469

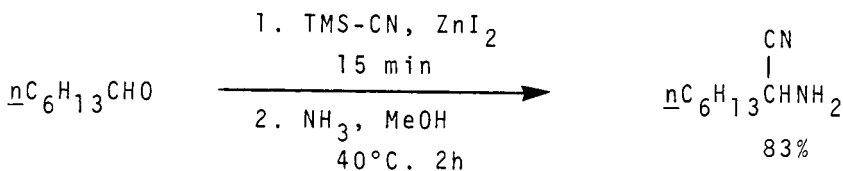


Sato, T.; Kaneko, Y.; Sakata, K.; Yamakawa, K.*

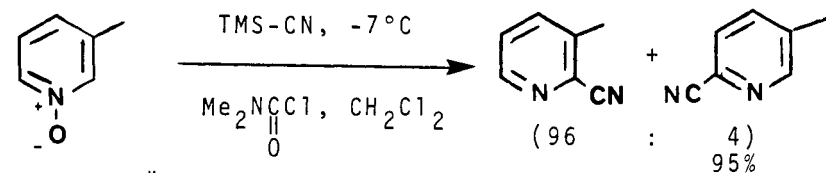
Bull Chem Soc Jpn., (1986), 59, 457

SECTION 355: Amine - Nitrile

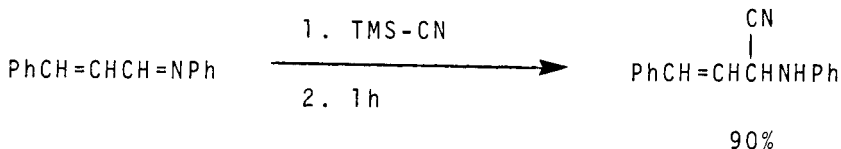
Barton, D.H.R.; Motherwell, W.B.; Simon, E.S.; Zard, S.Z.*
JCS Chem Comm., (1984), 337



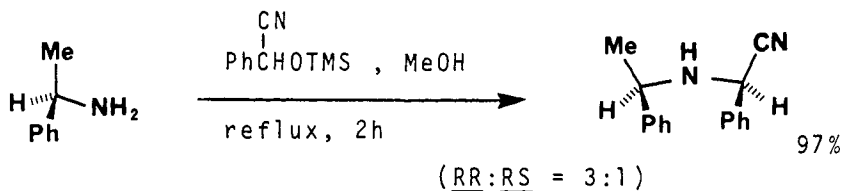
Mai, K.*; Patil, G. Tetrahedron Lett., (1984), 25, 4583



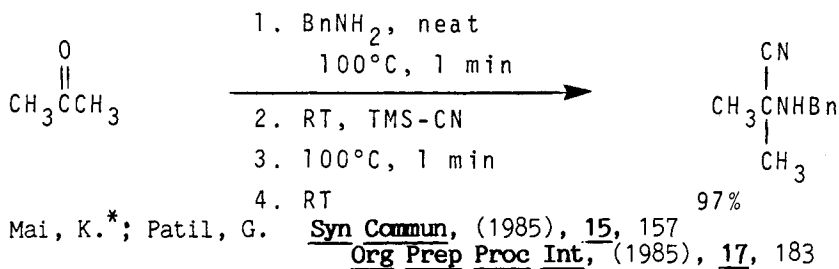
Fife, W.K.* Heterocycles, (1984), 22, 93, 1121



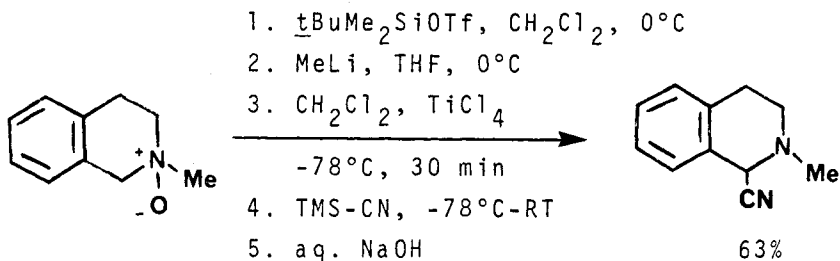
Prajapati, D.; Borush, R.C.; Sandhu, J.S.*; Baruah, J.N.
Ind J Chem B, (1984), 23, 853



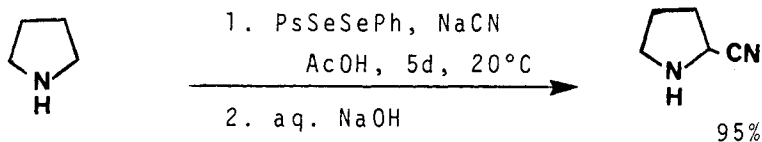
Mai, K.*; Patil, G. Syn Commun, (1984), **14**, 1299



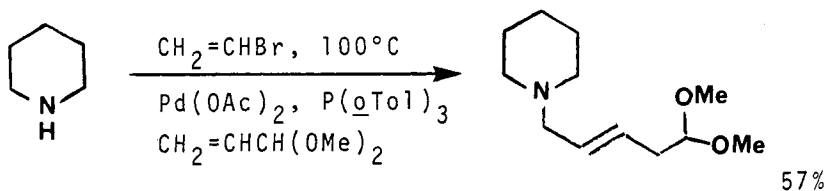
Mai, K.*; Patil, G. Syn Commun, (1985), **15**, 157
Org Prep Proc Int, (1985), **17**, 183



Tokito, N.; Okazaki, R.* Chem Lett, (1985), 241

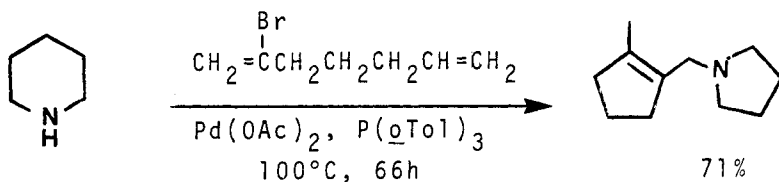


Barton, D.H.R.*; Billion, A.; Boivin, J.
Tetrahedron Lett, (1985), **26**, 1229

SECTION 356: Amine - Olefin

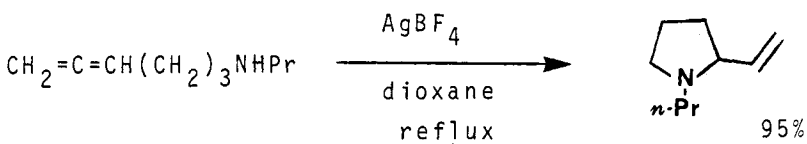
Fischetti, W.; Mak, K.T.; Stakem, F.G.; Kim, J.-I.; Rheingold, A.L.; Heck, R.F.*

J Org Chem, (1983), 48, 948

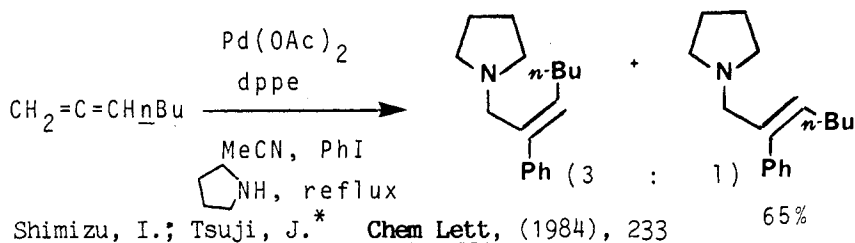


Narula, C.K.; Mak, K.T.; Heck, R.F.*

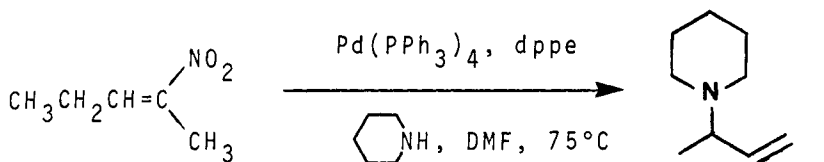
J Org Chem, (1983), 48, 2792



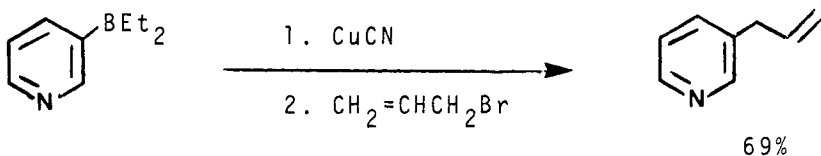
Arseniyadis, S.; Gore, J. Tetrahedron Lett, (1983), 24, 3997



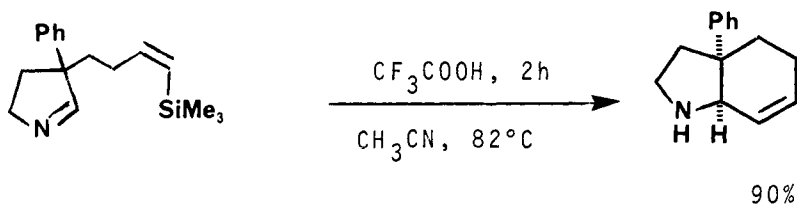
Shimizu, I.; Tsuji, J.* Chem Lett, (1984), 233



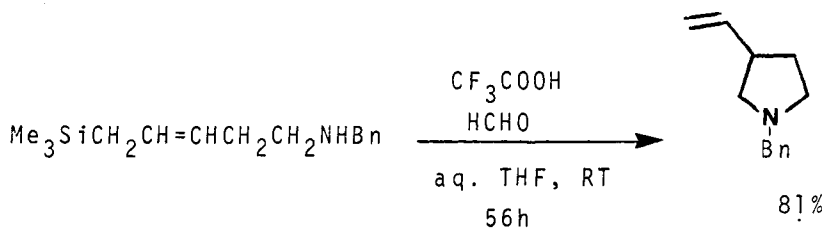
Tamura, R.*; Hayashi, K.; Kai, Y.; Oda, D. Tetrahedron Lett., (1984), 25, 4437 75%



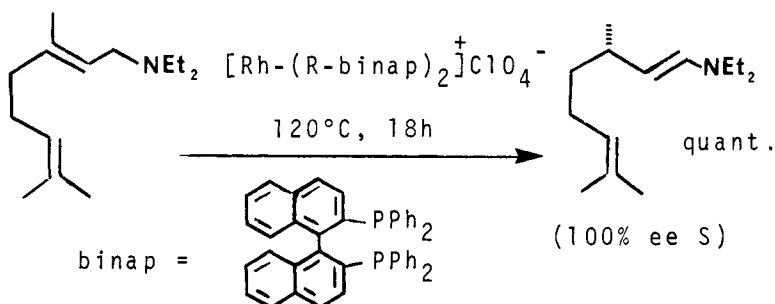
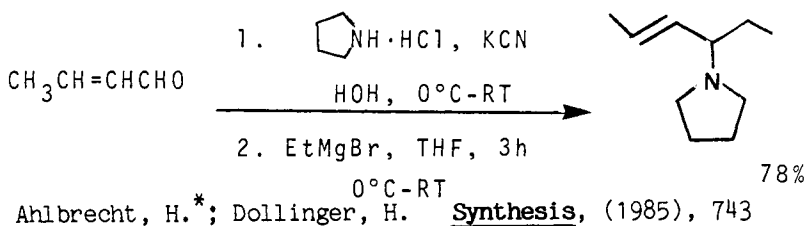
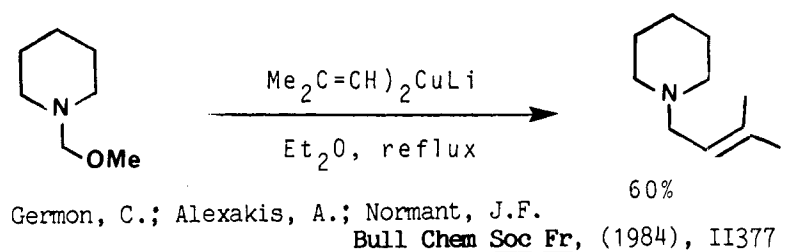
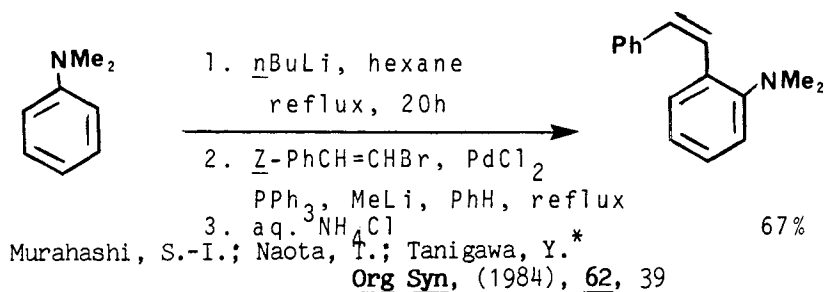
Ishikura, M.; Kamada, M.; Oda, I.; Terashima, M.* Heterocycles, (1985), 23, 117
 Ishikura, M.; Kamada, M.; Ohta, T.; Terashima, M.* Heterocycles, (1984), 22, 2475 69%



Overman, L.E.*; Burk, R.M. Tetrahedron Lett., (1984), 25, 5739 90%

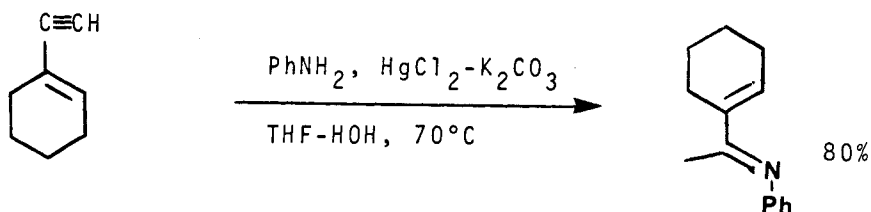


Grieco, P.A.*; Fobare, W.F. Tetrahedron Lett., (1986), 27, 5067 81%

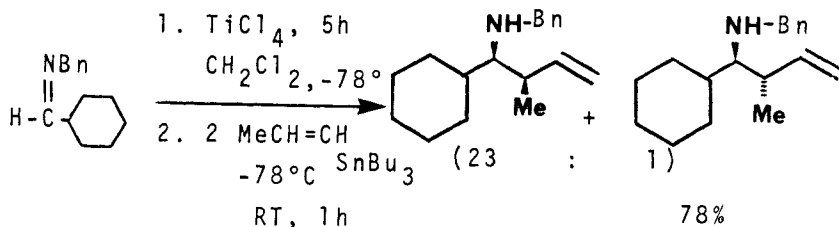


Tani, K.*; Yamagata, T.; Tatsuno, Y.; Yamagata, Y.; Tomita, K.;
 Akutagawa, S.; Kumobayashi, H.; Otsuka, S.

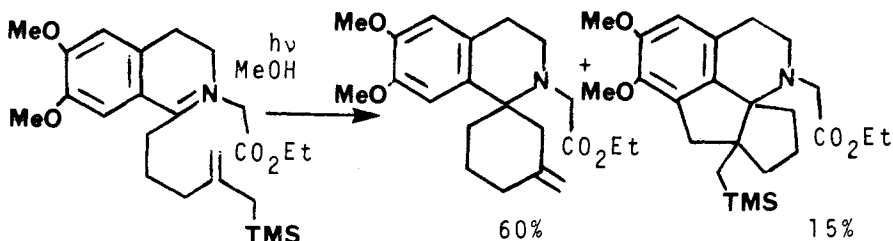
Angew Chem Int Ed Engl, (1985), **24**, 217



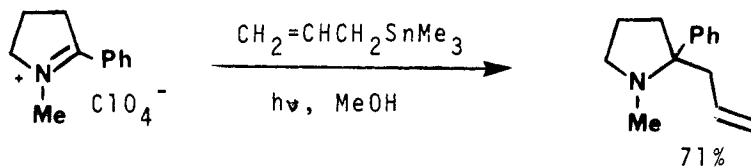
Barluenga, J.*; Aznar, F.; Liz, R.; Cabal, M.-P.
JCS Chem Comm, (1985), 1375



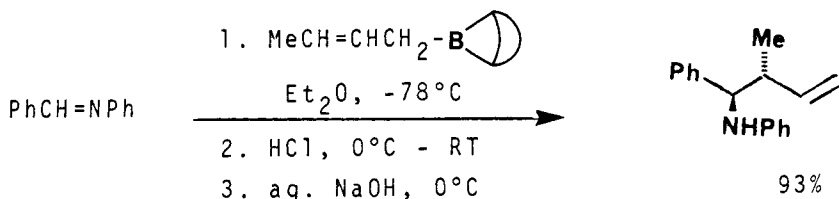
Keck, G.E.*; Enholm, E.J. J Org Chem, (1985), 50, 146



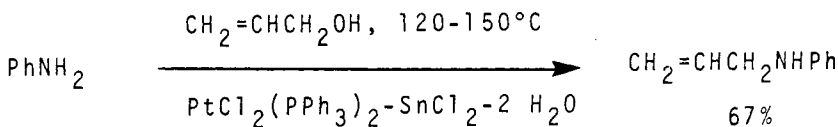
Ahmed-Schofield, R.; Mariano, P.S.*
J Org Chem, (1985), 50, 5667



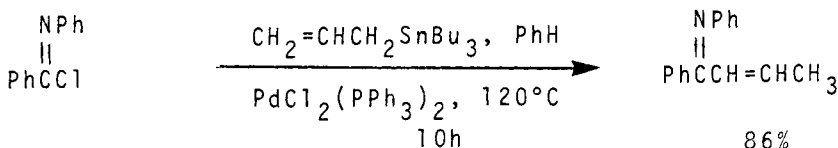
Borg, R.M.; Mariano, P.S.* Tetrahedron Lett, (1986), 27, 2821



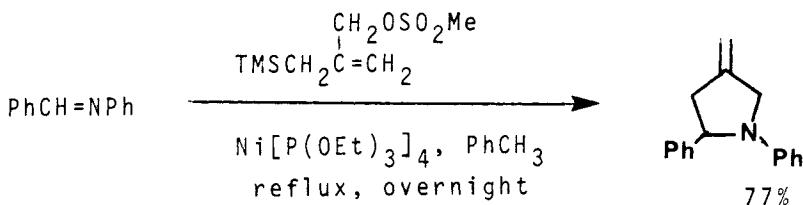
Yamamoto, Y.*; Komatsu, T.; Muruyama, K.
J Org Chem, (1985), 50, 3115



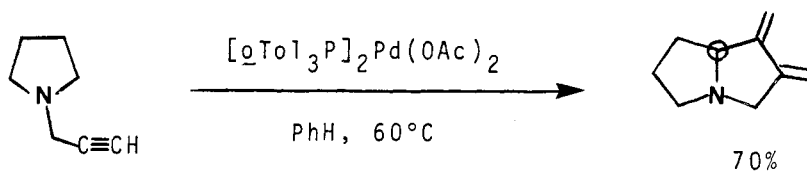
Tsuji, Y.; Takeuchi, R.; Ogawa, H.; Watanabe, Y.*
Chem Lett, (1986), 293



Kosugi, M.*; Koshiba, M.; Atoh, A.; Sano, H.; Migita, T.*
Bull Chem Soc Jpn, (1986), 59, 677

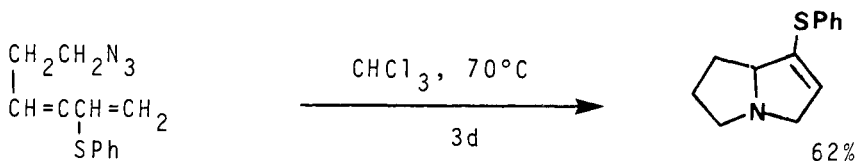


Jones, M.D.; Kemmitt, R.D.W. JCS Chem Comm, (1986), 1201



Trost, B.M.*; Chen, S.-F.

J Am Chem Soc, (1986), 108, 6053



Pearson, W.H.*; Celebuski, J.E.; Poon, Y.-F.; Dixon, B.R.; Glens, J.H.

Tetrahedron Lett, (1986), 27, 6301

Reviews:

"Diels Alder Reactions of Azadienes"

Boger, D.L.* Tetrahedron, (1983), 39, 2869

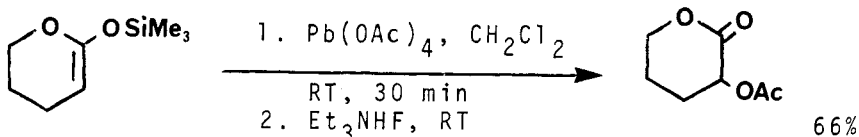
"Synthesis of Primary Allylic Amines"

Cheikh, R.B.; Choabouni, R.; Laurent, A.; Mison, P.; Nafti, A.
Synthesis, (1983), 685

"Recent Advances in the Chemistry of Conjugated Enamines"

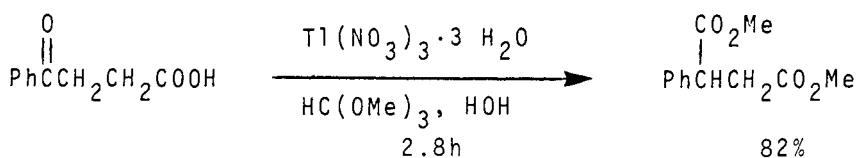
Hickmott, P.W.* Tetrahedron, (1984), 40, 2989

SECTION 357: Ester - Ester



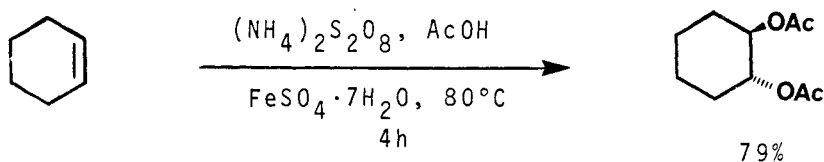
Rubottom, G.M.*; Gruber, J.M.; Marrero, R.; Juve Jr., H.D.; Kim, C.W.

J Org Chem, (1983), 48, 4940

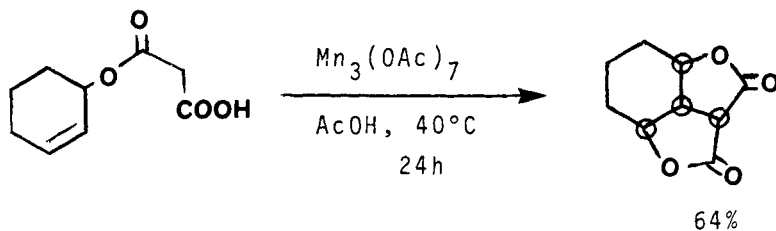


Taylor, E.C.*; Conley, R.A.; Katz, A.H.; McKillop, A.H.

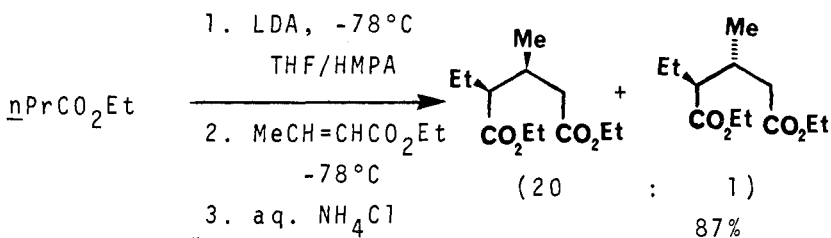
J Org Chem, (1984), 49, 3840



Fristad, W.E.*; Peterson, J.R. Tetrahedron, (1984), 40, 1469

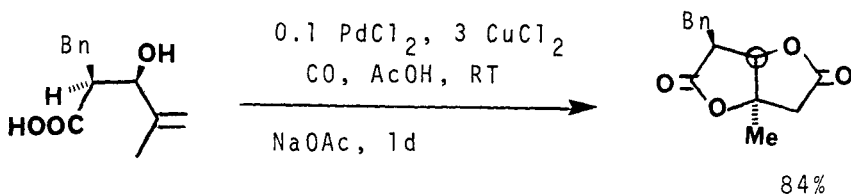


Corey, E.J.*; Kang, M. J Am Chem Soc, (1984), 106, 5384

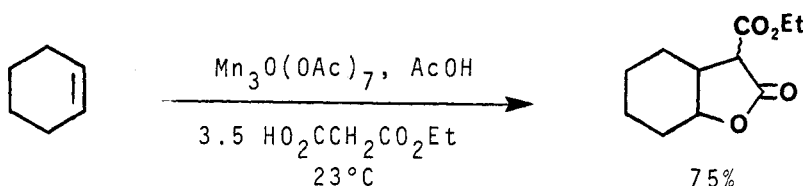


Yamaguchi, M.*; Tsukamoto, M.; Tanaka, S.; Hirao, I.

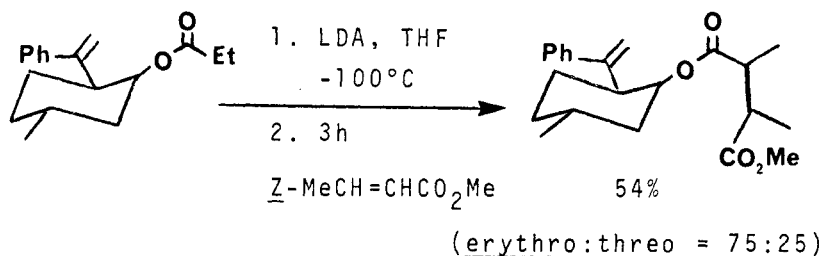
Tetrahedron Lett, (1984), 25, 5661



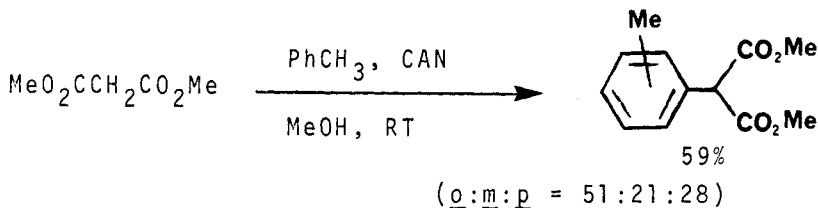
Tamaru, Y.; Higashimura, H.; Naka, K.; Hojo, M.; Yoshida, Z.*
Angew Chem Int Ed Engl, (1985), 24, 1045



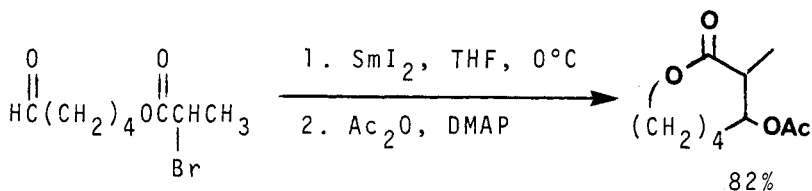
Corey, E.J.*; Gross, A.W. Tetrahedron Lett, (1985), 26, 4291



Corey, E.J.*; Peterson, R.T.
Tetrahedron Lett, (1985), 26, 5025



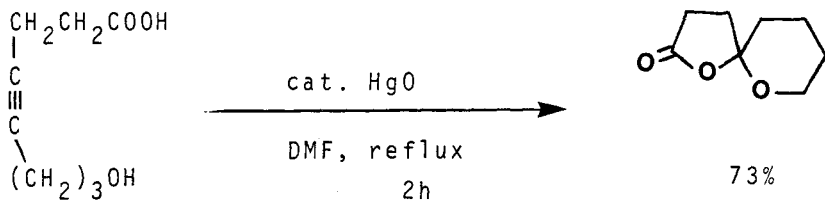
Baclocchi, E.*; Dell'aira, D.; Ruzziconi, R.
Tetrahedron Lett, (1986), 27, 2763



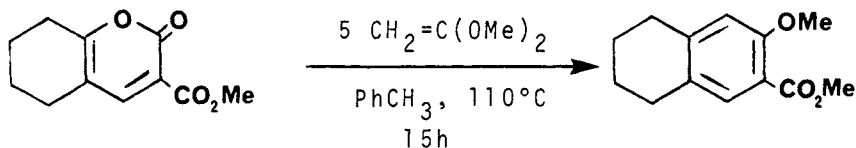
Tabuchi, T.; Kawamura, K.; Inanaga, J.*; Yamaguchi, M.
Tetrahedron Lett., (1986), 27, 3889

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

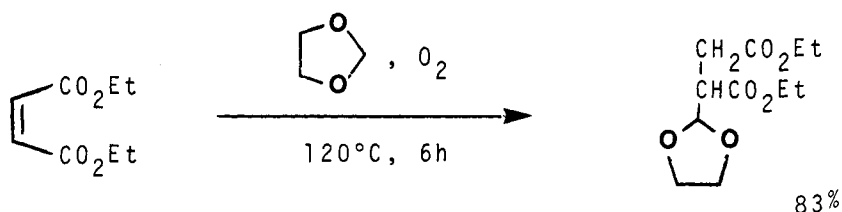
SECTION 358: Ester - Ether, Epoxide, Thioether



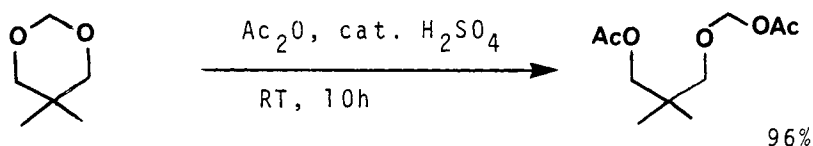
Yamamoto, M.*; Yoshitake, M.; Yamada, K.
JCS Chem Comm., (1983), 991



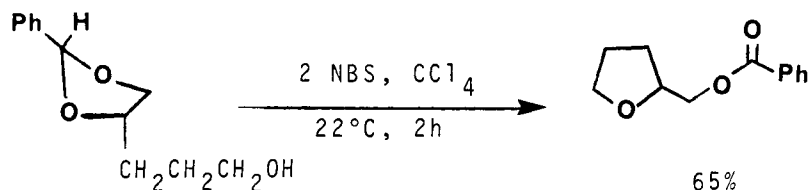
Boger, D.L.*; Mullican, M.D.
Tetrahedron Lett., (1983), 24, 4939



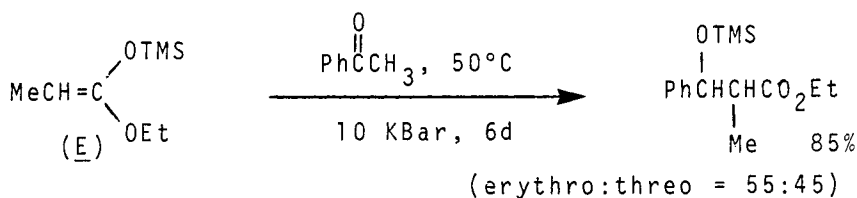
Watanabe, Y.*; Tsuji, Y.; Takeuchi, R.
Bull Chem Soc Jpn, (1983), 56, 1428



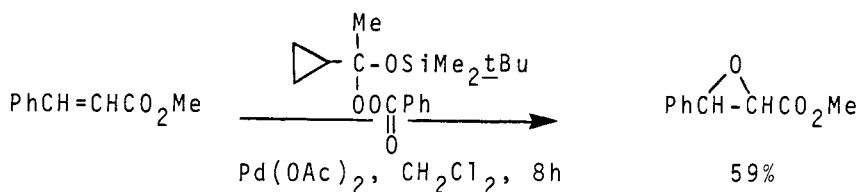
Bailey, W.F.*; Rivera, A.D. J Org Chem, (1984), 49, 4958



Williams, D.R.*; Harigaya, Y.; Moore, J.L.; D'sa, A.
J Am Chem Soc, (1984), 106, 2641

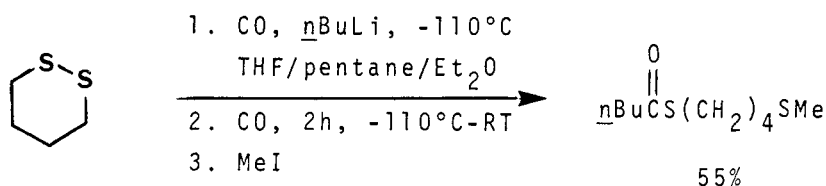


Yamamoto, Y.*; Maruyama, K.; Matsumoto, K.
Tetrahedron Lett, (1984), 25, 1075

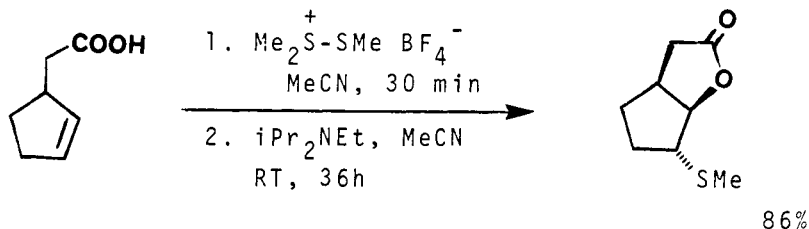


Nagata, R.; Matsuura, T.; Saito, I.*

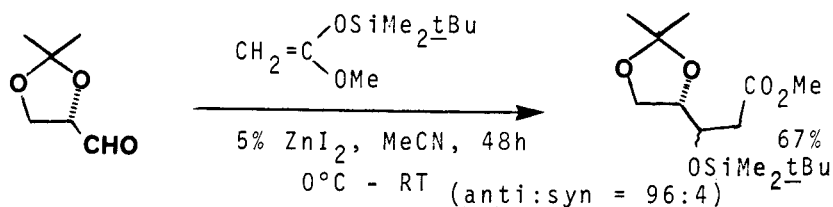
Tetrahedron Lett., (1984), 25, 2691



Seyferth, D.*; Hui, R.C. Organometallics, (1984), 3, 327

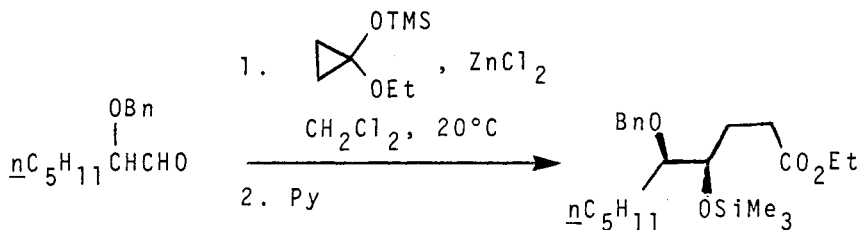


O'Malley, G.J.; Cava, M.P.* Tetrahedron Lett., (1985), 26, 6159



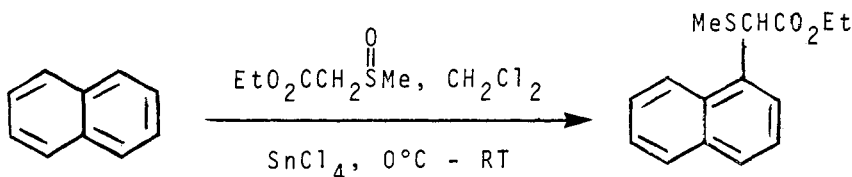
Kita, Y.*; Yasuda, H.; Tamura, O.; Itoh, F.; Ke, Y.Y.; Tamura, Y.

Tetrahedron Lett., (1985), 26, 5777



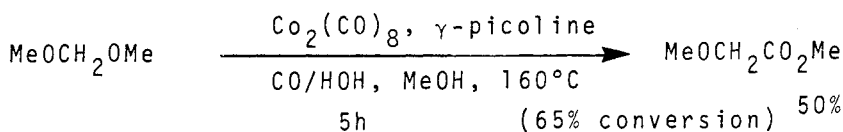
93%

Oshino, H.; Nakamura, E.*; Kuwajima, I.*
J Org Chem, (1985), 50, 2802



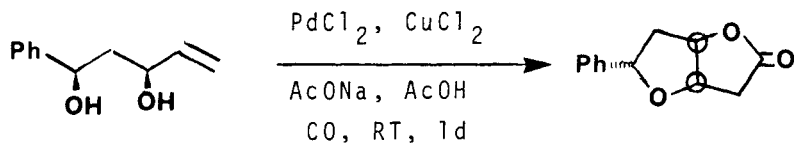
95%

Stamos, I.K.* Tetrahedron Lett, (1985), 26, 477



(65% conversion) 50%

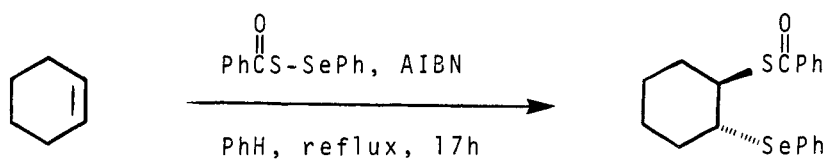
Murota, K.*; Matsuda, A.; Masuda, T.
Bull Chem Soc Jpn, (1985), 58, 2141



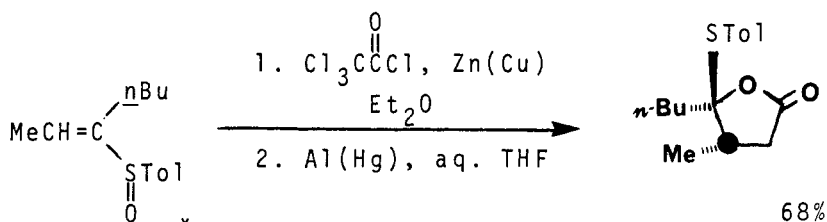
80%

Tamaru, Y.*; Kobayashi, T.; Kawamura, S.; Ochiai, H.; Hojo, M.*;
 Yoshida, Z.

Tetrahedron Lett, (1985), 26, 3207

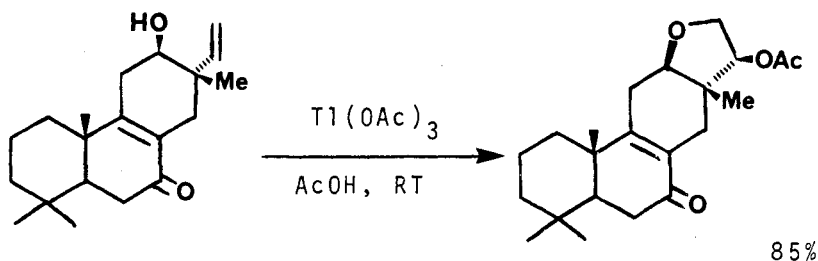
54% E, 10% Z

Toru, T.*; Seko, T.; Maekawa, E.

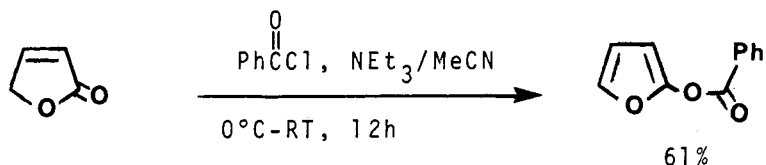
Tetrahedron Lett., (1985), 26, 3263

68%

Marino, J.P.*; De la Pradilla, R.F.

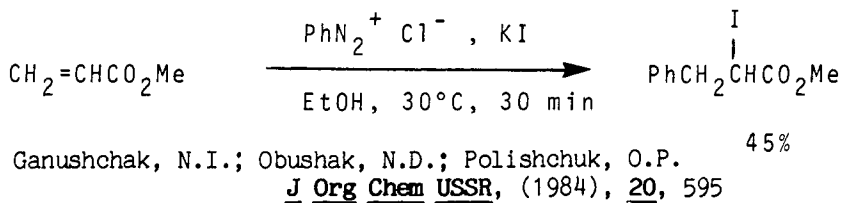
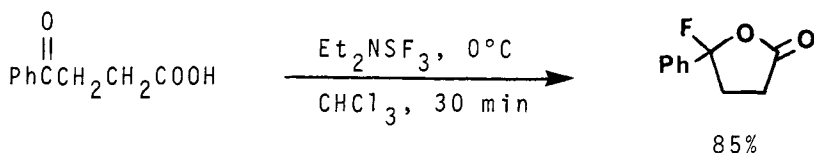
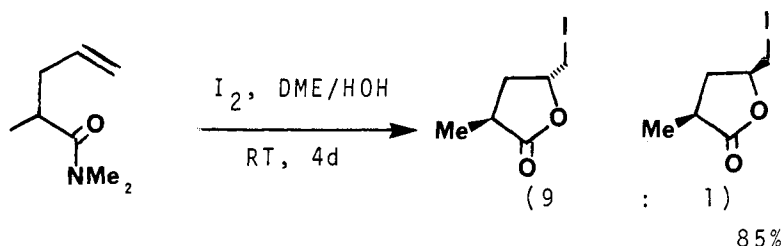
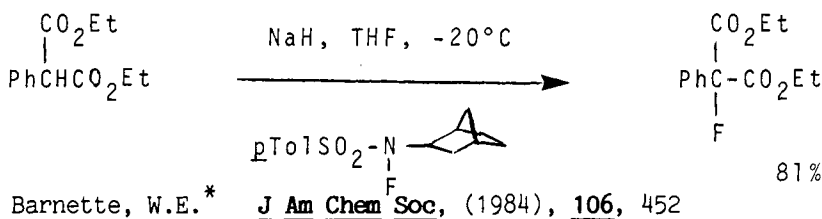
Tetrahedron Lett., (1985), 26, 5381

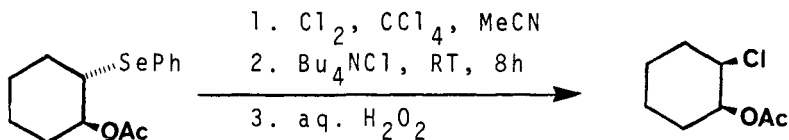
85%

Ferroz, H.M.C.*; Brocksom, T.J.; Pinto, A.C.; Abia, M.A.;
Zocher, D.H.T.Tetrahedron Lett., (1986), 27, 811

61%

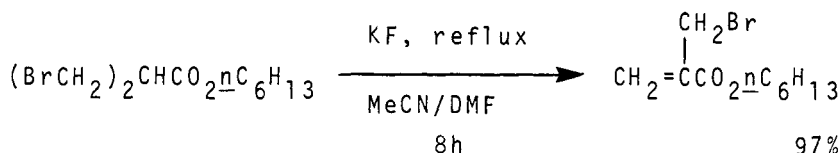
Hormi, O.E.O.; Näsman, J.H.* Syn Commun., (1986), 16, 69

SECTION 359: Ester - Halide, Sulfonate



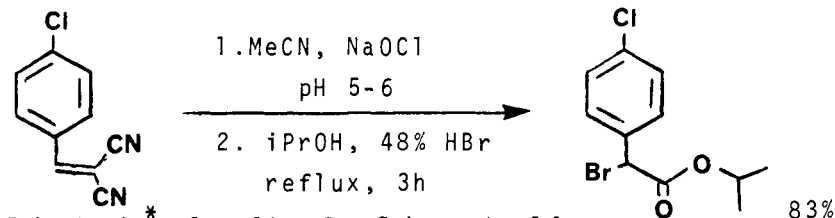
Morella, A.M.; Ward, A.D.*

Tetrahedron Lett., (1985), 26, 2899



Anzeveno, P.B.*; Campbell, J.A.; White, W.L.

Syn Commun., (1986), 16, 387

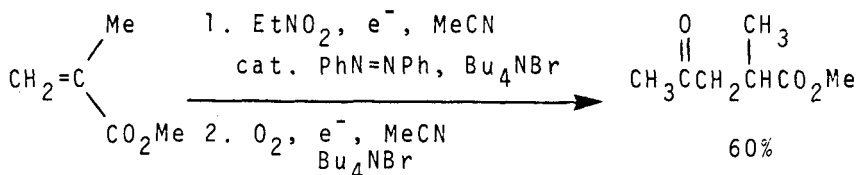


Robert, A.*; Jaguelin, S.; Guinamant, J.L.

Tetrahedron, (1986), 42, 2275

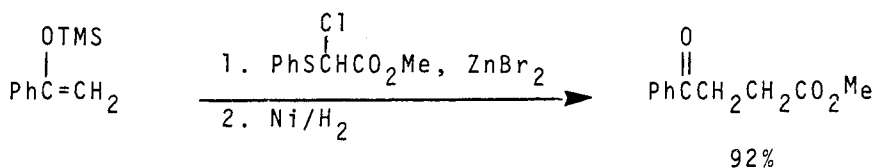
Also via: haloacids (Section 319); Halohydrins (Section 329)

SECTION 360: Ester - Ketone

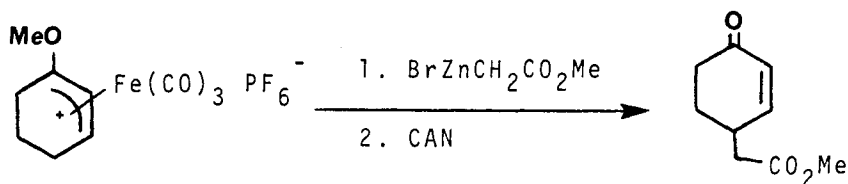
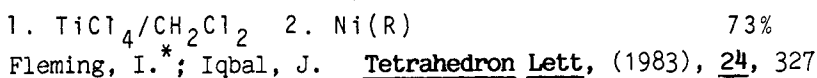


Monte, W.T.; Baizer, M.M.; Little, R.D.

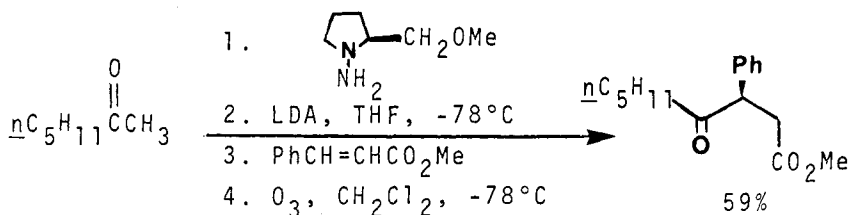
J Org Chem, (1983), 48, 803



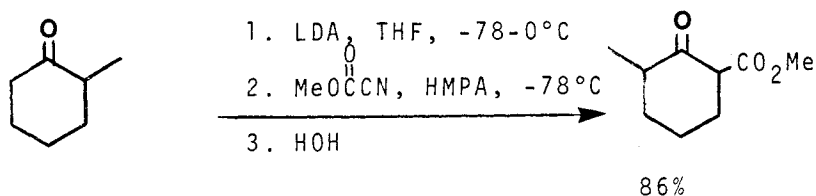
Lee, T.V.*; Okonkwo, J.O. Tetrahedron Lett., (1983), 24, 323



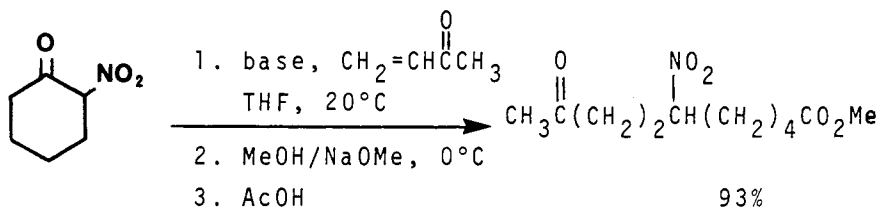
Pearson, A.J.*; Richards, I.C. Tetrahedron Lett., (1983), 24, 2465



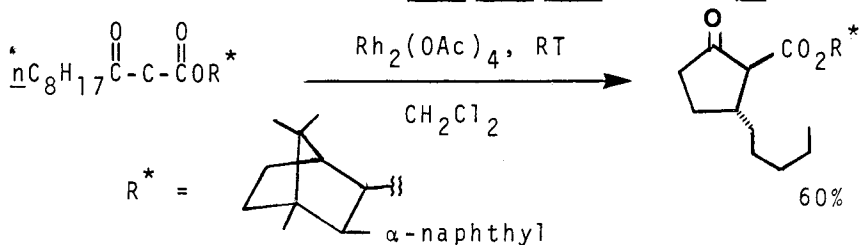
Enders, D.*; Papadopoulos, K. Tetrahedron Lett., (1983), 24, 4967



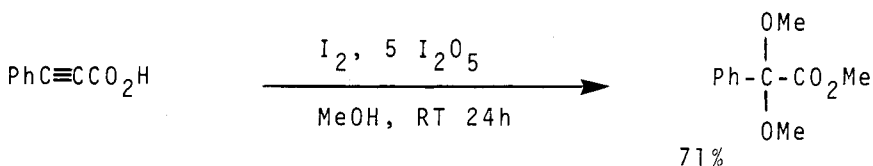
Mander, L.N.; Sethi, S.P. Tetrahedron Lett., (1983), 24, 5425



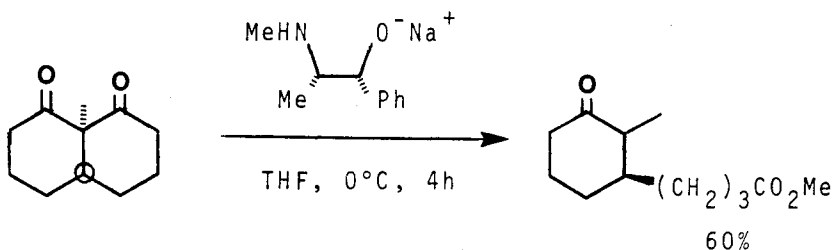
Huggenberg, W.; Hesse, M.* Helv Chim Acta, (1983), **66**, 1519



Taber, D.F.*; Raman, K. J Am Chem Soc, (1983), **105**, 5935

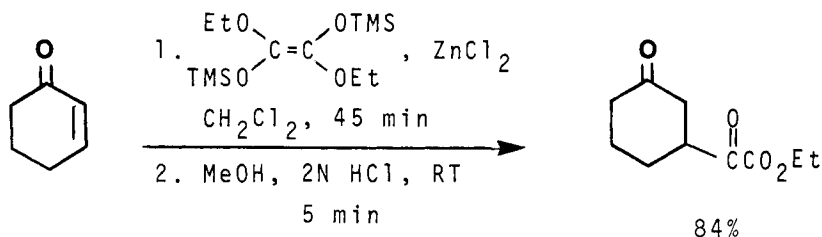


Cohen, M.J.; McNelis, E.* J Org Chem, (1984), **49**, 515

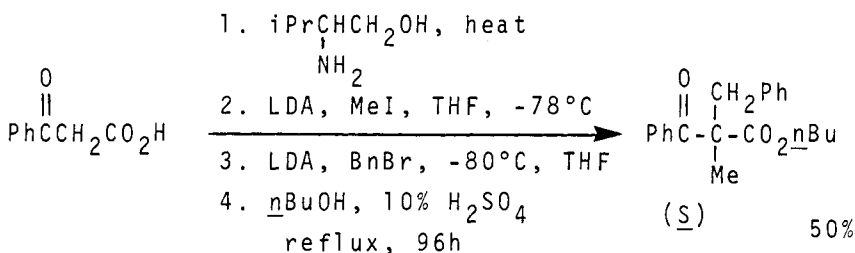


Duthaler, R.O.*; Maienfisch, P.

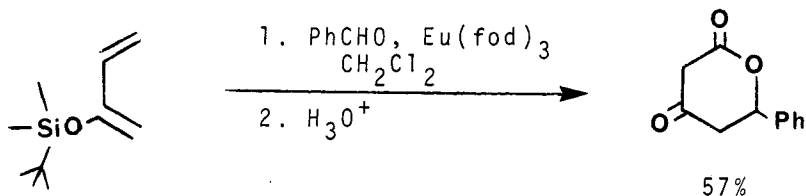
Helv Chim Acta, (1984), **67**, 845



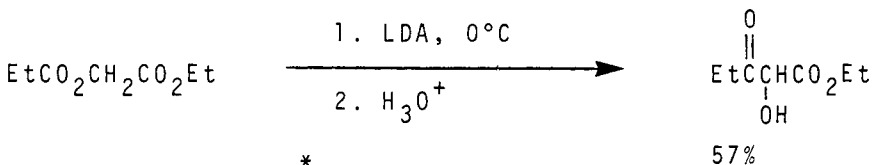
Reetz, M.T.*; Heimbach, H.; Schwellnus, K.
Tetrahedron Lett., (1984), 25, 511



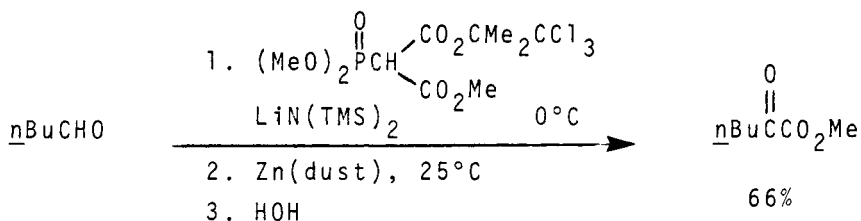
Meyers, A.I.*; Harre, M.; Garland, R.
J Am Chem Soc., (1984), 106, 1146



Castellino, S.; Sims, J.J. Tetrahedron Lett., (1984), 25, 2307

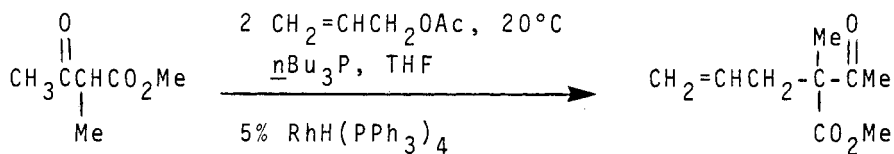


Lee, S.D.; Chan, T.H.*; Kwon, K.S.
Tetrahedron Lett., (1984), 25, 3399



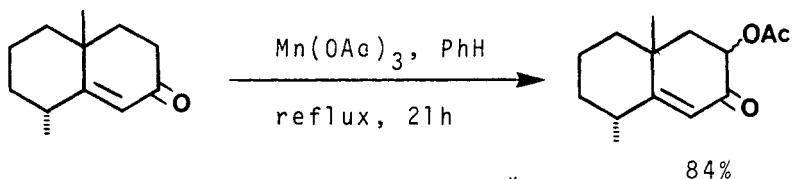
Horne, D.; Gaudino, J.; Thompson, W.J.*

Tetrahedron Lett., (1984), 25, 3529



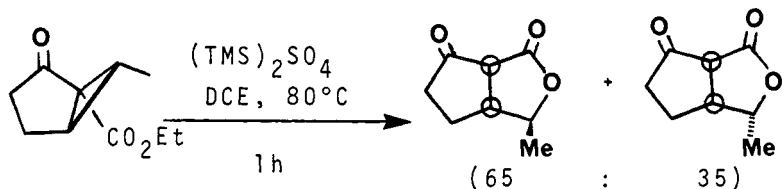
Tsuiji, J.*; Minami, I.; Shimizu, I.

Tetrahedron Lett., (1984), 25, 5157



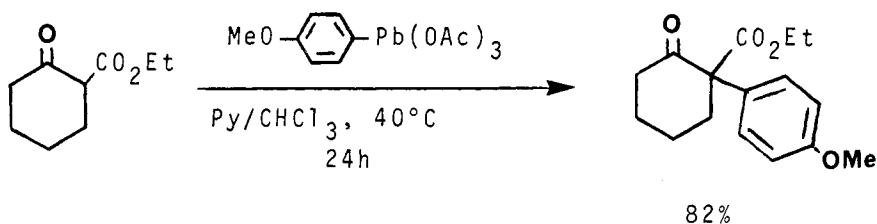
Dunlap, N.K.; Sabol, M.R.; Watt, D.S.*

Tetrahedron Lett., (1984), 25, 5839

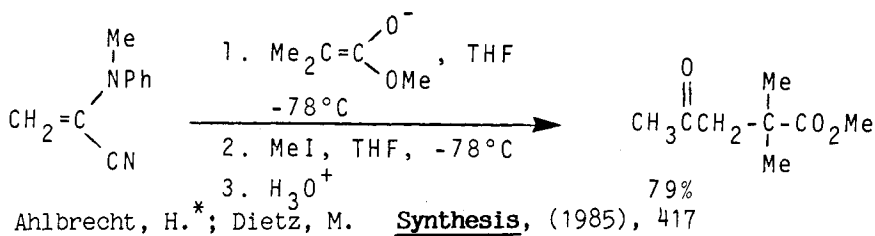


Morizawa, Y.; Hiyama, T.*; Oshima, K.; Nozaki, H.

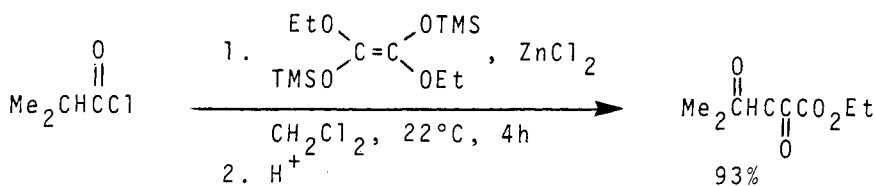
Bull Chem Soc Jpn., (1984), 57, 1123



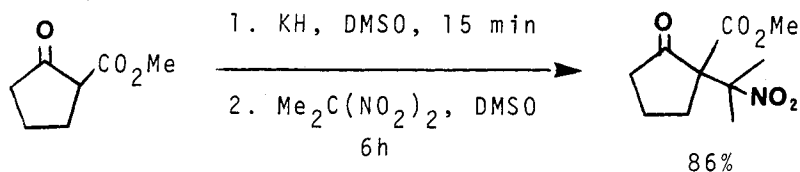
Kozyrod, R.P.; Pinkey, J.T.* Org Syn, (1984), **62**, 24



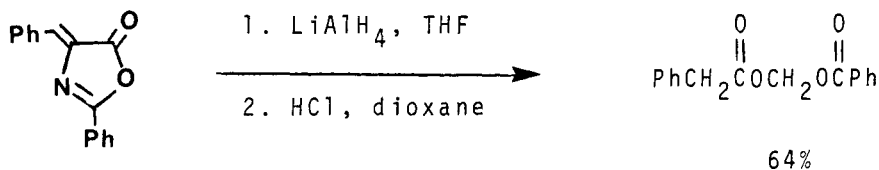
Ahlbrecht, H.*; Dietz, M. Synthesis, (1985), 417



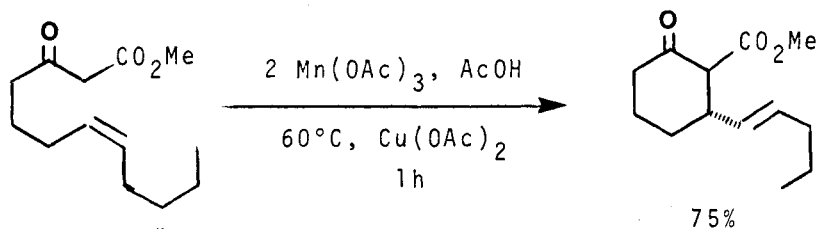
Reetz, M.T.*; Kyung, S.-H. Tetrahedron Lett, (1985), **26**, 6333



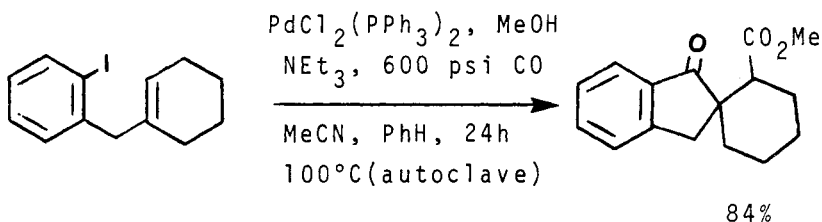
Kornblum, N.*; Kelly, W.J.; Kestner, M.M.
J Org Chem, (1985), **50**, 4720



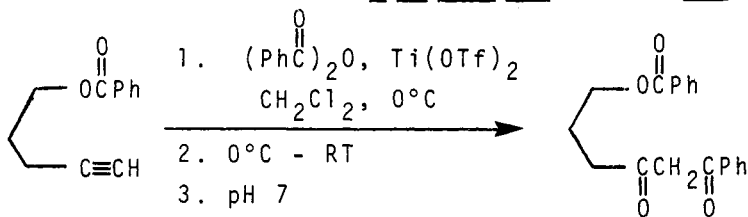
Naim, S.S.; Hussain, M.; Khan, N.H.* Synthesis, (1985), 48



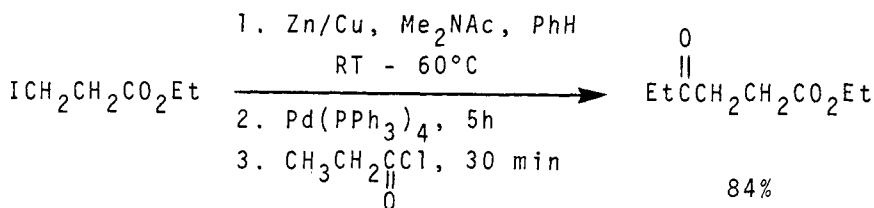
Snider, B.B.*; Mohan, R.; Kates, S.A.
J Org Chem, (1985), 50, 3659



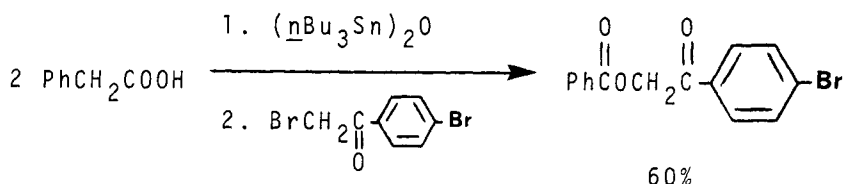
Tour, J.M.; Negishi, E.* J Am Chem Soc, (1985), 107, 8289



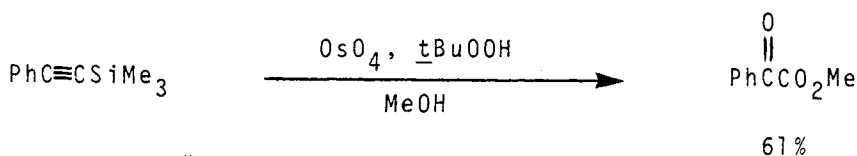
Tanabe, Y.; Mukaiyama, T. Chem Lett, (1985), 673



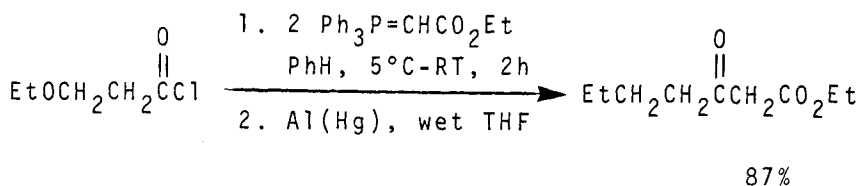
Tamaru, Y.; Ochiai, H.; Nakamura, T.; Tsubaki, K.; Yoshida, Z.
Tetrahedron Lett., (1985), 26, 5559



Vijayaraghavan, S.T.; Balasubramanian, T.R.
J Organomet Chem., (1985), 282, 17

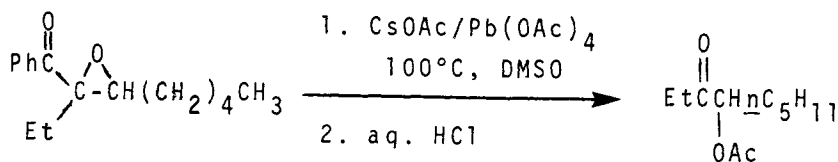


Page, P.C.B.*; Rosenthal, S.
Tetrahedron Lett., (1986), 27, 1947



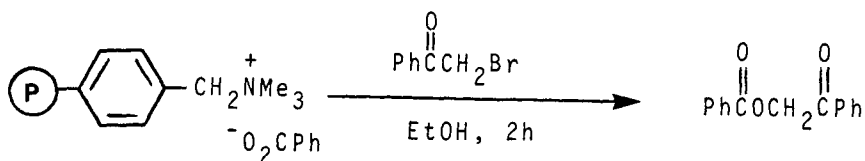
Sánchez, I.H.*; Larraza, M.I.; Breña, F.K.; Cruz, A.; Sotelo, O.; Flores, H.J.

Syn Commun., (1986), 16, 299



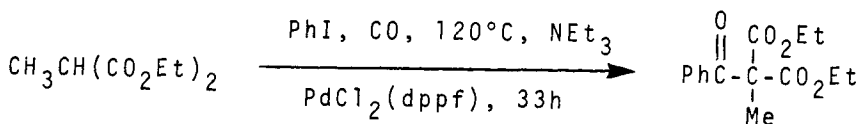
84%

Sato, T.; Motohashi, S.; Yamakawa, K.*

Bull Chem Soc Jpn, (1986), 59, 946

99%

Thorat, M.; Mane, R.; Jagdale, M.; Salunkhe, M.

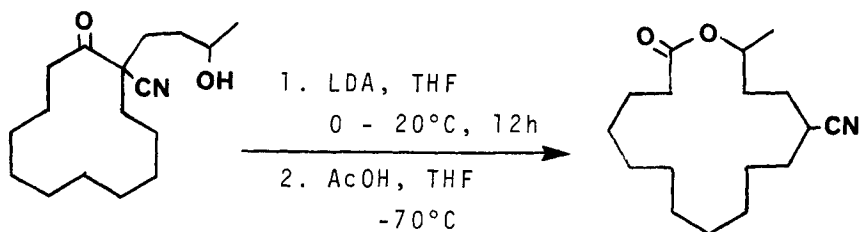
Org Prep Proc Int, (1986), 18, 203

75%

Kobayashi, T.; Tanaka, M.*

Tetrahedron Lett, (1986), 27, 4745

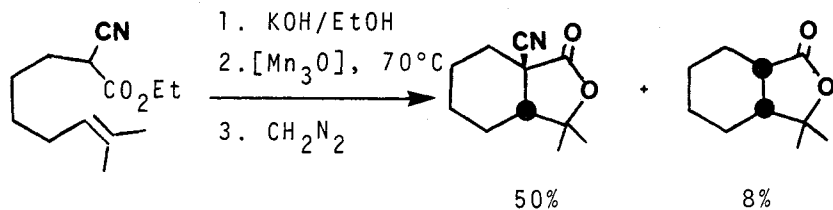
Also via: Ketoacids (Section 320); Hydroxyketones (Section 330)

SECTION 361: Ester - Nitrile

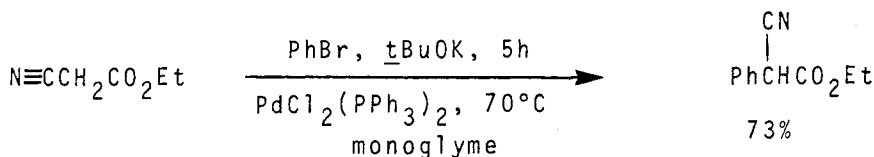
Milenkov, B.; Süsse, M.; Hesse, M.*

Helv Chim Acta, (1983), 68, 2115

51%



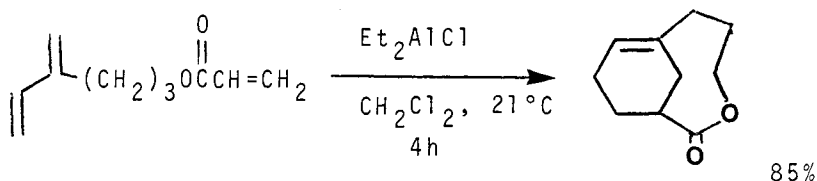
Ernst, A.B.; Fristad, W.E.* Tetrahedron Lett., (1985), **26**, 3761



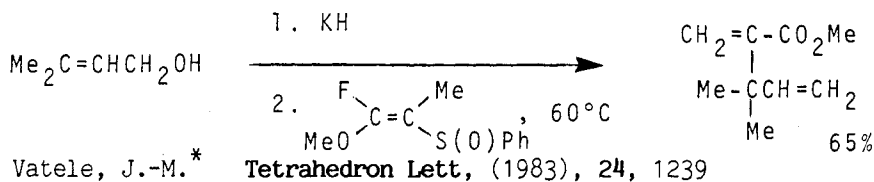
Uno, M.; Seto, K.; Ueda, W.; Masuda, M.; Takahashi, S.
Synthesis, (1985), 506

SECTION 362: Ester - Olefin

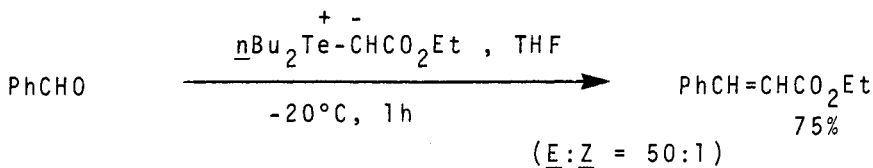
This section contains syntheses of enol esters and esters of unsaturated acids.



Shea, K.J.; Gilman, J.W. Tetrahedron Lett., (1983), **24**, 657

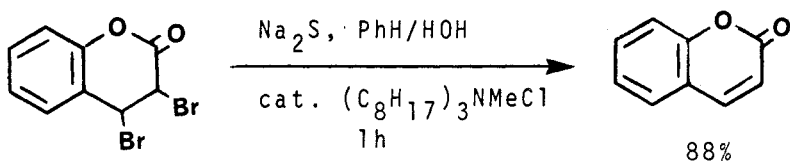


Vatele, J.-M.* Tetrahedron Lett., (1983), **24**, 1239



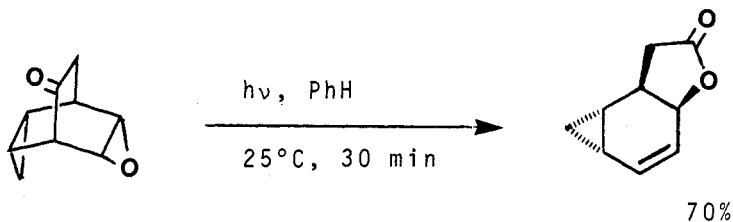
Osuka, A.*; Mori, Y.; Shimizu, H.; Suzuki, H.*

Tetrahedron Lett., (1983), 24, 2599



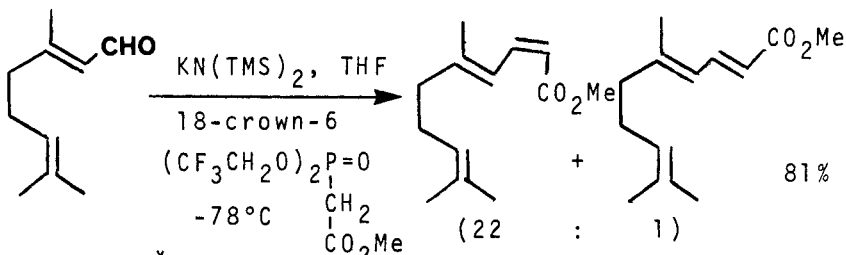
Nakayama, J.*; Machida, H.; Hoshino, M.

Tetrahedron Lett., (1983), 24, 3001



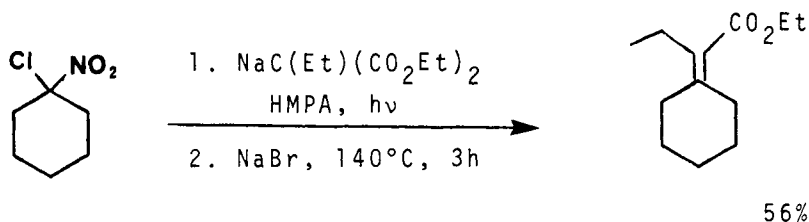
Aryal-Kaloustian, S.; Agosta, W.C.

J Org Chem, (1983), 48, 1718



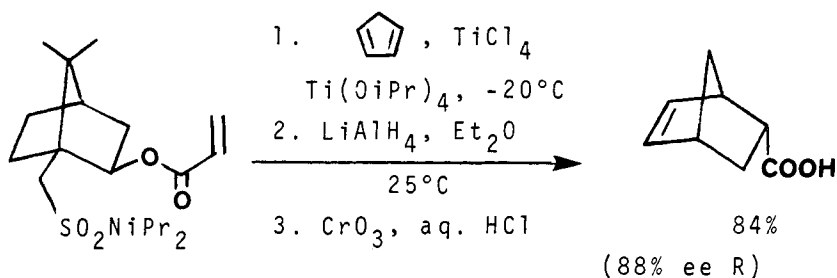
Still, W.C.*; Gennari, C.

Tetrahedron Lett., (1983), 24, 4405



Ono, N.*; Tamura, R.*; Eto, H.; Hamamoto, I.; Nakatsuka, T.; Hayami, J.; Kaji, A.

J Org Chem, (1983), 48, 3678



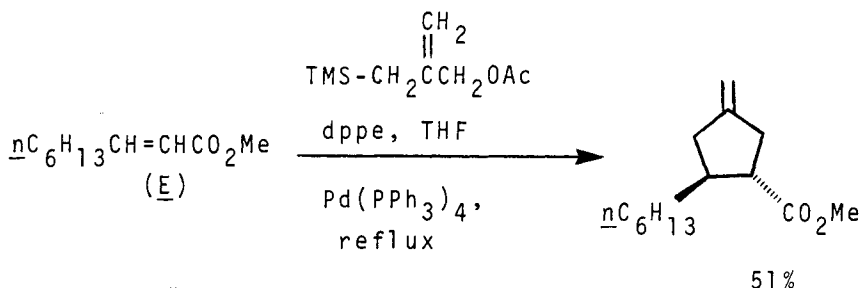
Oppolzer, W.*; Chapuis, C.; Kelly, M.J.

Helv Chim Acta, (1983), 66, 2358

Oppolzer, W.*; Chapuis, C. Tetrahedron Lett, (1984), 25, 5383

Oppolzer, W.*; Chapuis, C.; Bernardinelli, G.

Tetrahedron Lett, (1984), 25, 5885

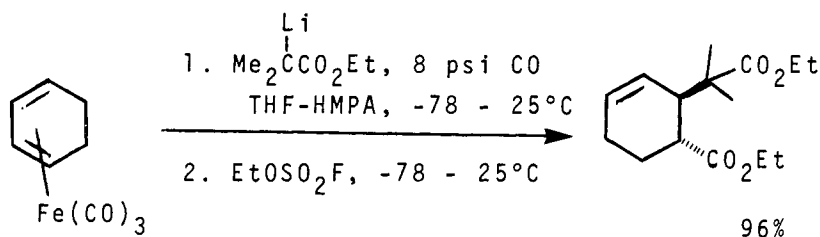


Trost, B.M.*; Chan, D.M.T.

J Am Chem Soc, (1983), 105, 2315, 2326

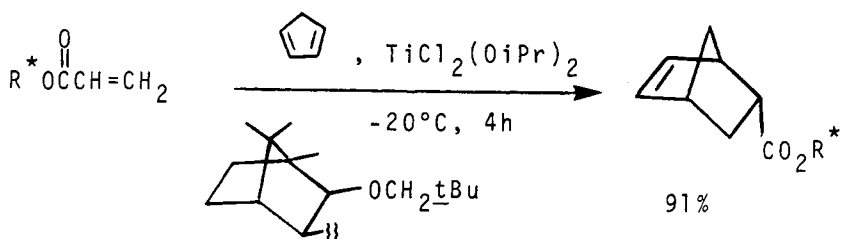
Trost, B.M.*; Balkovec, J.M.; Angle, S.R.

Tetrahedron Lett, (1986), 27, 1445



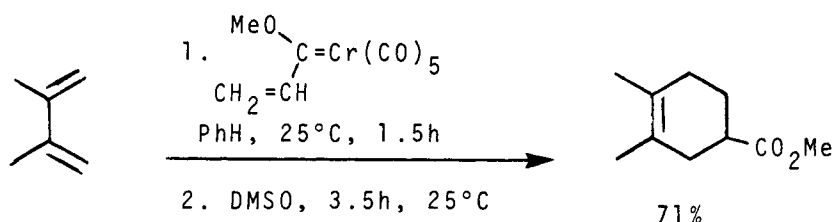
Semmelhack, M.F.*; Herndon, J.W.; Springer, J.P.

J Am Chem Soc, (1983), **105**, 2497

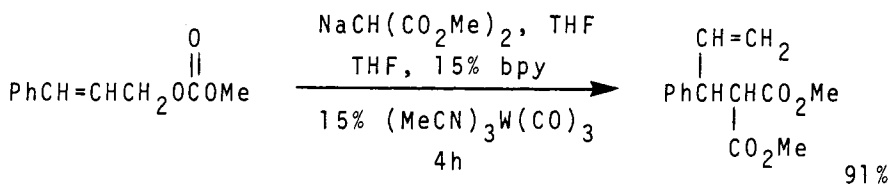


Oppolzer, W.*; Chapuis, C.; Dupuis, D.; Guo, M.

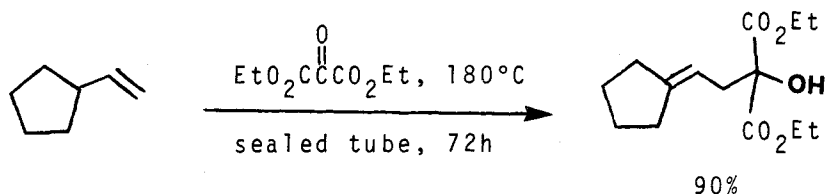
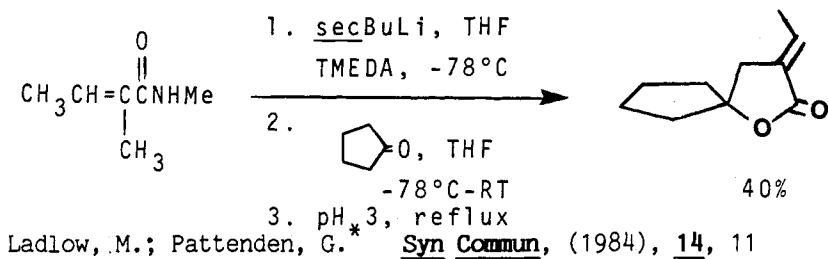
Helv Chim Acta, (1983), **68**, 2100



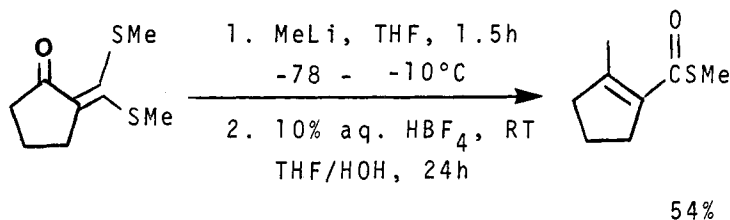
Wulff, W.D.*; Yang, D.C. J Am Chem Soc, (1983), **105**, 6726



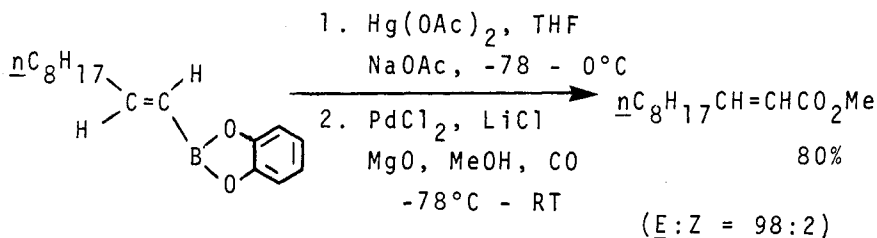
Trost, B.M.*; Hung, M.-H. J Am Chem Soc, (1983), **105**, 7757



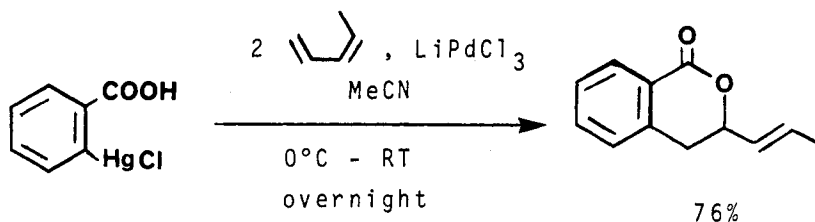
Saloman, M.F.; Pardo, S.N.; Saloman, R.G.*
J Org Chem, (1984), 49, 2446



Dieter, R.K.*; Lin, Y.J.; Dieter, J.W.
J Org Chem, (1984), 49, 3183

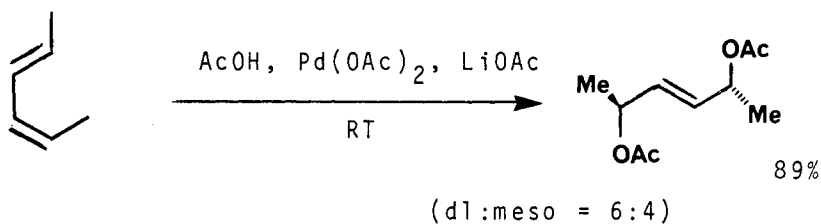


Larock, R.C.*; Narayanan, K. J Org Chem, (1984), 49, 3411



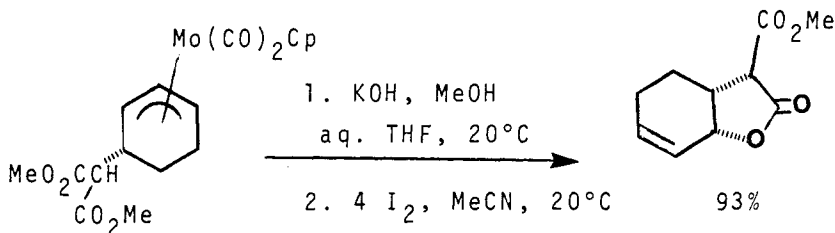
Larock, R.C.*; Harrison, L.W.; Hsu, M.H.

J Org Chem, (1984), 49, 3662

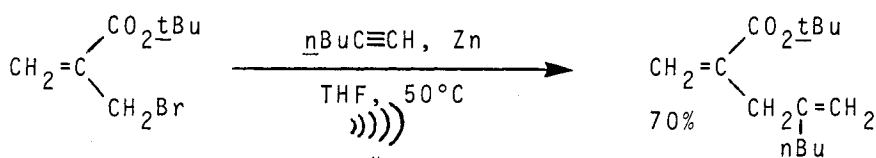


Bäckvall, J.-E.*; Byström, S.E.; Nordberg, R.E.

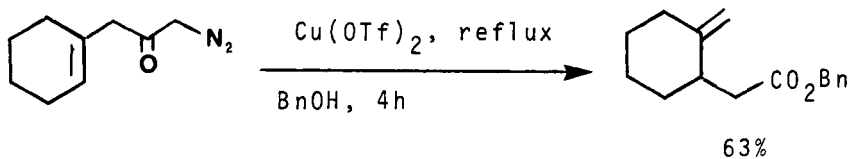
J Org Chem, (1984), 49, 4619



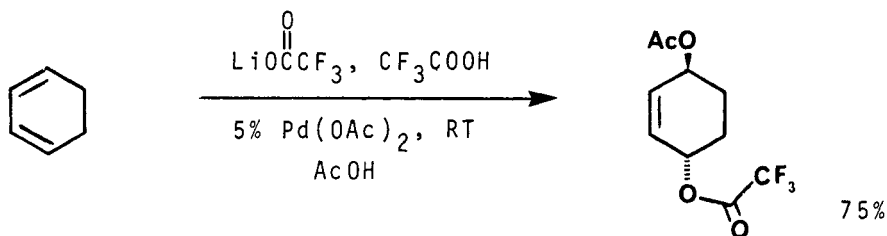
Pearson, A.J.*; Khan, M.N.I. J Am Chem Soc, (1984), 106, 1872



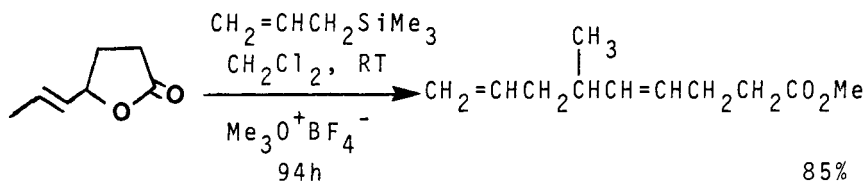
Knochel, P.; Normant, J.F.* Tetrahedron Lett, (1984), 25, 1475



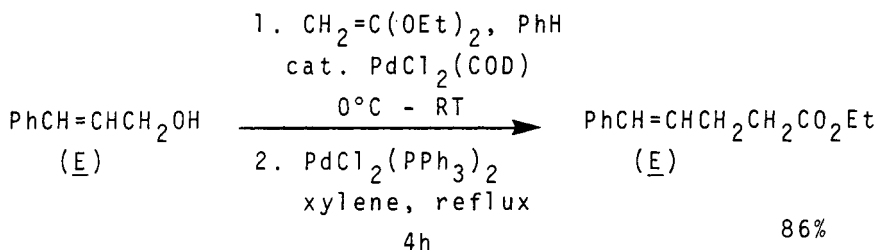
Smith III, A.B.*; Toder, B.H.; Branca, S.J.
J Am Chem Soc, (1984), **106**, 3995



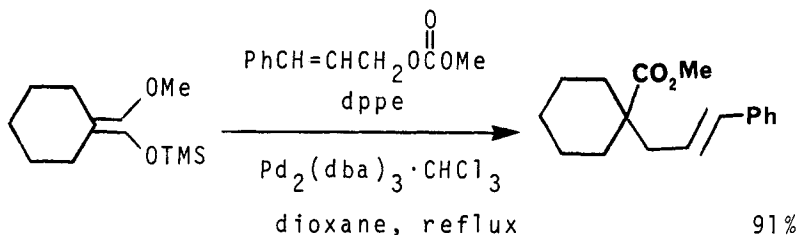
Bäckvall, J.-E.*; Vågberg, J.; Nordberg, R.E.
Tetrahedron Lett, (1984), **25**, 2717



Fujisawa, T.*; Kawashima, M.; Ando, S.
Tetrahedron Lett, (1984), **25**, 3213

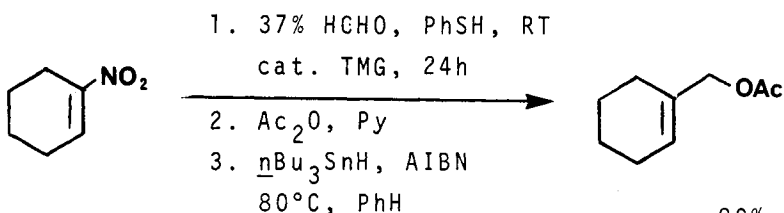


Ohshima, M.; Murakami, M.; Mukaiyama, T.
Chem Lett, (1984), 1535



91%

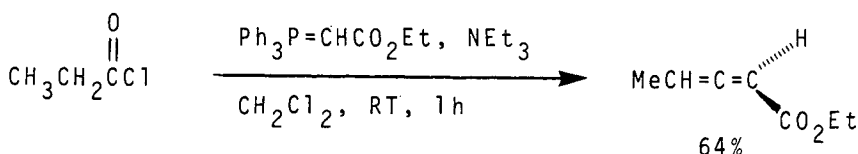
Tsuji, J.*; Takahashi, K.; Minami, I.; Shimizu, I.

Tetrahedron Lett., (1984), 25, 4783

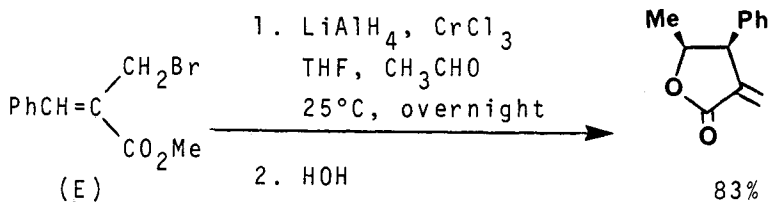
80%

TMG = tetramethylguanidine

Ono, N.*; Kamimura, A.; Kaji, A.

Tetrahedron Lett., (1984), 25, 5319

64%

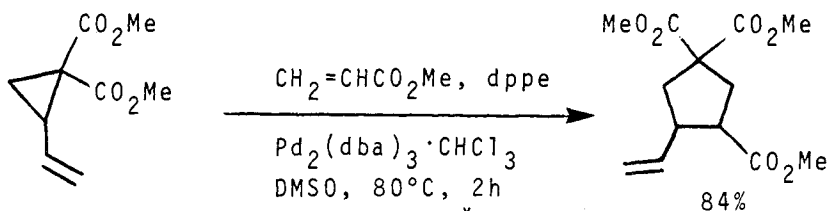
Lang, R.W.; Hansen, H.-J. Org Syn, (1984), 62, 202

83%

Drewes, S.E.*; Hoole, R.F.A. Syn Commun, (1985), 15, 1067

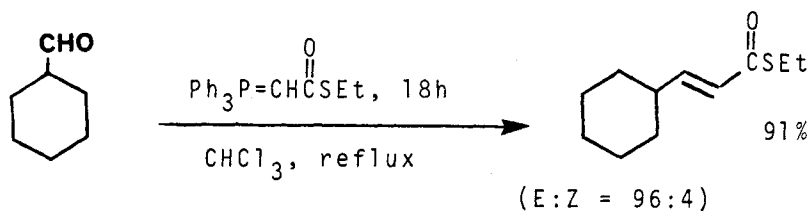
Okuda, Y.; Nakatsukasa, S.; Oshima, K.; Nozaki, H.

Chem Lett., (1985), 481



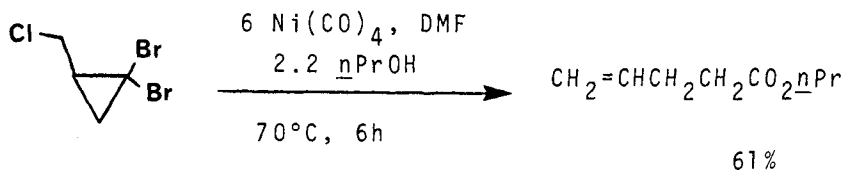
Shimizu, I.; Ohashi, Y.; Tsuji, J.*

Tetrahedron Lett., (1985), 26, 3825



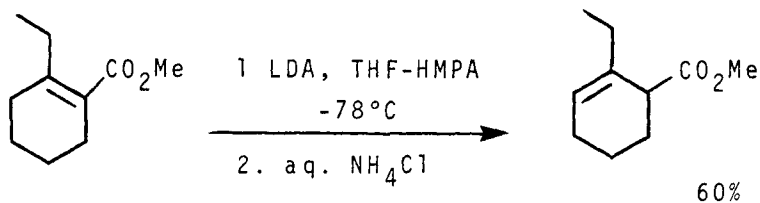
Keck, G.E.*; Boden, E.P.; Mabury, S.A.

J Org Chem, (1985), 50, 709



Hirao, T.*; Nagata, S.; Agawa, T.

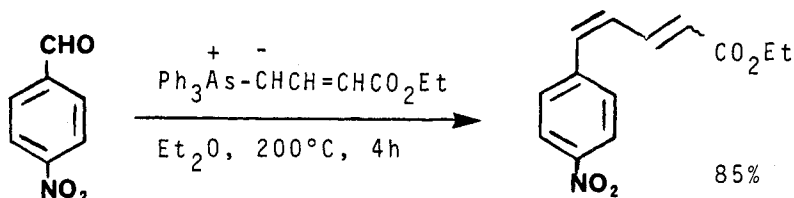
Tetrahedron Lett., (1985), 26, 5795



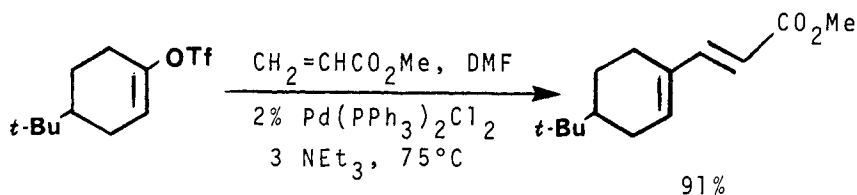
Harris, F.L.; Weiler, L.*

JCS Chem Comm, (1985), 1124

Tetrahedron Lett., (1984), 25, 1333

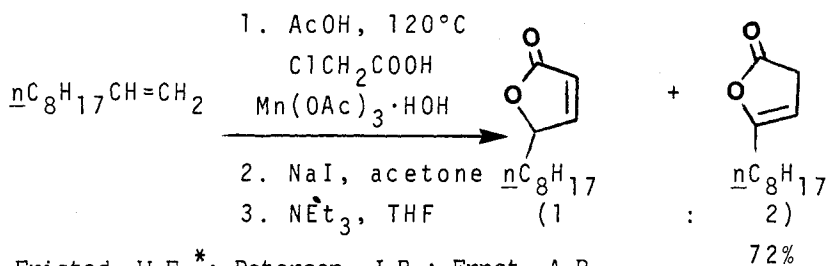


Huang, Y.*; Shen, Y.; Zheng, J.; Zhang, S.
Synthesis, (1985), 57



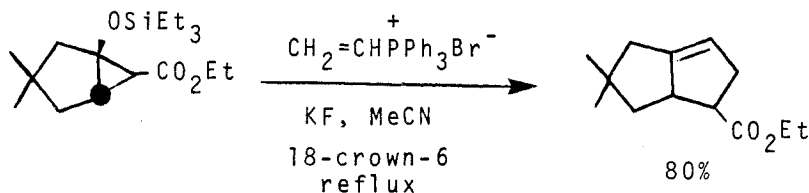
Scott, W.J.*; Peña, M.R.; Swärd, K.; Stoessel, S.J.; Stille, J.K.

J Org Chem, (1985), 50, 2302

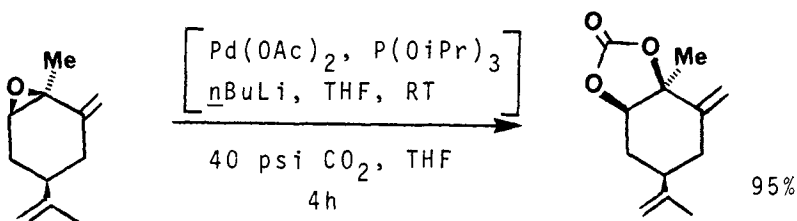
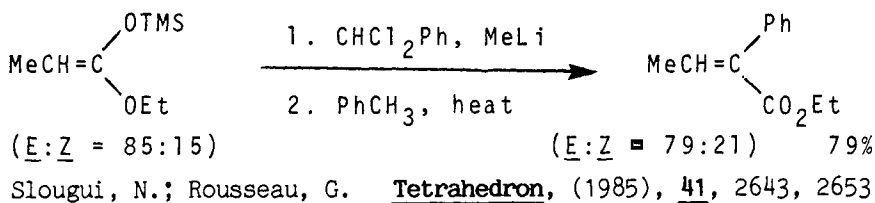


Fristad, W.E.*; Peterson, J.R.; Ernst, A.B.

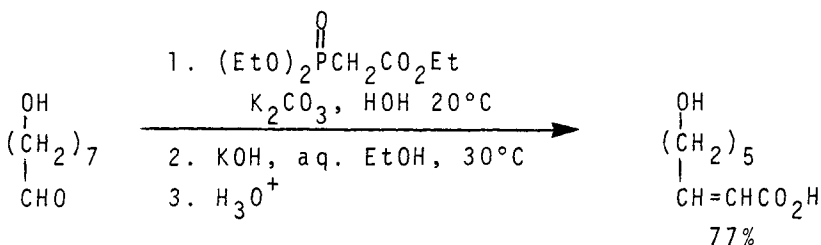
J Org Chem, (1985), 50, 3143



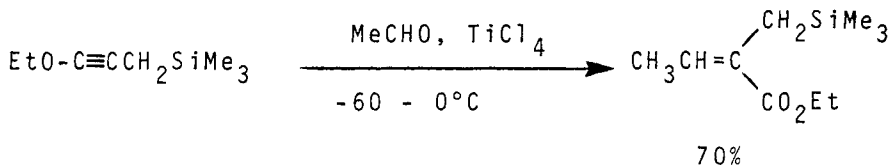
Marino, J.P.*; Laborde, E. J Am Chem Soc, (1985), 107, 734



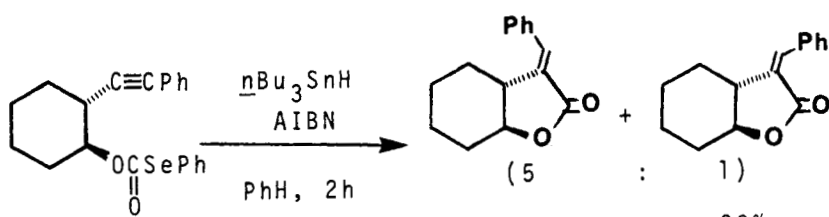
Trost, B.M.*; Angle, S.R. J Am Chem Soc, (1985), 107, 6123



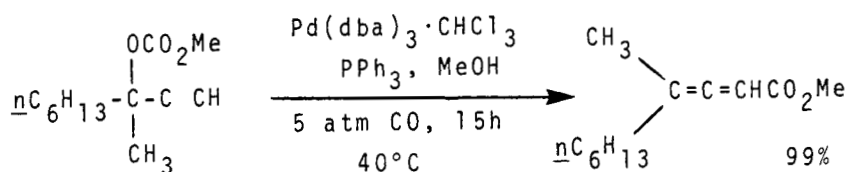
Villieras, J.*; Rambaud, M.; Graff, M.
Tetrahedron Lett, (1985), 26, 53



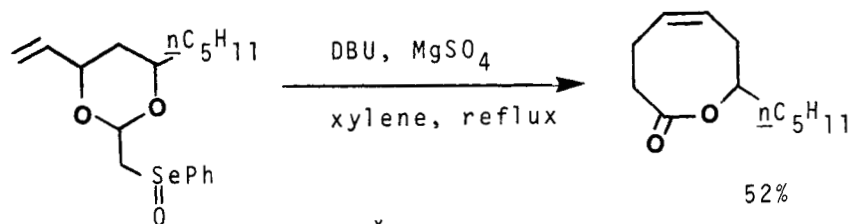
Pornet, J.; Khouz, B.; Miginiac, L.
Tetrahedron Lett, (1985), 26, 1861



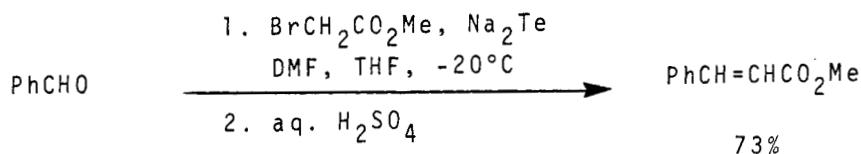
Bache, M.D.*; Bosch, E. Tetrahedron Lett., (1986), 27, 641



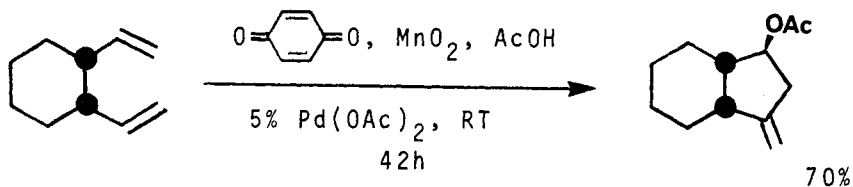
Tsuji, J.*; Suguira, T.; Minami, I. Tetrahedron Lett., (1986), 27, 731



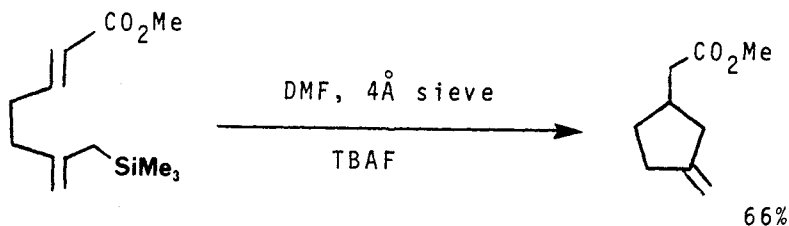
Carling, R.W.; Holmes, A.B.* JCS Chem Comm., (1986), 325



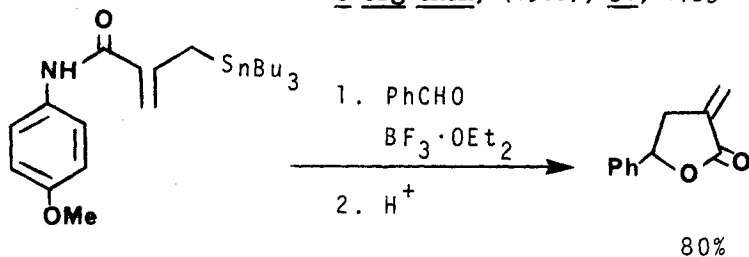
Suzuki, H.*; Inouye, M. Chem Lett., (1986), 403



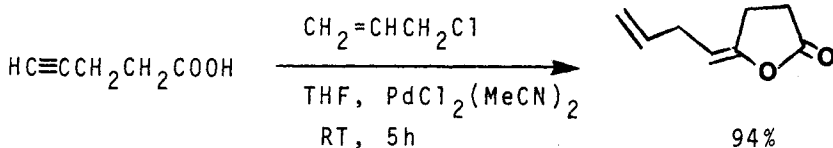
Antonsson, T.; Heumann, A.; Moberg, C.
JCS Chem Comm, (1986), 518



Majetich, G.*; Desmond Jr., R.W.; Soria, J.J.
J Org Chem, (1986), 51, 1753

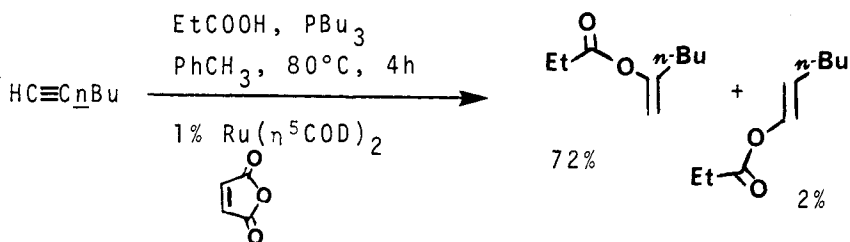


Tanaka, K.*; Yoda, H.; Isobe, Y.; Kaji, A.
J Org Chem, (1986), 51, 1856

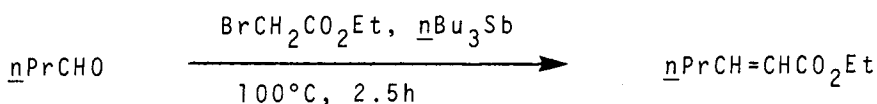


Yanagihara, N.; Lambert, C.; Iritani, K.; Utimoto, K.*; Nozaki, H.

J Am Chem Soc, (1986), 108, 2753

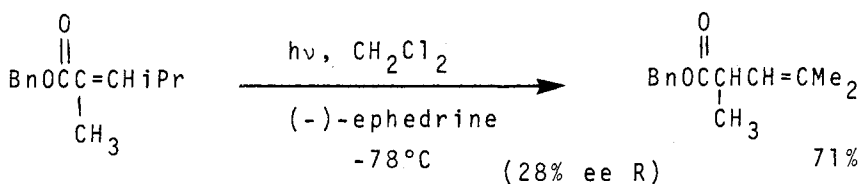


Mitsudo, T.*; Hori, Y.; Yamakawa, Y.; Watanabe, Y.*
Tetrahedron Lett., (1986), 27, 2125

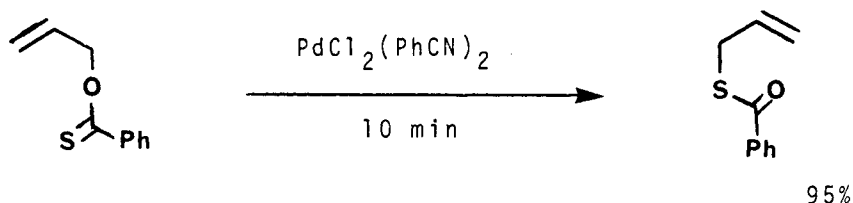


92%

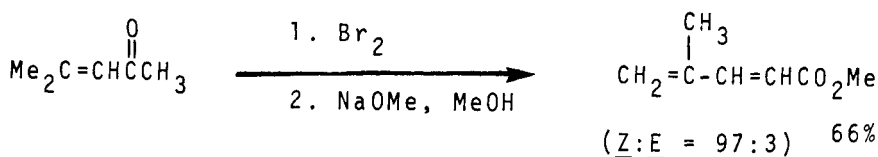
Huang, Y.; Shen, Y.; Chen, C.
Tetrahedron Lett., (1986), 27, 2903



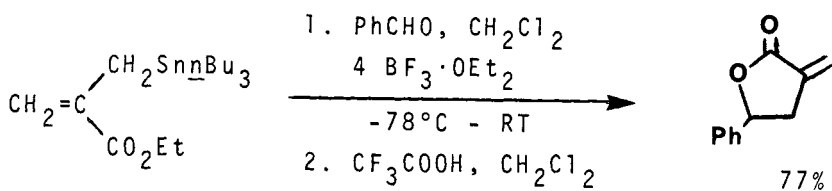
Piva, O.; Henin, F.; Muzart, J.; Pete, J.-P.*
Tetrahedron Lett., (1986), 27, 3001



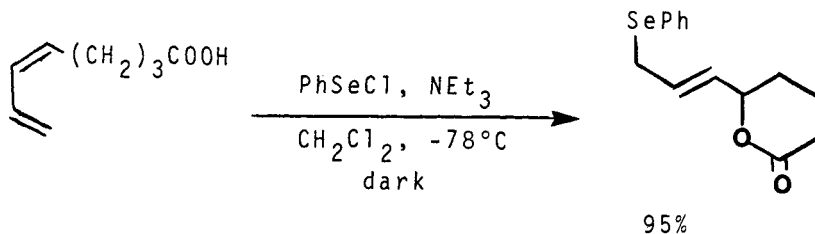
Auburn, P.R.; Whelan, J.; Bosnich, B.*
Organometallics, (1986), 5, 1533



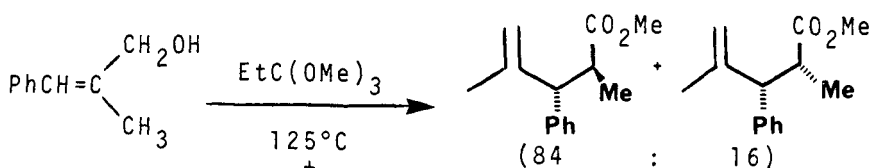
Engler, T.A.*; Falter, W. Tetrahedron Lett., (1986), 27, 4115



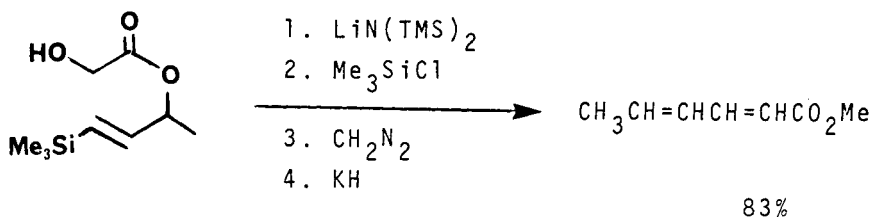
Baldwin, J.E.*; Adlington, R.M.; Sweeney, J.B.
Tetrahedron Lett., (1986), 27, 5423



Huckstep, M.R.*; Taylor, R.J.K.*; Caton, M.P.L.
Tetrahedron Lett., (1986), 27, 5919



Daub, G.W.*; Shanklin, P.L.*; Tata, C.
J Org Chem., (1986), 51, 3402 80%



Sato, T.; Tsunekawa, H.; Kohama, H.; Fujisawa, T.*
Chem Lett, (1986), 1553

Review: "Synthesis of α -Methylene- γ -Lactones"

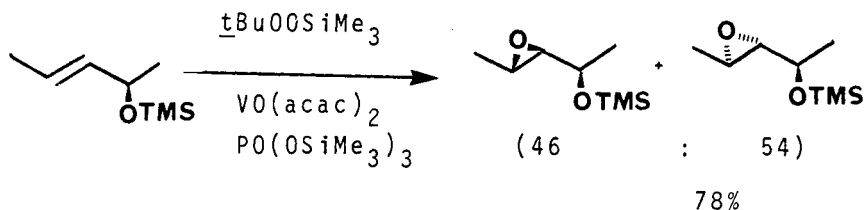
Sarma, J.C.; Sharma, R.P. Heterocycles, (1986), **24**, 441

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

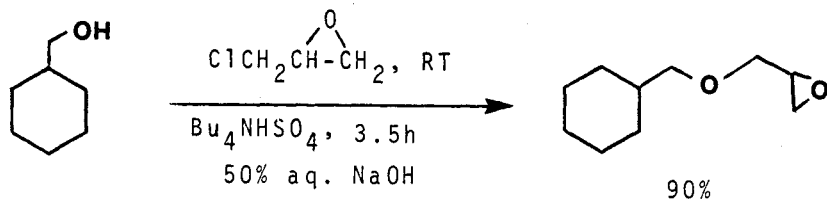
Also via: Acetylenic esters (Section 306); Olefinic acids
 (Section 322; β -hydroxyesters (Section 327)

SECTION 363: Ether, Epoxide, Thioether - Ether, Epoxide, Thioether

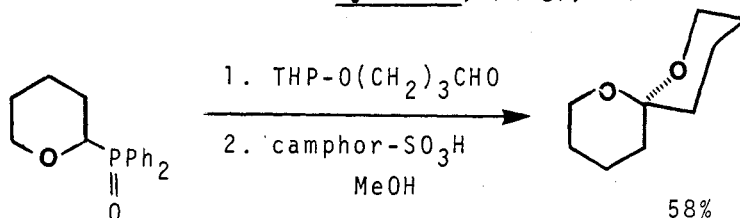
See Section 60A (Protection of Aldehydes) and Section 180A
 (Protection of Ketones) for reactions involving formation of
 Acetals and Ketals.



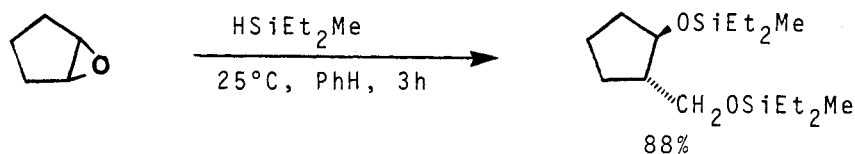
Hujama, T.*; Obayashi, M. Tetrahedron Lett, (1983), **24**, 395



Mouzin, G.; Cousse, H.; Rieu, J.-P.; Duflos, A.
Synthesis, (1983), 117

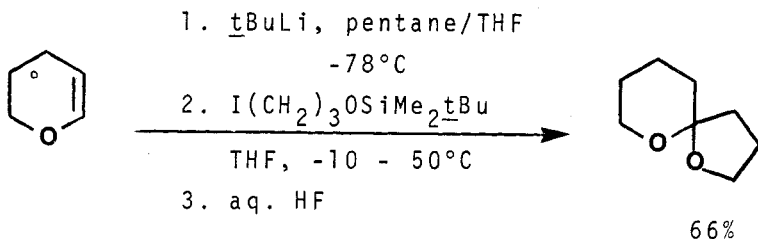


Ley, S.V.*; Lygo, B. Tetrahedron Lett., (1984), 25, 113

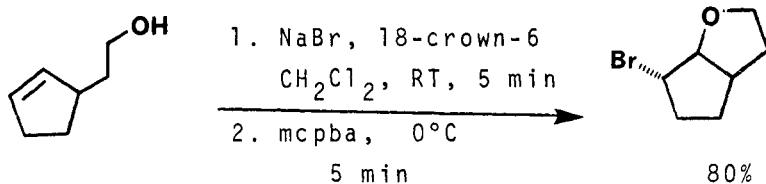


Murai, T.; Kato, S.; Murai, S.*; Toki, T.; Suzuki, S.; Sonoda, N.

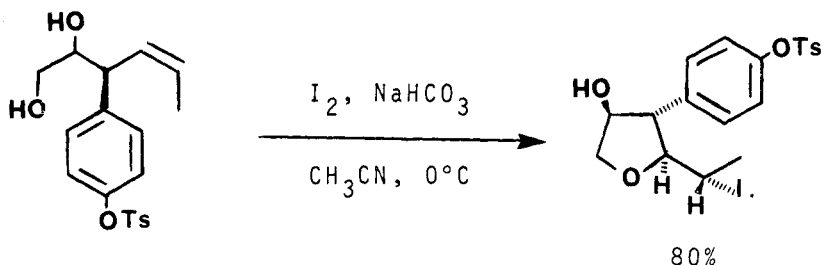
J Am Chem Soc., (1984), 106, 6093



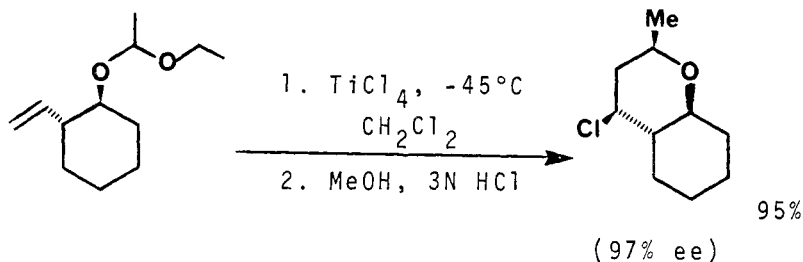
Amouroux, R.* Heterocycles, (1984), 22, 1489

SECTION 364: Ether, Epoxide, Thioether - Halide, Sulfonate

Srebnik, M.; Mechoulam, R.* JCS Chem Comm, (1984), 1070



Williams, D.R.*; Grote, J.; Harigaya, Y.
Tetrahedron Lett, (1984), 25, 5231



Melany, M.L.; Lock, G.A.; Thompson, D.W.

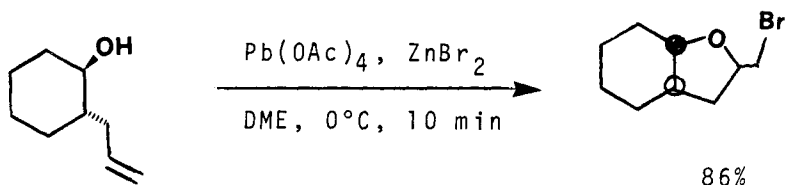
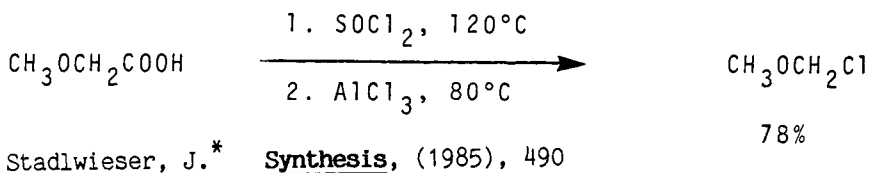
J Org Chem, (1985), 50, 3925

Winstead, R.C.; Simpson, T.H.*; Lock, G.A.; Schiavelli, M.D.;
Thompson, D.W.

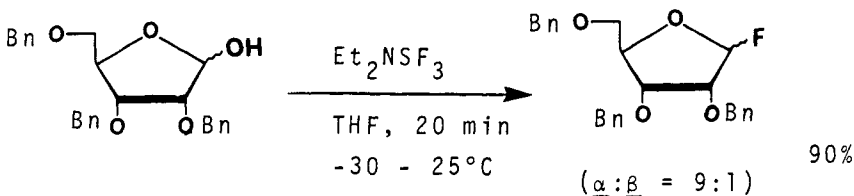
J Org Chem, (1986), 51, 275

Bunnelle, W.H.*; Seamon, D.W.*; Mohler, D.L.; Ball, T.F.;
Thompson, D.W.

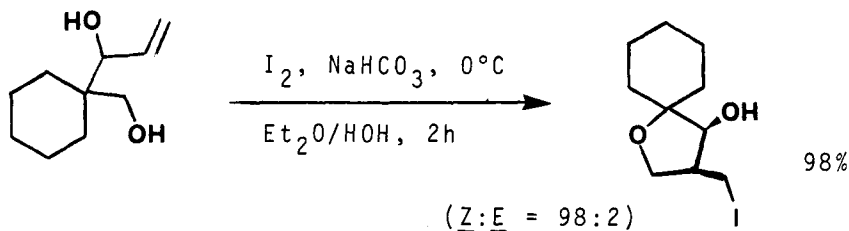
Tetrahedron Lett, (1984), 25, 2653



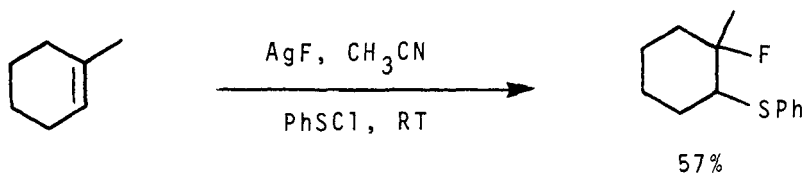
Motohashi, S.*; Satomi, M.; Fujimoto, Y.*; Tatsuno, T.
Heterocycles, (1985), 23, 2035



Posner, G.H.*; Haines, S.R.* Tetrahedron Lett, (1985), 26, 5



Tamaru, Y.; Kawamura, S.; Yoshida, Z.*
Tetrahedron Lett, (1985), 26, 2885

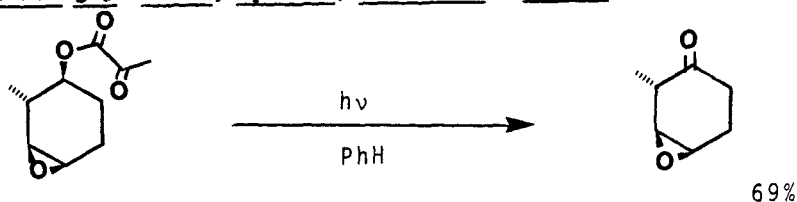


Purrington, S.T.*; Correa, I.D. J Org Chem, (1986), 51, 1080

Review: "Organic Synthesis with α -Chlorosulfides"

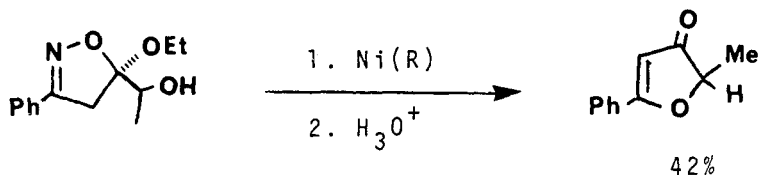
Dilworth, B.M.; McKervey, M.A. Tetrahedron, (1986), 42, 3731

SECTION 365: Ether, Epoxide, Thioether - Ketone



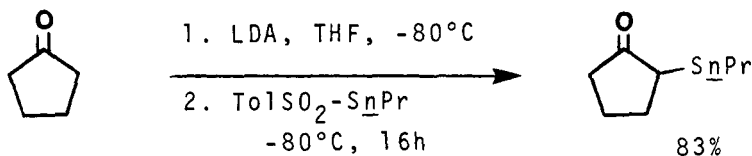
Carless, H.A.J.*; Fekarurhobo, G.K.

Tetrahedron Lett, (1983), 24, 107



Curran, D.P.*; Singleton, D.H.

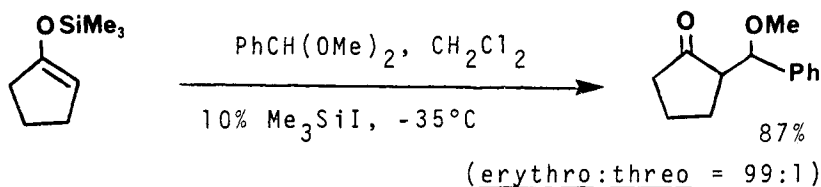
Tetrahedron Lett, (1983), 24, 2079



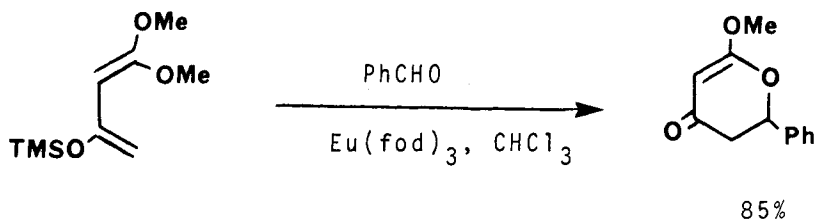
Scholz, D.*

Liebigs Ann Chem, (1983), 259, 264

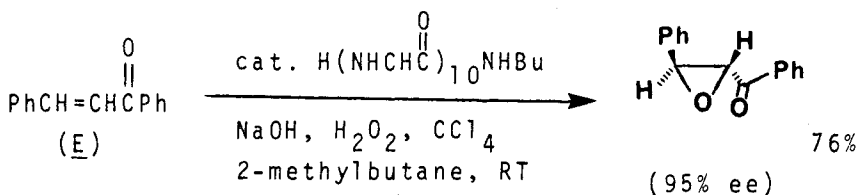
Monatsh Chem, (1983), 114, 655



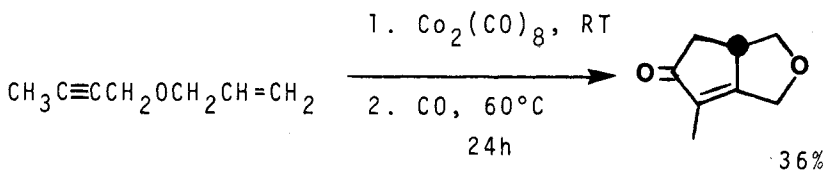
Sakurai, H.*; Sasaki, K.; Hosomi, A.
Bull Chem Soc Jpn, (1983), **56**, 3195



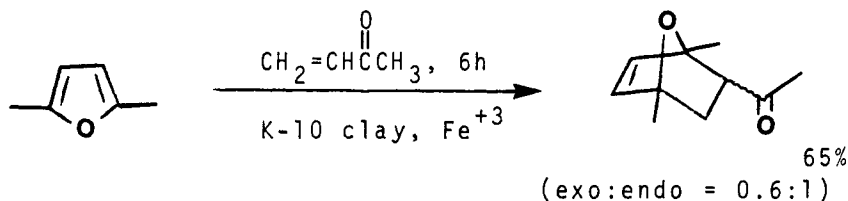
Danishefsky, S.*; Harvey, D.F.; Quallich, G.; Uang, B.J.
J Org Chem, (1984), **49**, 392



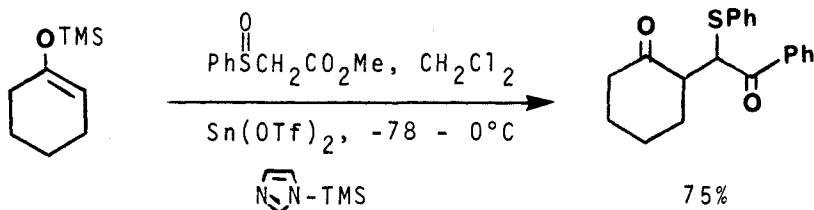
Banfi, S.; Colonna, S.*; Molinari, H.; Julia, S.*; Guixer, J.
Tetrahedron, (1984), **40**, 5207



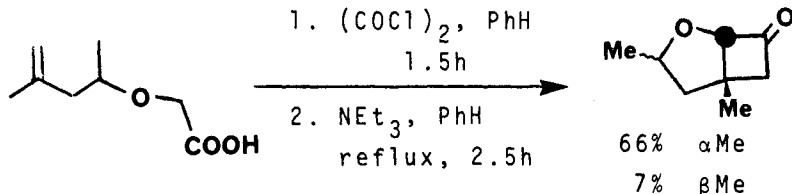
Billington, D.C.*; Willison, D.
Tetrahedron Lett, (1984), **25**, 4041



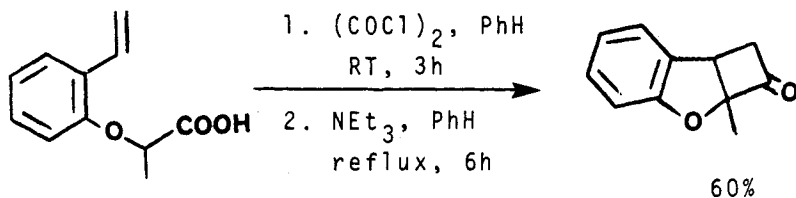
Laszlo, P.*; Lucchetti, J. Tetrahedron Lett., (1984), **25**, 4387



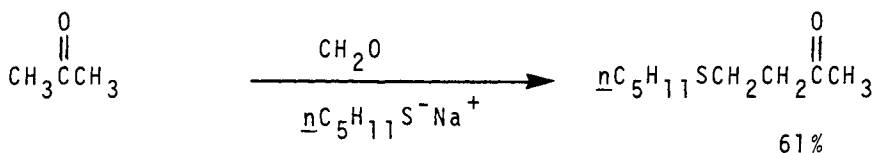
Shimizu, M.; Akiyama, T.; Mukaiyama, T.
Chem Lett., (1984), 1531



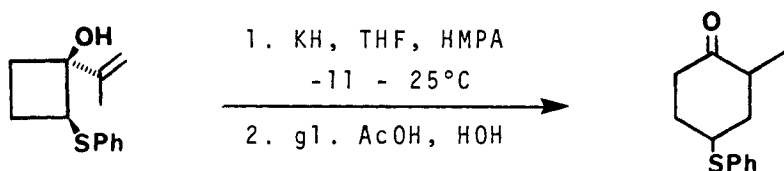
Snider, B.B.*; Hui, R.A.H.F. J Org Chem, (1985), **50**, 5167
 Snider, B.B.*; Hui, R.A.H.F.; Kulkarni, Y.S.
J Am Chem Soc, (1985), **107**, 2194



Brady, W.T.*; Giang, Y.F. J Org Chem, (1985), **50**, 5177

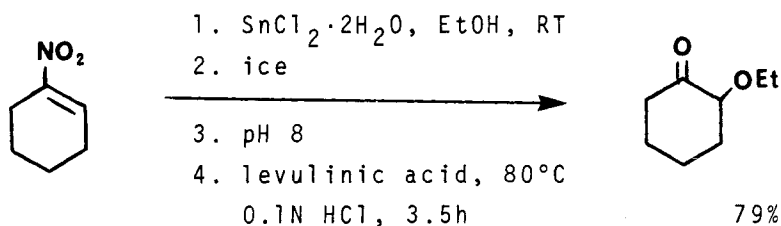


Sabirov, S.S.; Gnevasheva, L.M.; Ismailov, M.I.; Isobaev, M.D.
J Org Chem USSR, (1984), 20, 1239

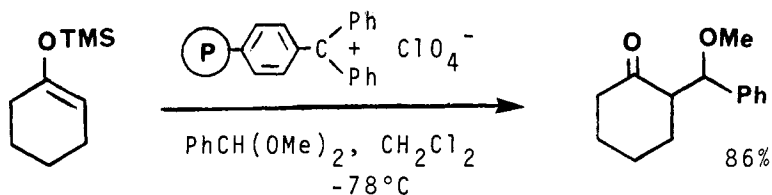


Cohen, T.*; Yu, L.-C.; Daniewski, W.M.
J Org Chem, (1985), 50, 4596

69%

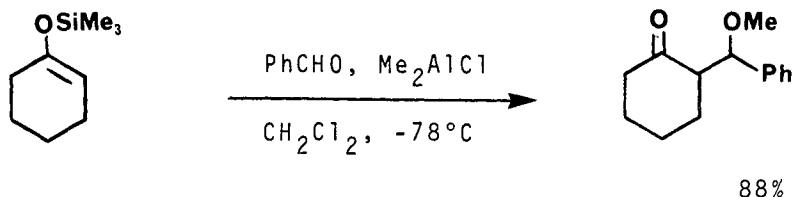


Varma, R.S.; Kabalka, G.W.* Syn Commun, (1985), 15, 443

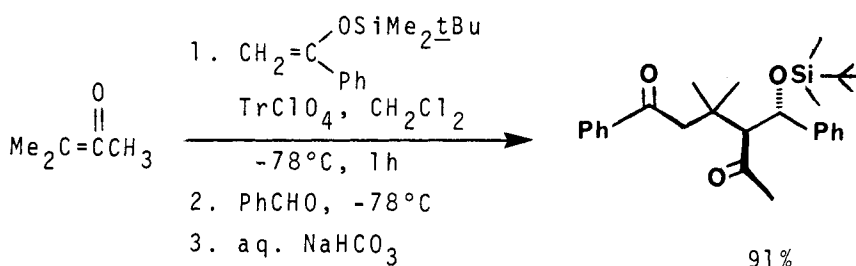


(syn:anti = 88:12)

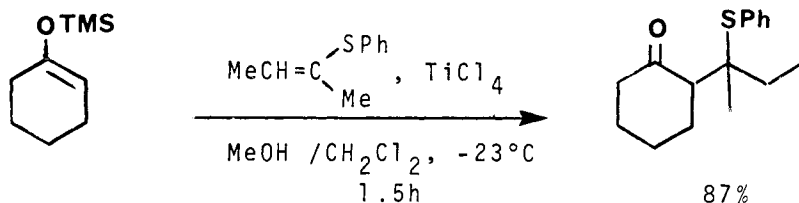
Mukaiyama, T.; Iwakiri, H. Chem Lett, (1985), 1363



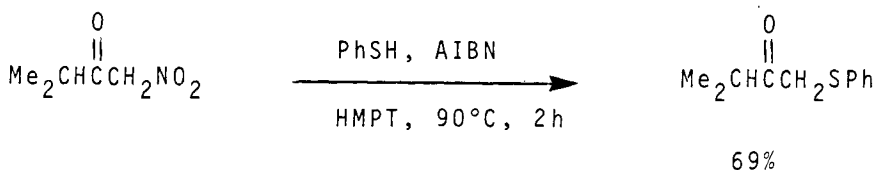
Naruse, Y.; Ukai, J.; Ikeda, N.; Yamamoto, H.*
Chem Lett, (1985), 1451



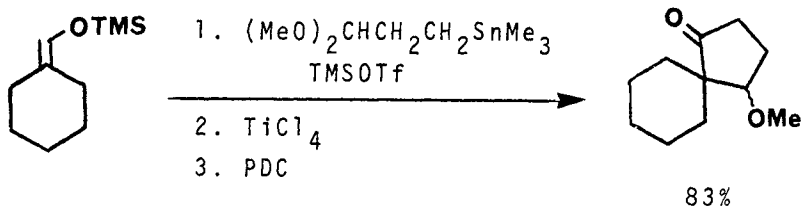
Kobayashi, S.; Mukaiyama, T. Chem Lett, (1986), 221



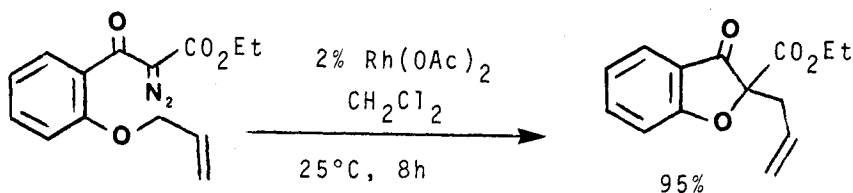
Takeda, T.*; Kaneko, Y.; Fujiwara, T.
Tetrahedron Lett, (1986), 27, 3029



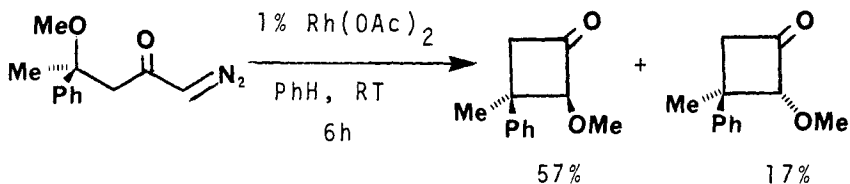
Miyake, H.*; Yamamura, K. Bull Chem Soc Jpn, (1986), 59, 89



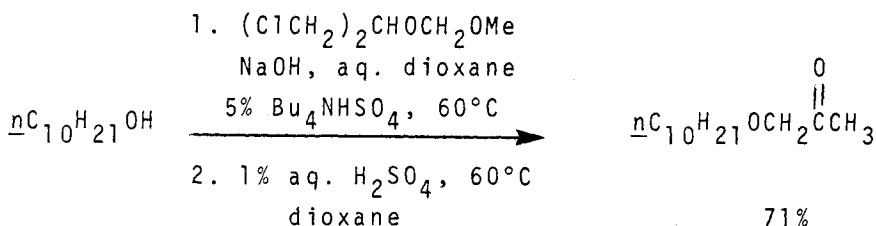
Lee, T.V.*; Richardson, K.A.; Taylor, D.A.
Tetrahedron Lett., (1986), 27, 5021



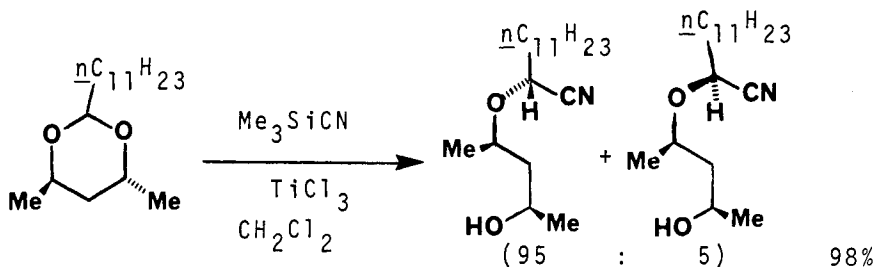
Pirrung, M.C.*; Werner, J.A. J Am Chem Soc., (1986), 108, 6060



Roskamp, E.J.; Johnson, C.R.* J Am Chem Soc., (1986), 108, 6062

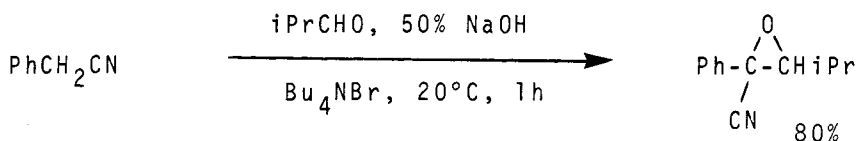


Gu, X.-P.; Ikeda, I.; Komada, S.; Masuyama, A.; Okahara, M.*
J Org Chem., (1986), 51, 5425

SECTION 366: Ether, Epoxide, Thioether - Nitrile

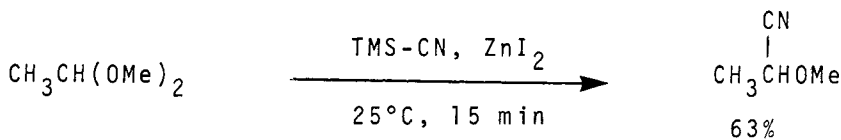
Elliott, J.D.*; Choi, V.M.F.; Johnson, W.S.

J Org Chem, (1983), 48, 2294



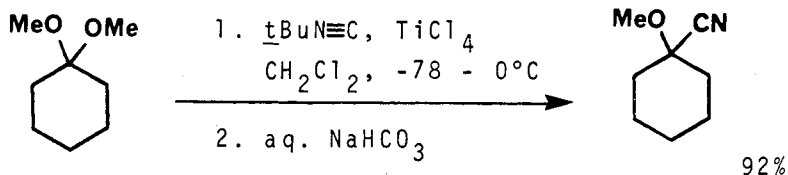
Makosza, M.*; Kwast, A.; Kwast, E.; Jonezyk, A.

J Org Chem, (1985), 50, 3722



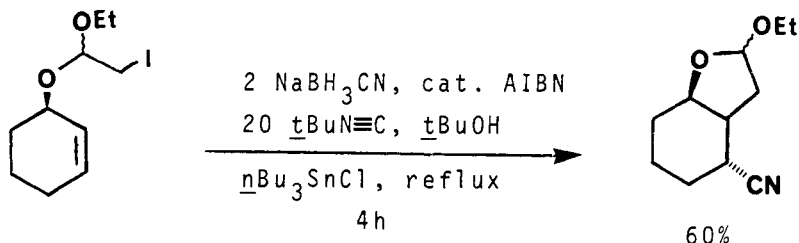
Kirchmeyer, S.; Mertens, A.; Arvanaghi, M.; Olah, G.A.*

Synthesis, (1983), 498



Ito, Y.*; Imai, H.; Segoe, K.; Saegusa, T.*

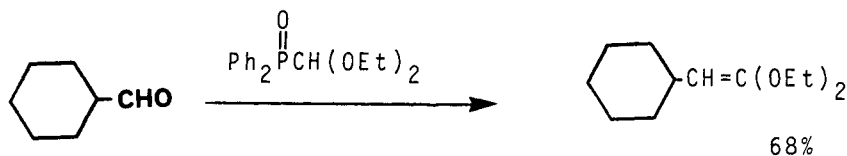
Chem Lett, (1984), 937



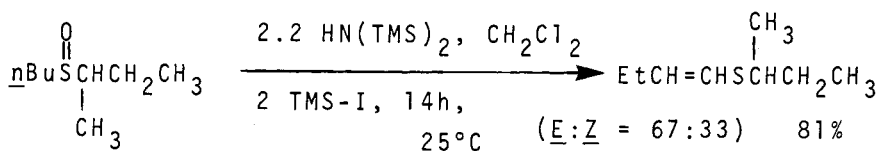
Stork, G.*; Sher, P.M. J Am Chem Soc, (1986), **108**, 303
J Am Chem Soc, (1983), **105**, 6765

SECTION 367: Ether, Epoxide, Thioether - Olefin

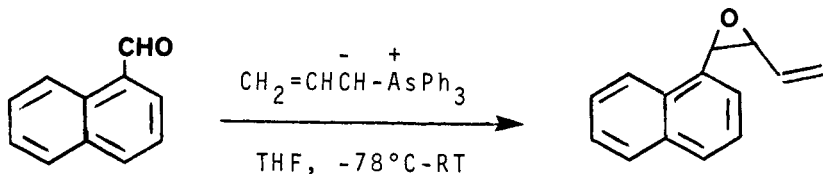
Enol ethers are found in this section.



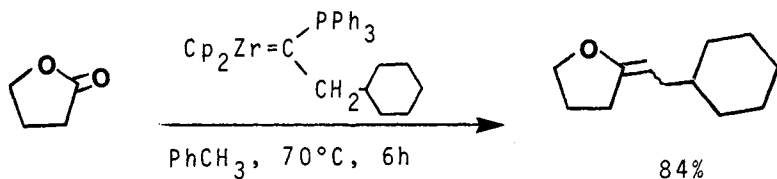
van Schaik, T.A.M.; Henzen, A.V.; van der Gen, A.*
Tetrahedron Lett, (1983), **24**, 1303



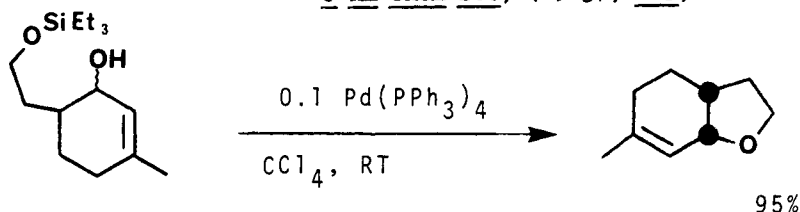
Miller, R.D.*; McKean, D.R. Tetrahedron Lett, (1983), **24**, 2619



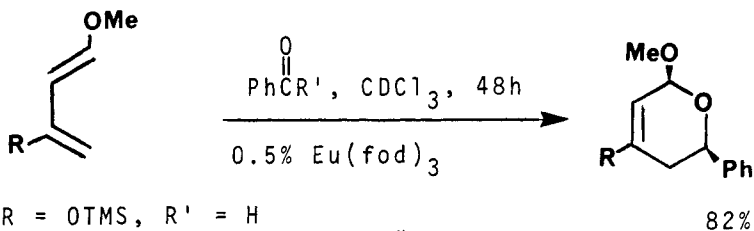
Ousset, J.B.; Mioskowski, C.*; Solladie, G.
Tetrahedron Lett, (1983), **24**, 4419



Hartner Jr., F.W.; Schwartz, J.; Clift, S.M.
J Am Chem Soc, (1983), 105, 640

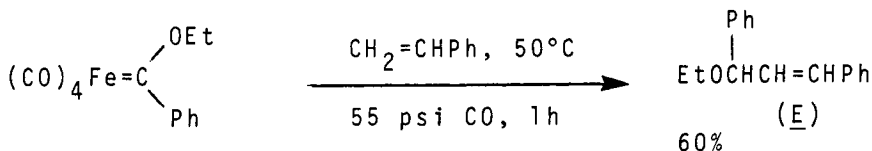


Stanton, S.A.; Felman, S.W.; Parkhurst, C.S.; Godleski, S.A.*
J Am Chem Soc, (1983), 105, 1964

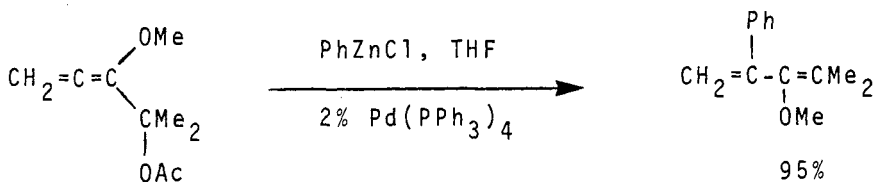


$\text{R} = \text{OTMS}$, $\text{R}' = \text{H}$
 Bednarski, M.; Danishefsky, S.*
J Am Chem Soc, (1983), 105, 3716

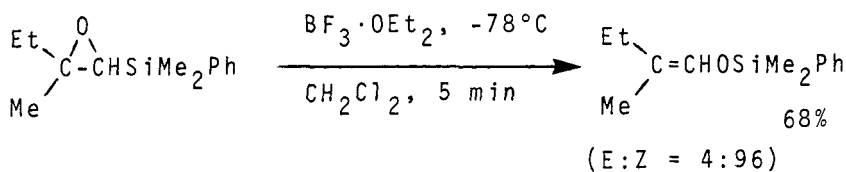
$\text{R} = \text{H}$, $\text{R}' = \text{Me}$ 10 KBar, 20h 81% ($\underline{\text{E}}:\underline{\text{Z}} = 1:1$)
 Jurczak, J.; Golebiowski, A.; Bauer, T. Synthesis, (1985), 928



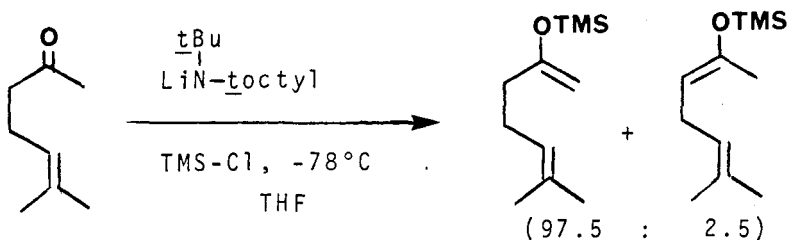
Semmelhack, M.F.*; Tamura, R. J Am Chem Soc, (1983), 105, 6750



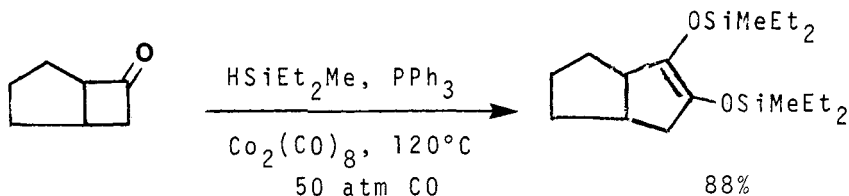
Kleijn, H.; Westmijze, H.; Meijer, J.; Vermeer, P.
Rec Trav Chim Pays Bas, (1983), **102**, 378



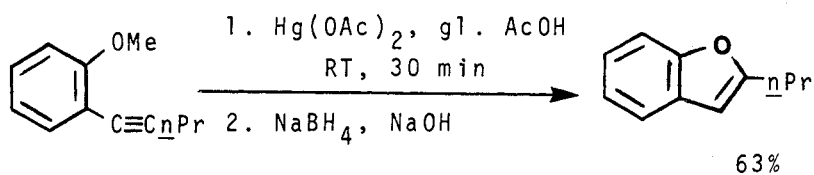
Fleming, I.*; Newton, T.W. JCS Perkin I, (1984), 119



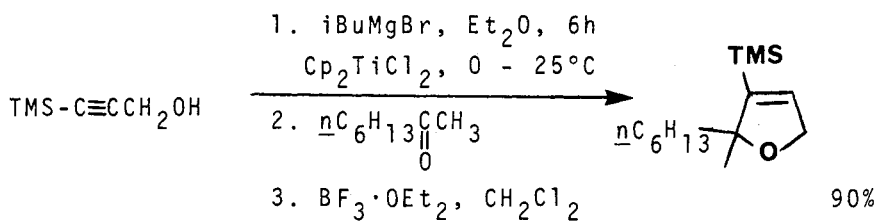
Corey, E.J.*; Gross, A.W. Tetrahedron Lett, (1984), **25**, 495



Chatani, N.; Furukawa, H.; Kato, T.; Murai, S.*; Sonoda, N.
J Am Chem Soc, (1984), **106**, 430

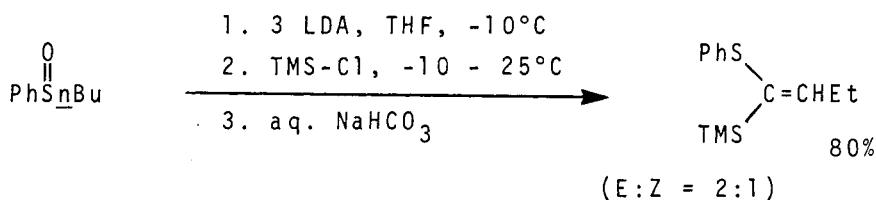


Larock, R.C.*; Harrison, L.W. J Am Chem Soc, (1984), **106**, 4218

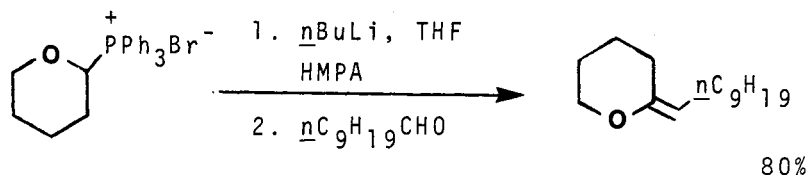


Sato, F.*; Kanbara, H.; Tanaka, Y.

Tetrahedron Lett, (1984), **25**, 5063

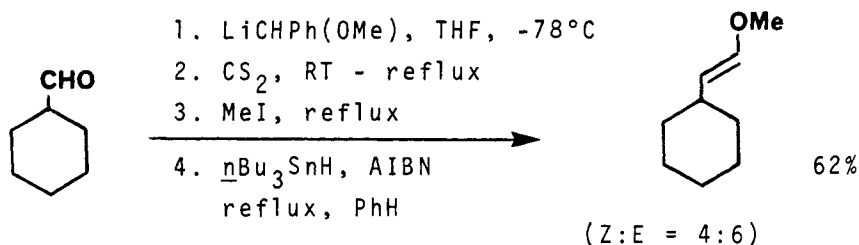


Miller, R.O.*; Hässig, R. Tetrahedron Lett, (1984), **25**, 5351

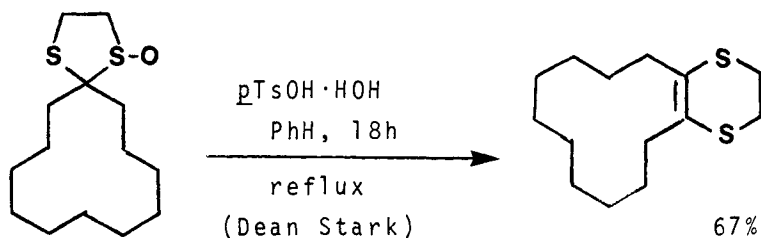


Ousset, J.B.; Mioskowski, C.*; Yang, Y.-L.; Falck, J.R.*

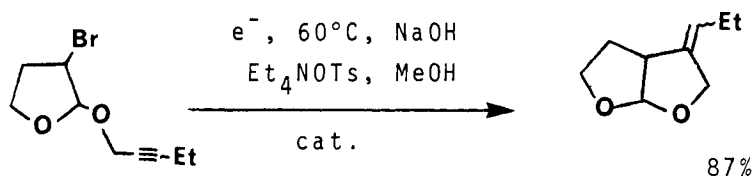
Tetrahedron Lett, (1984), **25**, 5903



Vatele, J.-M.* Tetrahedron Lett., (1984), 25, 5997

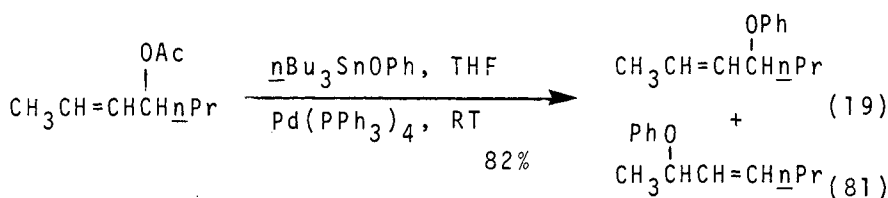


Nickon, A.*; Rodriguez, A.D.; Shirhatti, V.; Ganguly, R.
J Org Chem, (1985), 50, 4218

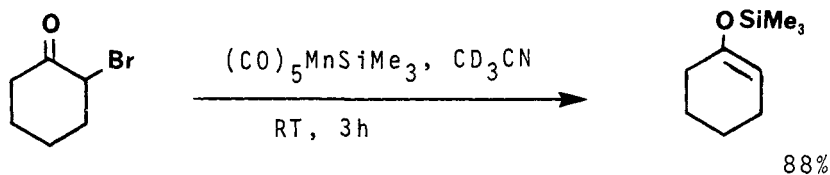


cat. = chloropyridine cobaloxime (III)

Torii, S.*; Inokuchi, T.; Yukawa, T.
J Org Chem, (1985), 50, 5875

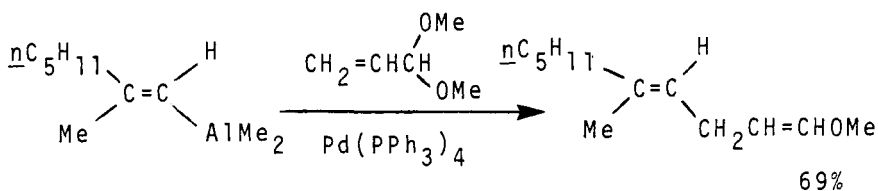


Keinan, E.*; Sahai, M.; Roth, Z.; Nudelman, A.*; Herzig, J.
J Org Chem, (1985), 50, 3558



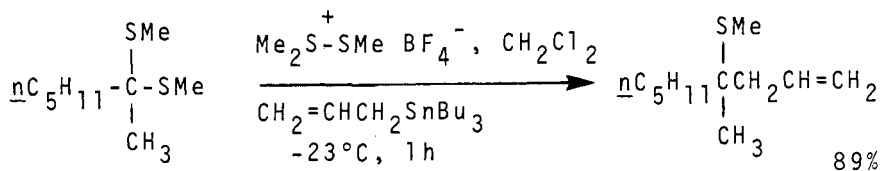
Marsi, M.; Brinkman, K.C.; Lisensky, C.A.; Vaughn, G.D.; Gladysz, J.A.

J Org Chem, (1985), 50, 3396



(E:Z = 2:1)

Chatterjee, S.; Negishi, E.* J Org Chem, (1985), 50, 3406

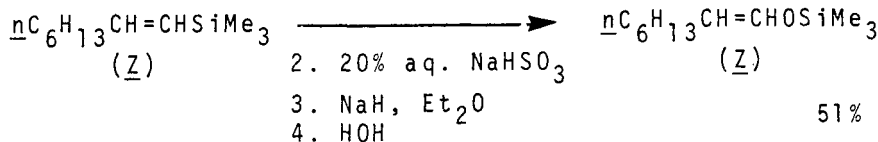


Trost, B.M.*; Sato, T. J Am Chem Soc, (1985), 107, 719

1. $\text{Me}_3\text{N} \cdot 0.2\text{H}_2\text{O}$

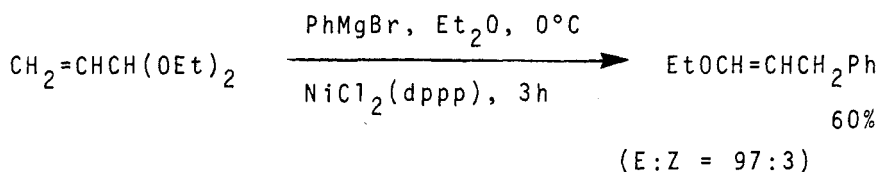
OsO_4 , $t\text{BuOH}$

reflux, 24h

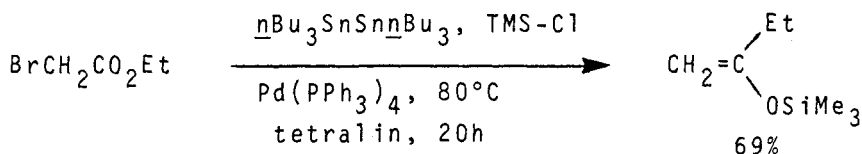


Hudrlik, P.F.*; Hudrlik, A.M.; Kulkarni, A.K.

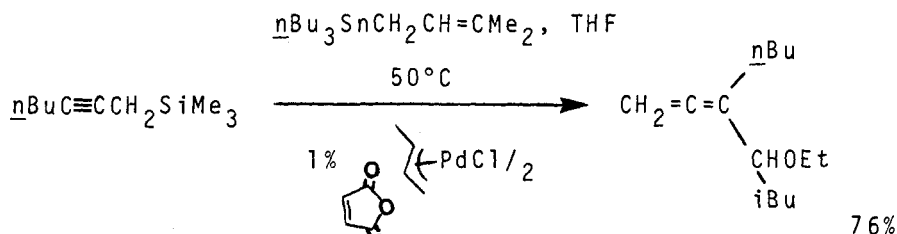
J Am Chem Soc, (1985), 107, 4260



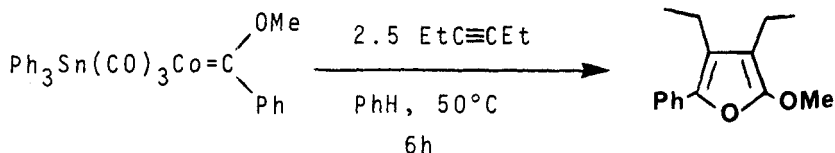
Sugimura, H.; Takei, H.* Chem Lett, (1985), 351



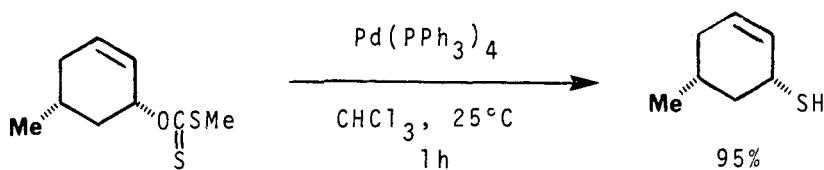
Kosugi, M.*; Koshiba, M.; Sano, H.; Migita, T.*
Bull Chem Soc Jpn, (1985), 58, 1075



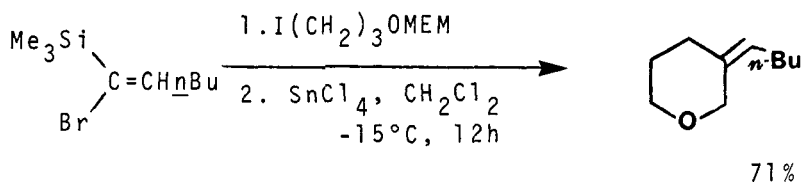
Pornet, J.; Miginiac, L.*; Jaworski, K.; Rondrianielina, B.
Organometallics, (1985), 4, 333



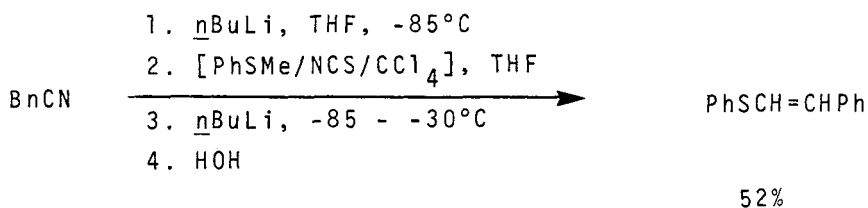
Wulff, W.D.*; Gilbertson, S.R.; Springer, J.P.
J Am Chem Soc, (1986), 108, 520



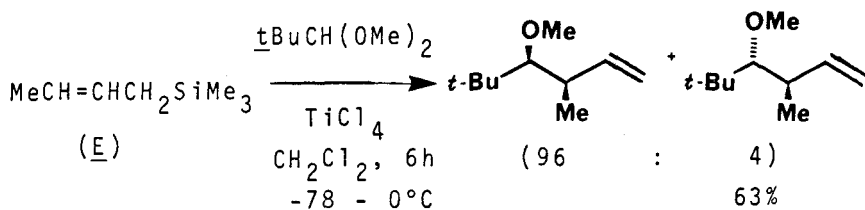
Auburn, P.R.; Whelan, J.; Bosnich, B.
JCS Chem Comm, (1986), 146



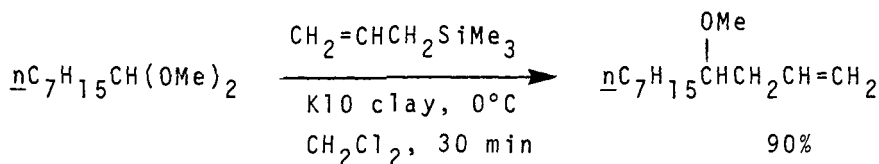
Overman, L.E.*; Castañeda, A.; Blumenkopff, T.A.
J Am Chem Soc, (1986), 108, 1303



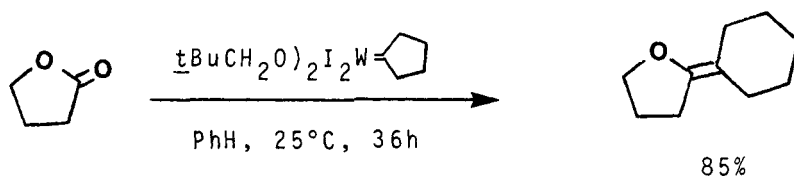
Harada, T.; Karasawa, A.; Oku, A.* J Org Chem, (1986), 51, 842



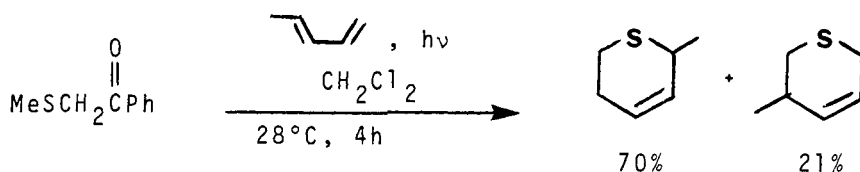
Hosomi, A.*; Ando, M.; Sakurai, H.* Chem Lett, (1986), 365



Kawai, M.; Onka, M.*; Izumi, Y. Chem Lett, (1986), **381**

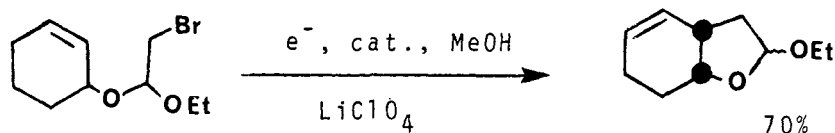


Aguero, A.; Kress, J.; Osborn, J.A. JCS Chem Comm, (1986), 531



Vedejs, E.*; Eberlein, T.H.; Mazur, D.J.; McClure, C.K.; Perry, D.A.; Ruggeri, R.; Schwartz, E.; Stults, J.S.; Varie, D.L.; Wilde, R.G.; Wittenberger, S.

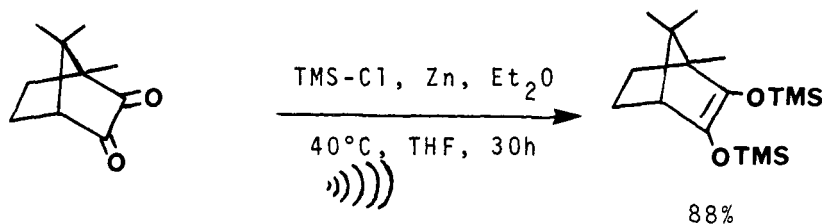
J Org Chem, (1986), **51**, 1556



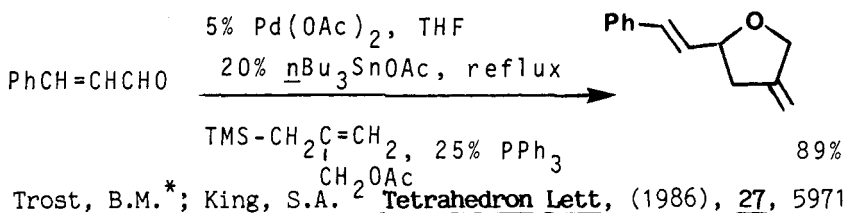
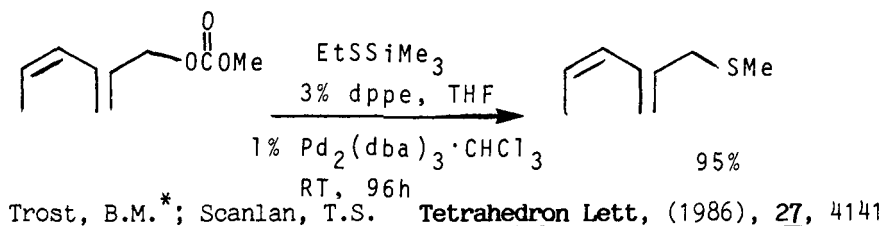
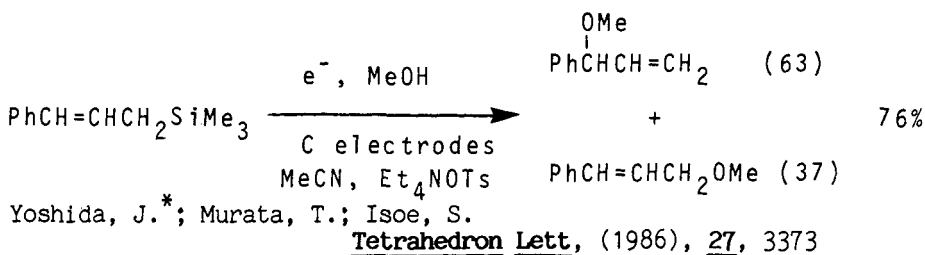
cat. = chloro(pyridino)-bis-(dimethylglyoximate) cobalt (III)

Bhandal, H.; Pattenden, G.*; Russell, J.J.

Tetrahedron Lett, (1986), **27**, 2299



Boudjouk, P.*; So, J.H. Syn Commun, (1986), 16, 775



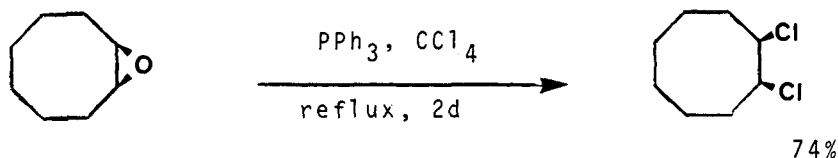
Review: "Silyl Enol Ethers In Synthesis"

Brownbridge, P. Synthesis, (1983), 1, 85

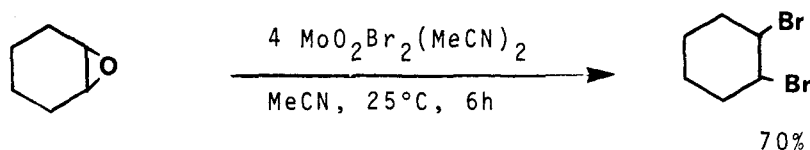
Related Methods: Protection of Ketones (Section 180A)

SECTION 368: Halide, Sulfonate - Halide, Sulfonate

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

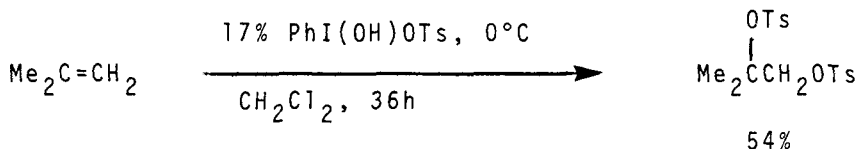


Croft, A.P.; Bartsch, R.A.* J Org Chem, (1983), **48**, 3353

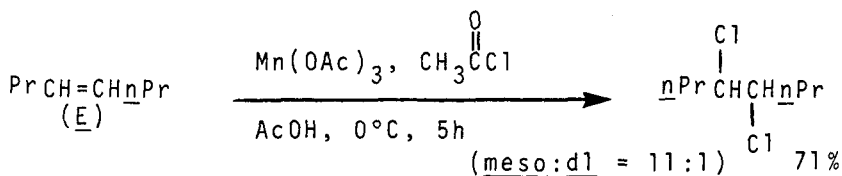


Arzoumanian, H.*; Krentzien, H.; Lai, R.; Metzger, J.; Petrignoni, J.-F.

J Organomet Chem, (1983), **243**, 175

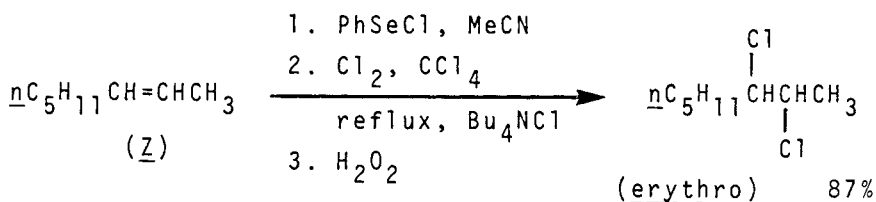


Rebrovic, L.; Koser, G.F. J Org Chem, (1984), **49**, 2462

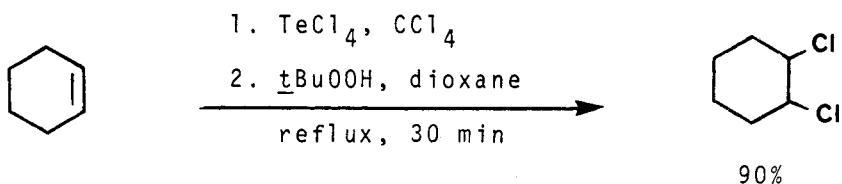


Donnelly, K.D.; Fristad, W.E.*; Gellerman, B.J.; Peterson, J.R.; Selle, B.J.

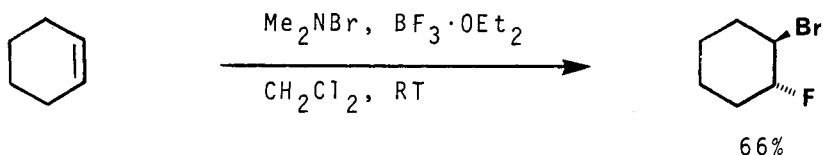
Tetrahedron Lett, (1984), **25**, 607



Morella, A.M.; Ward, A.D.* Tetrahedron Lett., (1984), 25, 1197

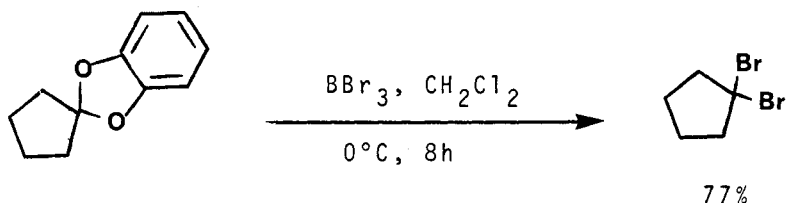


Uemura, S.*; Fukuzawa, S. J Organomet Chem., (1984), 268, 223

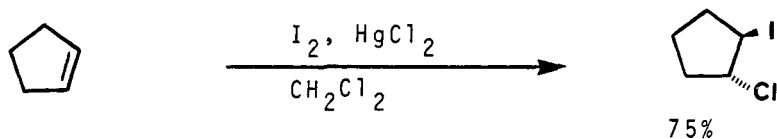


Heasley, G.E.*; Janes, J.M.; Stark, S.R.; Robinson, B.L.;
Heasley, V.L.; Shellhamer, D.F.

Tetrahedron Lett., (1985), 26, 1811

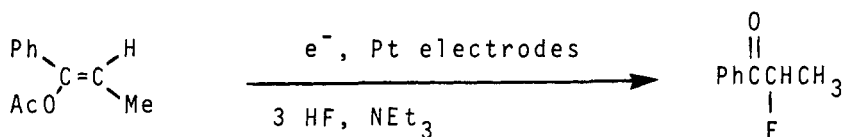


Napolitano, E.*; Fiaschi, R.; Mastorilli, E.
Synthesis, (1986), 122

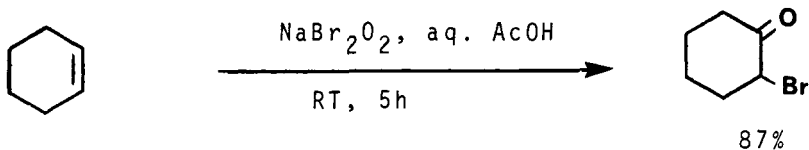


Barluenga, J.*; Martinez-Gallo, J.M.; Najera, C.; Yus, M.
J Chem Res, (1986), 274

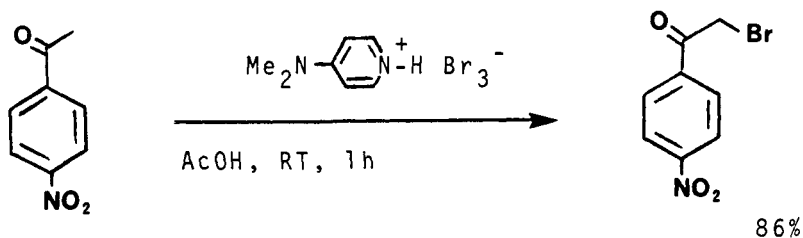
SECTION 369: Halide, Sulfonate - Ketone



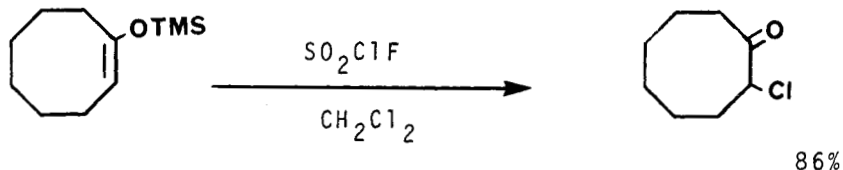
Laurent, E.; Tardivel, R.; Thiebault, H.
Tetrahedron Lett, (1983), 24, 903



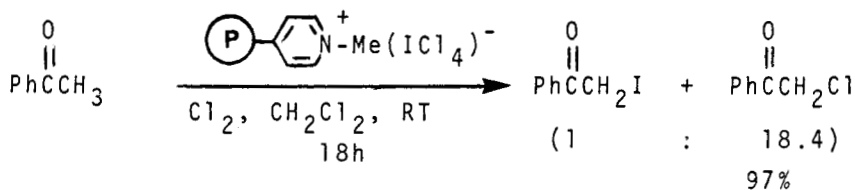
Kageyama, T.*; Tobito, Y.; Katoh, A.; Ueno, Y.*; Okawara, M.
Chem Lett, (1983), 1481



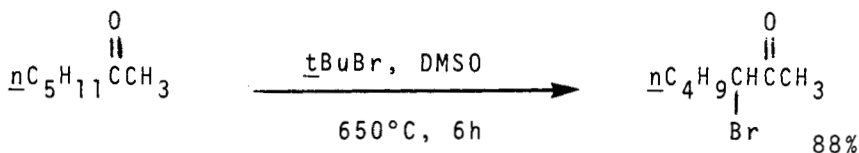
Arrieta, A.; Ganboa, I.; Palomo, C.
Syn Commun, (1984), 14, 939



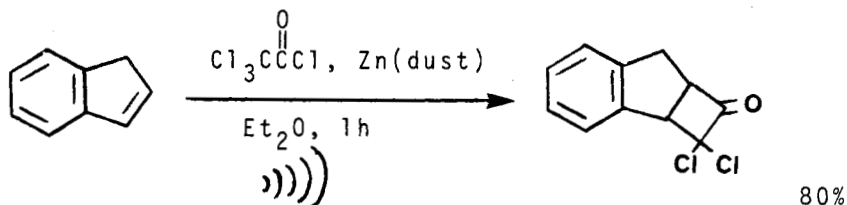
Olah, G.A.*; Ohannesian, L.; Arvanaghi, M.; Prakash, G.K.S.
J Org Chem, (1984), **49**, 2032



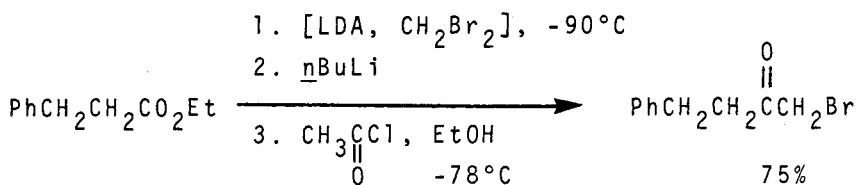
Šket, B.; Zupan, M.* Tetrahedron, (1984), **40**, 2865



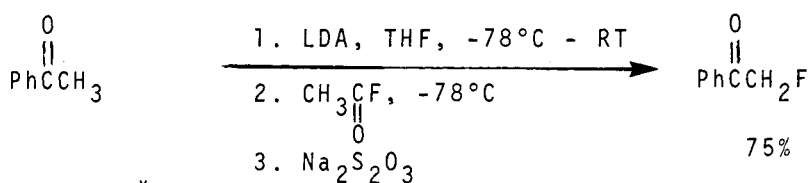
Armani, E.; Dossena, A.; Marchelli, R.*; Casnati, G.
Tetrahedron, (1984), **40**, 2035



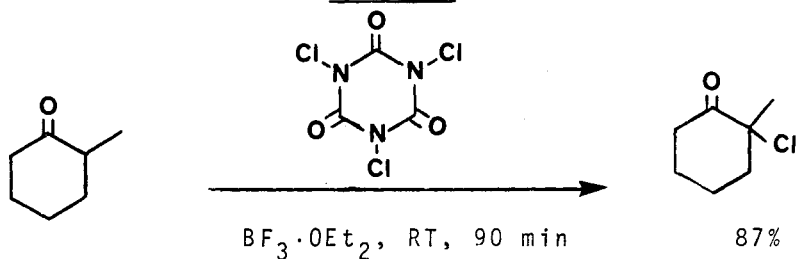
Mehta, G.*; Rao, H.S.P. Syn Commun, (1985), **15**, 991



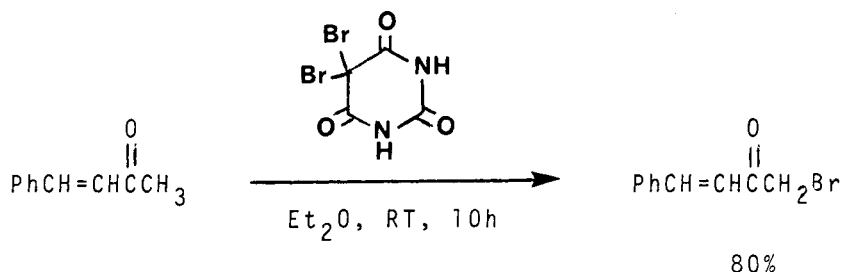
Kowalski, C.J.*; Haque, M.S. J Org Chem, (1985), 50, 5140



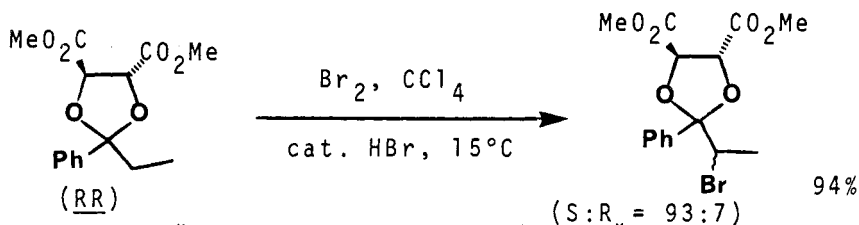
Rozen, S.*; Brand, M. Synthesis, (1985), 665



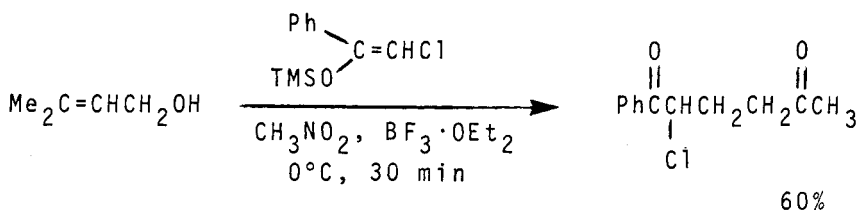
Hiegel, G.A.*; Peyton, K.B. Syn Commun, (1985), 15, 385



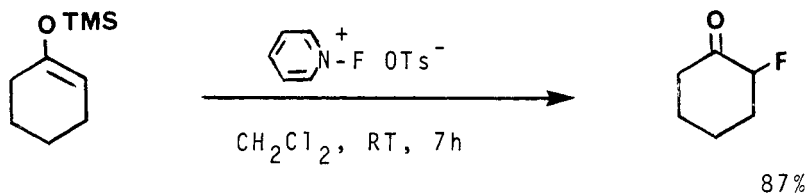
Grundke, G.; Keese, W.; Rimpler, M.*
Chem Ber, (1985), 118, 4288



Castaldi, G.*; Cavicchioli, S.; Giordano, C.*; Uggeri, F.
Angew Chem Int Ed Engl, (1986), 25, 259

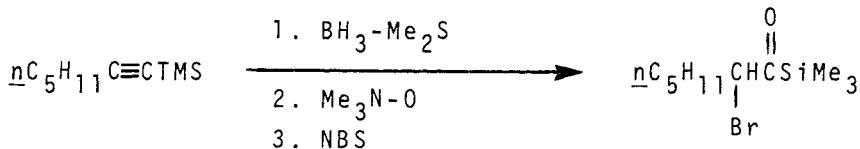


Poirier, J.-M.; Hennequin, L.; Fomani, M.
Bull Chem Soc Fr, (1986), II436

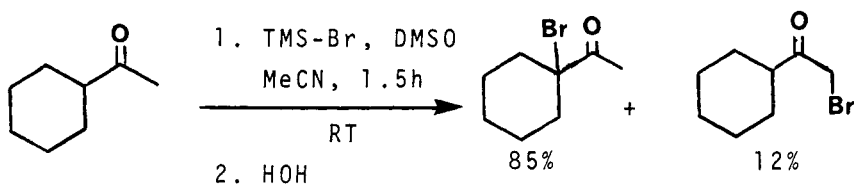


(also for o,p fluorination of phenols)

Umemoto, T.*; Kawada, K.; Tomita, K.
Tetrahedron Lett, (1986), 27, 4465



Page, P.C.B.*; Rosenthal, S.
Tetrahedron Lett, (1986), 27, 5421

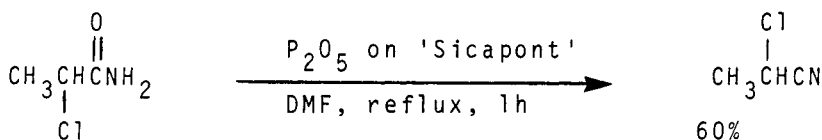


Bellesia, F.; Ghelfi, F.; Grandi, R.; Pagnoni, U.M.*
J Chem Res, (1986), 428

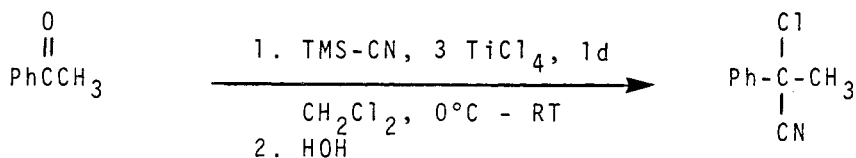
Review: "α-Fluoro Carbonyl Compounds"

Rozen, S.; Filler, R. Tetrahedron, (1985), 41, 1111

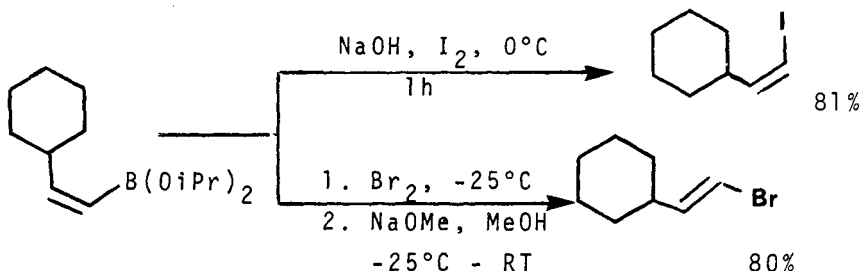
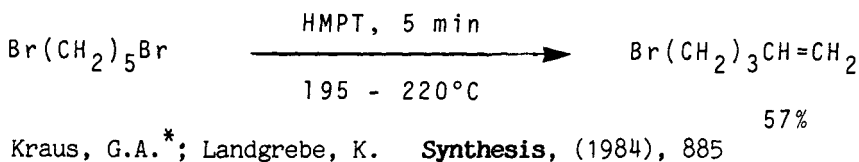
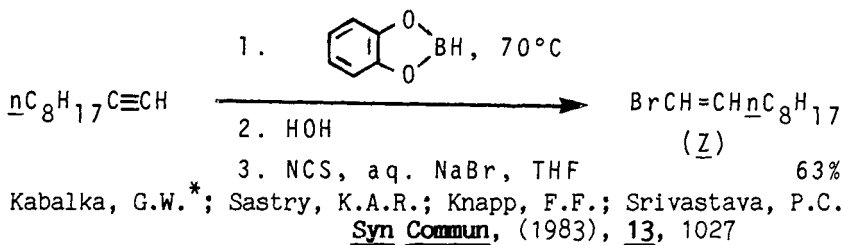
SECTION 370: Halide, Sulfonate - Nitrile



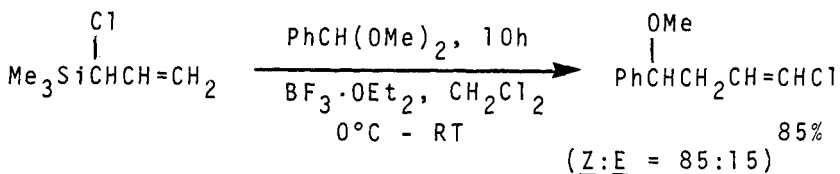
Kaiser, D.A.; Kaye, P.T. Syn Commun, (1984), 14, 883



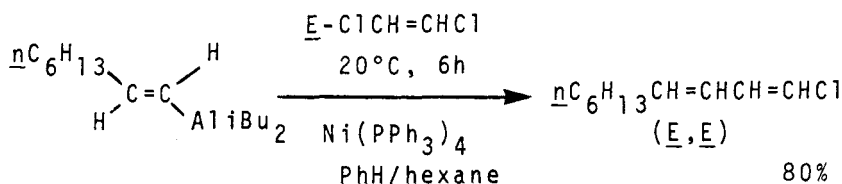
Kiyooka, S.*; Fujiyama, R.; Kawaguchi, K.
Chem Lett, (1984), 1979

SECTION 371: Halide, Sulfonate - Olefin

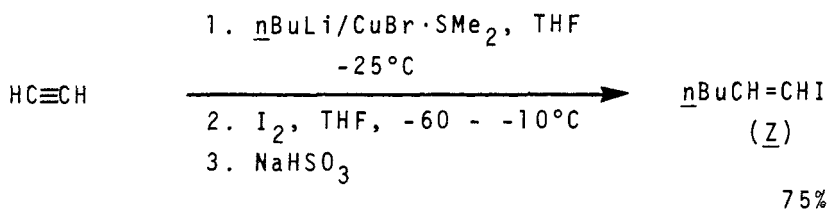
Brown, H.C.*; Samayaji, V. Synthesis, (1984), 919



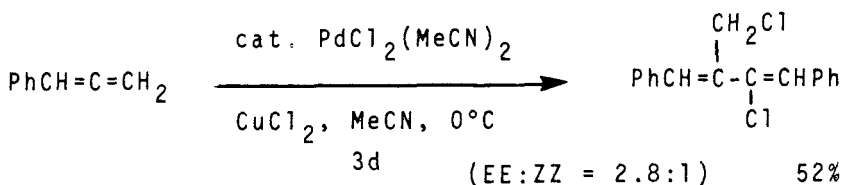
Hosomi, A.*; Ando, M.; Sakurai, H.* Chem Lett, (1984), 1385



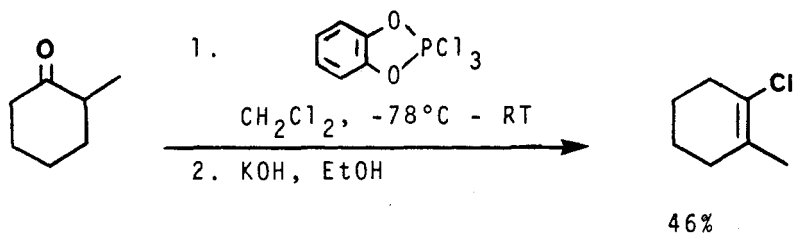
Ratovelomanana, V.; Linstrumelle, G.

Tetrahedron Lett., (1984), 25, 6001

Alexakis, A.; Cahiez, G.; Normant, J.F.*

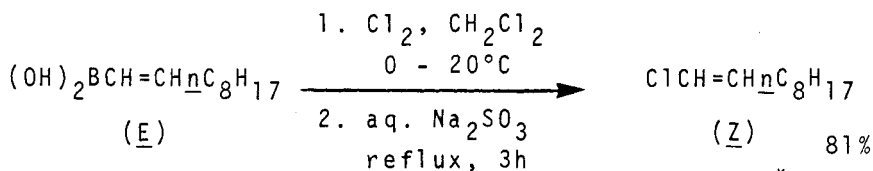
Org Syn, (1984), 62, 1

Hegedus, L.S.*; Kambe, N.; Ishii, Y.; Mori, A.

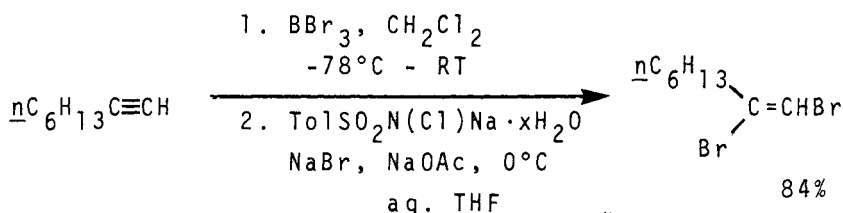
J Org Chem, (1985), 50, 2240

Hudrlik, P.F.*; Kulkarni, A.K.

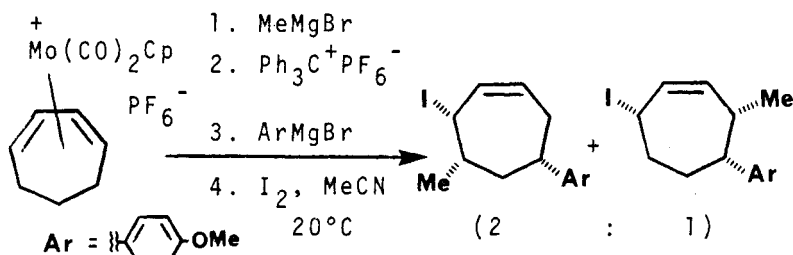
Tetrahedron, (1985), 41, 1179



Kunda, S.A.; Smith, T.L.; Hyalarides, M.D.; Kabalka, G.W.*
Tetrahedron Lett., (1985), 26, 279

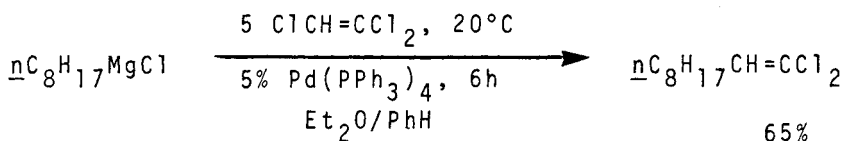


Hara, S.; Kato, T.; Shimizu, H.; Suzuki, A.*
Tetrahedron Lett., (1985), 26, 1065



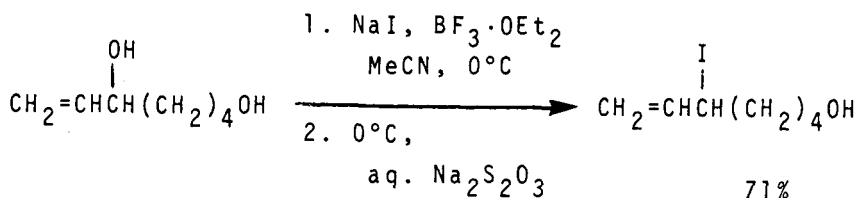
Pearson, A.J.*; Khan, Md.N.I.

Tetrahedron Lett., (1985), 26, 1407

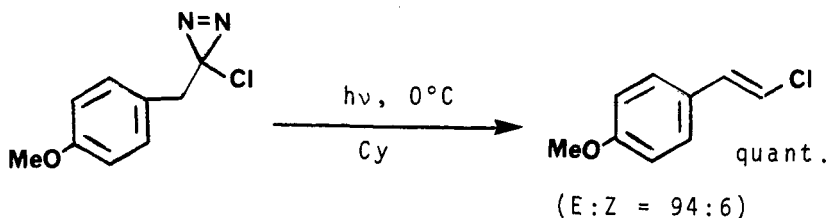


Ratovelomanana, V.; Linstrumelle, G.; Normant, J.-F.*

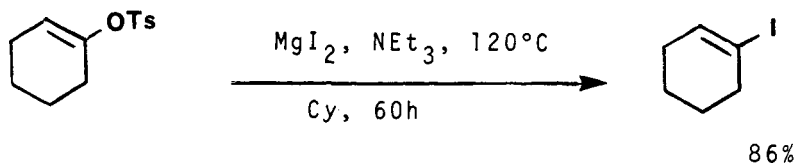
Tetrahedron Lett., (1985), 26, 2575



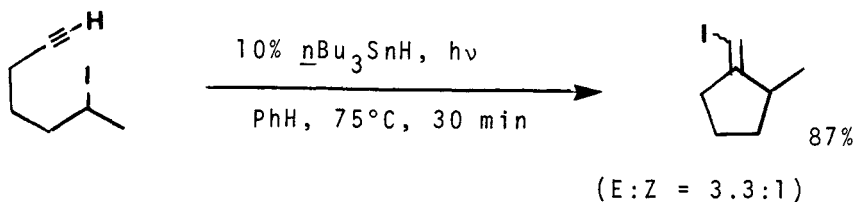
Vankar, Y.D.*; Rao, C.T. Tetrahedron Lett., (1985), **26**, 2717



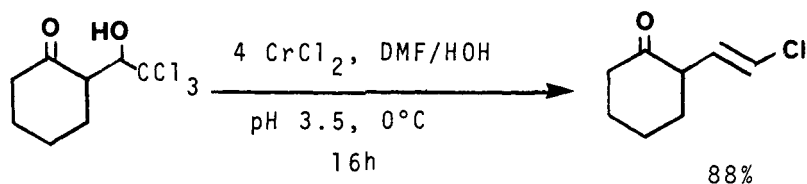
Tomioka, H.*; Hayashi, N.; Inoue, N.; Izawa, Y.
Tetrahedron Lett., (1985), **26**, 1651



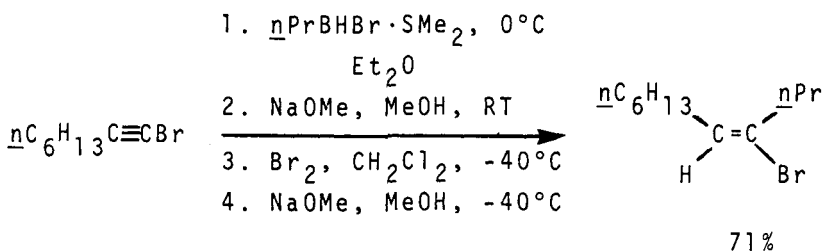
García Martínez, A.*; Martínez Alvarez, R.; García Fraile, A.
Synthesis, (1986), 222



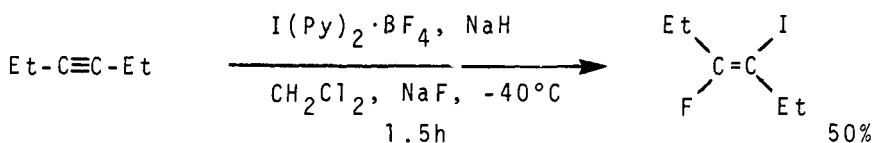
Curran, D.P.*; Chen, M.-H.; Kim, D.
J Am Chem Soc., (1986), **108**, 2489



Wolf, R.; Steckhan, E.* JCS Perkin I, (1986), 733

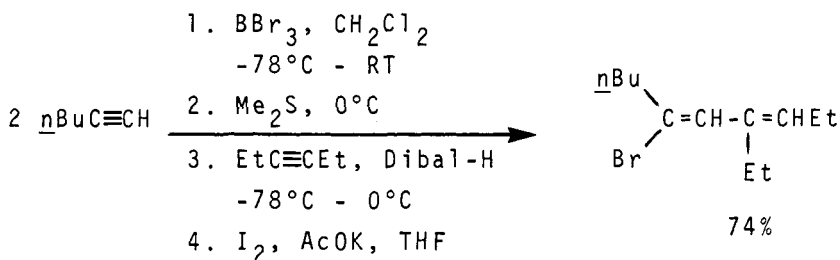


Brown, H.C.*; Bhat, N.G.; Rajagopalan, S.
Synthesis, (1986), 480

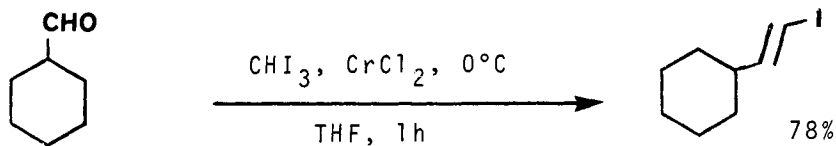


Barluenga, J.*; Rodríguez, M.A.; González, J.M.; Campos, P.J.;
 Asensio, G.

Tetrahedron Lett, (1986), 27, 3303



Hyuga, S.; Takinami, S.; Hara, S.; Suzuki, A.*
Chem Lett, (1986), 459

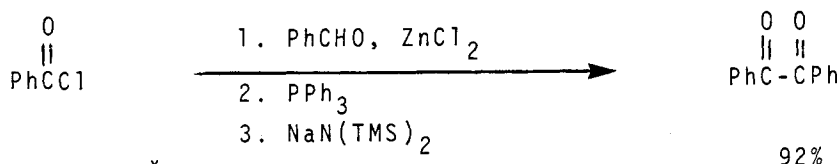


(E:Z = 89:11)

Takai, K.*; Nitta, K.; Utimoto, K.

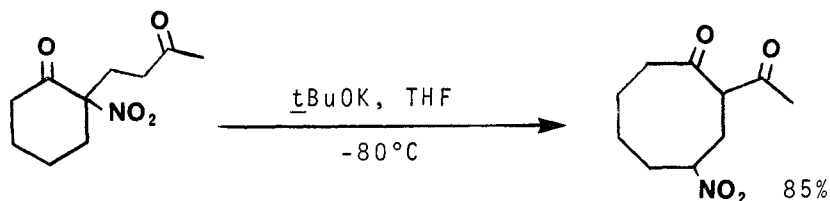
J Am Chem Soc, (1986), 108, 7408

SECTION 372: Ketone - Ketone

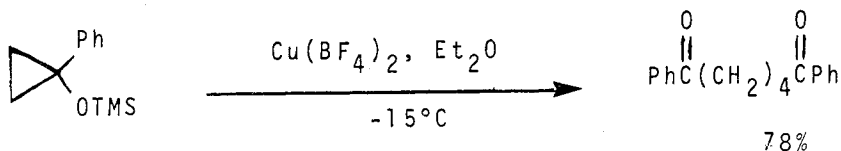


Anders, E.*; Gassner, T.

Angew Chem Int Ed Engl, (1983), 22, 619

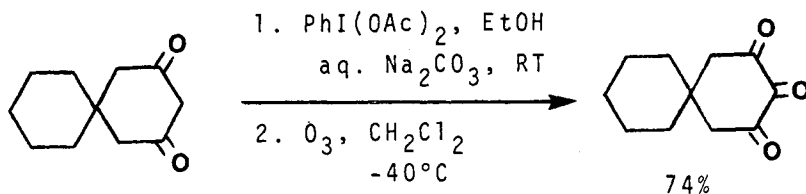


Nakashita, Y.; Hesse, M. Helv Chim Acta, (1983), 66, 845

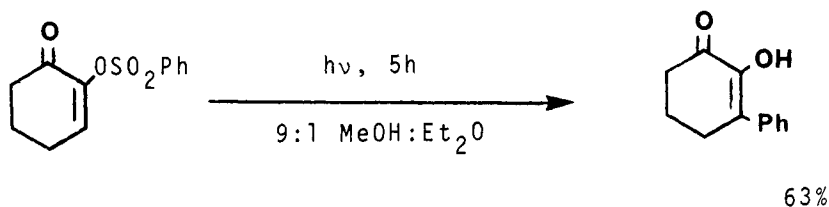


Ryu, I.; Ando, M.; Ogawa, A.; Murai, S.*; Sonoda, N.

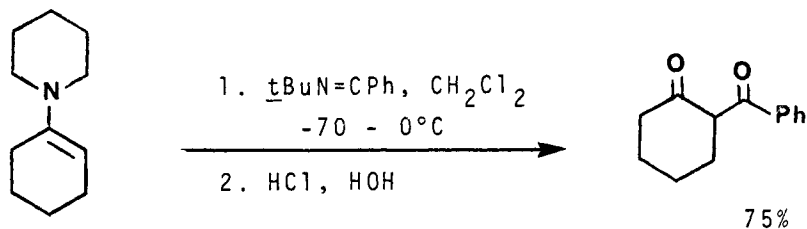
J Am Chem Soc, (1983), 105, 7192



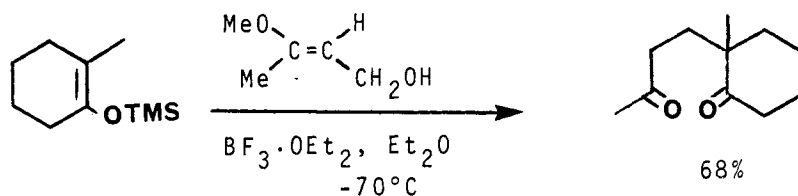
Schank, K.*; Lick, C. Synthesis, (1983), 392



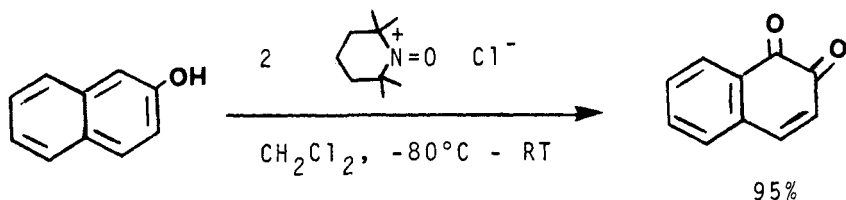
Feigenbaum, A.*; Pete, J.-P.; Scholler, D.
J Org Chem, (1984), 49, 2355



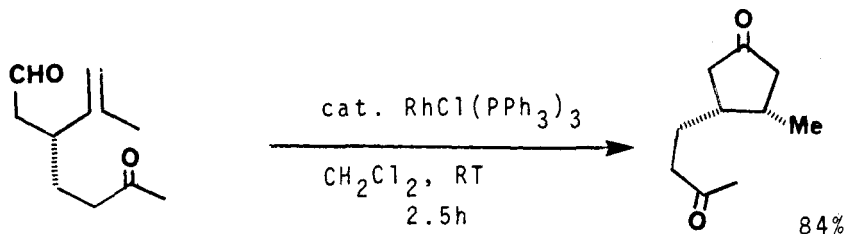
Baudoux, D.; Fuks, R.* Bull Chem Soc Belg, (1984), 93, 1009



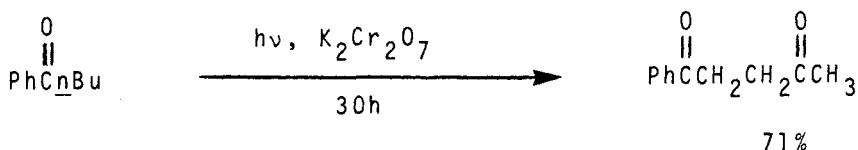
Duhamel, P.*; Poirier, J.-M.; Tavel, G.
Tetrahedron Lett, (1984), 25, 43



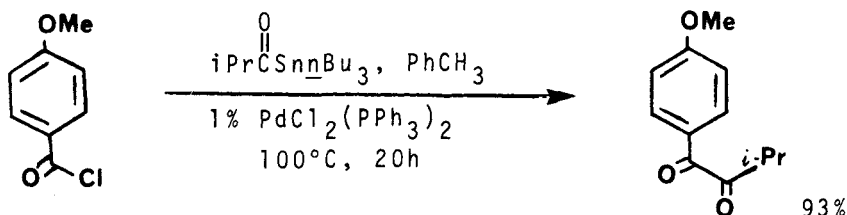
Hunter, D.H.*; Barton, D.H.R.; Motherwell, W.J.
Tetrahedron Lett., (1984), 25, 603



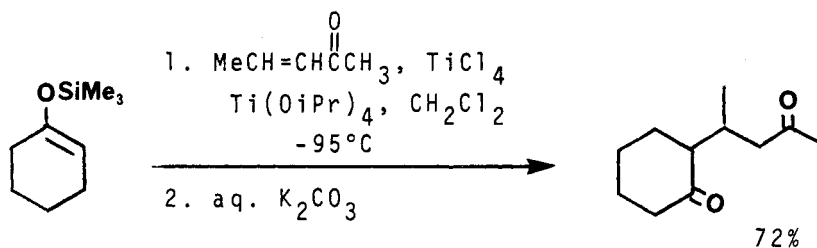
Sakai, K.*; Ishiguro, Y.; Funakoshi, K.; Ueno, K.; Suemune, H.
Tetrahedron Lett., (1984), 25, 961



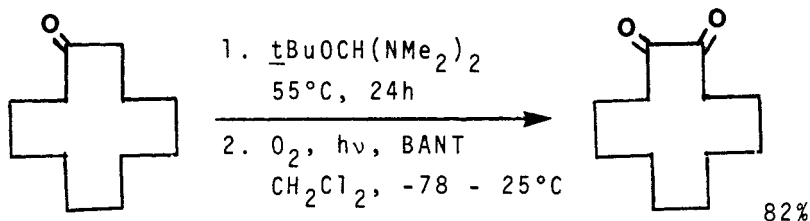
Mitani, M.*; Tamada, M.; Uehara, S.; Koyama, K.
Tetrahedron Lett., (1984), 25, 2805



Verlhac, J.-B.; Chanson, E.; Jousseau, B.; Quintard, J.-P.
Tetrahedron Lett., (1985), 26, 6075

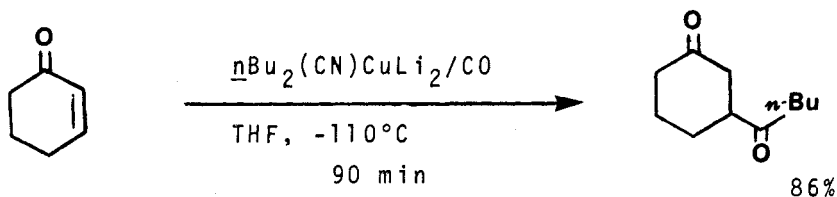


Huffman, J.W.*; Potnis, S.M.; Satish, A.V.
J Org Chem, (1985), 50, 4266

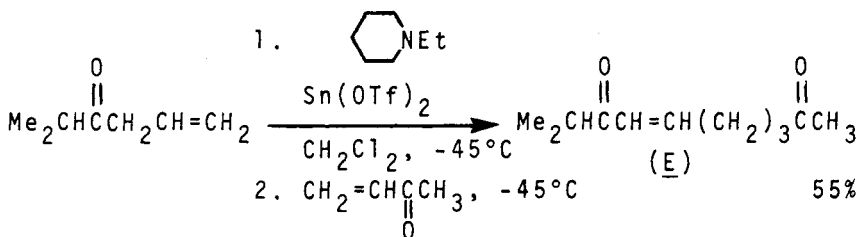


BANT = bis-acenaphthalene thiophene

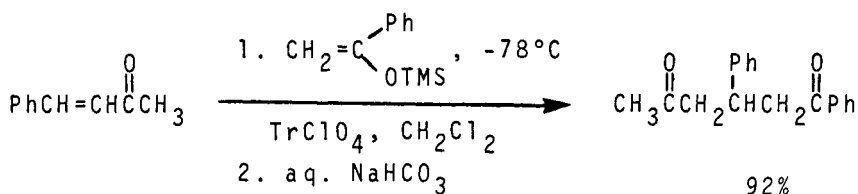
Wasserman, H.H.*; Ives, J.L. J Org Chem, (1985), 50, 3573



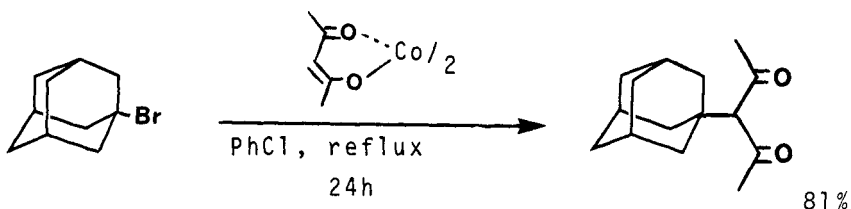
Seyferth, D.*; Hui, R.C. J Am Chem Soc, (1985), 107, 4551



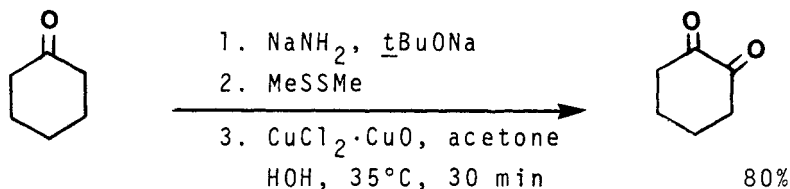
Stevens, R.V.; Mukaiyama, T. Chem Lett, (1985), 851



Kobayashi, S.; Murakami, M.; Mukaiyama, T.
Chem Lett, (1985), 953

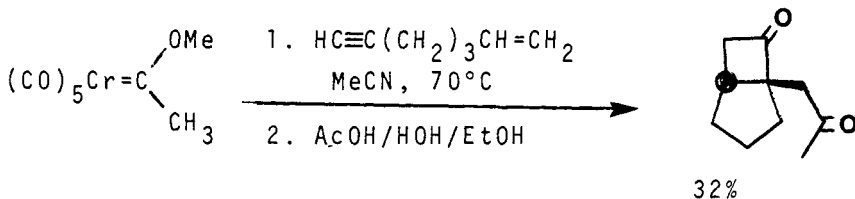


Gonzalez, A.; Güell, F.; Marquet, J.; Moreno-Mañas, M.*
Tetrahedron Lett, (1985), 26, 3735

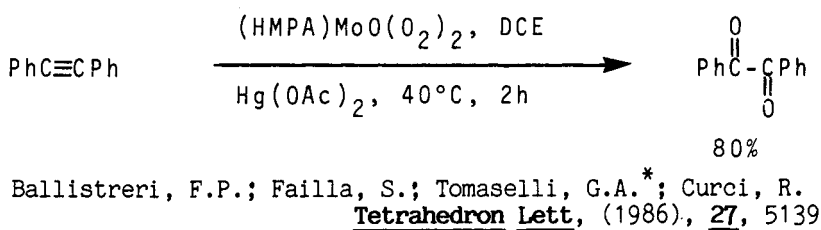
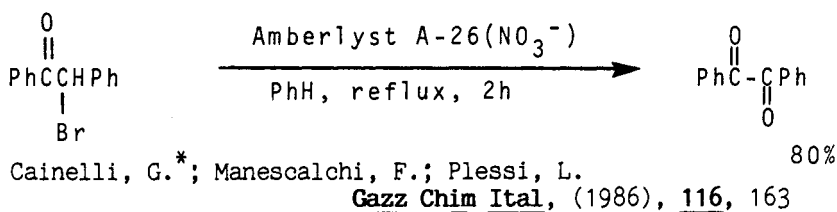


Carré, M.C.; Caubere, P.* Tetrahedron Lett, (1985), 26, 3103
 Carré, M.C.; Ndebeka, G.; Riondel, A.; Bourgasser, P.; Caubere, P.*

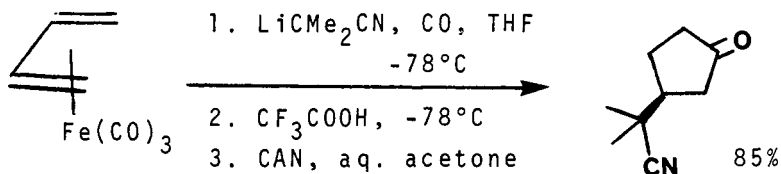
Tetrahedron Lett, (1984), 25, 1551



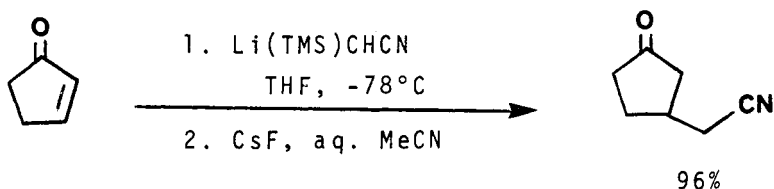
Wulff, W.D.*; Kaesler, R.W. Organometallics, (1985), 4, 1461



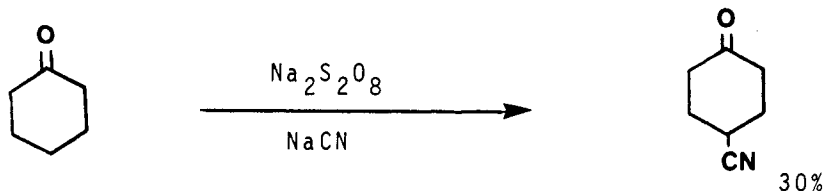
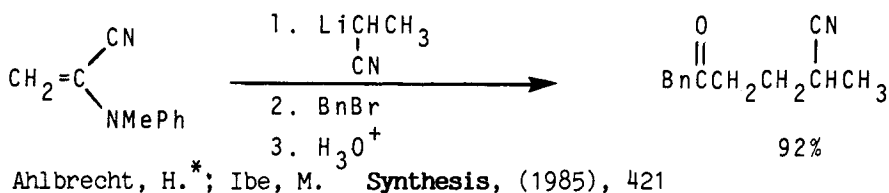
SECTION 373: Ketone - Nitrile



Semmelhack, M.F.*; Herndon, J.W.; Liu, J.K.
Organometallics, (1983), 2, 1885



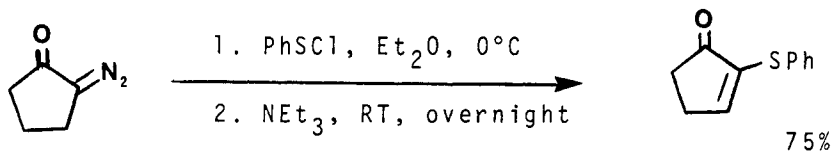
Tomioka, K.; Koga, K. Tetrahedron Lett, (1984), 25, 1599

**SECTION 374: Ketone - Olefin**

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

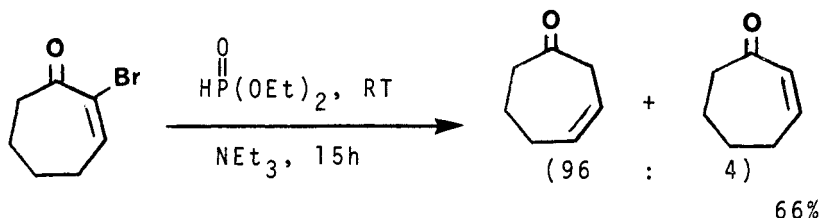
For the oxidation of allylic methylene groups ($\text{C}=\text{C}-\text{CH}_2 \rightarrow \text{C}=\text{C}-\text{CO}$), see Section 170 (Ketones from Alkyls and Methylenes).

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

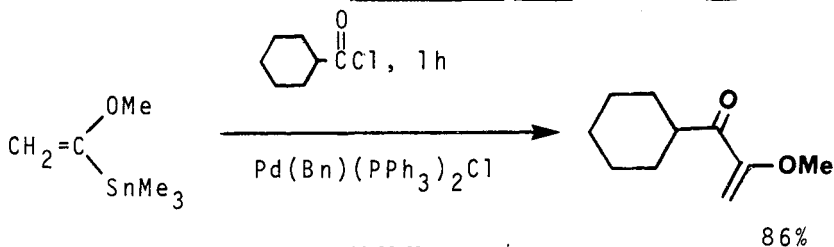


McKervey, M.A.*; Ratananukul, P.

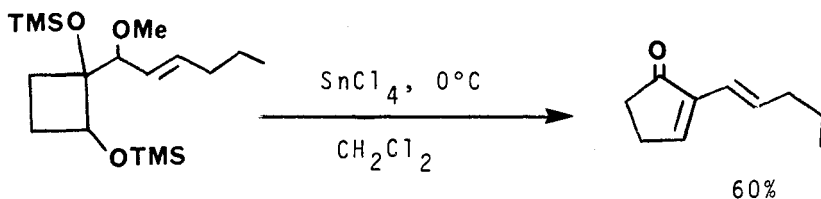
Tetrahedron Lett., (1983), 24, 117



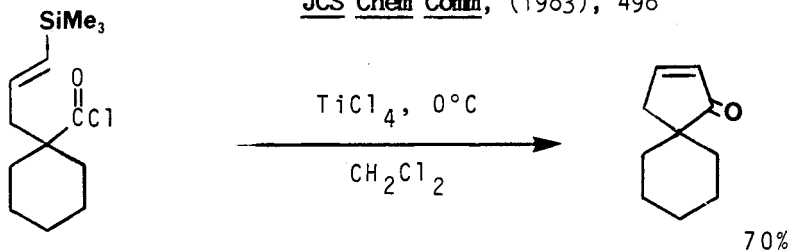
Hirao, T.*; Masunga, T.; Hayashi, K.; Ohshiro, Y.*; Agawa, T.
Tetrahedron Lett., (1983), 24, 399



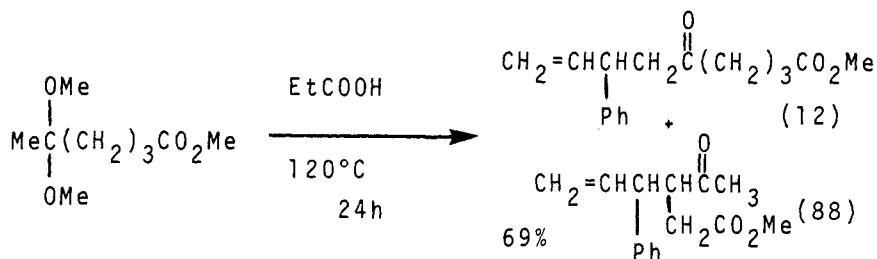
Soderquist, J.A.; Leong, W.W.H.
Tetrahedron Lett., (1983), 24, 2361



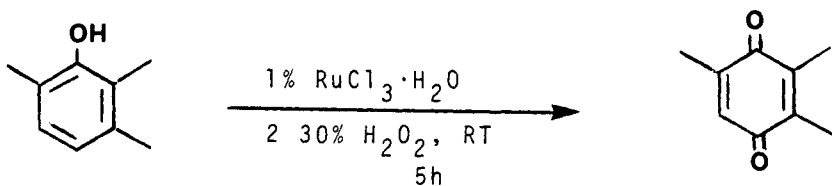
Nakamura, E.; Shimada, J.; Kuwajima, I.*
JCS Chem Comm, (1983), 498



Nakamura, E.; Fukuzaki, K.; Kuwajima, I.*
JCS Chem Comm, (1983), 499

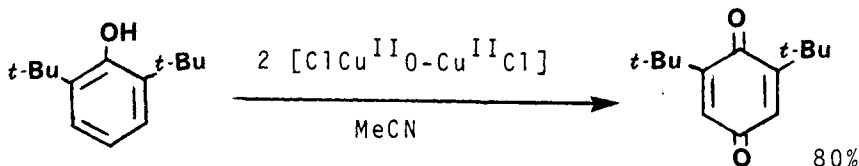


Daub, G.W.*; Lunt, S.R. Tetrahedron Lett., (1983), 24, 4397

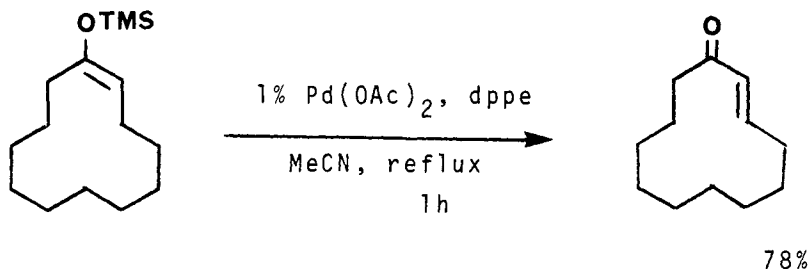


Ito, S.; Aihara, K.; Matsumoto, M.*

Tetrahedron Lett., (1983), 24, 5249

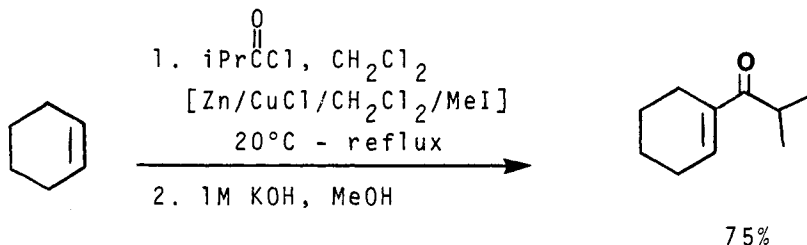


Capdevielle, P.; Maumy, M. Tetrahedron Lett., (1983), 24, 5611

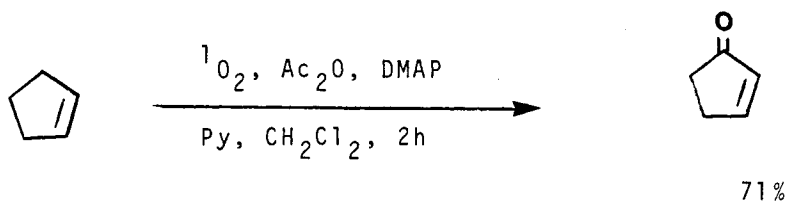


Tsui, J.*; Minami, I.; Shimizu, I.

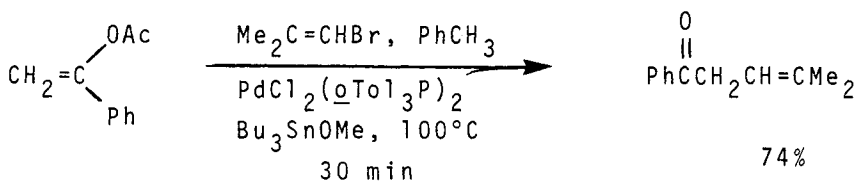
Tetrahedron Lett., (1983), 24, 5635



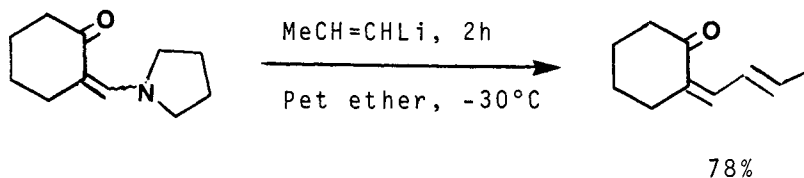
Shono, T.*; Nishiguchi, I.; Sasaki, M.; Ikeda, H.; Kurita, M.
J Org Chem, (1983), **48**, 2503



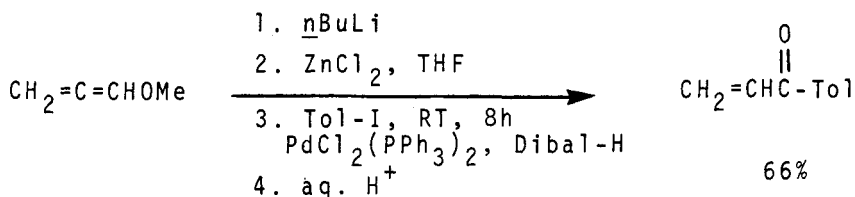
Mihelich, E.D.*; Eickhoff, D.J. J Org Chem, (1983), **48**, 4135



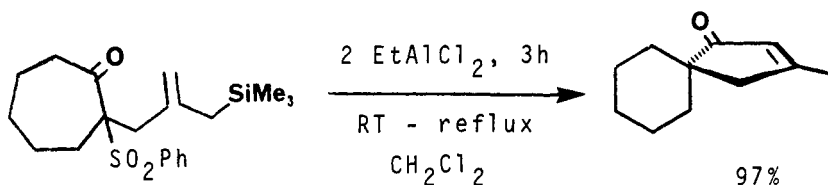
Kosugi, M.; Hagiwara, I.; Migita, T.* Chem Lett, (1983), 839



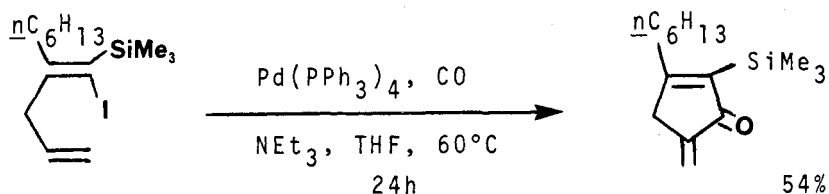
Mukaiyama, T.*; Ohsumi, T. Chem Lett, (1983), 875



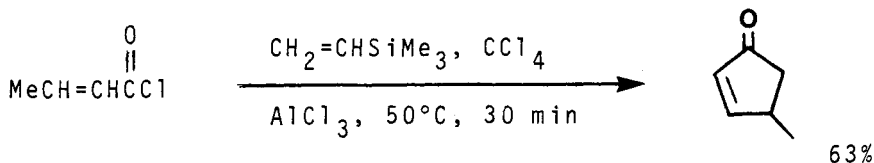
Russell, C.E.; Hegedus, L.S.* J Am Chem Soc, (1983), **105**, 943



Trost, B.M.*; Adams, B.R. J Am Chem Soc, (1983), **105**, 4849

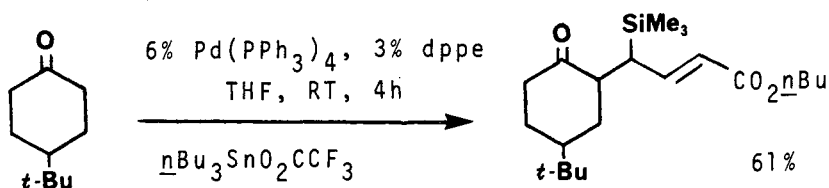


Negishi, E.*; Miller, J.A. J Am Chem Soc, (1983), **105**, 6761

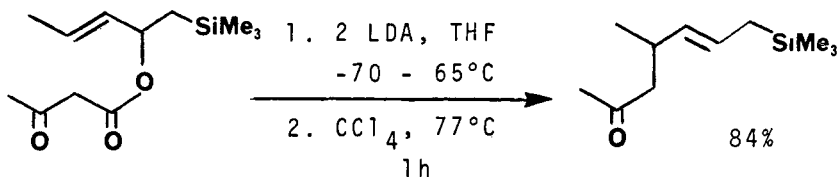


Kjeldsen, G.*; Knudsen, J.S.; Ravn-Petersen, L.S.; Torssell, K.B.G.

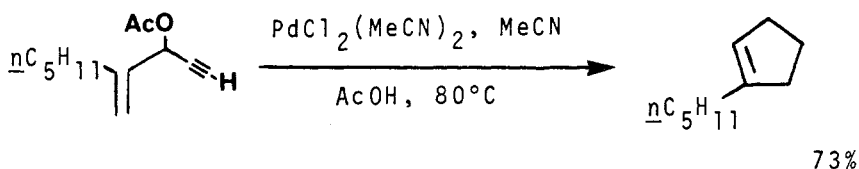
Tetrahedron, (1983), **39**, 2237



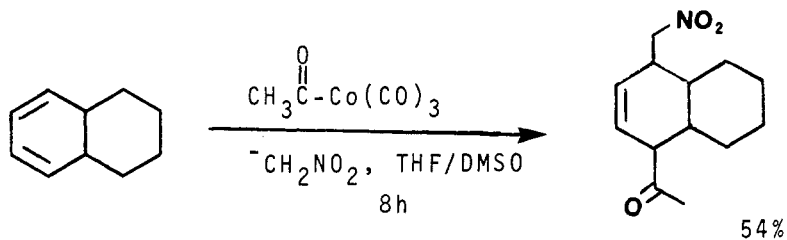
Trost, B.M.*; Self, C.R. J Org Chem, (1984), 49, 468



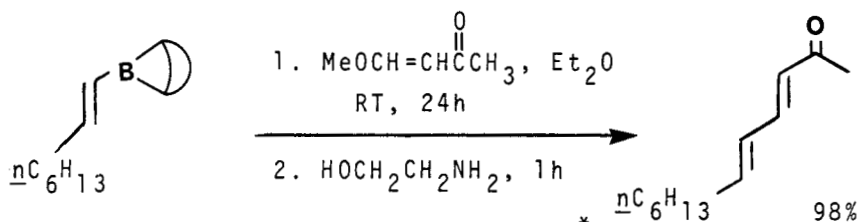
Wilson, S.R.*; Price, M.F. J Org Chem, (1984), 49, 722



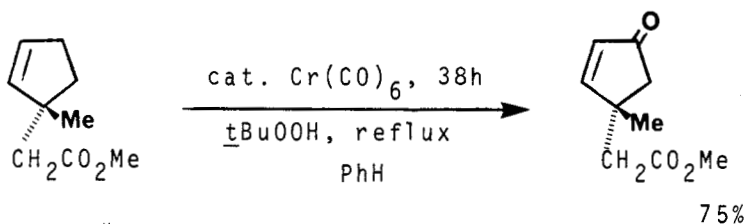
Rautenstrauch, V.* J Org Chem, (1984), 49, 950



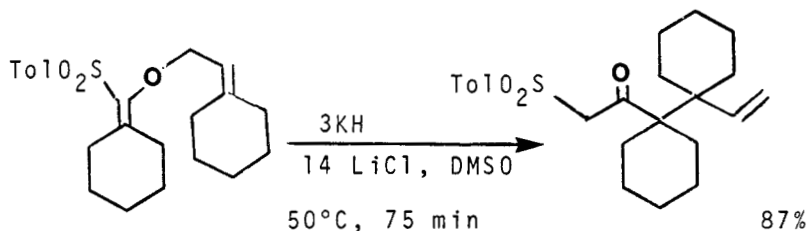
Hegedus, L.S.*; Perry, R.J. J Org Chem, (1984), 49, 2570



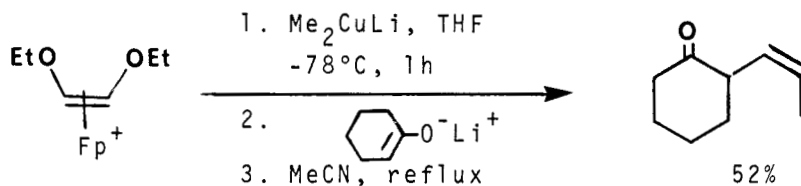
Molander, G.A.; Singarem, B.; Brown, H.C.*
J Org Chem, (1984), **49**, 5024



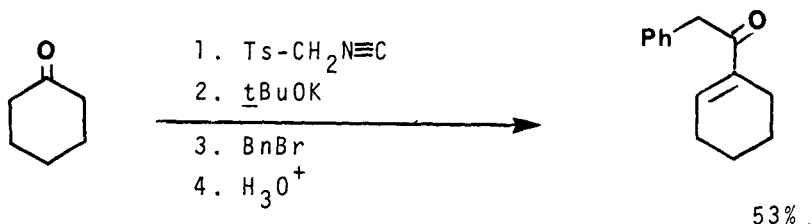
Pearson, A.J.*; Chen, Y.-S.; Hsu, S.-Y.; Ray, T.
Tetrahedron Lett, (1984), **25**, 1235



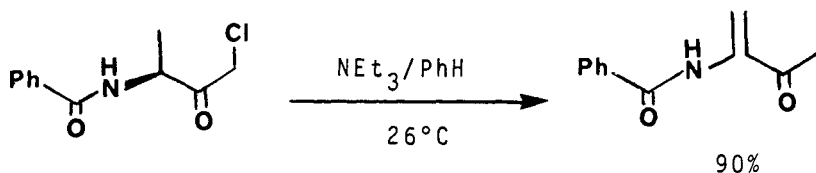
Denmark, S.E.*; Harmata, M.A.
Tetrahedron Lett, (1984), **25**, 1543



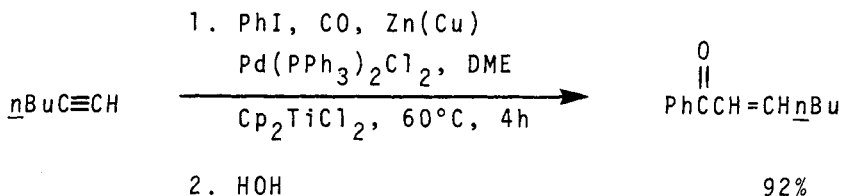
Marsi, M.; Rosenblum, M.*
J Am Chem Soc, (1984), **106**, 7264



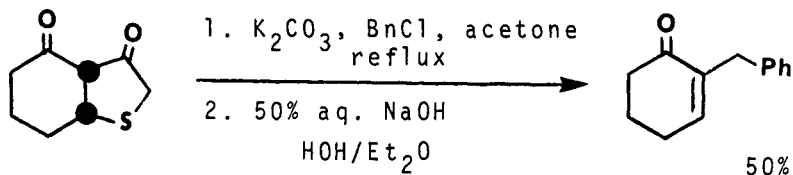
Moskal, J.; van Leusen, A.M.

Tetrahedron Lett., (1984), 25, 2585

Gordon, E.M.*; Plušćec, J.; Delaney, N.G.; Natarajan, S.; Sundeen, J.

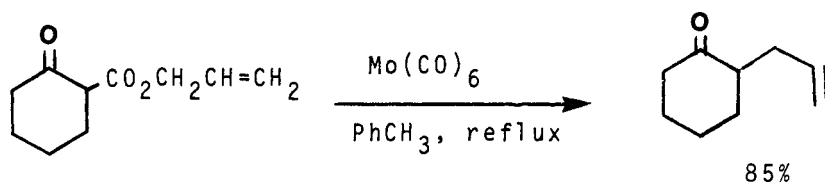
Tetrahedron Lett., (1984), 25, 3277

Tamaru, Y.; Ochiai, H.; Yoshida, Z.*

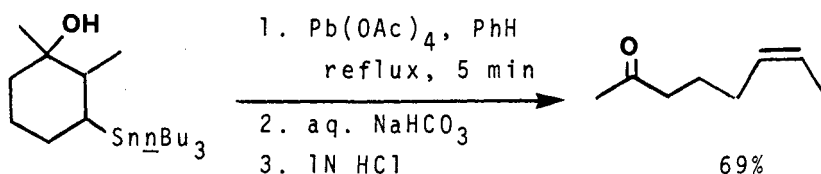
Tetrahedron Lett., (1984), 25, 3861

Beraldi, P.G.; Barco, A.; Benetti, S.; Pollini, G.P.; Zanirato, V.

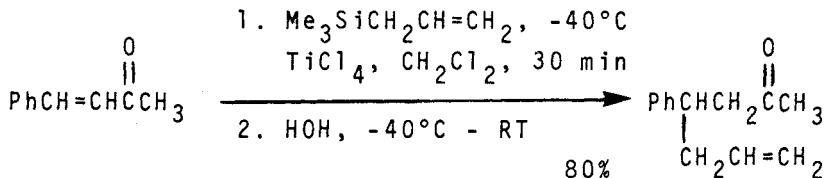
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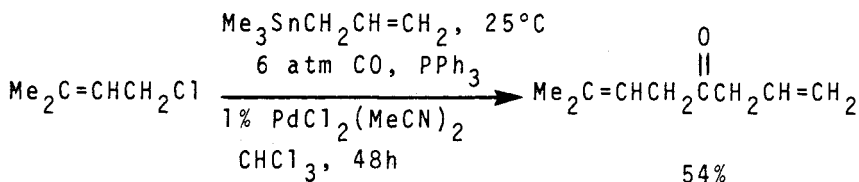
Tsui, J.*; Minami, I.; Shimizu, I. Chem Lett, (1984), 1721



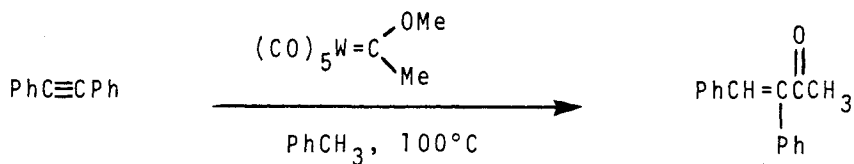
Nakatani, K.; Ise, S.* Tetrahedron Lett, (1984), 25, 5335



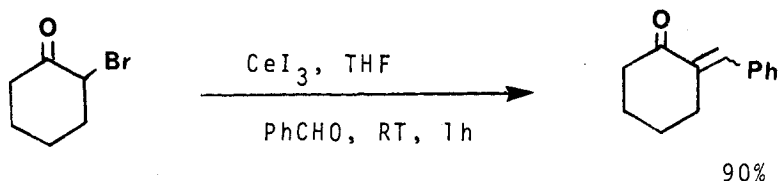
Sakurai, H.*; Hosomi, A.; Hayashi, J. Org Syn, (1984), 62, 86



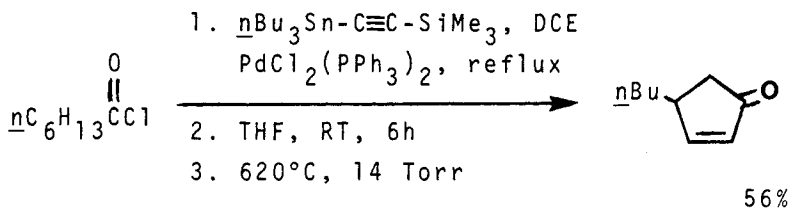
Merrifield, J.H.; Godschalx, J.P.; Stille, J.K.*
Organometallics, (1984), 3, 1108



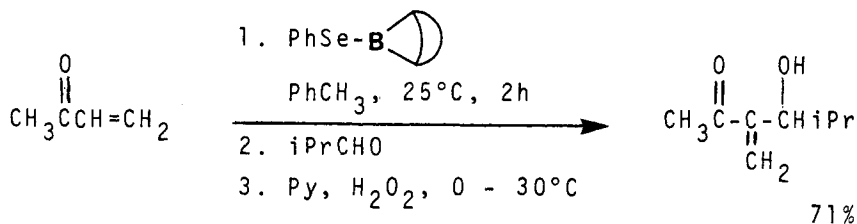
Macomber, D.W.* Organometallics, (1984), **3**, 1589 64%



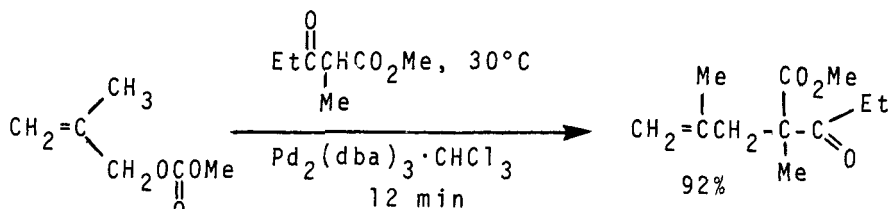
Fukuzawa, S.*; Fujinami, T.; Sakai, S.
JCS Chem Comm, (1985), 777



Ackroyd, J.; Karpf, M.; Dreiding, A.S.*
Helv Chim Acta, (1985), **68**, 338

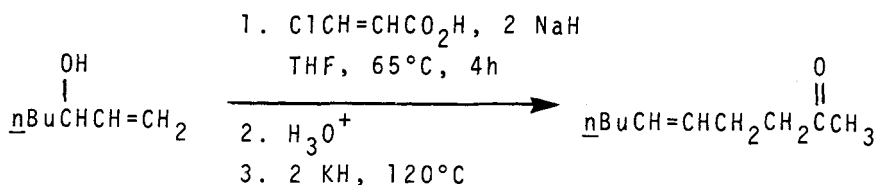


Leonard, W.R.; Livinghouse, T.* J Org Chem, (1985), **50**, 730



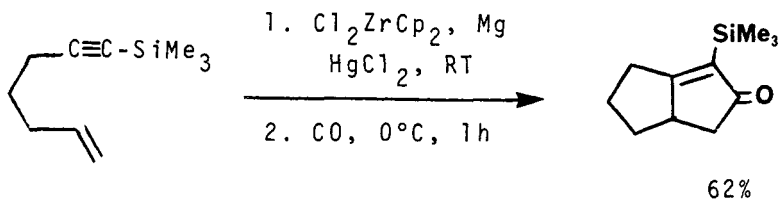
Tsuji, J.*; Shimizu, I.; Minami, I.; Ohashi, Y.; Sugiura, T.; Takahashi, K.

J Org Chem, (1985), 50, 1523



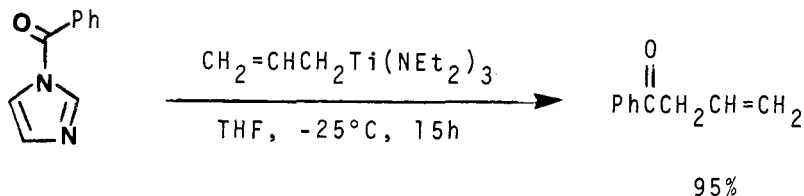
Büchi, G.*; Vogel, D.E.

J Org Chem, (1985), 50, 4664



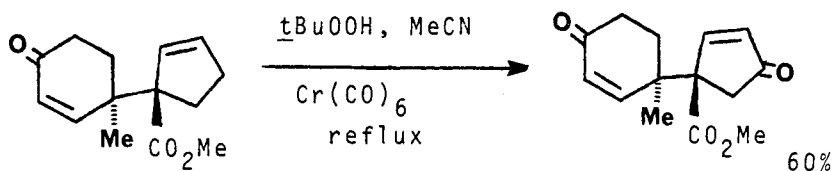
Negishi, E.*; Holmes, S.J.; Tour, J.M.; Miller, J.A.

J Am Chem Soc, (1985), 107, 2568

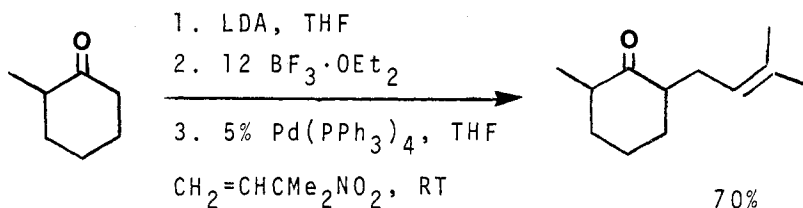


Reetz, M.T.*; Wenderoth, B.; Urz, R.

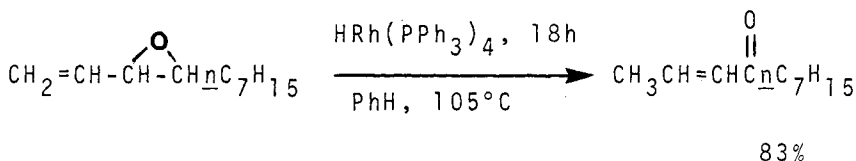
Chem Ber, (1985), 118, 348



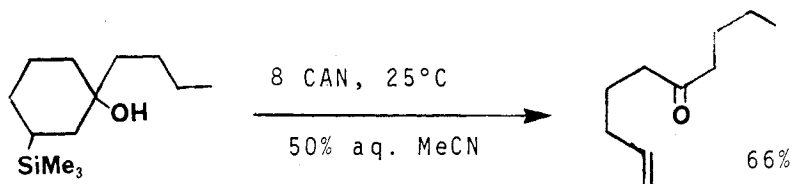
Pearson, A.J.*; Chen, Y.-S.; Han, G.R.; Hsu, S.-Y.; Ray, T.
JCS Perkin I, (1985), 267



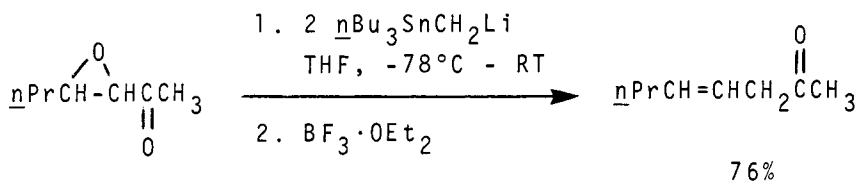
Ono, N.*; Hamamoto, I.; Kaji, A.*
Bull Chem Soc Jpn, (1985), 58, 1863



Sato, S.; Matsuda, I.*; Izumi, Y.
Tetrahedron Lett, (1985), 26, 1527

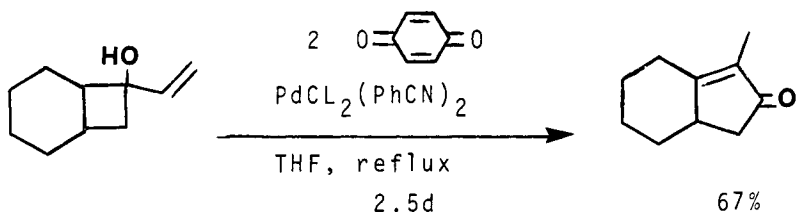


Wilson, S.R.*; Zucker, P.A.; Kim, C.-W.; Villa, C.A.
Tetrahedron Lett, (1985), 26, 1969



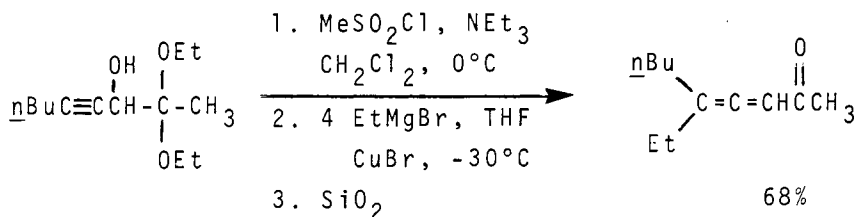
Sato, T.*; Kikuchi, T.; Sootome, N.; Murayama, E.

Tetrahedron Lett., (1985), 26, 2205



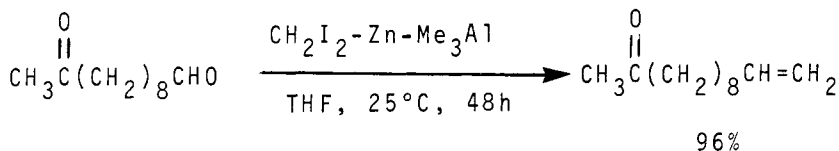
Clark, G.R.*; Thiensathit, S.

Tetrahedron Lett., (1985), 26, 2503



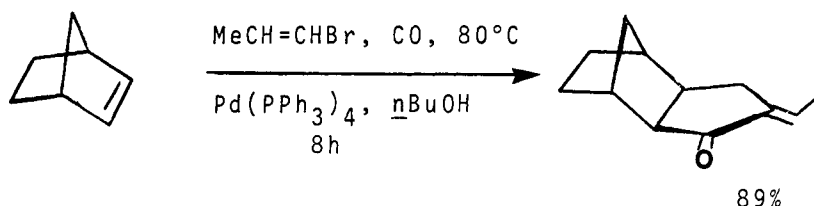
Bernard, D.; Doritheatu, A.*

Tetrahedron Lett., (1985), 26, 4923



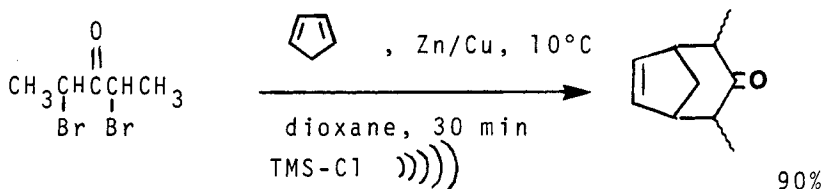
Okazoe, T.; Hibino, J.; Takai, K.*; Nozaki, H.

Tetrahedron Lett., (1985), 26, 5581



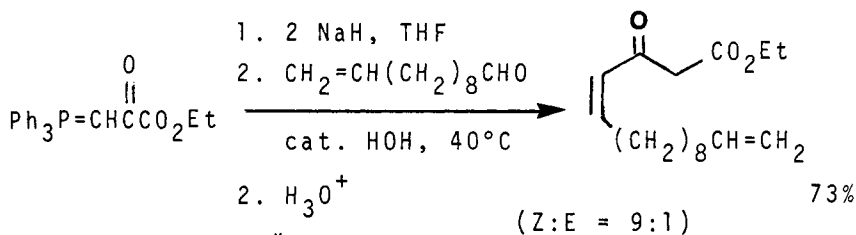
Amari, E.; Catellani, M.; Chiusoli, G.P.

J Organomet Chem, (1985), 285, 383



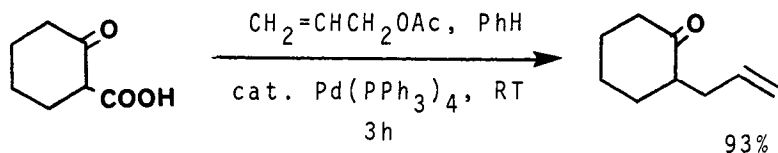
Joshi, N.N.; Hoffmann, H.M.R.*

Tetrahedron Lett, (1986), 27, 687



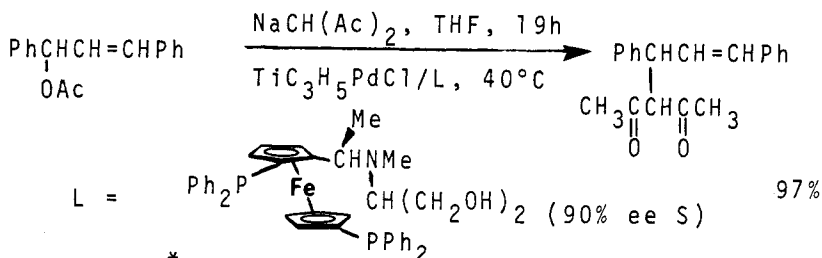
Pietrusiewicz, K.M.*; Monkiewicz, J.

Tetrahedron Lett, (1986), 27, 739

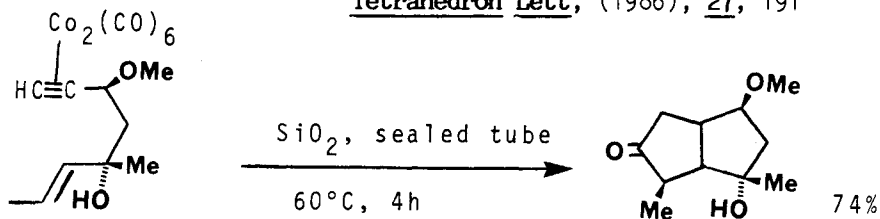


Tsuda, T.*; Okada, M.; Nishi, S.; Saegusa, T.*

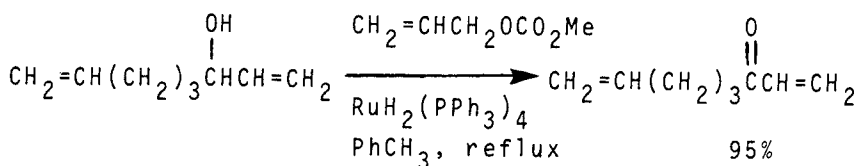
J Org Chem, (1986), 51, 421



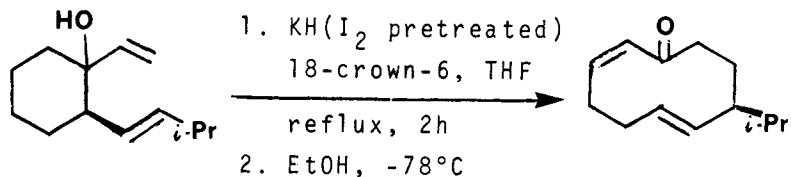
Hayashi, T.*; Yamamoto, A.; Hagihara, T.; Ito, Y.
Tetrahedron Lett., (1986), **27**, 191



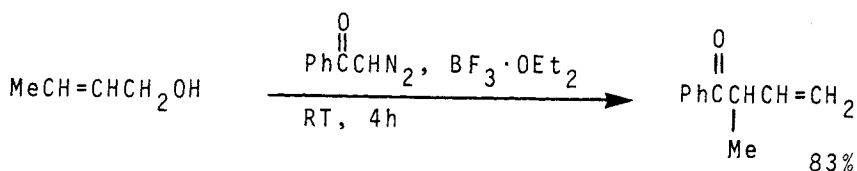
Smit, W.A.*; Gybin, A.S.; Shashkov, A.S.; Strychkov, Y.T.;
 Kyz'mina, L.G.; Mikaelian, G.S.; Caple, R.*; Swanson, E.D.
Tetrahedron Lett., (1986), **27**, 1241, 1245



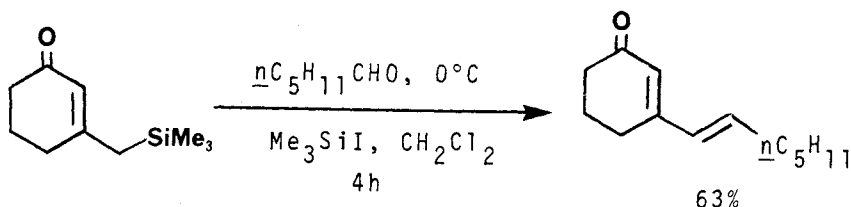
Minami, I.; Yamada, M.; Tsuji, J.*
Tetrahedron Lett., (1986), **27**, 1805



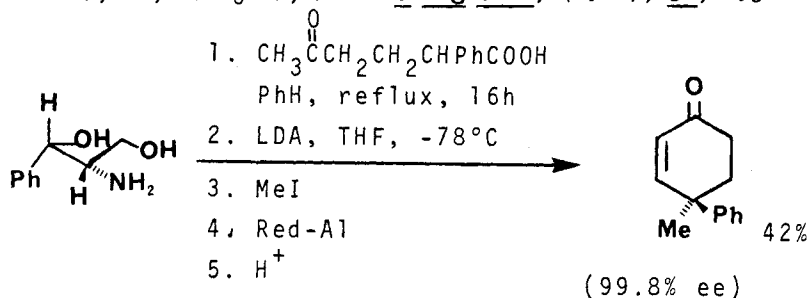
(improved procedure)
 Macdonald, T.L.*; Natalie Jr., K.J.; Prasad, G.; Sawyer, J.S.
J Org Chem., (1986), **51**, 1124



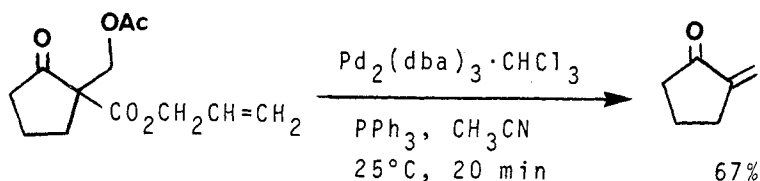
Kachinsky, J.L.C.; Salomon, R.G.* J Org Chem, (1986), 51, 1393



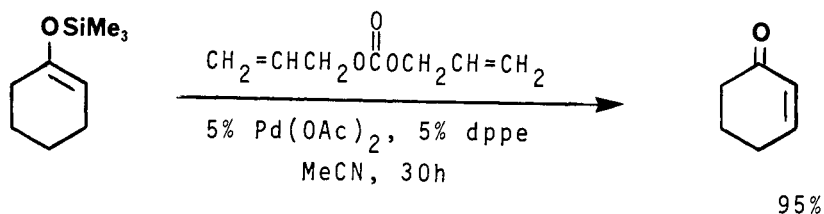
Hatanaka, Y.; Kuwajima, I.* J Org Chem, (1986), 51, 1932



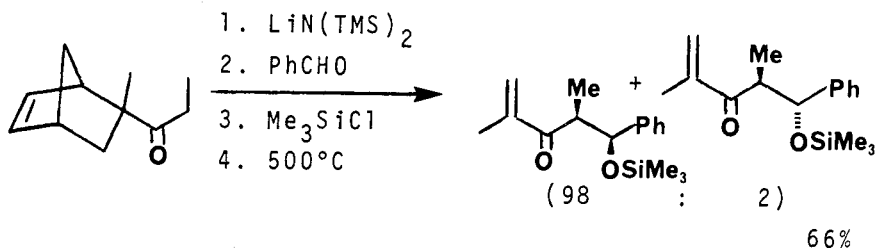
Meyers, A.I.*; Lefker, B.A.; Wanner, K.Th.; Aitken, R.A.
J Org Chem, (1986), 51, 1936



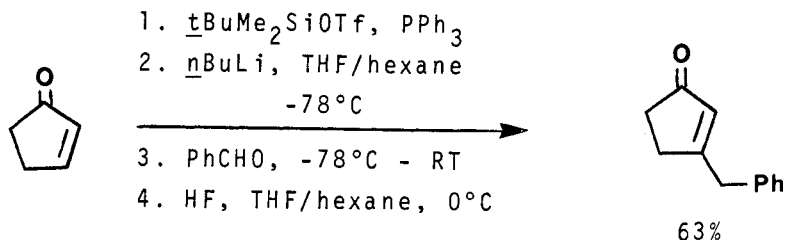
Tsuiji, J.*; Nisar, M.; Minami, I.
Tetrahedron Lett, (1986), 27, 2483



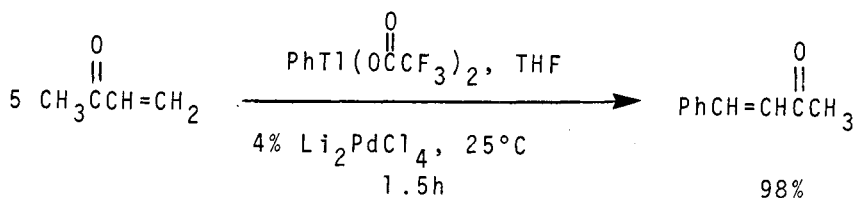
Minami, I.; Takahashi, K.; Shimizu, I.; Kimura, T.
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Kozikowski, A.P.*; Jung, S.H. J Org Chem, (1986), 51, 3400



Kjonaas, R.A.* J Org Chem, (1986), 51, 3708

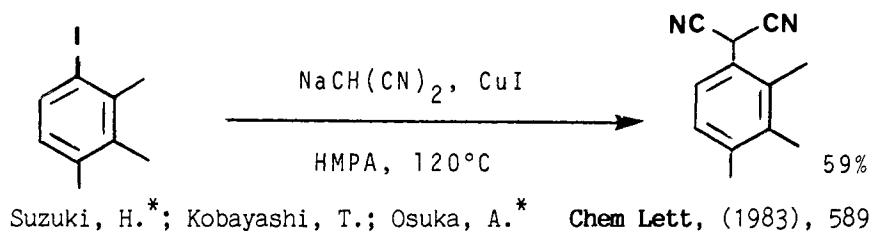
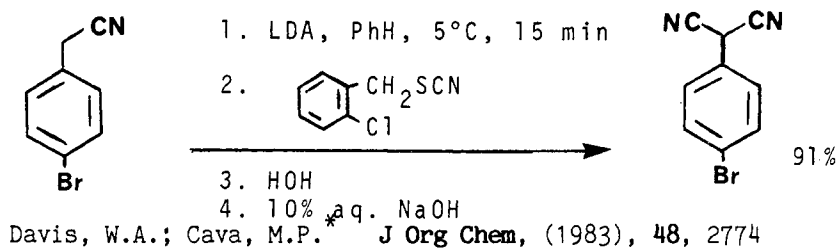
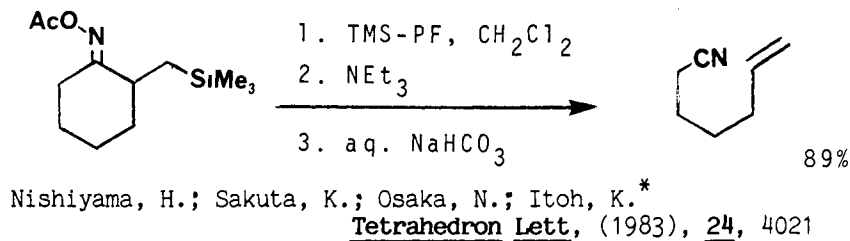
Reviews:

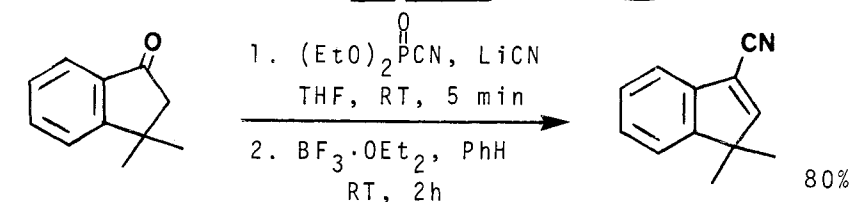
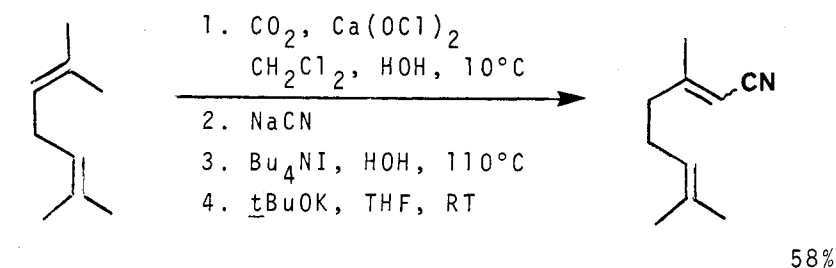
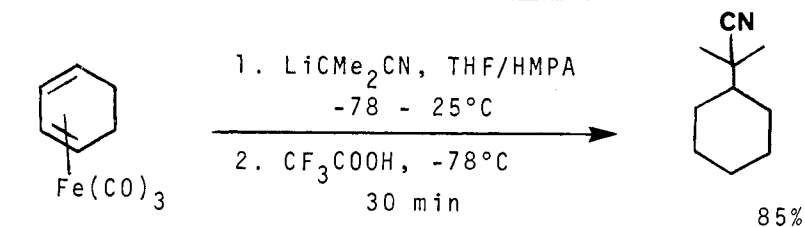
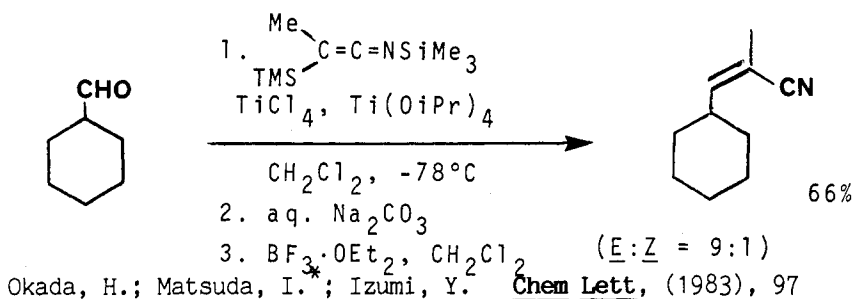
"Chromium (II) Reagents: Reduction of α -Acetylenic Ketones to trans-Enones"

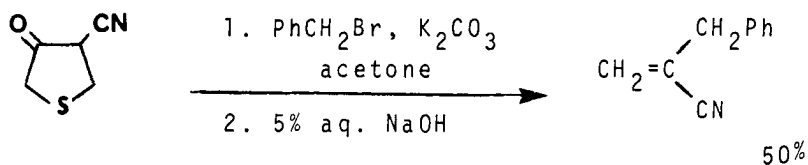
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Muzart, J.* Bull Chem Soc Fr, (1986), II65

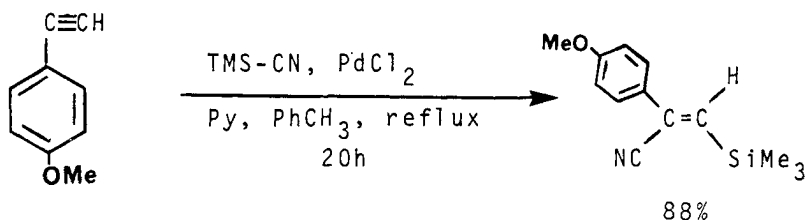
SECTION 375: Nitrile - Nitrile**SECTION 376: Nitrile - Olefin**



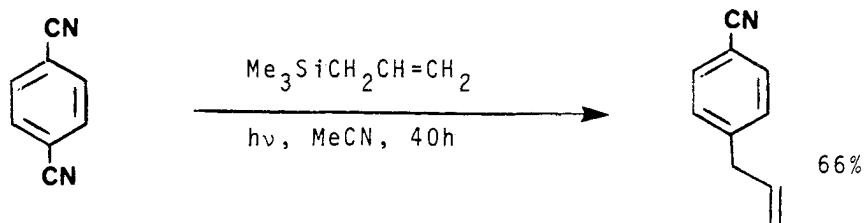


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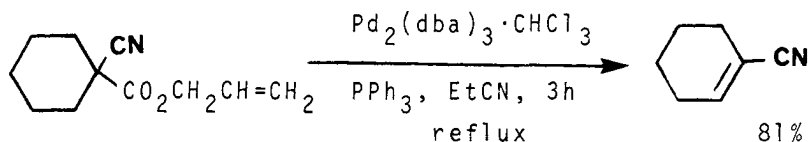


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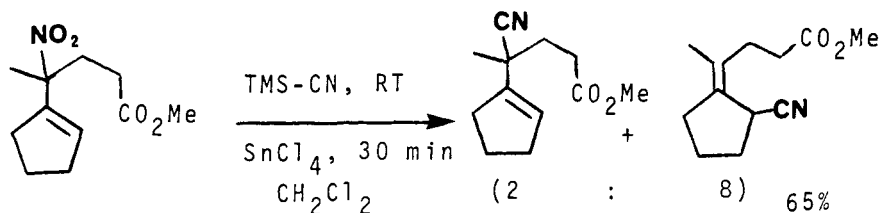
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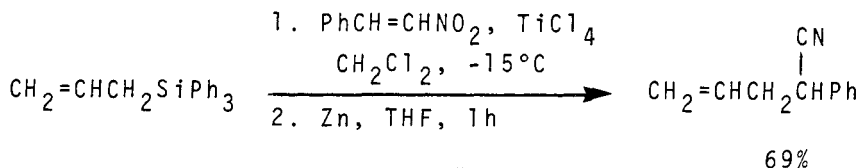


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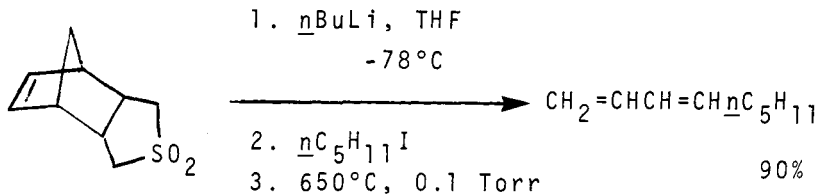


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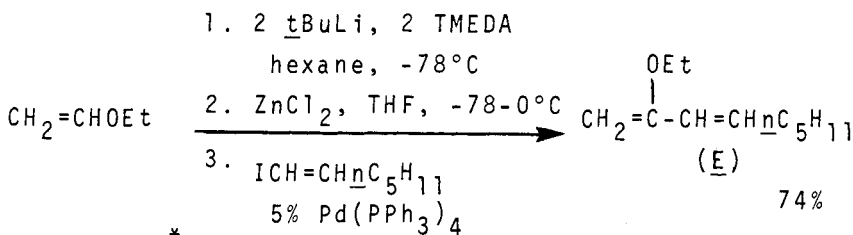
SECTION 377: Olefin - Olefin



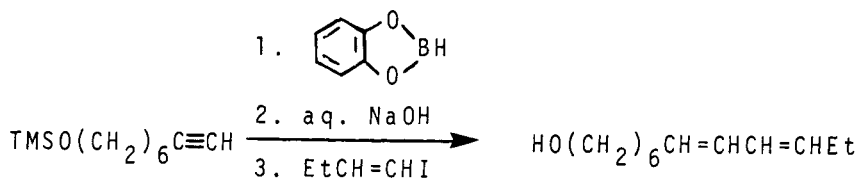
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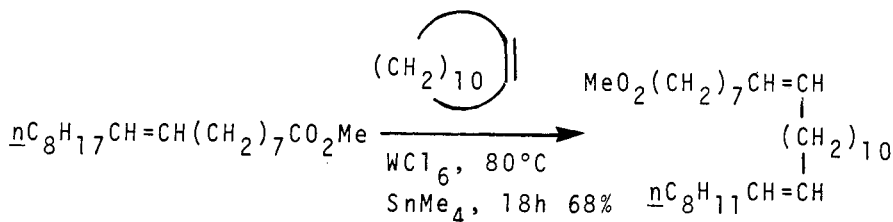
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in PhCH_3 , 120°C74% ($\text{EE}:\text{ZE} = 99:1$)

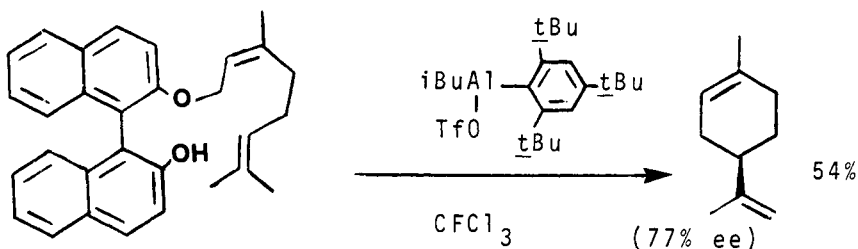
in THF, 65°C

74% ($\text{ZE}:\text{EE} = 99:1$)

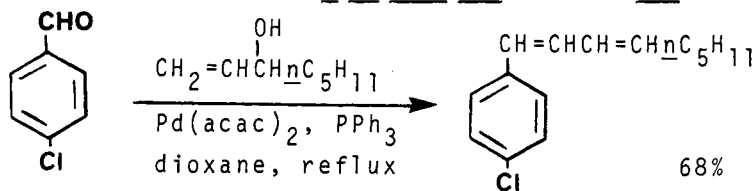
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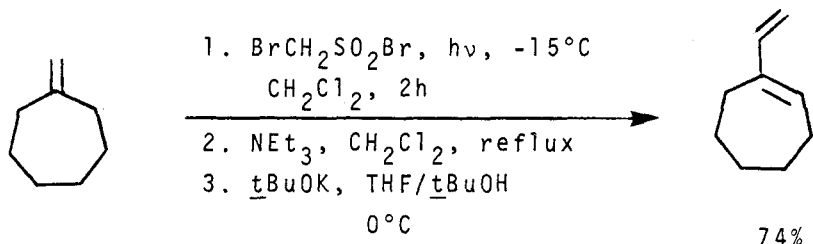
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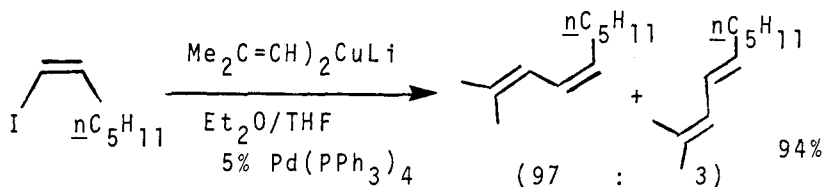
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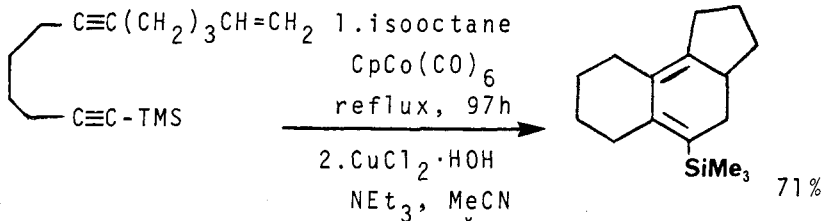
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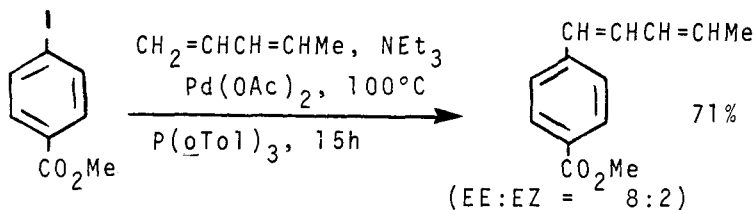
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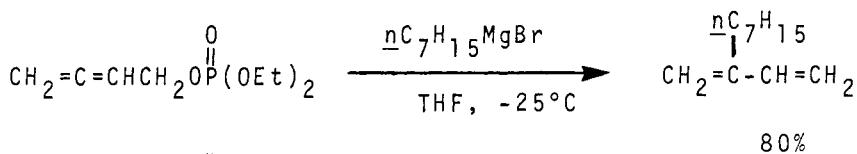
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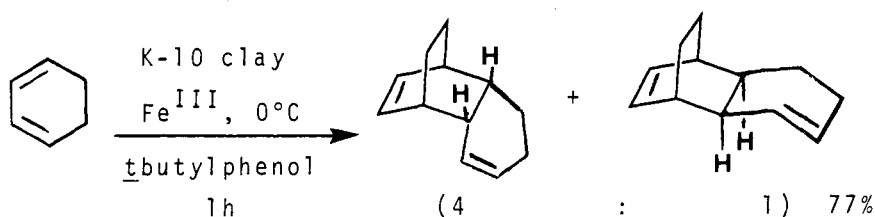
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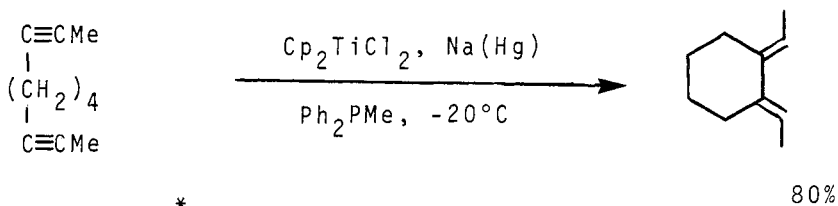
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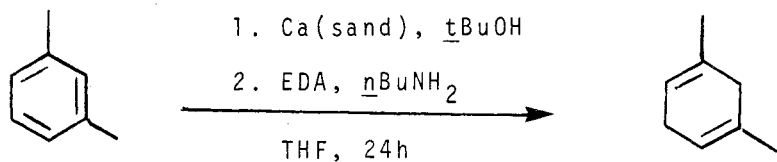


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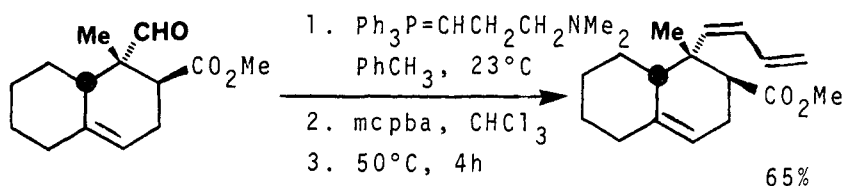
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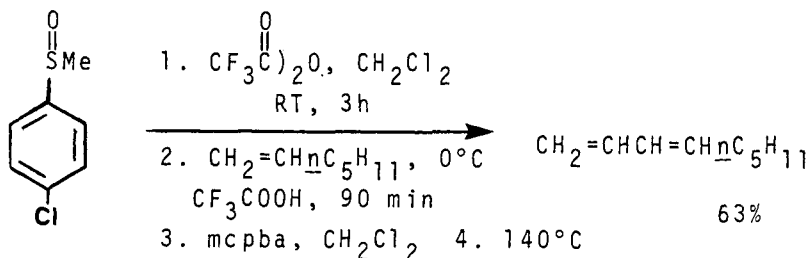
90%

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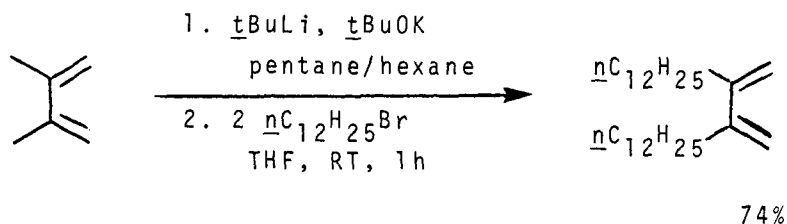
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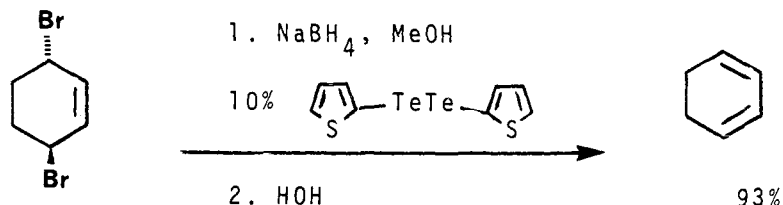
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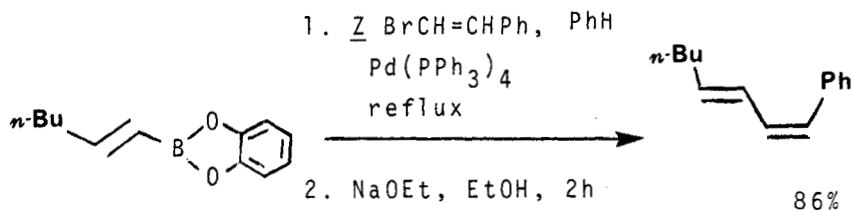
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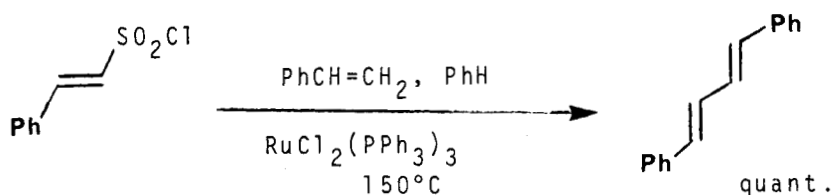
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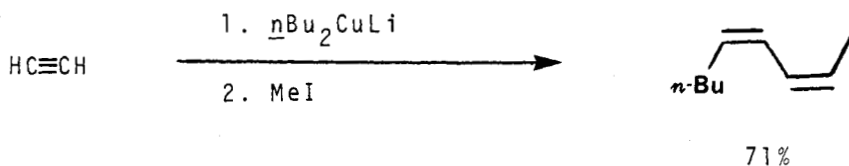
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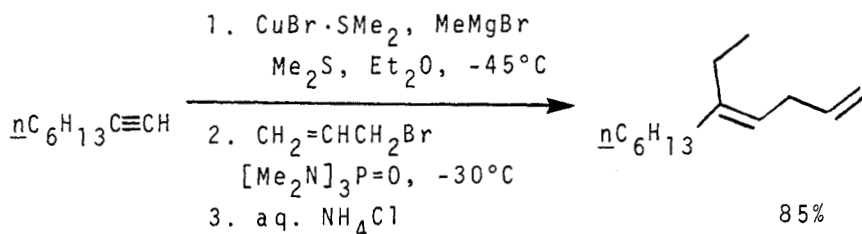
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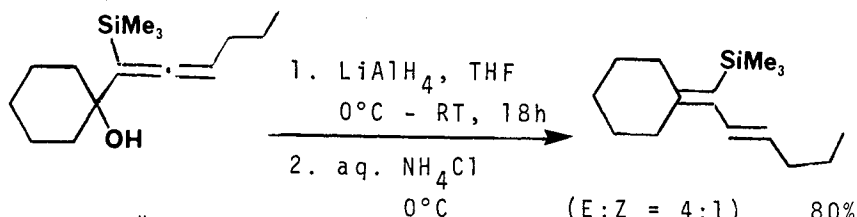
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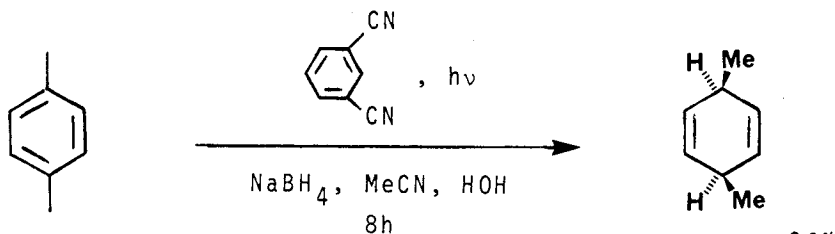


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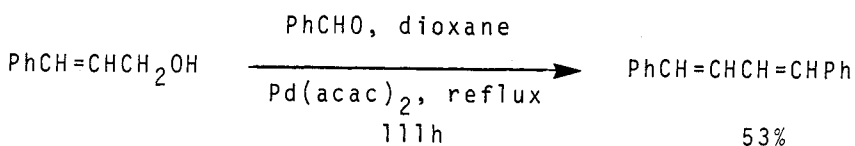


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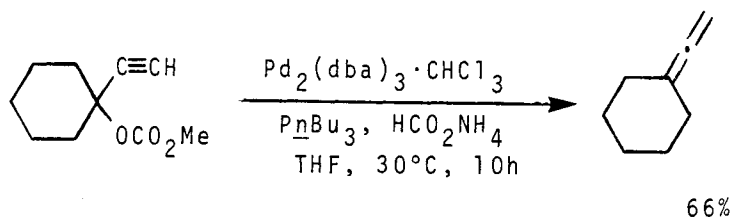


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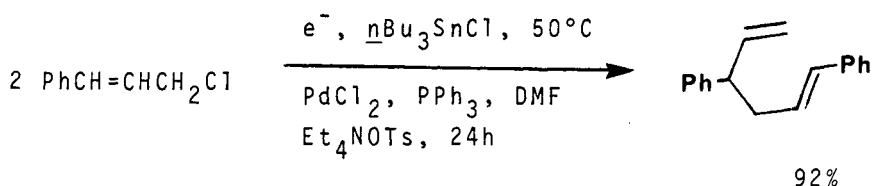
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