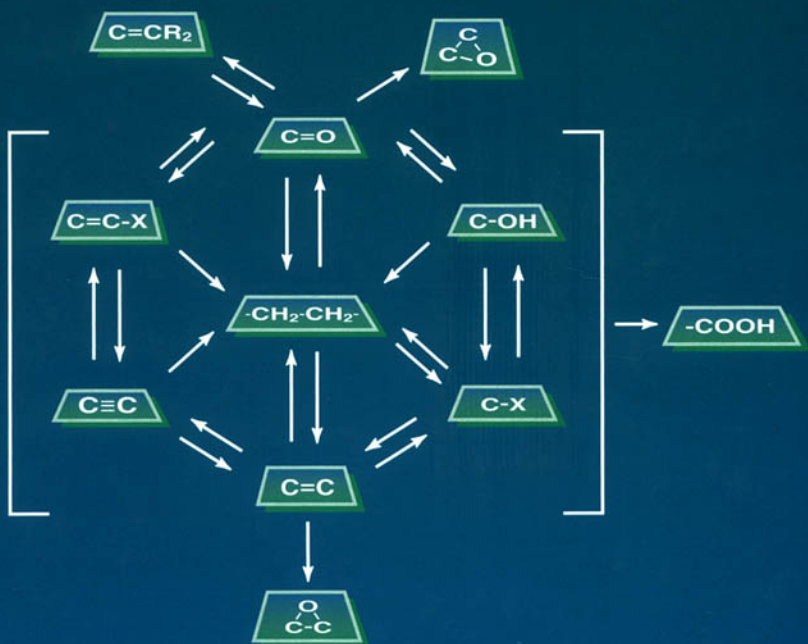


Compendium of Organic Synthetic Methods

Volume 9



Michael B. Smith

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Volume 9

MICHAEL B. SMITH

DEPARTMENT OF CHEMISTRY
THE UNIVERSITY OF CONNECTICUT
STORRS, CONNECTICUT



A Wiley-Interscience Publication

JOHN WILEY & SONS, INC.

New York • Chichester • Weinheim • Brisbane • Singapore • Toronto

Cover illustration was adapted from "Disconnect By the Numbers: A Beginner's Guide to Synthesis" by M. B. Smith. *Journal of Chemical Education*, 1990, 67, 848–856.

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Published simultaneously in Canada.

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Library of Congress Cataloging Card Number: 71-162800

ISBN 0-471-14579-3

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

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PREFACE

Since the original volume in this series by Ian and Shuyen Harrison, the goal of the *Compendium of Organic Synthetic Methods* was to facilitate the search for functional group transformations in the original literature of Organic Chemistry. In Volume 2, difunctional compounds were added and this compilation was continued by Louis Hegedus and Leroy Wade for Volume 3 of the series. Wade became the author for Volume 4 and continued with Volume 5. I began editing the series with Volume 6, where I introduced an author index for the first time and added a new chapter (Chapter 15, Oxides). Volume 7 introduced Sections 378 (Oxides–Alkynes) through Section 390 (Oxides–Oxides). The *Compendium* is a handy desktop reference that will remain a valuable tool to the working Organic chemist, allowing a “quick check” of the literature. It also allows one to “browse” for new reactions and transformations that may be of interest. The body of Organic literature is very large and the *Compendium* is a focused and highly representative review of the literature and is offered in that context.

Compendium of Organic Synthetic Methods, Volume 9 contains both functional group transformations and carbon-carbon bond forming reactions from the literature appearing in the years 1993, 1994 and 1995. The classification schemes used for volumes 6–8 have been continued. Difunctional compounds appear in Chapter 16. The experienced user of the *Compendium* will require no special instructions for the use of Volume 9. Author citations and the Author Index have been continued as in Volumes 6–8.

Every effort has been made to keep the manuscript error free. Where there are errors I take full responsibility. If there are questions or comments, the reader is encouraged to contact me directly at the address, phone, fax, or Email addresses given below.

As I have throughout my writing career, I thank my wife Sarah and my son Steven who have shown unfailing patience and devotion during this work. I also thank Darla Henderson, the editor of this volume.

Michael B. Smith

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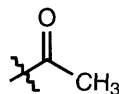
Voice phone: (860)-486-2881
Fax: (860)-486-2981
Email: smith@nucleus.chem.unconn.edu

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ABBREVIATIONS

Ac

Acetyl



acac

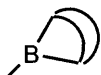
Acetylacetonate

AIBN

azo-bis-isobutyronitrile

aq.

Aqueous



9-Borabicyclo[3.3.1]nonylboryl

9-BBN

9-Borabicyclo[3.3.1]nonane

BER

Borohydride exchange resin

BINAP

2*R*,3*S*-2,2'-*bis*-(diphenylphosphino)-1,1'-binaphthyl

Bn

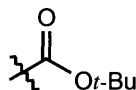
benzyl

Bz

benzoyl

BOC

t-Butoxycarbonyl

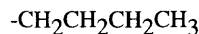


bpy (Bipy)

2,2'-Bipyridyl

Bu

n-Butyl

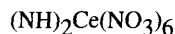


CAM

Carboxamidomethyl

CAN

Ceric ammonium nitrate



c-

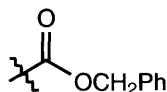
cyclo-

cat.

Catalytic

Cbz

Carbobenzyloxy



Chirald

2*S*,3*R*-(+)-4-dimethylamino-1,2-diphenyl-3-methylbutan-2-ol

COD

1,5-Cyclooctadienyl

COT

1,3,5-cyclooctatrienyl

Cp

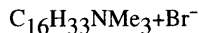
Cyclopentadienyl

CSA

Camphorsulfonic acid

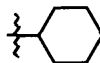
CTAB

cetyltrimethylammonium bromide



Cy (*c*-C₆H₁₁)

Cyclohexyl



°C

Temperature in Degrees Centigrade

DABCO

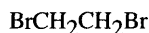
1,4-Diazobicyclo[2.2.2]octane

dba

dibenzylidene acetone

DBE

1,2-Dibromoethane



DBN

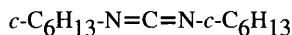
1,8-Diazabicyclo[5.4.0]undec-7-ene

DBU




1,5-Diazabicyclo[4.3.0]non-5-ene

DCC

1,3-Dicyclohexylcarbodiimide



DCE	1,2-Dichloroethane	$\text{ClCH}_2\text{CH}_2\text{Cl}$
DDQ	2, 3-Dichloro-5,6-dicyano-1,4-benzoquinone	
% de	% Diastomeric excess	
DEA	Diethylamine	$\text{HN}(\text{CH}_2\text{CH}_3)_2$
DEAD	Diethylazodicarboxylate	$\text{EtO}_2\text{C}-\text{N}=\text{NCO}_2\text{Et}$
Dibal-H	Diisobutylaluminum hydride	$(\text{Me}_2\text{CHCH}_2)_2\text{AlH}$
Diphos (dppe)	1,2- <i>bis</i> -(Diphenylphosphino)ethane	$\text{Ph}_2\text{PCH}_2\text{CH}_2\text{PPh}_2$
Diphos-4 (dppb)	1,4- <i>bis</i> -(Diphenylphosphino)butane	$\text{Ph}_2\text{P}(\text{CH}_2)_4\text{PPh}_2$
DMAP	4-Dimethylaminopyridine	
DMA	Dimethylacetamide	
DME	Dimethoxyethane	$\text{MeOCH}_2\text{CH}_2\text{OMe}$
DMF	<i>N,N'</i> -Dimethylformamide	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}-\text{C}-\text{N}(\text{CH}_3)_2 \end{array}$
dmp	<i>bis</i> -[1,3-Di(<i>p</i> -methoxyphenyl)-1,3-propanedionato]	
dpm	dipivaloylmethanato	
dppb	1,4- <i>bis</i> -(Diphenylphosphino)butane	$\text{Ph}_2\text{P}(\text{CH}_2)_4\text{PPh}_2$
dppe	1,2- <i>bis</i> -(Diphenylphosphino)ethane	$\text{Ph}_2\text{PCH}_2\text{CH}_2\text{PPh}_2$
dppf	<i>bis</i> -(Diphenylphosphino)ferrocene	
dppp	1,3- <i>bis</i> -(Diphenylphosphino)propane	$\text{Ph}_2\text{P}(\text{CH}_2)_3\text{PPh}_2$
dvb	Divinylbenzene	
e^-	Electrolysis	
% ee	% Enantiomeric excess	
EE	1-Ethoxyethyl	$\text{EtO}(\text{Me})\text{HCO}-$
Et	Ethyl	$-\text{CH}_2\text{CH}_3$
EDA	Ethylenediamine	$\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$
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	Cyclopentadienyl- <i>bis</i> -carbonyl iron	
FVP	Flash Vacuum Pyrolysis	
h	hour (hours)	
h ν	Irradiation with light	
1,5-HD	1,5-Hexadienyl	
HMPA	Hexamethylphosphoramide	$(\text{Me}_3\text{N})_3\text{P}=\text{O}$
HMPT	Hexamethylphosphorous triamide	$(\text{Me}_3\text{N})_3\text{P}$
iPr	Isopropyl	$-\text{CH}(\text{CH}_3)_2$
LICA (LIPCA)	Lithium cyclohexylisopropylamide	
LDA	Lithium diisopropylamide	$\text{LiN}(\text{iPr})_2$
LHMDS	Lithium hexamethyl disilazide	$\text{LiN}(\text{SiMe}_3)_2$
LTMP	Lithium 2,2,6,6-tetramethylpiperidide	
MABR	Methylaluminum <i>bis</i> -(4-bromo-2,6-di- <i>tert</i> -butylphenoxide)	
MAD	<i>bis</i> -(2,6-di- <i>t</i> -butyl-4-methylphenoxy)methyl aluminum	
mCPBA	<i>meta</i> -Chloroperoxybenzoic acid	
Me	Methyl	$-\text{CH}_3$
MEM	β -Methoxyethoxymethyl	$\text{MeOCH}_2\text{CH}_2\text{OCH}_2-$
Mes	Mesityl	2,4,6-tri-Me-C ₆ H ₂

MOM	Methoxymethyl	MeOCH ₂ -
Ms	Methanesulfonyl	CH ₃ SO ₂ -
MS	Molecular Sieves (3Å or 4Å)	
MTM	Methylthiomethyl	CH ₃ SCH ₂ -
NAD	Nicotinamide adenine dinucleotide	
NADP	Sodium triphosphopyridine nucleotide	
Napth	Napthyl (C ₁₀ H ₈)	
NBD	Norbornadiene	
NBS	<i>N</i> -Bromosuccinimide	
NCS	<i>N</i> -Chlorosuccinimide	
NIS	<i>N</i> -Iodosuccinimide	
Ni(R)	Raney nickel	
NMP	N-Methyl-2-pyrrolidinone	
Oxone	2 KHSO ₅ •KHSO ₄ •K ₂ SO ₄	
(P)	Polymeric backbone	
PCC	Pyridinium chlorochromate	
PDC	Pyridinium dichromate	
PEG	Polyethylene glycol	
Ph	Phenyl	
PhH	Benzene	
PhMe	Toluene	
Phth	Phthaloyl	
pic	2-Pyridinecarboxylate	
Pip	Piperidine	
PMP	4-methoxyphenyl	
Pr	<i>n</i> -Propyl	-CH ₂ CH ₂ CH ₃
Py	Pyridine	
quant.	Quantitative yield	
Red-Al	[(MeOCH ₂ CH ₂ O) ₂ AlH ₂]Na	
sBu	<i>sec</i> -Butyl	CH ₃ CH ₂ CH(CH ₃)
sBuLi	<i>sec</i> -Butyllithium	CH ₃ CH ₂ CH(Li)CH ₃
Siamyl	Diisoamyl	(CH ₃) ₂ CHCH(CH ₃)-
TADDOL	α,α,α',α'-tetraaryl-4,5-dimethoxy-1,3-dioxolane	
TASF	<i>tris</i> -(Diethylamino)sulfonium difluorotrimethyl silicate	
TBAF	Tetrabutylammonium fluoride	<i>n</i> -Bu ₄ N ⁺ F
TBDMS	<i>t</i> -Butyldimethylsilyl	<i>t</i> -BuMe ₂ Si
TBHP (<i>t</i> -BuOOH)	<i>t</i> -Butylhydroperoxide	Me ₃ COOH
<i>t</i> -Bu	<i>tert</i> -Butyl	-C(CH ₃) ₃
TEBA	Triethylbenzylammonium	Bn(CH ₃) ₃ N ⁺
TEMPO	Tetramethylpiperdinyloxy free radical	

TFA	Trifluoroacetic acid	CF_3COOH
TFAA	Trifluoroacetic anhydride	$(\text{CF}_3\text{CO})_2\text{O}$
Tf (OTf)	Triflate	$-\text{SO}_2\text{CF}_3(-\text{OSO}_2\text{CF}_3)$
THF	Tetrahydrofuran	
THP	Tetrahydropyran	
TMEDA	Tetramethylethylenediamine	$\text{Me}_2\text{NCH}_2\text{CH}_2\text{NMe}_2$
TMG	1,1,3,3-Tetramethylguanidine	
TMS	Trimethylsilyl	$-\text{Si}(\text{CH}_3)_3$
TMP	2,2,6,6-Tetramethylpiperidine	
TPAP	tetra- <i>n</i> -Propylammonium perruthenate	
Tol	Tolyl	$4\text{-C}_6\text{H}_4\text{CH}_3$
Tr	Trityl	$-\text{CPh}_3$
TRIS	Triisopropylphenylsulfonyl	
Ts(Tos)	Tosyl = <i>p</i> -Toluenesulfonyl	$4\text{-MeC}_6\text{H}_4$
))))))	Sonication	
X_C	Chiral auxiliary	

INDEX, MONOFUNCTIONAL COMPOUNDS

Sections—heavy type
Pages—light type

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

PROTECTION

	Sect.	Pg.
Carboxylic acids	30A	9
Alcohols, phenols	45A	42
Aldehydes	60A	55
Amides	90A	115
Amines	105A	137
Ketones	180A	206

PREPARATION OF

FROM

	Alkynes	Carboxylic acid derivatives	Alcohols, phenols	Aldehydes	Alkyls, methylenes, aryls	Amides	Amines	Esters	Ethers, epoxides	Halides, sulfonates	Hydrides (RH)	Ketones	Nitriles	Alkenes	Miscellaneous
Alkynes	1 1									10 2	12 3		14 3	15 3	
Carboxylic acid derivatives		17 5	18 6	19 6			23 7	24 7	25 7		27 8		29 8	30 9	
Alcohols, phenols	31 11	32 11	33 12	34 13	36 25		38 26	39 26	40 29	41 30	42 30	43 39	44 39	45 41	
Aldehydes		47 48	48 48	49 49	50 50		52 51	53 51	54 52	55 52		57 53	58 53	59 54	70 55
Alkyls, methylenes, aryls	61 58		63 60	64 60	65 61		68 64	69 65	70 65	71 70	72 71			74 72	75 99
Amides	76 100	77 100	78 101		80 102	81 102	82 108	83 110		85 111		87 112	88 113	89 113	90 113
Amines			93 117	94 118		96 119	97 120	98 129	99 129	100 130	101 131	102 131	103 132	104 132	105 133
Esters	106 140	107 140	108 142	109 144		111 145		113 146	114 148	115 149	116 150	117 151	118 153	119 154	120 154
Ethers, epoxides	121 156		123 156	124 158				128 159	129 160	130 161	131 161	132 161		134 162	135 169
Halides, sulfonates		137 171	138 171		140 172		142 172			145 173	146 173	147 174		149 175	150 175
Hydrides (RH)			153 176				157 177	158 178	159 179	160 179		162 181	163 182		165 182
Ketones	166 183	167 184	168 186	169 189	170 191	171 191	172 192	173 193	174 193	175 195	176 196	177 198		179 202	180 204
Nitriles			183 208	184 208		186 209		188 209		190 209		192 210			195 211
Alkenes	196 212	197 216	198 217	199 217	200 219	201 220	202 220	203 220	204 221	205 221		207 223		209 223	210 225
Miscellaneous	211 227	212 227	213 227				217 228	218 228	219 228	220 232	221 232	222 232	223 233	234 233	225 233

INDEX, DIFUNCTIONAL COMPOUNDS

Sections—heavy type

Pages—light type

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

											Alkyne
300 235											
											Carboxylic acid
											Alcohol, Phenol
302 235	313 241	323 245									
											Aldehyde
303 237	324 250										
											Amide
315 242	325 250	334 283	342 287								
											Amine
305 337	316 242	326 252	335 283	343 288	350 303						
											Ester
327 257	344 289	351 304	357 323								
											Ether, Epoxide
307 238	318 243	328 261	337 284	345 290	352 309	358 325	363 340				
											Halide
308 239	319 244	329 265	346 292	353 311	359 326	364 342	368 356				
											Ketone
309 239	320 244	330 267	347 293	354 312	360 330	365 344	369 357	372 360			
											Nitrile
310 239	331 274	348 296	355 315	361 334	366 350	373 362					
											Alkene
311 239	322 244	332 276	341 284	349 296	356 315	362 335	367 350	371 359	374 363	376 375	377 376
											Oxide
378 381	380 381	381 383	382 383	383 383	384 384	385 385	386 386	387 386	389 387	390 390	

INTRODUCTION

Relationship between Volume 9 and Previous Volumes. *Compendium of Organic Synthetic Methods*, Volume 9 presents about 1200 examples of published reactions for the preparation of monofunctional compounds, updating the 10650 in Volumes 1–8. Volume 9 contains about 800 examples of reactions which prepare of difunctional compounds with various functional groups. Reviews have long been a feature of this series and Volume 9 adds almost 90 pertinent reviews in the various sections. Volume 9 contains approximately 1000 fewer entries than Volume 8 for an identical three-year period, primarily for difunctional compounds. Interestingly, there are about 500 fewer citations from the most cited journal (*Tetrahedron Letters*) than in the previous edition. Whether this represents a trend in the literature or an inadvertent selectivity on my part is unknown, but there has been a clear increase in biochemical and total synthesis papers which may account for this.

Chapters 1–14 continue as in Volumes 1–8, as does Chapter 15, introduced in Volume 6. Difunctional compounds appear in Chapter 16, as in Volumes 6 and 7. The sections on oxides as part of difunctional compounds, introduced in Volume 7, continues in Chapter 16 of Volumes 8 and 9 with Sections 378 (Oxides–Alkynes) through Section 390 (Oxides–Oxides).

Following Chapter 16 is a complete alphabetical listing of all authors (last name, initials). The authors for each citation appear below the reaction. The principle author is indicated by underlining (i.e., Kwon, T.W.; Smith, M. B.), as in Volumes 7 and 8.

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 (1993–1995), 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 $\text{PhCH=CHCH}_2\text{OH} \rightarrow \text{PhCH=CHCOOH}$ 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 Sections 74D and 74E (Alkyls from Alkenes), respectively.

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 alkenes).

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

$\text{RCH=CHCOOH} \rightarrow \text{RCH=CH}_2$	Hydrides from carboxylic acids
$\text{RCH=CH}_2 \rightarrow \text{RCH=CHCOOH}$	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
$\text{RCH=CHCHO} \rightarrow \text{RCH=CH}_2$	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
$\text{RCH=CH}_2 \rightarrow \text{RCH}_2\text{CH}_3$	Alkyls from alkenes
	(Hydrogenation of Alkenes)
$\text{RBr} + \text{HC}\equiv\text{CH} \rightarrow \text{RCH}\equiv\text{CR}$	Alkynes from halides; also alkynes from alkynes
$\text{ROH} + \text{RCOOH} \rightarrow \text{RCOOR}$	Esters from alcohols; also esters from carboxylic acids
$\text{RCH=CHCHO} \rightarrow \text{RCH}_2\text{CH}_2\text{CHO}$	Alkyls from alkenes (Conjugate Reduction)
$\text{RCH=CHCN} \rightarrow \text{RCH}_2\text{CH}_2\text{CN}$	Alkyls from alkenes (Conjugate Reduction)

How to Use the Book to Locate Examples of the Preparation of Protection of Monofunctional Compounds. Examples of the preparation of one functional group from another are found in the monofunctional index on p. x, which lists the corresponding section and page. Sections that contain examples of the reactions of a functional group are found in the horizontal rows of this index. Section 1 gives examples of the reactions of alkynes that form new alkynes; Section 16 gives reactions of alkynes that form carboxylic acids; and Section 31 gives reactions of alkynes 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 alkynes from alkynes; 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 74E (Alkyls, Methylenes, and Aryls from Alkenes).

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 (Alkenes from Aldehydes) and Section 207 (Alkenes 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 alkynes, carboxylic acids, alcohols, phenols, aldehydes, amides, amines, esters, ketones, and alkenes are also indexed on p. xvii. Section (designated with an A: 15A, 30A, etc.) with "protecting group: reactions are located at the end of pertinent chapters.

Some pairs of functional groups such as 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 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 a citation in this book be taken as a complete experimental procedure. Failure to refer to the original literature prior to beginning laboratory work could be hazardous.** The original papers usually yield a further set of references to previous work. Papers that appear after those publications can usually be found by consulting *Chemical Abstracts* and 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 alkene. Reactions that form difunctional compounds are classified into sections on the basis of two functional groups in the product that are pertinent to the reaction. The relative positions of the groups do not affect the classification. Thus preparations of 1,2-amino-alcohols, 1,3-amino-alcohols, and 1,4-amino-alcohols are included in a single section (Section 326, Alcohol-Amine). Difunctional compounds that have an oxide as the second group are found in the appropriate section (Sections 278–290). The nitroketone product of oxidation of a nitroalcohol is found in Section 386 (Ketone-Oxide). Conversion of an oxide to another functional group is generally found in the "Miscellaneous" section of the sections concerning monofunctional com-

pounds. Conversion of a nitroalkane to an amine, for example is found in Section 105 (Amines from Miscellaneous Compounds). The following examples illustrate applications of this classification system:

<i>Difunctional Product</i>	<i>Section Title</i>
$\text{RC}\equiv\text{C}-\text{C}\equiv\text{CR}$	Alkyne-Alkyne
$\text{RCH}(\text{OH})\text{COOH}$	Carboxylic acid-Alcohol
$\text{RCH}=\text{CHOMe}$	Ether-Alkene
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-Alkene
$\text{RCH}=\text{CHOAc}$	Ester-Alkene
$\text{RCH}(\text{OMe})\text{CH}_2\text{SO}_2\text{CH}_2\text{CH}_2\text{OH}$	Alcohol-Ether
$\text{RSO}_2\text{CH}_2\text{CH}_2\text{OH}$	Alcohol-Oxide

How to Use the Book to Locate Examples of the Preparation of Difunctional Compounds. The difunctional index on p. xi 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 alkene and acetylenic compounds from alkene and acetylenic starting materials can, in principle, be classified in either the monofunctional or difunctional sections; for example, the transformation $\text{RCH}=\text{CHBr} \rightarrow \text{RCH}=\text{CHCOOH}$ could be considered as preparing carboxylic acids from halides (Section 25, monofunctional compounds) or preparing a carboxylic acid-alkene (Section 322, difunctional compounds). The choice usually depends on the focus of the particular paper where this reaction was found. In such cases both sections should be consulted.

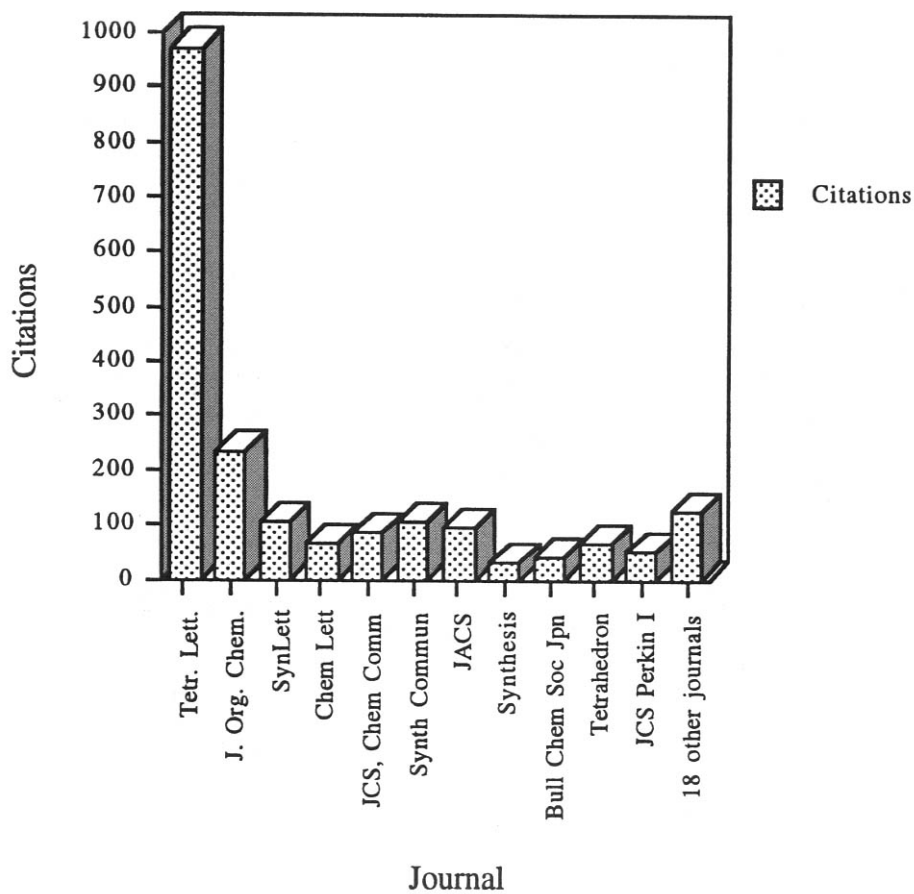
Reactions applicable to both aldehyde and ketone starting materials are in many cases illustrated by an example that uses only one of them. Likewise, many citations for reactions found in the Aldehyde-X sections, will include examples that could be placed in the Ketone-X section. Again the choice is dictated by the paper where the reaction was found.

Many literature preparations of difunctional compounds are extensions of the methods applicable to monofunctional compounds. As an example, the reaction $\text{RCI} \rightarrow \text{ROH}$ might be used for the preparation of diols from an appropriate dichloro compound. Such methods are difficult to categorize and may be found in either the monofunctional or difunctional sections, depending on the focus of the original paper.

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).

Sources of Literature Citations. I thought it would be useful for a reader of this *Compendium* to see the distribution of citations used to this book (i.e., which journals have the most new synthetic methodology). As seen in the accompanying graph, *Tetrahedron Letters* and *Journal of Organic Chemistry* account for roughly 60% of all the citations in Volume 9. This book was not edited to favor one journal, category or type of article over another. Undoubtedly, my own personal preferences are part of the selection but I believe that this compilation is an accurate representation of new synthetic methods that appear in the literature for this period. Therefore, I believe the accompanying graph reflects those journals where new synthetic methodology is located. I should point out that the category "18 other journals" includes: *Accts. Chem. Res.*; *Acta Chem. Scand.*; *Angew. Chem. Int. Ed. Engl.*; *Bull. Chim. Soc. Belg.*; *Bull. Chim. Soc. Fr.*; *Can. J. Chem.*; *Chem. Ber.*; *Gazz. Chim. Ital.*; *Heterocycles*; *J. Chem. Soc.*; *J. Het. Chem.*; *J. Indian Chem. Soc.*; *Liebigs Ann. Chem.*; *Org. Prep. Proceed Int.*; *Recl. Trav. Chim., Pays-Bas*; and *Tetrahedron Asymmetry*. In addition, nine more journals were examined but no references were recorded.



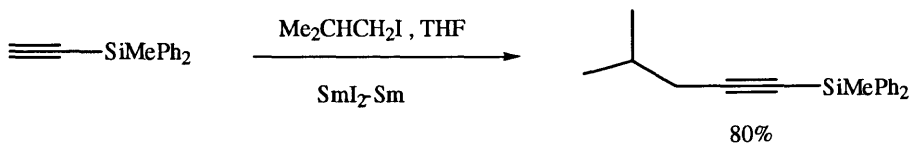
Compendium of Organic Synthetic Methods

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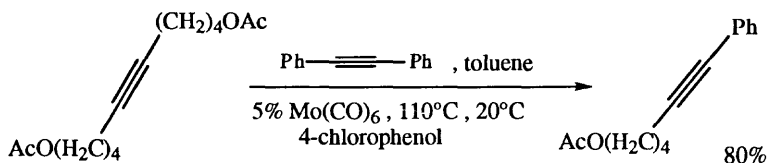
CHAPTER 1

PREPARATION OF ALKYNES

SECTION 1: ALKYNES FROM ALKYNES



Murakami, M.; Hayashi, M.; Ito, Y. *Synlett*, **1994**, 179



Kaneta, N.; Hikichi, K.; Asaka, S.; Uemura, M.; Mori, M. *Chem. Lett.*, **1995**, 1055

REVIEW:

"Palladium And/Or Copper-Mediated Cross-Coupling Reactions Between 1-Alkynes And Vinyl, Aryl, 1-Alkynyl, 1,2-Propadienyl, Propargyl And Allylic Halides Or Related Compounds. A Review," Rossi, R.; Carpita, A.; Bellina, F. *Org. Prep. Proceed. Int.*, **1995**, 27, 129

SECTION 2: ALKYNES FROM ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

SECTION 3: ALKYNES FROM ALCOHOLS AND THIOLS

NO ADDITIONAL EXAMPLES

SECTION 4: ALKYNES FROM ALDEHYDES

NO ADDITIONAL EXAMPLES

SECTION 5: ALKYNES FROM ALKYL, METHYLENES AND ARYL

NO ADDITIONAL EXAMPLES

SECTION 6: ALKYNES FROM AMIDES

NO ADDITIONAL EXAMPLES

SECTION 7: ALKYNES FROM AMINES

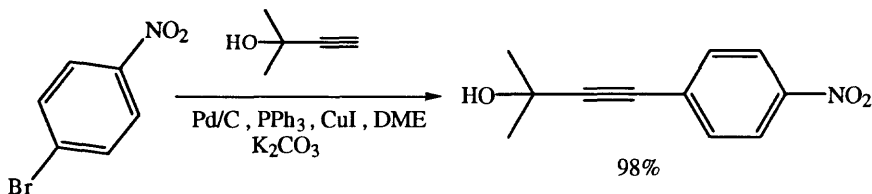
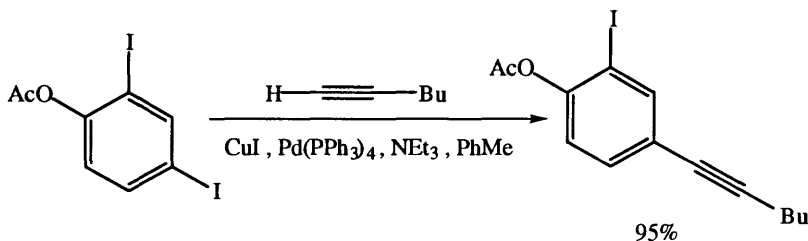
NO ADDITIONAL EXAMPLES

SECTION 8: ALKYNES FROM ESTERS

NO ADDITIONAL EXAMPLES

SECTION 9: ALKYNES FROM ETHERS, EPOXIDES AND THIOETHERS

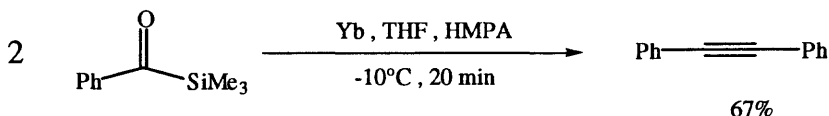
NO ADDITIONAL EXAMPLES

SECTION 10: ALKYNES FROM HALIDES AND SULFONATESBleicher, L.; Cosford, N.D.P. *Synlett*, **1995**, 1115Bates, R.W.; Gabel, C.J.; Ji, J. *Tetrahedron Lett.*, **1994**, 35, 6993

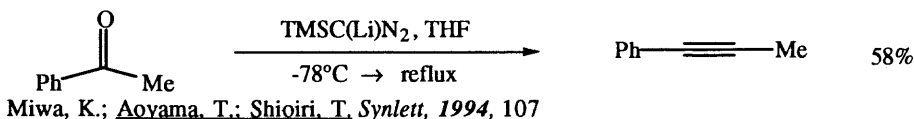
SECTION 11: ALKYNES FROM HYDRIDES

For examples of the reaction $RC\equiv CH \rightarrow RC\equiv C-C\equiv CR^1$, see section 300 (Alkyne-Alkyne).

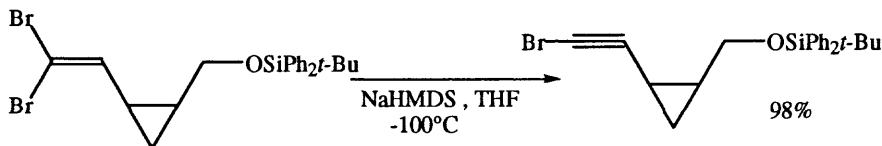
NO ADDITIONAL EXAMPLES

SECTION 12: ALKYNES FROM KETONES

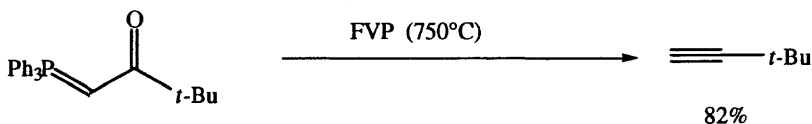
Taniguchi, Y.; Fujii, N.; Makioka, Y.; Takai, K.; Fujiwara, Y. *Chem. Lett.*, **1993**, 1165

**SECTION 13: ALKYNES FROM NITRILES**

NO ADDITIONAL EXAMPLES

SECTION 14: ALKYNES FROM ALKENES

Grandjean, D.; Pale, P.; Chuche, J. *Tetrahedron Lett.*, **1994**, 35, 3529

SECTION 15: ALKYNES FROM MISCELLANEOUS COMPOUNDS

Aitken, R.A.; Atherton, J.I. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 1281

From arylCO derivatives:

Aitken, R.A.; Horsburgh, C.E.R.; McCreadie, J.G.; Seth, S. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 1727

SECTION 15A: PROTECTION OF ALKYNES

NO ADDITIONAL EXAMPLES

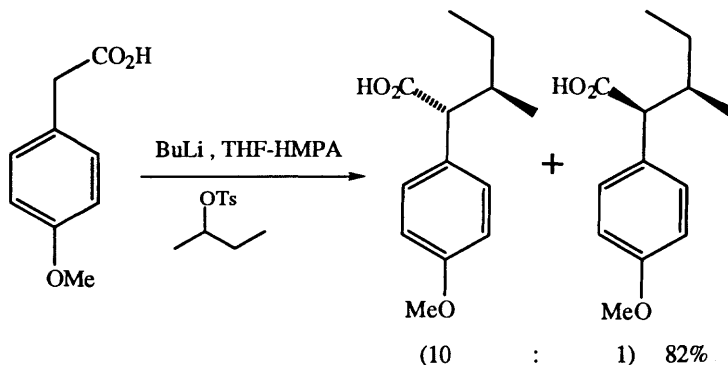
CHAPTER 2

PREPARATION OF ACID DERIVATIVES

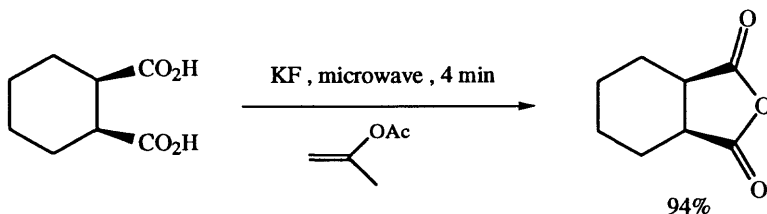
SECTION 16: ACID DERIVATIVES FROM ALKYNES

NO ADDITIONAL EXAMPLES

SECTION 17: ACID DERIVATIVES FROM ACID DERIVATIVES

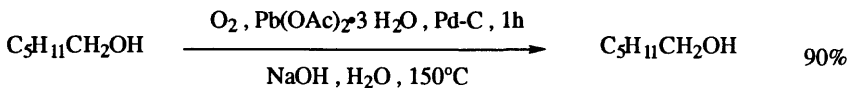


Kusumoto, T.; Ichikawa, S.; Asaka, K.; Sato, K.; Hiyama, T. *Tetrahedron Lett.*, **1995**, 36, 1071

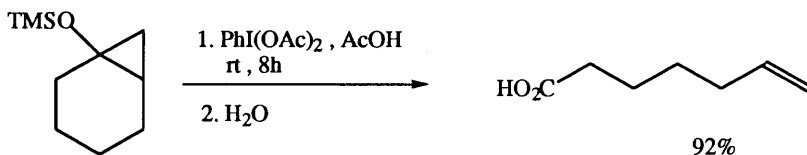


Villemin, D.; Labiad, B.; Loupy, A. *Synth. Commun.*, **1993**, 23, 419

SECTION 18: ACID DERIVATIVES FROM ALCOHOLS AND THIOLS

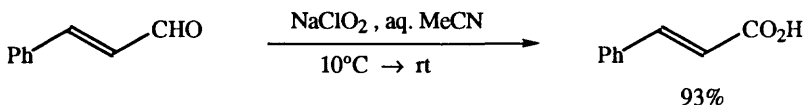
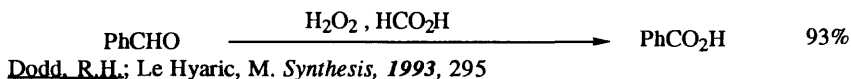


Akada, M.; Nakano, S.; Sugiyama, T.; Tchitoh, K.; Nakao, H.; Akita, M.; Moro-Oka, Y. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 1511

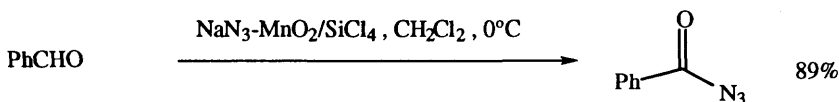


Kirihara, M.; Yokoyama, S.; Kakuda, H.; Momose, T. *Tetrahedron Lett.*, **1995**, 36, 6907

SECTION 19: ACID DERIVATIVES FROM ALDEHYDES



Babu, B.R.; Balasubramanian, K.K. *Org. Prep. Proceed. Int.*, **1994**, 26, 123



Elmorsy, S.S. *Tetrahedron Lett.*, **1995**, 36, 1341

SECTION 20: ACID DERIVATIVES FROM ALKYL, METHYLENES AND ARYL

NO ADDITIONAL EXAMPLES

SECTION 21: ACID DERIVATIVES FROM AMIDES

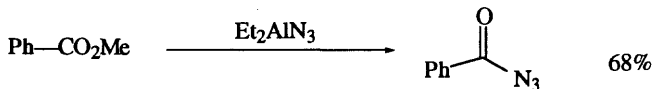
NO ADDITIONAL EXAMPLES

SECTION 22: ACID DERIVATIVES FROM AMINES

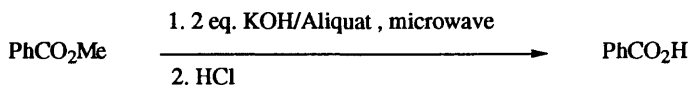
NO ADDITIONAL EXAMPLES

SECTION 23: ACID DERIVATIVES FROM ESTERS

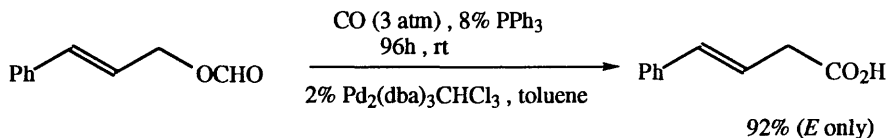
Other reactions useful for the hydrolysis of esters may be found in Section 30A (Protection of Carboxylic Acids).



Rawal, V.H.; Zhong, H.M. *Tetrahedron Lett.*, **1994**, *35*, 4947

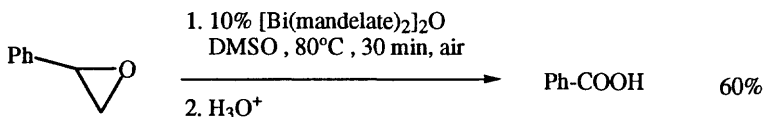


Loupy, A.; Pigeon, P.; Ramdani, M.; Jacquault, P. *Synth. Commun.*, **1994**, *24*, 159

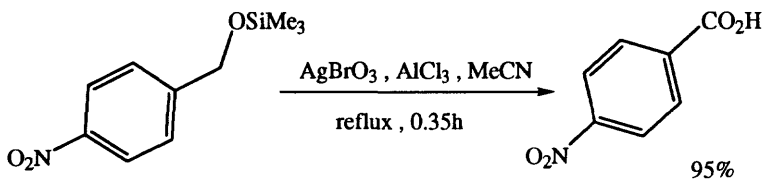


Yamamoto, A. *Bull. Chem. Soc. Jpn.*, **1995**, *68*, 433

SECTION 24: ACID DERIVATIVES FROM ETHERS, EPOXIDES AND THIOETHERS

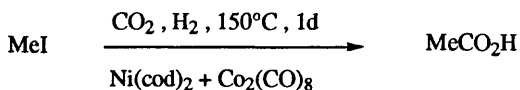


Zevaco, T.; Duñach, E.; Postel, M. *Tetrahedron Lett.*, **1993**, *34*, 2601



Firouzbadi, H.; Mohammadpoor-Baltork, I. *Synth. Commun.*, **1994**, *24*, 1065

SECTION 25: ACID DERIVATIVES FROM HALIDES AND SULFONATES



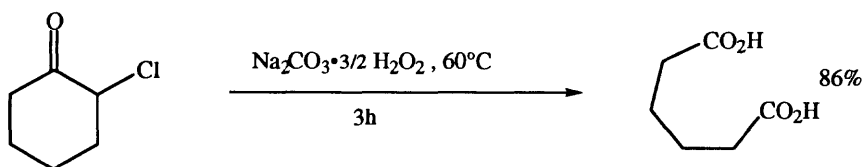
Fukuoka, A.; Gotoh, N.; Kobayashi, N.; Hirano, M.; Komiya, S. *Chem. Lett.*, **1995**, 567

REVIEW:

"Preparation Of Thiol Acids, Thiol Esters And Amides By Reactions Of Carbonyl Sulfides With Grignard Reagents," Katritzky, A.R.; Moutou, J.-L.; Yang, Z. *Org. Prep. Proceed. Int.*, 1995, 27, 361

SECTION 26: ACID DERIVATIVES FROM HYDRIDES

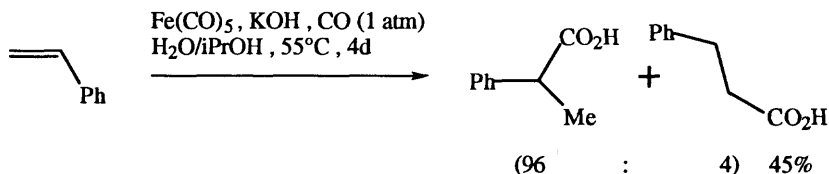
NO ADDITIONAL EXAMPLES

SECTION 27: ACID DERIVATIVES FROM KETONES

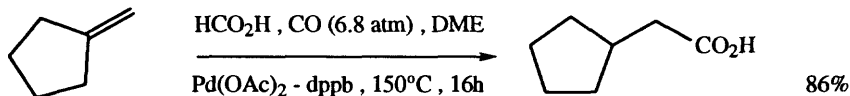
Yang, D.T.C.; Cao, Y.H.; Kabalka, G.W. *Synth. Commun.*, 1995, 25, 3695

SECTION 28: ACID DERIVATIVES FROM NITRILES

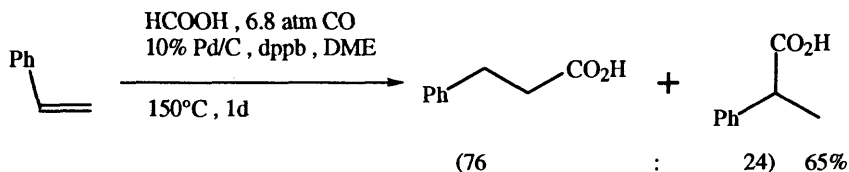
NO ADDITIONAL EXAMPLES

SECTION 29: ACID DERIVATIVES FROM ALKENES

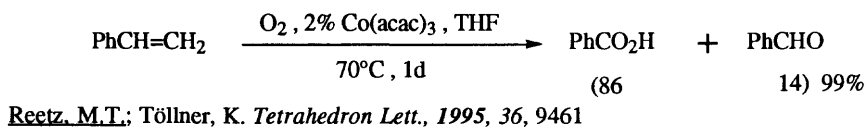
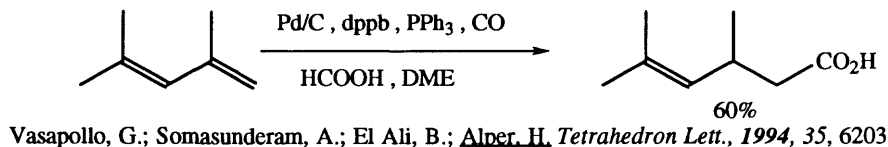
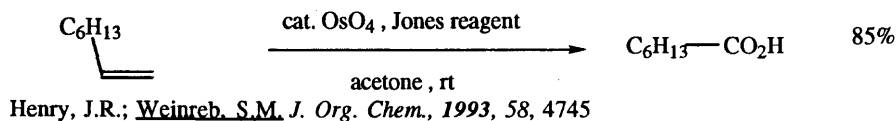
Brunet, J.-J.; Neibecker, D.; Srivastava, R.S. *Tetrahedron Lett.*, 1993, 34, 2759



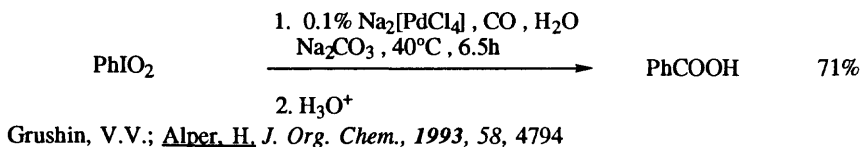
El Ali, B.; Alper, H. *J. Org. Chem.*, 1993, 58, 3595



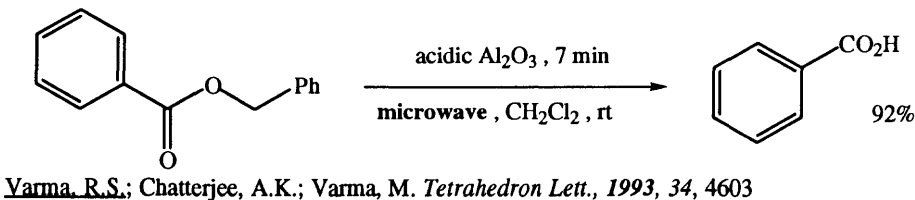
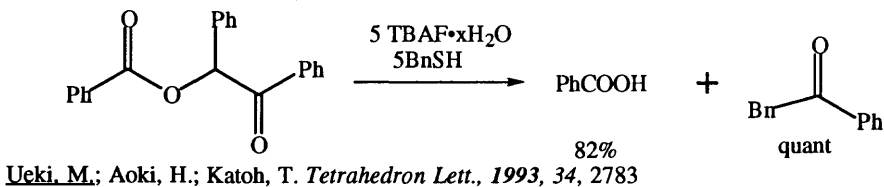
El Ali, B.; Vasapollo, G.; Alper, H. *J. Org. Chem.*, 1993, 58, 4739

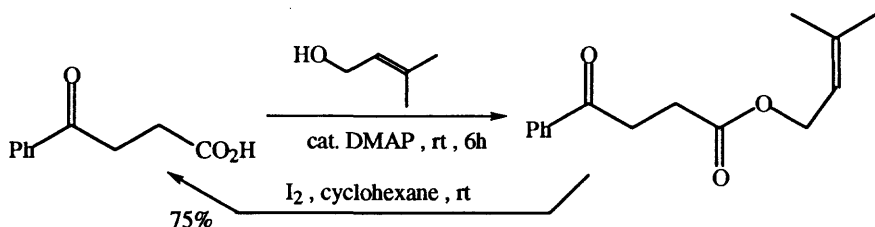


SECTION 30: ACID DERIVATIVES FROM MISCELLANEOUS COMPOUNDS

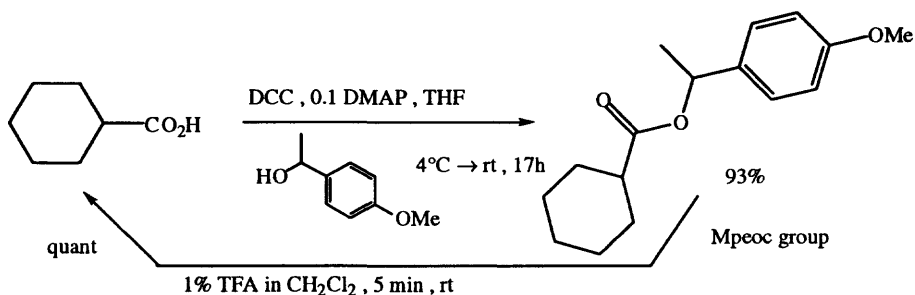


SECTION 30A: PROTECTION OF CARBOXYLIC ACID DERIVATIVES

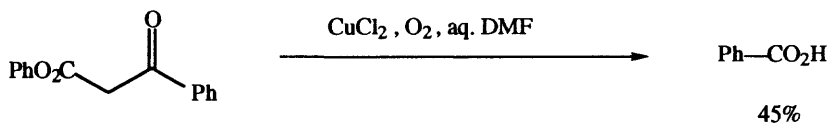




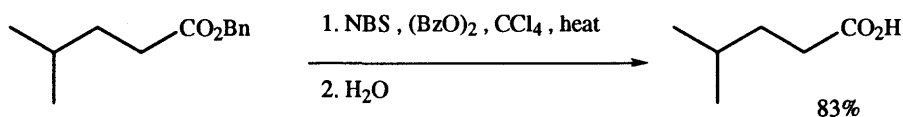
Cossy, L.; Albouy, A.; Scheloske, M.; Gomez Pardo, D. *Tetrahedron Lett.*, **1994**, 35, 1539



Bernatowicz, M.S.; Chao, H.-G.; Matsueda, G.R. *Tetrahedron Lett.*, **1994**, 35, 1651



Ram, R.N.; Singh, L. *Tetrahedron Lett.*, **1995**, 36, 5401



Anson, M.S.; Montana, J.G. *Synlett*, **1994**, 219

REVIEW:

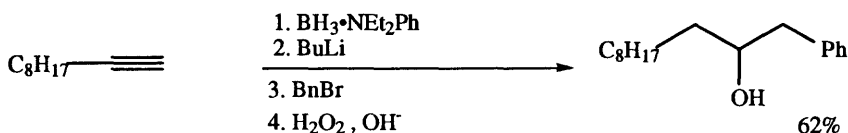
"Recent Developments in Chemical Deprotection of Ester Functional Groups," Salomon, C.J.; Mata, E.G.; Mascaretti, O.A. *Tetrahedron*, **1993**, 49, 3691

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

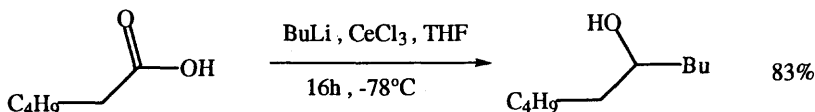
PREPARATION OF ALCOHOLS

SECTION 31: ALCOHOLS AND THIOLS FROM ALKYNES

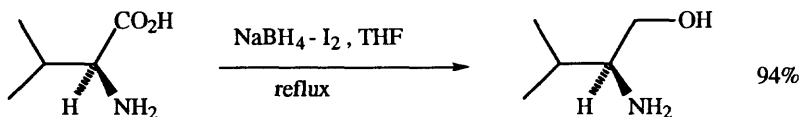


Reddy, Ch.K.; Periasamy, M. *Tetrahedron*, 1993, 49, 8897

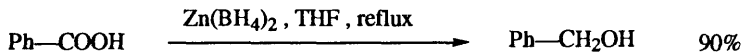
SECTION 32: ALCOHOLS AND THIOLS FROM ACID DERIVATIVES



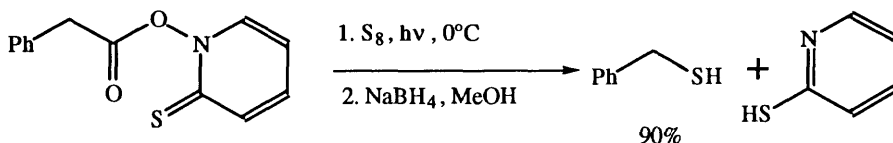
Ahn, Y.; Cohen, T. *Tetrahedron Lett.*, **1994**, 35, 203



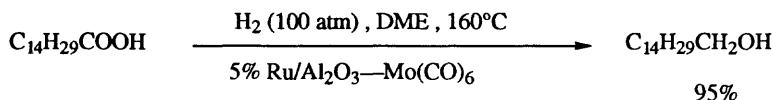
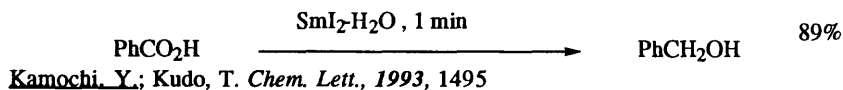
McKennon, M.J.; Meyers, A.I.; Drauz, K.; Schwarm, M. *J. Org. Chem.*, **1993**, *58*, 3568



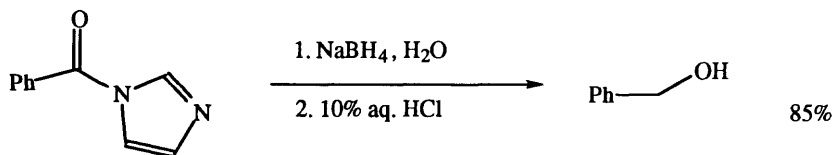
Narasimhan, S.; Madhavan, S.; Prasad, K.G. *J. Org. Chem.*, 1995, 60, 5314



Barton, D.H.R.; Castagnino, E.; Jaszberenyi, J.Cs. *Tetrahedron Lett.*, **1994**, 35, 6057

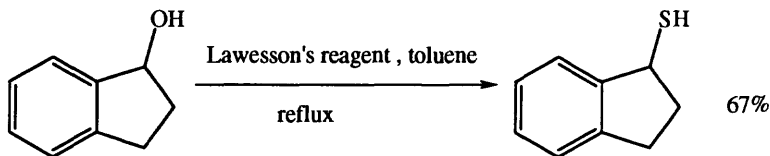


He, D.-H.; Wakasa, N.; Fuchikami, T. *Tetrahedron Lett.*, **1995**, 36, 1059

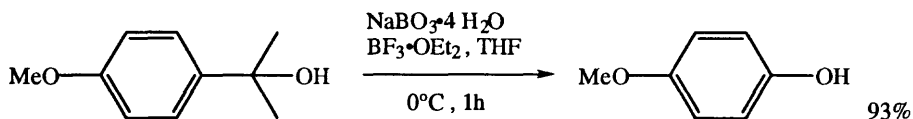


Sharma, R.; Voymov, G.H.; Ovaska, T.V.; Marquez, V.E. *Synlett*, **1995**, 839

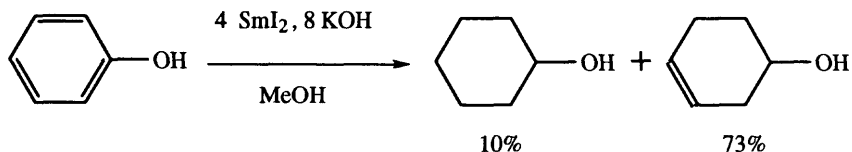
SECTION 33: ALCOHOLS AND THIOLS FROM ALCOHOLS AND THIOLS



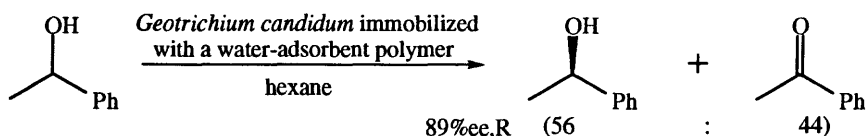
Nishio, T. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1113



Kabalka, G.W.; Reddy, N.K.; Narayana, C. *Tetrahedron Lett.*, **1993**, 34, 7667



Kamochi, Y.; Kudo, T. *Tetrahedron Lett.*, **1994**, 35, 4169



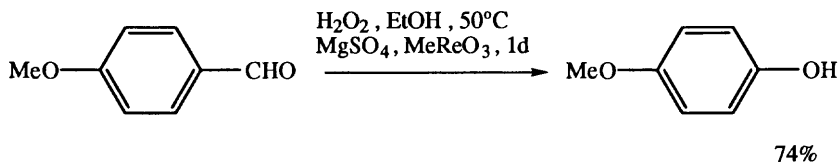
Nakamura, K.; Inoue, Y.; Ohno, A. *Tetrahedron Lett.*, **1994**, 35, 4375

SECTION 34: ALCOHOLS AND THIOLS FROM ALDEHYDES

The following reaction types are included in this section:

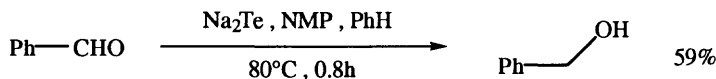
- A. Reductions of Aldehydes to Alcohols
B. Alkylation of Aldehydes, forming Alcohols.

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

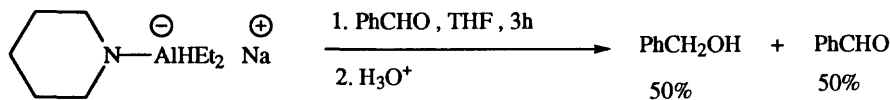


Yamazaki, S. *Chem. Lett.*, **1995**, 127

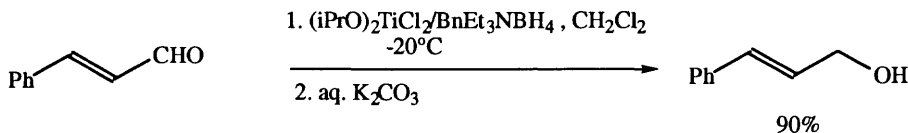
SECTION 34A: REDUCTIONS OF ALDEHYDES TO ALCOHOLS



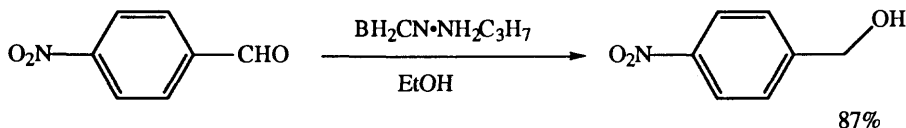
Suzuki, H.; Nakamura, T. *J. Org. Chem.*, **1993**, 58, 241



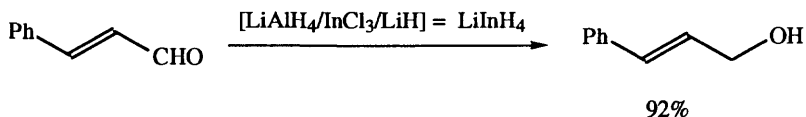
Yoon, N.M.; Ahn, J.H.; An, D.K.; Shon, Y.S. *J. Org. Chem.*, **1993**, 58, 1941



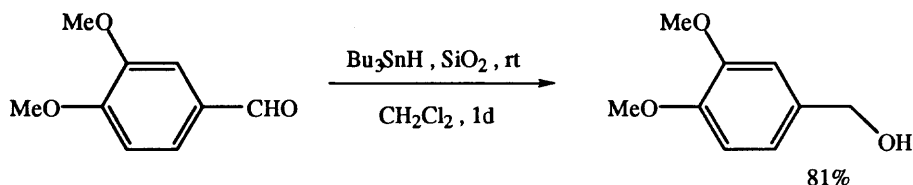
Ravikumar, K.S.; Baskaran, S.; Chandrasekaran, S. *J. Org. Chem.*, **1993**, 58, 5981



Das, M.K.; Maiti, P.K.; Bhaumik, A. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 810



Yamada, M.; Tanaka, K.; Araki, S.; Butsugan, Y. *Tetrahedron Lett.*, **1995**, 36, 3169



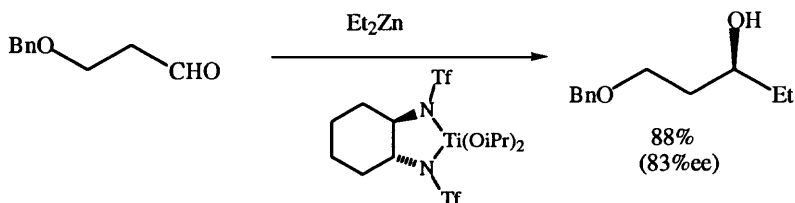
Figadère, B.; Chaboche, C.; Franck, X.; Peyrat, J.-F. *J. Org. Chem.*, **1995**, *60*, 7138

REVIEW:

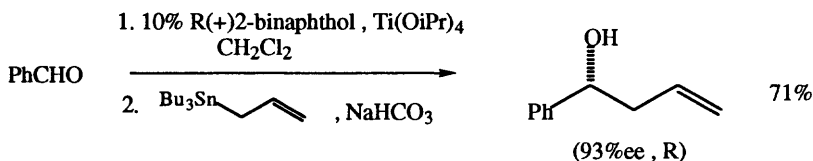
" β -Hydroxy Diisopinocampheylborane As A Mild, Chemoselective Reducing Agent For Aldehydes," Cha, J.S.; Kim, E.J.; Kwon, O.O.; Kwon, S.Y.; Seo, W.W.; Chang, S.W. *Org. Prep. Proceed. Int.*, **1995**, *27*, 541

SECTION 34B: ALKYLATION OF ALDEHYDES, FORMING ALCOHOLS

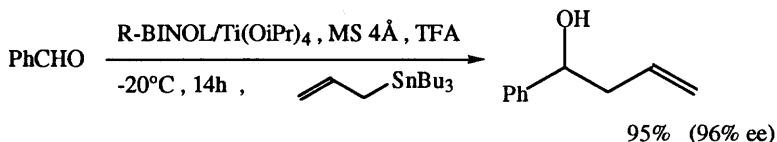
ASYMMETRIC ALKYLATIONS



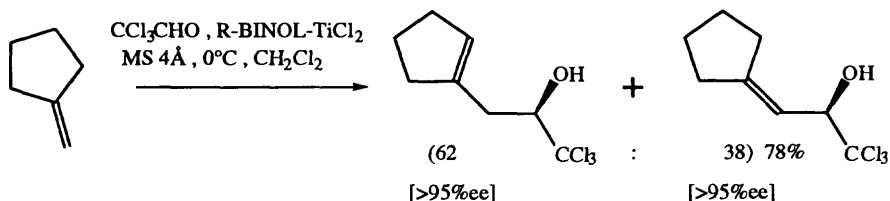
Knochel, P.; Brieden, W.; Rozema, M.; Eisenberg, C. *Tetrahedron Lett.*, **1993**, *34*, 5881



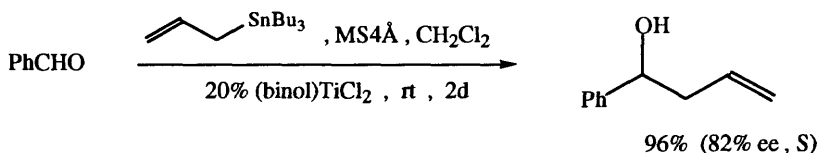
Keck, G.E.; Geraci, L.S. *Tetrahedron Lett.*, **1993**, *34*, 7827



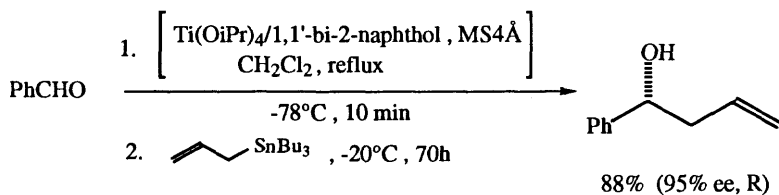
Keck, G.E.; Krishnamurthy, D.; Grier, M.C. *J. Org. Chem.*, **1993**, *58*, 6543



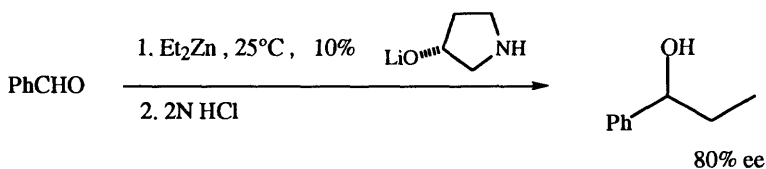
Mikami, K.; Yajima, T.; Terada, M.; Uchimaru, T. *Tetrahedron Lett.*, **1993**, 34, 7591



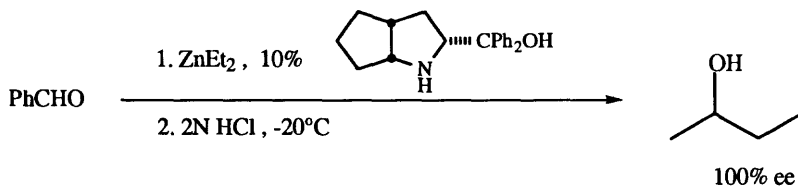
Costa, A.L.; Piazza, M.G.; Tagliavini, E.; Trombini, C.; Umani-Ronchi, A. *J. Am. Chem. Soc.*, **1993**, 115, 7001



Keck, G.E.; Tarbet, K.H.; Geraci, L.S. *J. Am. Chem. Soc.*, **1993**, 115, 8467



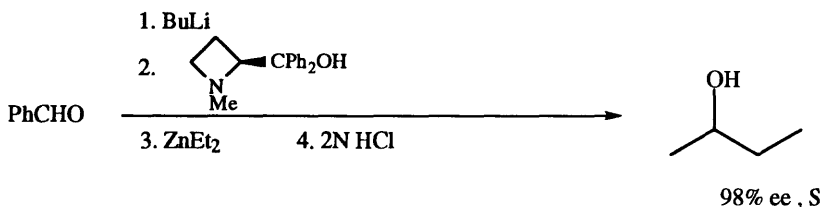
Mehler, T.; Martens, J.; Wallbaum, S. *Synth. Commun.*, **1993**, 23, 2691



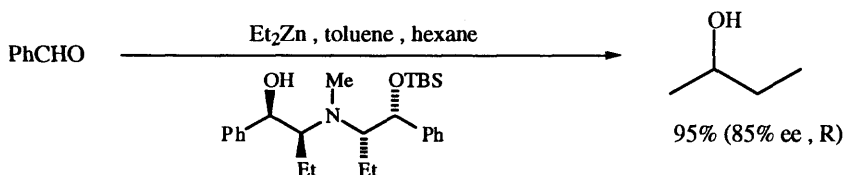
Wallbaum, S.; Martens, J. *Tetrahedron Asymmetry*, **1993**, 4, 637

With a chiral oxazoline additive, 60% ee

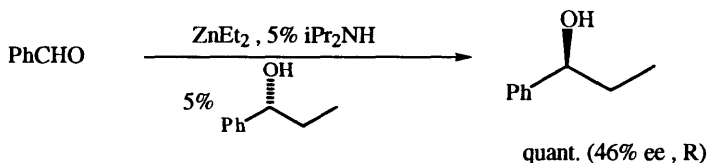
Allen, J.V.; Frost, C.G.; Williams, J.M.J. *Tetrahedron Asymmetry*, **1993**, 4, 649



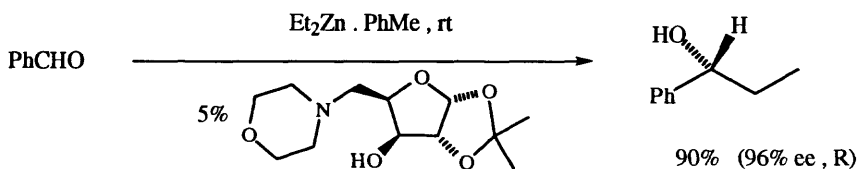
Behnen, W.; Mehler, T.; Martens, T. *Tetrahedron Asymmetry*, **1993**, *4*, 1413



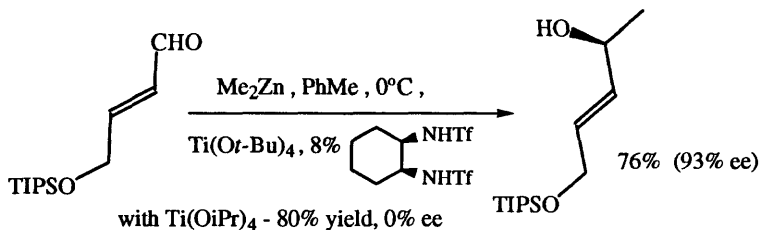
de Vries, E.F.J.; Brussee, J.; Kruse, C.G.; van der Gen, A. *Tetrahedron Asymmetry*, **1993**, *4*, 1987



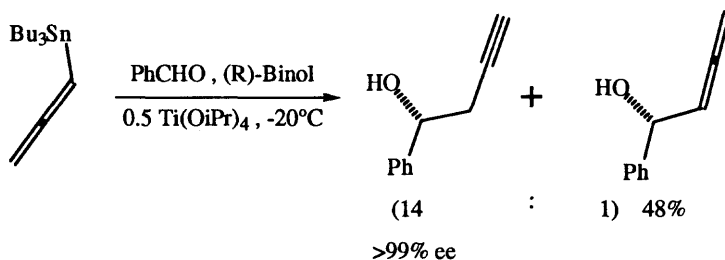
Sheng Jian, L.; Yaozhong, J.; Aiqiao, M.; Guishu, Y. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 885



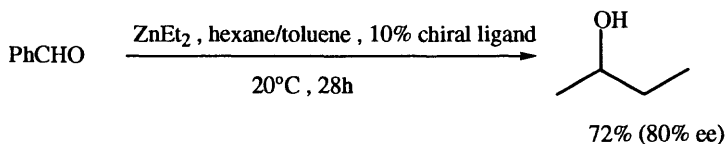
Cho, B.T.; Kim, N. *Tetrahedron Lett.*, **1994**, *35*, 4115



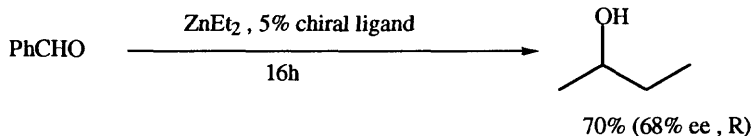
Nowotng, S.; Vettel, S.; Knochel, P. *Tetrahedron Lett.*, **1994**, *35*, 4539



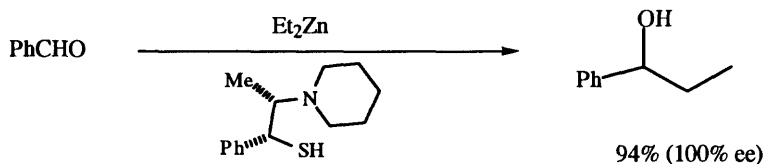
Keck, G.E.; Krishnamurthy, D.; Chen, X. *Tetrahedron Lett.*, **1994**, 35, 8323



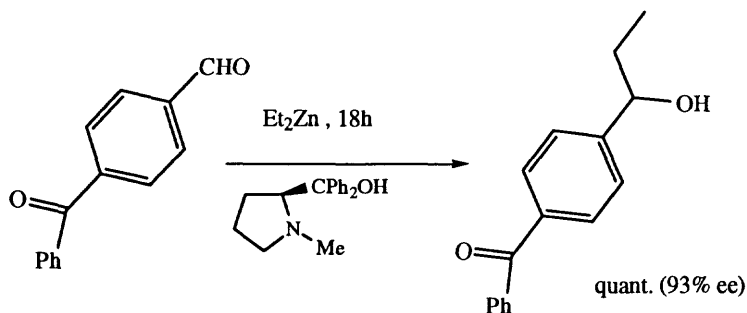
Andrés, J.M.; Martínez, M.A.; Pedrosa, R.; Pérez-Encabo, A. *Tetrahedron Asymmetry*, **1994**, 5, 67



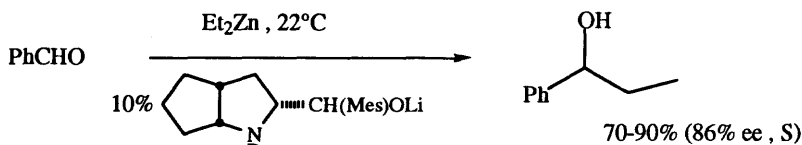
Ishizaki, M.; Fujita, K.; Shimamoto, M.; Hoshino, O. *Tetrahedron Asymmetry*, **1994**, 5, 411



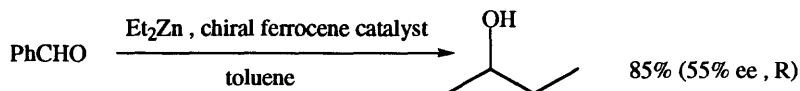
Kang, J.; Lee, J.W.; Kim, J.I. *J. Chem. Soc. Chem. Commun.*, **1994**, 2009



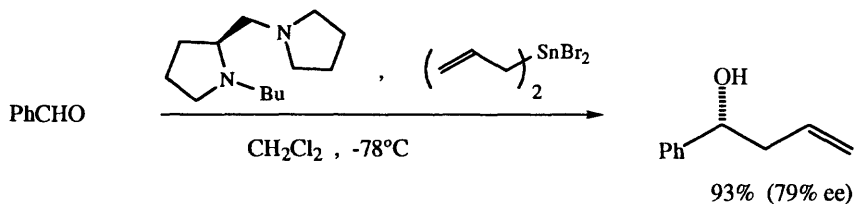
Watanabe, M.; Soai, K. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 3125



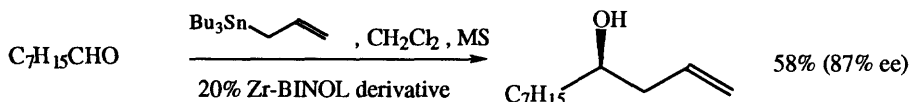
Stingl, K.; Martens, J. *Liebigs Ann. Chem.*, **1994**, 491



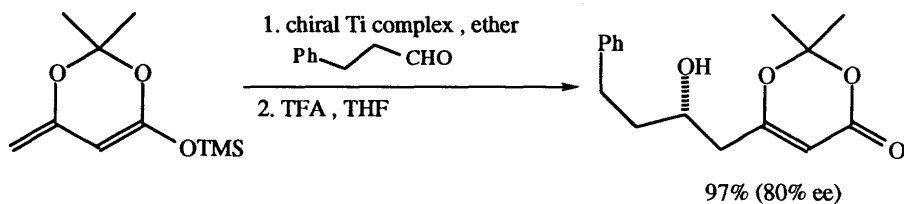
Fukuzawa, S.; Tsudzuki, K. *Tetrahedron Asymmetry*, **1995**, 6, 1039



Kobayashi, S.; Nishio, K. *Tetrahedron Lett.*, **1995**, 36, 6729

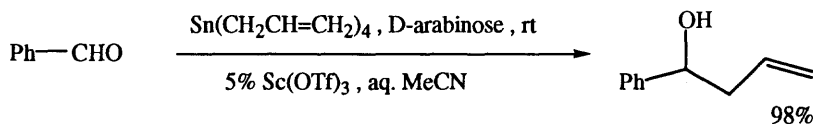


Bedeschi, P.; Casolari, S.; Costa, A.L.; Tagliavini, E.; Umani-Ronchi, A. *Tetrahedron Lett.*, **1995**, 36, 7897

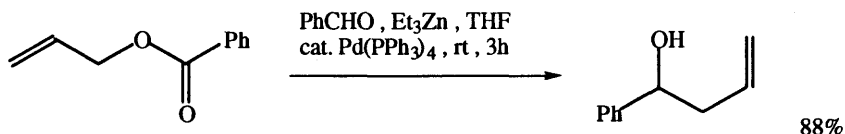


Singer, R.A.; Carreira, E.M. *J. Am. Chem. Soc.*, **1995**, 117, 12360

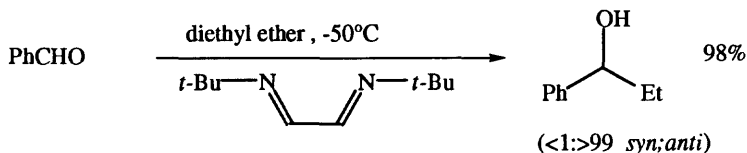
NON-ASYMMETRIC ALKYLATIONS



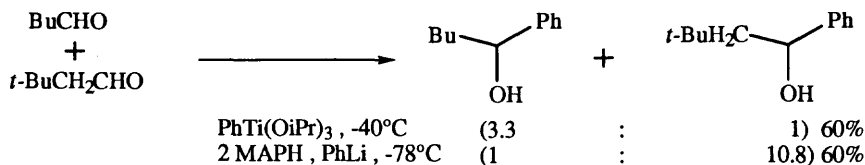
Hachiya, I.; Kobayashi, S. *J. Org. Chem.*, **1993**, 58, 6958



Yasui, K.; Goto, Y.; Yajima, T.; Taniseki, Y.; Fugami, K.; Tanaka, A.; Tamaru, Y. *Tetrahedron Lett.*, **1993**, *34*, 7619

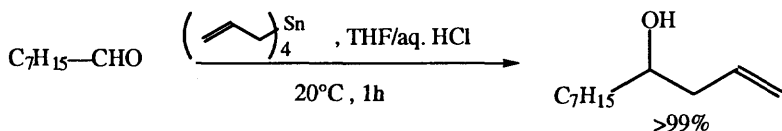


Wissing, E.; Havennith, R.W.A.; Boersma, J.; Smeets, W.J.J.; Spek, A.L.; van Koten, G. J. *Org. Chem.*, **1993**, *58*, 4228

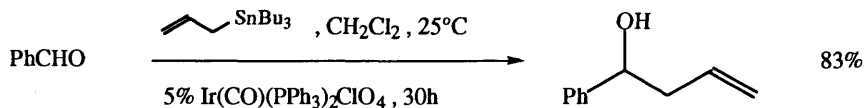


MAPH = ArOAr, Ar = 2,5-diphenylphenyl

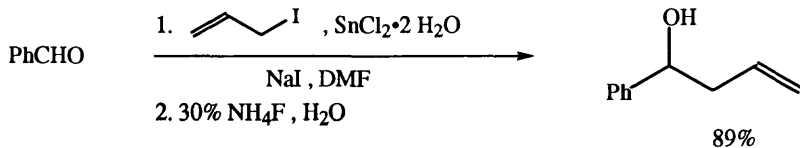
Maruoka, K.; Saito, S.; Concepcion, A.B.; Yamamoto, H. *J. Am. Chem. Soc.*, **1993**, *115*, 1183



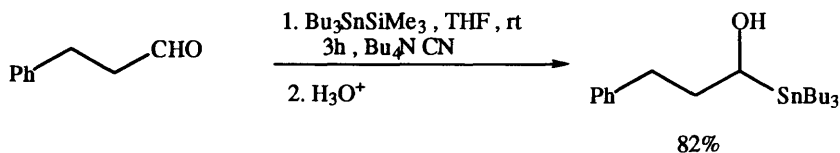
Yanagisawa, A.; Inoue, H.; Morodome, M.; Yamamoto, H. *J. Am. Chem. Soc.*, **1993**, *115*, 10356



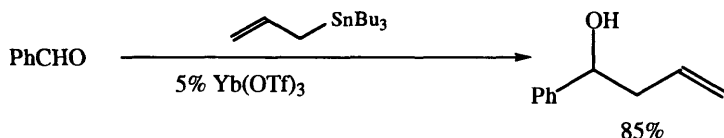
Nuss, J.M.; Rennels, R.A. *Chem. Lett.*, **1993**, 197



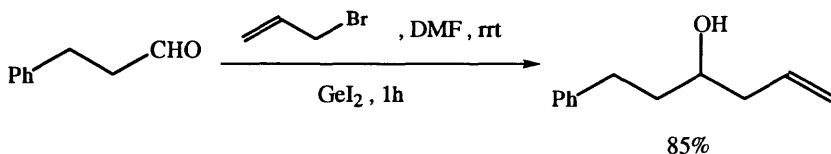
Imai, T.; Nishida, S. *Synthesis*, **1993**, 395



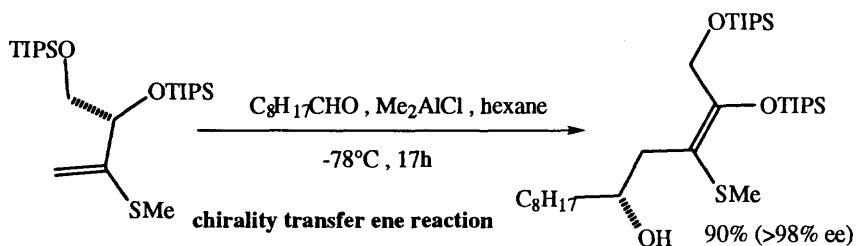
Bhatt, R.K.; Ye, J.; Falck, J.R. *Tetrahedron Lett.*, **1994**, 35, 4081



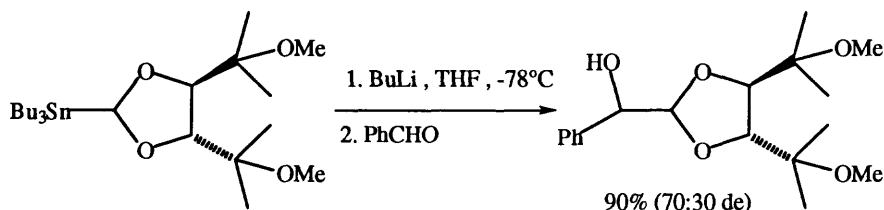
Aspinall, H.C.; Browning, A.F.; Greeves, N.; Ravenscroft, P. *Tetrahedron Lett.*, **1994**, 35, 4639



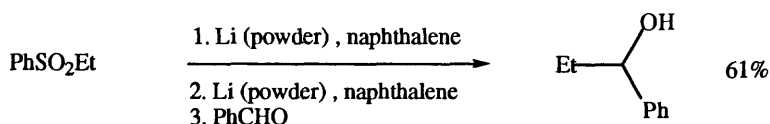
Hashimoto, Y.; Kagoshima, H.; Saigo, K. *Tetrahedron Lett.*, **1994**, 35, 4805



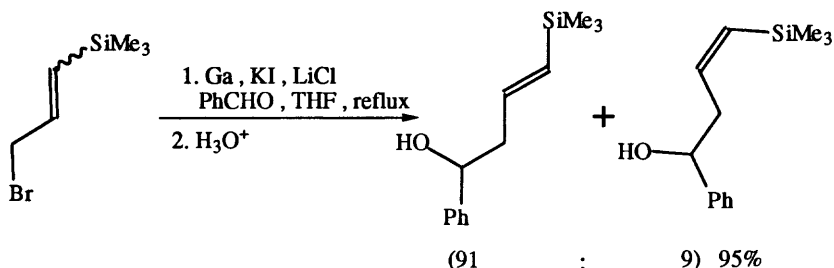
Masaya, K.; Tanino, K.; Kuwajima, I. *Tetrahedron Lett.*, **1994**, 35, 7965



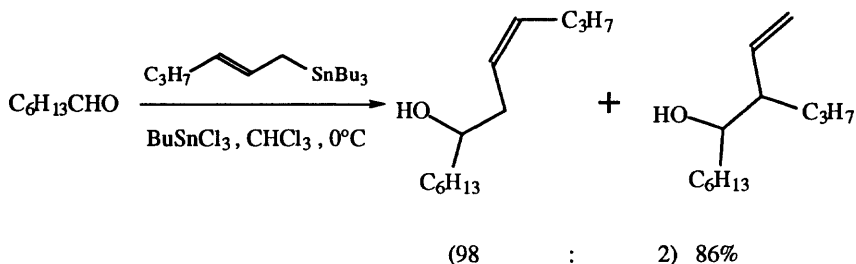
Colombo, L.; DiGiacomo, M.; Brusotti, G.; Delouge, G. *Tetrahedron Lett.*, **1994**, 35, 2063



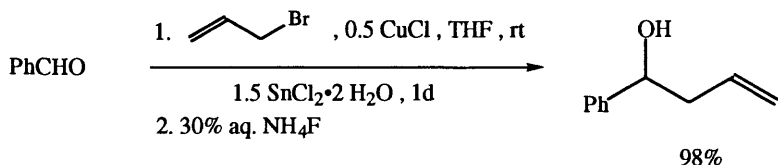
Guijarro, D.; Yus, M. *Tetrahedron Lett.*, **1994**, 35, 2965



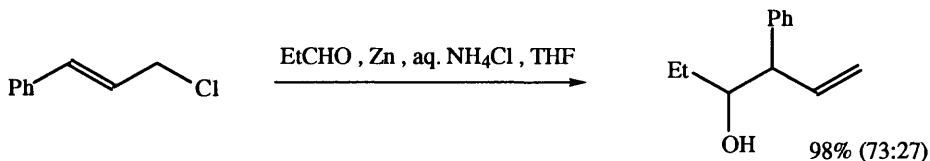
Han, Y.; Huang, Y.-Z. *Tetrahedron Lett.*, **1994**, 35, 9433



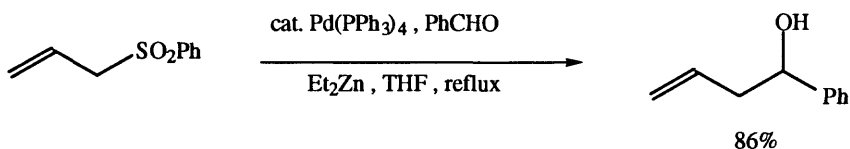
Miyaki, H.; Yamamura, K. *Chem. Lett.*, **1994**, 897



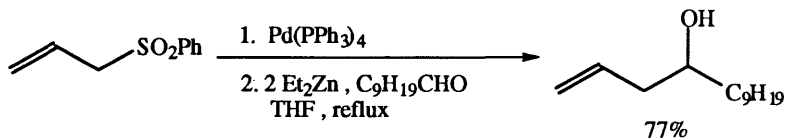
Imai, T.X.; Nishida, S. *J. Chem. Soc. Chem. Commun.*, **1994**, 273



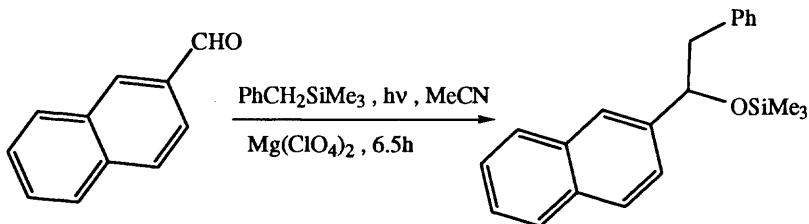
Sjöholm, R.; Rairama, R.; Ahonen, M. *J. Chem. Soc. Chem. Commun.*, **1994**, 1217



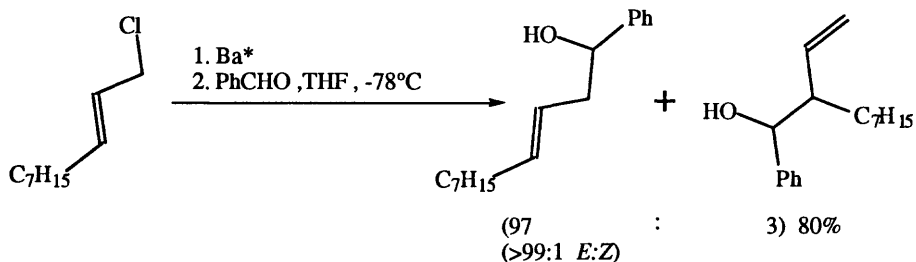
Clayden, J.; Julia, M. *J. Chem. Soc. Chem. Commun.*, **1994**, 1905



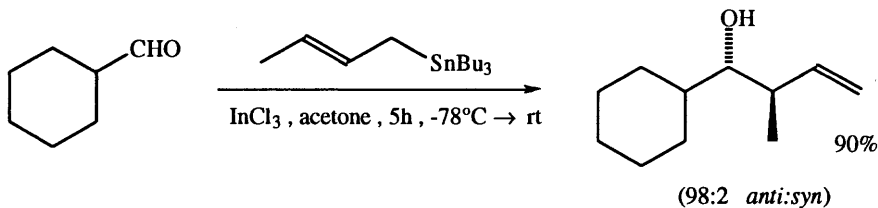
Clayden, I.; Julia, M. *J. Chem. Soc. Chem. Commun.*, **1994**, 2261



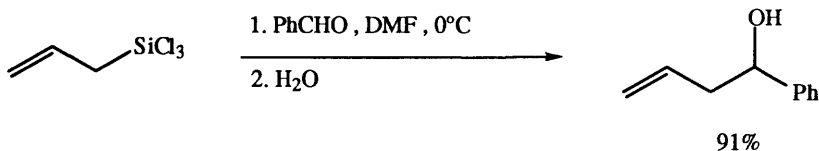
Fukuzumi, S.; Okamoto, T.; Otera, J. *J. Am. Chem. Soc.*, **1994**, 116, 5503



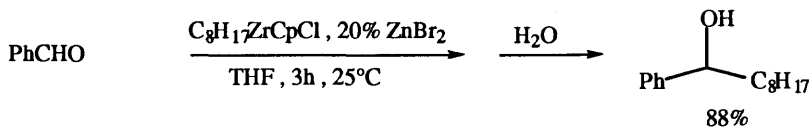
Yanagisawa, A.; Habaue, S.; Yasue, K.; Yamamoto, H. *J. Am. Chem. Soc.*, **1994**, 116, 6130



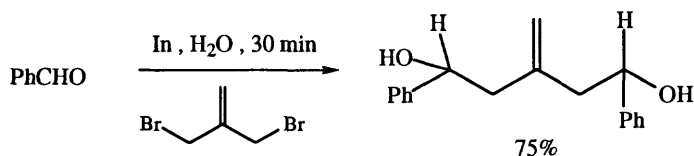
Marshall, J.A.; Hinkle, K.W. *J. Org. Chem.*, **1995**, 60, 1920



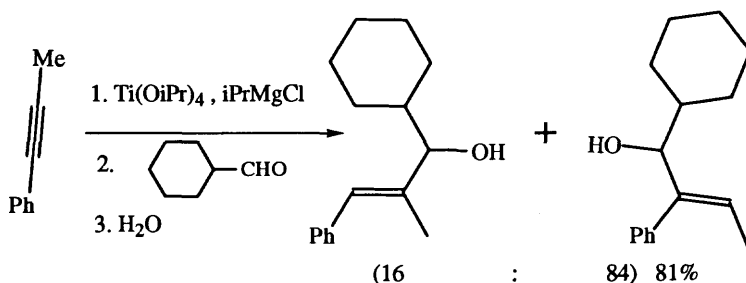
Kobayashi, S.; Nishio, K. *J. Org. Chem.*, **1995**, 60, 6620



Zheng, B.; Srebnik, M. *J. Org. Chem.*, **1995**, *60*, 3278

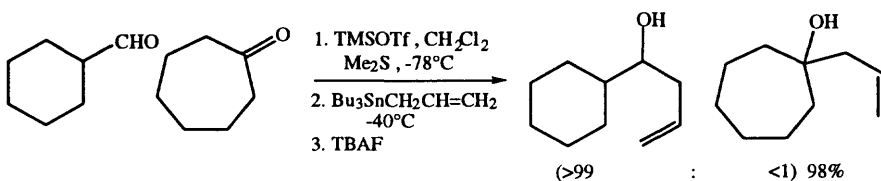


Li, C.-J. *Tetrahedron Lett.*, **1995**, *36*, 517

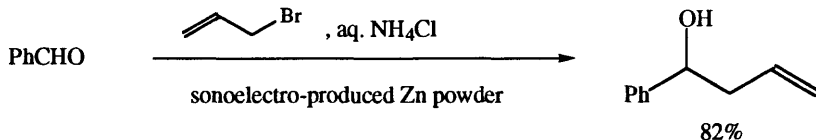


Harada, K.; Urabe, H.; Sato, F. *Tetrahedron Lett.*, **1995**, *36*, 3203

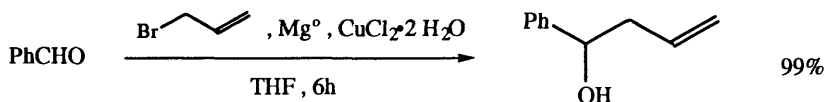
Nakagawa, T.; Kasatkin, A.; Sato, F. *Tetrahedron Lett.*, **1995**, *36*, 3207



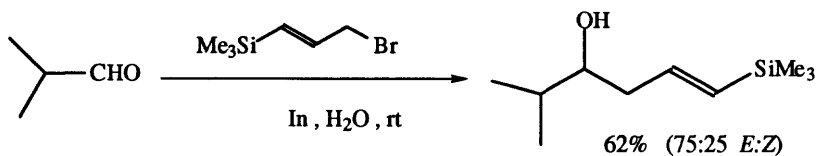
Kim, S.; Kim, S.H. *Tetrahedron Lett.*, **1995**, *36*, 3723



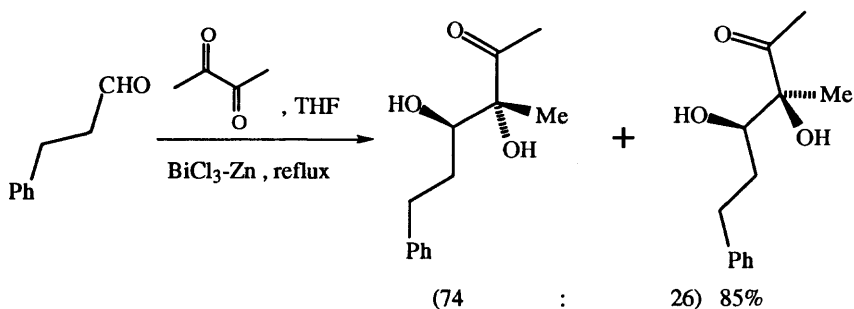
Durant, A.; Delplancke, J.-L.; Winand, R.; Reisse, J. *Tetrahedron Lett.*, **1995**, *36*, 4257



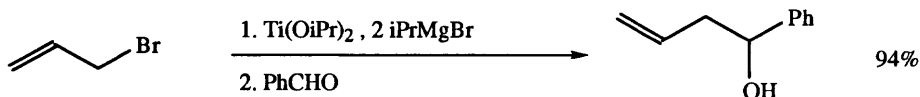
Sarangi, C.; Nayak, A.; Nanda, B.; Das, N.B.; Sharma, R.P. *Tetrahedron Lett.*, **1995**, *36*, 7119



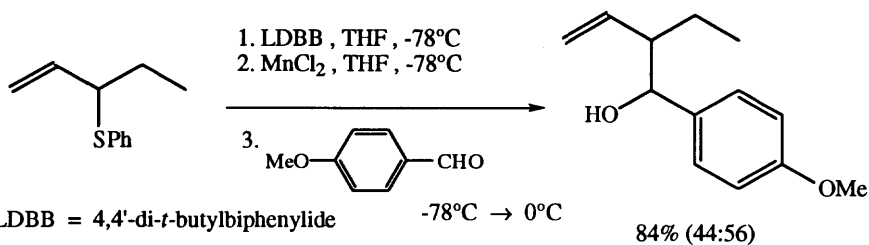
Isaac, M.B.; Chan, T.-H. *Tetrahedron Lett.*, **1995**, 36, 8957



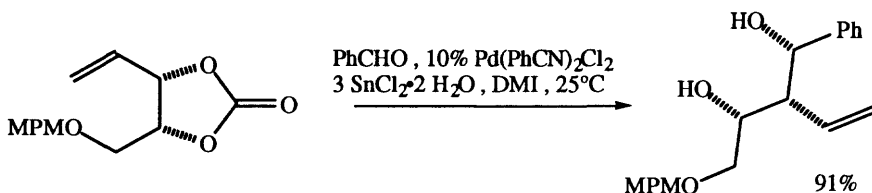
Miyoshi, N.; Kukuma, T.; Wada, M. *Chem. Lett.*, **1995**, 999



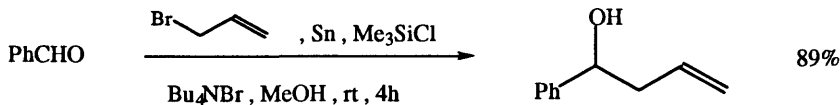
Kasatkin, A.; Nakagawa, T.; Okamoto, S.; Sato, F. *J. Am. Chem. Soc.*, **1995**, 117, 3881



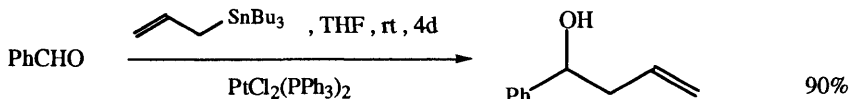
Ahn, Y.; Doubleday, W.W.; Cohen, T. *Synth. Commun.*, **1995**, 25, 33



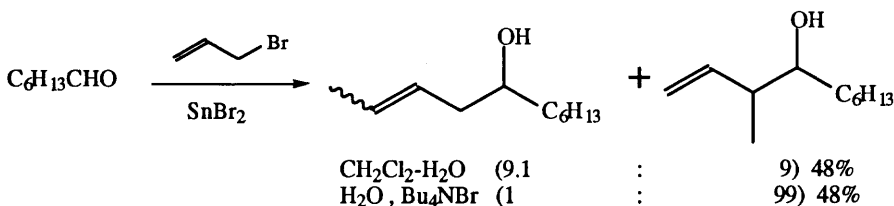
Kang, S.-K.; Park, D.-C.; Park, C.-H.; Jang, S.-B. *Synth. Commun.*, **1995**, 25, 1359



Zhou, J.-Y.; Yao, X.-B.; Chen, Z.-G.; Wu, S.-H., *Synth. Commun.*, **1995**, 25, 3081



Nakamura, H.; Asao, N.; Yamamoto, Y., *J. Chem. Soc. Chem. Commun.*, **1995**, 1273



Masuyama, Y.; Kishida, M.; Kurusu, Y. *J. Chem. Soc. Chem. Commun.*, **1995**, 1405

REVIEW:

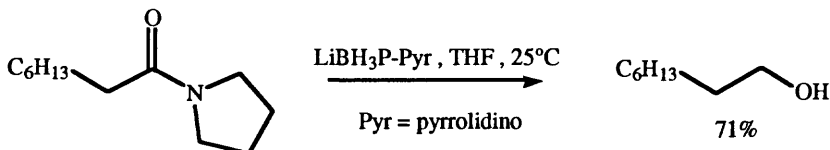
"Synthetic Organoindium Chemistry: What Makes Indium So Appealing," Cintas, P., *Synlett*, **1995**, 1087

SECTION 35: ALCOHOLS AND THIOLS FROM ALKYL, METHYLENES AND ARYL

No examples of the reaction $\text{RR}^1 \rightarrow \text{ROH}$ (R^1 = alkyl, aryl, etc.) occur in the literature. For reactions of the type $\text{RH} \rightarrow \text{ROH}$ (R = alkyl or aryl) see Section 41 (Alcohols and Phenols from Hydrides).

NO ADDITIONAL EXAMPLES

SECTION 36: ALCOHOLS AND THIOLS FROM AMIDES

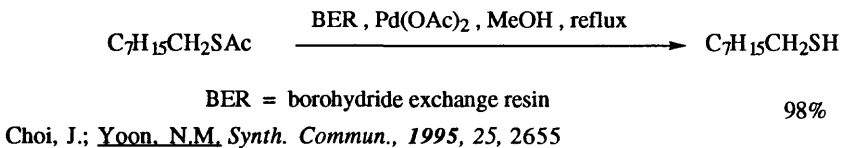
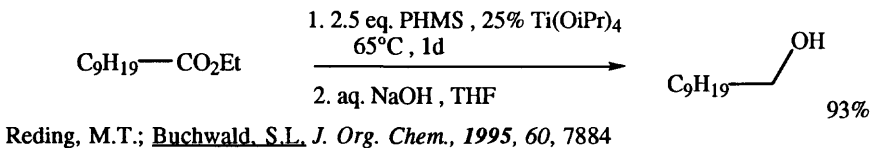
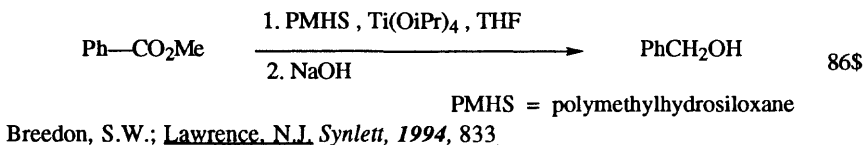
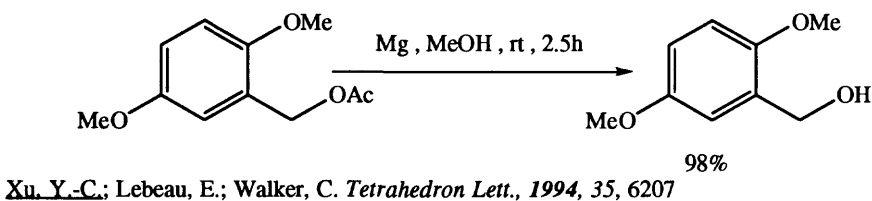
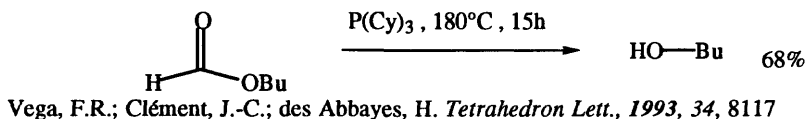


Fisher, G.B.; Fuller, J.C.; Harrison, J.; Goralski, C.T.; Singaram, B., *Tetrahedron Lett.*, **1993**, 34, 1091

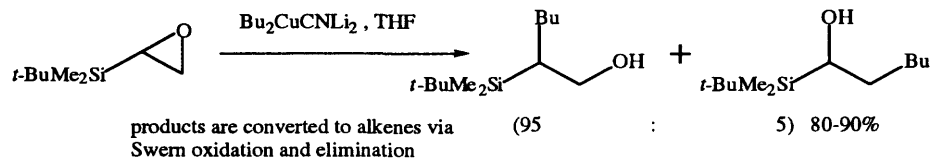
SECTION 37: ALCOHOLS AND THIOLS FROM AMINES

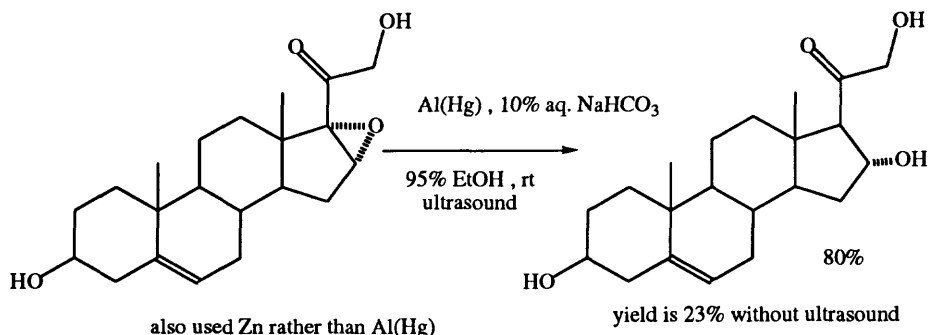
NO ADDITIONAL EXAMPLES

SECTION 38: ALCOHOLS AND THIOLS FROM ESTERS



SECTION 39: ALCOHOLS AND THIOLS FROM ETHERS, EPOXIDES AND THIOETHERS

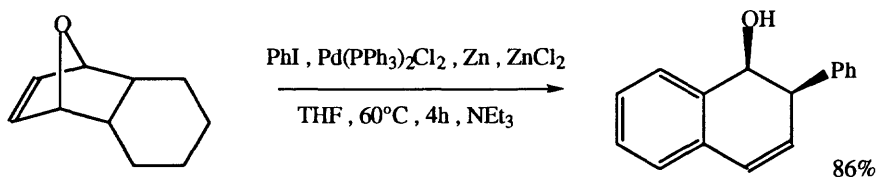




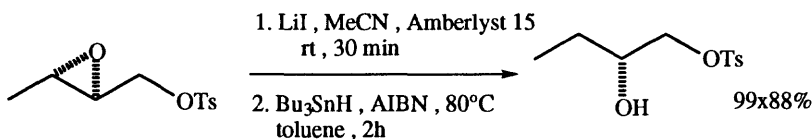
Mirando Moreno, M.J.S.; Sáe Melo, M.L.; Campos Neves, A.S.

Tetrahedron Lett., **1993**, *34*, 353

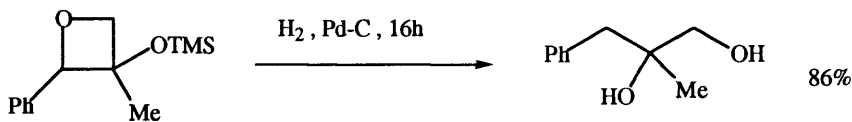
Salvador, J.A.R.; Sáe Melo, M.L.; Campos Neves, A.S. *Tetrahedron Lett.*, **1993**, *34*, 361



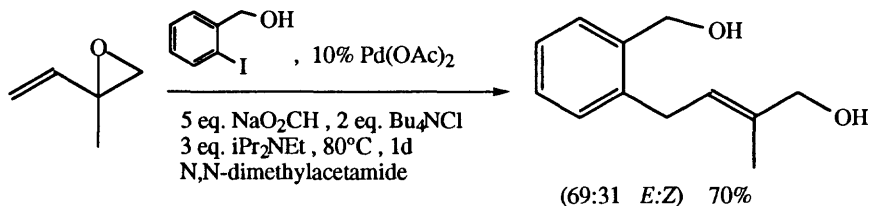
Duan, J.-P.; Cheng, C.-H. *Tetrahedron Lett.*, **1993**, *34*, 4019



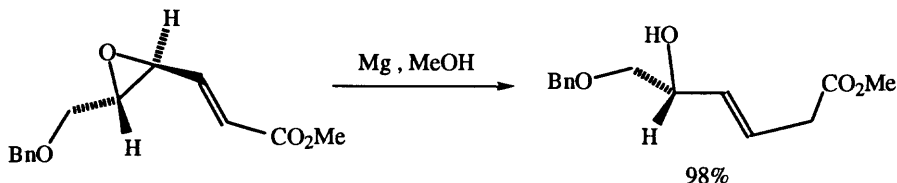
Federici, C.; Righi, G.; Rossi, L.; Bonini, C.; Chiummiento, L.; Funicello, M. *Tetrahedron Lett.*, **1994**, *35*, 797



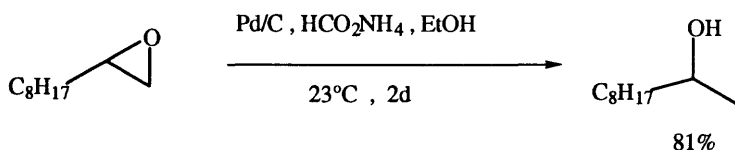
Bach, T. *Tetrahedron Lett.*, **1994**, *35*, 1855



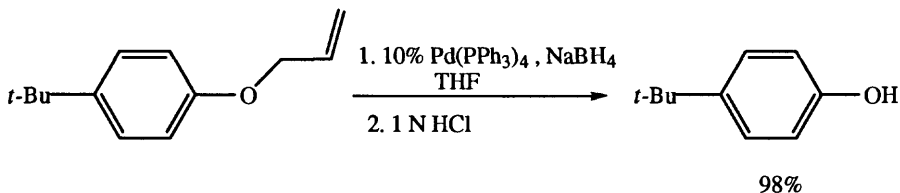
Larock, R.C.; Ding, S. *J. Org. Chem.*, **1993**, *58*, 804



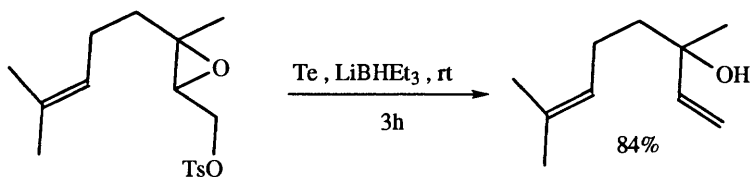
Pak, C.S.; Lee, E.; Lee, G.H. *J. Org. Chem.*, **1993**, 58, 1523



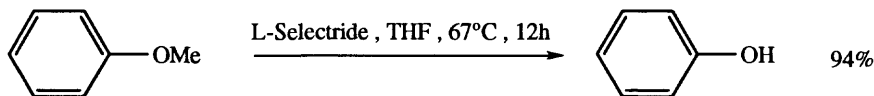
Dragovich, P.S.; Prins, T.J.; Zhou, R. *J. Org. Chem.*, **1995**, 60, 4922



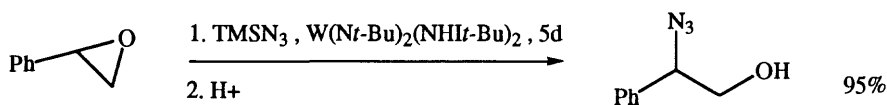
Beugelmans, R.; Bourdet, S.; Bigot, A.; Zhu, J. *Tetrahedron Lett.*, **1994**, 35, 4349



Kumar, A.; Dittmer, D.C. *Tetrahedron Lett.*, **1994**, 35, 5583

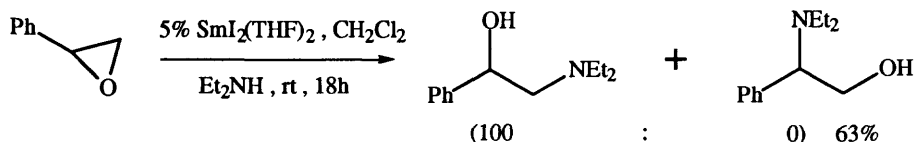


Majetich, G.; Zhang, Y.; Wheless, K. *Tetrahedron Lett.*, **1994**, 35, 8727

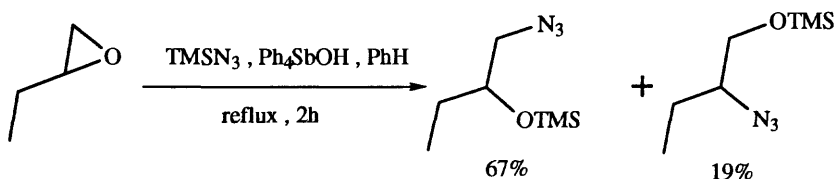


[with $\text{Cr(Nt-Bu)}_2\text{Cl}_2$; 12h — 95%]

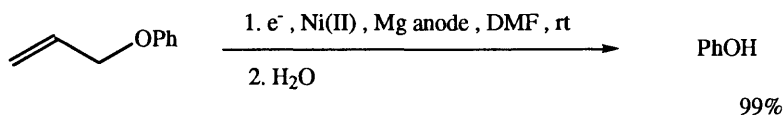
Leung, W.-H.; Chow, E.K.F.; Wu, M.-C.; Kum, P.W.Y.; Yeung, L.-L. *Tetrahedron Lett.*, **1995**, 36, 107



regioselectivity of addition reversed with Me_3SiN_3 to form azide-OTMS
 Van de Weghe, P.; Collin, J. *Tetrahedron Lett.*, **1995**, 36, 1649



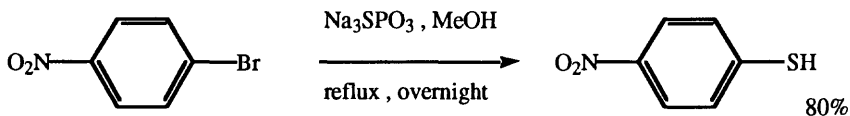
Fujiwara, M.; Tanaka, M.; Baba, A.; Ando, H.; Souma, Y. *Tetrahedron Lett.*, **1995**, 36, 4849



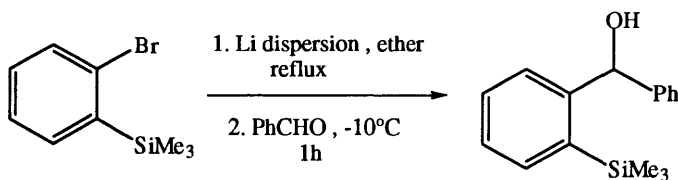
Olivero, S.; Duñach, E. *J. Chem. Soc. Chem. Commun.*, **1995**, 2497

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

SECTION 40: ALCOHOLS AND THIOLS FROM HALIDES AND SULFONATES

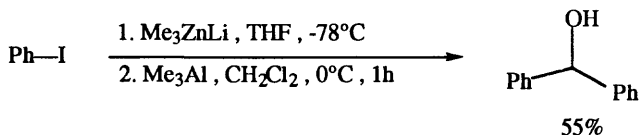


Bieniarz, C.; Cornwall, M.J. *Tetrahedron Lett.*, **1993**, 34, 939

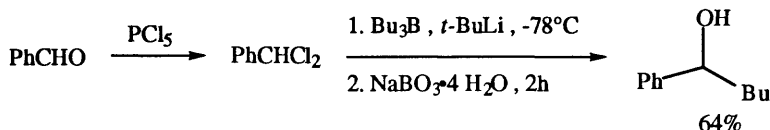


also works with ketones

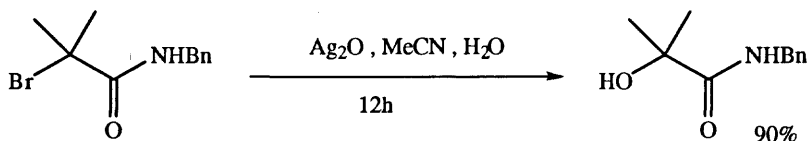
Takahashi, M.; Hatano, K.; Kimura, M.; Watanabe, T.; Oriyama, T.; Koga, G. *Tetrahedron Lett.*, **1994**, 35, 579



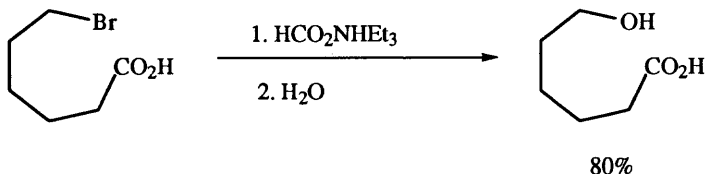
Kondo, Y.; Takazawa, N.; Yamazaki, C.; Sakamoto, T. *J. Org. Chem.*, **1994**, 59, 4717



Kabalka, G.W.; Lin, N.-S.; Yu, S. *Tetrahedron Lett.*, **1995**, 36, 8545

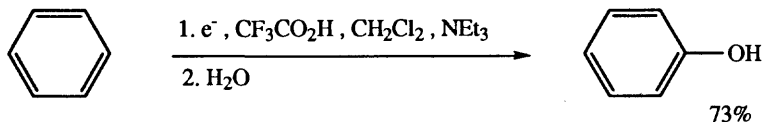


Yang, R.-Y.; Dai, L.-X. *Synth. Commun.*, **1994**, 24, 2229



Alexander, J.; Renyer, M.L.; Veerapanane, H. *Synth. Commun.*, **1995**, 25, 3875

SECTION 41: ALCOHOLS AND THIOLS FROM HYDRIDES



Fujimoto, K.; Maekawa, H.; Tokuda, Y.; Matsubara, Y.; Mizuno, T.; Nishiguchi, I. *Synlett*, **1995**, 661

SECTION 42: ALCOHOLS AND THIOLS FROM KETONES

The following reaction types are included in this section:

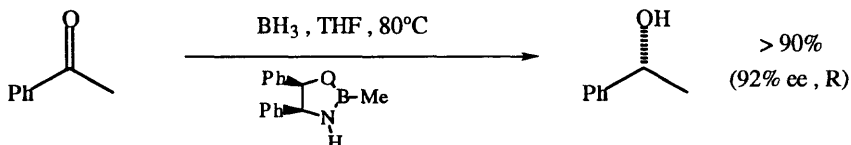
A. Reductions of Ketones to Alcohols

B. Alkylations of Ketones, forming Alcohols

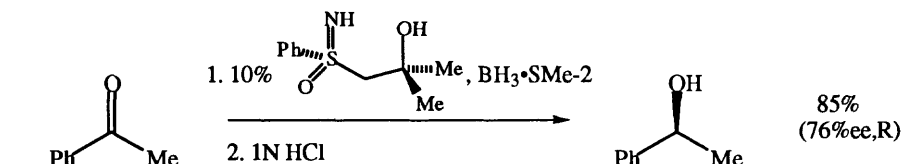
Coupling of ketones to give diols is found in Section 323 (Alcohol → Alcohol).

SECTION 42A: REDUCTION OF KETONES TO ALCOHOLS

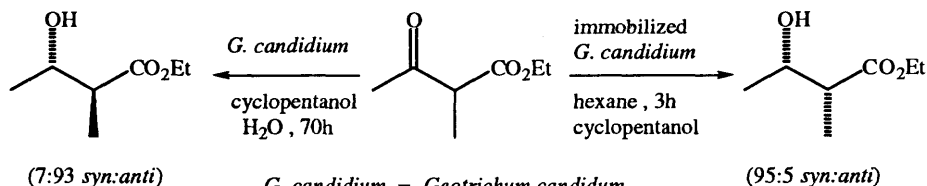
ASYMMETRIC REDUCTION



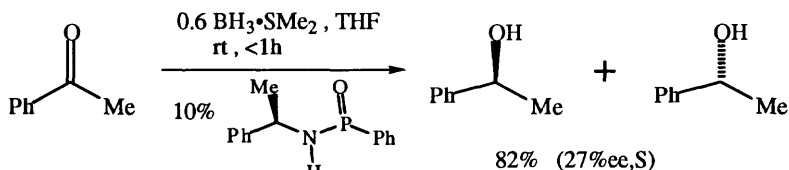
Quallich, G.L.; Woodall, T.M. *Tetrahedron Lett.*, 1993, 34, 4145



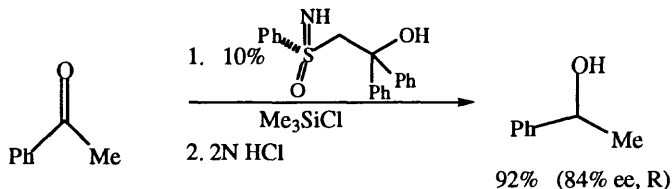
Bolm, C.; Elder, M. *Tetrahedron Lett.*, 1993, 34, 6041



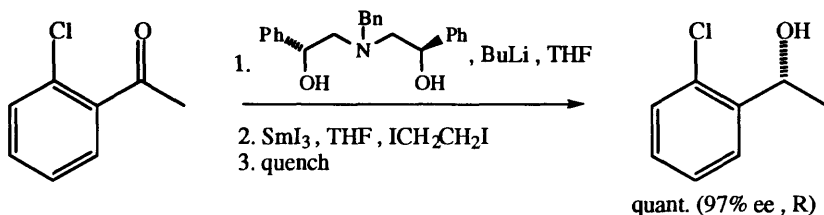
Nakamura, K.; Takano, S.; Ohno, A. *Tetrahedron Lett.*, 1993, 34, 6087



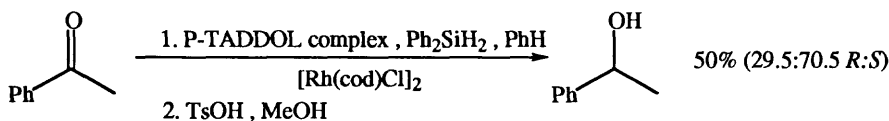
Burns, B.; Studley, J.R.; Wills, M. *Tetrahedron Lett.*, 1993, 34, 7105



Bolm, C.; Seger, A.; Felder, M. *Tetrahedron Lett.*, 1993, 34, 8079

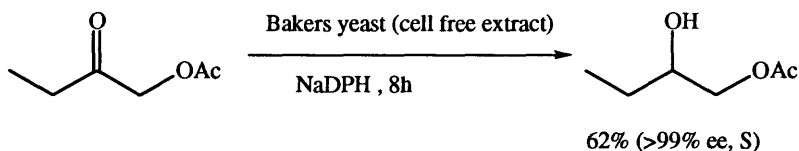


Evans, D.A.; Nelson, S.G.; Gagné, M.R.; Muci, A.R. *J. Am. Chem. Soc.*, **1993**, *115*, 9800

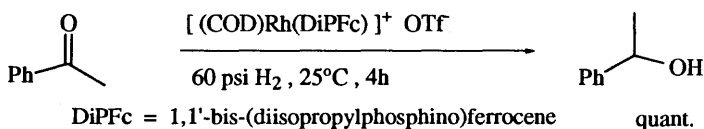


TADDOL = $\alpha,\alpha,\alpha',\alpha'$ -tetraaryl-4,5-dimethoxy-1,3-dioxolane

Jakaki, J.-i.; Schweizer, W.B.; Seebach, D. *Helv. Chim. Acta*, **1993**, *76*, 2654

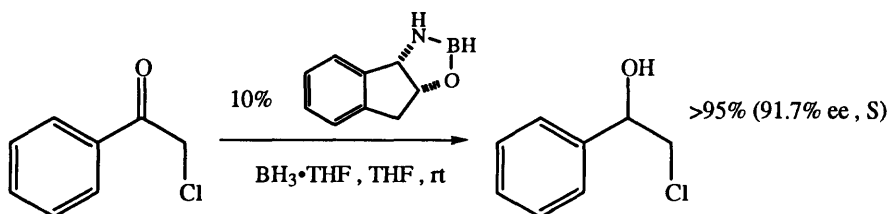


Ishihara, K.; Sakai, T.; Tsuboi, S.; Uetaka, M. *Tetrahedron Lett.*, **1994**, *35*, 4569

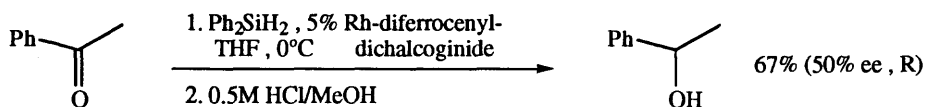


DiPFc = 1,1'-bis-(diisopropylphosphino)ferrocene

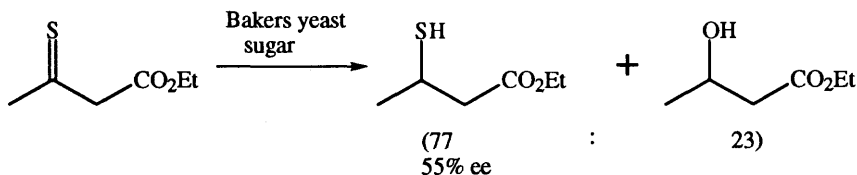
Burk, M.J.; Harper, T.G.P.; Lee, J.R.; Kalberg, C. *Tetrahedron Lett.*, **1994**, *35*, 4963



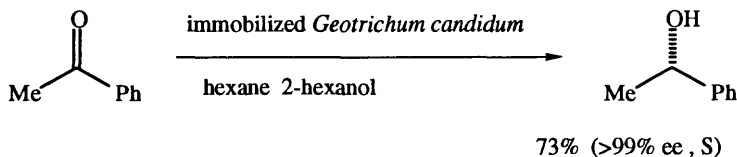
Hong, Y.; Gao, Y.; Nie, X.; Zepp, C.M. *Tetrahedron Lett.*, **1994**, *35*, 6631



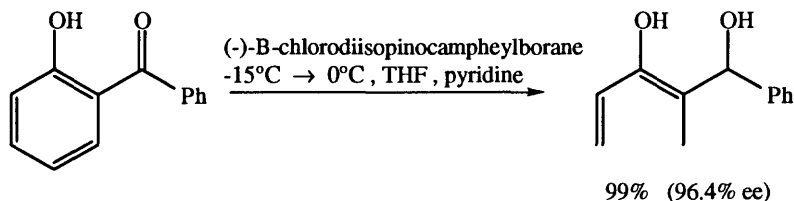
Nishibayashi, Y.; Singh, J.D.; Segawa, K.; Kukuzawa, S.i.; Uemura, S. *J. Chem. Soc. Chem. Commun.*, **1994**, 1375



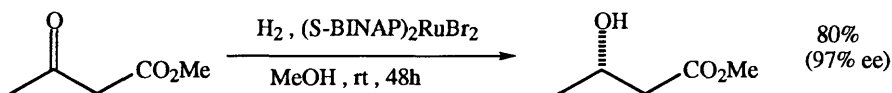
Nielsen, J.K.; Madsen, J. *Tetrahedron Asymmetry*, **1994**, 5, 403



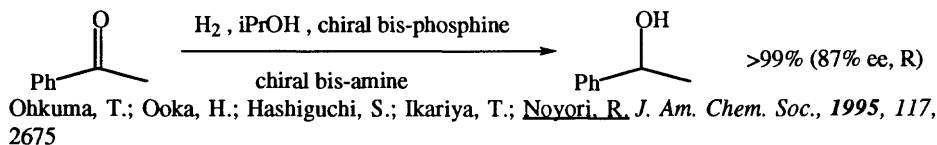
Nakamura, K.; Inoue, Y.; Ohno, A. *Tetrahedron Lett.*, **1995**, 36, 265



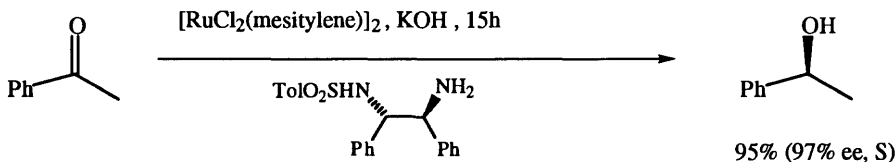
Shieh, W.-C.; Cantrell Jr., W.R.; Carlson, J.A. *Tetrahedron Lett.*, **1995**, 36, 3797



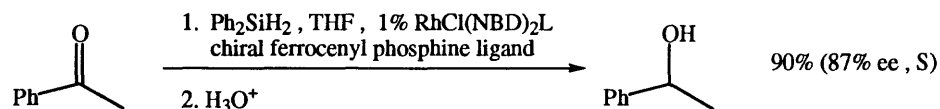
Genêt, J.P.; Ratovelomanana-Vidal, V.; Caño de Andrade, M.C.; Pfister, X.; Guerreiro, P.; Lenoir, J.Y. *Tetrahedron Lett.*, **1995**, 36, 4801



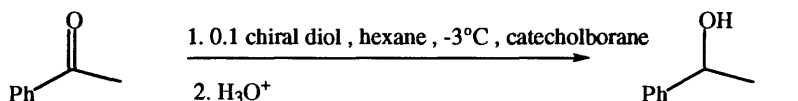
Ohkuma, T.; Ooka, H.; Hashiguchi, S.; Ikariya, T.; Noyori, R. *J. Am. Chem. Soc.*, **1995**, 117, 2675



Hashiguchi, S.; Fujii, A.; Takehara, J.; Ikariya, T.; Noyori, R. *J. Am. Chem. Soc.*, **1995**, 117, 7562

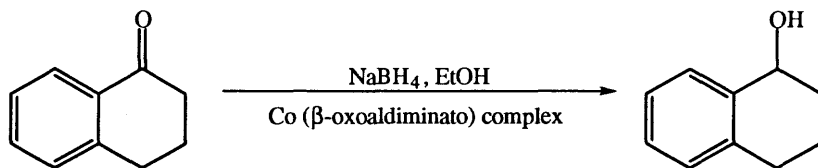


Hayashi, T.; Hayashi, C.; Uozumi, Y. *Tetrahedron Asymmetry*, 1995, 6, 2503



quant. (82% ee)

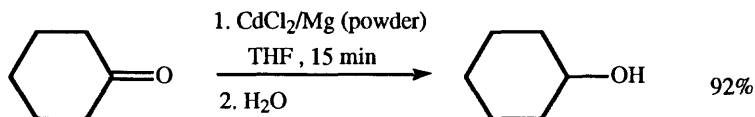
Giffels, G.; Dreisbach, C.; Kragl, U.; Weigerding, M.; Waldmann, H.; Wandrey, C. *Angew. Chem. Int. Ed. Engl.*, 1995, 34, 2005



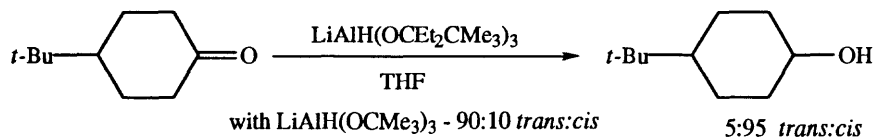
99% (73% ee, S)

Nagata, T.; Yorozu, K.; Yamada, T.; Mukaiyama, T. *Angew. Chem. Int. Ed. Engl.*, 1995, 34, 2145

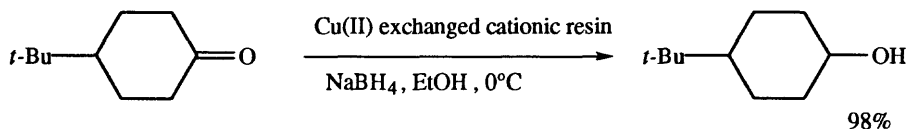
NON-ASYMMETRIC REDUCTION



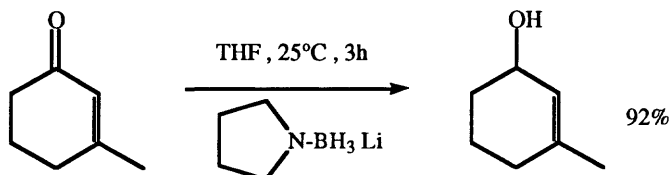
Bordoloi, M. *Tetrahedron Lett.*, 1993, 34, 1681



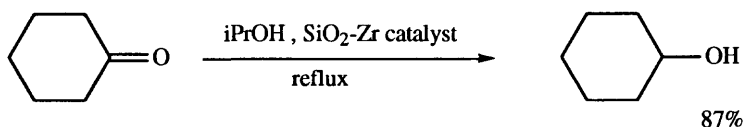
Boireau, G.; Deberly, A.; Toneva, R. *Synlett*, 1993, 585



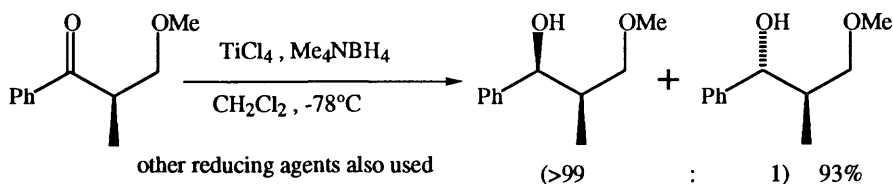
Sarkar, A.; Rao, B.R.; Ram, B. *Synth. Commun.*, 1993, 23, 291



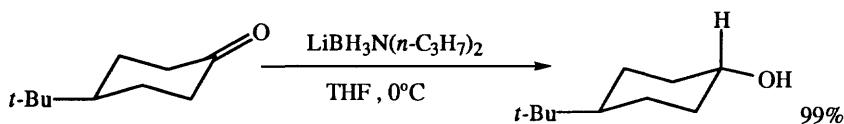
Fuller, J.C.; Staangeland, E.L.; Goralski, C.T.; Singaram, B. *Tetrahedron Lett.*, **1993**, 34, 257



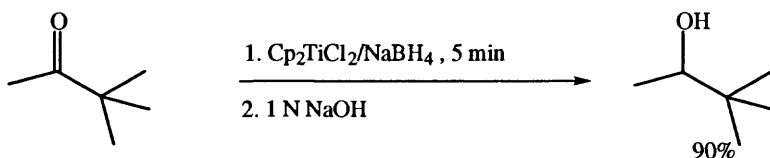
Inada, K.; Shibagaki, M.; Nakanishi, Y.; Matsushita, H. *Chem. Lett.*, **1993**, 1795



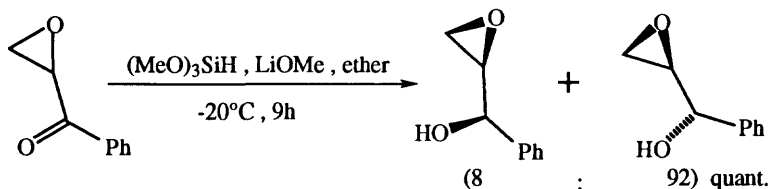
Sarko, C.R.; Guch, I.C.; DiMare, M. *J. Org. Chem.*, **1994**, 59, 705



Harrison, J.; Fuller, J.C.; Goralski, C.T.; Singaram, B. *Tetrahedron Lett.*, **1994**, 35, 5201

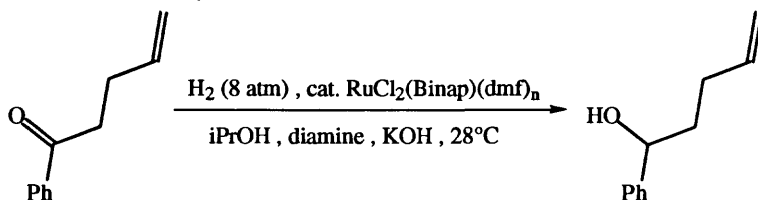


Barden, M.C.; Schwartz, J. *J. Org. Chem.*, **1995**, 60, 5963

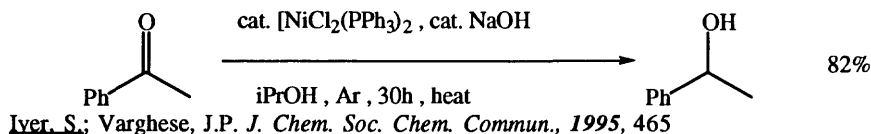


with $(\text{MeO})_3\text{SiH/HMPA/LiOMe/0}^\circ\text{C/2h} \rightarrow (90:10) \text{ 98\%}$

Hojo, M.; Fujii, A.; Murakami, C.; Aihara, H.; Hosomi, A. *Tetrahedron Lett.*, **1995**, 36, 571



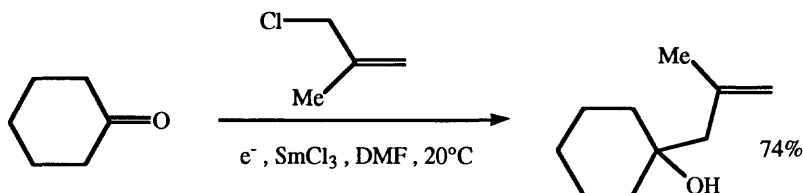
Ohkuma, T.; Ooka, H.; Ikariya, T.; Noyori, R. *J. Am. Chem. Soc.*, **1995**, *117*, 10417



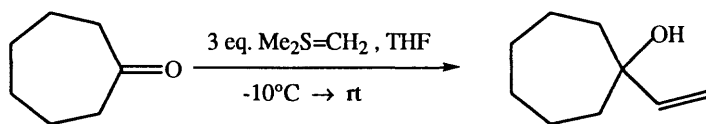
Iyer, S.; Varghese, J.P. *J. Chem. Soc. Chem. Commun.*, **1995**, 465

SECTION 42B: ALKYLATION OF KETONES, FORMING ALCOHOLS

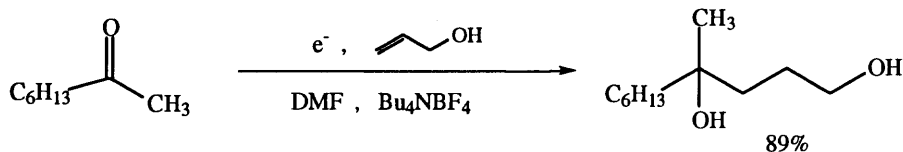
Aldol reactions are listed in Section 330 (Ketone-Alcohol)



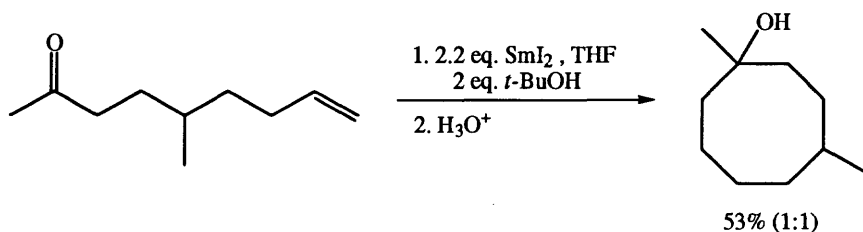
Hebri, H.; Duñach, E.; Périchon, J. *Tetrahedron Lett.*, **1993**, *34*, 1475



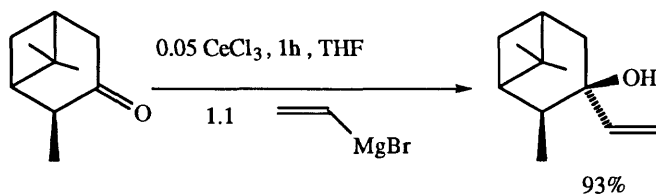
Harnett, J.J.; Alcaraz, L.; Mioskowski, C.; Martel, J.P.; LeGall, T.; Shin, D.-S.; Falck, J.R. *Tetrahedron Lett.*, **1994**, *35*, 2009



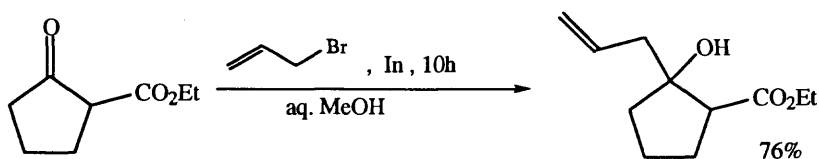
Shono, T.; Morishima, Y.; Moriyoshi, N.; Ishifune, M. *J. Org. Chem.*, **1994**, *59*, 273



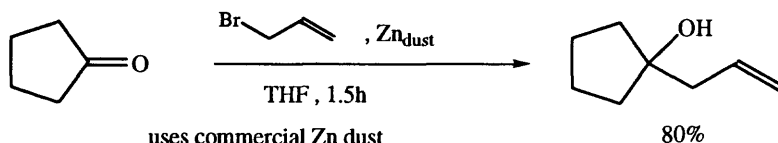
Molander, G.A.; McKie, J.A. *J. Org. Chem.*, **1994**, *59*, 3186



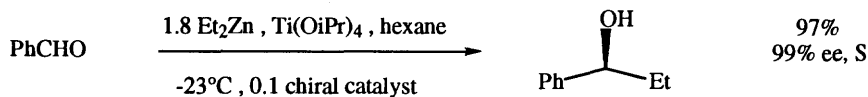
Dimitrov, V.; Bratavanov, S.; Simova, S.; Kostova, K. *Tetrahedron Lett.*, **1994**, *35*, 6713



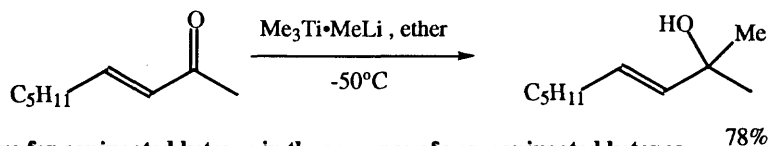
Li, C.-J.; Lu, Y.-Q. *Tetrahedron Lett.*, **1995**, *36*, 2721



uses commercial Zn dust
Ranu, B.C.; Majee, A.; Das, A.R. *Tetrahedron Lett.*, **1995**, *36*, 4885

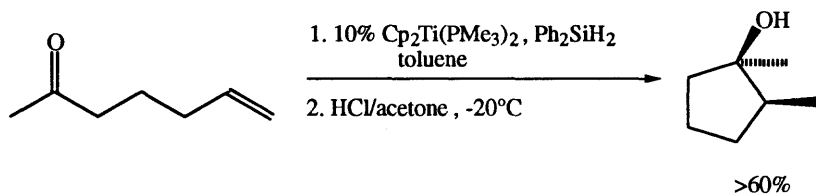


Zhang, X.; Guo, C. *Tetrahedron Lett.*, **1995**, *36*, 4947

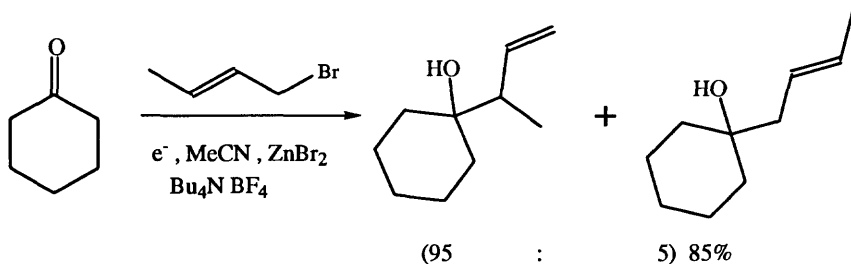


selective for conjugated ketones in the presence of non-conjugated ketones

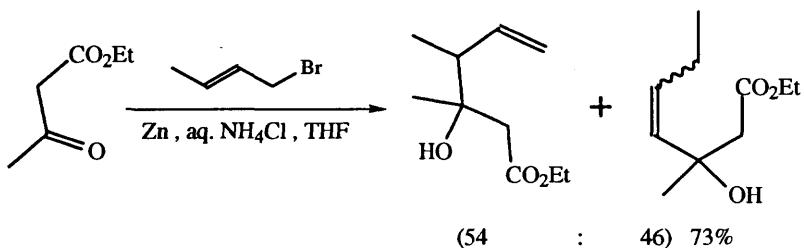
Markó, I.E.; Leung, C.W. *J. Am. Chem. Soc.*, **1994**, *116*, 371



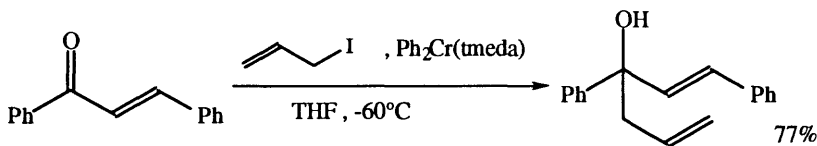
Kablaoui, N.M.; Buchwald, S.L., *J. Am. Chem. Soc.*, **1995**, *117*, 6785



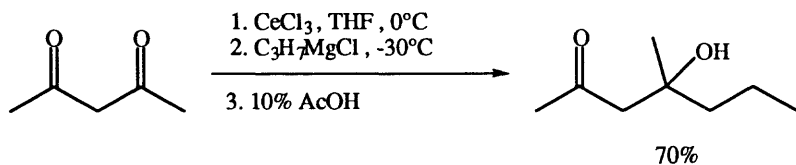
Rollin, Y.; Derien, S.; Duñach, E.; Gebehenne, C.; Perichon, J. *Tetrahedron*, **1993**, *49*, 7723



Ahonen, M.; Sjöholm, R. *Chem. Lett.*, **1995**, 341

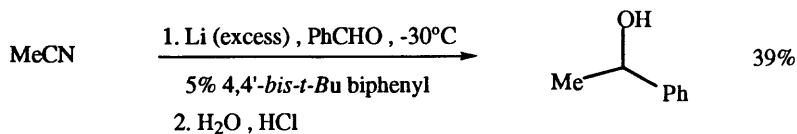


Wipf, P.; Lim, S. *J. Chem. Soc. Chem. Commun.*, **1993**, 1655



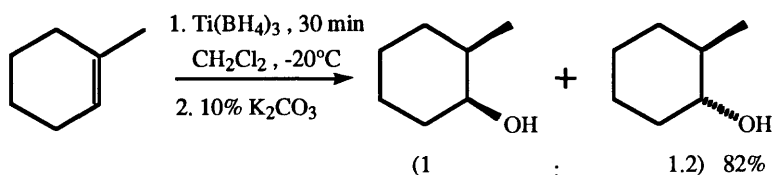
Bartoli, G.; Marcantoni, E.; Petrini, M. *Angew. Chem. Int. Ed. Engl.*, **1993**, *32*, 1061

SECTION 43: ALCOHOLS AND THIOLS FROM NITRILES

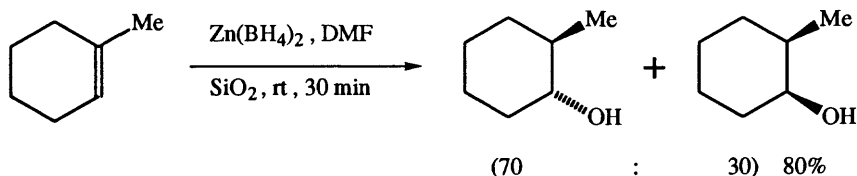


Guijarro, D.; Yus, M., *Tetrahedron*, **1994**, *50*, 3441

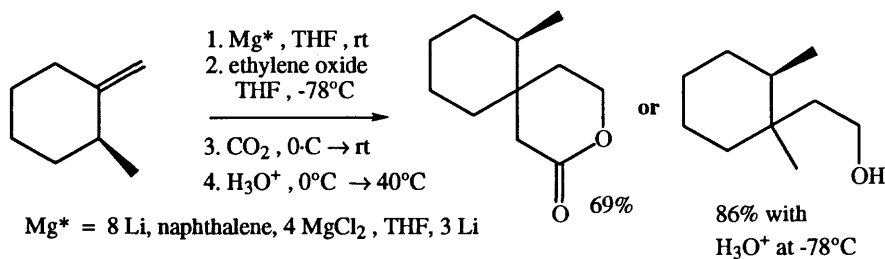
SECTION 44: ALCOHOLS AND THIOLS FROM ALKENES



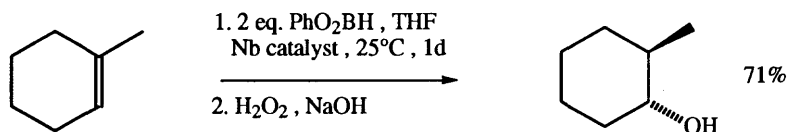
Kumar, K.S.R.; Baskaran, S.; Chandrasekaran, S. *Tetrahedron Lett.*, **1993**, *34*, 171



Ranu, B.C.; Charkraborty, R.; Saha, M. *Tetrahedron Lett.*, **1993**, *34*, 4659



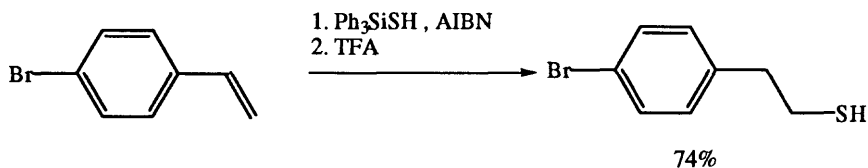
Sell, M.S.; Xiong, H.; Rieke, R.D., *Tetrahedron Lett.*, **1993**, *34*, 6007, 6011



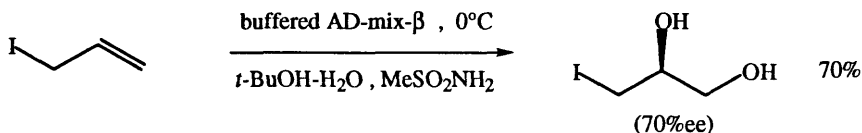
Burgess, K.; Jaspars, M. *Tetrahedron Lett.*, **1993**, *34*, 6813

also with Cp₂TiCl₄, see

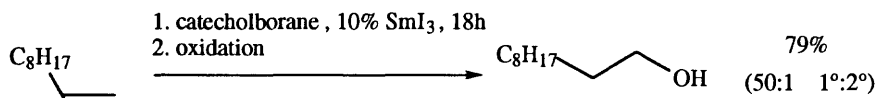
Burgess, K.; van der Donk, W.A. *Tetrahedron Lett.*, **1993**, *34*, 6817



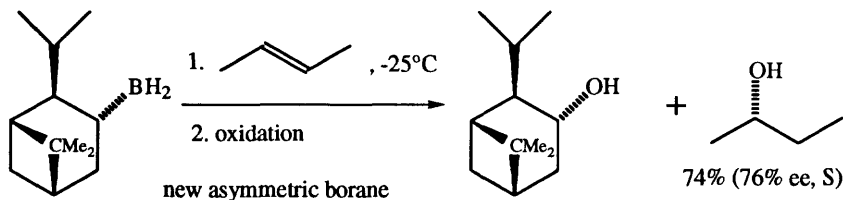
Haché, B.; Gareau, Y. *Tetrahedron Lett.*, **1994**, 35, 1837



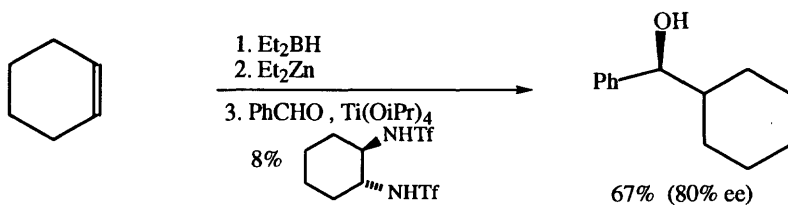
Vanhessche, K.P.M.; Wang, Z.-M.; Sharpless, K.B. *Tetrahedron Lett.*, **1994**, 35, 3473



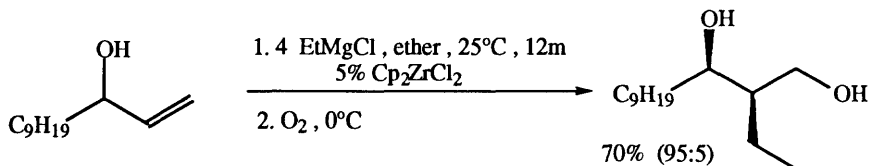
Evans, D.A.; Muci, A.R.; Stürmer, R. *J. Org. Chem.*, **1993**, 58, 5307



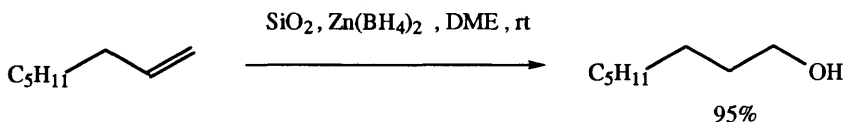
Dhokte, U.P.; Brown, H.C. *Tetrahedron Lett.*, **1994**, 35, 4715



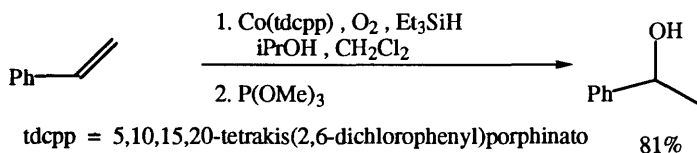
Schwink, L.; Knochel, P. *Tetrahedron Lett.*, **1994**, 35, 9007



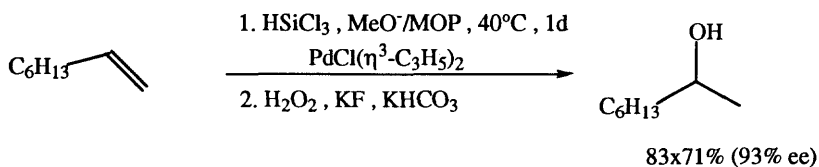
Houri, A.F.; Didiuk, M.T.; Xu, Z.; Horan, N.R.; Hoveyda, A.H. *J. Am. Chem. Soc.*, **1993**, 115, 6614



Ranu, B.C.; Sarkar, A.; Saha, M.; Chakraborty, R. *Tetrahedron*, **1994**, *50*, 6579

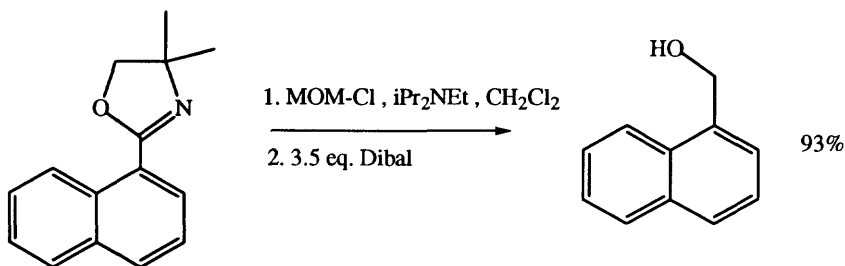


tdcpp = 5,10,15,20-tetrakis(2,6-dichlorophenyl)porphinato
 Matsushita, Y.; Sugamoto, K.; Matsui, T. *Chem. Lett.*, **1993**, 925

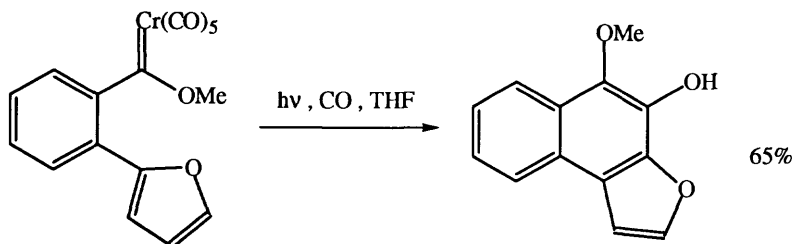


Uozumi, Y.; Kitayama, K.; Hayashi, T.; Yanagi, K.; Fukuyo, E. *Bull. Chem. Soc. Jpn.*, **1995**, *68*, 713

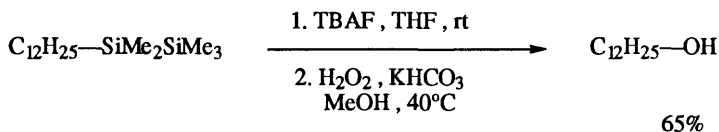
SECTION 45: ALCOHOLS AND THIOLS FROM MISCELLANEOUS COMPOUNDS



Meyers, A.I.; Shimano, M. *Tetrahedron Lett.*, **1993**, *34*, 4893

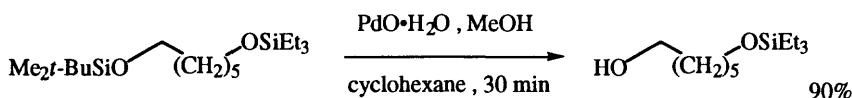


Merlic, C.A.; Roberts, W.M. *Tetrahedron Lett.*, **1993**, *34*, 7379

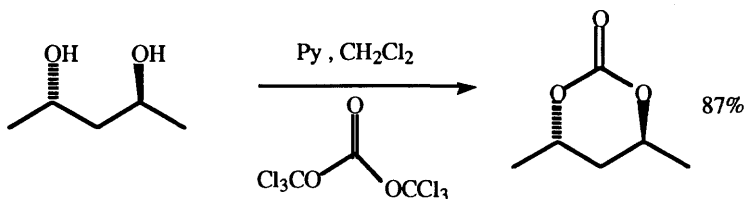


Suginome, M.; Matsunaga, S.; Ito, Y. *Synlett*, 1995, 941

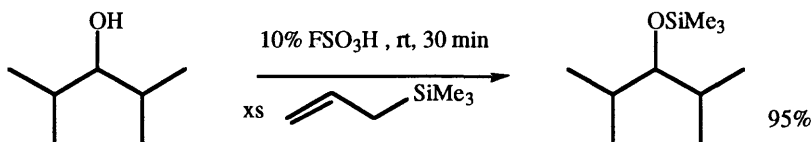
SECTION 45A: PROTECTION OF ALCOHOLS AND THIOLS



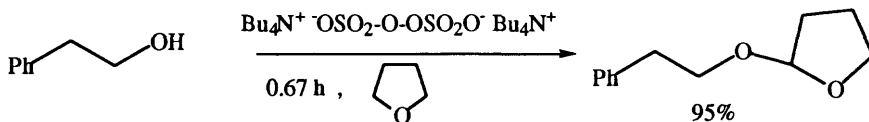
Cornier, J.E.; Issac, M.B.; Chen, L-F. *Tetrahedron Lett.*, 1993, 34, 243



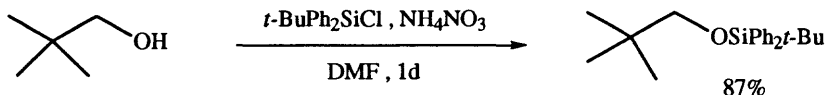
Burk, R.M.; Roof, M.B. *Tetrahedron Lett.*, 1993, 34, 395



Lipshutz, B.H.; Burgess-Henry, J.; Roth, G.P. *Tetrahedron Lett.*, 1993, 34, 995



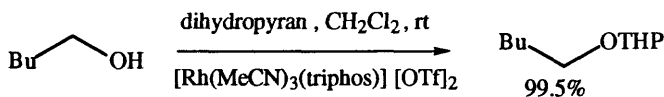
Jung, J.C.; Choi, H.C.; Kim, Y.H. *Tetrahedron Lett.*, 1993, 34, 3581



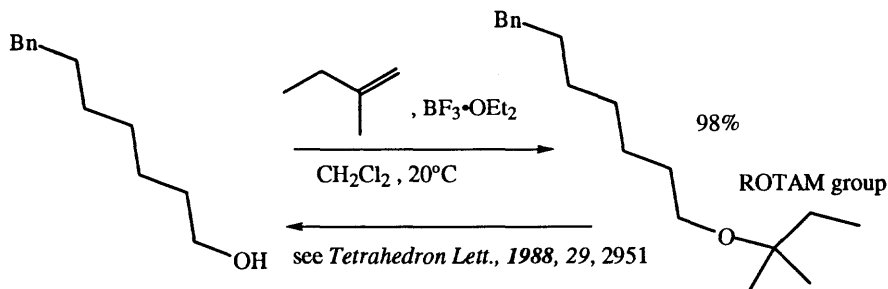
CAUTION: NH_4NO_3 & NH_4ClO_4
are potentially explosive

[w/ $\text{AgNO}_3/\text{BnOH}/15 \text{ min}$ - 83%]

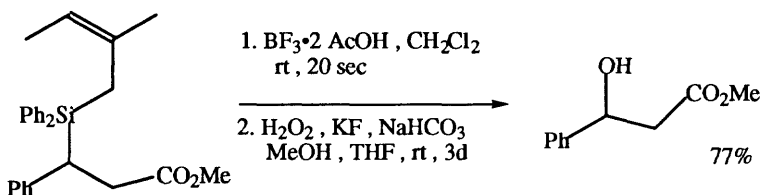
Hardinger, S.A.; Wijaya, N. *Tetrahedron Lett.*, 1993, 34, 3821



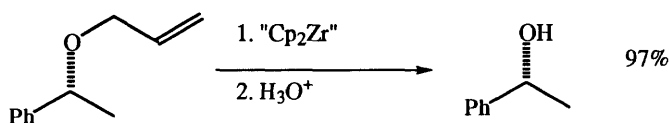
Ma, S.; Venanzi, L.M. *Tetrahedron Lett.*, **1993**, *34*, 5269



Figadère, B.; Franck, X.; Cavé, A. *Tetrahedron Lett.*, **1993**, *34*, 5893

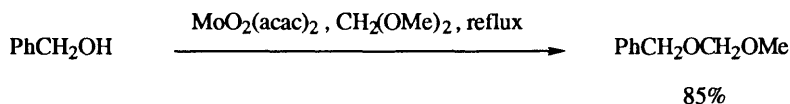


Fleming, I.; Winter, S.B.D. *Tetrahedron Lett.*, **1993**, *34*, 7287

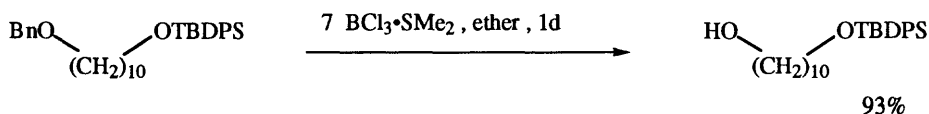


$\text{Cp}_2\text{Zr} = \text{Cp}_2\text{ZrCl}_2/\text{BuLi}$ - see *Tetrahedron Lett.*, **1986**, *27*, 2829

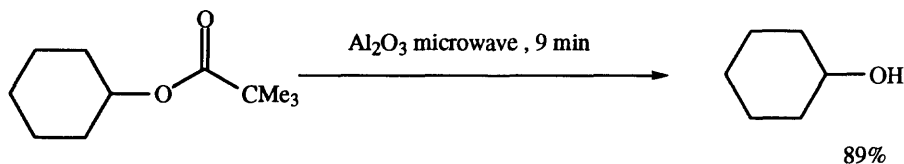
Ito, H.; Taguchi, T.; Hanzawa, Y. *J. Org. Chem.*, **1993**, *58*, 774



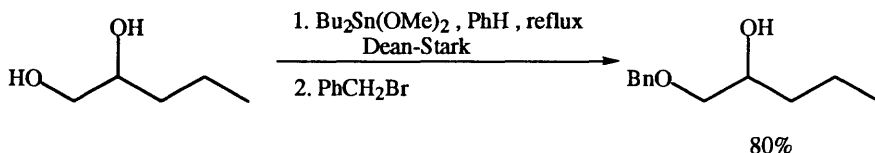
Kantam, M.L.; Santhi, P.L. *Synlett*, **1993**, 429



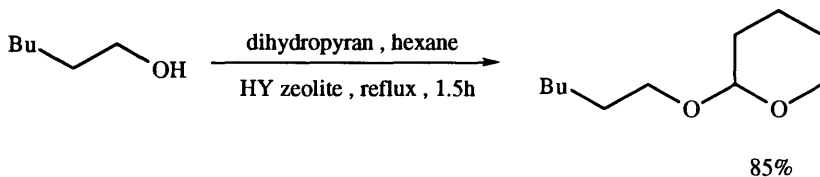
Congreve, M.S.; Davison, E.C.; Fuhry, M.A.M.; Holmes, A.B.; Payne, A.N.; Robinson, R.A.; Ward, S.E. *Synlett*, **1993**, 663



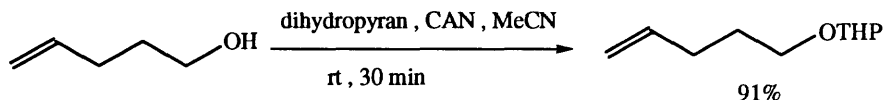
Ley, S.V.; Mynett, D.M. *Synlett*, **1993**, 793



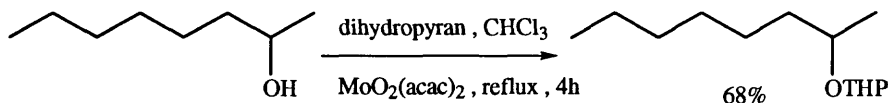
Boons, G.-J.; Castle, G.H.; Clase, J.A.; Grice, P.; Ley, S.V.; Pinel, C. *Synlett*, **1993**, 913



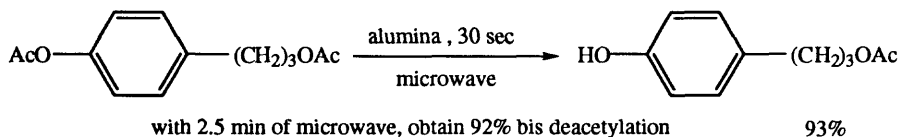
Kumar, P.; Dinesh, C.U.; Reddy, R.R.; Pandey, B. *Synthesis*, **1993**, 1069



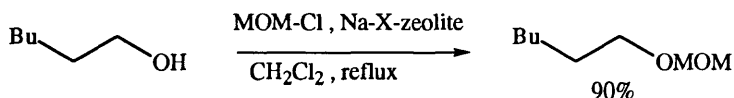
Maity, G.; Roy, S.C. *Synth. Commun.*, **1993**, 23, 1667



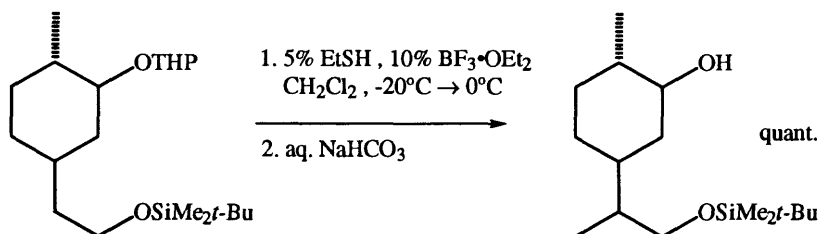
Kantam, M.L.; Santhi, P.L. *Synth. Commun.*, **1993**, 23, 2225



Varma, R.S.; Varma, M.; Chatterjee, A.K. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 999

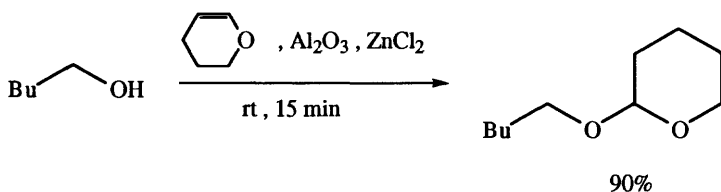


Kumar, P.; Raju, S.V.N.; Reddy, R.S.; Pandey, B. *Tetrahedron Lett.*, **1994**, 35, 1289

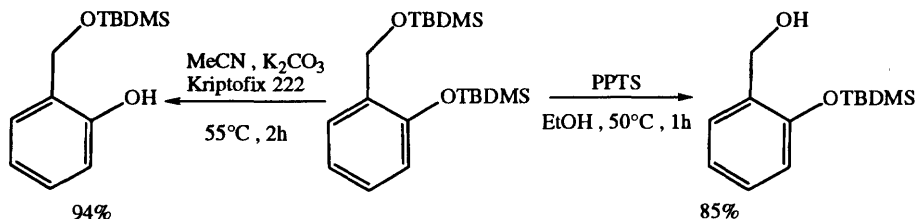


cleavage of THP ethers in the presence of other acid labile functional groups

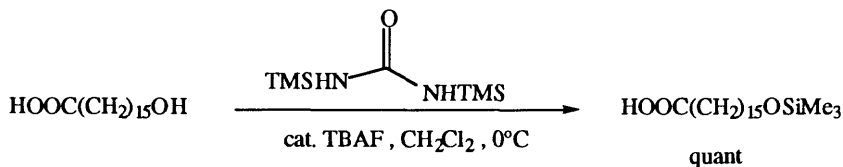
Nambiar, K.P.; Mitra, A. *Tetrahedron Lett.*, **1994**, 35, 3033



Ranu, B.C.; Saha, M. *J. Org. Chem.*, **1994**, 59, 8269

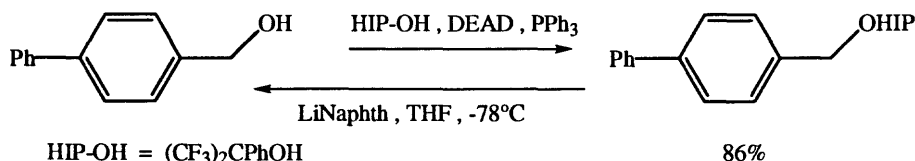


Prakash, C.; Saleh, S.; Blair, I.A. *Tetrahedron Lett.*, **1994**, 35, 7565



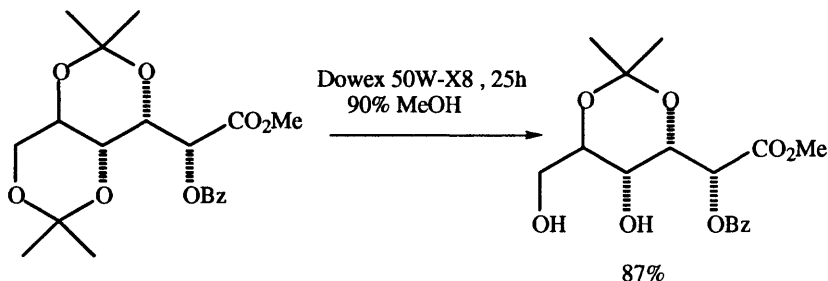
other silazanes can be used as well

Tanabe, Y.; Murakami, M.; Kitaichi, K.; Yoshida, Y. *Tetrahedron Lett.*, **1994**, 35, 8409

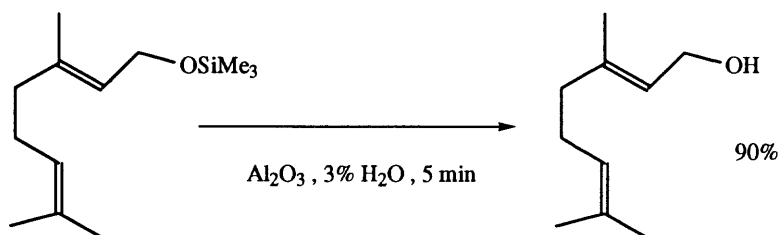


HIP-OH = (CF₃)₂CPhOH

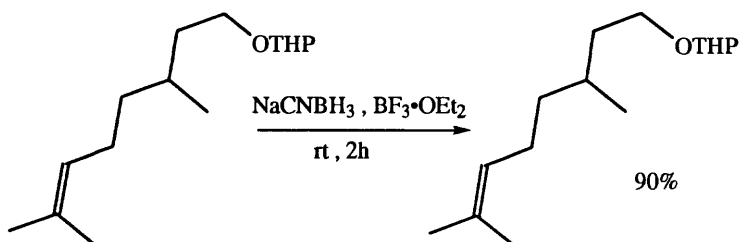
Cho, H.-S.; Yu, J.; Falck, J.R. *J. Am. Chem. Soc.*, **1994**, 116, 8354



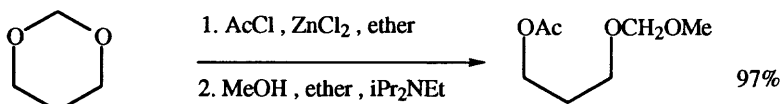
Park, K.H.; Yoon, Y.J.; Lee, S.G. *Tetrahedron Lett.*, **1994**, 35, 9737



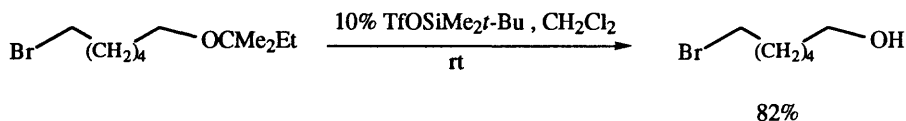
Feixas, J.; Capdevila, A.; Guerrero, A. *Tetrahedron*, **1994**, 50, 8539



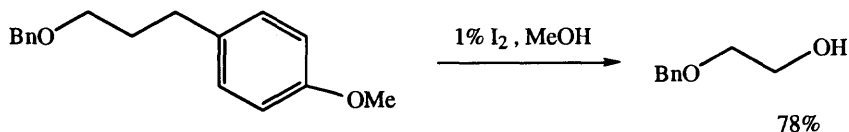
Srikrishna, A.; Sattigeri, J.A.; Viswajanani, R.; Yelamaggad, C.V. *J. Org. Chem.*, **1995**, 60, 2260



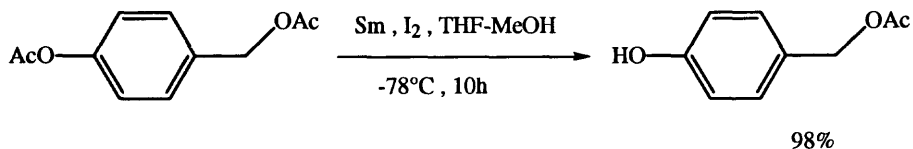
Bailey, W.F.; Zarcone, L.M.J.; Rivera, A.D. *J. Org. Chem.*, **1995**, 60, 2532



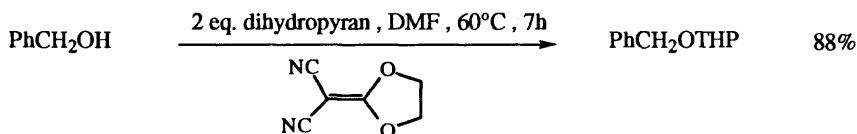
Franck, X.; Figadère, B.; Cavé, A. *Tetrahedron Lett.*, **1995**, 36, 711



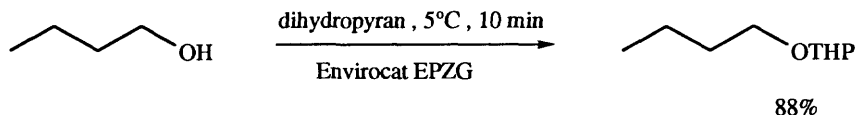
Vaino, A.R.; Szarek, W.A. *Synlett*, **1995**, 1157



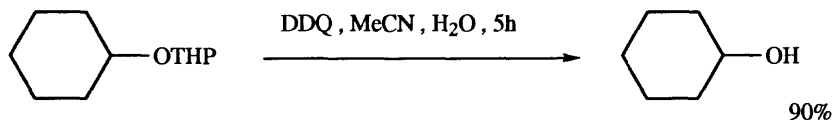
Yanada, R.; Negoro, N.; Bessho, K.; Yanada, K. *Synlett*, **1995**, 1261



Miura, T.; Masaki, Y. *Synth. Commun.*, **1995**, 25, 1981



Bandgar, B.P.; Jagtap, S.R.; Aghade, B.B.; Wadgaonkar, P.P. *Synth. Commun.*, **1995**, 25, 2211



Raina, S.; Singh, V.K. *Synth. Commun.*, **1995**, 25, 2395

REVIEW:

"Silyl Ethers as Protective Groups for Alcohols. Oxidative Deprotection and Stability Under Alcohol Oxidation Conditions," Muzart, J. *Synthesis*, **1993**, 11

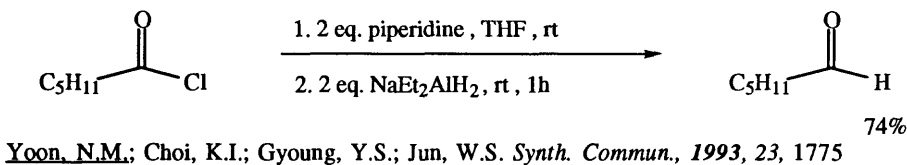
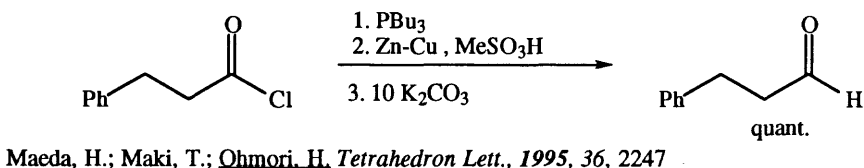
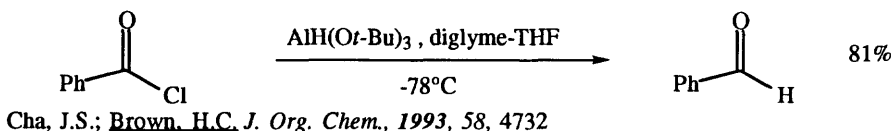
CHAPTER 4

PREPARATION OF ALDEHYDES

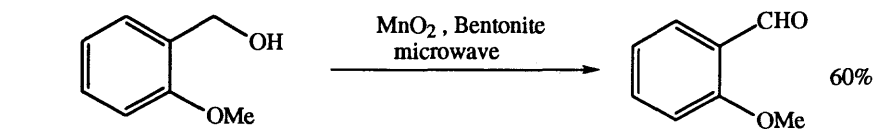
SECTION 46: ALDEHYDES FROM ALKYNES

NO ADDITIONAL EXAMPLES

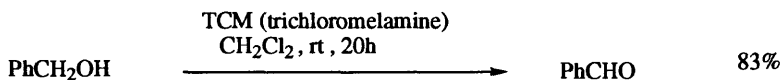
SECTION 47: ALDEHYDES FROM ACID DERIVATIVES



SECTION 48: ALDEHYDES FROM ALCOHOLS AND THIOLS

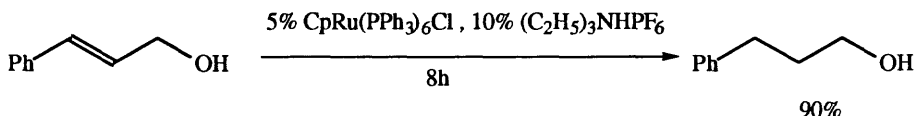


Martinez, L.A.; García, O.; Delgado, F.; Álvarez, C.; Patiño, R. *Tetrahedron Lett.*, **1993**, 34, 5293

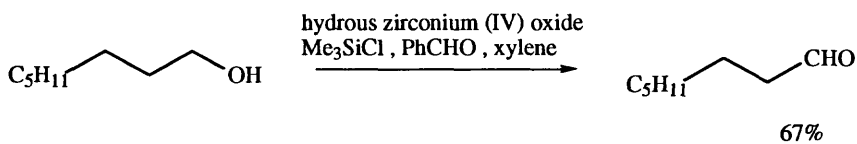


also oxidizes 2° alcohols to ketones

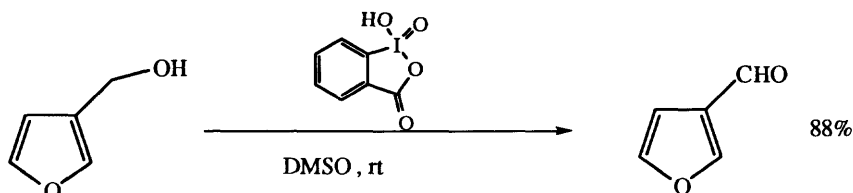
Kondo, S.; Ohira, M.; Kawasoe, S.; Kunisada, H.; Yuki, Y. *J. Org. Chem.*, **1993**, *58*, 5003



Trost, B.M.; Kulawiec, R.J. *J. Am. Chem. Soc.*, **1993**, *115*, 2027

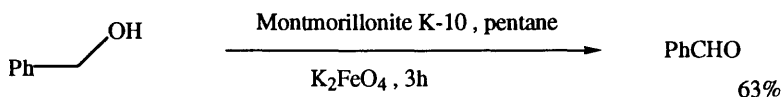


Kuno, H.; Shibagaki, M.; Yakahashi, K.; Matsushita, H. *Bull. Chem. Soc. Jpn.*, **1993**, *66*, 1699

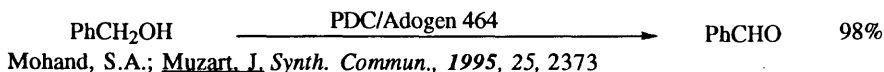


also for the preparation of ketones and 1,2-diketones

Frigerio, M.; Santagostino, M. *Tetrahedron Lett.*, **1994**, *35*, 8019



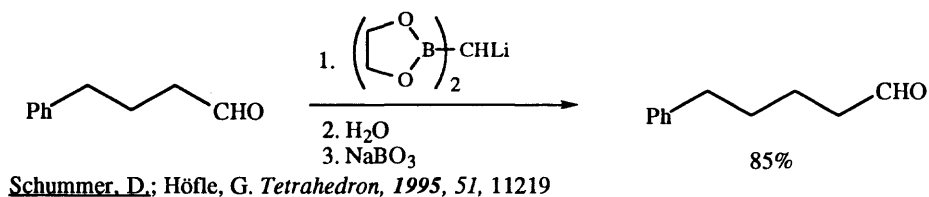
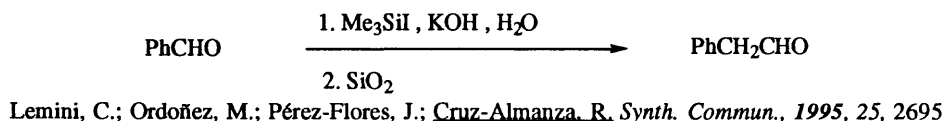
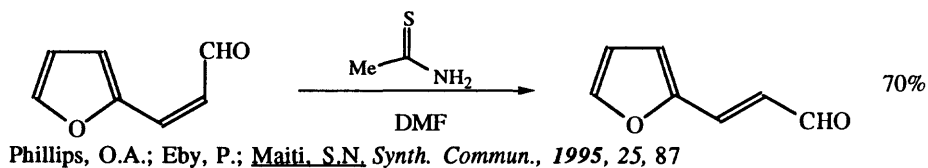
Delaude, L.; Laszlo, P.; Lehance, P. *Tetrahedron Lett.*, **1995**, *36*, 8505



Mohand, S.A.; Muzart, J. *Synth. Commun.*, **1995**, *25*, 2373

SECTION 49: ALDEHYDES FROM ALKYNES

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



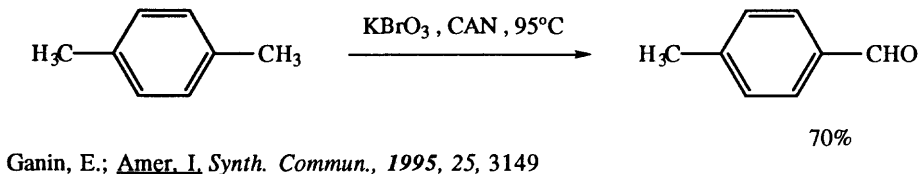
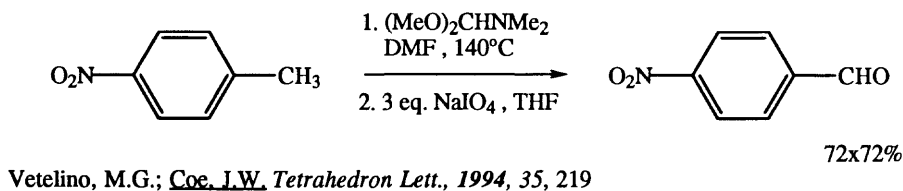
Related Methods:

Aldehydes from Ketones (Section 57)

Ketones from Ketones (Section 177)

Also via: Alkenyl aldehydes (Section 341)

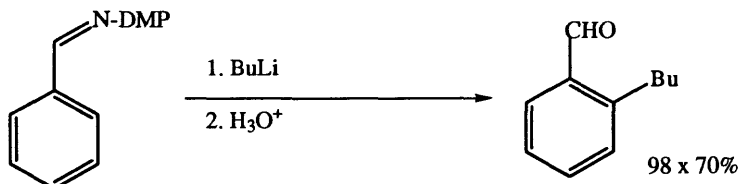
SECTION 50: ALDEHYDES FROM ALKYL, METHYLENES AND ARYLS



SECTION 51: ALDEHYDES FROM AMIDES

NO ADDITIONAL EXAMPLES

SECTION 52: ALDEHYDES FROM AMINES

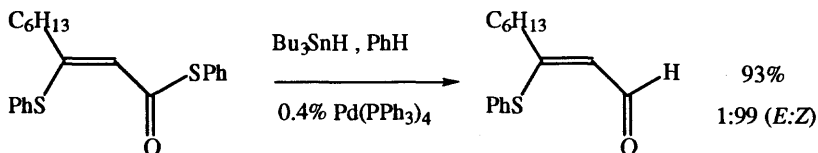


Flippin, L.A.; Carter, D.S.; Dubree, H.J.P. *Tetrahedron Lett.*, **1993**, *34*, 3255

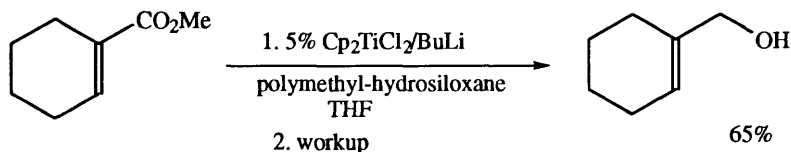
Related Methods:

Ketones from Amines (Section 172)

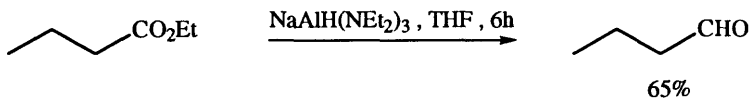
SECTION 53: ALDEHYDES FROM ESTERS



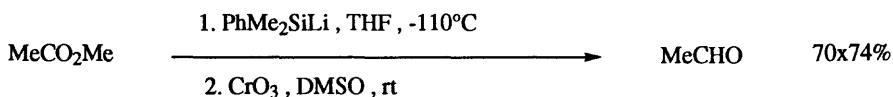
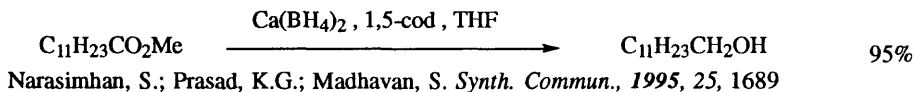
Kuniyasu, H.; Ogawa, A.; Sonoda, N. *Tetrahedron Lett.*, **1993**, *34*, 2491



Barr, K.J.; Berk, S.C.; Buchwald, S.L. *J. Org. Chem.*, **1994**, *59*, 4323



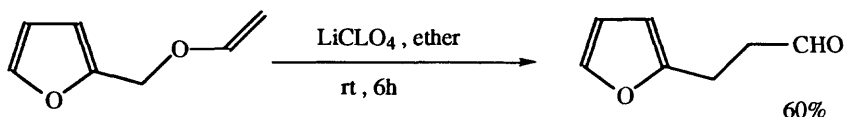
Cha, J.S.; Kim, J.M.; Jeoung, M.K.; Kwon, O.O.; Kim, E.J. *Org. Prep. Proceed. Int.*, **1995**, *27*, 95



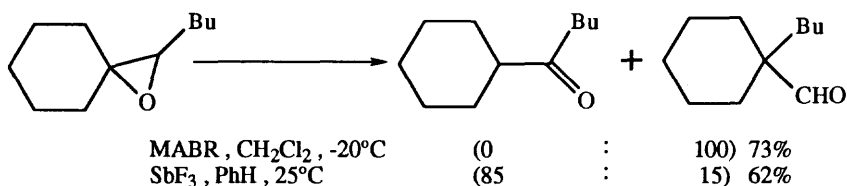
Fleming, I.; Ghosh, U. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 257

REVIEW:

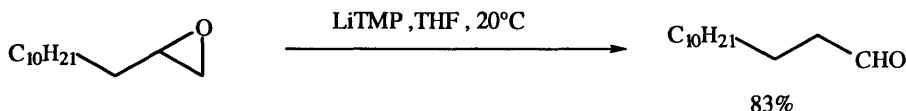
"Asymmetric Reductions of C-N Double Bonds. A Review," Zhu, Q.-C.; Hutchins, R.O. *Org. Prep. Proceed. Int.*, **1994**, 26, 193

SECTION 54: ALDEHYDES FROM ETHERS, EPOXIDES AND THIOETHERS

Palani, N.; Balasubramanian, K.K. *Tetrahedron Lett.*, **1995**, 36, 9527



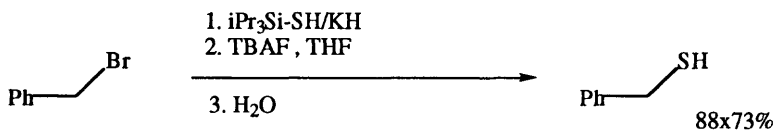
Maruoka, K.; Murase, N.; Bureau, R.; Ooi, T.; Yamamoto, H. *Tetrahedron*, **1994**, 50, 3663



Yanagisawa, A.; Yasue, K.; Yamamoto, H. *J. Chem. Soc. Chem. Commun.*, **1994**, 2103

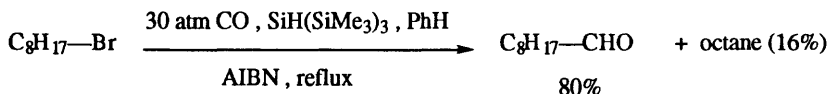
Related Methods:

Ketones from Ethers and Epoxides (Section 174)

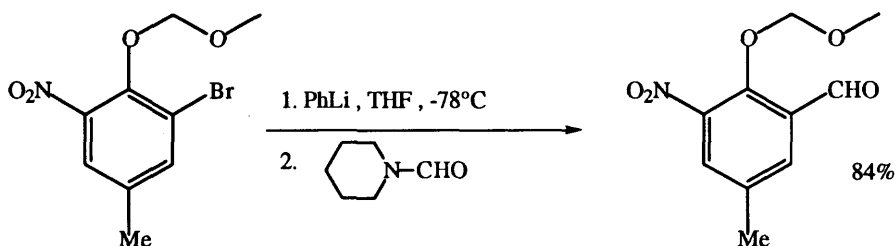
SECTION 55: ALDEHYDES FROM HALIDES AND SULFONATES

Miranda, E.I.; Diaz, M.J.; Rosado, I.; Soderquist, J.A. *Tetrahedron Lett.*, **1994**, 35, 3221

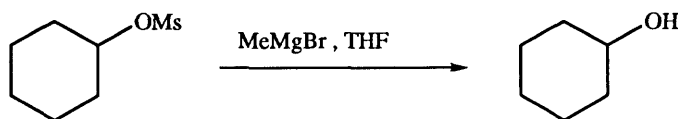
Rane, A.M.; Miranda, E.I.; Soderquist, J.A. *Tetrahedron Lett.*, **1994**, 35, 3225



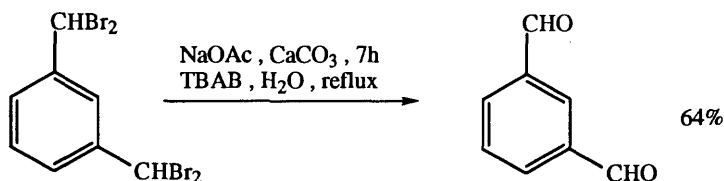
Ryu, I.; Hasegawa, M.; Kurihara, A.; Ogawa, A.; Tsunoi, S.; Sonoda, N. *Synlett*, **1993**, 143



Hardcastle, I.R.; Quayle, P.; Ward, E.L.M. *Tetrahedron Lett.*, **1994**, 35, 1747



Cossy, J.; Ranaivosata, J.-L.; Bellosta, V.; Wietzke, R. *Synth. Commun.*, **1995**, 25, 3109

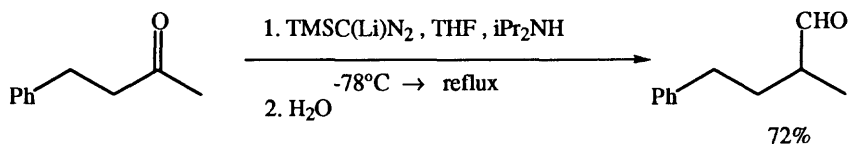


Mataka, S.; Liu, G.-B.; Sawada, T.; Tori-i, A.; Tashiro, M. *J. Chem. Res. (S)*, **1995**, 410

SECTION 56: ALDEHYDES FROM HYDRIDES

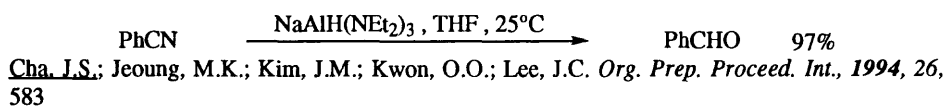
NO ADDITIONAL EXAMPLES

SECTION 57: ALDEHYDES FROM KETONES

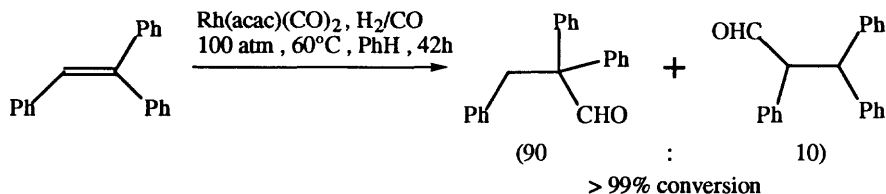


Miwa, K.; Aoyama, T.; Shioiri, T. *Synlett*, **1994**, 109

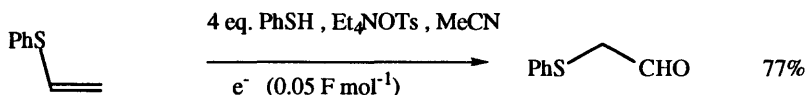
SECTION 58: ALDEHYDES FROM NITRILES



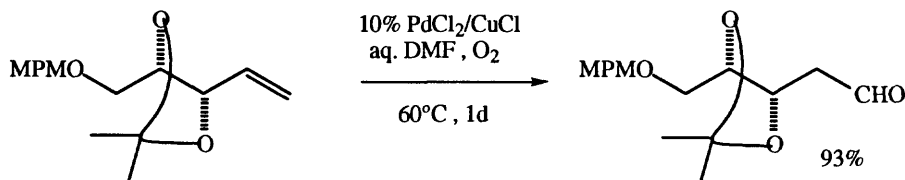
SECTION 59: ALDEHYDES FROM ALKENES



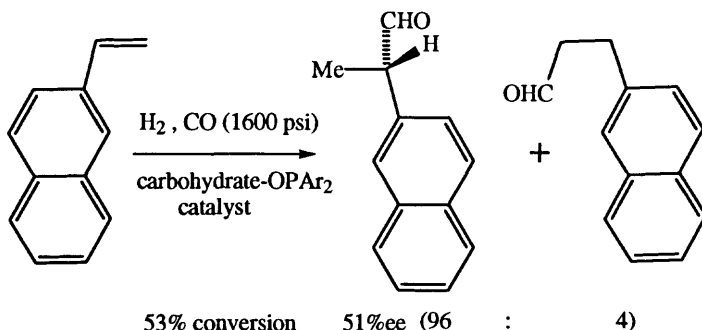
Higashizima, T.; Sakai, N.; Nozaki, K.; Takaya, H. *Tetrahedron Lett.*, **1994**, 35, 2023



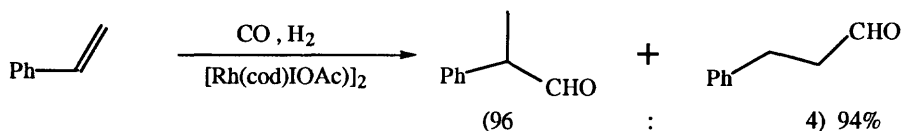
Yoshida, J.; Nakatani, S.; Isoe, S. *J. Org. Chem.*, **1993**, 58, 4855



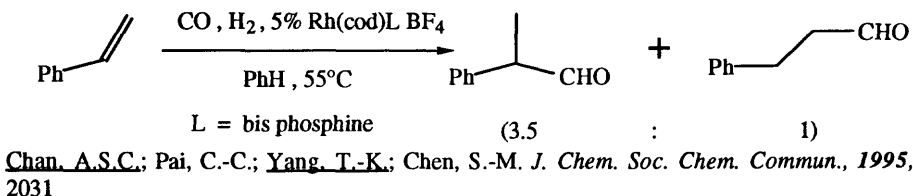
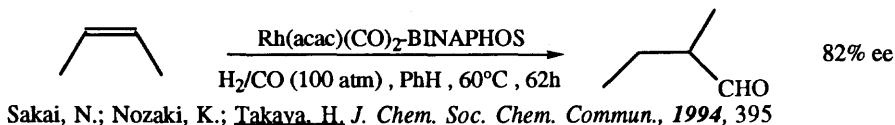
Kang, S.-K.; Jung, K.-Y.; Chung, J.-U.; Namkoong, E.-Y.; Kim, T.-H. *J. Org. Chem.*, **1995**, 60, 4678



RajanBabu, T.V.; Ayers, T.A. *Tetrahedron Lett.*, **1994**, 35, 4295



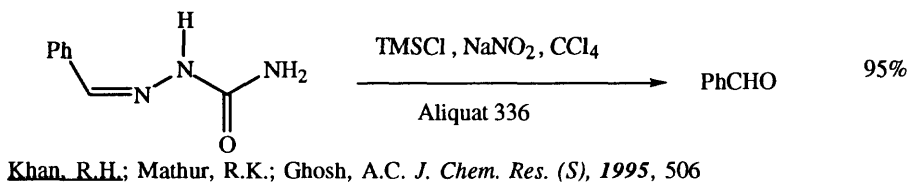
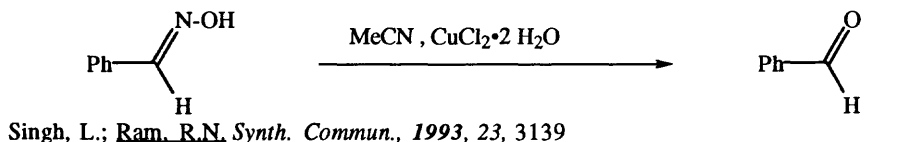
Doyle, M.P.; Shanklin, M.S.; Zlokazov, M.V. *Synlett*, **1994**, 615



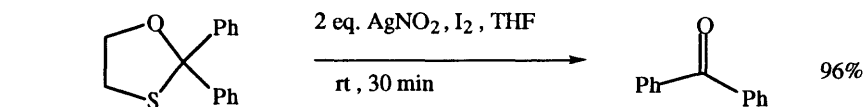
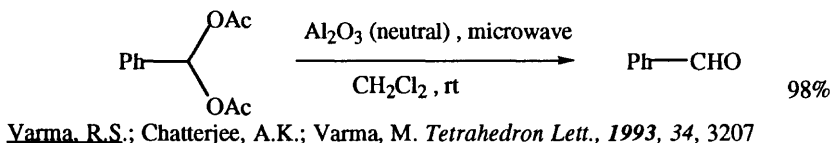
Related Methods:

Ketones from Alkenes (Section 179)

SECTION 60: ALDEHYDES FROM MISCELLANEOUS COMPOUNDS



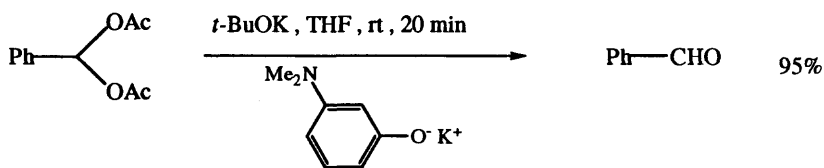
SECTION 60A: PROTECTION OF ALDEHYDES



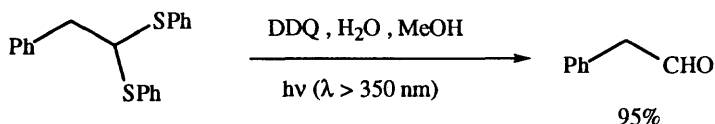
also works with dithianes

also for protected ketones

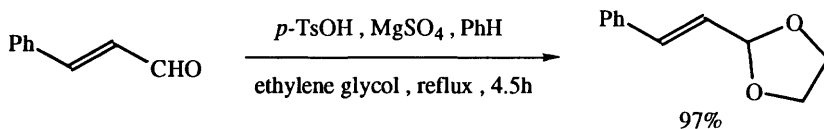
Nishide, K.; Yokota, K.; Nakamura, D.; Sumiya, T.; Node, M.; Ueda, M.; Fuji, K. *Tetrahedron Lett.*, **1993**, 34, 3425



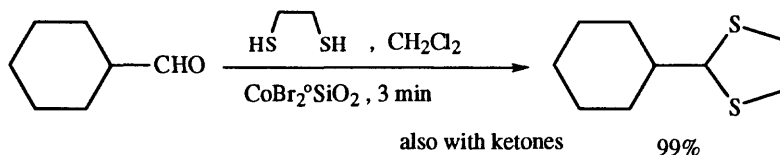
Ku, Y.-Y.; Patel, R.; Sawick, D. *Tetrahedron Lett.*, **1993**, 34, 8037



Mathew, L.; Sankararaman, S. *J. Org. Chem.*, **1993**, 58, 7576

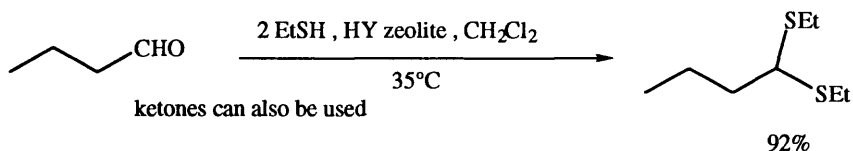


Lu, T.-J.; Yang, J.-F.; Sheu, L.-J. *J. Org. Chem.*, **1995**, 60, 2931



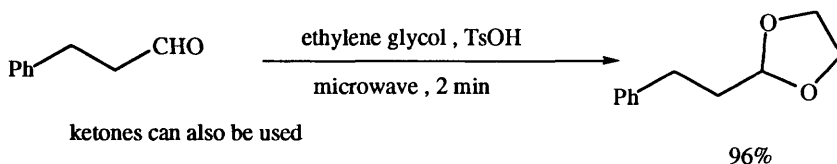
also with ketones

Patney, H.K. *Tetrahedron Lett.*, **1994**, 35, 5717



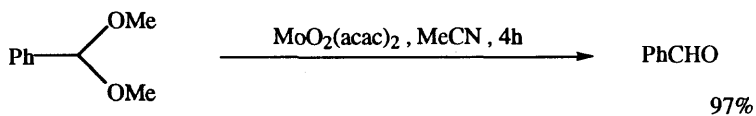
ketones can also be used

Kumar, P.; Reddy, R.S.; Singh, A.P.; Pandley, B. *Synthesis*, **1993**, 67

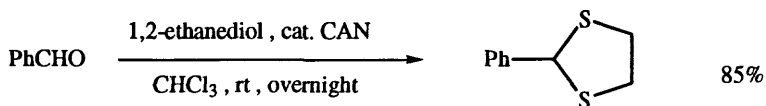


ketones can also be used

Moghaddam, F.M.; Sharifi, A. *Synth. Commun.*, **1995**, 25, 2457



Kantam, M.L.; Swapna, V.; Santhi, P.L. *Synth. Commun.*, **1995**, 25, 2529



ketones can also be used

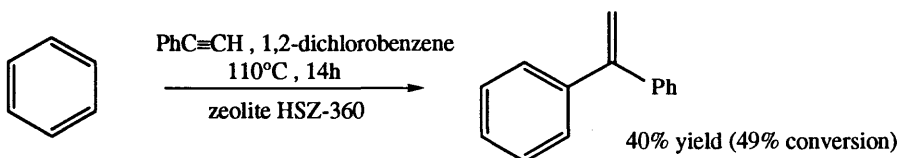
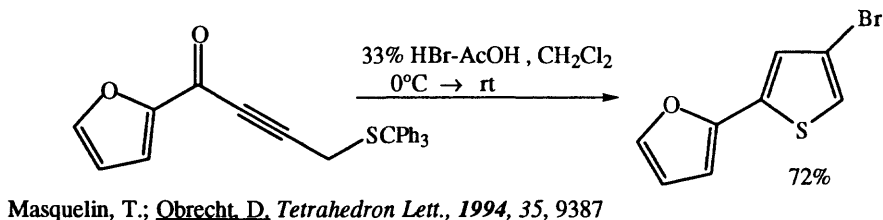
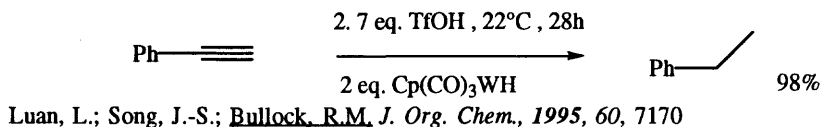
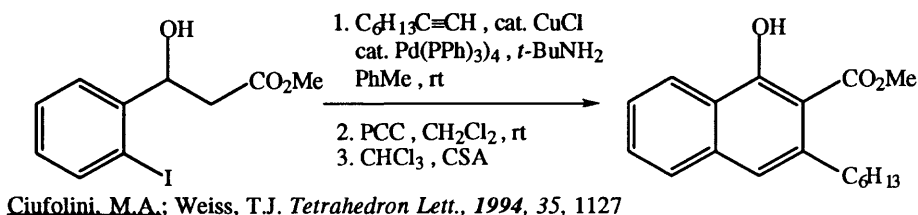
Mandal, P.K.; Roy, S.C. *Tetrahedron*, **1995**, 51, 7823

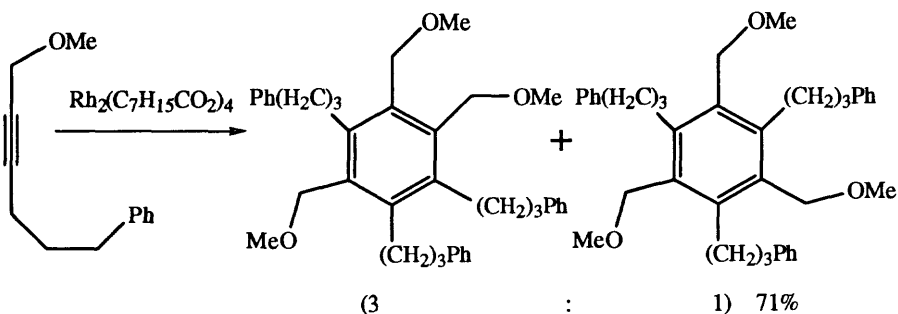
CHAPTER 5

PREPARATION OF ALKYL, METHYLENES AND ARYL

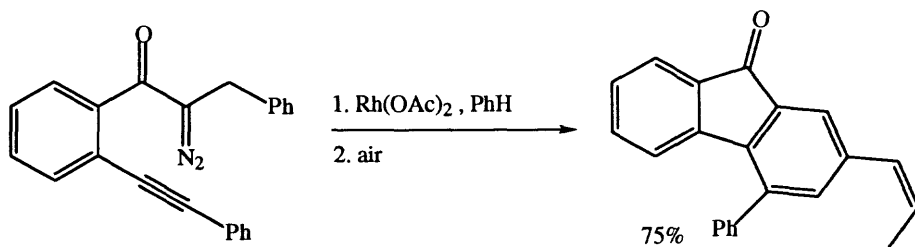
This chapter lists the conversion of functional groups into methyl, ethyl, propyl, etc. as well as methylene (CH₂), phenyl, etc.

SECTION 61: ALKYL, METHYLENES AND ARYL FROM ALKYNES

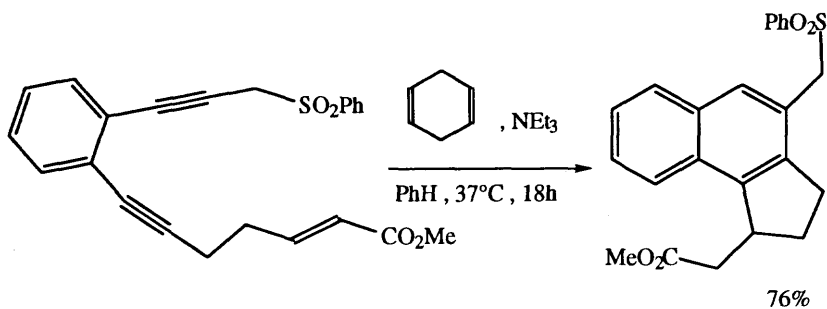




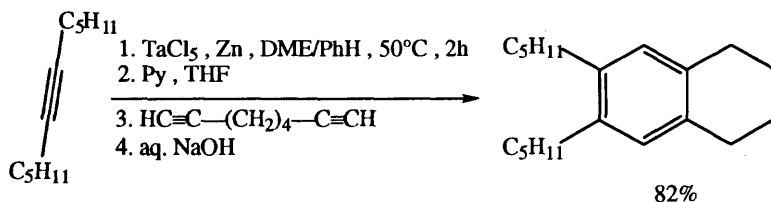
Taber, D.E.; Rahimizadeh, M. *Tetrahedron Lett.*, **1994**, *35*, 9139



Mueller, P.H.; Kassir, J.M.; Semones, M.A.; Weingarten, M.D.; Padwa, A. *Tetrahedron Lett.*, **1993**, *34*, 4285



Grissom, J.W.; Klingberg, D. *Tetrahedron Lett.*, **1995**, *36*, 6607

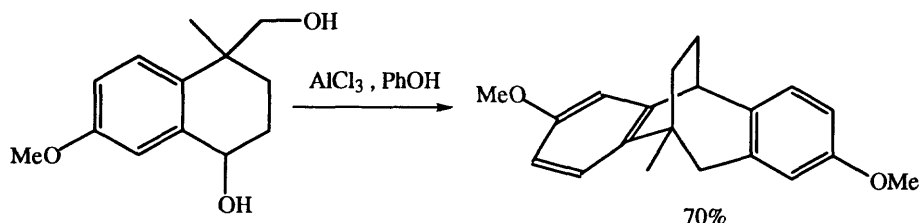


Takai, K.; Yamada, M.; Utimoto, K. *Chem. Lett.*, **1995**, 851

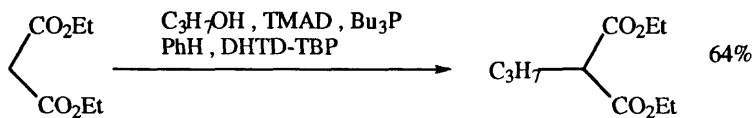
SECTION 62: ALKYL, METHYLENES AND ARYL FROM ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

SECTION 63: ALKYL, METHYLENES AND ARYL FROM ALCOHOLS AND THIOLS



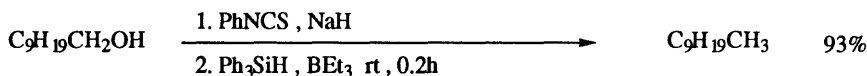
Bijoy, P.; Subba Rao, G.S.R. *Tetrahedron Lett.*, **1994**, 35, 3341



TMAD = $\text{Me}_2\text{NCON=NCONMe}_2$

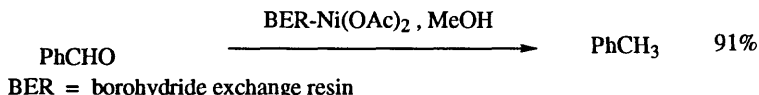
DHTD = 4,7-dimethyl-3,5,7-hexahydro-1,2,4,7-tetrazocin-3,8-dione

Tsudoda, T.; Nagaku, M.; Nagino, C.; Kawamura, Y.; Ozaki, F.; Hioki, H.; Itô, S. *Tetrahedron Lett.*, **1995**, 36, 2531



Oba, M.; Nishiyama, K. *Tetrahedron*, **1994**, 50, 10193

SECTION 64: ALKYL, METHYLENES AND ARYL FROM ALDEHYDES

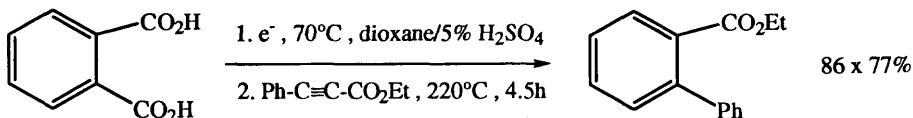


BER = borohydride exchange resin

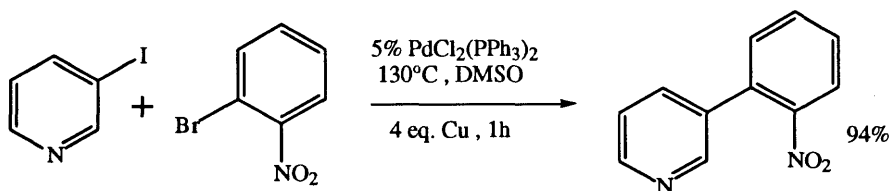
Bandgar, B.P.; Kshirsagar, S.N.; Wadgaonkar, P.P. *Synth. Commun.*, **1995**, 25, 941

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

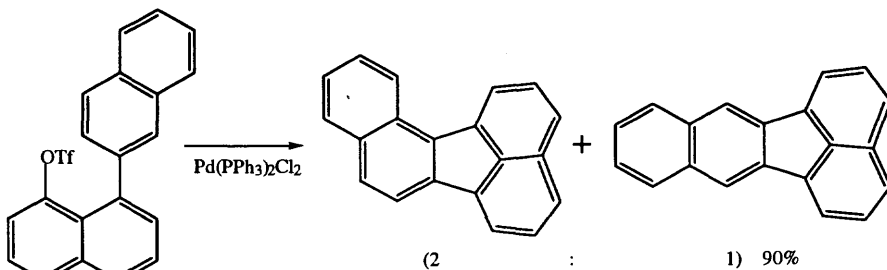
SECTION 65: ALKYLs, METHYLENES AND ARYLs FROM ALKYLs, METHYLENES AND ARYLs



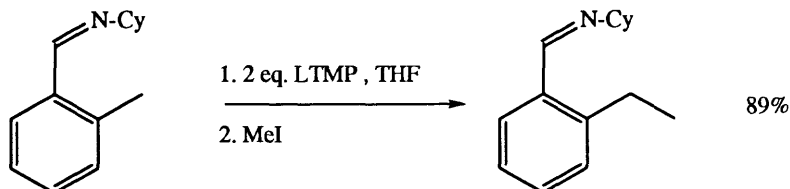
Ohno, T.; Ozaki, M.; Inagaki, A.; Hirashima, T.; Nishiguchi, I. *Tetrahedron Lett.*, **1993**, *34*, 2601



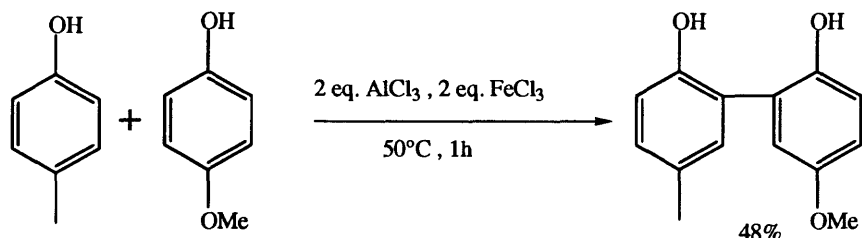
Shimizu, N.; Kitmura, T.; Watanabe, K.; Yamaguchi, T.; Shigyo, H.; Ohta, T. *Tetrahedron Lett.*, **1993**, *34*, 3421



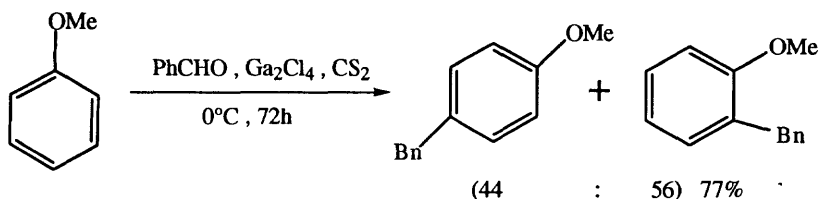
Rice, J.E.; Cai, Z.-W. *J. Org. Chem.*, **1993**, *58*, 1415



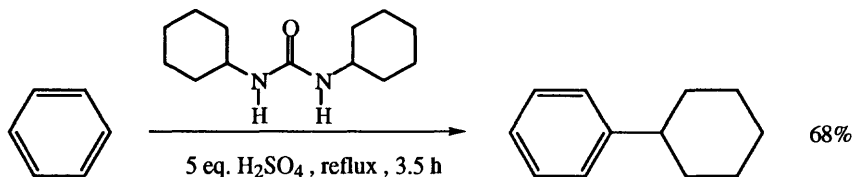
Flippin, L.A.; Muchowski, J.M.; Carter, D.S. *J. Org. Chem.*, **1993**, *58*, 2463



Sartori, G.; Maggi, R.; Bigi, F.; Grandi, M. *J. Org. Chem.*, **1993**, 58, 7271

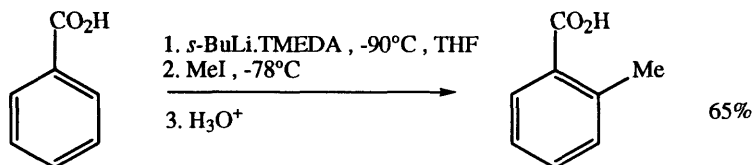


Hashimoto, Y.; Hirata, K.; Kagoshima, H.; Kihara, N.; Hasegawa, M.; Saigo, K. *Tetrahedron*, **1993**, 49, 5969

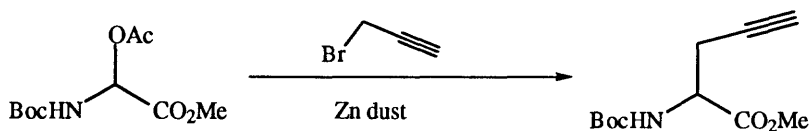


yield based on moles of alkylating agent

Chung, K.H.; Kim, J.N.; Ryu, E.K. *Tetrahedron Lett.*, **1994**, 35, 2913

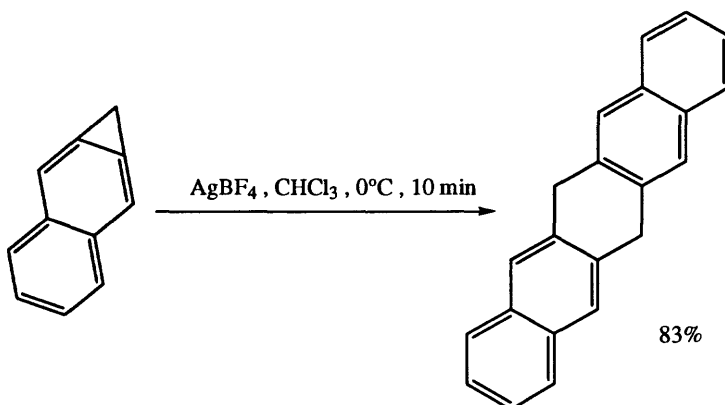


Mortier, J.; Moyroud, J.; Bennetau, B.; Cain, P.A. *J. Org. Chem.*, **1994**, 59, 4042

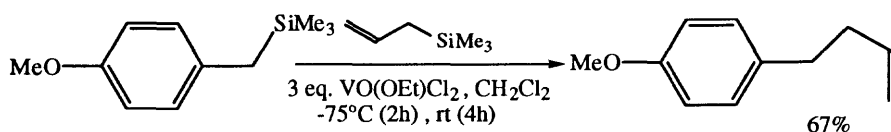


Alkylation also occurs with benzylic and allylic halides 97%

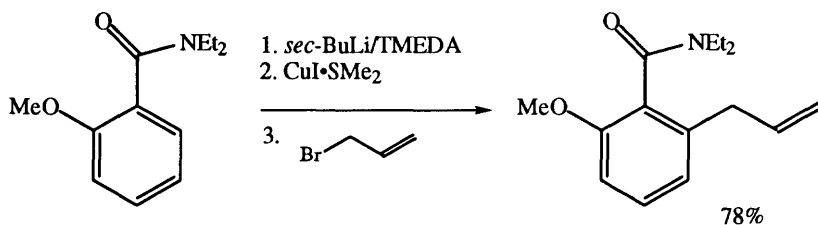
Aboud, N.A.; Nosal, R. *Tetrahedron Lett.*, **1994**, 35, 3669



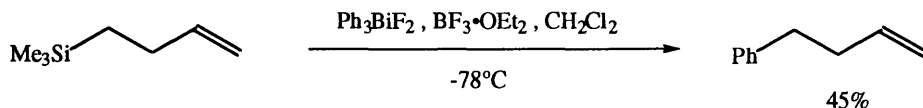
Hillups, W.E.; McCord, D.J.; Maughon, B.R. *Tetrahedron Lett.*, **1994**, 35, 4493



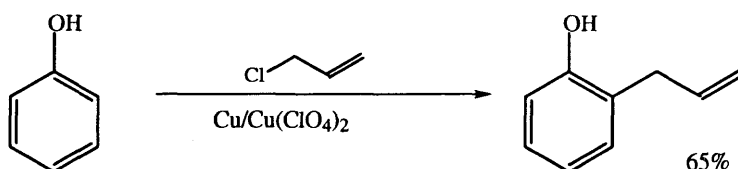
Hirao, T.; Fujii, T.; Ohshiro, Y. *Tetrahedron Lett.*, **1994**, 35, 8005



Casas, R.; Cavé, C.; d'Angelo, J. *Tetrahedron Lett.*, **1995**, 36, 1039



Matano, Y.; Yoshimune, M.; Suzuki, H. *Tetrahedron Lett.*, **1995**, 36, 7475



Baruah, J.B. *Tetrahedron Lett.*, **1995**, 36, 8509

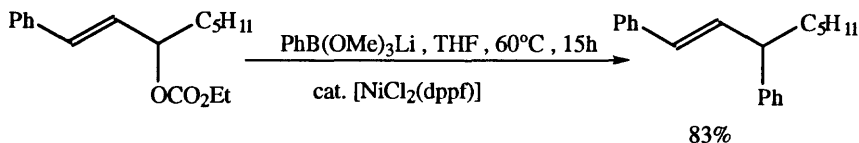
SECTION 66: ALKYL, METHYLENE AND ARYL FROM AMIDES

NO ADDITIONAL EXAMPLES

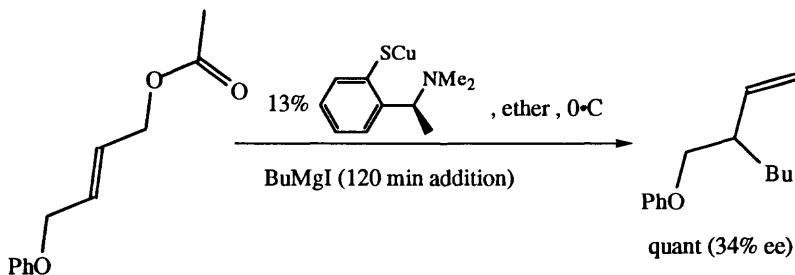
SECTION 67: ALKYL, METHYLENE AND ARYL FROM AMINES

NO ADDITIONAL EXAMPLES

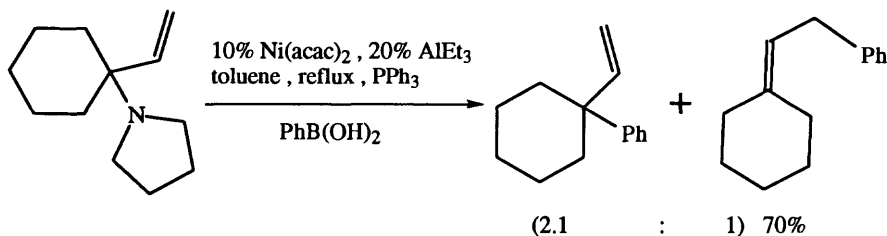
SECTION 68: ALKYL, METHYLENE AND ARYL FROM ESTERS



Kobayashi, Y.; Ikeda, E. *J. Chem. Soc. Chem. Commun.*, **1994**, 1789



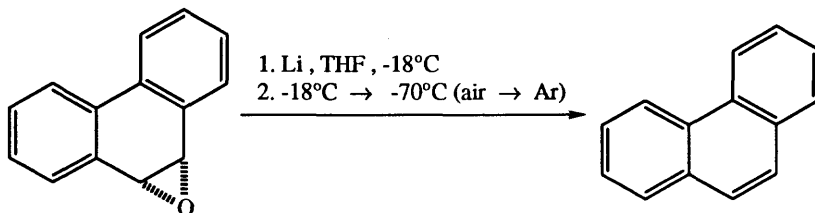
van Klaveren, M.; Persson, E.S.M.; del Villar, A.; Grove, D.M.; Bäckvall, J.-E. *Tetrahedron Lett.*, **1995**, *36*, 3059



Trost, B.M.; Spagnol, M.D. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 2083

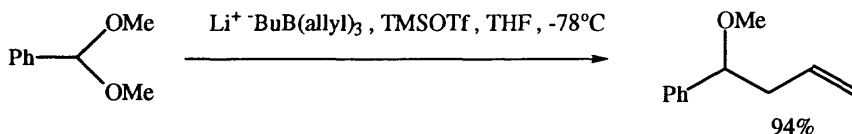
SECTION 69: ALKYL, METHYLENES AND ARYL FROM ETHERS, EPOXIDES AND THIOETHERS

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



95%

Elmalak, O.; Rabinovitz, M.; Blum, J. *J. Heterocyclic Chem.*, **1993**, 30, 291

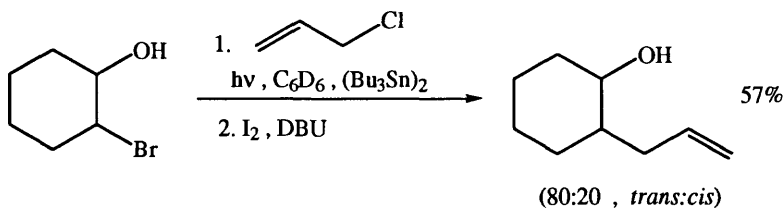


94%

Hunter, R.; Michael, J.P.; Tomlinson, G.D. *Tetrahedron*, **1994**, 50, 871

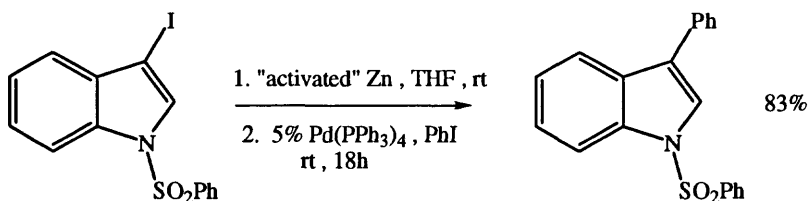
SECTION 70: ALKYL, METHYLENES AND ARYL FROM HALIDES AND SULFONATES

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



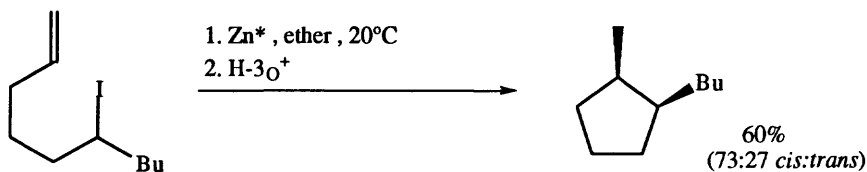
57%

Huval, C.C.; Singleton, D.A. *Tetrahedron Lett.*, **1993**, 34, 3041

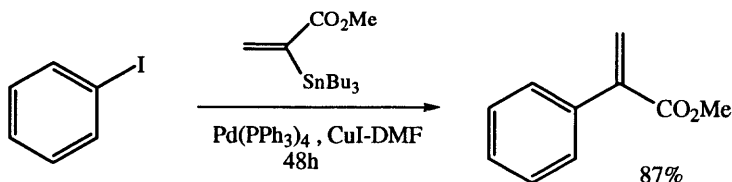


83%

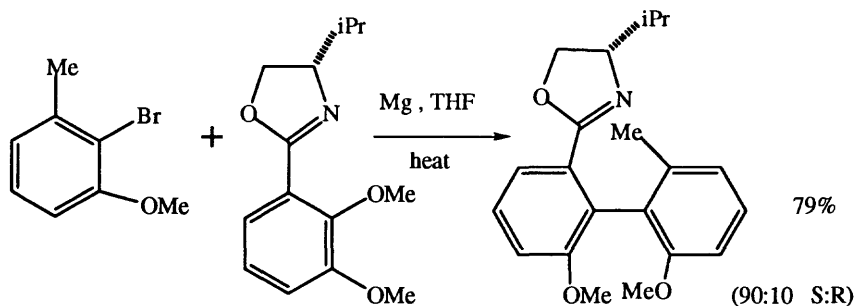
Sakamoto, T.; Kondo, Y.; Takazawa, N.; Yamanaka, H. *Tetrahedron Lett.*, **1993**, 34, 5955



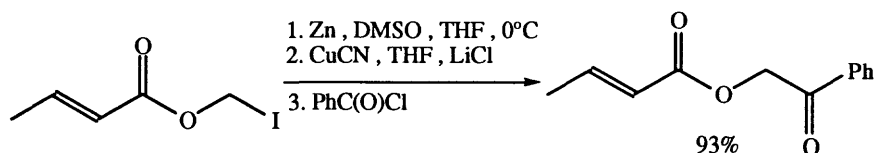
Meyer, C.; Marek, J.; Courtemanche, G.; Normant, J.-F. *Tetrahedron Lett.*, **1993**, 34, 6053



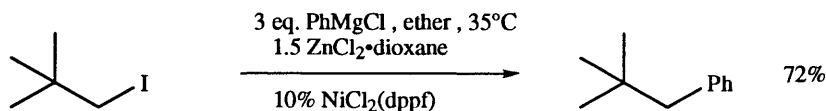
Levin, J.I. *Tetrahedron Lett.*, **1993**, 34, 6211



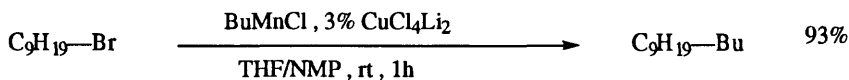
Moorlag, H.; Meyers, A.I. *Tetrahedron Lett.*, **1993**, 34, 6989, 6993



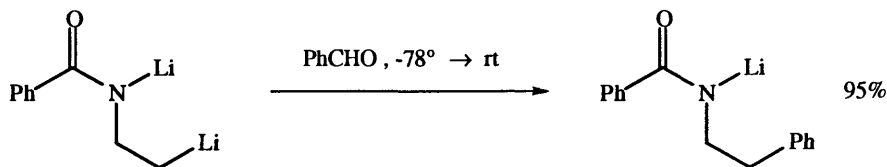
Knochel, P.; Chou, T.-S.; Jubert, C.; Rajagopal, D. *J. Org. Chem.*, **1993**, 58, 588



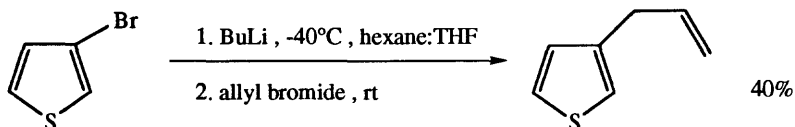
Park, K.; Yuan, K.; Scott, W.J. *J. Org. Chem.*, **1993**, 58, 4866



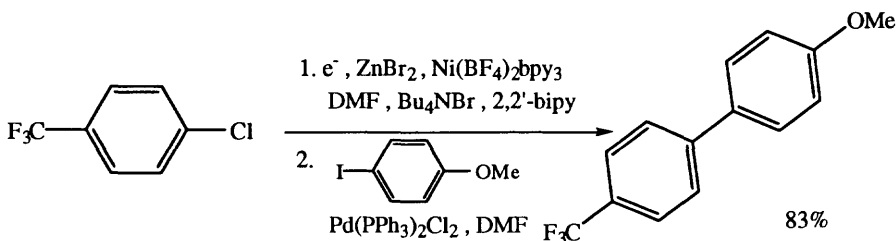
Cahiez, G.; Marquais, S. *Synlett*, **1993**, 45



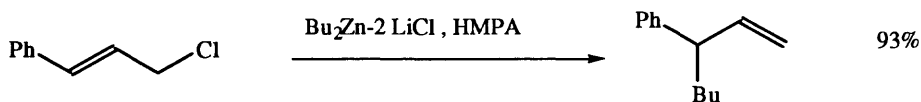
Barluega, J.; Montserrat, J.M.; Flórez, J. *J. Org. Chem.*, **1993**, *58*, 5976



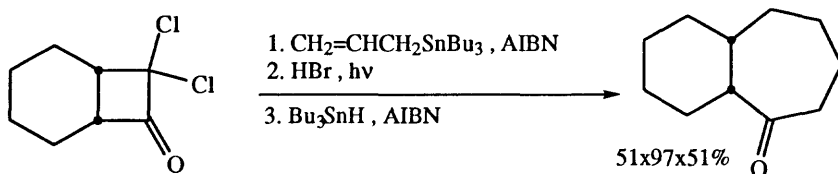
Wu, X.; Chen, T.-A.; Zhu, L.; Rieke, R.D. *Tetrahedron Lett.*, **1993**, *34*, 3673



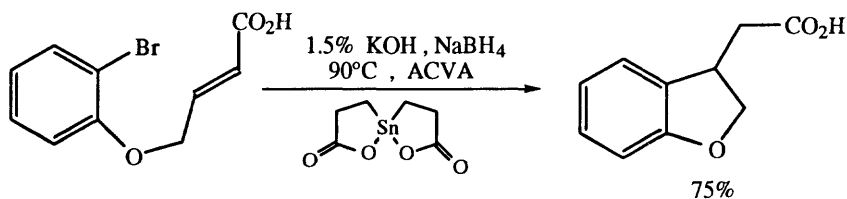
Sibille, S.; Ratovelomanana, V.; Nédélec, J.Y.; Périchon, J. *Synlett*, **1993**, 425



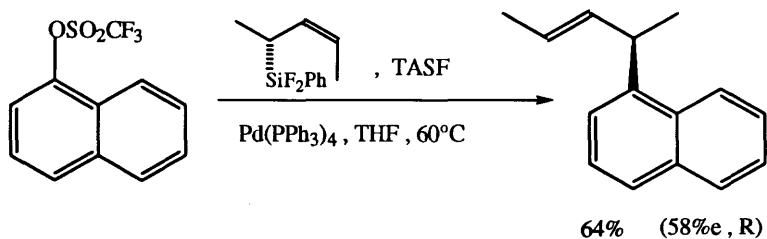
Arai, M.; Kawasuji, T.; Nakamura, E. *Chem. Lett.*, **1993**, 357



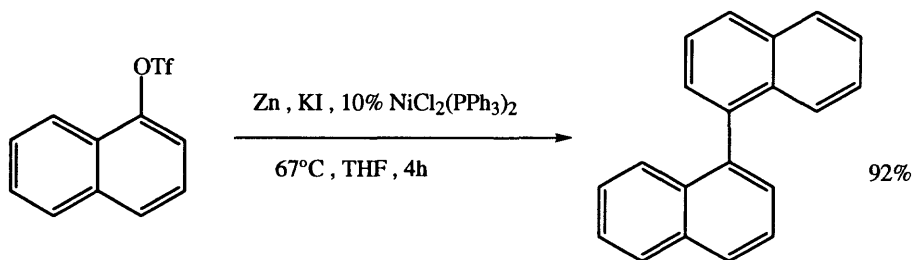
Zhang, W.; Hua, Y.; Hoge, G.; Dowd, P. *Tetrahedron Lett.*, **1994**, *35*, 3865



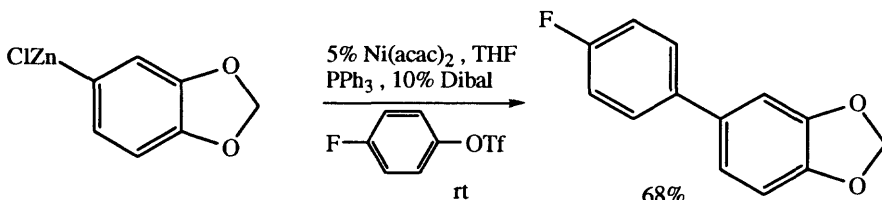
Rai, R.; Collum, D.B. *Tetrahedron Lett.*, **1994**, *35*, 6221



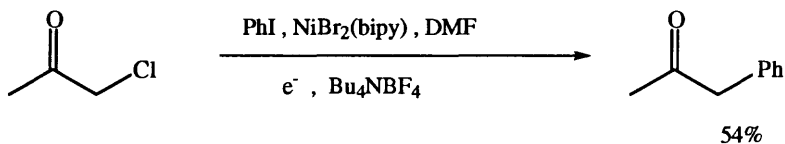
Hatanaka, Y.; Goda, K.; Hiyama, T. *Tetrahedron Lett.*, **1994**, 35, 1279



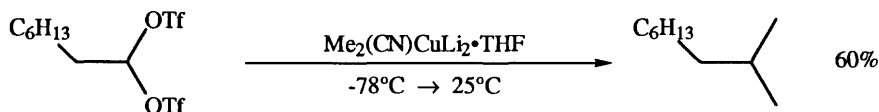
Jutand, A.; Mosleh, A. *Synlett*, **1993**, 568



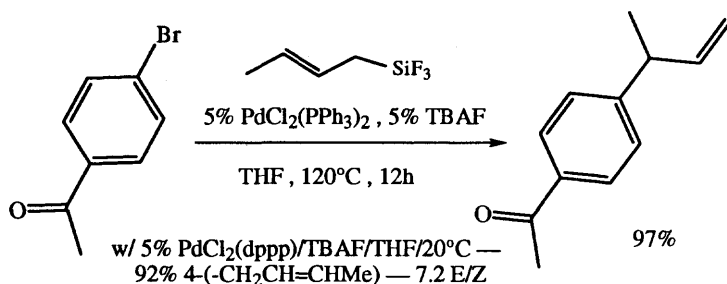
Quesnelle, C.A.; Familoni, O.B.; Snieckus, V. *Synlett*, **1994**, 349



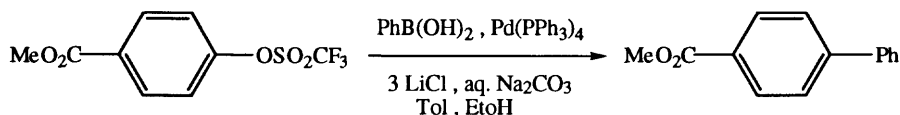
Drandetti, M.; Sibille, S.; Nédélec, J.-Y.; Périchon, J. *Synth. Commun.*, **1994**, 24, 145



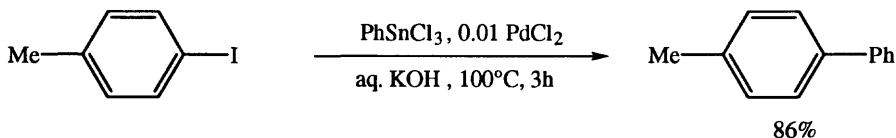
Martínez, A.G.; Barcina, J.O.; Díez, B.R.; Subramanian, L.R. *Tetrahedron*, **1994**, 50, 13231



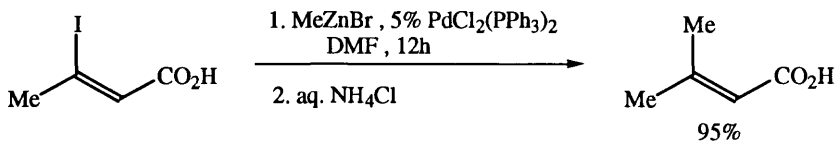
Hatanaka, Y.; Goda, K.; Hiyama, T. *Tetrahedron Lett.*, **1994**, 35, 6511



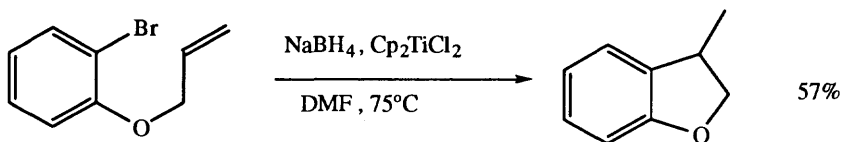
Percec, V.; Bae, J.-Y.; Hill, D.H. *J. Org. Chem.*, **1995**, 60, 1060



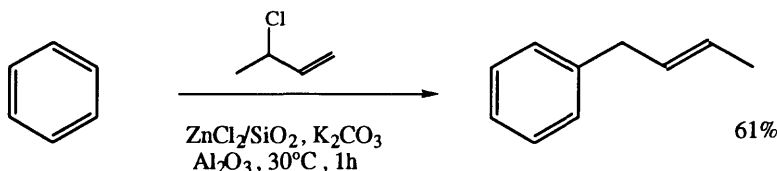
Roshchin, A.I.; Bumagin, N.A.; Beletskaya, I.P. *Tetrahedron Lett.*, **1995**, 36, 125



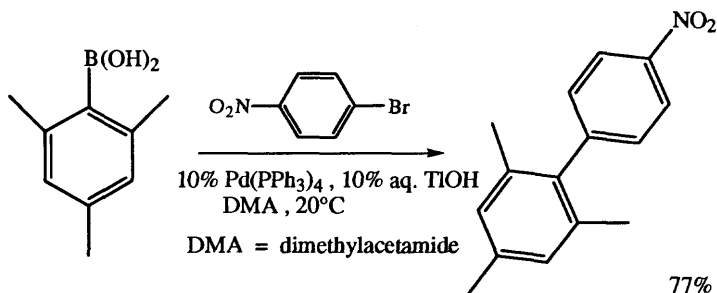
Abarbri, M.; Parrain, J.-L.; Duchêne, A. *Tetrahedron Lett.*, **1995**, 36, 2469



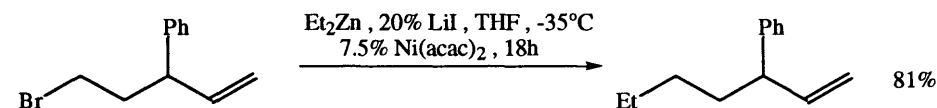
Liu, Y.; Schwartz, J. *Tetrahedron*, **1995**, 51, 4471



Kodomari, M.; Nawa, S.; Miyoshi, T. *J. Chem. Soc. Chem. Commun.*, **1995**, 1895



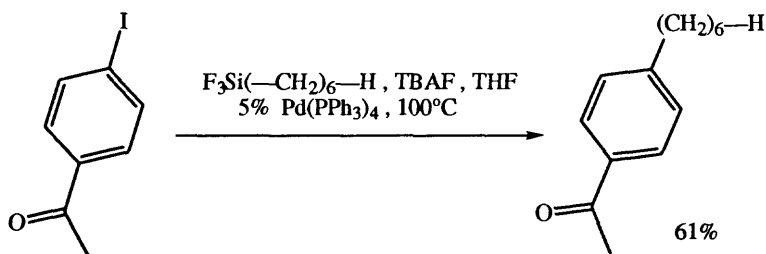
Anderson, J.C.; Namli, H. *Synlett*, **1995**, 765



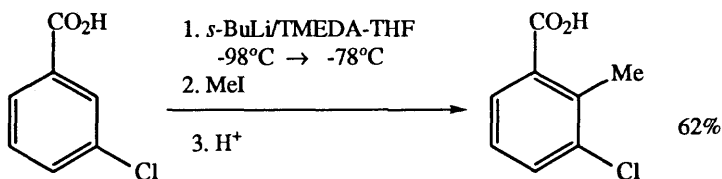
Devasagayaram, A.; Stüdemann, T.; Knochel, P. *Angew. Chem. Int. Ed. Engl.*, **1995**, 34, 2723

SECTION 71: ALKYL, METHYLENES AND ARYL FROM HYDRIDES

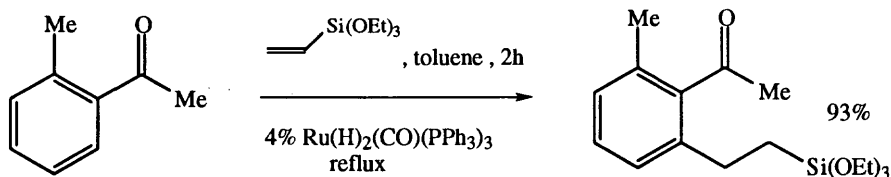
This section lists examples of the reaction of $RH \rightarrow RR'$ ($R, R' = \text{alkyl or aryl}$). For the reaction $C=CH \rightarrow C=C-R$ ($R = \text{alkyl or aryl}$), see Section 209 (Alkenes from Alkenes). For alkylations of ketones and esters, see Section 177 (Ketones from Ketones) and Section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



Matsushashi, H.; Juroboshi, M.; Hatanaka, Y.; Hiyama, T. *Tetrahedron Lett.*, **1994**, 35, 6507



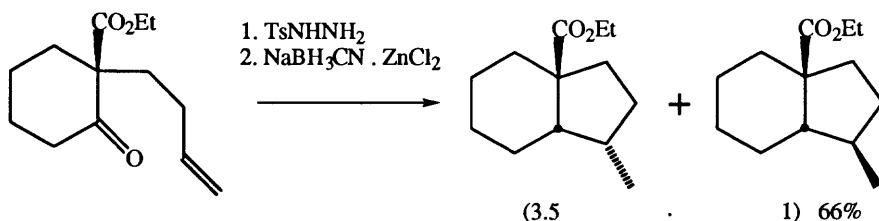
Bennetau, B.; Mortier, L.; Moyroud, J.; Guesnet, J.-L. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 1265



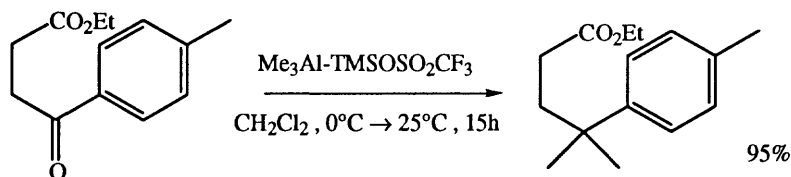
Kakiuchi, F.; Sekine, S.; Tanaka, Y.; Kamatani, A.; Sonoda, M.; Chatani, N.; Murai, S. *Bull. Chem. Soc. Jpn.*, **1995**, 68, 62

SECTION 72: ALKYLs, METHYLENES AND ARYLs FROM KETONES

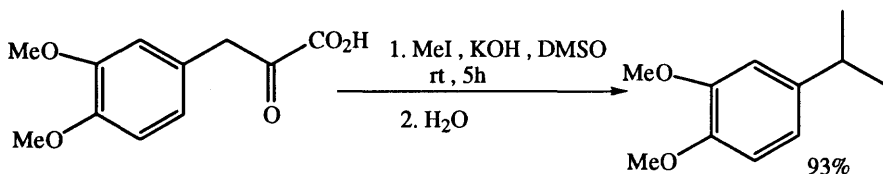
The conversions $\text{R}_2\text{C}=\text{O} \rightarrow \text{R-R}$, R_2CH_2 , $\text{R}_2\text{CHR}'$, etc. are listed in this section.



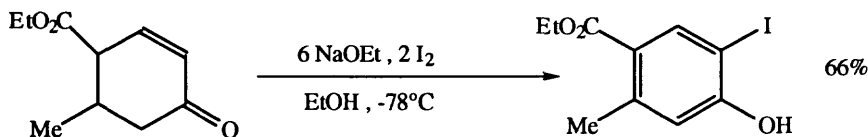
Taber, D.E.; Wang, Y.; Stachel, S.J. *Tetrahedron Lett.*, **1993**, 34, 6209



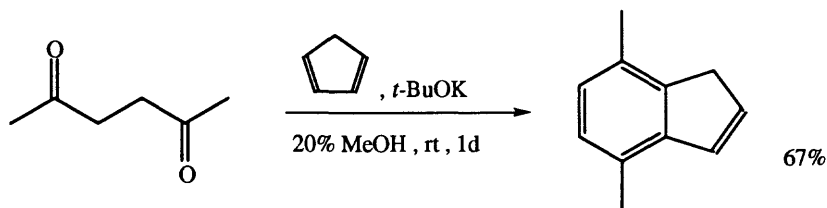
Kim, C.U.; Misco, P.F.; Luh, B.Y.; Mansuri, M.M. *Tetrahedron Lett.*, **1994**, 35, 3017



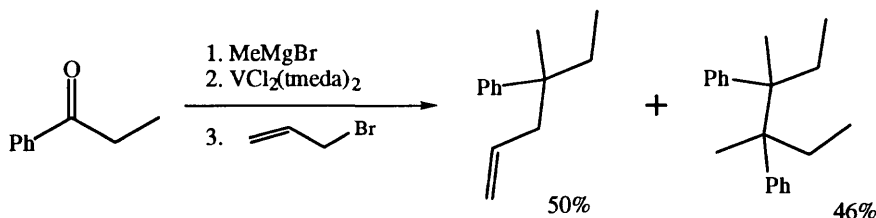
Yli-Kauhaluoma, J.T.; Janda, K.D. *Tetrahedron Lett.*, **1994**, 35, 4509



Hegde, S.G.; Kassim, A.M.; Ingrim, A.I. *Tetrahedron Lett.*, **1995**, 36, 8395



Coe, J.W.; Vetelino, M.G.; Kemp, D.S. *Tetrahedron Lett.*, **1994**, 35, 6627



Kataoka, Y.; Makihira, I.; Akiyama, H.; Tani, K. *Tetrahedron Lett.*, **1995**, 36, 6495

SECTION 73 ALKYL, METHYLENE AND ARYL FROM NITRILES

NO ADDITIONAL EXAMPLES

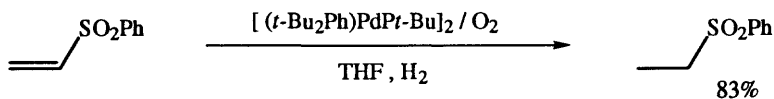
SECTION 74: ALKYL, METHYLENE AND ARYL FROM ALKENES

The following reaction types are included in this section:

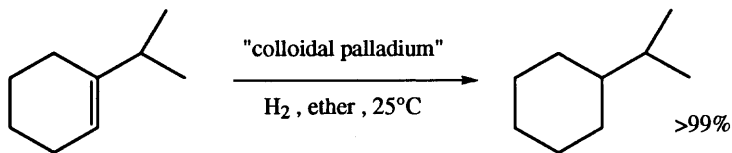
- A. Hydrogenation of Alkenes (and Aryls)
- B. Formation of Aryls
- C. Alkylations and Arylations of Alkenes
- D. Conjugate Reduction of Conjugated Aldehydes, Ketones, Acids, Esters and Nitriles
- E. Conjugate Alkylations
- F. Cyclopropanations, including halocyclopropanations

SECTION 74A: Hydrogenation of Alkenes (and Aryls)

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

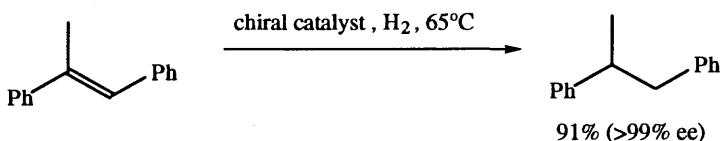


Cho, I.S.; Alper, H. *J. Org. Chem.*, **1994**, 59, 4027

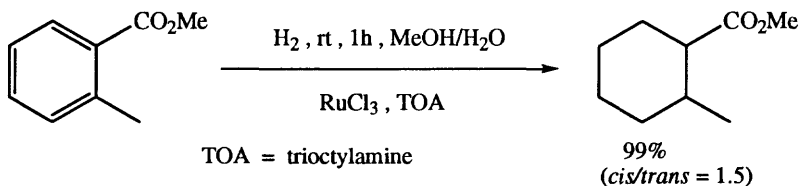


"colloidal palladium" = $[\text{TMS}(\text{OSiHMe})_n\text{OTMS}]\text{Pd}(\text{hfacac})_2$

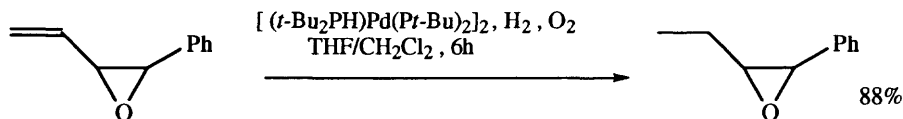
Fowley, L.A.; Michos, D.; Luo, X.-L.; Crabtree, R.H. *Tetrahedron Lett.*, **1993**, *34*, 3075



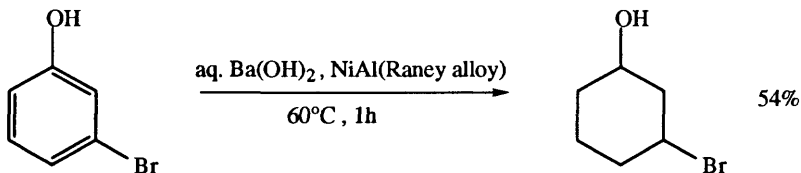
Broene, R.D.; Buchwald, S.L. *J. Am. Chem. Soc.*, **1993**, *115*, 12569



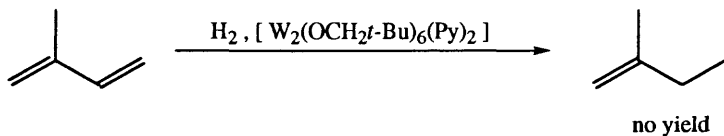
Fache, F.; Lehuède, S.; LeMaire, M. *Tetrahedron Lett.*, **1995**, *36*, 885



Cho, I.S.; Lee, B.; Alper, H. *Tetrahedron Lett.*, **1995**, *36*, 6009

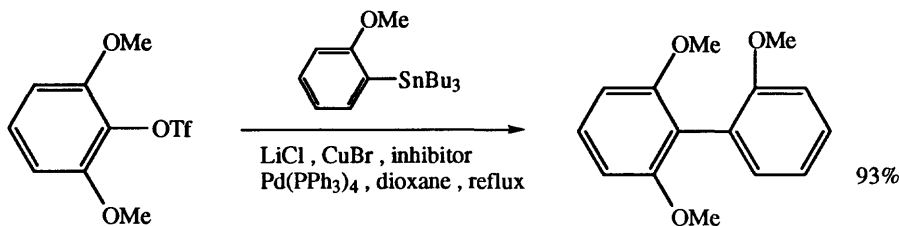


Tsukinoki, T.; Kakinami, T.; Iida, Y.; Ueno, M.; Ueno, Y.; Mashimo, T.; Tsuzuki, H.; Tashiro, M. *J. Chem. Soc. Chem. Commun.*, **1995**, 209

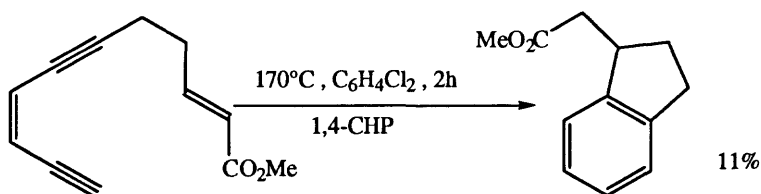


Barry, J.T.; Chisholm, M.H. *J. Chem. Soc. Chem. Commun.*, **1995**, 1599

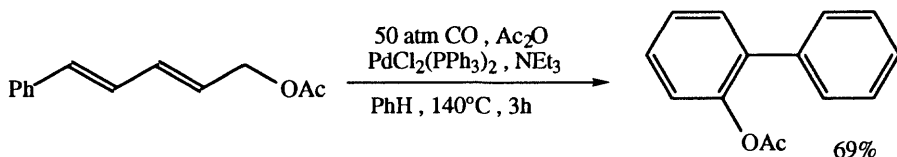
SECTION 74B: Formation of Aryls



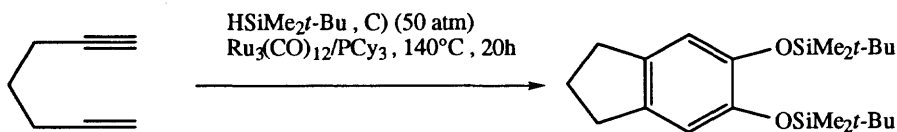
Saá, J.M.; Martorell, G. *J. Org. Chem.*, **1993**, *58*, 1963



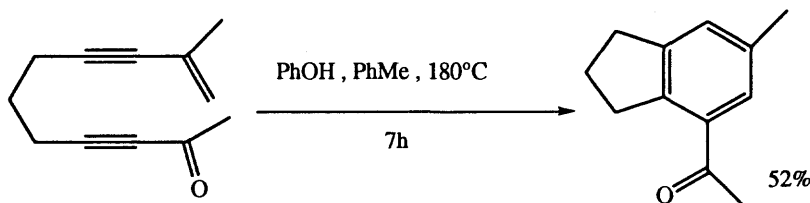
Grissom, J.W.; Calkins, T.L.; McMullen, H.A. *J. Org. Chem.*, **1993**, *58*, 6556



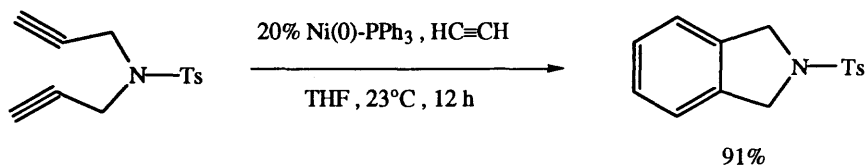
Ishii, Y.; Gao, C.; Xu, W.-X.; Iwasaki, M.; Hidai, M. *J. Org. Chem.*, **1993**, *58*, 6818



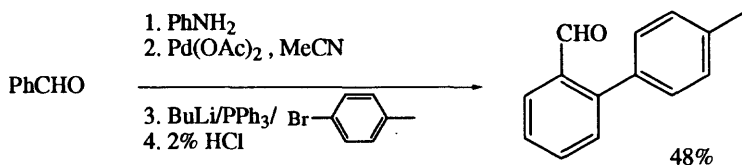
Chatani, N.; Fukumoto, Y.; Ida, T.; Murai, S. *J. Am. Chem. Soc.*, **1993**, *115*, 11614



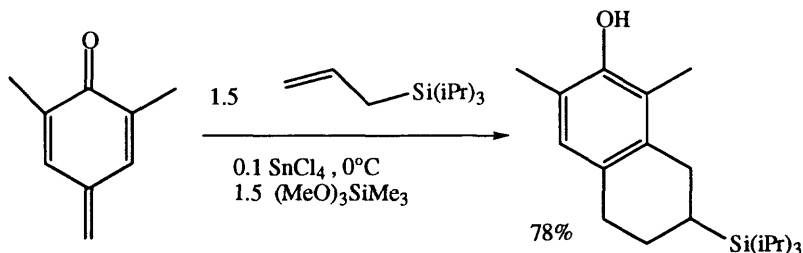
Danheiser, R.L.; Gould, A.E.; de la Pradilla, R.F.; Helgason, A.L. *J. Org. Chem.*, **1994**, *59*, 5514



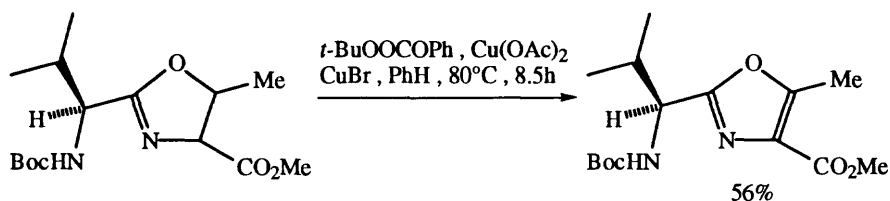
Sato, Y.; Nishimata, T.; Mori, M. *J. Org. Chem.*, **1994**, *59*, 6133



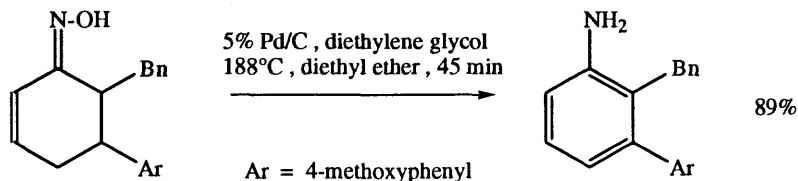
Rama Rao, A.V.; Reddy, K.L.; Reddy, M.M. *Tetrahedron Lett.*, **1994**, *35*, 5039



Angle, S.R.; Boyce, J.P. *Tetrahedron Lett.*, **1994**, *35*, 6461

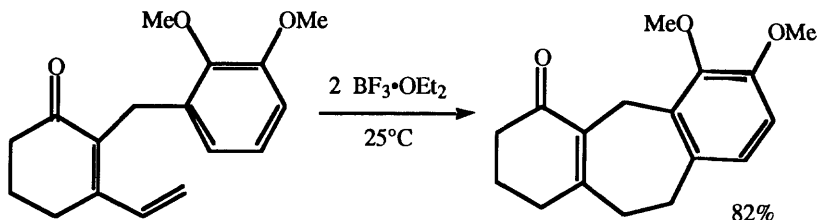


Tavares, F.; Meyers, A.I. *Tetrahedron Lett.*, **1994**, *35*, 6803



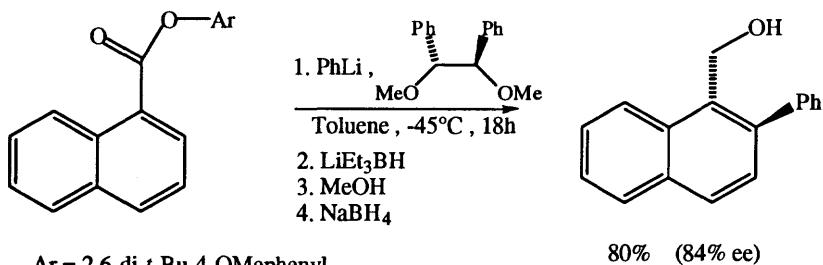
Matsumoto, M.; Tomizuka, J.; Suzuki, M. *Synth. Commun.*, **1994**, *24*, 1441

SECTION 74C: Alkylations and Arylations of Alkenes



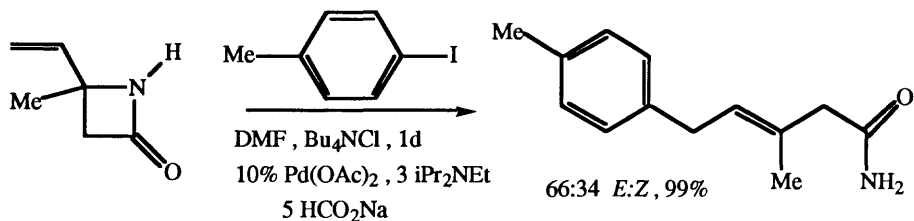
Majetich, G.; Zhang, Y.; Feltman, T.L. *Tetrahedron Lett.*, **1993**, 34, 441

Majetich, G.; Zhang, Y.; Feltman, T.L.; Duncan Jr., S. *Tetrahedron Lett.*, **1993**, 34, 445

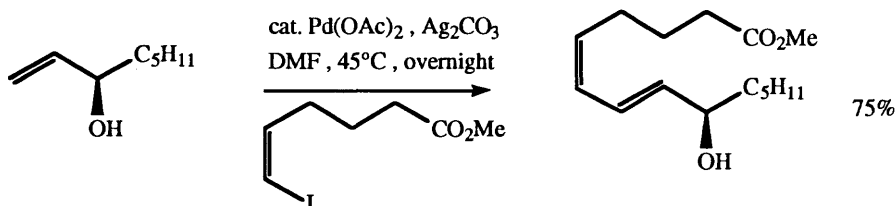


Ar = 2,6-di-*i*-Bu-4-OMe phenyl

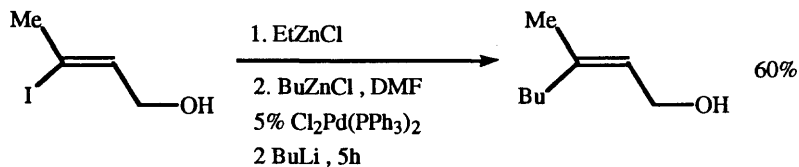
Tomioaka, K.; Shindo, M.; Koga, K. *Tetrahedron Lett.*, **1993**, 34, 681



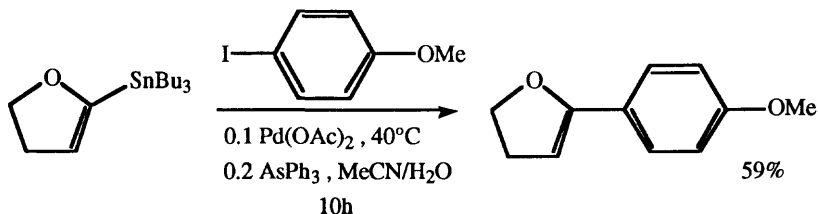
Larock, R.C.; Ding, S. *Tetrahedron Lett.*, **1993**, 34, 979



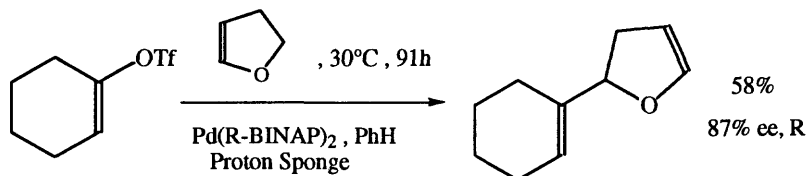
Jeffery, T. *Tetrahedron Lett.*, **1993**, 34, 1133



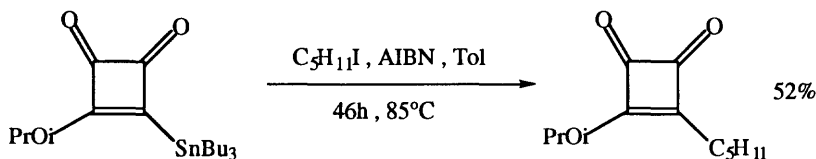
Negishi, E.; Ay, M.; Gulevich, Y.V.; Noda, Y. *Tetrahedron Lett.*, **1993**, *34*, 1437



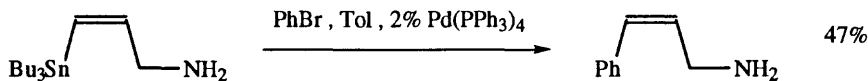
Zhang, H-C.; Brakta, M.; Daves Jr., G.D. *Tetrahedron Lett.*, **1993**, *34*, 1571



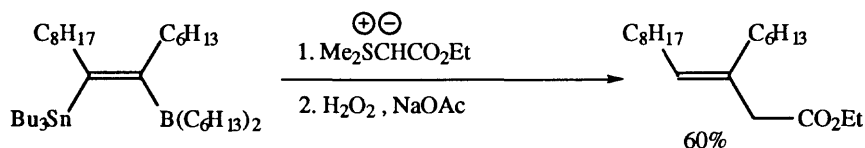
Ozawa, E.; Kobatake, T.; Hayashi, T. *Tetrahedron Lett.*, **1993**, *34*, 2505



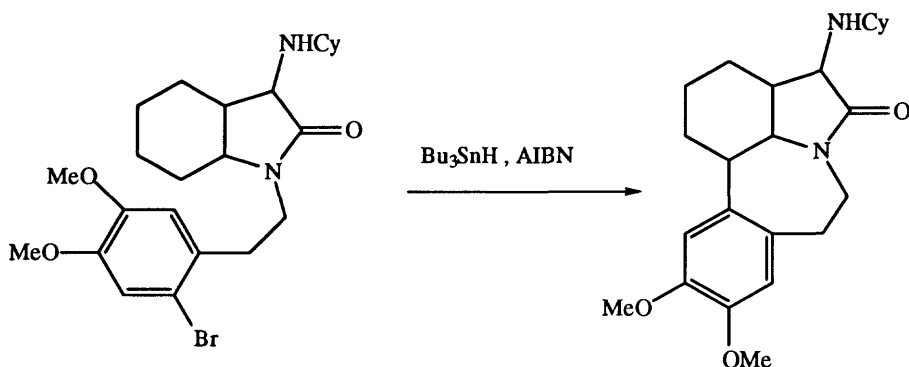
Kinney, W.A. *Tetrahedron Lett.*, **1993**, *34*, 2715



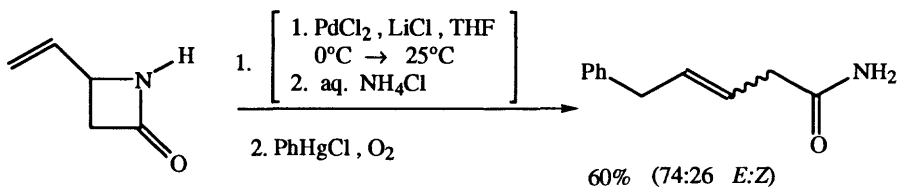
Corriu, R.J.P.; Geng, B.; Moreau, J.J.E. *J. Org. Chem.*, **1993**, *58*, 1443



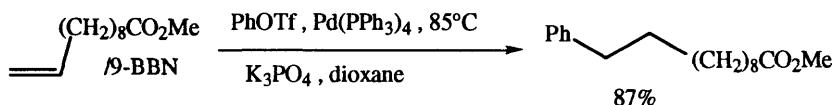
Deng, M.-Z.; Li, N.-S.; Huang, Y.-Z. *J. Org. Chem.*, **1993**, *58*, 1949



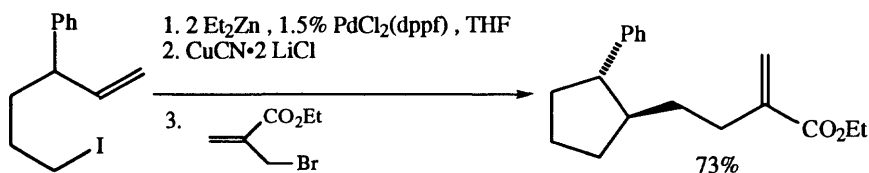
Rigby, J.H.; Qabar, M.N. *J. Org. Chem.*, **1993**, *58*, 4473



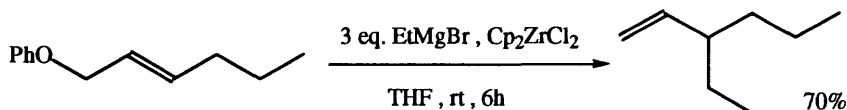
Larock, R.C.; Ding, S. *J. Org. Chem.*, **1993**, *58*, 2081



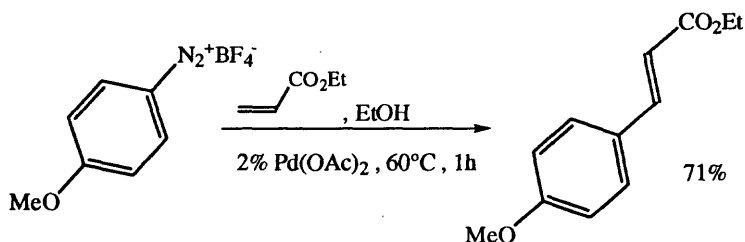
Oh-e, T.; Miyaura, N.; Suzuki, A. *J. Org. Chem.*, **1993**, *58*, 2201



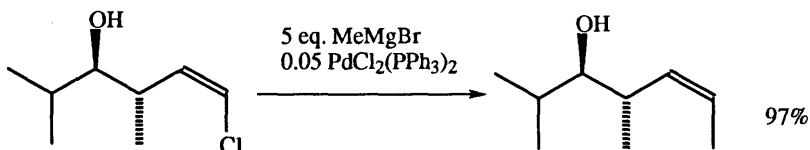
Stadmüller, H.; Lentz, R.; Tucker, C.E.; Stüdemann, T.; Dörner, W.; Knochel, P. *J. Am. Chem. Soc.*, **1993**, *115*, 7027



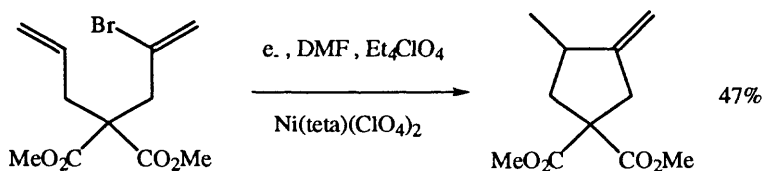
Suzuki, N.; Kondakov, D.Y.; Takahashi, T. *J. Am. Chem. Soc.*, **1993**, *115*, 8485



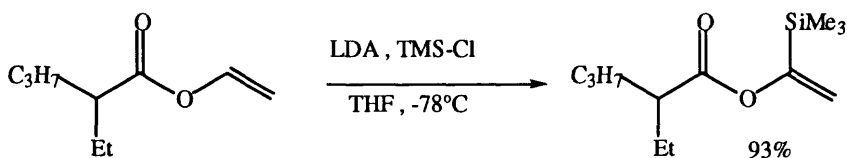
Sengupta, S.; Bhattacharyya, S. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1943



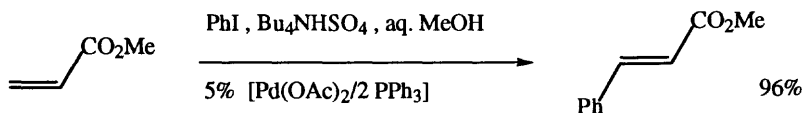
Hoffmann, R.W.; Giesen, V.; Fuest, M. *Liebigs Ann. Chem.*, **1993**, 629



Ozaki, S.; Horiguchi, I.; Matsushita, H.; Ohmori, H. *Tetrahedron Lett.*, **1994**, 35, 725

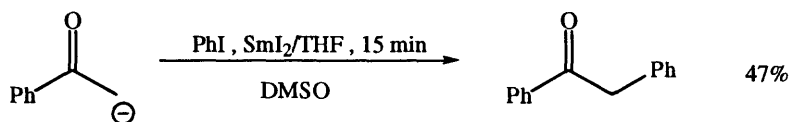


Wright, S.W. *Tetrahedron Lett.*, **1994**, 35, 1841

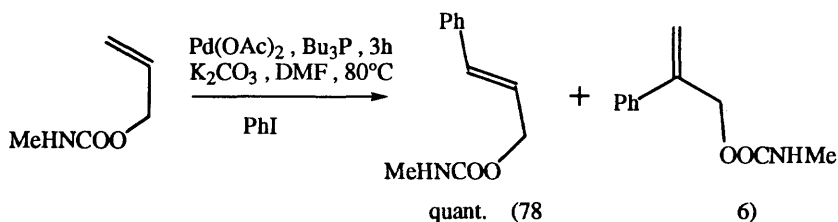


Heck reaction in aqueous media

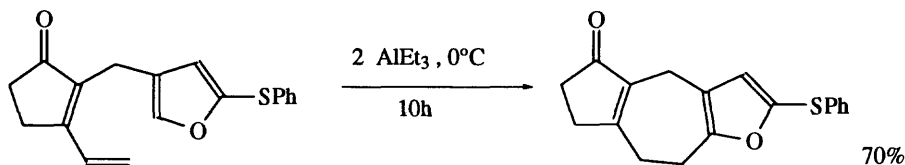
Jeffery, T. *Tetrahedron Lett.*, **1994**, 35, 3051



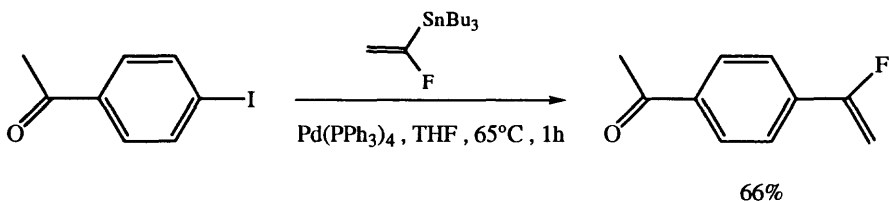
Nazareno, M.A.; Rossi, R.A. *Tetrahedron Lett.*, **1994**, 35, 5185



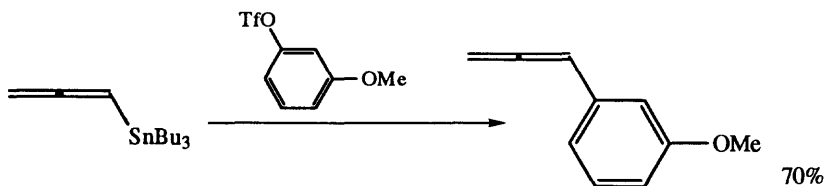
Ono, K.; Fugami, K.; Tanaka, S.; Tamaru, Y. *Tetrahedron Lett.*, **1994**, 35, 4133



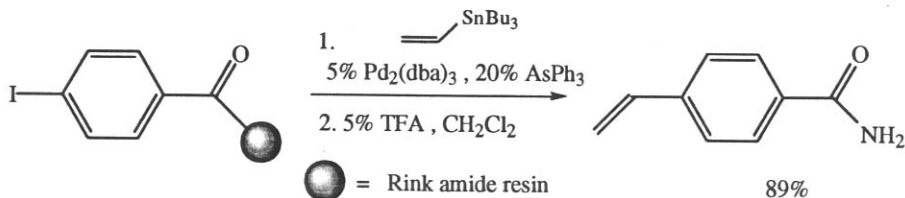
Majetich, G.; Zhang, Y.; Liu, S. *Tetrahedron Lett.*, **1994**, 35, 4887



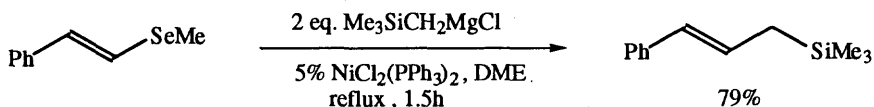
Matthews, D.P.; Waid, P.P.; Sabol, J.S.; McCarthy, J.R. *Tetrahedron Lett.*, **1994**, 35, 5177



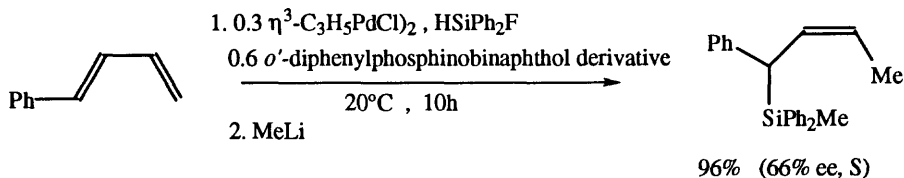
Badone, D.; Cardamone, R.; Guzzi, U. *Tetrahedron Lett.*, **1994**, 35, 5477



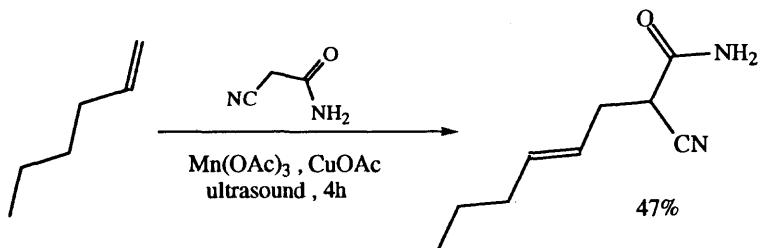
Deshpande, M.S. *Tetrahedron Lett.*, **1994**, 35, 5613



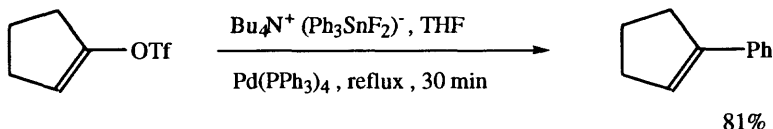
Hevesi, L.; Hermans, B.; Allard, C. *Tetrahedron Lett.*, 1994, 35, 6729



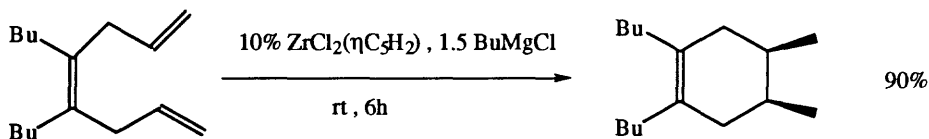
Hatanaka, Y.; Goda, K.; Yamashita, F.; Hiyama, T. *Tetrahedron Lett.*, **1994**, 35, 7981



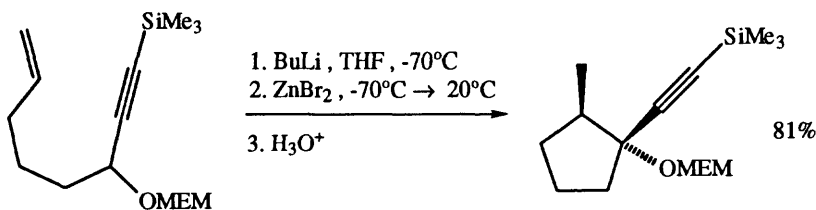
Bosman, C.; D'Annibale, A.; Resta, S.; Trogolo, C. *Tetrahedron Lett.*, 1994, 35, 8049

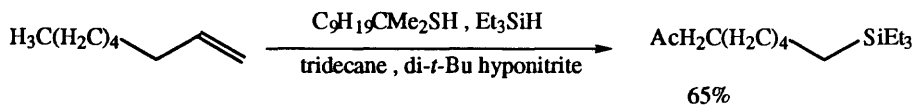


Martinez, A.G.; Barcina, J.O.; Cerezo, A. de F.; Subramanian, L.R. *Synlett*, 1994, 1047

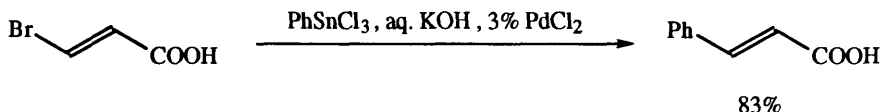


Takahashi, T.; Kitora, M.; Kasai, K. *J. Chem. Soc. Chem. Commun.*, 1994, 2693

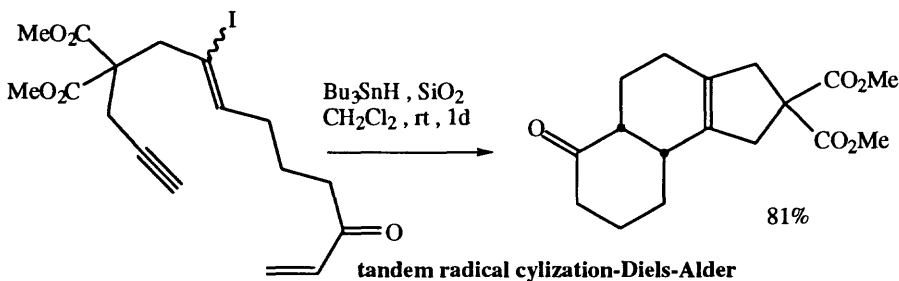




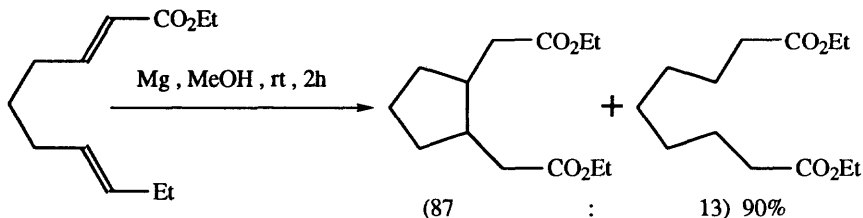
Dang, H.-S.; Roberts, B.P. *Tetrahedron Lett.*, 1995, 36, 2875



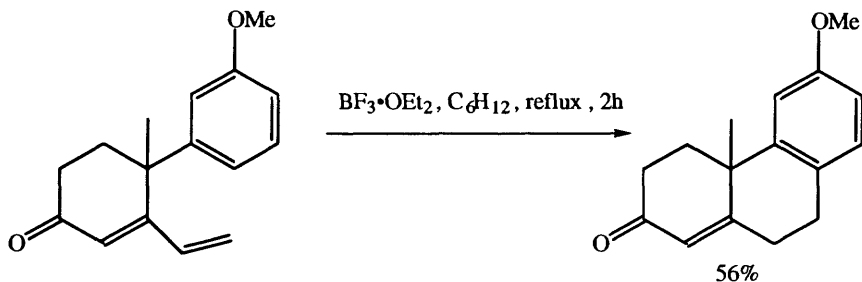
Rai, R.; Aubrecht, K.B.; Collum, D.B. *Tetrahedron Lett.*, 1995, 36, 3169



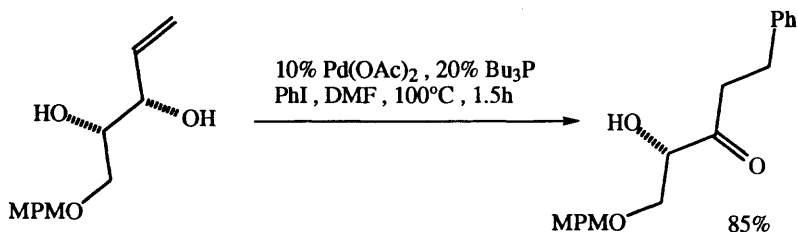
Journet, M.; Malacria, M. *J. Org. Chem.*, 1995, 60, 6885



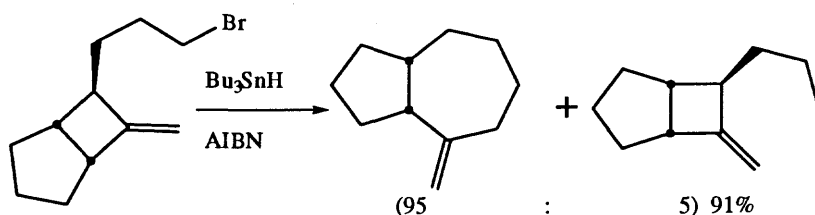
Chavan, S.P.; Ethiraj, K.S. *Tetrahedron Lett.*, 1995, 36, 2281



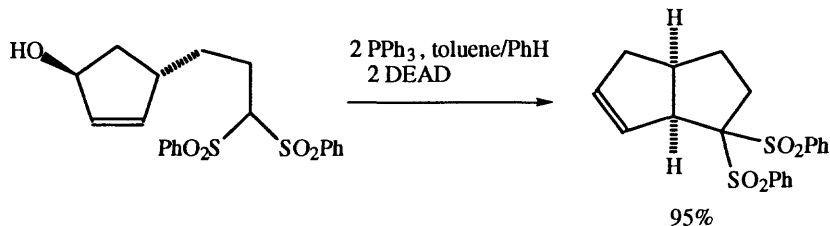
Majeti, G.; Liu, S.; Siesel, D. *Tetrahedron Lett.*, 1995, 36, 4749



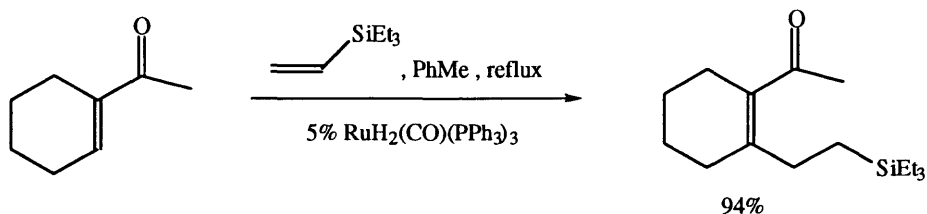
Kang, S.-K.; Jung, K.-Y.; Park, C.-H.; Namkoong, E.-Y.; Kim, T.-H. *Tetrahedron Lett.*, **1995**, 36, 6287



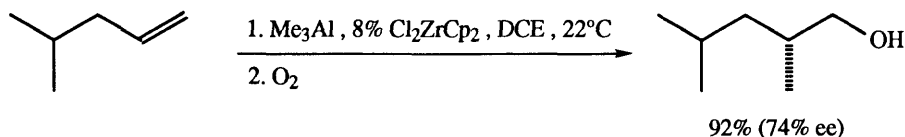
Zhang, W.; Dowd, P. *Tetrahedron Lett.*, **1995**, 36, 8539



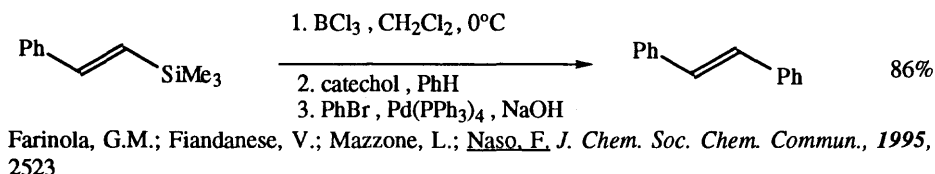
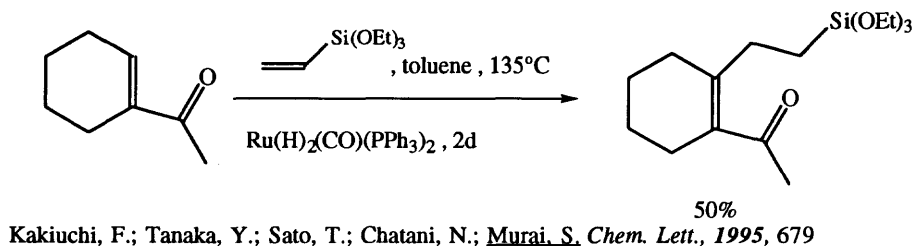
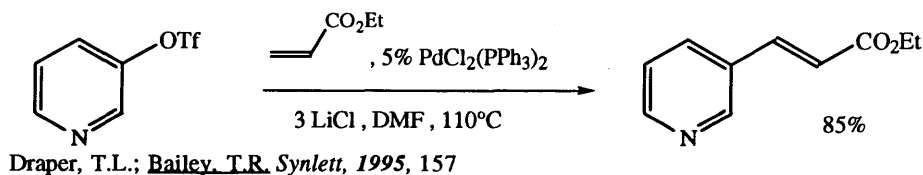
Yu, J.; Cho, H.S.; Falck, J.R. *Tetrahedron Lett.*, **1995**, 36, 8577



Trost, B.M.; Imi, K.; Davies, I.W. *J. Am. Chem. Soc.*, **1995**, 117, 5371

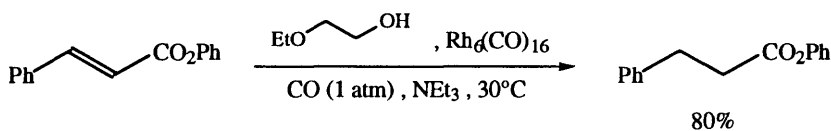
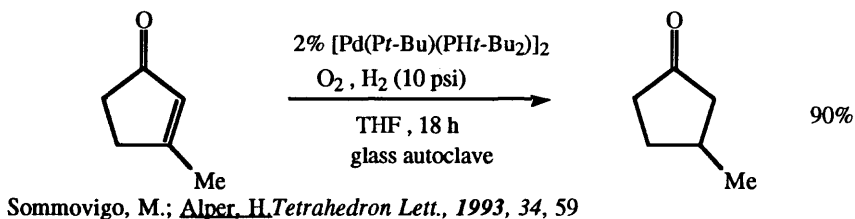


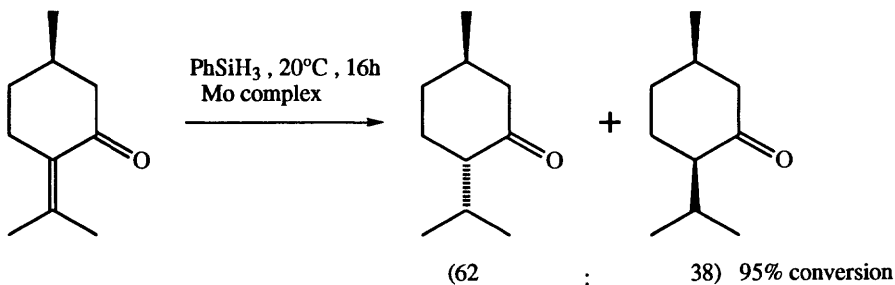
Kondakov, D.Y.; Negishi, E. *J. Am. Chem. Soc.*, **1995**, 117, 10771

**REVIEW:**

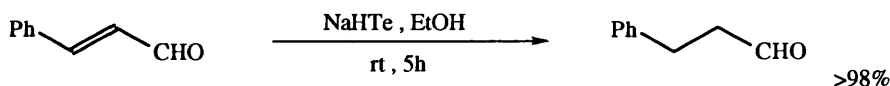
"Recent Developments and New Perspectives In The Heck Reaction," Cabri, W.; Candiani, T. *Accts. Chem. Res.*, 1995, 28, 2

SECTION 74D: Conjugate Reduction of α,β -Unsaturated Carbonyl Compounds and Nitriles

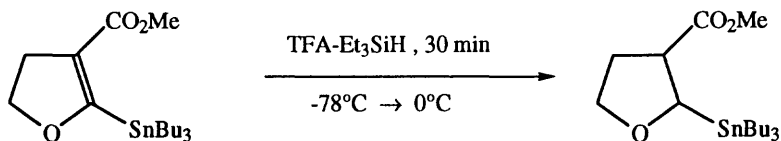




Schmidt, T. *Tetrahedron Lett.*, **1994**, 35, 3513

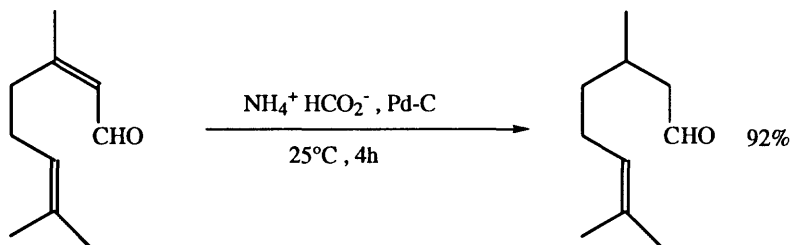


Yamashita, M.; Tanaka, Y.; Arita, A.; Nishida, M. *J. Org. Chem.*, **1994**, 59, 3500

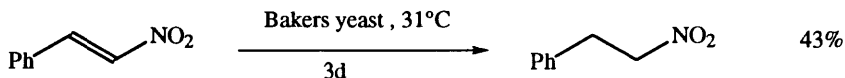


various protonic and Lewis acids used

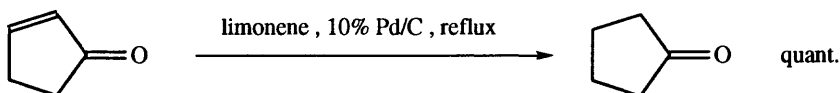
Zhao, Y.; Quayle, P.; Keo, E.A. *Tetrahedron Lett.*, **1994**, 35, 4179



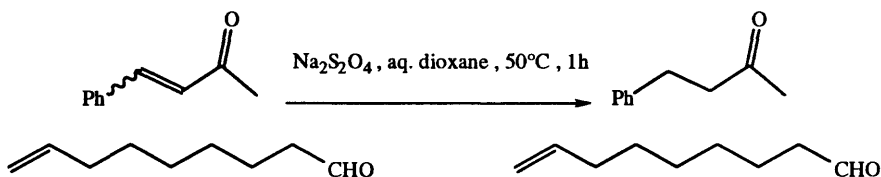
Ranu, B.C.; Sarkar, A. *Tetrahedron Lett.*, **1994**, 35, 8649



Takeshita, M.; Yoshida, S.; Kohno, Y. *Heterocycles*, **1994**, 37, 553

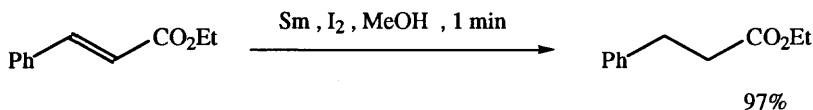


von Holleben, M.L.; Zucolotto, M.; Zini, C.A.; Oliveira, E.R. *Tetrahedron*, **1994**, 50, 973

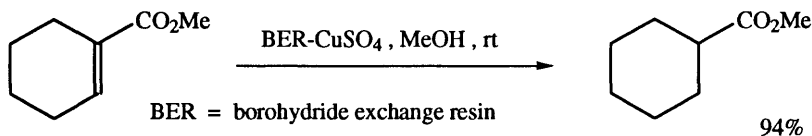


selective reduction of conjugated carbonyl C=C units

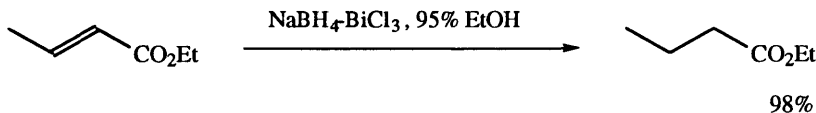
Dhillon, R.S.; Singh, R.P.; Kaur, D. *Tetrahedron Lett.*, **1995**, *36*, 1107



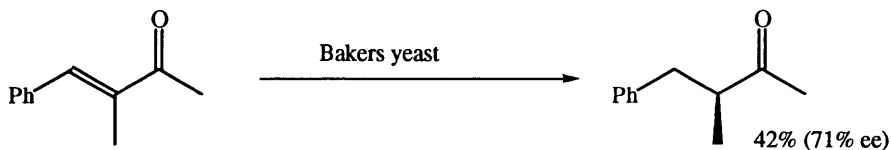
Yanada, R.; Bessho, K.; Yanada, K. *Synlett*, **1995**, 443



Sim, T.B.; Yoon, N.M. *Synlett*, **1995**, 726

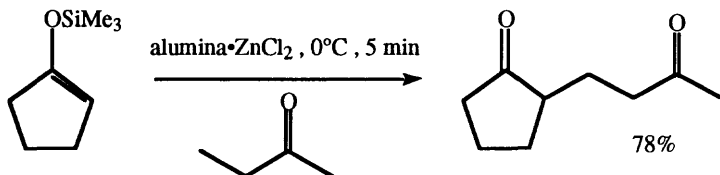


Ren, P.-D.; Pan, S.-F.; Dong, T.-W.; Wu, S.-H. *Synth. Commun.*, **1995**, *25*, 3395

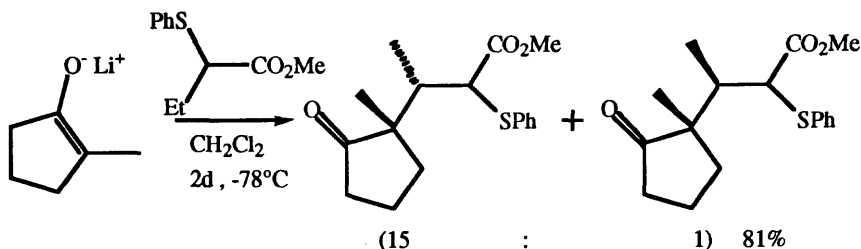


Kawai, Y.; Saitou, K.; Hida, K.; Ohno, A. *Tetrahedron Asymmetry*, **1995**, *6*, 2143

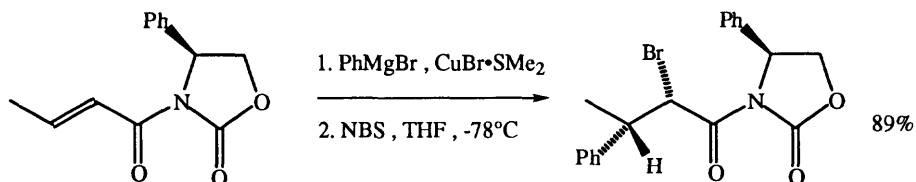
SECTION 74E: Conjugate Alkylations



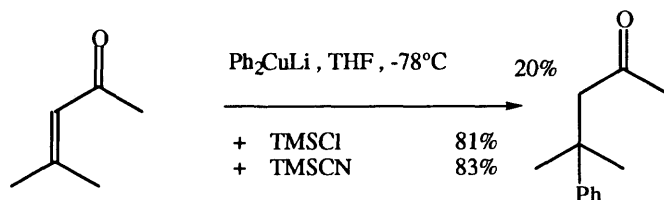
Ranu, B.C.; Saha, M.; Bhar, S. *Tetrahedron Lett.*, **1993**, *34*, 1989



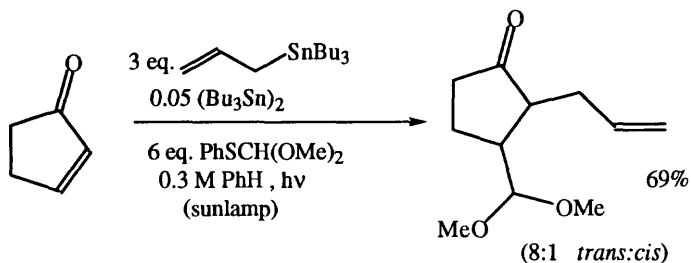
Corey, E.J.; Houpin, I.N. *Tetrahedron Lett.*, 1993, 34, 2421



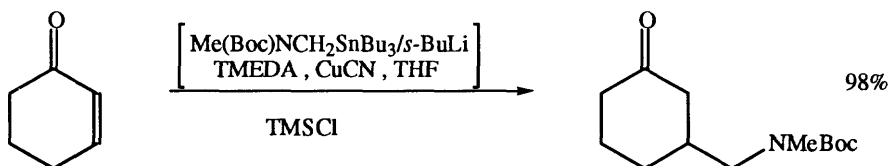
Li, G.; Jarosinski, M.A.; Hruby, V.J. *Tetrahedron Lett.*, 1993, 34, 2565



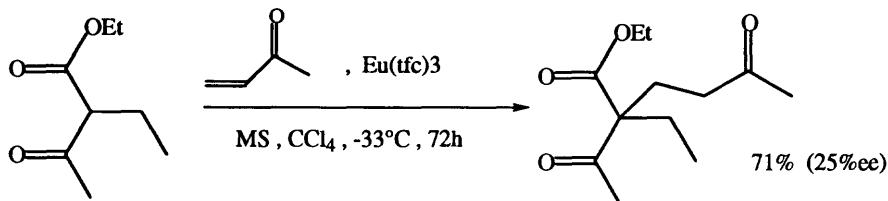
Lipshutz, B.H.; James, B. *Tetrahedron Lett.*, 1993, 34, 6689



Keck, G.E.; Kordik, C.P. *Tetrahedron Lett.*, 1993, 34, 6875

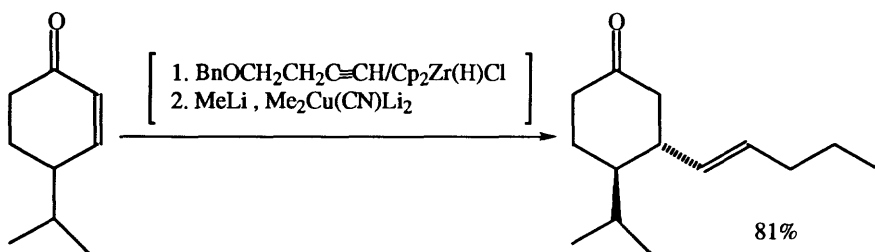


Dieter, R.K.; Alexander, C.W. *Synlett*, 1993, 407

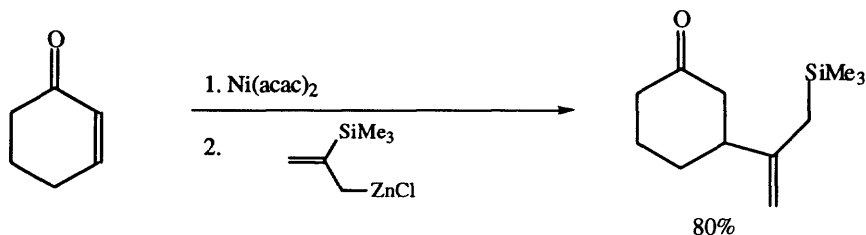


$\text{Eu}(\text{tfc})_3$ = [tris-(3-trifluoromethylhydroxymethylene)-d-camphorato] europium (III)

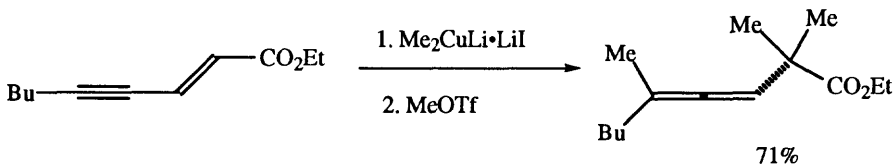
Bonadies, F.; Lattanzi, A.; Orelli, L.R.; Resci, S.; Scretti, A. *Tetrahedron Lett.*, **1993**, 34, 7649



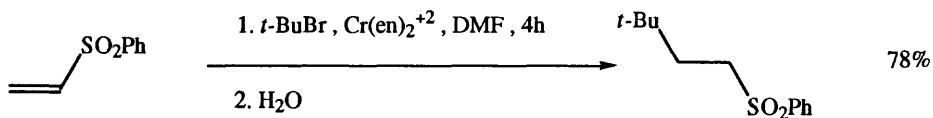
Lipshutz, B.H.; Wood, M.R. *J. Am. Chem. Soc.*, **1993**, 115, 12625



Eshelby, J.J.; Crowley, P.J.; Parsons, P.J. *Synlett*, **1993**, 279

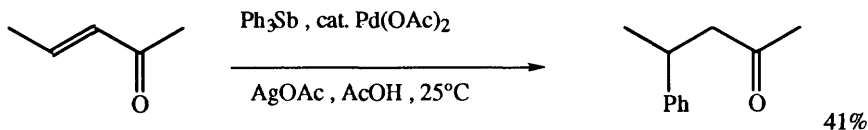


Arndt, S.; Handke, G.; Krause, N. *Chem. Ber.*, **1993**, 126, 251

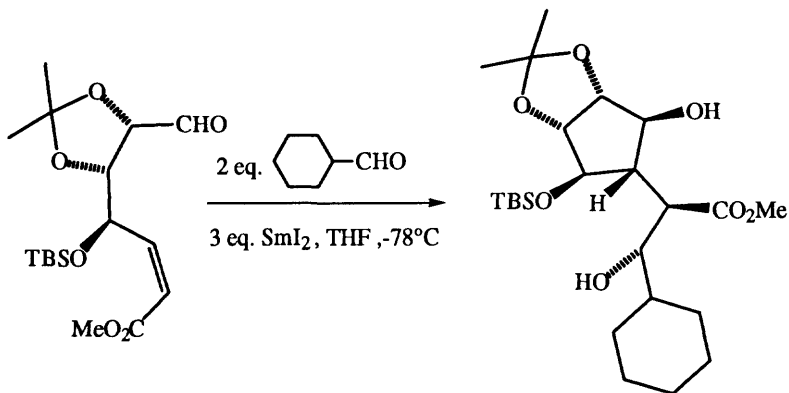


en = ethylene diamine

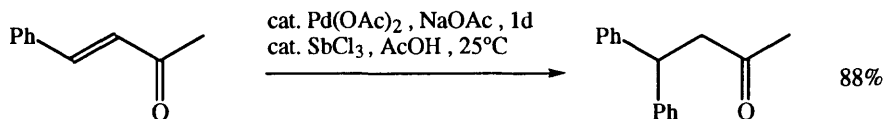
Tashtoush, H.I.; Sustmann, R. *Chem. Ber.*, **1993**, 126, 1759



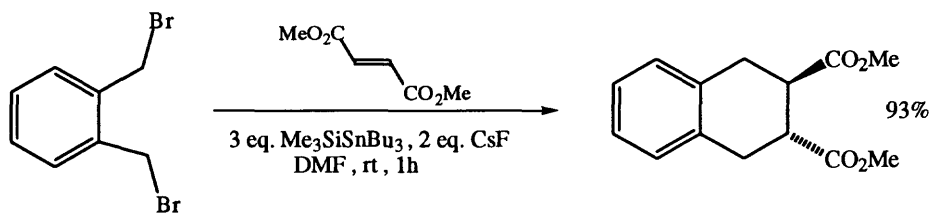
Cho, C.S.; Tanabe, K.; Uemura, S. *Tetrahedron Lett.*, **1994**, *35*, 1275



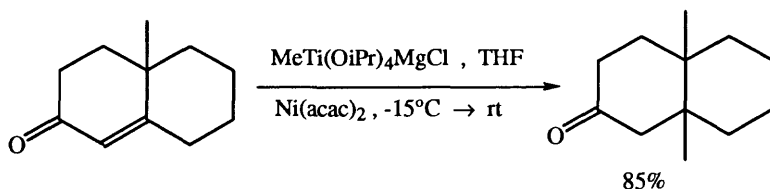
Enholm, E.J.; Trivellas, A. *Tetrahedron Lett.*, **1994**, *35*, 1627



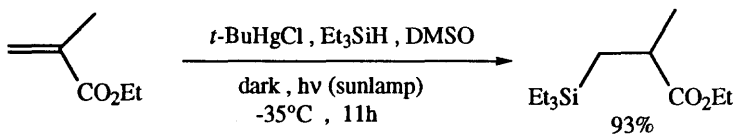
Cho, C.S.; Motofusa, S.; Uemura, S. *Tetrahedron Lett.*, **1994**, *35*, 1739



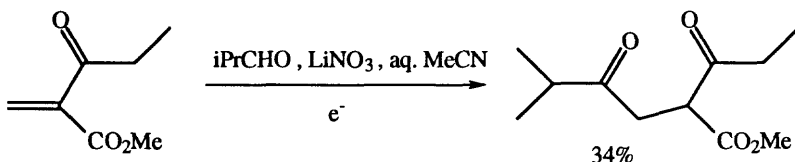
Sato, H.; Isono, N.; Okamura, K.; Date, T.; Mori, M. *Tetrahedron Lett.*, **1994**, *35*, 2035



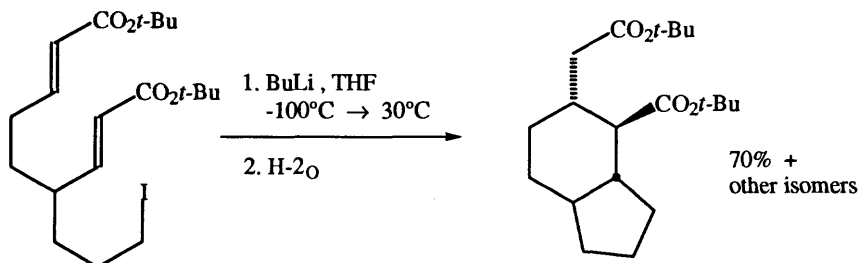
Flemming, S.; Kabbara, J.; Nickisch, K.; Neh, H.; Westermann, J. *Tetrahedron Lett.*, **1994**, *35*, 6075



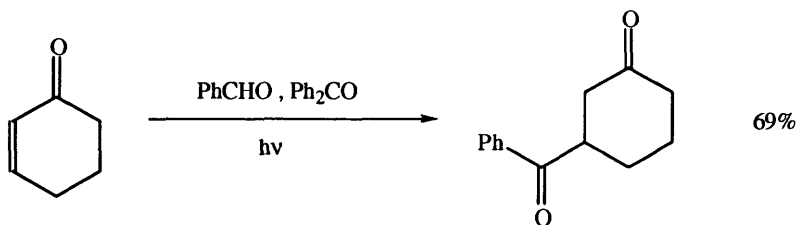
Russell, G.A.; Shi, B.Z. *Tetrahedron Lett.*, **1994**, 35, 3841



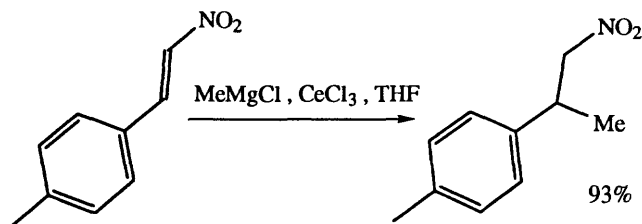
Shono, T.; Soejima, T.; Takigawa, K.; Yamaguchi, Y.; Maekawa, H.; Kashimura, S. *Tetrahedron Lett.*, **1994**, 35, 4161



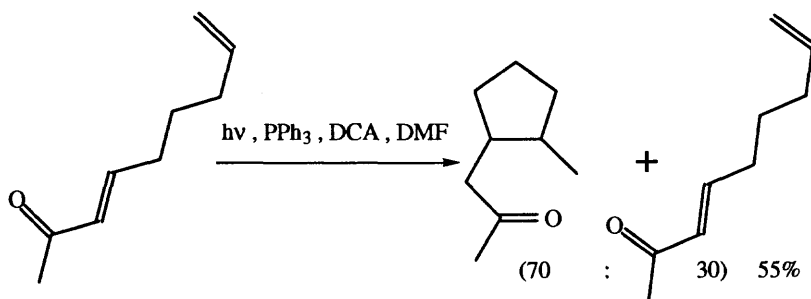
Cooke Jr., M.P.; Gopal, D. *Tetrahedron Lett.*, **1994**, 35, 2837



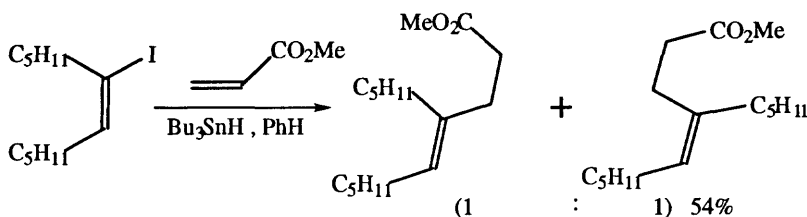
Kraus, G.A.; Liu, P. *Tetrahedron Lett.*, **1994**, 35, 7723



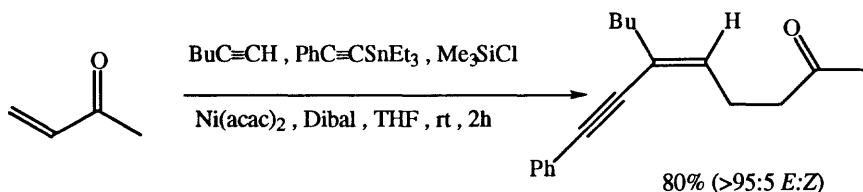
Bartoli, G.; Bosco, M.; Sambri, L.; Marcantoni, E. *Tetrahedron Lett.*, **1994**, 35, 8651



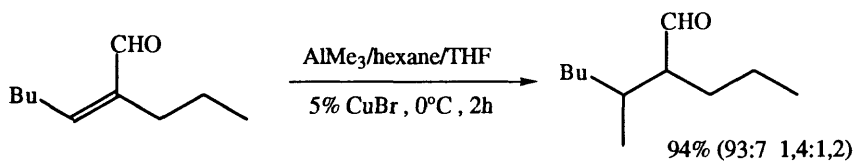
Pandey, G.; Hajra, S.; Ghorai, M.K. *Tetrahedron Lett.*, **1994**, 35, 7837



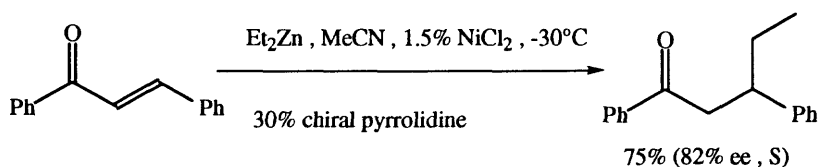
Miura, K.; Itoh, D.; Hondo, T.; Hosomi, A. *Tetrahedron Lett.*, **1994**, 35, 9605



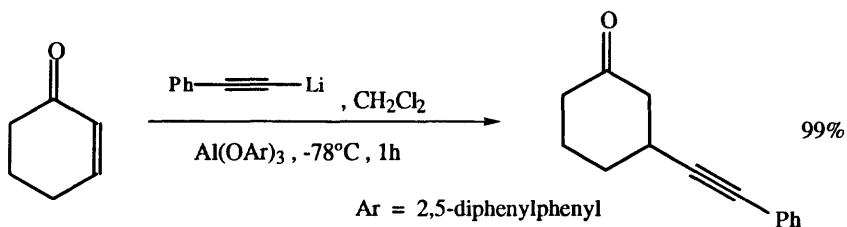
Ikeda, S.; Sato, Y. *J. Am. Chem. Soc.*, **1994**, 116, 5975



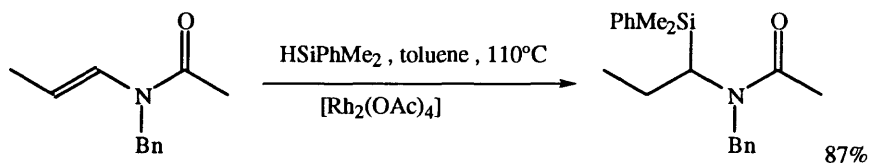
Kabbara, J.; Flemming, S.; Nickisch, K.; Neh, H.; Westermann, J. *Synlett*, **1994**, 679



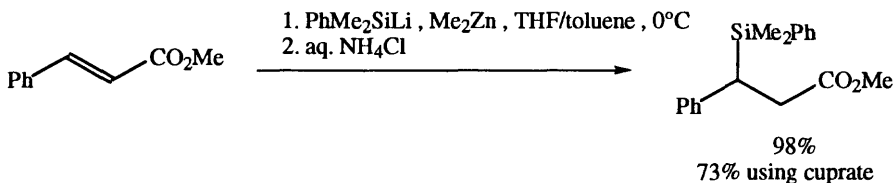
Asami, M.; Usui, K.; Higuchi, S.; Inoue, S. *Chem. Lett.*, **1994**, 297



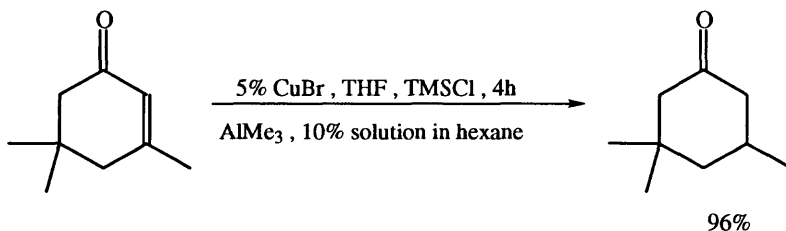
Maruoka, K.; Shimada, I.; Imoto, H.; Yamamoto, H. *Synlett*, **1994**, 519



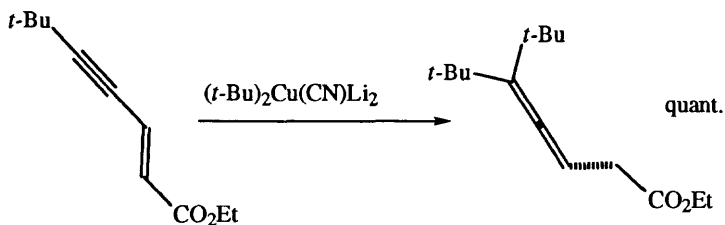
Murai, T.; Oda, T.; Kimura, F.; Onishi, H.; Kanda, T.; Kato, S. *J. Chem. Soc. Chem. Commun.*, **1994**, 2143



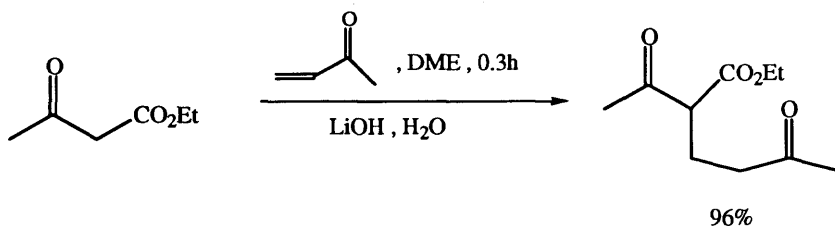
Crump, R.A.N.C.; Fleming, I.; Urch, C.J. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 701



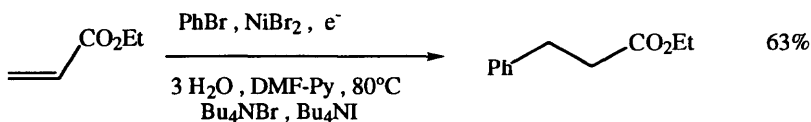
Kabbara, J.; Flemming, S.; Nickisch, K.; Neh, H.; Westermann, J. *Chem. Ber.*, **1994**, 127, 1489



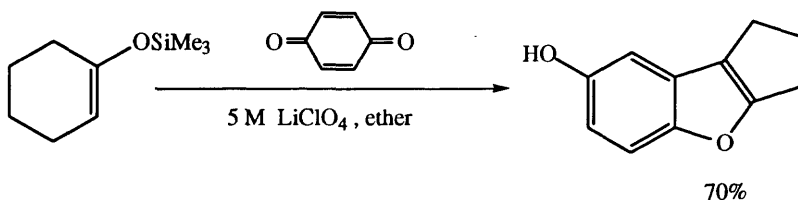
Gerold, A.; Krause, N. *Chem. Ber.*, **1994**, 127, 1547



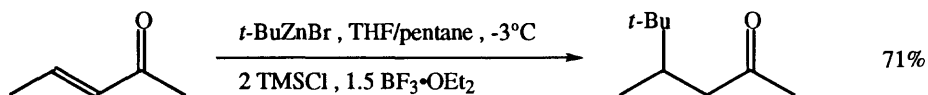
Bonadies, E.; Forcellese, M.L.; Locati, L.; Screttri, A.; Scolamiero, C. *Gazz. Chim. Ital.*, **1994**, *124*, 467



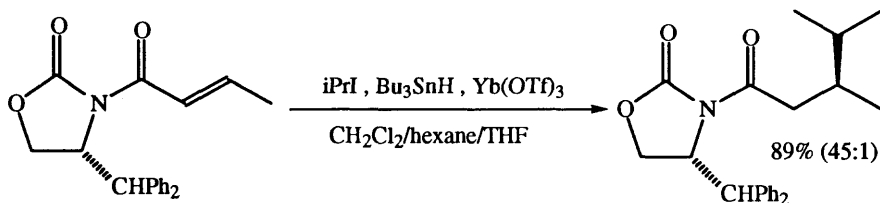
Condon-Guegnot, S.; Léonel, E.; Nédélec, J.-Y.; Périchon, J. *J. Org. Chem.*, **1995**, *60*, 7684



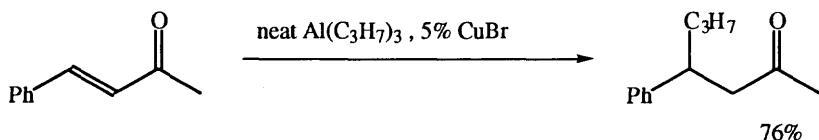
Sarawathy, V.G.; Sankararaman, S. *J. Org. Chem.*, **1995**, *60*, 5024



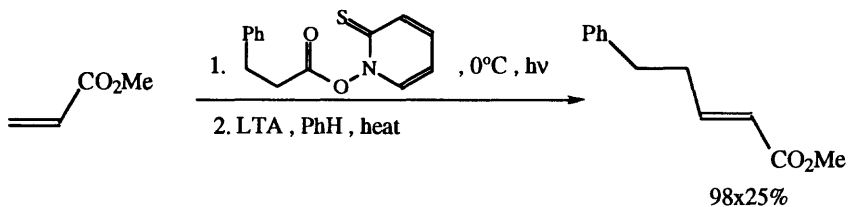
Hanson, M.V.; Rieke, R.D. *J. Am. Chem. Soc.*, **1995**, *117*, 10775



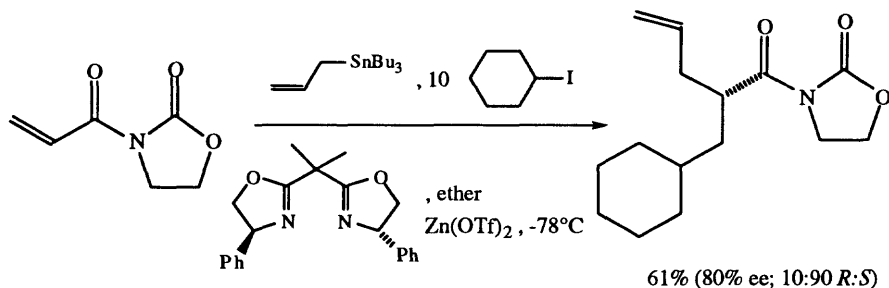
Sibi, M.P.; Jasperse, C.P.; Ji, J. *J. Am. Chem. Soc.*, **1995**, *117*, 10779



Kabbara, L.; Flemming, S.; Nickisch, K.; Neh, H.; Westermann, J. *Tetrahedron*, **1995**, *51*, 743



Barton, D.H.R.; Chern, C.-Y.; Jaszberenyi, J.Cs. *Tetrahedron*, **1995**, *51*, 1867

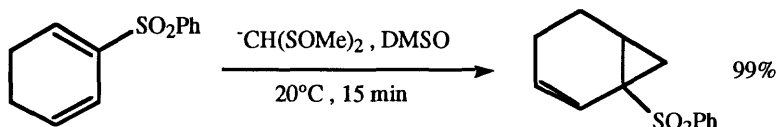


Wu, J.H.; Radinov, R.; Porter, N.A. *J. Am. Chem. Soc.*, **1995**, *117*, 11029

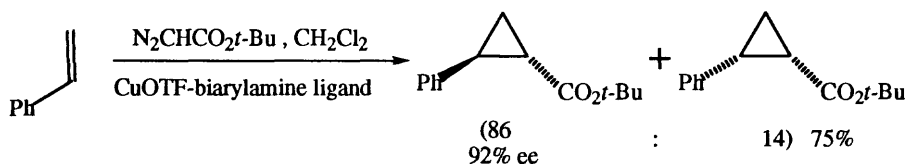
REVIEW:

"Intramolecular Michael and Anti-Michael Additions to Carbon-Carbon Triple Bonds," Rudolf, W.-D.; Schwarz, R. *Synlett*, **1993**, 341

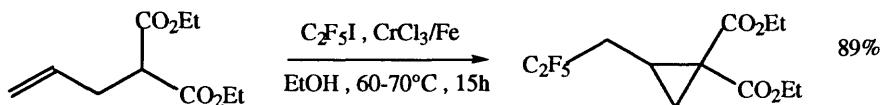
SECTION 74F: Cyclopropanations, including Halocyclopropanations



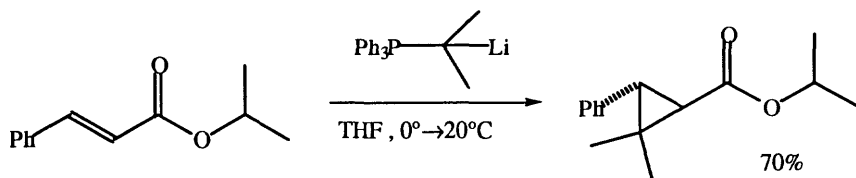
Bäckvall, J.-E.; Löfstöm, C.; Juntunen, S.K. *Tetrahedron Lett.*, **1993**, *34*, 2007



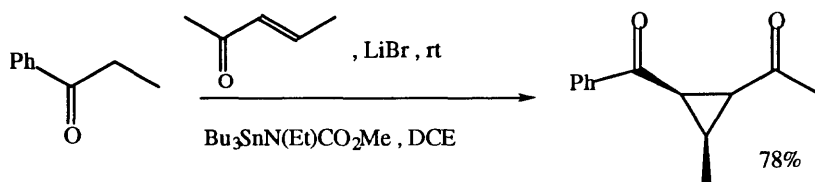
Ito, K.; Katsuki, T. *Tetrahedron Lett.*, **1993**, *34*, 2661



Hu, C.-M.; Chen, J. *Tetrahedron Lett.*, **1993**, *34*, 5957

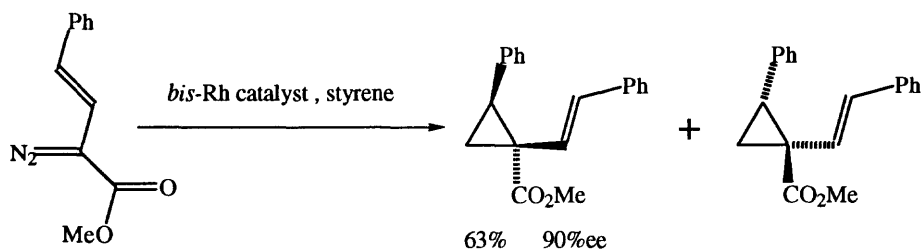


Kreif, A.; Dubois, P. *Tetrahedron Lett.*, **1993**, 34, 2691

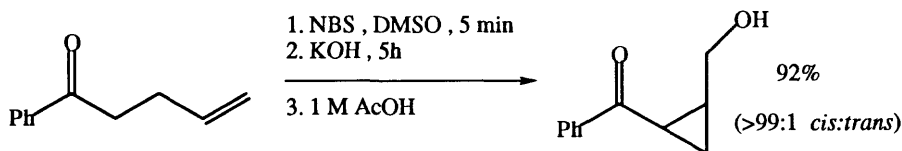


(93:7 1,2-*trans*:*cis*)

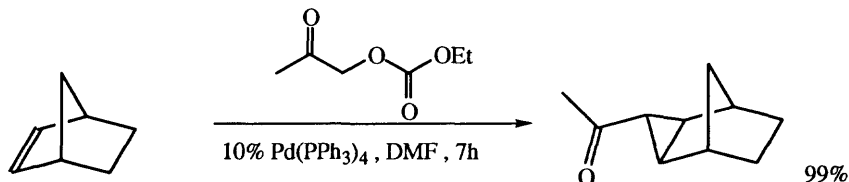
Shibata, I.; Mori, Y.; Yamasaki, H.; Baba, A.; Matsuda, H. *Tetrahedron Lett.*, **1993**, 34, 6567



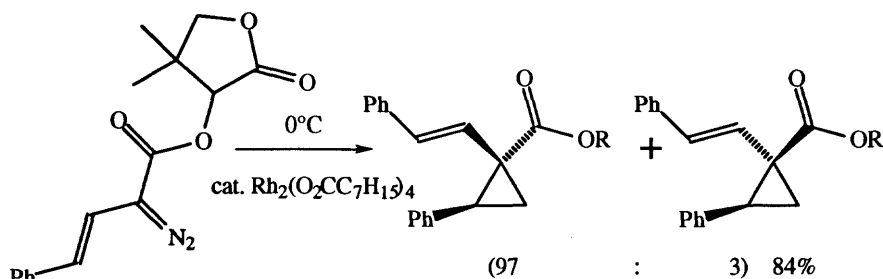
Davies, H.M.L.; Hutcheson, D.K. *Tetrahedron Lett.*, **1993**, 34, 7243



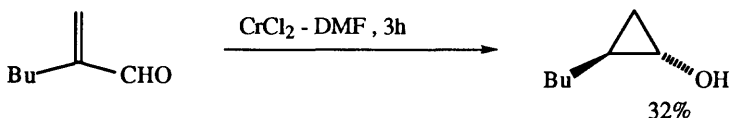
Dechoux, L.; Ebel, M.; Jung, L.; Stembach, J.F. *Tetrahedron Lett.*, **1993**, 34, 7405



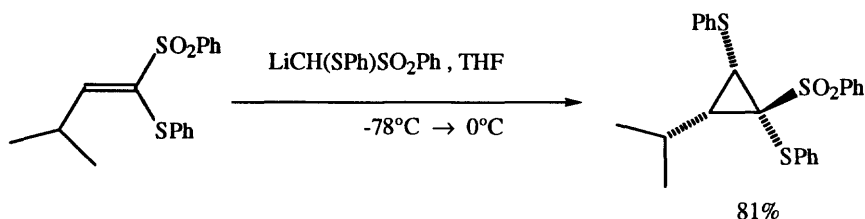
Ogoshi, S.; Morimoto, T.; Nishio, K.; Ohe, K.; Murai, S. *J. Org. Chem.*, **1993**, 58, 9



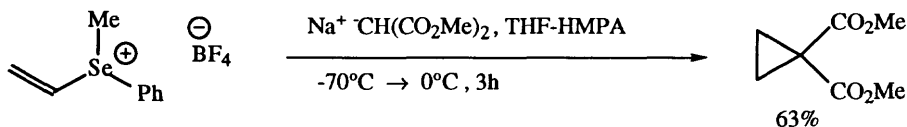
Davies, H.M.L.; Huby, N.J.S.; Cantrell Jr., W.R.; Olive, J.L. *J. Am. Chem. Soc.*, **1993**, *115*, 9468



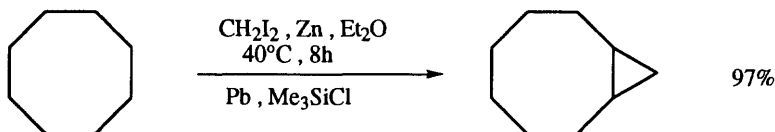
Montgomery, D.; Reynolds, K.; Stevenson, P. *J. Chem. Soc. Chem. Commun.*, **1993**, 363



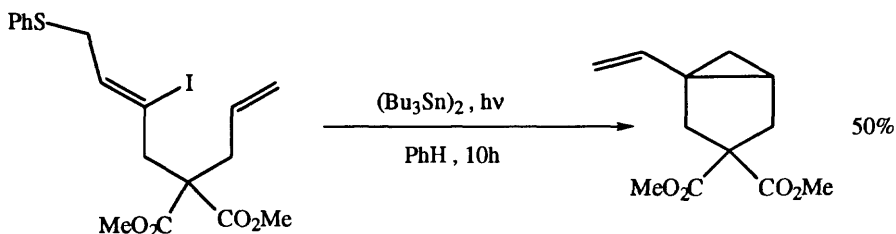
Bailey, P.L.; Hewkin, C.T.; Clegg, W.; Jackson, R.F.W. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 577



Watanabe, Y.; Ueno, Y.; Torii, T. *Bull. Chem. Soc. Jpn.*, **1993**, *66*, 2042

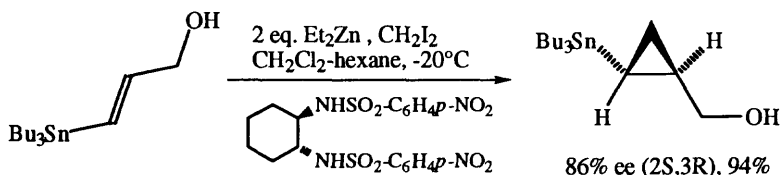


Takai, K.; Kakiuchi, T.; Utimoto, K. *J. Org. Chem.*, **1994**, *59*, 2671

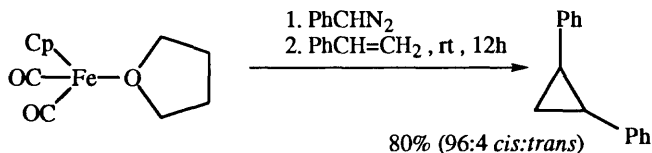


Denis, R.C.; Gravel, D. *Tetrahedron Lett.*, 1994, 35, 4531

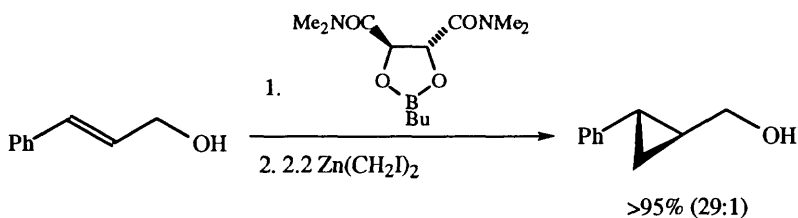
(2.7)



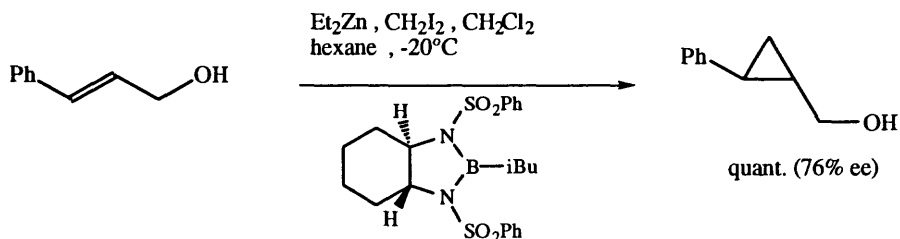
Imai, N.; Sakamoto, K.; Takahashi, H.; Kobayashi, S. *Tetrahedron Lett.*, 1994, 35, 7045



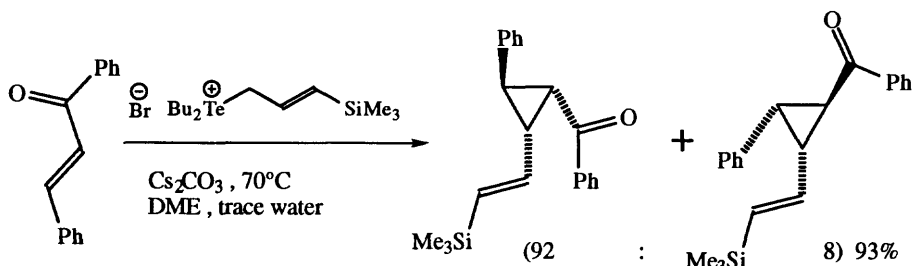
Seitz, W.J.; Hossain, M.M. *Tetrahedron Lett.*, 1994, 35, 7561



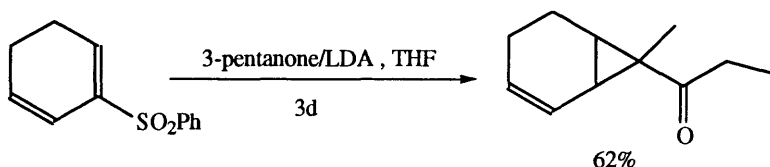
Charette, A.B.; Juteau, H. *J. Am. Chem. Soc.*, 1994, 116, 2651



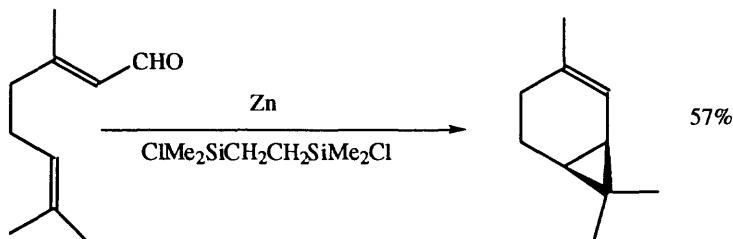
Imai, N.; Takahashi, H.; Kobayashi, S. *Chem. Lett.*, 1994, 177



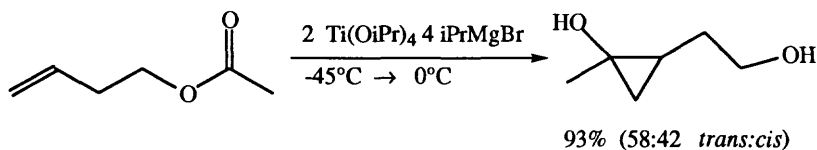
Huang, Y.-Z.; Tang, Y.; Zhou, Z.-L.; Xia, W.; Shi, L.-P. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 893



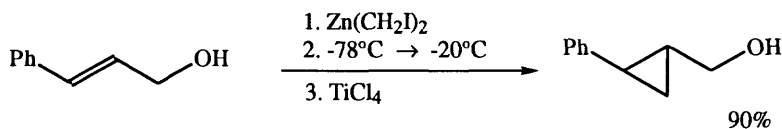
Ericsson, A.M.; Plobeck, N.A.; Bäckvall, J.-E. *Acta Chem. Scand. B.*, **1994**, 48, 252



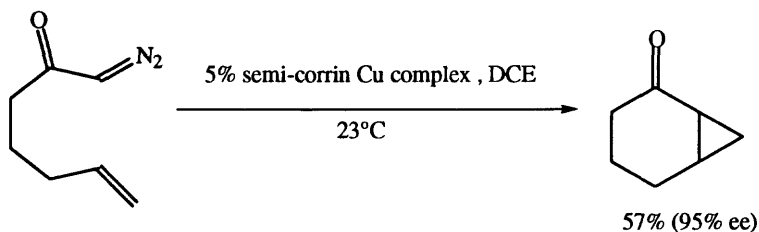
Motherwell, W.B.; Roberts, L.R. *Tetrahedron Lett.*, **1995**, 36, 1121



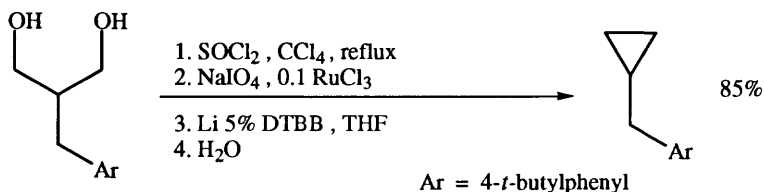
Kasatkin, A.; Sato, E. *Tetrahedron Lett.*, **1995**, 36, 6079



Charette, A.B.; Brochu, C. *J. Am. Chem. Soc.*, **1995**, 117, 11367



Piqué, C.; Föhndrich, B.; Pfaltz, A. *Synlett*, 1995, 491

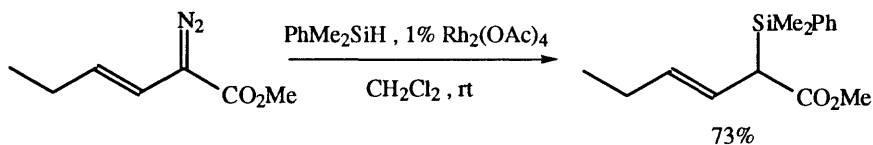


Guijarro, D.; Yus, M. *Tetrahedron*, 1995, 51, 11445

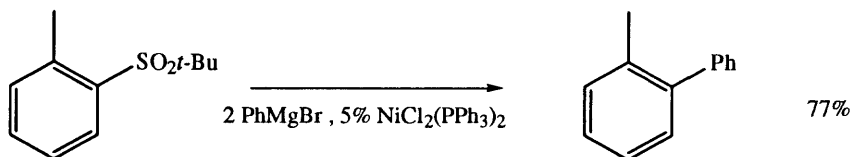
REVIEW:

"The Asymmetric Cyclopropanation of Acyclic Allylic Alcohols: Efficient Stereocontrol with Iodomethylzinc Reagents," Charette, A.B.; Marcoux, J.-F. *Synlett*, 1995, 1197

SECTION 75: ALKYLs, METHYLENES AND ARYLs FROM MISCELLANEOUS COMPOUNDS



Landais, Y.; Planchenault, D.; Weber, V. *Tetrahedron Lett.*, 1994, 35, 9549



Clayden, J.; Cooney, J.J.A.; Julia, M. *J. Chem. Soc., Perkin Trans. 1.*, 1995, 7

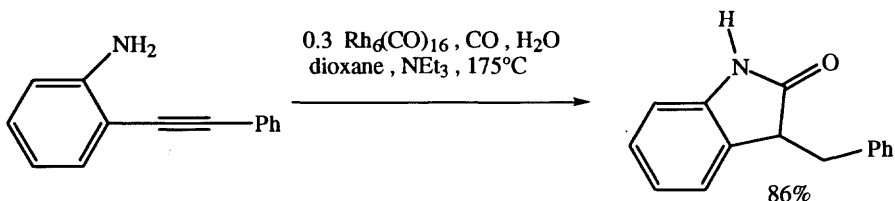
REVIEW:

"Organonickel Chemistry in Organic Synthesis. Some Applications of Alkyl and Metalacyclic Derivatives," Cámpora, J.; Paneque, M.; Poveda, M.L.; Carmona, E. *Synlett*, 1994, 465

CHAPTER 6

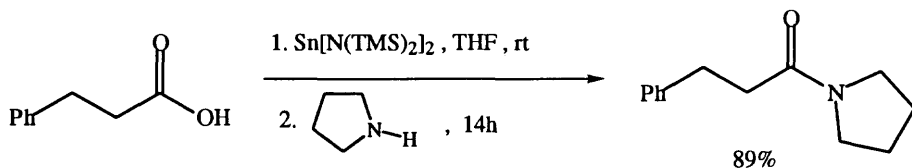
PREPARATION OF AMIDES

SECTION 76: AMIDES FROM ALKYNES

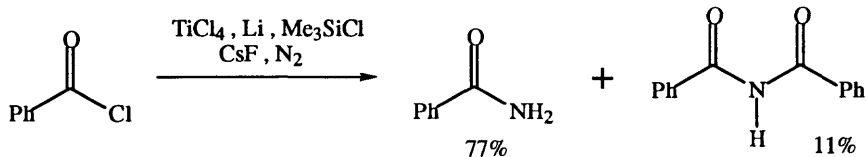


Hirao, K.; Morii, N.; Joh, T.; Takahashi, S. *Tetrahedron Lett.*, **1995**, 36, 6243

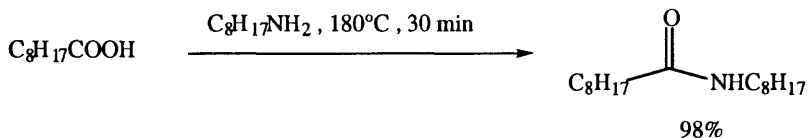
SECTION 77: AMIDES FROM ACID DERIVATIVES



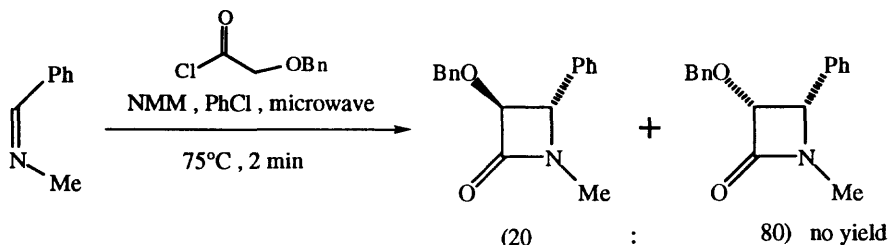
Burnell-Curty, C.; Roskamp, E.J. *Tetrahedron Lett.*, **1993**, 34, 5193



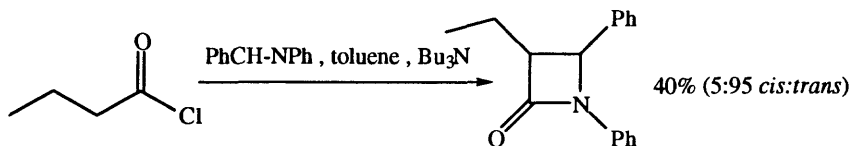
Kawaguchi, M.; Hamaoka, S.; Mori, M. *Tetrahedron Lett.*, **1993**, 34, 6907



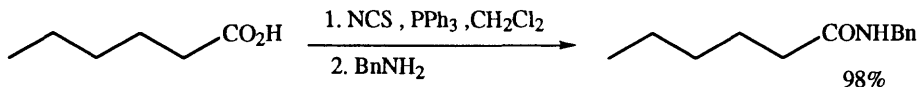
Jursic, B.S.; Zdravkovski, Z. *Synth. Commun.*, **1993**, 23, 2761



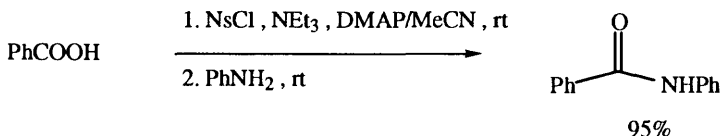
Bose, A.K.; Banik, B.K.; Manhas, M.S. *Tetrahedron Lett.*, **1995**, 36, 213



Browne, M.; Burnett, D.A.; Caplen, M.A.p; Chen, L.-Y.; Clader, J.W.; Domalski, M.; Dugar, S.; Pushpavanam, P.; Sher, R.; Vaccaro, W.; Viziano, M.; Zhao, H. *Tetrahedron Lett.*, **1995**, 36, 2555

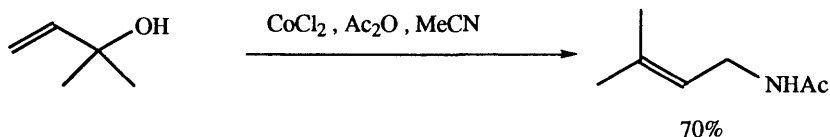


Frøyen, P. *Synth. Commun.*, **1995**, 25, 959

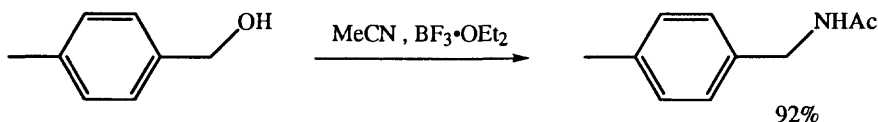


Lee, J.C.; Cho, Y.H.; Lee, H.K.; Cho, S.H. *Synth. Commun.*, **1995**, 25, 2877

SECTION 78: AMIDES FROM ALCOHOLS AND THIOLS



Mukhopadhyay, M.; Reddy, M.M.; Maikap, G.C.; Iqbal, I. *J. Org. Chem.*, **1995**, 60, 2670

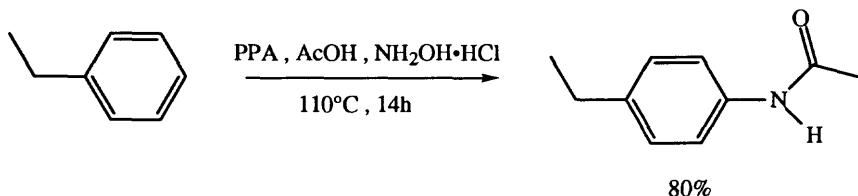


Firouzabadi, H.; Sardarian, A.R.; Badparva, H. *Synth. Commun.*, **1994**, 24, 601

SECTION 79: AMIDES FROM ALDEHYDES

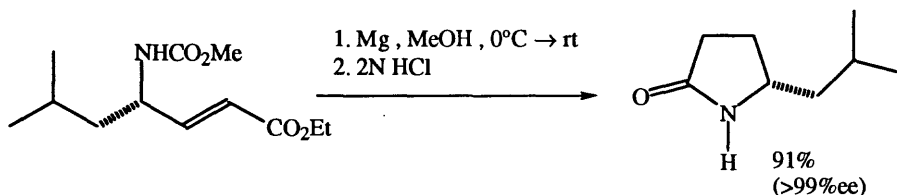
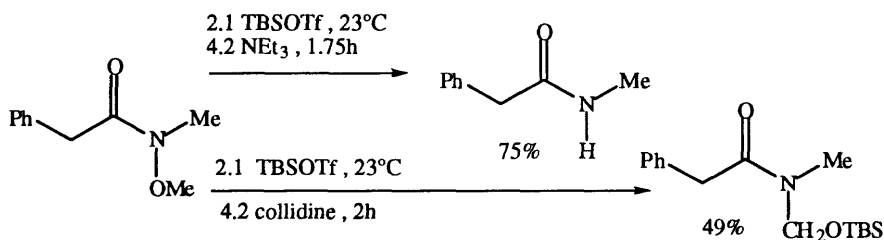
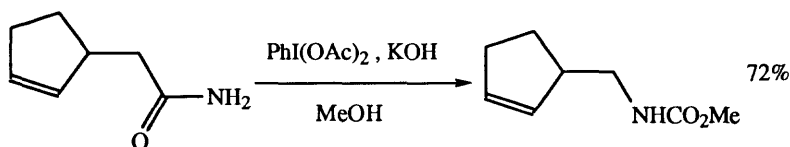
NO ADDITIONAL EXAMPLES

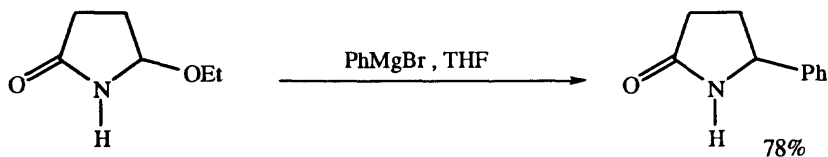
SECTION 80: AMIDES FROM ALKYL, METHYLENES AND ARYLS

Cablewski, T.; Gurr, P.A.; Raner, K.D.; Strauss, C.R. *J. Org. Chem.*, **1994**, *59*, 5814

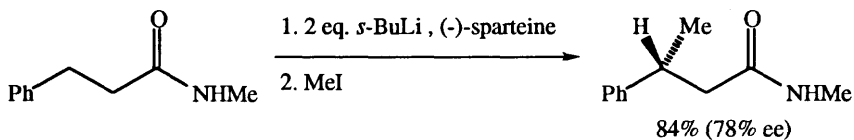
SECTION 81: AMIDES FROM AMIDES

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

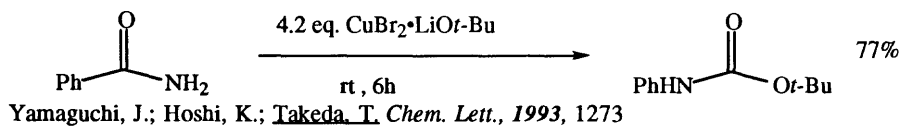
Wei, Z.-Y.; Knaus, E.E. *Tetrahedron Lett.*, **1993**, *34*, 4439Keck, G.E.; McHardey, S.F.; Murry, J.A. *Tetrahedron Lett.*, **1993**, *34*, 6215Moriarty, R.M.; Chany II, C.J.H.; Vaid, R.K.; Prakash, O.; Tuladhar, S.M. *J. Org. Chem.*, **1993**, *58*, 2478



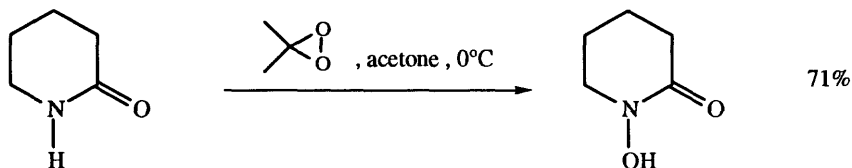
Wei, Z.Y.; Knaus, E.E. *Org. Prep. Proceed. Int.*, **1993**, *25*, 255



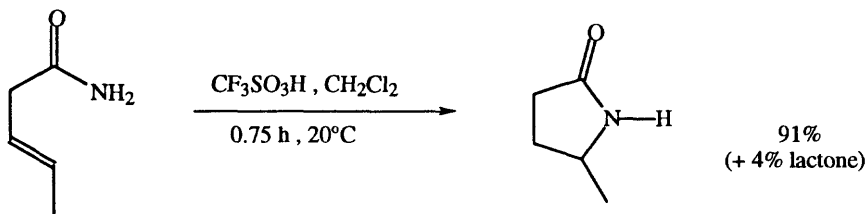
Beak, P.; Du, H. *J. Am. Chem. Soc.*, **1993**, *115*, 2516



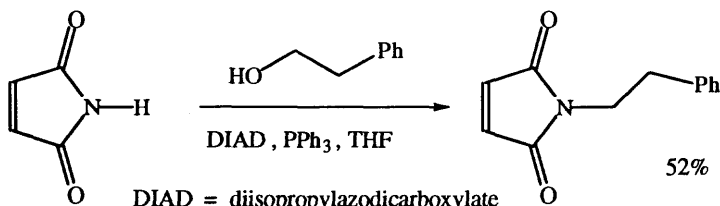
Yamaguchi, J.; Hoshi, K.; Takeda, T. *Chem. Lett.*, **1993**, 1273



Neset, S.M.; Benneche, T.; Undheim, K. *Acta Chem. Scand. B.*, **1993**, *47*, 1141

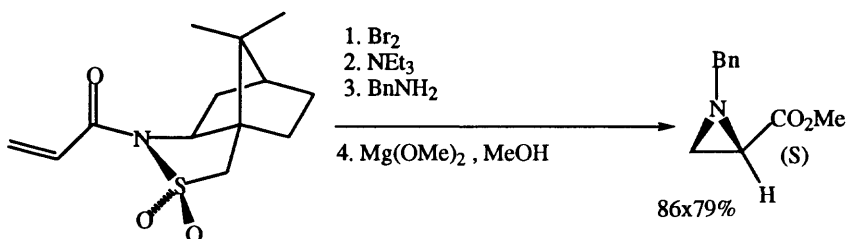


Marson, C.M.; Fallah, A. *Tetrahedron Lett.*, **1994**, *35*, 293

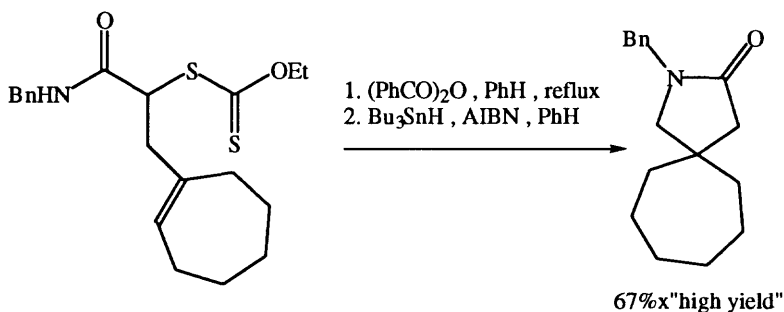


DIAD = diisopropylazodicarboxylate

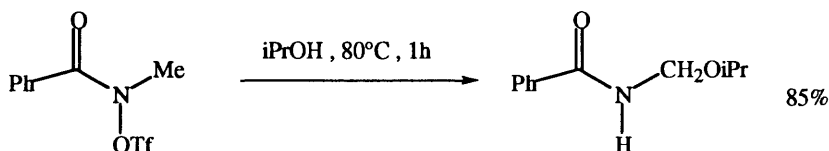
Walker, M.A. *Tetrahedron Lett.*, **1994**, *35*, 665



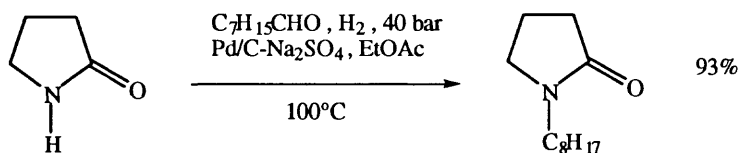
Garner, P.; Dogan, O.; Pillai, S. *Tetrahedron Lett.*, **1994**, 35, 1653



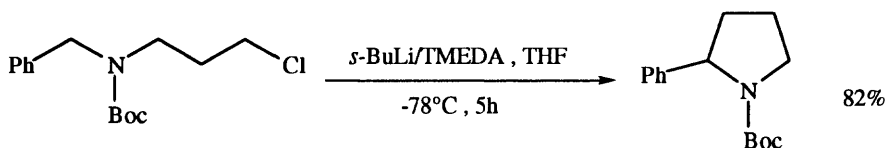
Axon, J.; Boiteau, L.; Boivin, J.; Forbes, J.E.; Zard, S.Z. *Tetrahedron Lett.*, **1994**, 35, 1719



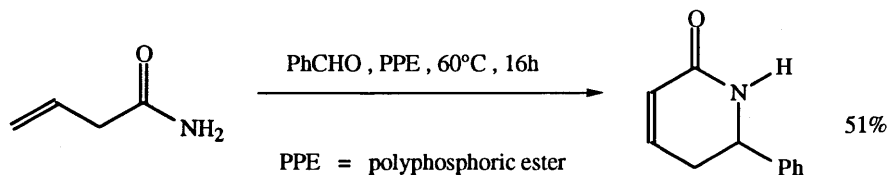
Hoffman, R.V.; Nayyar, N.K.; Shankweiler, J.M.; Klinekole III, B.W. *Tetrahedron Lett.*, **1994**, 35, 3231



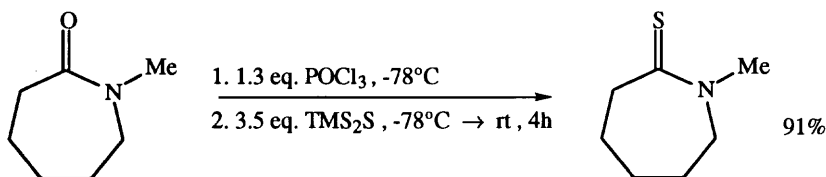
Fache, F.; Jacquot, L.; LeMaire, M. *Tetrahedron Lett.*, **1994**, 35, 3313



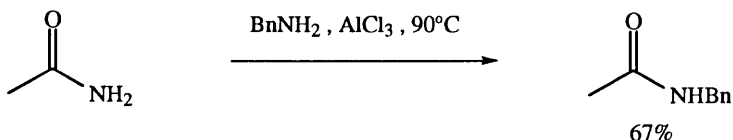
Beak, P.; Wu, S.; Yum, E.K.; Jun, Y.M. *J. Org. Chem.*, **1994**, 59, 276



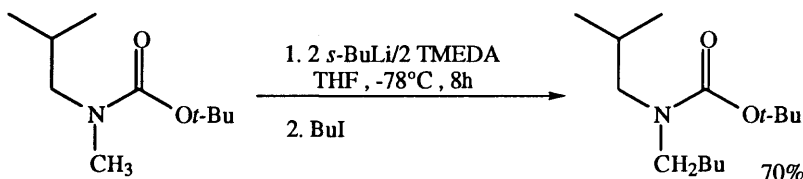
Marson, C.M.; Grabowska, U.; Eallah, A.; Walsgrove, T.; Eggleston, D.S.; Baures, P.W. *J. Org. Chem.*, 1994, 59, 291



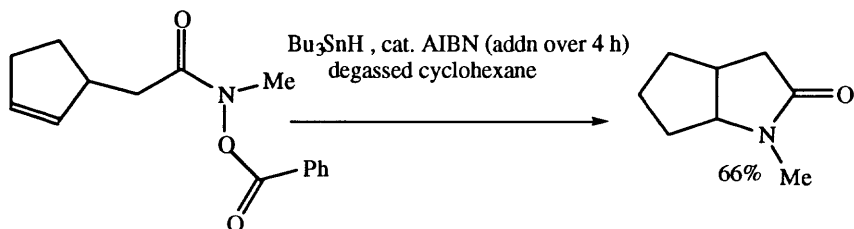
Smith, D.C.; Lee, S.W.; Fuchs, P.L. *J. Org. Chem.*, 1994, 59, 348



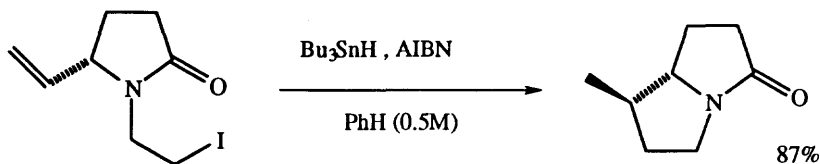
Bon, E.; Bigg, D.C.H.; Bertrand, G. *J. Org. Chem.*, 1994, 59, 4035



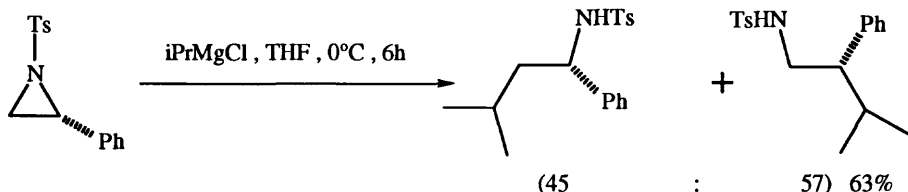
Snieckus, V.; Rogers-Evans, M.; Beak, P.; Lee, W.K.; Yum, E.K.; Freskos, J. *Tetrahedron Lett.*, 1994, 35, 4067



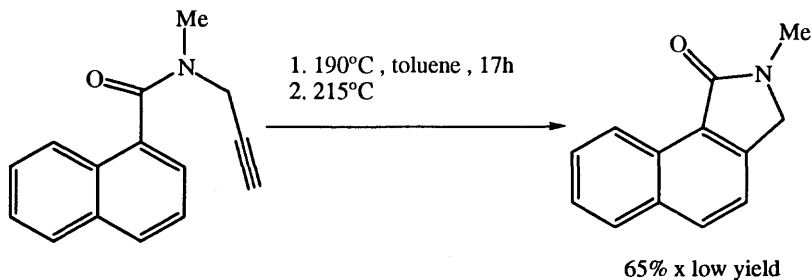
Callier, A.-C.; Quiclet-Sire, B.; Zard, S.Z. *Tetrahedron Lett.*, 1994, 35, 6109



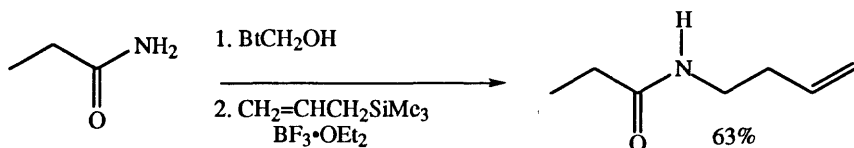
Keusenkothen, P.F.; Smith, M.B. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 2485



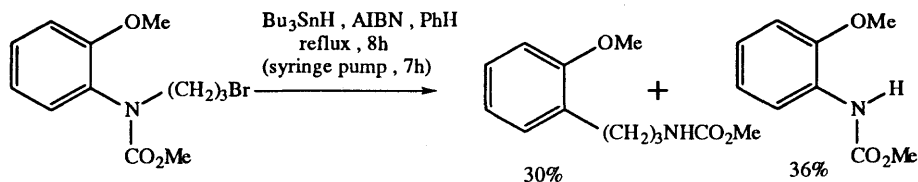
Toshimitsu, A.; Abe, H.; Hirose, C.; Tamao, K. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 3465



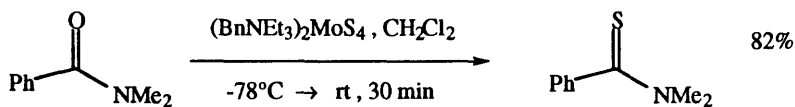
Ciganek, E.; Wuonola, M.A.; Harlow, R.L. *J. Heterocyclic Chem.*, **1994**, 31, 1251



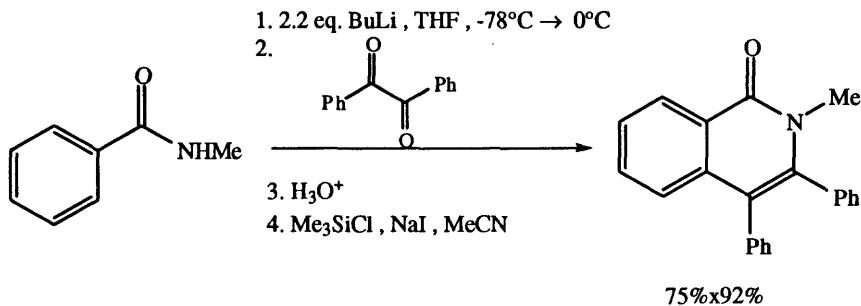
Katritzky, A.R.; Ignatchenko, A.V.; Lang, H. *J. Org. Chem.*, **1995**, 60, 4002



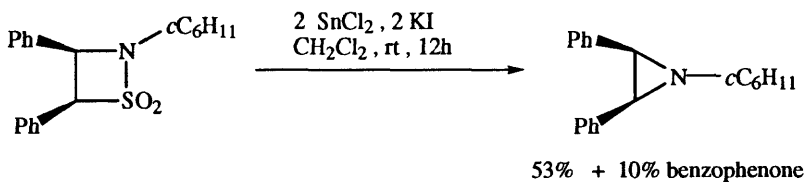
Lee, E.; Whang, H.S.; Chung, C.K. *Tetrahedron Lett.*, **1995**, 36, 913



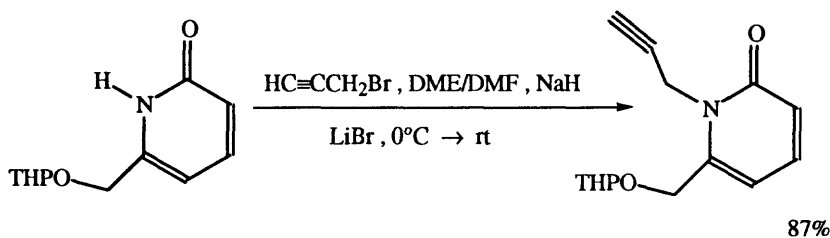
Ilankumaran, P.; Ramesha, A.R.; Chandrasekaran, S. *Tetrahedron Lett.*, **1995**, 36, 8311



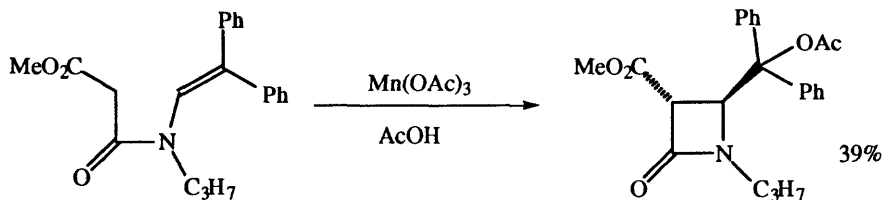
Kiselyov, A.S. *Tetrahedron Lett.*, **1995**, 36, 493



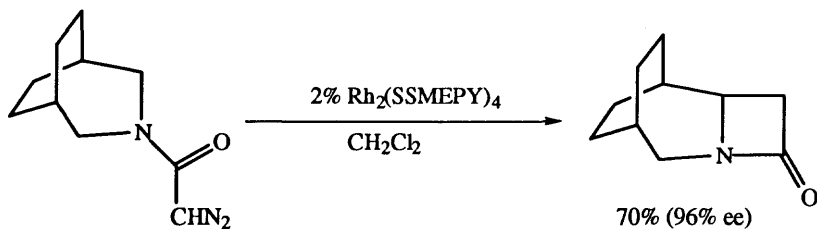
Kataoka, T.; Iwama, T. *Tetrahedron Lett.*, **1995**, 36, 5559



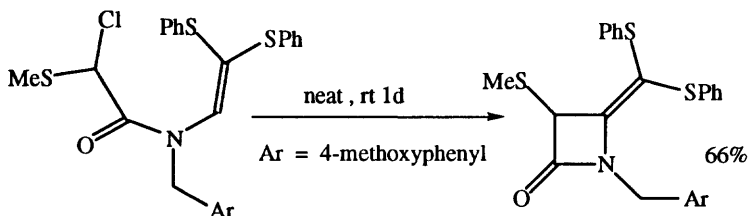
Liu, H.; Ko, S.-B.; Josien, H.; Curran, D.P. *Tetrahedron Lett.*, **1995**, 36, 8917



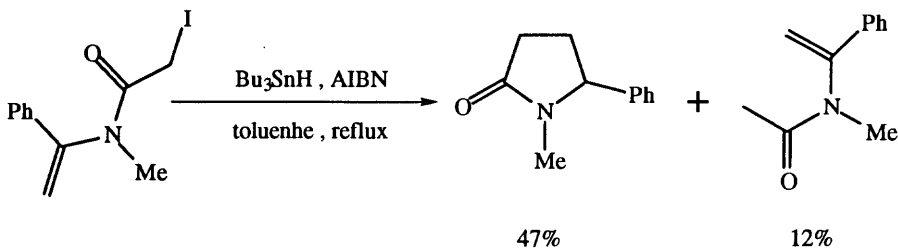
D'Annibale, A.; Resta, S.; Trogolo, C. *Tetrahedron Lett.*, **1995**, 36, 9039



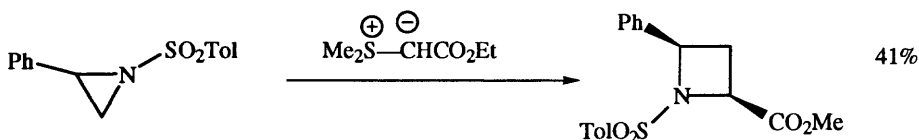
Doyle, M.P.; Kalinin, A.V. *Synlett*, **1995**, 1075



Ishibashi, H.; Nakaharu, T.; Nishimura, M.; Nishikawa, A.; Kameoka, C.; Ikeda, M. *Tetrahedron*, **1995**, 51, 2929

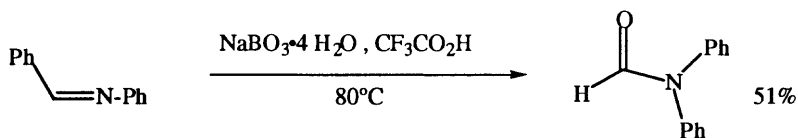


Sato, T.; Chono, N.; Ishibashi, H.; Ikeda, M. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 1115

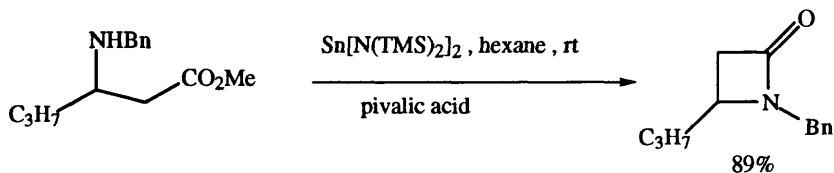


Nadir, U.K.; Arora, A. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 2605

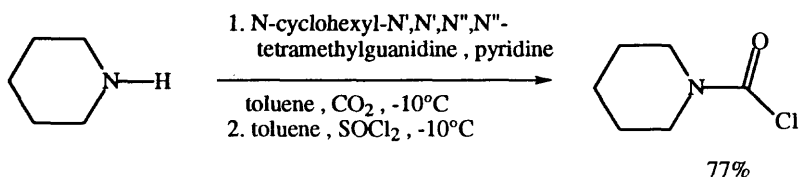
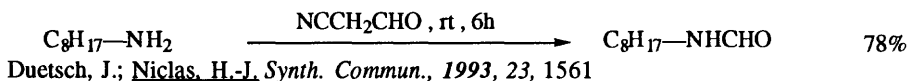
SECTION 82: AMIDES FROM AMINES



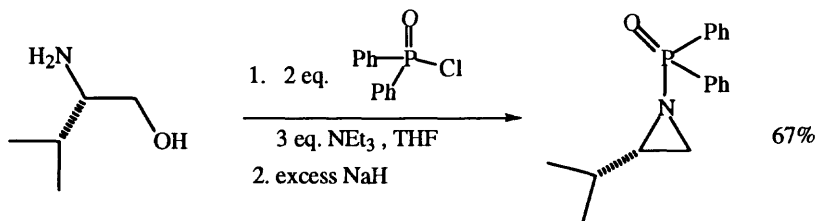
Nongkunsarn, P.; Ramsden, C.A. *Tetrahedron Lett.*, **1993**, 34, 6773



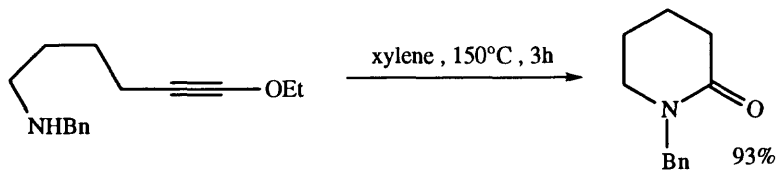
Wang, W.-B.; Roskamp, E.J. *J. Am. Chem. Soc.*, **1993**, *115*, 9417



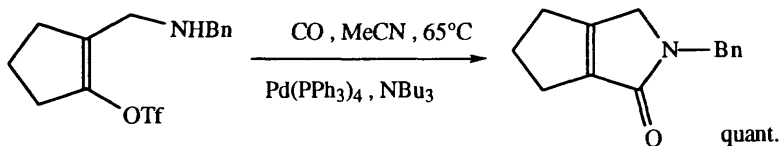
McGhee, W.D.; Pan, Y.; Talley, J.J. *Tetrahedron Lett.*, **1994**, *35*, 835



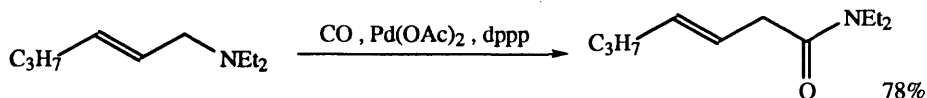
Osborn, H.M.I.; Cantrill, A.A.; Sweeney, J.B.; Howson, W. *Tetrahedron Lett.*, **1994**, *35*, 3159



MaGee, D.I.; Ramaseshan, M. *Synlett*, **1994**, 743

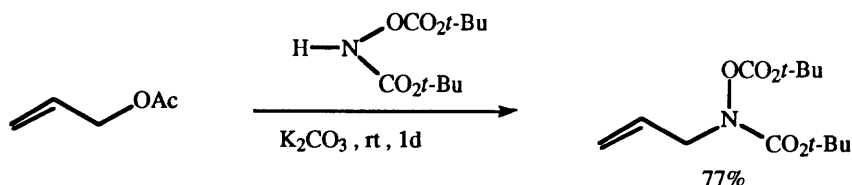


Crisp, G.T.; Meyer, A.G. *Tetrahedron*, **1995**, *51*, 5585

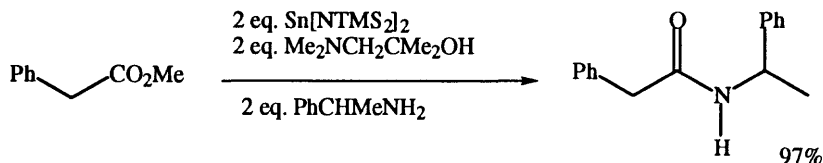


Murahashi, S.-I.; Imada, Y.; Nishimura, K. *Tetrahedron*, **1994**, 50, 453

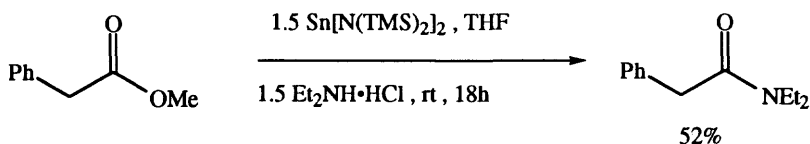
SECTION 83: AMIDES FROM ESTERS



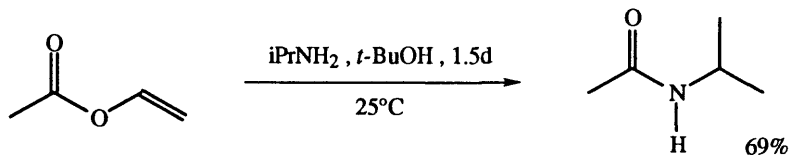
Genet, J.-P.; Thorimbert, S.; Touzin, A.-M. *Tetrahedron Lett.*, **1993**, 34, 1159



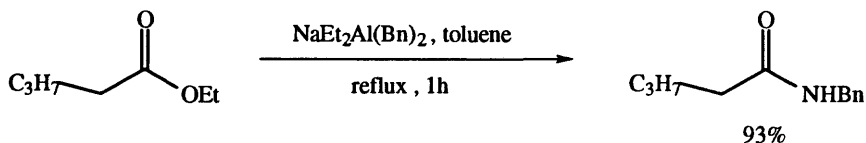
Wang, W.-B.; Restituyo, J.A.; Roskamp, E.J. *Tetrahedron Lett.*, **1993**, 34, 7217



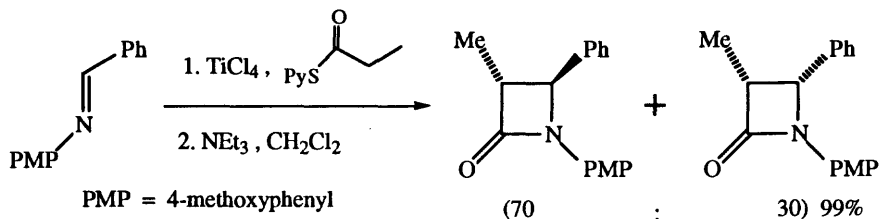
Smith, L.A.; Wang, W.-B.; Burnell-Curty, C.; Roskamp, E.J. *Synlett*, **1993**, 850



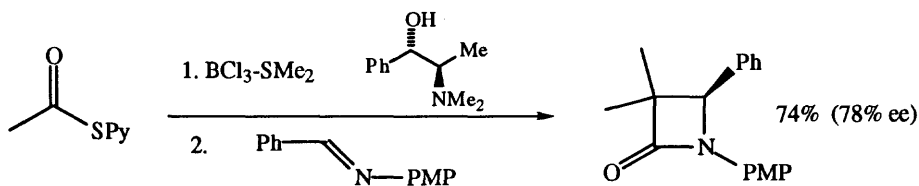
Chen, S.-T.; Chen, S.-Y.; Chen, S.-J. *Tetrahedron Lett.*, **1994**, 35, 3583



Sim, T.B.; Yoon, N.M. *Synlett*, **1994**, 827



Annunziata, R.; Benaglia, M.; Cinquini, M.; Cozzi, F.; Ponzini, F.; Raimondi, L. *Tetrahedron*, **1994**, 50, 2939

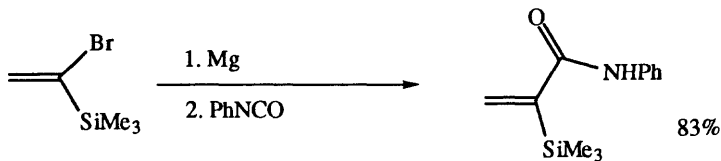


Annunziata, R.; Benaglia, M.; Cinquini, M.; Cozzi, F. *Tetrahedron Lett.*, **1995**, 36, 613

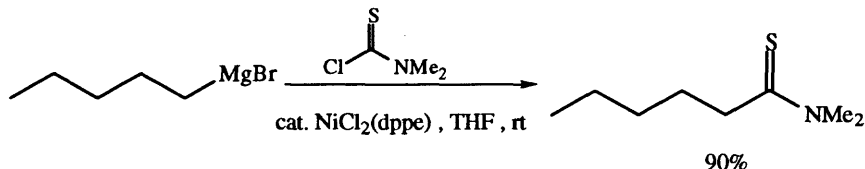
SECTION 84: AMIDES FROM ETHERS, EPOXIDES AND THIOETHERS

NO ADDITIONAL EXAMPLES

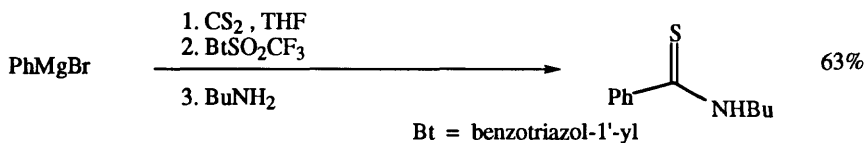
SECTION 85: AMIDES FROM HALIDES AND SULFONATES



Cooke Jr., M.P.; Pollock, C.M. *J. Org. Chem.*, **1993**, 58, 7474



Babudri, F.; Fiandanese, V.; Marchese, G.; Punzi, A. *Synlett*, **1994**, 719

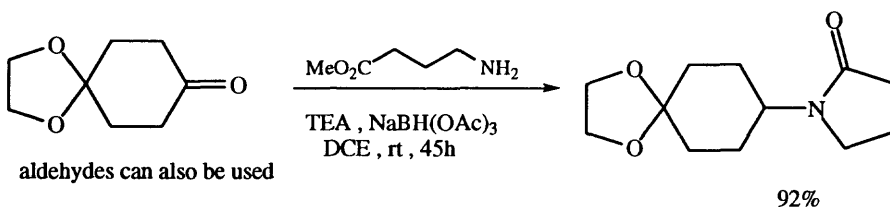


Katritzky, A.R.; Moutou, J.-L.; Yang, Z. *Synlett*, **1995**, 99

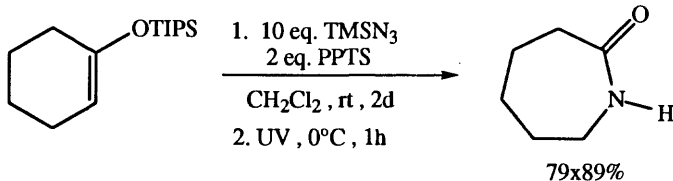
SECTION 86: AMIDES FROM HYDRIDES

NO ADDITIONAL EXAMPLES

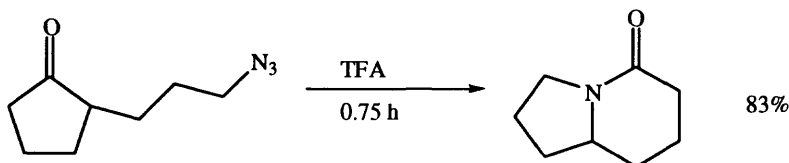
SECTION 87: AMIDES FROM KETONES



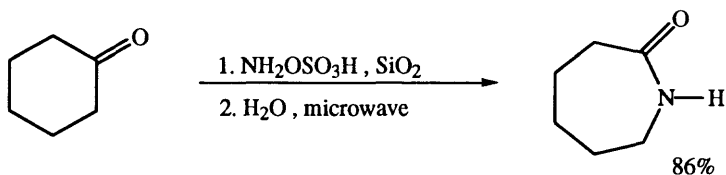
Abdel-Magid, A.E.; Harris, B.D.; Maryanoff, C.A. *Synlett*, **1994**, 81



Evans, P.A.; Modi, D.P. *J. Org. Chem.*, **1995**, 60, 6662

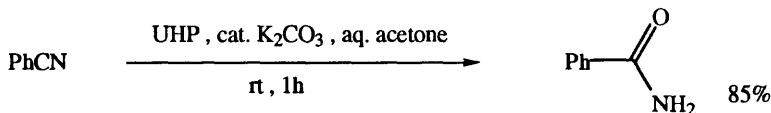


Milligan, G.L.; Mossman, C.J.; Aubé, J. *J. Am. Chem. Soc.*, **1995**, 117, 10449



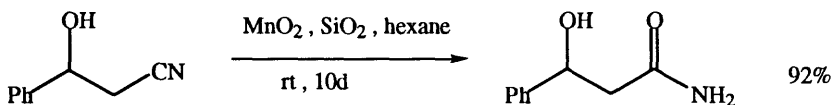
Laurent, A.; Jacquault, P.; Di Martino, J.-L.; Hamelin, J. *J. Chem. Soc. Chem. Commun.*, **1995**, 1101

SECTION 88: AMIDES FROM NITRILES

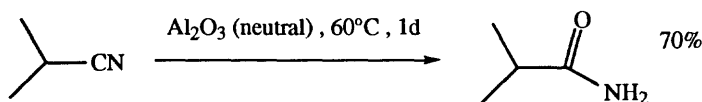


UHP = urea-hydrogen peroxide adduct

Balicki, R.; Kaczmarek, Ł. *Synth. Commun.*, **1993**, 23, 3149

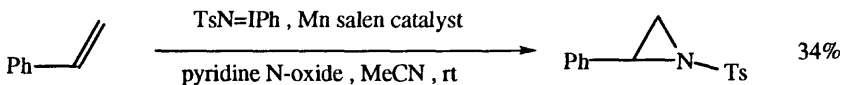


Breuilles, P.; Leclerc, R.; Uguen, D. *Tetrahedron Lett.*, **1994**, 35, 1401

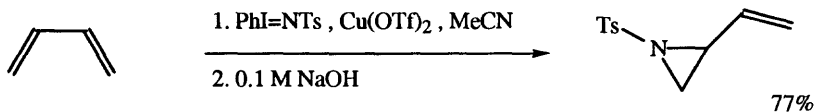


Wilgus, C.P.; Downing, S.; Militor, E.; Bains, S.; Pagni, R.M.; Kabalka, G.W. *Tetrahedron Lett.*, **1995**, 36, 3469

SECTION 89: AMIDES FROM ALKENES

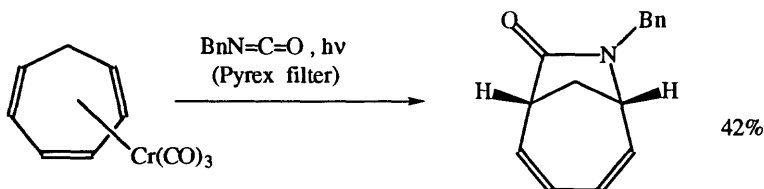


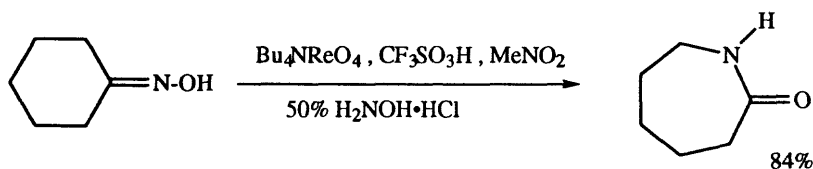
Noda, K.; Hosoya, N.; Irie, R.; Ito, Y.; Katsuki, T. *Synlett*, **1993**, 469



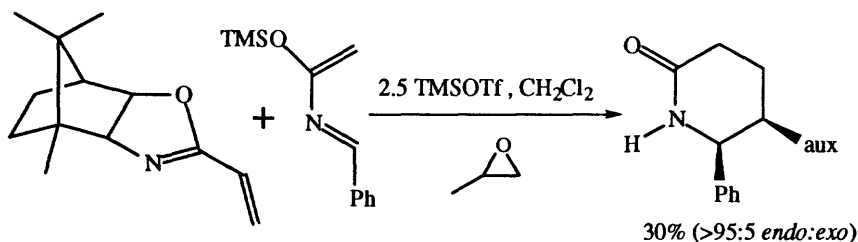
Knight, J.G.; Muldowney, M.P. *Synlett*, **1995**, 949

SECTION 90: AMIDES FROM MISCELLANEOUS COMPOUNDS

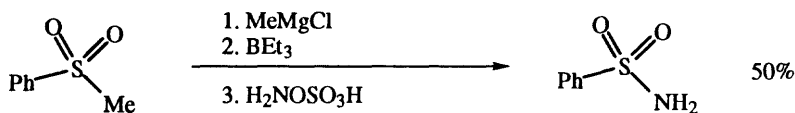




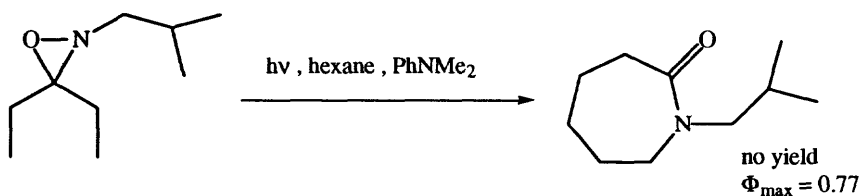
Narasaka, K.; Kusama, H.; Yamashita, Y.; Sato, H. *Chem. Lett.*, **1993**, 489



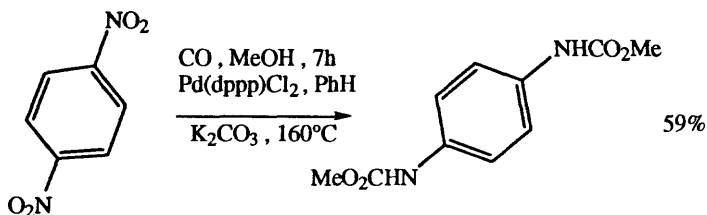
Pouilhés, A.; Langlois, Y.; Nshimyum Kiza, P.; Mbiya, K.; Ghosez, L. *Bull. Soc. Chim. Fr.*, **1993**, 130, 304



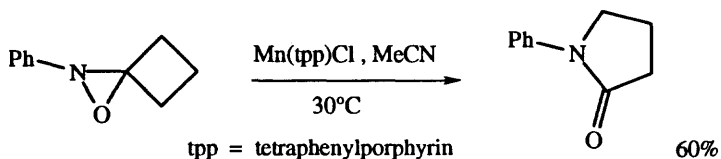
Huang, H.-C.; Reinhard, E.J.; Reitz, D.B. *Tetrahedron Lett.*, **1994**, 35, 7201



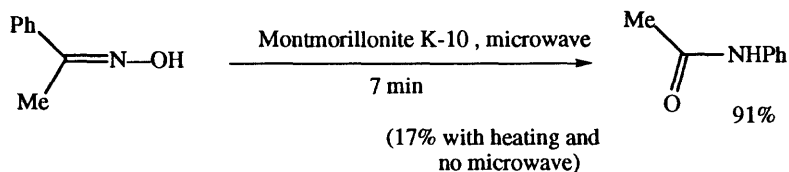
Post, A.J.; Nwaukwa, S.; Morrison, H. *J. Am. Chem. Soc.*, **1994**, 116, 6439



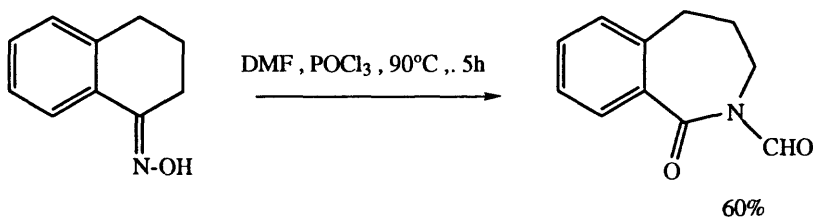
Reddy, N.P.; Masdeu, A.M.; El Ali, B.; Alper, H. *J. Chem. Soc. Chem. Commun.*, **1994**, 863



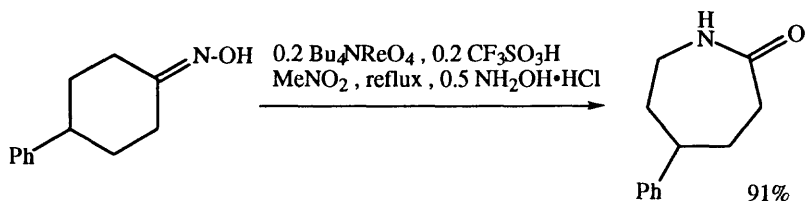
Suda, K.; Sashima, M.; Izutsu, M.; Hino, F. *J. Chem. Soc. Chem. Commun.*, **1994**, 949



Bosch, A.I.; de la Cruz, P.; Diez-Barra, E.; Loupy, A.; Langa, F. *Synlett*, **1995**, 1259

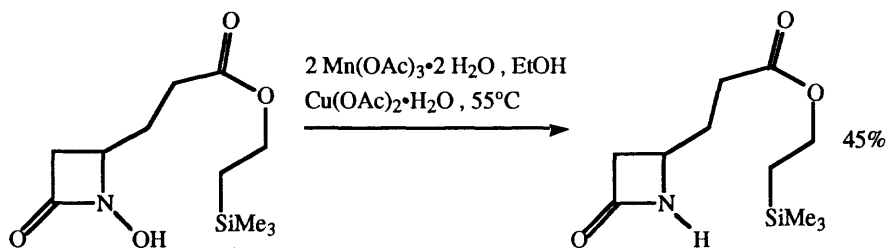


Majo, V.J.; Venugopal, M.; Prince, A.A.M.; Perumal, P.T. *Synth. Commun.*, **1995**, 25, 3863

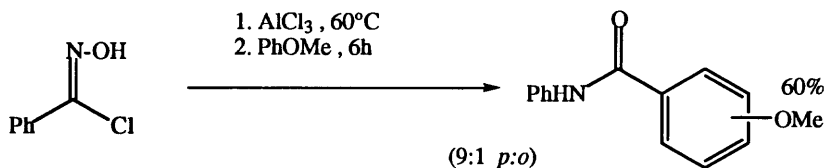


Kusama, H.; Yamashita, Y.; Narasaka, K. *Bull. Chem. Soc. Jpn.*, **1995**, 68, 373

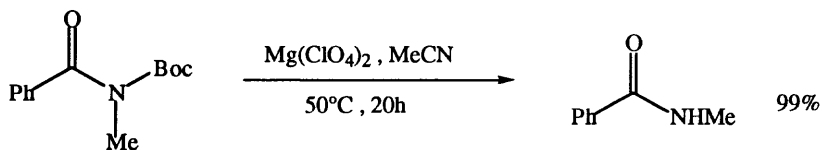
SECTION 90A: PROTECTION OF AMIDES



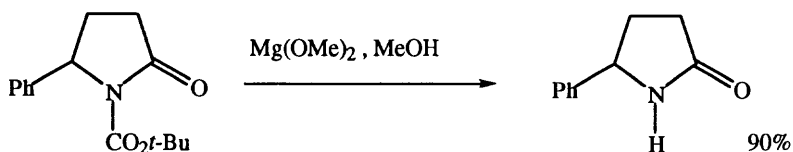
Ghosh, A.; Miller, M.J. *Tetrahedron Lett.*, **1993**, 34, 83



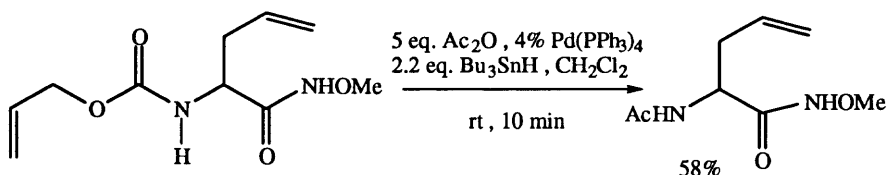
Kim, J.N.; Ryu, E.K. *Tetrahedron Lett.*, **1993**, *34*, 3567



Stafford, J.A.; Brackeen, M.F.; Karanewsky, D.S.; Valvano, N.L. *Tetrahedron Lett.*, **1993**, *34*, 7873



Wei, Z.-Y.; Knaus, E.E. *Tetrahedron Lett.*, **1994**, *35*, 545



Roos, E.C.; Bernabé, P.; Hiemstra, H.; Speckamp, W.N.; Kaptein, B.; Boesten, W.H.J. *J. Org. Chem.*, **1995**, *60*, 1733

CHAPTER 7

PREPARATION OF AMINES

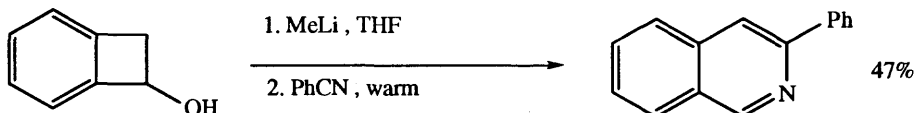
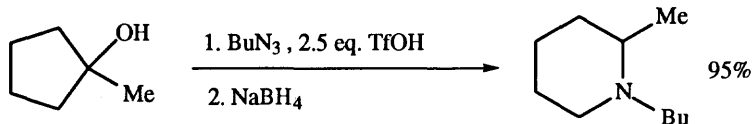
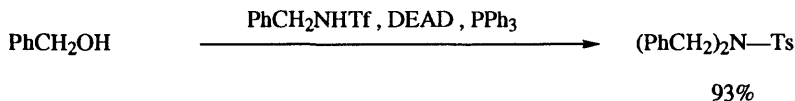
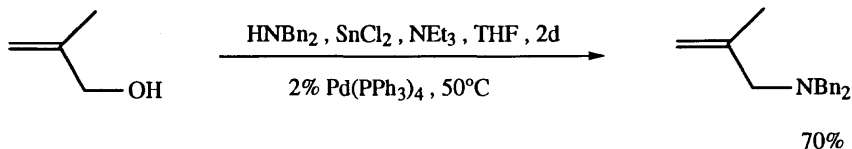
SECTION 91: AMINES FROM ALKYNES

NO ADDITIONAL EXAMPLES

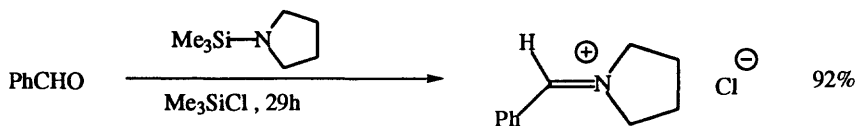
SECTION 92: AMINES FROM ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

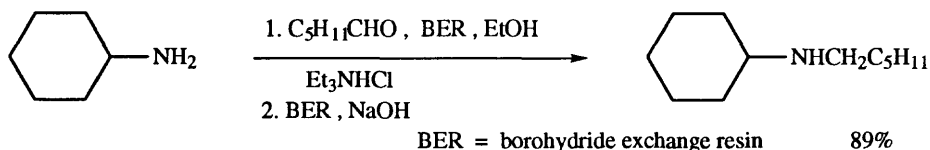
SECTION 93: AMINES FROM ALCOHOLS AND THIOLS

Fitzgerald, J.J.; Michael, F.E.; Olofson, R.A. *Tetrahedron Lett.*, **1994**, 35, 9191Pearson, W.H.; Fang, W. *J. Org. Chem.*, **1995**, 60, 4960Bell, K.E.; Knight, D.W.; Gravestock, M.B. *Tetrahedron Lett.*, **1995**, 36, 8681Masuyama, Y.; Kagawa, M.; Kuru, Y. *Chem. Lett.*, **1995**, 1121

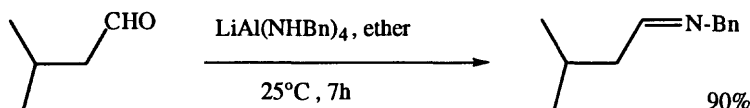
SECTION 94: AMINES FROM ALDEHYDES



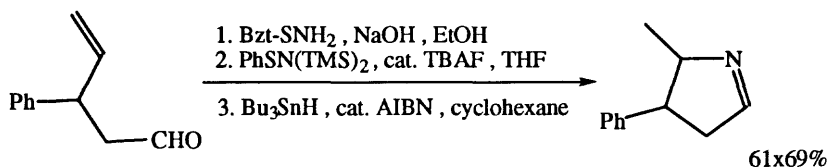
Jahn, U.; Schroth, W. *Tetrahedron Lett.*, **1993**, 34, 5863



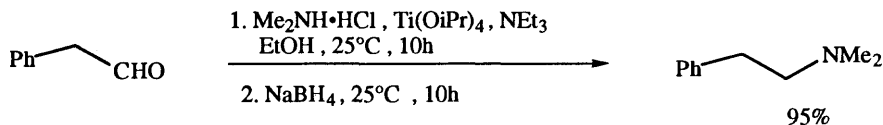
Yoon, N.M.; Kim, E.G.; Son, H.S.; Choi, J. *Synth. Commun.*, **1993**, 23, 1595



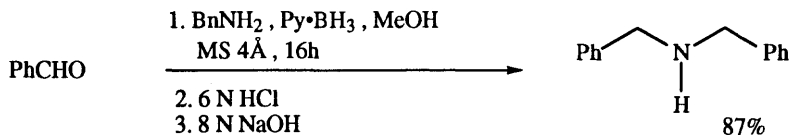
Solladié-Cavallo, A.; Bencheqroun, M.; Bonne, F. *Synth. Commun.*, **1993**, 23, 1683



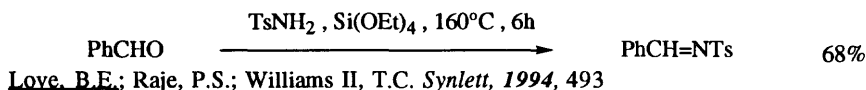
Boivin, J.; Fouquet, E.; Zard, S.Z. *Tetrahedron*, **1994**, 50, 1745

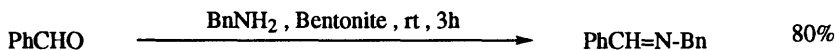


Bhattacharyya, S. *J. Org. Chem.*, **1995**, 60, 4928



Bomann, M.D.; Guch, I.C.; DiMare, M. *J. Org. Chem.*, **1995**, 60, 5995





ketones can also be used

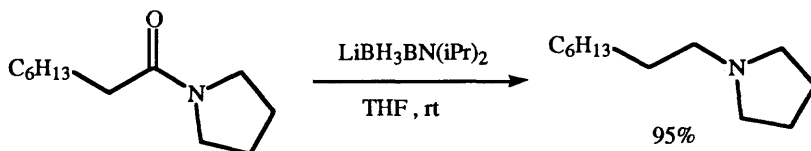
Saoudi, A.; Benguedach, A.; Benhaoua, H. *Synth. Commun.*, **1995**, 25, 2349

Related Methods: Section 102 (Amines from Ketones)

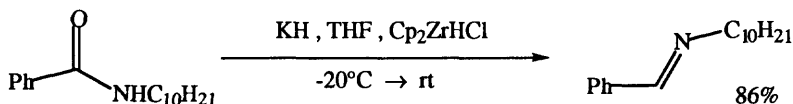
SECTION 95: AMINES FROM ALKYL, METHYLENES AND ARYL

NO ADDITIONAL EXAMPLES

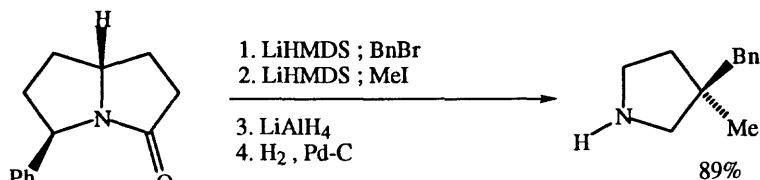
SECTION 96: AMINES FROM AMIDES



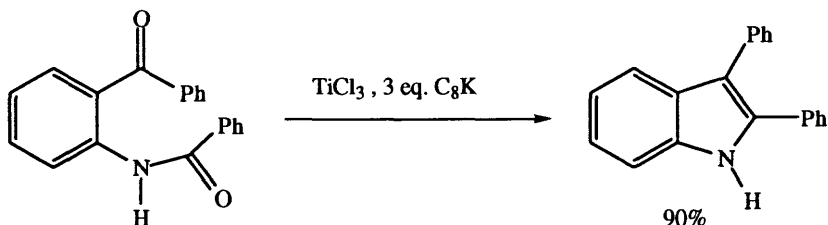
Fisher, G.B.; Fuller, J.C.; Harrison, J.; Goralski, C.T.; Singaram, B. *Tetrahedron Lett.*, **1993**, 34, 1091



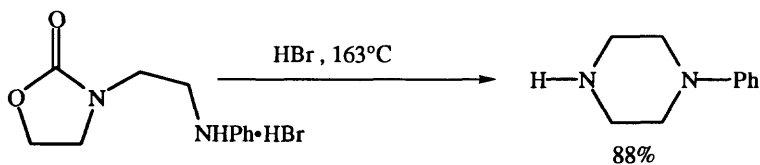
Schedler, D.J.A.; Godfrey, A.G.; Ganem, B. *Tetrahedron Lett.*, **1993**, 34, 5035



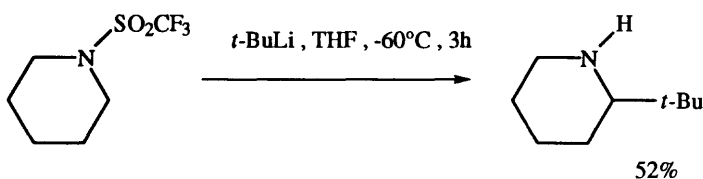
Westrum, L.J.; Meyers, A.I. *Tetrahedron Lett.*, **1994**, 35, 973



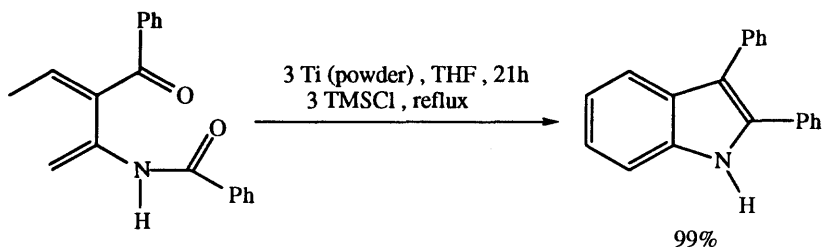
Furstner, A.; Hupperts, A.; Ptock, A.; Janssen, E. *J. Org. Chem.*, **1995**, 60, 5215



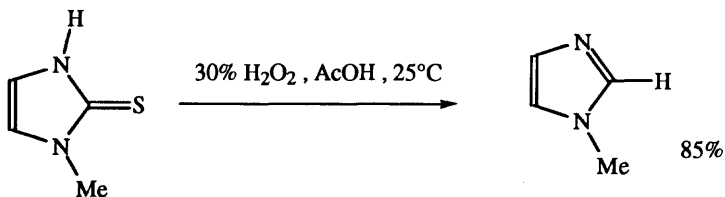
Poindexter, G.S.; Bruce, M.A.; LeBoulluec, K.L.; Monkovic, I. *Tetrahedron Lett.*, **1994**, 35, 7331



Bozee-Ogor, S.; Salou-Guiziou, V.; Yaouanc, J.J.; Handel, H. *Tetrahedron Lett.*, **1995**, 36, 6063



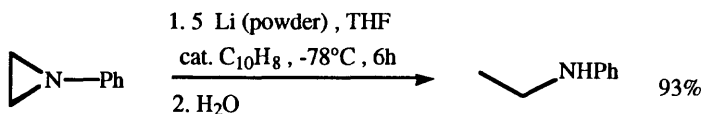
Fürstner, A.; Hupperts, A. *J. Am. Chem. Soc.*, **1995**, 117, 4468



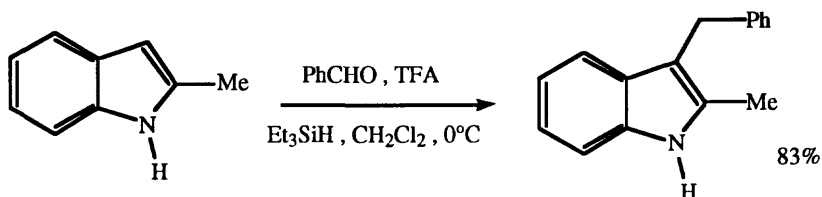
Grivas, S.; Ronne, E. *Acta Chem. Scand. B.*, **1995**, 49, 225

Related Methods: Section 105A (Protection of Amines)

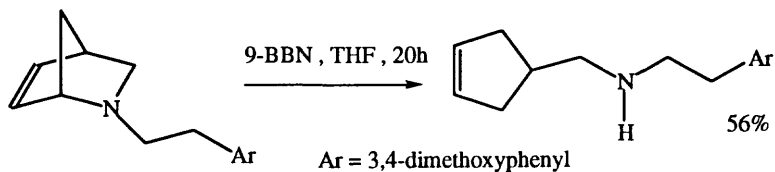
SECTION 97: AMINES FROM AMINES



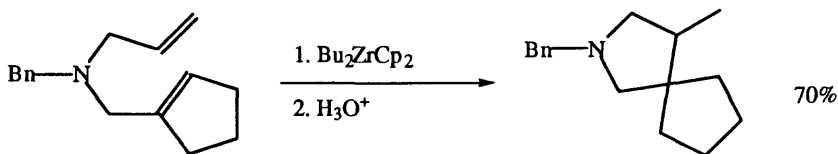
Almena, J.; Foubelo, F.; Yus, M. *Tetrahedron Lett.*, **1993**, 34, 1649



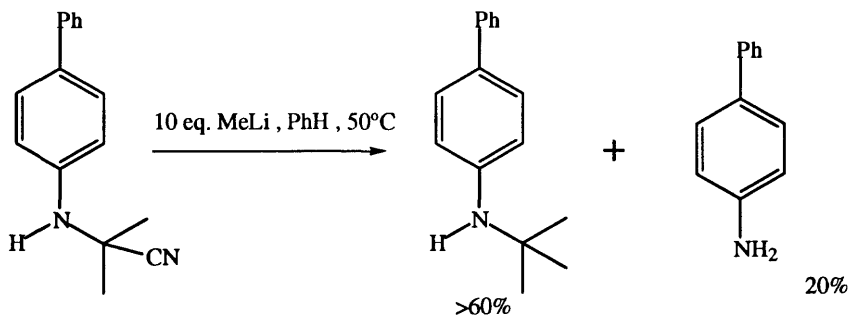
Appleton, J.E.; Dack, K.N.; Green, A.D.; Steele, J. *Tetrahedron Lett.*, **1993**, *34*, 1529



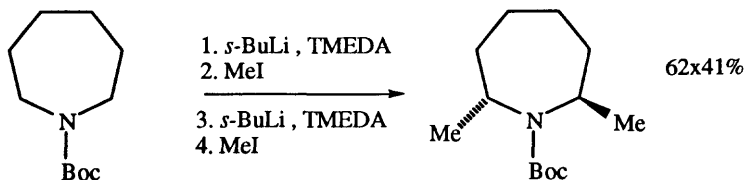
Gaul, M.D.; Fowler, K.W.; Grieco, P.A. *Tetrahedron Lett.*, **1993**, *34*, 3099



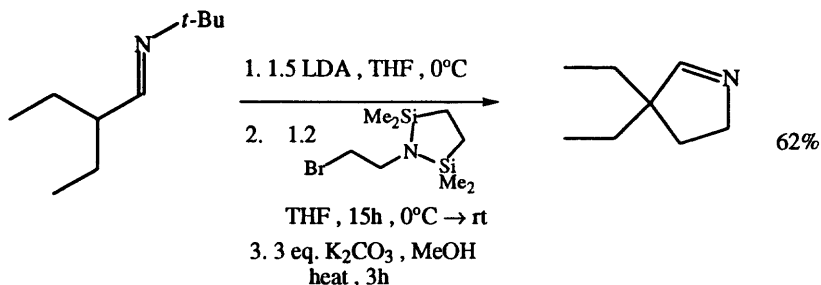
Maye, J.P.; Negishi, E. *Tetrahedron Lett.*, **1993**, *34*, 3359



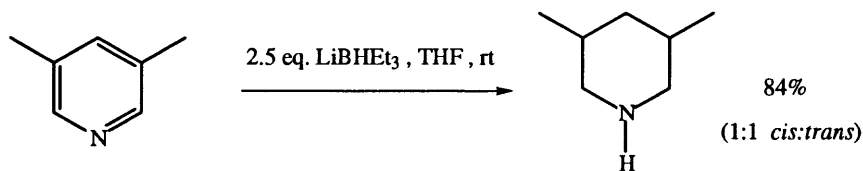
Genin, M.J.; Biles, C.; Romero, D.L. *Tetrahedron Lett.*, **1993**, *34*, 4301



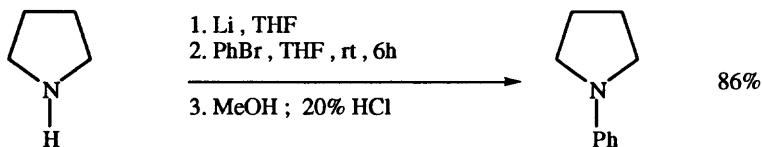
Beak, P.; Lee, W.K. *J. Org. Chem.*, **1993**, *58*, 1109



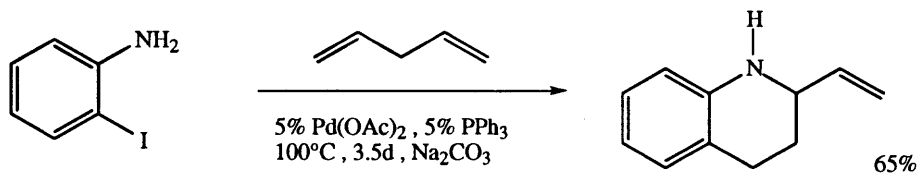
DeKimpe, N.G.; Keppens, M.A.; Stevens, C.V. *Tetrahedron Lett.*, **1993**, *34*, 4693



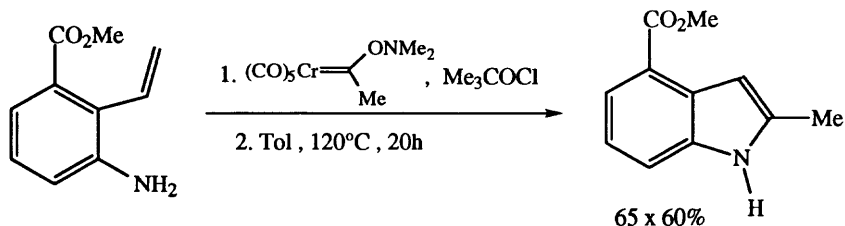
Blough, B.E.; Carroll, F.I. *Tetrahedron Lett.*, **1993**, *34*, 7239



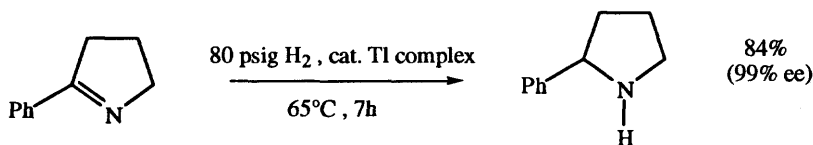
Kanth, J.V.B.; Periasamy, M. *J. Org. Chem.*, **1993**, *58*, 3156



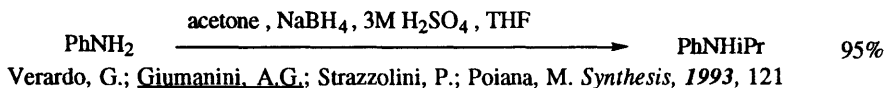
Larock, R.C.; Berrios-Peña, N.G.; Fried, C.A.; Yum, E.K.; Tu, C.; Leong, W. *J. Org. Chem.*, **1993**, *58*, 4509



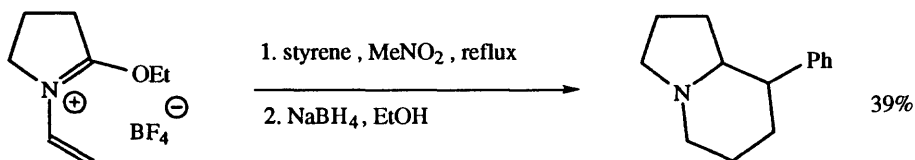
Söderberg, B.C.; Helton, E.S.; Austin, L.R.; Odens, H.H. *J. Org. Chem.*, **1993**, *58*, 5589



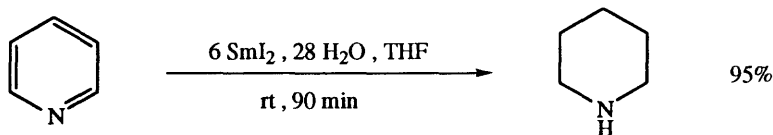
Willoughby, C.A.; Buchwald, S.L. *J. Org. Chem.*, **1993**, 58, 7627



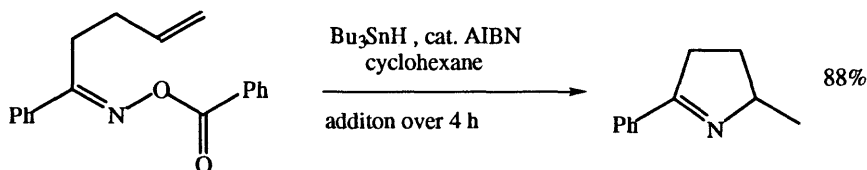
Verardo, G.; Giumanini, A.G.; Strazzolini, P.; Poiana, M. *Synthesis*, **1993**, 121



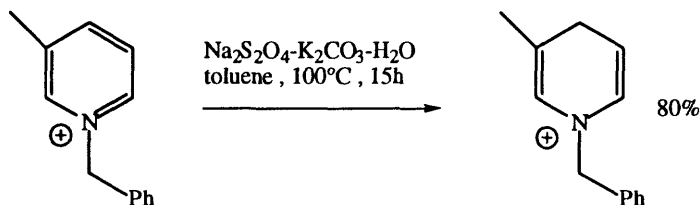
Sheu, J.; Smith, M.B.; Matsumoto, K. *Synth. Commun.*, **1993**, 23, 253



Kamochi, Y.; Kudo, T. *Heterocycles*, **1993**, 36, 2383

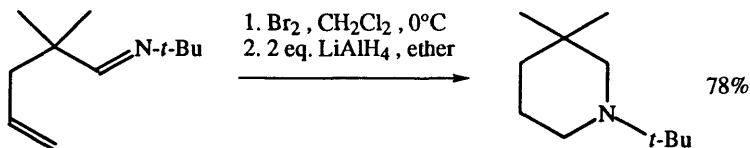


Boivin, J.; Schiano, A.-M.; Zard, S.Z. *Tetrahedron Lett.*, **1994**, 35, 249

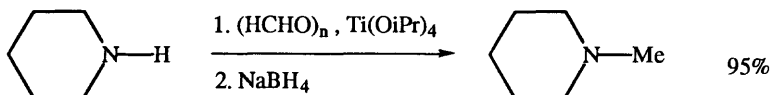


the reaction fails for many N-R where R \neq Bn

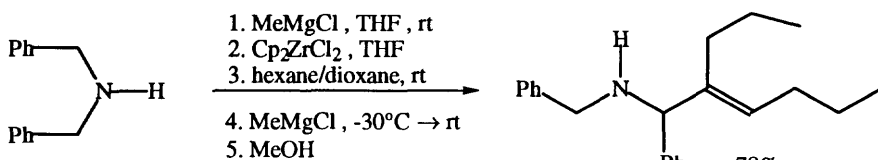
Wong, Y.-S.; Marazano, C.; Gnecco, D.; Das, B.C. *Tetrahedron Lett.*, **1994**, 35, 707



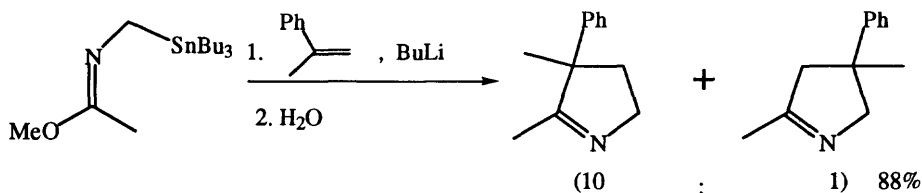
DeKimpe, N.; Boelens, M.; Piqueur, J.; Baele, J. *Tetrahedron Lett.*, **1994**, 35, 1925



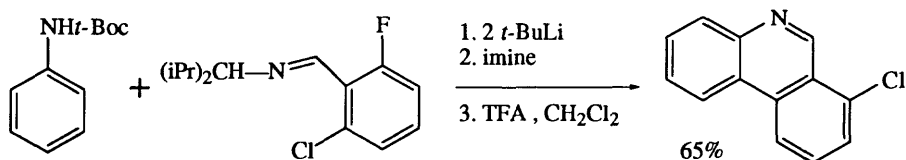
Bhattacharyya, S. *Tetrahedron Lett.*, **1994**, 35, 2401



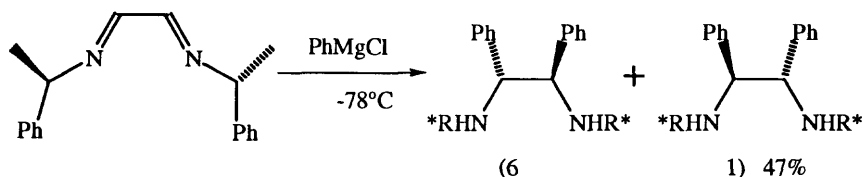
Harris, M.C.J.; Whitby, R.J.; Blagg, J. *Tetrahedron Lett.*, **1994**, 35, 2431



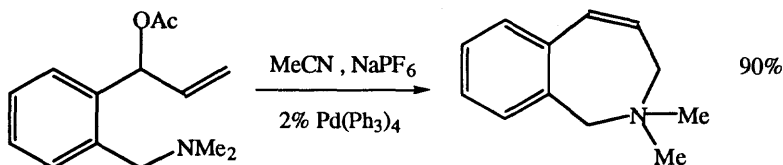
Pearson, W.H.; Stevens, E.P. *Tetrahedron Lett.*, **1994**, 35, 2641



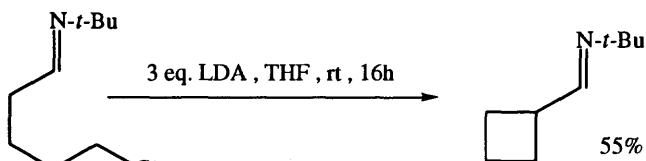
Reuter, D.C.; Flippin, L.A.; McIntosh, J.; Caroon, J.M.; Hammaker, J. *Tetrahedron Lett.*, **1994**, 35, 4899



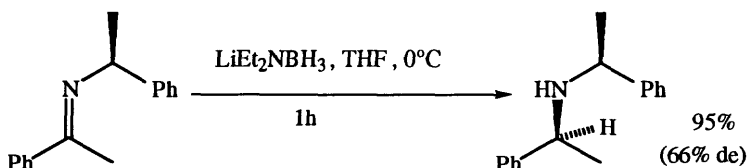
Bambridge, K.; Begley, M.J.; Simpkins, N.S. *Tetrahedron Lett.*, **1994**, 35, 3391



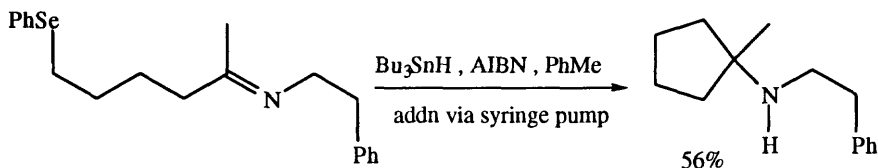
Grellier, M.; Pfeffer, M.; van Koten, G. *Tetrahedron Lett.*, **1994**, 35, 2877



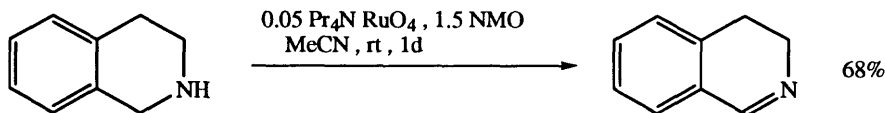
Stevens, C.V.; De Kimpe, N.G.; Katritzky, A.R. *Tetrahedron Lett.*, **1994**, 35, 3763



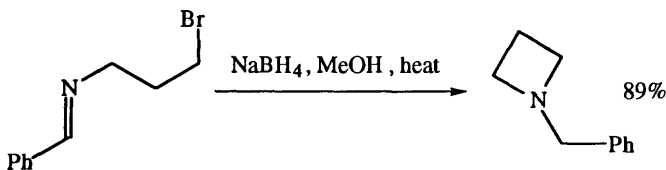
Fuller, J.C.; Belisle, C.M.; Goralski, C.T.; Singaram, B. *Tetrahedron Lett.*, **1994**, 35, 5389



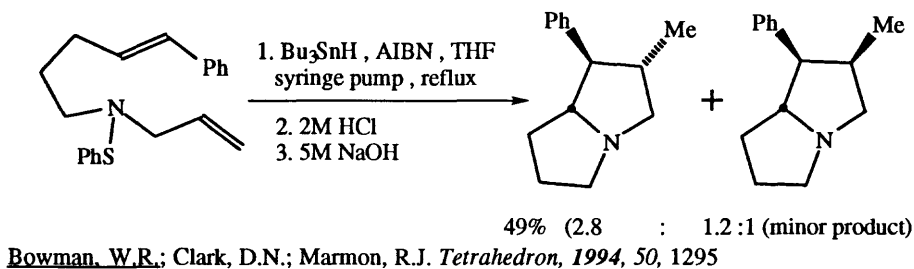
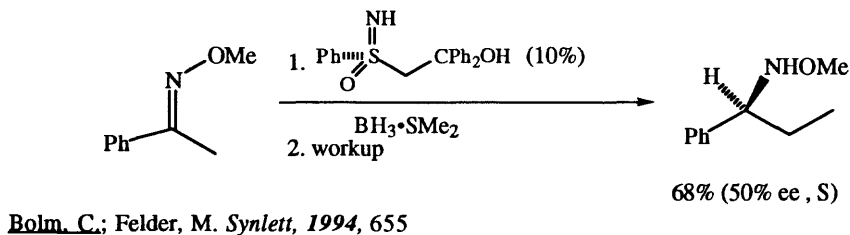
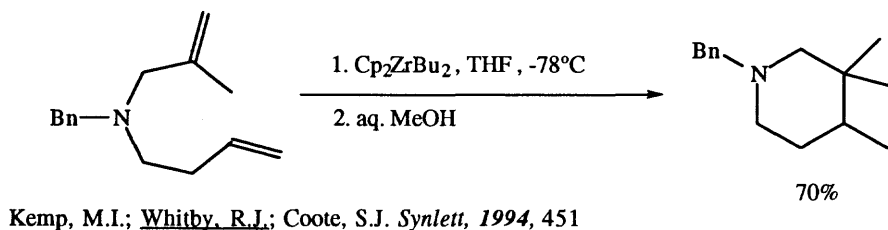
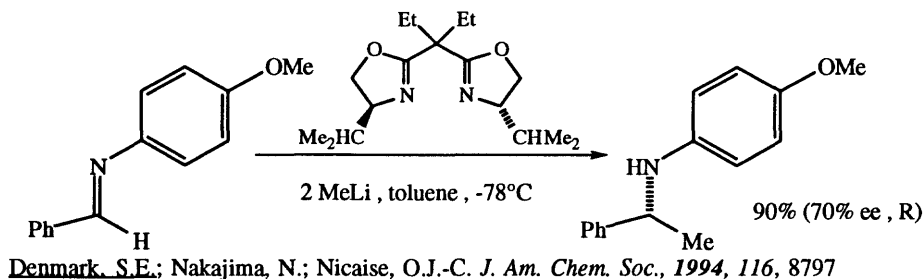
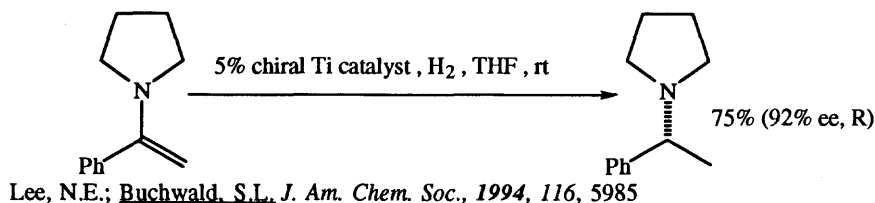
Bowman, W.R.; Stephenson, P.T.; Terrett, N.K.; Young, A.R. *Tetrahedron Lett.*, **1994**, 35, 6369

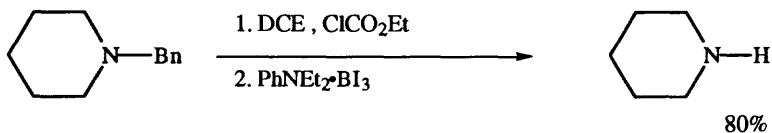


Goti, A.; Romani, M. *Tetrahedron Lett.*, **1994**, 35, 6567

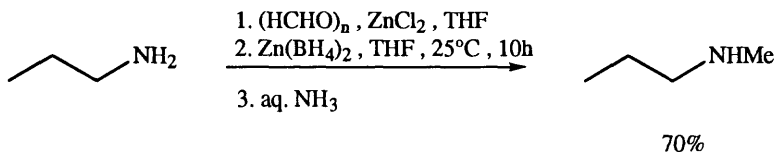


De Kimpe, N.; De Smaele, D. *Tetrahedron Lett.*, **1994**, 35, 8023

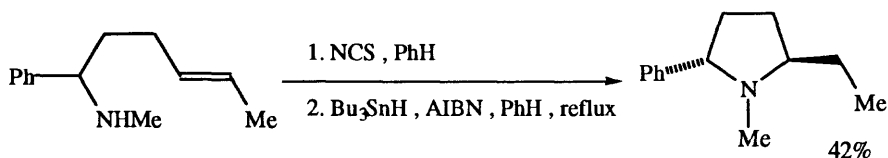




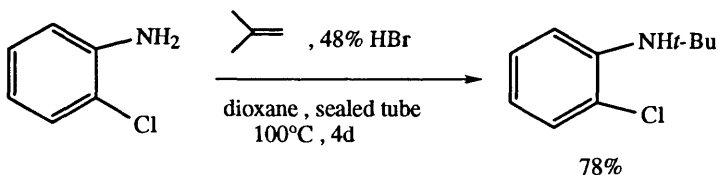
Kanth, J.V.B.; Reddy, Ch.K.; Periasamy, M. *Synth. Commun.*, **1994**, *24*, 313



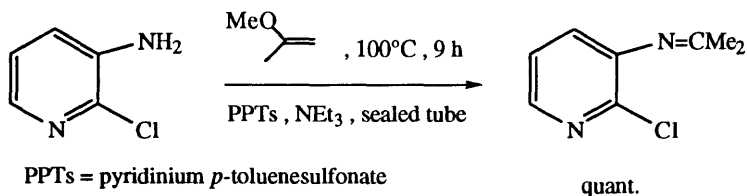
Bhattacharyya, S.; Chatterjee, A.; Dutta Chowdhury, S.K.
J. Chem. Soc., Perkin Trans. 1., **1994**, 1



Tokuda, M.; Fujita, H.; Sugimoto, H. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 777

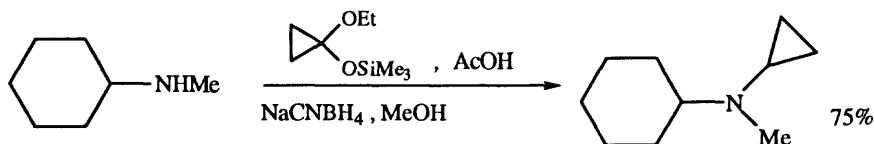


Gage, J.R.; Wagner, J.M. *J. Org. Chem.*, **1995**, *60*, 2613

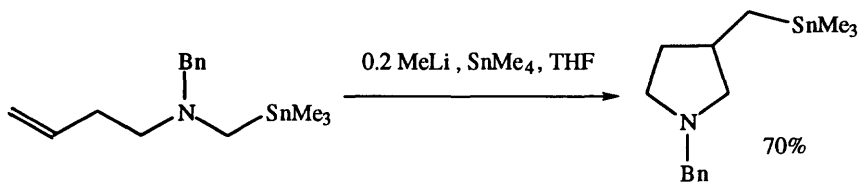


PPTs = pyridinium *p*-toluenesulfonate

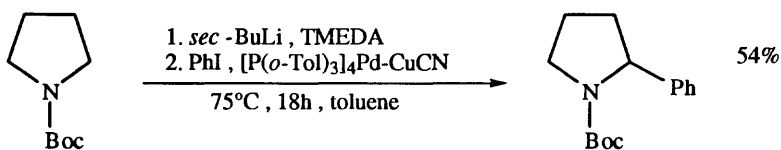
Morris, J.; Wishka, D.G. *J. Org. Chem.*, **1995**, *60*, 2642



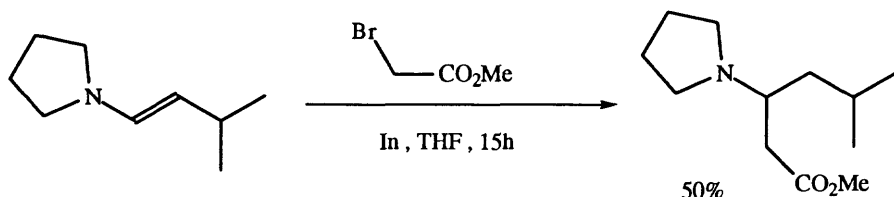
Gillaspy, M.L.; Lefker, B.A.; Hada, W.A.; Hoover, D.J. *Tetrahedron Lett.*, **1995**, *36*, 7399



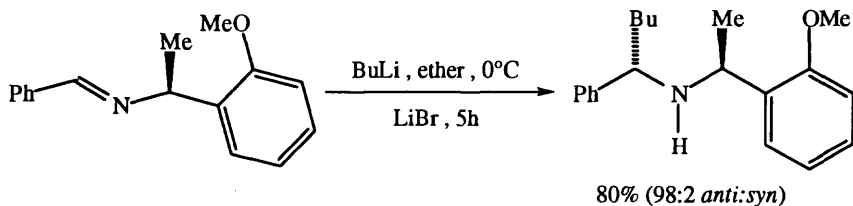
Coldham, J.; Hufton, R. *Tetrahedron Lett.*, **1995**, 36, 2157



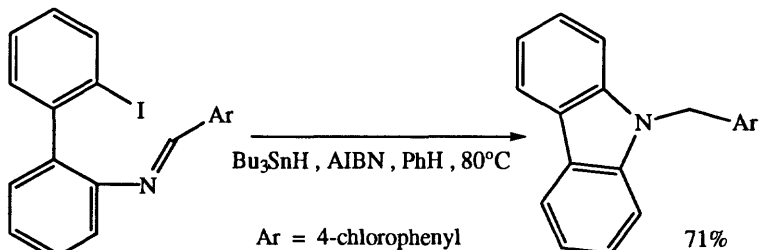
Dieter, R.K.; Li, S. *Tetrahedron Lett.*, **1995**, 36, 3613



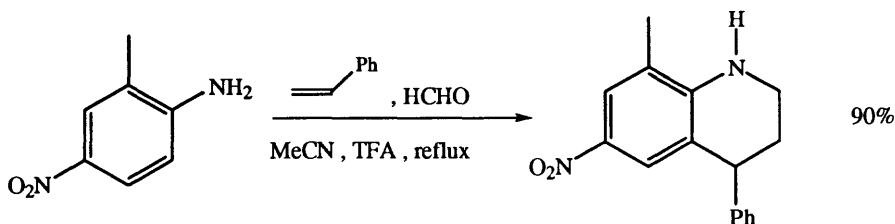
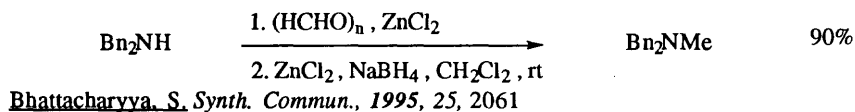
Bossard, F.; Dambrin, V.; Lintanf, V.; Beuchet, P.; Mosset, P. *Tetrahedron Lett.*, **1995**, 36, 6055



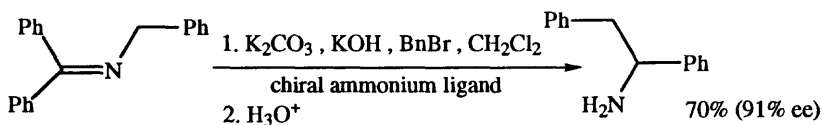
Hashimoto, Y.; Kobayashi, N.; Kai, A.; Saigo, K. *Synlett*, **1995**, 961



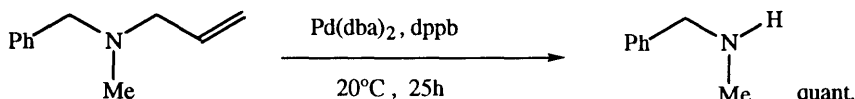
Gioanola, M.; Leardini, R.; Nanni, D.; Pareschi, P.; Zanardi, G. *Tetrahedron*, **1995**, 51, 2039



Mellor, J.M.; Merriman, G.D. Tetrahedron, 1995, 51, 6115

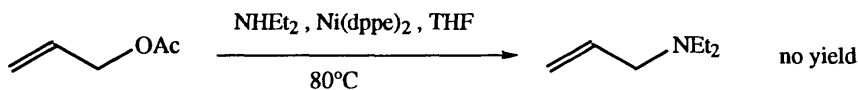


Eddine, J.J.; Cherqaoui, M. Tetrahedron Asymmetry, 1995, 6, 1225



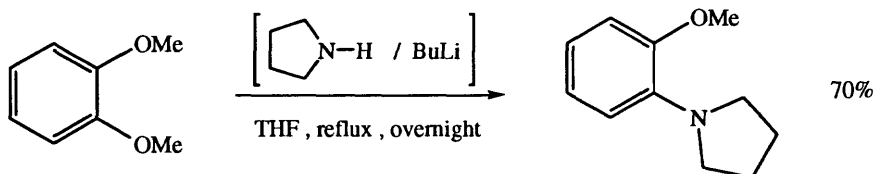
Lemaire-Audoire, S.; Savignac, M.; Dupuis, C.; Genêt, J.-P. Bull. Soc. Chim. Fr., 1995, 132, 1157

SECTION 98: AMINES FROM ESTERS



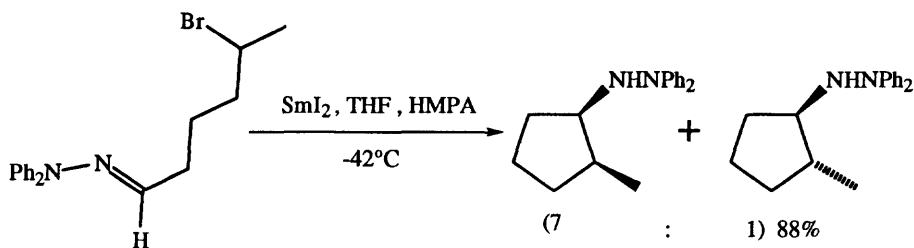
Bricout, H.; Carpentier, J.-F.; Mortreux, A. J. Chem. Soc. Chem. Commun., 1995, 1863

SECTION 99: AMINES FROM ETHERS, EPOXIDES AND THIOETHERS

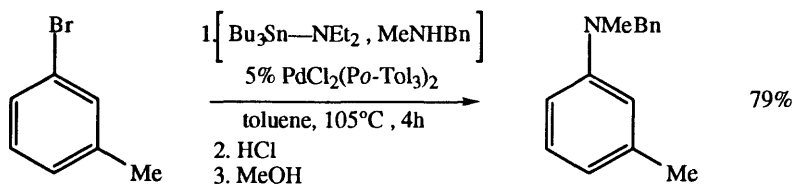


ten Hoeve, W.; Kruse, C.G.; Luteyn, J.M.; Thiecke, J.R.G.; ten Hoeve, W.; Kruse, C.G.; Luteyn, J.M.; Thiecke, J.R.G.; Wynberg, H. J. Org. Chem., 1993, 58, 5101

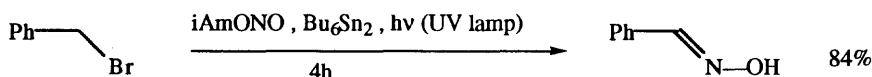
SECTION 100: AMINES FROM HALIDES AND SULFONATES



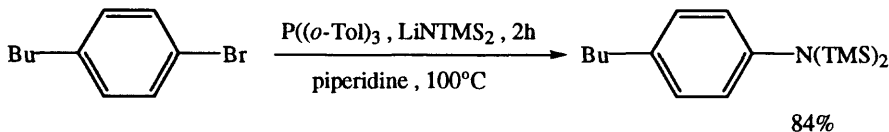
Sturino, C.F.; Fallis, A.G. *J. Am. Chem. Soc.*, **1994**, 116, 7447



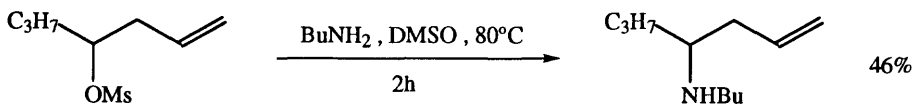
Guram, A.S.; Buchwald, S.L. *J. Am. Chem. Soc.*, **1994**, 116, 7901



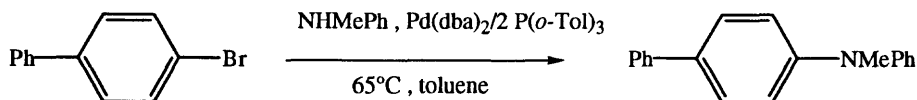
Fletcher, R.J.; Kiril, M.; Murphy, J.A. *Tetrahedron Lett.*, **1995**, 36, 323



Louie, J.; Hartwig, J.F. *Tetrahedron Lett.*, **1995**, 36, 3689

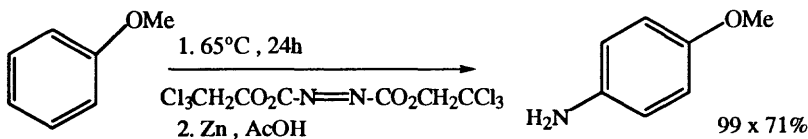


Hénin, F.; Mahuet, E.; Muller, C.; Muzart, J. *Synth. Commun.*, **1995**, 25, 1331



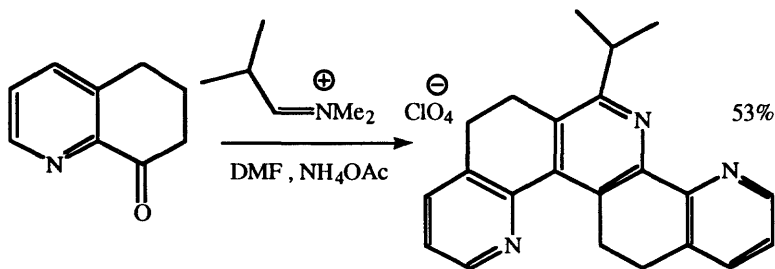
Guram, A.S.; Rennels, R.A.; Buchwald, S.L. *Angew. Chem. Int. Ed. Engl.*, **1995**, 34, 1348

SECTION 101: AMINES FROM HYDRIDES

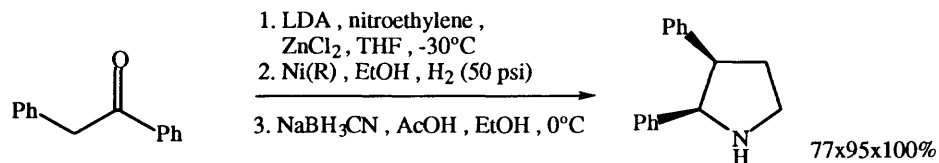


Zaltsgendler, I.; Leblanc, Y.; Bernstein, M.A. *Tetrahedron Lett.*, **1993**, *34*, 2441

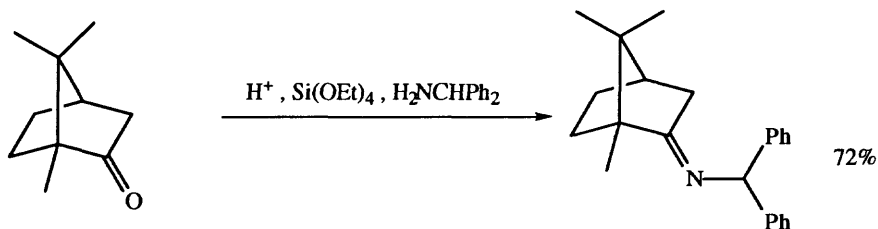
SECTION 102: AMINES FROM KETONES



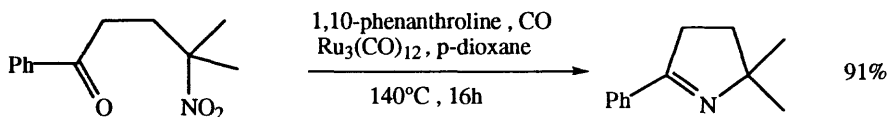
Westerwelle, U.; Risch, N. *Tetrahedron Lett.*, **1993**, *34*, 1775



Pal, K.; Behnke, M.L.; Tong, L. *Tetrahedron Lett.*, **1993**, *34*, 6205



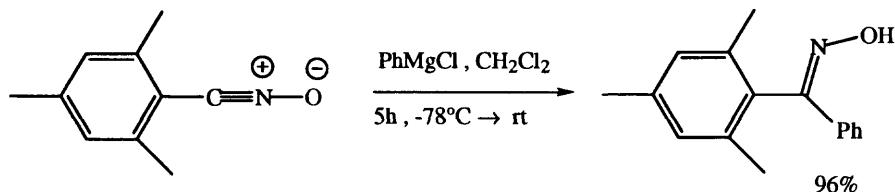
Love, B.E.; Ren, J. *J. Org. Chem.*, **1993**, *58*, 5556



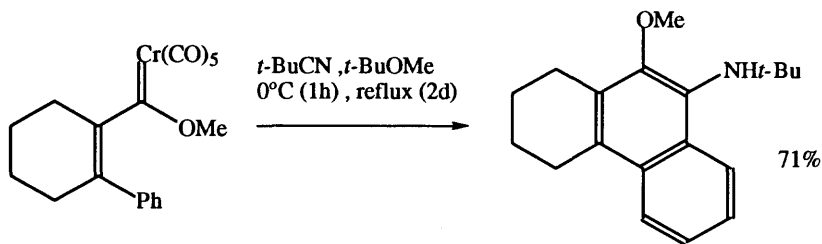
Watanabe, Y.; Yamamoto, J.; Akazome, M.; Kondo, T.; Mitsudo, T. *J. Org. Chem.*, **1995**, *60*, 8328

Related Methods: Section 94 (Amines from Aldehydes)

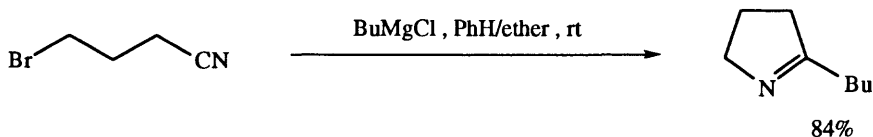
SECTION 103: AMINES FROM NITRILES



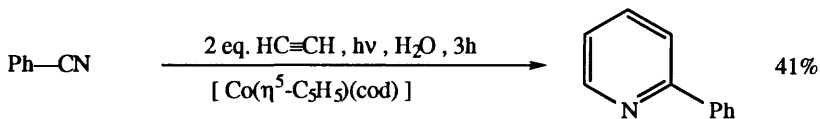
Kim, J.N.; Kim, H.R.; Ryu, E.K. *Tetrahedron Lett.*, **1993**, *34*, 5117



Merlic, C.A.; Burns, E.E. *Tetrahedron Lett.*, **1993**, *34*, 5401

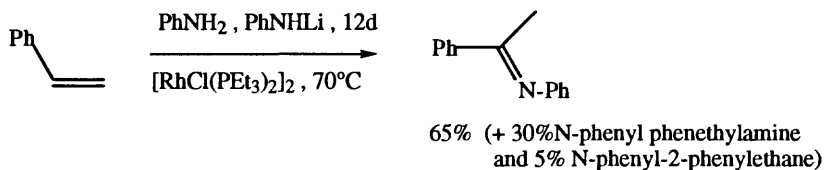


Ery, D.E.; Fowler, C.B.; Dieter, R.K. *Synlett*, **1994**, 836

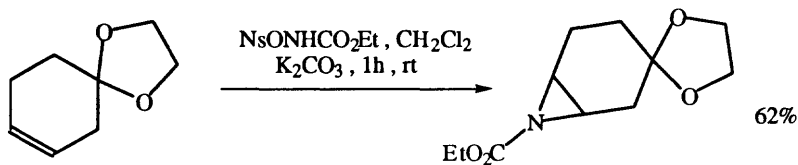


Heller, B.; Oehme, G. *J. Chem. Soc. Chem. Commun.*, **1995**, 179

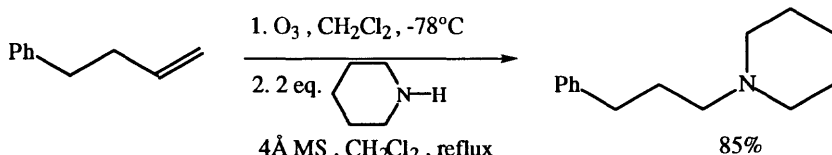
SECTION 104: AMINES FROM ALKENES



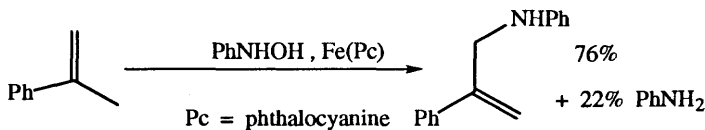
Brunet, J.-J.; Neibecker, D.; Philippot, K. *Tetrahedron Lett.*, **1993**, *34*, 3877



Fioravanti, S.; Loreto, M.A.; Pellacani, L.; Tardella, P.A. *Tetrahedron Lett.*, **1993**, *34*, 4353

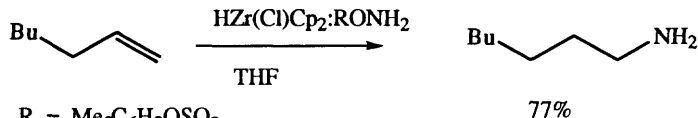


Hon, Y.-S.; Lu, L. *Tetrahedron Lett.*, **1993**, *34*, 5309



Pc = phthalocyanine

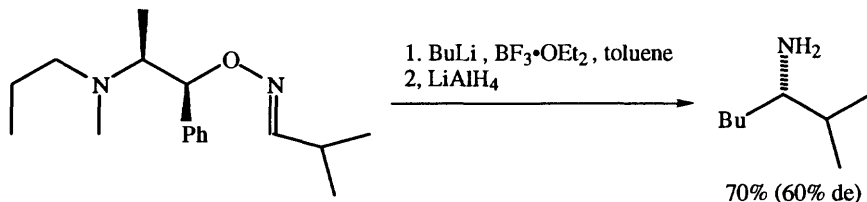
Johannsen, M.; Jørgensen, K.A. *J. Org. Chem.*, **1994**, *59*, 214



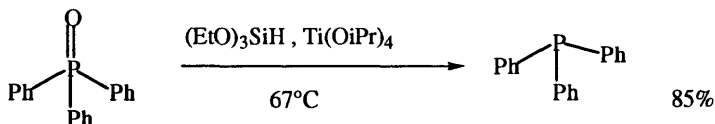
$\text{R} = \text{Me}_3\text{C}_6\text{H}_2\text{OSO}_2^-$

Zheng, B.; Srebnik, M. *J. Org. Chem.*, **1995**, *60*, 1912

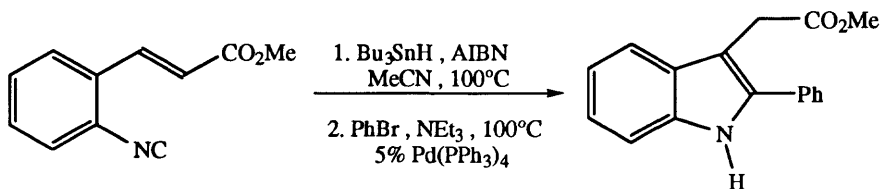
SECTION 105: AMINES FROM MISCELLANEOUS COMPOUNDS



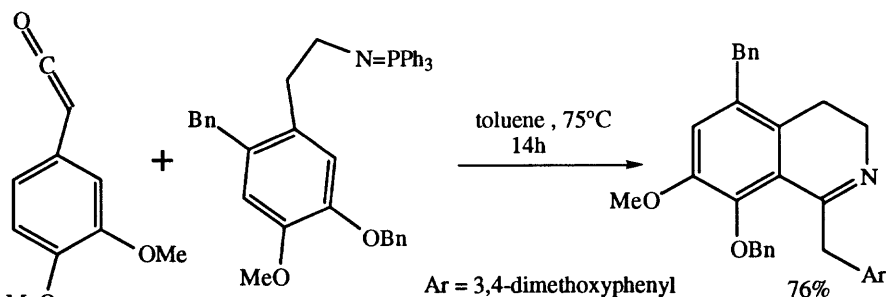
Dieter, R.K.; Datar, R. *Can. J. Chem.*, **1993**, *71*, 814



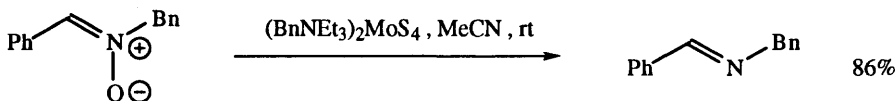
Coumbe, T.; Lawrence, N.J.; Muhammad, F. *Tetrahedron Lett.*, **1994**, *35*, 625



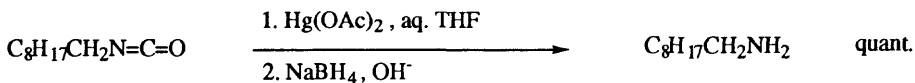
Fukuyama, T.; Chen, X.; Peng, G. *J. Am. Chem. Soc.*, **1994**, *116*, 3127



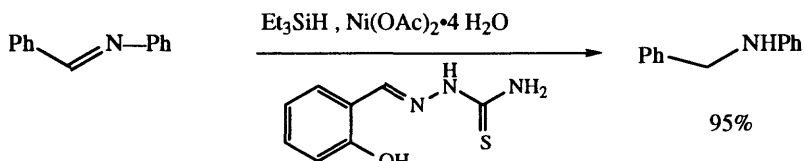
Rodrigues, J.A.R.; Leiva, G.C.; de Sousa, J.D.F. *Tetrahedron Lett.*, **1995**, *36*, 59



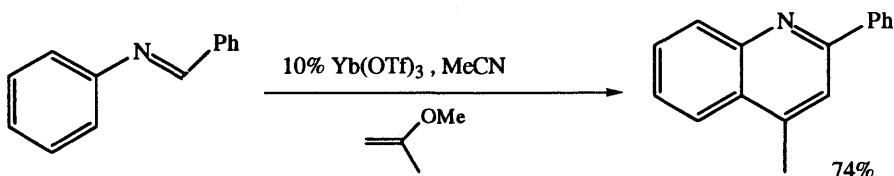
Ilanckumar, P.; Chandrasekaran, S. *Tetrahedron Lett.*, **1995**, *36*, 4881



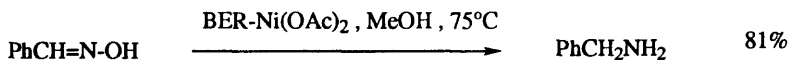
Malanga, C.; Urso, A.; Lardicci, L. *Tetrahedron Lett.*, **1995**, *36*, 8859



Vetter, A.H.; Berkessel, A. *Synthesis*, **1995**, 419

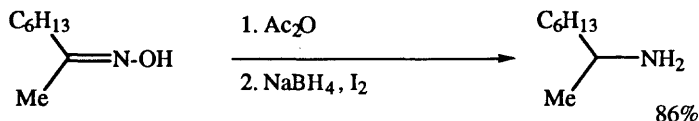


Makioka, Y.; Shindo, T.; Taniguchi, Y.; Takaki, K.; Fujiwara, Y. *Synthesis*, **1995**, 801

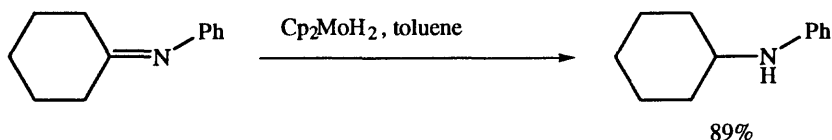


BER = borohydride exchange resin

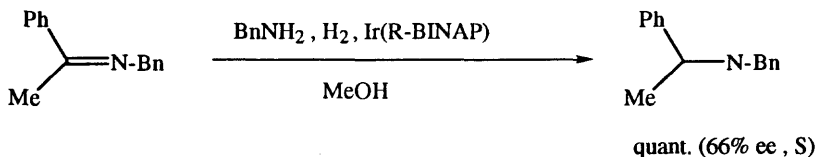
Bandgar, B.P.; Nikat, S.M.; Wadgaonkar, P.P. *Synth. Commun.*, 1995, 25, 863



Barbry, D.; Champagne, P. *Synth. Commun.*, 1995, 25, 3503

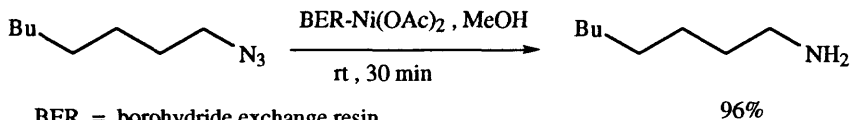


Minato, M.; Fujiwara, Y.; Ito, T. *Chem. Lett.*, 1995, 647



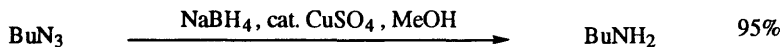
Tani, K.; Onouchi, J.; Yamagata, T.; Kataoka, Y. *Chem. Lett.*, 1995, 955

AMINES FROM AZIDES

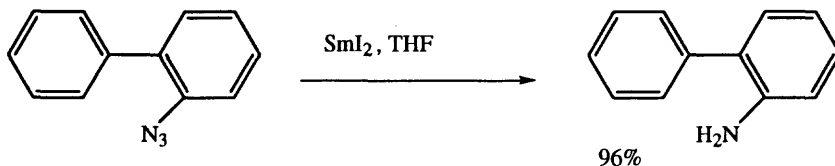


BER = borohydride exchange resin

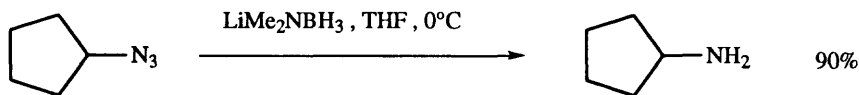
Yoon, N.M.; Choi, J.; Shon, Y.S. *Synth. Commun.*, 1993, 23, 3047



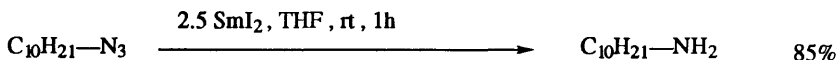
Rao, H.S.P.; Siva, P. *Synth. Commun.*, 1994, 24, 549



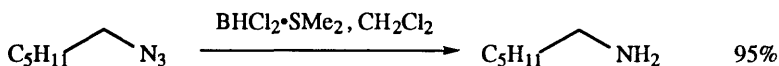
Benati, L.; Montevecchi, P.C.; Nanni, D.; Spagnolo, P.; Volta, M. *Tetrahedron Lett.*, 1995, 36, 7313



Alvarez, S.G.; Fisher, G.B.; Singaram, B. *Tetrahedron Lett.*, **1995**, 36, 2567

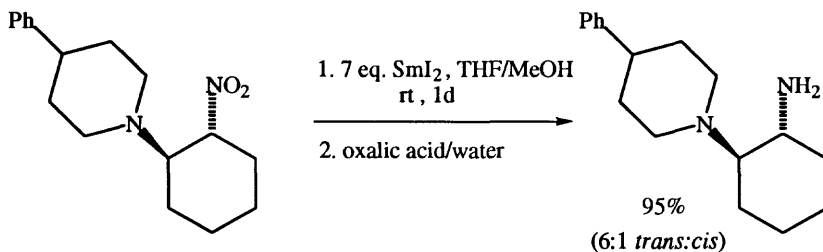


Goulaouic-Dubois, C.; Hesse, M. *Tetrahedron Lett.*, **1995**, 36, 7427

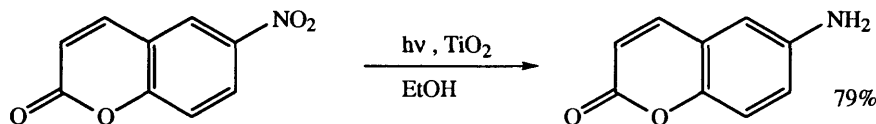


Salunkhe, A.M.; Brown, H.C. *Tetrahedron Lett.*, **1995**, 36, 7987

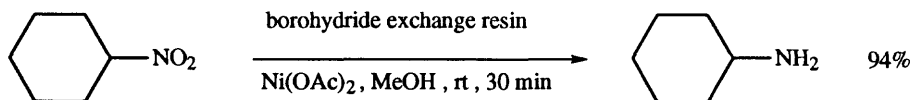
AMINES FROM NITRO COMPOUNDS



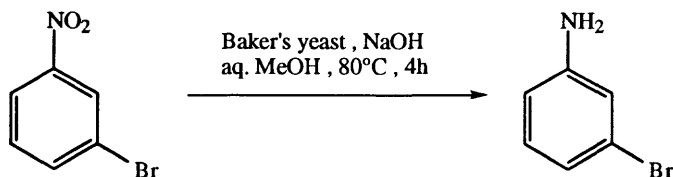
Sturgess, M.A.; Yarberry, D.J. *Tetrahedron Lett.*, **1993**, 34, 4743



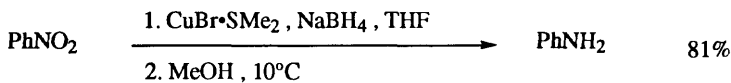
Mahdavi, F.; Bruton, T.C.; Li, Y. *J. Org. Chem.*, **1993**, 58, 744



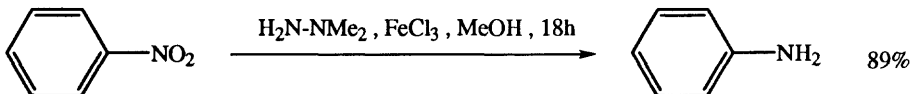
Yoon, N.M.; Choi, J. *Synlett*, **1993**, 135



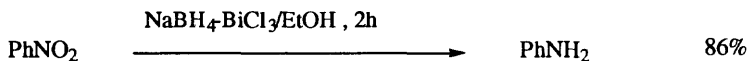
Baik, W.; Han, J.L.; Lee, K.C.; Lee, N.H.; Kim, B.H.; Hahn, J.-T. *Tetrahedron Lett.*, **1994**, 35, 3965



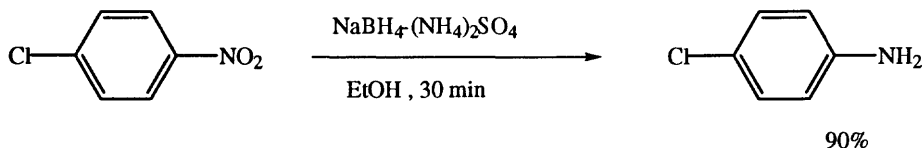
Patel, H.V.; Vyas, K.A. *Org. Prep. Proceed. Int.*, **1995**, 27, 81



Boothroud, S.R.; Kerr, M.A. *Tetrahedron Lett.*, **1995**, 36, 2411



Ren, P.-D.; Pan, S.-F.; Dong, T.-W.; Wu, S.H. *Synth. Commun.*, **1995**, 25, 3799



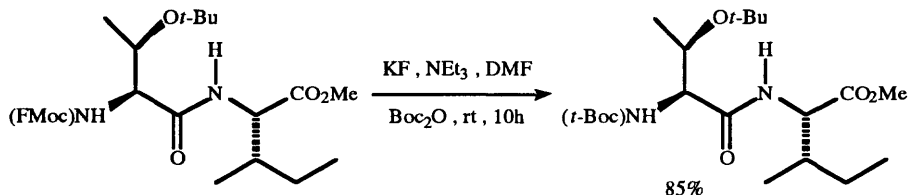
Gohain, S.; Prajapati, D.; Sandhu, J.S. *Chem. Lett.*, **1995**, 725

REVIEWS:

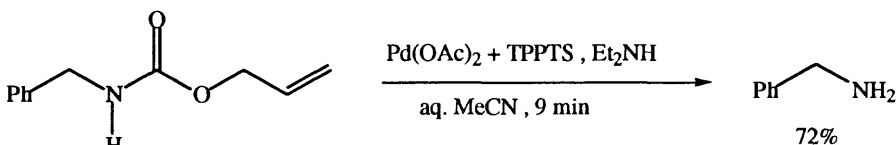
"Asymmetric Reductions of C-N Double Bonds. A Review," Zhu, Q.-C.; Hutchins, R.O. *Org. Prep. Proceed. Int.*, **1994**, 26, 193

"Reduction of Nitro-Substituted Tertiary Alkanes," Weis, C.D.; Newkome, G.R. *Synthesis*, **1995**, 1053

SECTION 105A: PROTECTION OF AMINES

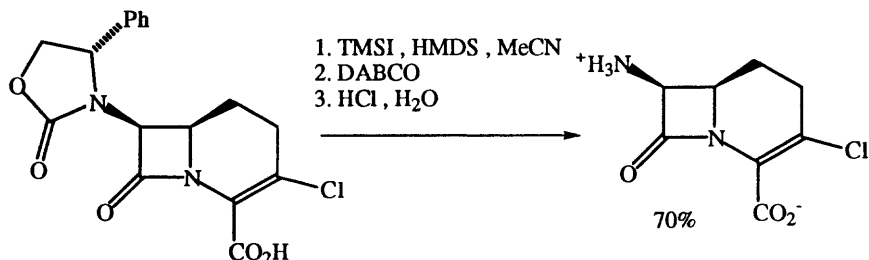


Li, W.-R.; Jiang, J.; Joullié, M.M. *Tetrahedron Lett.*, **1993**, 34, 1413

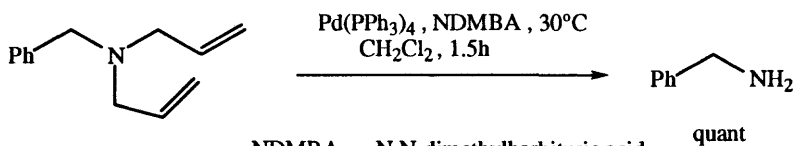


also with carbonates to give alcohols

Genêt, J.P.; Blart, E.; Savignac, M.; Lemeune, S.; Paris, J.-M. *Tetrahedron Lett.*, **1993**, 34, 4189

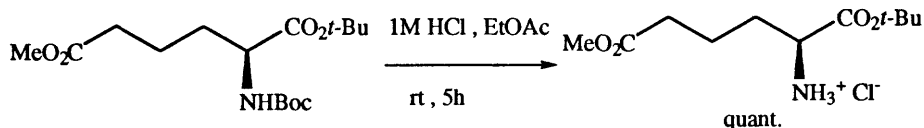


Fisher, J.W.; Dunigan, J.M.; Hatfield, L.D.; Hoying, R.C.; Ray, J.E.; Thomas, K.L. *Tetrahedron Lett.*, **1993**, *34*, 4755

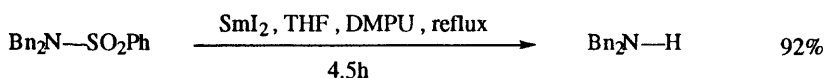


NDMBA = N,N-dimethylbarbituric acid

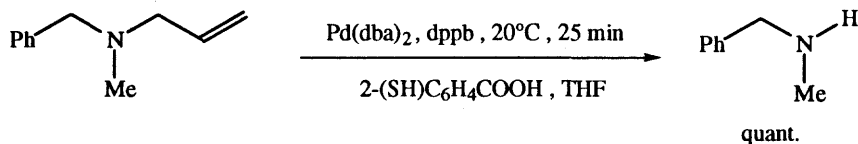
Garro-Helion, F.; Merzouk, A.; Guibé, F. *J. Org. Chem.*, **1993**, *58*, 6109



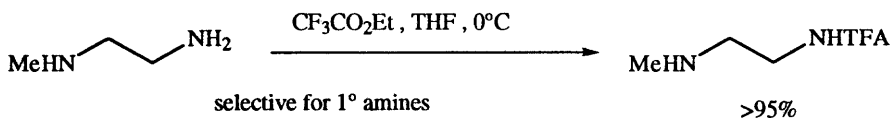
Gibson, F.S.; Bergmeier, S.C.; Rapoport, H. *J. Org. Chem.*, **1994**, *59*, 3216



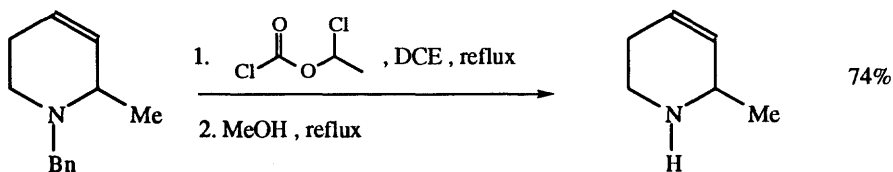
Vedejs, E.; Lin, S. *J. Org. Chem.*, **1994**, *59*, 1602



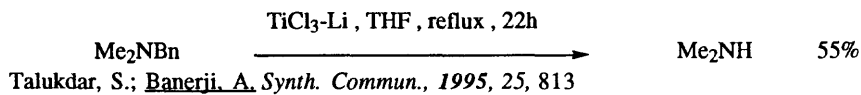
Lemaire-Audoire, S.; Savignac, M.; Genêt, J.P.; Bernard, J.-M. *Tetrahedron Lett.*, **1995**, *36*, 1267



Xu, D.; Prasad, K.; Repic, O.; Blacklock, T.J. *Tetrahedron Lett.*, **1995**, *36*, 7357



Yang, B.V.; O'Rourke, D.; Li, J. *Synlett*, **1993**, 195

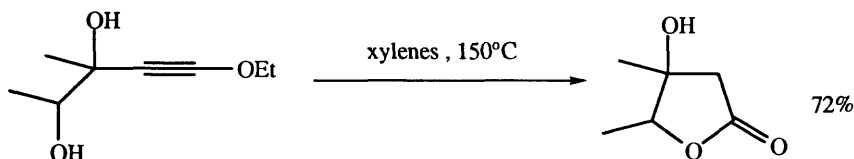


Talukdar, S.; Banerji, A. *Synth. Commun.*, **1995**, 25, 813

CHAPTER 8

PREPARATION OF ESTERS

SECTION 106: ESTERS FROM ALKYNES

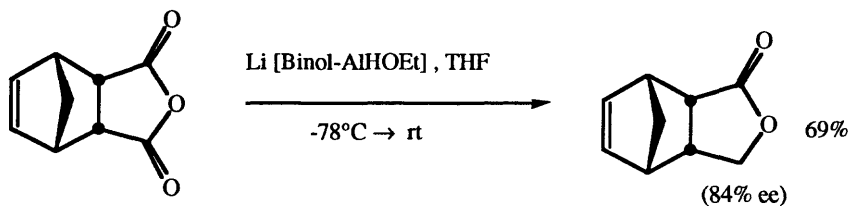


Liang, L.; Ramaseshan, M.; MaGee, D.I. *Tetrahedron*, **1993**, *49*, 2159

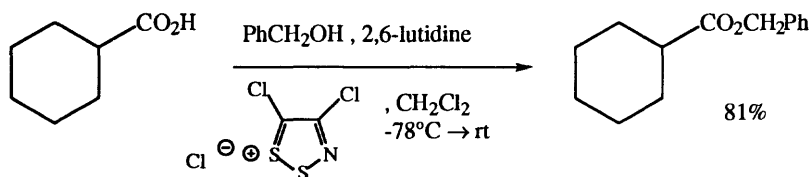
SECTION 107: ESTERS FROM ACID DERIVATIVES

The following types of reactions are found in this section:

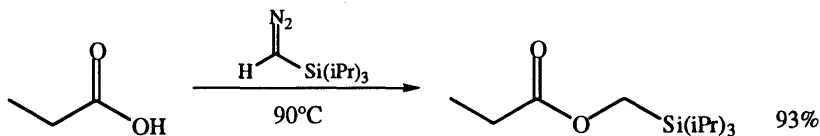
1. Esters from the reaction of alcohols with carboxylic acids, acid halides and anhydrides.
2. Lactones from hydroxy acids
3. Esters from carboxylic acids and halides, sulfoxides and miscellaneous compounds



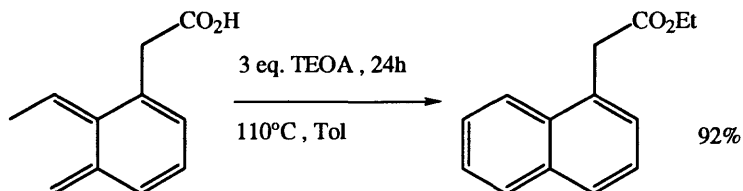
Matsuki, K.; Inoue, H.; Takeda, M. *Tetrahedron Lett.*, **1993**, *34*, 1167



Folmer, J.J.; Weinreb, S.M. *Tetrahedron Lett.*, **1993**, *34*, 2737

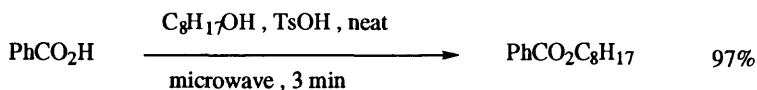


Soderquist, J.A.; Miranda, E.I. *Tetrahedron Lett.*, **1993**, 34, 4905

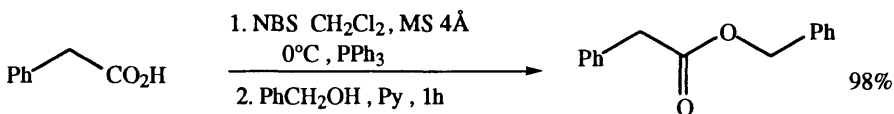


TEOA = triethyl orthoacetate

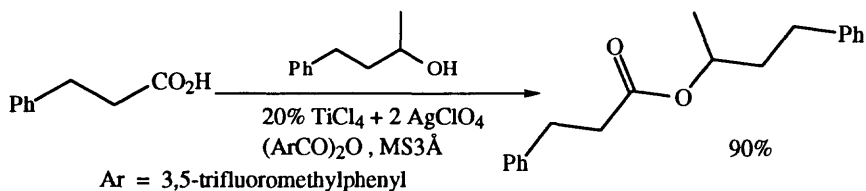
Trujillo, J.I.; Gopalan, A.S. *Tetrahedron Lett.*, **1993**, 34, 7355



Loupy, A.; Petit, A.; Randani, M.; Yvanaeff, C.; Majoub, M.; Labiad, B.; Villemin, D. *Can. J. Chem.*, **1993**, 71, 90

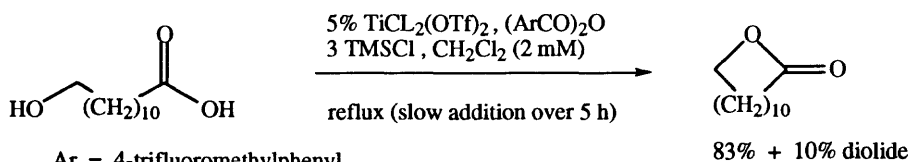


Sucheta, K.; Reddy, G.S.R.; Ravi, D.; Ramo Rao, N. *Tetrahedron Lett.*, **1994**, 35, 4415



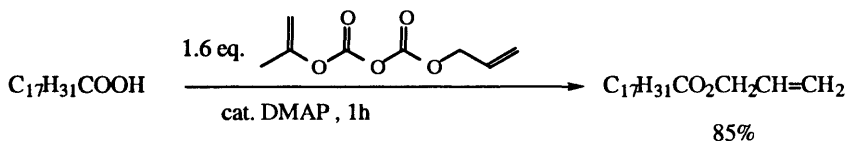
Ar = 3,5-trifluoromethylphenyl

Shiina, I.; Miyoshi, So.; Miyashita, M.; Mukaiyama, T. *Chem. Lett.*, **1994**, 515

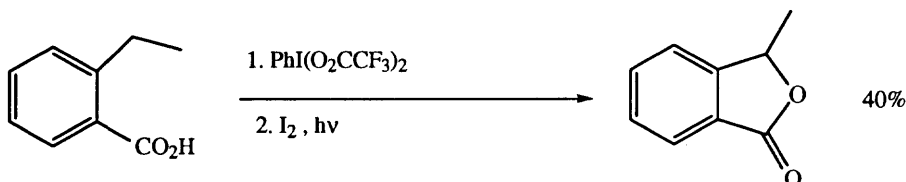


Ar = 4-trifluoromethylphenyl

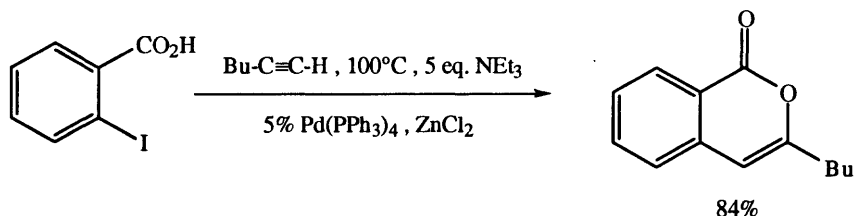
Shiina, I.; Mukaiyama, T. *Chem. Lett.*, **1994**, 677



Takeda, K.; Akiyama, A.; Konda, Y.; Takayanagi, H.; Harigaya, Y. *Tetrahedron Lett.*, **1995**, 36, 113



Togo, H.; Muraki, T.; Yokoyama, M. *Tetrahedron Lett.*, **1995**, 36, 7089

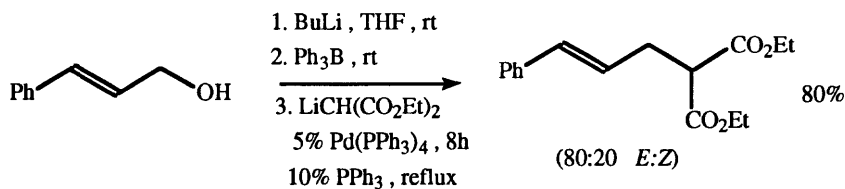


Liao, H.-Y.; Cheng, E.H. *J. Org. Chem.*, **1995**, 60, 3711

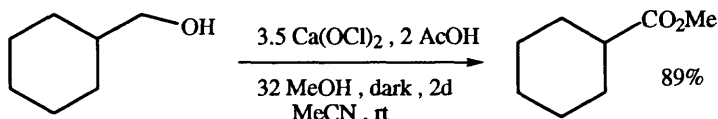
Further examples of the reaction $\text{RCO}_2\text{H} + \text{R}'\text{OH} \rightarrow \text{RCO}_2\text{R}'$ are included in Section 108 (Esters from Alcohols and Phenols) and in Section 30A (Protection of Carboxylic Acids).

SECTION 108: ESTERS FROM ALCOHOLS AND THIOLS

Further examples of the reaction $\text{ROH} \rightarrow \text{RCO}_2\text{R}'$ are included in Section 107 (Esters from Acid Derivatives) and in Section 45A (Protection of Alcohols and Phenols).



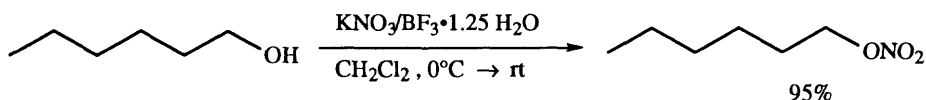
Starý, I.; Stará, I.G.; Kočovský, P. *Tetrahedron Lett.*, **1993**, 34, 179



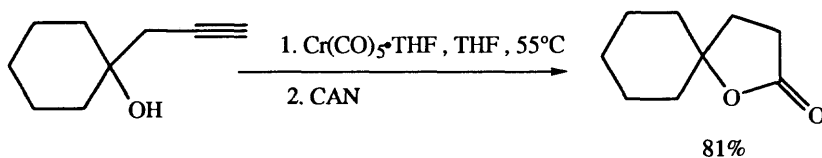
McDonald, C.E.; Nice, L.E.; Shaw, A.W.; Nestor, N.B. *Tetrahedron Lett.*, **1993**, 34, 2741



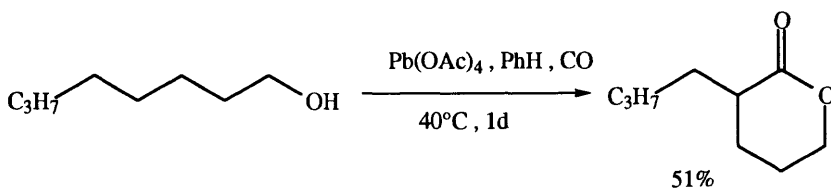
Fernández, I.; García, B.; Muñoz, S.; Pedro, J.R.; de la Salud, R. *Synlett*, **1993**, 489



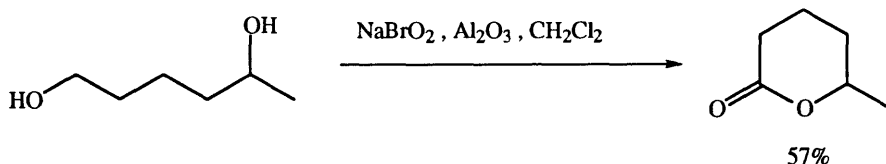
Olah, G.A.; Wang, Q.; Li, X.; Prakash, G.K.S. *Synthesis*, **1993**, 207



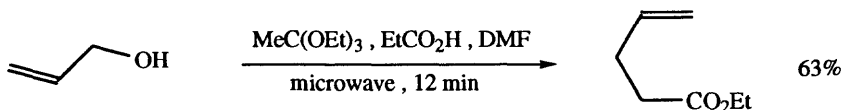
Quayle, P.; Rahman, S.; Ward, E.L.M. *Tetrahedron Lett.*, **1994**, 35, 3801



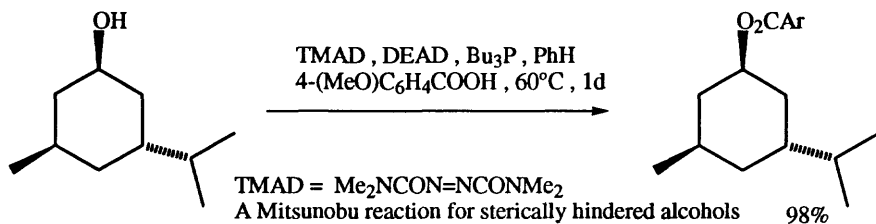
Tsunoi, S.; Ryu, I.; Sonoda, N. *J. Am. Chem. Soc.*, **1994**, 116, 5473



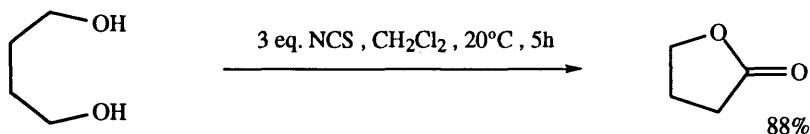
Morimoto, T.; Hirano, M.; Iwasaki, K.; Ishikawa, T. *Chem. Lett.*, **1994**, 53



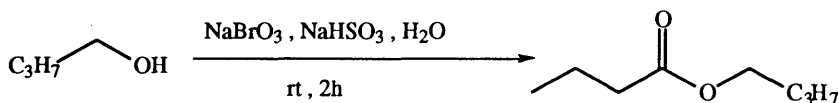
Srikrishna, A.; Nagaraju, S.; Kondaiah, P. *Tetrahedron*, **1995**, 51, 1809



Tsudoda, T.; Yamamiya, Y.; Kawamura, Y.; Itô, S. *Tetrahedron Lett.*, **1995**, 36, 2529

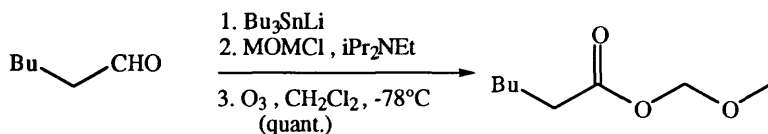


Kondo, S.; Kawasoe, S.; Kunisada, H.; Yuki, Y. *Synth. Commun.*, **1995**, 25, 719

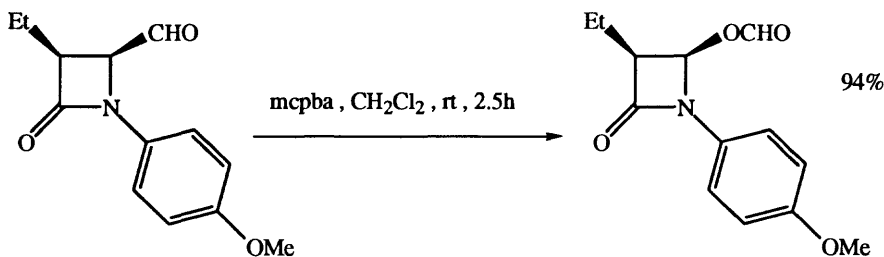


Takase, K.; Masuda, H.; Kai, O.; Nishiyama, Y.; Sakaguchi, S.; Ishii, Y. *Chem. Lett.*, **1995**, 871

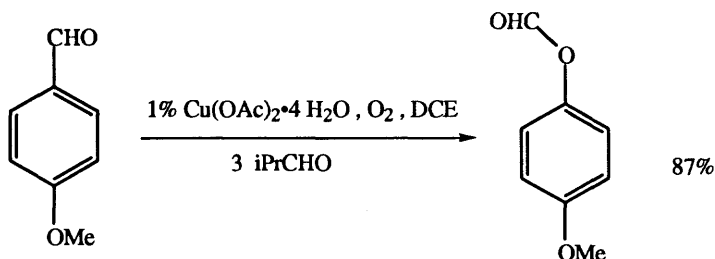
SECTION 109: ESTERS FROM ALDEHYDES



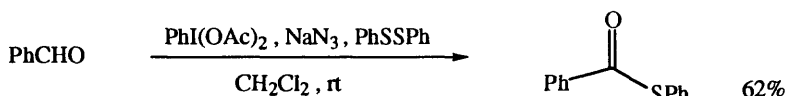
Linderman, R.J.; Jaber, M. *Tetrahedron Lett.*, **1994**, 35, 5993



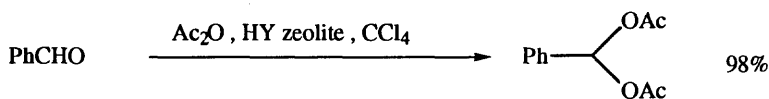
Alcaide, B.; Aly, M.F.; Sierra, M.A. *Tetrahedron Lett.*, **1995**, 36, 3401



Anoune, N.; Lantéri, P.; Longeray, R.; Arnaud, C. *Tetrahedron Lett.*, **1995**, 36, 6679



Tingoli, M.; Temperini, A.; Testaferri, L.; Tiecco, M. *Synlett*, **1995**, 1129



Pereira, C.; Gigante, B.; Marcelo-Curto, M.J.; Carreyre, H.; Pérot, G.; Guisnet, M. *Synthesis*, **1995**, 1077

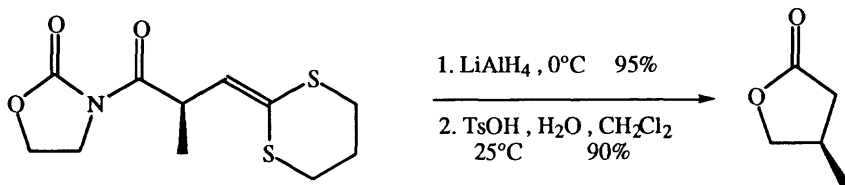
Related Methods: Section 117 (Esters from Ketones)

SECTION 110: ESTERS FROM ALKYL, METHYLENES AND ARYL

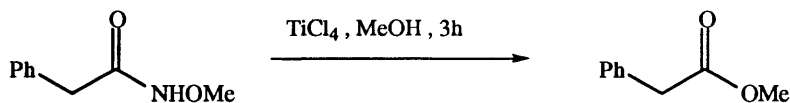
No examples of the reaction $R-R \rightarrow RCO_2R'$ or $R'CO_2R$ ($R, R' = \text{alkyl, aryl, etc.}$) occur in the literature. For the reaction $R-H \rightarrow RCO_2R'$ or $R'CO_2R$, see Section 116 (Esters from Hydrides).

NO ADDITIONAL EXAMPLES

SECTION 111: ESTERS FROM AMIDES

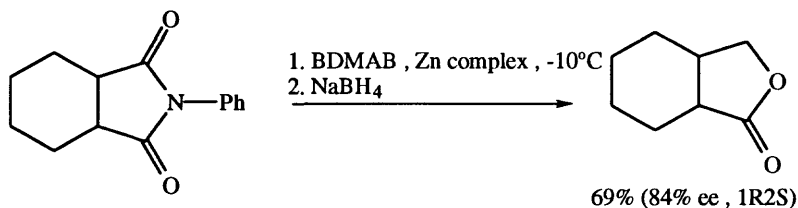


Canan Koch, S.S.; Chamberlin, A.R. *J. Org. Chem.*, **1993**, 58, 2725



86%

Fisher, L.E.; Caroon, J.M.; Stabler, S.R.; Lundberg, S.; Zaidi, S.; Sorensen, C.M.; Sparacino, M.L.; Muchowski, J.M. *Can. J. Chem.*, **1994**, *72*, 142



69% (84% ee, 1R2S)

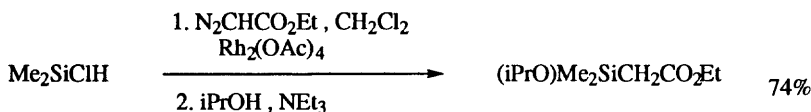
Kang, J.; Lee, J.W.; Kim, J.I.; Pyun, C. *Tetrahedron Lett.*, **1995**, *36*, 4265

SECTION 112: ESTERS FROM AMINES

NO ADDITIONAL EXAMPLES

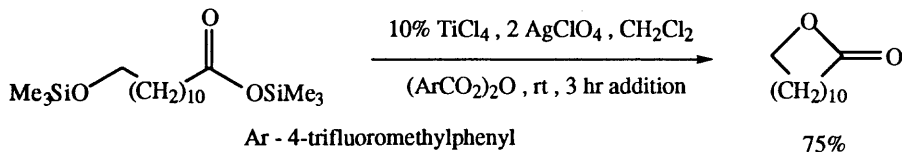
SECTION 113: ESTERS FROM ESTERS

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



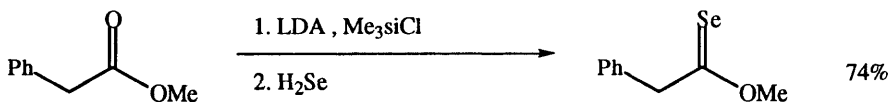
74%

Andrey, O.; Landais, Y.; Panchenault, D. *Tetrahedron Lett.*, **1993**, *34*, 2927



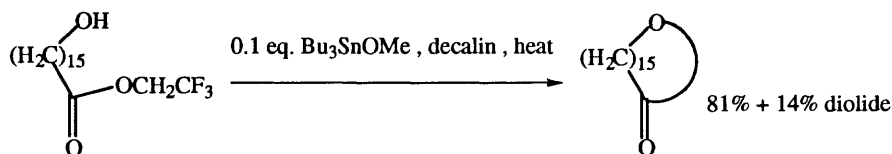
75%

Mukaiyama, T.; Izumi, J.; Miyashita, M.; Shiina, I. *Chem. Lett.*, **1993**, 907



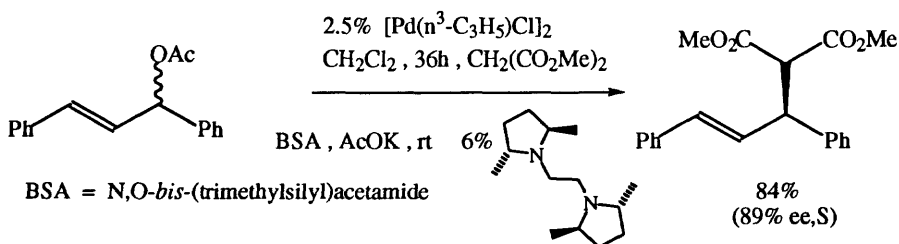
74%

Wright, S.W. *Tetrahedron Lett.*, **1994**, *35*, 1331

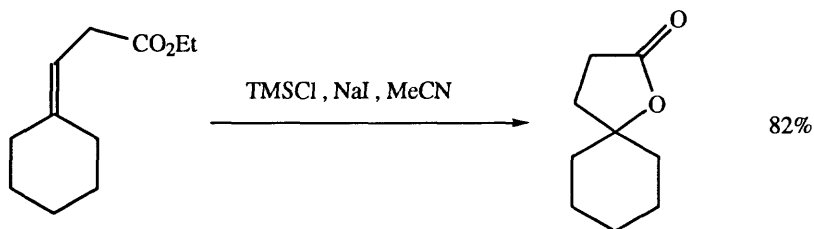


[with BuSnH/AIBN \rightarrow 70% lactone + 0% diolide]

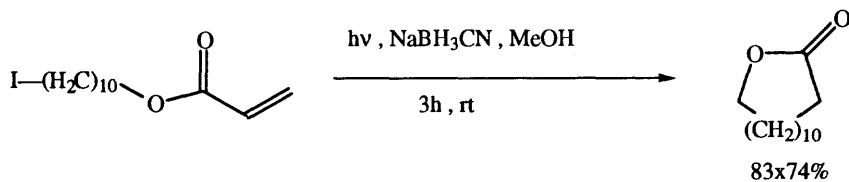
White, J.D.; Green, N.J.; Fleming, F.F. *Tetrahedron Lett.*, **1993**, *34*, 3515



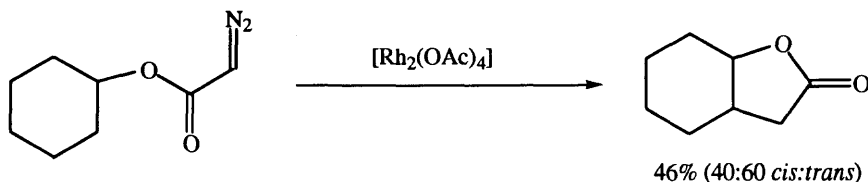
Kubota, H.; Nakajima, M.; Koga, K. *Tetrahedron Lett.*, **1993**, *34*, 8135



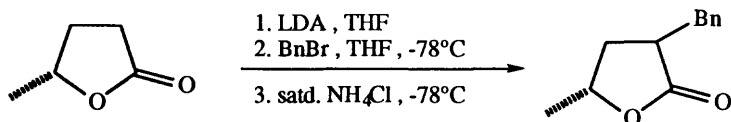
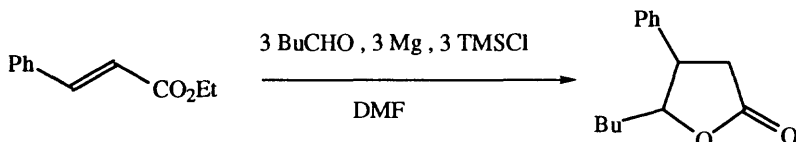
Piva, O. *Tetrahedron*, **1994**, *50*, 13687



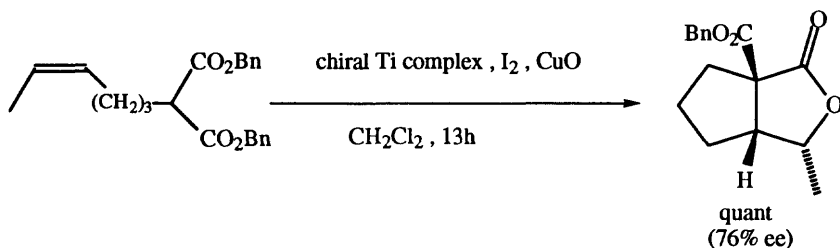
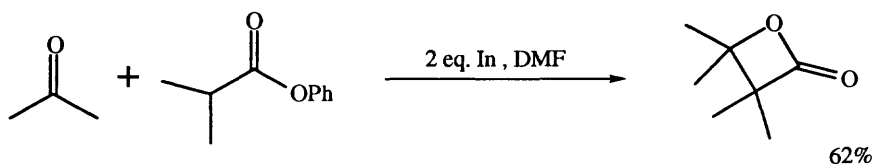
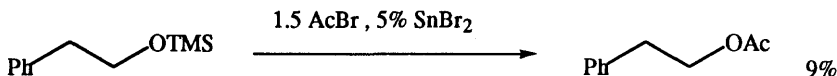
Abe, M.; Hayashikoshi, T.; Kurata, T. *Chem. Lett.*, **1994**, 1789

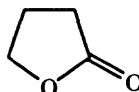
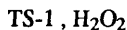


Müller, P.; Polleux, P. *Helv. Chim. Acta*, **1994**, *77*, 645

83% (10:1 *anti:syn*)Anceau, C.; Dauphin, G.; Coudert, G.; Guillaumet, G. *Bull. Soc. Chim. Fr.*, **1994**, 131, 291

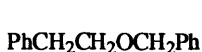
74%

Ohno, T.; Ishino, Y.; Tsumagari, Y.; Nishiguchi, I. *J. Org. Chem.*, **1995**, 60, 458Inoue, T.; Kitagawa, O.; Kurumizawa, S.; Ochiai, O.; Taguchi, T. *Tetrahedron Lett.*, **1995**, 36, 1479Schick, H.; Ludwig, R.; Kleiner, K.; Kunath, A. *Tetrahedron*, **1995**, 51, 2939**SECTION 114: ESTERS FROM ETHERS, EPOXIDES AND THIOETHERS**Oriyama, T.; Oda, M.; Gono, J.; Koga, G. *Tetrahedron Lett.*, **1994**, 35, 2027



55%

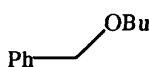
TS-1 = titanium silicate

Sasidharan, M.; Suresh, S.; Sudalai, A. *Tetrahedron Lett.*, **1995**, 36, 9071

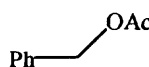
rt, 1h



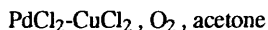
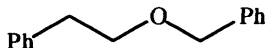
92%

Oriyama, T.; Kimura, M.; Oda, M.; Koga, G. *Synlett*, **1993**, 437

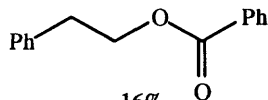
1.7 min



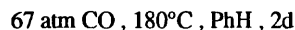
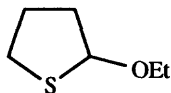
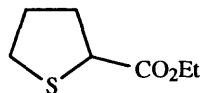
82%

Yulin, J.; Yuncheng, Y. *Synth. Commun.*, **1994**, 24, 1045

CO (60 atm), 2d



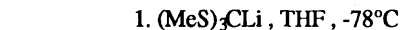
16%

Miyamoto, M.; Minami, Y.; Ukaji, Y.; Kinoshita, H.; Inomata, K. *Chem. Lett.*, **1994**, 1149[Rh(cod)Cl]₂

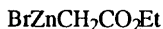
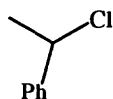
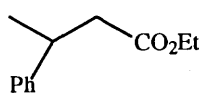
73%

Khuntaveeporn, K.; Alper, H. *J. Chem. Soc. Chem. Commun.*, **1995**, 917

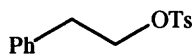
SECTION 115: ESTERS FROM HALIDES AND SULFONATES



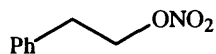
91x84%

Barbero, M.; Cadamuro, S.; Degani, I.; Dughera, S.; Fochi, R. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 2075CH₂Cl₂, 0°C → 20°C

69%

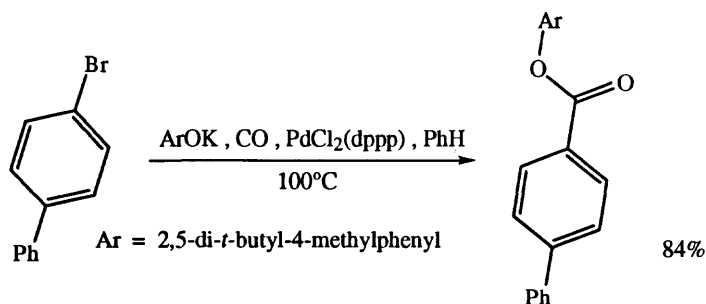
Bott, K. *Tetrahedron Lett.*, **1994**, 35, 555

sealed tube (135°C)

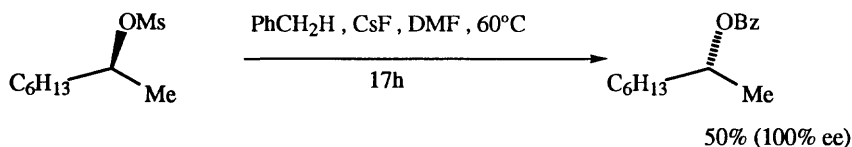


81%

Hwu, J.R.; Yyas, K.A.; Patel, H.V.; Lin, C.-H.; Yang, J.-C. *Synthesis*, **1994**, 471



Kubota, Y.; Hanaoka, T.-a.; Takeuchi, K.; Sugi, Y. *J. Chem. Soc. Chem. Commun.*, **1994**, 1553

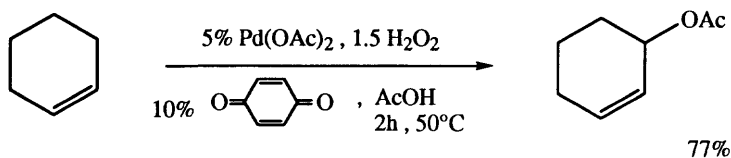


Sato, T.; Otera, I. *Synlett*, **1995**, 336

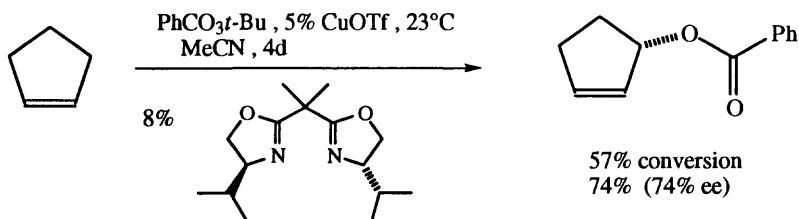
Related Methods: Section 25 (Acid Derivatives from Halides).

SECTION 116: ESTERS FROM HYDRIDES

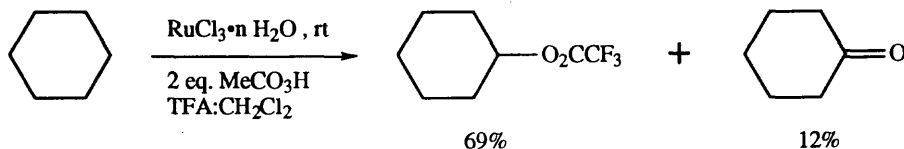
This section contains examples of the reaction $R-H \rightarrow RCO_2R'$ or $R'CO_2R$ (R = alkyl, aryl, etc.).



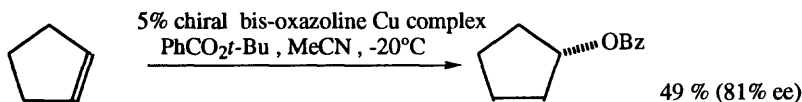
Åkermark, B.; Larsson, E.M.; Oslob, J.D. *J. Org. Chem.*, **1994**, 59, 5729



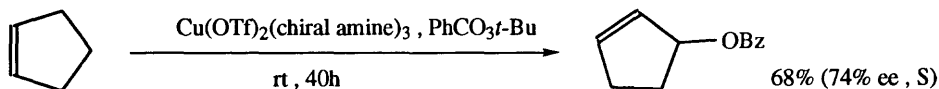
Gokhale, A.S.; Minidis, A.B.E.; Pfaltz, A. *Tetrahedron Lett.*, **1995**, 36, 1831



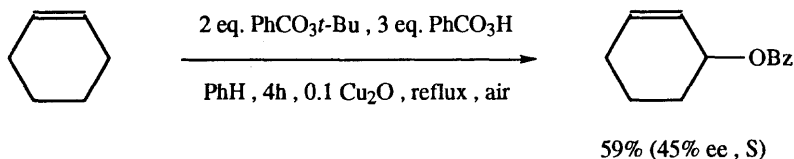
Murahashi, S.; Oda, Y.; Komiya, N.; Naota, T. *Tetrahedron Lett.*, **1994**, 35, 7953



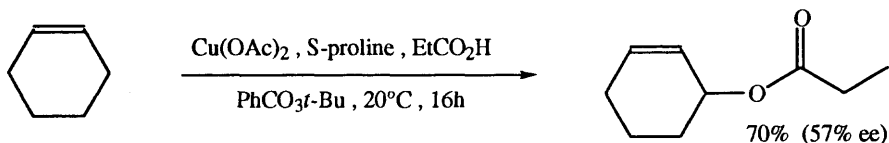
Andrus, M.B.; Argade, A.B.; Chen, X.; Pamment, M.G. *Tetrahedron Lett.*, **1995**, 36, 2945



Kawasaki, K.; Tsumura, S.; Katsuki, T. *Synlett*, **1995**, 1245



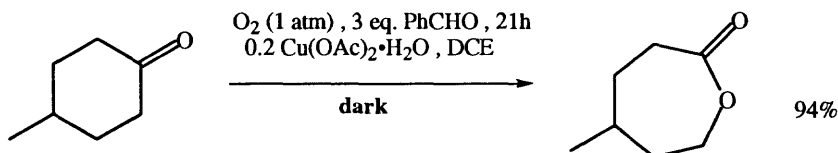
Levina, A.; Muzart, J. *Tetrahedron Asymmetry*, **1995**, 6, 147



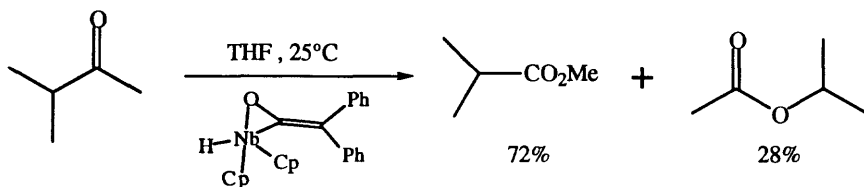
Rispens, M.T.; Zondervan, C.; Rispens, M.T.; Zondervan, C.; Feringa, B.L. *Tetrahedron Asymmetry*, **1995**, 6, 661

Also via: Section 26 (Acid Derivatives) and Section 41 (Alcohols).

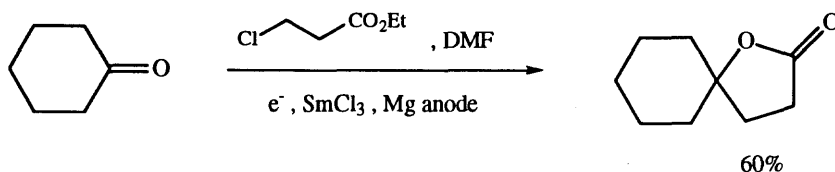
SECTION 117: ESTERS FROM KETONES



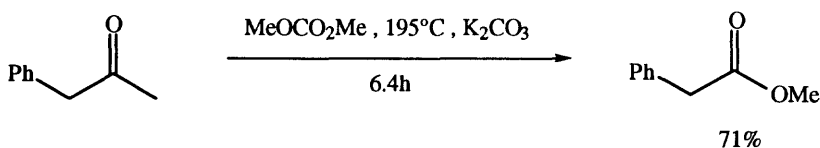
Bolm, C.; Schlingloff, G.; Weickhardt, K. *Tetrahedron Lett.*, **1993**, 34, 3405



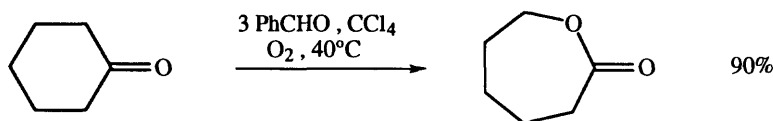
Fermin, M.C.; Bruno, J.W. *Tetrahedron Lett.*, **1993**, 34, 7545



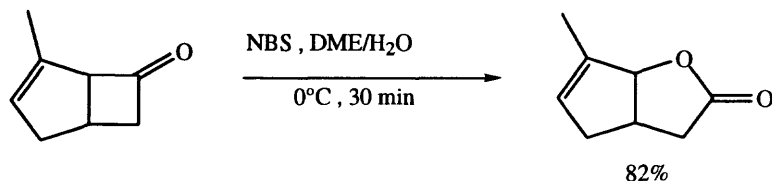
Hebri, H.; Duñach, E.; Périchon, J. *J. Chem. Soc. Chem. Commun.*, **1993**, 499



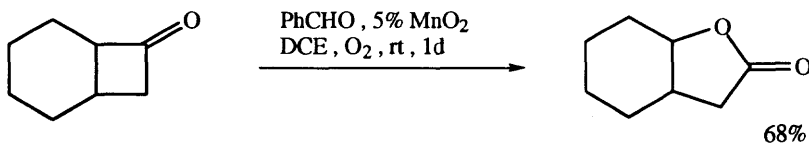
Selva, M.; Marques, C.A.; Tundo, P. *Gazz. Chim. Ital.*, **1993**, 123, 515



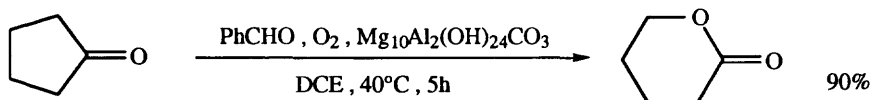
Kaneda, K.; Ueno, S.; Imanaka, T.; Shimotsuma, E.; Nishiyama, Y.; Ishii, Y. *J. Org. Chem.*, **1994**, 59, 2915



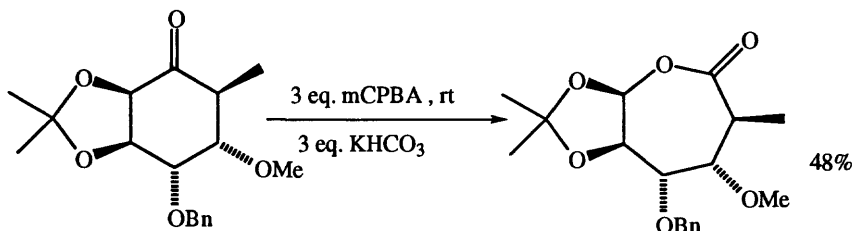
Marotta, E.; Piombi, B.; Righi, P.; Rosini, G. *J. Org. Chem.*, **1994**, 59, 7526



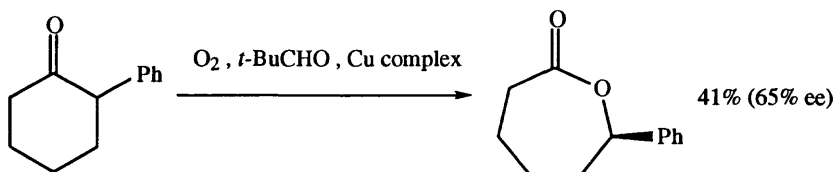
Inokuchi, T.; Kanazaki, M.; Sugimoto, T.; Torii, S. *Synlett*, **1994**, 1037



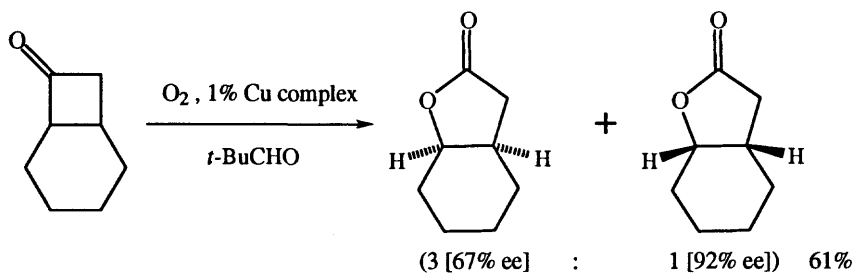
Kaneda, K.; Ueno, S.; Imanaka, T. *J. Chem. Soc. Chem. Commun.*, **1994**, 797



Chida, N.; Tobe, T.; Ogawa, S. *Tetrahedron Lett.*, **1994**, 35, 7249



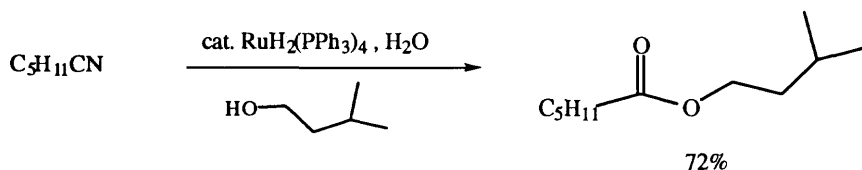
Bolm, C.; Schlingloff, G.; Weickhardt, K. *Angew. Chem. Int. Ed. Engl.*, **1994**, 33, 1848



Bolm, C.; Schlingloff, G. *J. Chem. Soc. Chem. Commun.*, **1995**, 1247

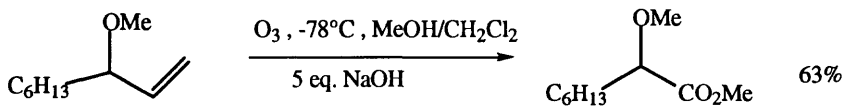
Also via: Section 27 (Acid Derivatives).

SECTION 118: ESTERS FROM NITRILES

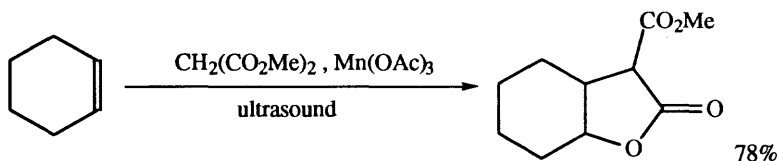


Naota, T.; Shichijo, Y.; Murahashi, S.-I. *J. Chem. Soc. Chem. Commun.*, **1994**, 1359

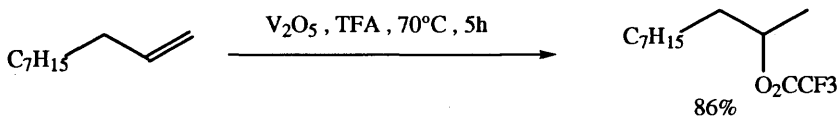
SECTION 119: ESTERS FROM ALKENES



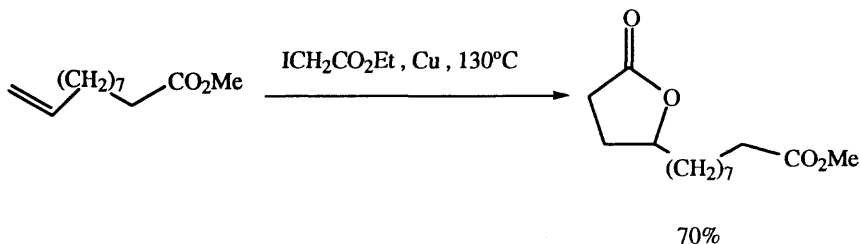
Marshall, J.A.; Garofalo, A.W. *J. Org. Chem.*, **1993**, 58, 3675



Allegretti, M.; D'Annibale, A.; Trogolo, C. *Tetrahedron*, **1993**, 49, 10705



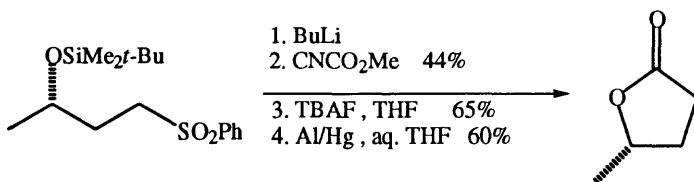
Choudary, B.M.; Reddy, P.N. *J. Chem. Soc. Chem. Commun.*, **1993**, 405



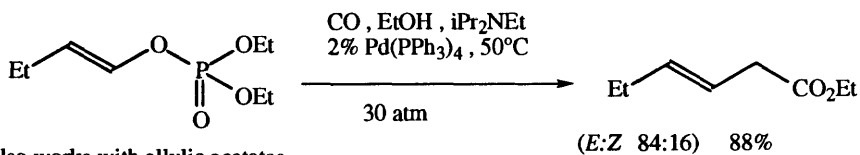
Metzger, J.O.; Mahler, R. *Angew. Chem. Int. Ed. Engl.*, **1995**, 34, 902

Also via: Section 44 (Alcohols).

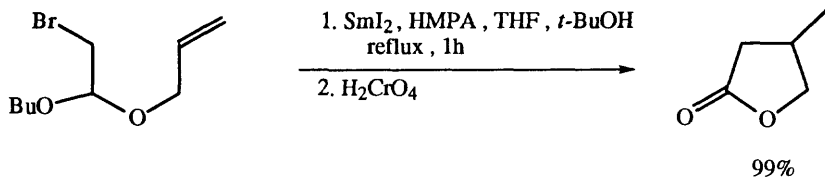
SECTION 120: ESTERS FROM MISCELLANEOUS COMPOUNDS



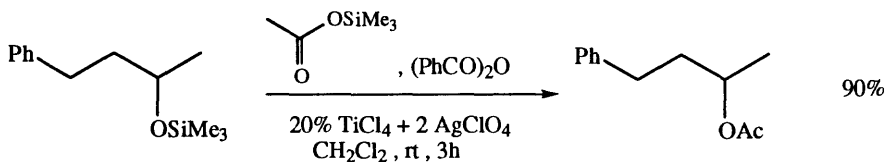
Robin, S.; Huet, F. *Tetrahedron Lett.*, **1993**, 34, 2945



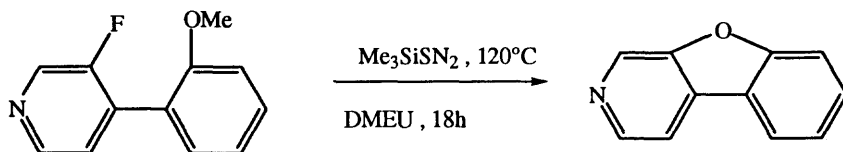
Murahashi, S.-I.; Imada, Y.; Taniguchi, Y.; Higashiura, S. *J. Org. Chem.*, **1993**, 58, 1538



Fukuzawa, S.; Tsuchimoto, T. *Synlett*, **1993**, 803



Miyashita, M.; Shiina, I.; Miyoshi, S.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 1516



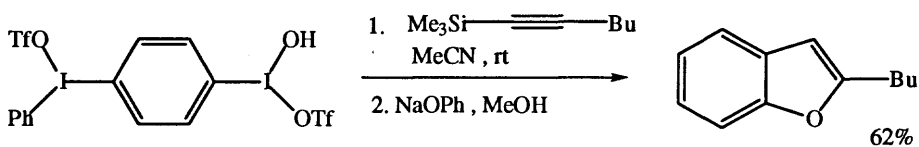
DMEU = 1,3-dimethyl-2-imidazolidinone

Lai, L.-L.; Lin, R.Y.; Huang, W.-H.; Shiao, M.-J. *Tetrahedron Lett.*, **1994**, 35, 3545

CHAPTER 9

PREPARATION OF ETHERS, EPOXIDES AND THIOETHERS

SECTION 121: ETHERS, EPOXIDES AND THIOETHERS FROM ALKYNES

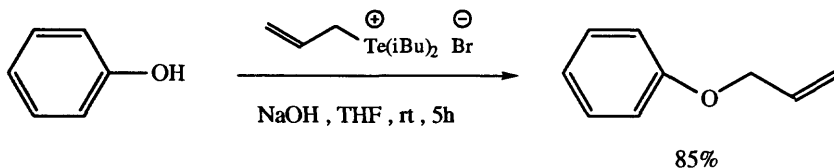


Kitamura, T.; Zheng, L.; Taniguchi, H.; Sakurai, M.; Tanaka, R. *Tetrahedron Lett.*, **1993**, *34*, 4055

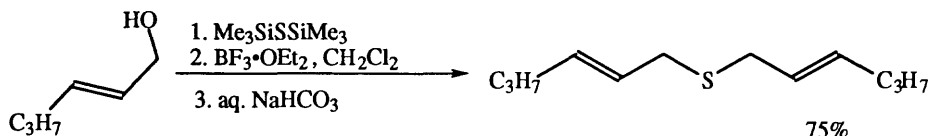
SECTION 122: ETHERS, EPOXIDES AND THIOETHERS FROM ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

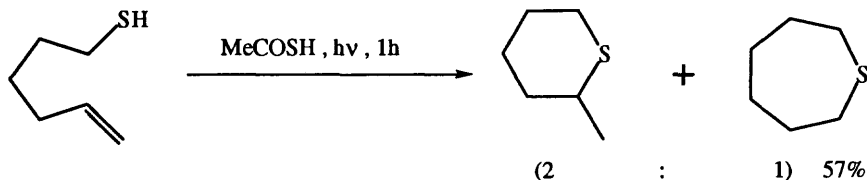
SECTION 123: ETHERS, EPOXIDES AND THIOETHERS FROM ALCOHOLS AND THIOLS



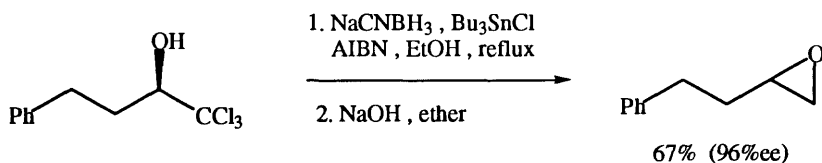
Xu, C.; Lu, S.; Huang, X. *Synth. Commun.*, **1993**, *23*, 2527



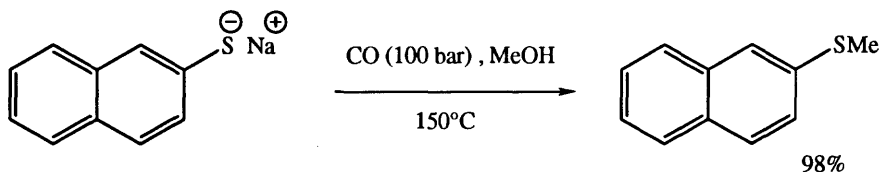
Tsay, S.-C.; Yep, G.L.; Chen, B.-L.; Lin, L.C.; Hwu, J.R. *Tetrahedron*, **1993**, *49*, 8969



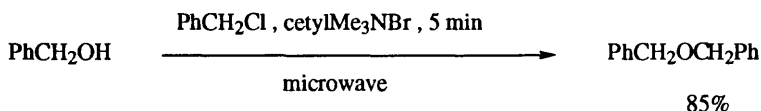
Kirpichenko, S.V.; Tolstikova, L.L.; Suslova, E.N.; Voronkov, M.G. *Tetrahedron Lett.*, **1993**, 34, 3889



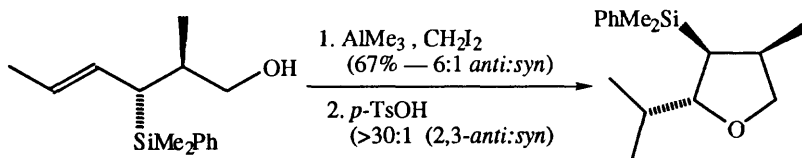
Corey, E.L.; Helal, C.J. *Tetrahedron Lett.*, **1993**, 34, 5227



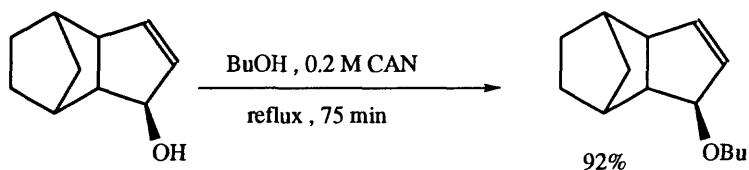
Bott, K. *Chem. Ber.*, **1993**, 126, 1955



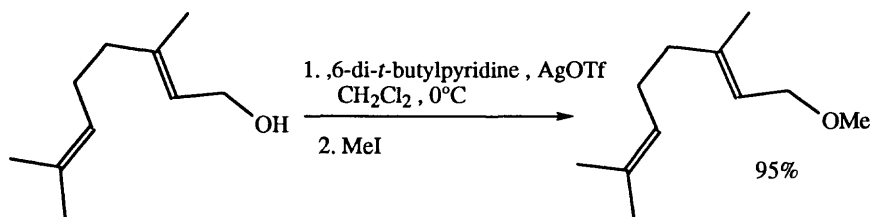
Yuncheng, Y.; Yulin, J.; Jun, P.; Xiaohui, Z.; Conggui, Y. *Gazz. Chim. Ital.*, **1993**, 123, 519



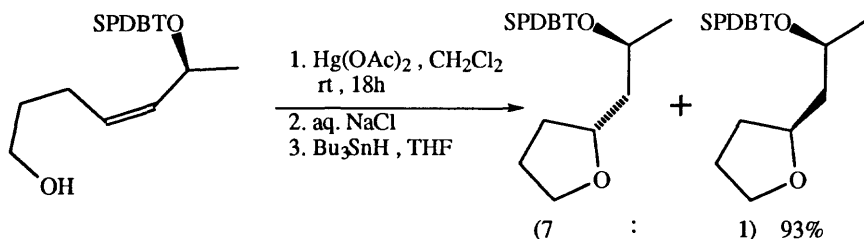
Panek, J.S.; Garbaccio, R.M.; Jain, N.F. *Tetrahedron Lett.*, **1994**, 35, 6453



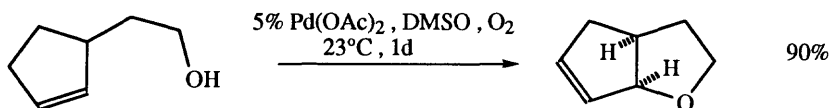
Iranpoor, N.; Mothaghineghad, E. *Tetrahedron*, **1994**, 50, 1859



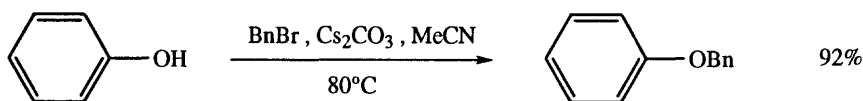
Burk, R.M.; Gac, T.S.; Roof, M.T.S. *Tetrahedron Lett.*, **1994**, 35, 8111



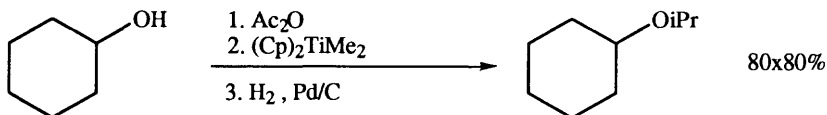
Garavelas, A.; Mavropoulos, I.; Perlmutter, P.; Westman, G. *Tetrahedron Lett.*, **1995**, 36, 463



Rönn, M.; Bäckvall, J.-E.; Andersson, P.G. *Tetrahedron Lett.*, **1995**, 36, 7749

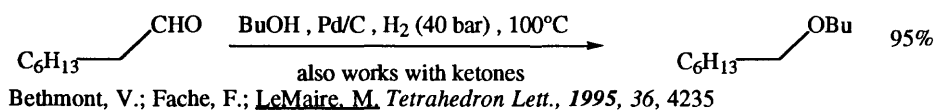


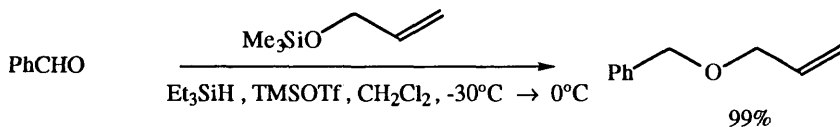
Lee, J.C.; Yuk, J.Y.; Cho, S.H. *Synth. Commun.*, **1995**, 25, 1367



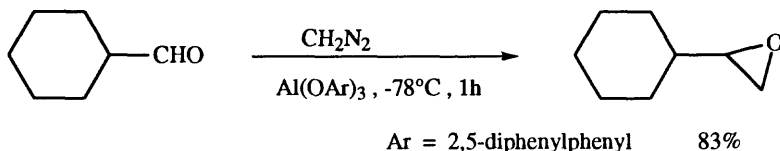
Le Diguarher, T.; Billington, D.C.; Dorey, G. *Synth. Commun.*, **1995**, 25, 1633

SECTION 124: ETHERS, EPOXIDES AND THIOETHERS FROM ALDEHYDES

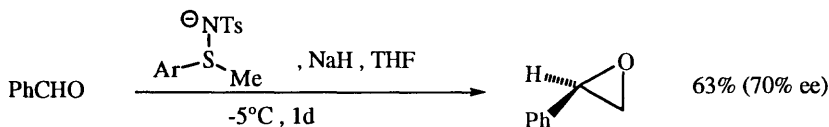




Hatakeyama, S.; Mori, H.; Kitano, K.; Yamada, H.; Nishizawa, M. *Tetrahedron Lett.*, **1994**, 35, 4367



Maruoka, K.; Concepcion, A.B.; Yamamoto, H. *Synlett*, **1994**, 521



Baird, C.P.; Taylor, P.C. *J. Chem. Soc. Chem. Commun.*, **1995**, 893

SECTION 125: ETHERS, EPOXIDES AND THIOETHERS FROM ALKYL, METHYLENES AND ARYLS

NO ADDITIONAL EXAMPLES

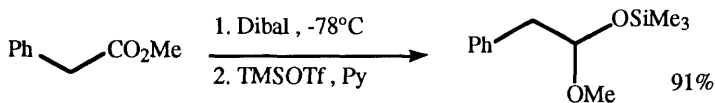
SECTION 126: ETHERS, EPOXIDES AND THIOETHERS FROM AMIDES

NO ADDITIONAL EXAMPLES

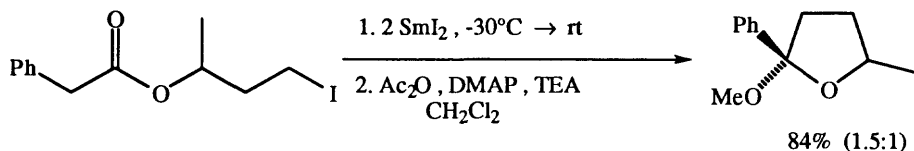
SECTION 127: ETHERS, EPOXIDES AND THIOETHERS FROM AMINES

NO ADDITIONAL EXAMPLES

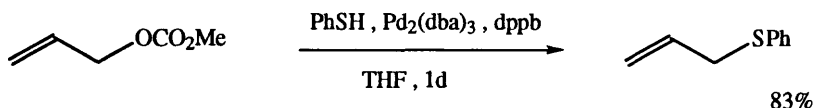
SECTION 128: ETHERS, EPOXIDES AND THIOETHERS FROM ESTERS



Kiyooka, S.; Shirouchi, M.; Kaneko, Y. *Tetrahedron Lett.*, **1993**, 34, 1491

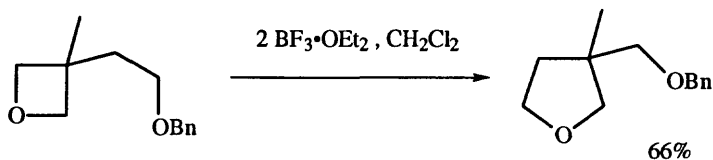


Molander, G.A.; McKie, J.A. *J. Am. Chem. Soc.*, **1993**, *115*, 5821

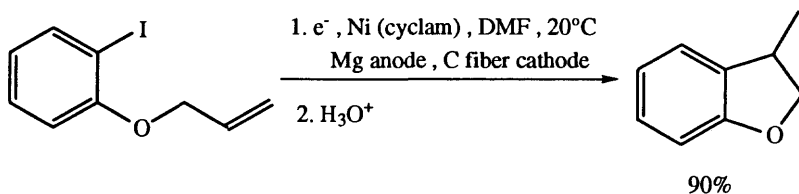


Goux, C.; Lhoste, P.; Sinou, D. *Tetrahedron*, **1994**, *50*, 10321

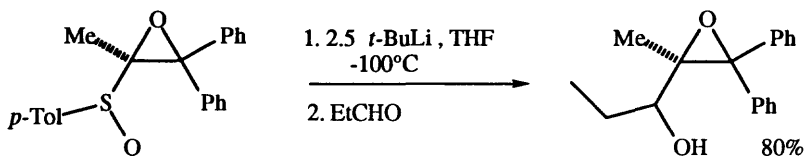
SECTION 129: ETHERS, EPOXIDES AND THIOETHERS FROM ETHERS, EPOXIDES AND THIOETHERS



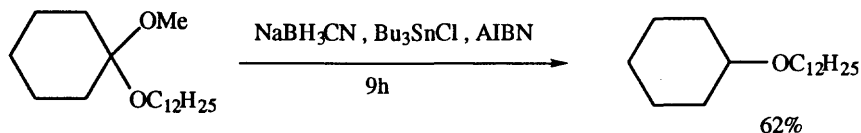
Itoh, A.; Hirose, Y.; Kashiwagi, H.; Masaki, Y. *Heterocycles*, **1994**, *38*, 2165



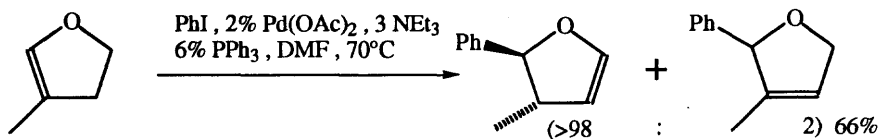
Olivero, S.; Clinet, J.C.; Duñach, E. *Tetrahedron Lett.*, **1995**, *36*, 4429



Sato, T.; Horiguchi, K. *Tetrahedron Lett.*, **1995**, *36*, 8235

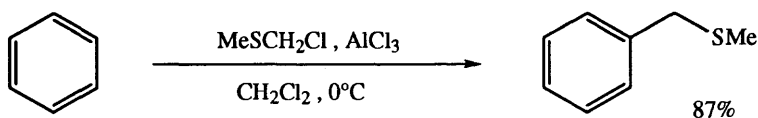
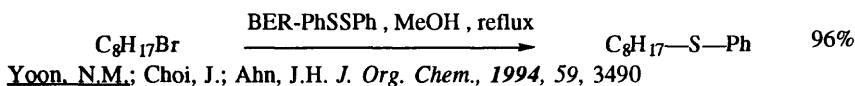


Srikrishna, A.; Viswajanani, R. *Synlett*, **1995**, 95

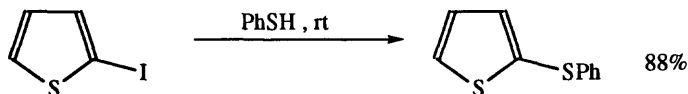


Hilliers, S.; Rieger, O. *Synlett*, **1995**, 153

SECTION 130: ETHERS, EPOXIDES AND THIOETHERS FROM HALIDES AND SULFONATES



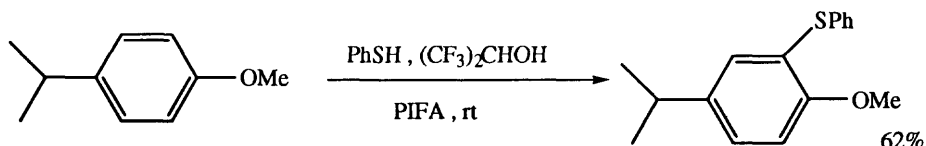
Olah, G.A.; Wang, Q.; Neyer, G. *Synthesis*, **1994**, 276



Lee, S.B.; Hong, J.-I. *Tetrahedron Lett.*, **1995**, 36, 8439

Related Methods: Section 123 (Ethers from Alcohols).

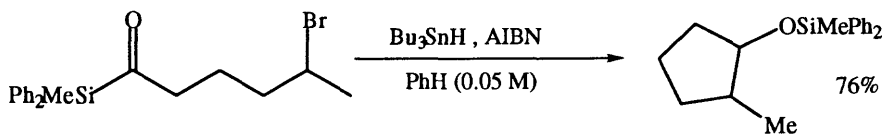
SECTION 131: ETHERS, EPOXIDES AND THIOETHERS FROM HYDRIDES



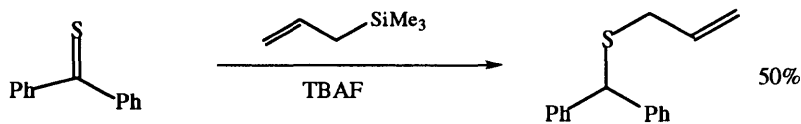
PIFA = phenyliodine(III) bis(trifluoroacetate)

Kita, Y.; Takada, T.; Mihara, S.; Tohma, H. *Synlett*, **1995**, 211

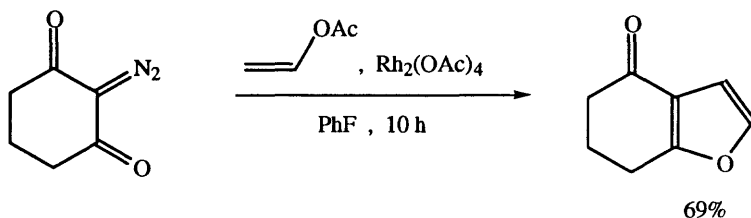
SECTION 132: ETHERS, EPOXIDES AND THIOETHERS FROM KETONES



Tsai, Y.-M.; Tang, K.-H.; Jiaang, W.-T. *Tetrahedron Lett.*, **1993**, 34, 1303



Capperucci, A.; Degl'Innocenti, A.; Ferrara, M.C.; Bonini, B.F.; Mazzanti, G.; Zanti, P.; Ricci, A. *Tetrahedron Lett.*, **1994**, 35, 161



Pirrung, M.C.; Lee, Y.R. *Tetrahedron Lett.*, **1994**, 35, 6231

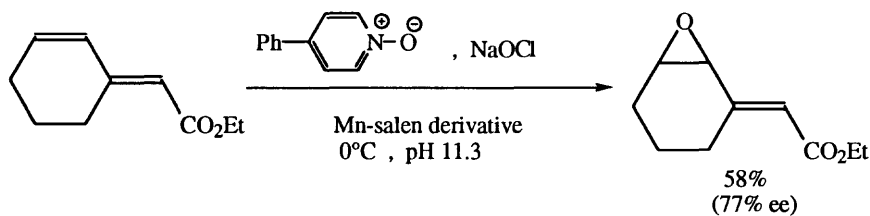
Related Methods: Section 124 (Epoxides from Aldehydes).

SECTION 133: ETHERS, EPOXIDES AND THIOETHERS FROM NITRILES

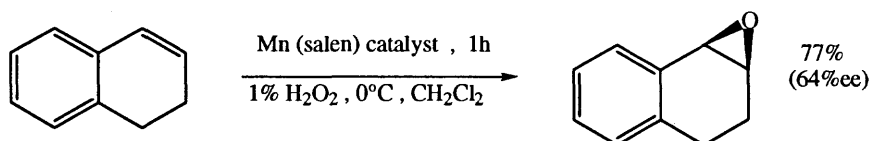
NO ADDITIONAL EXAMPLES

SECTION 134: ETHERS, EPOXIDES AND THIOETHERS FROM ALKENES

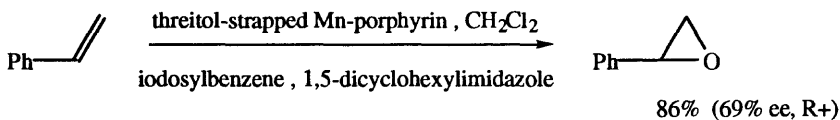
Asymmetric Epoxidation



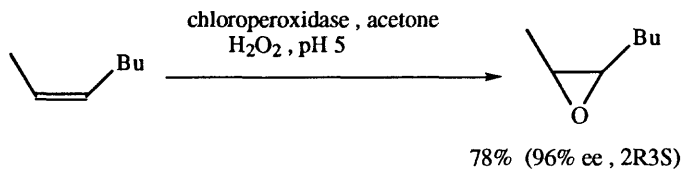
Chang, S.; Lee, N.H.; Jacobsen, E.N. *J. Org. Chem.*, **1993**, 58, 6939



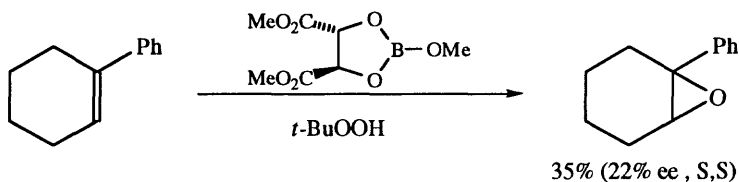
Schwenkreis, T.; Berkessel, A. *Tetrahedron Lett.*, **1993**, 34, 4785



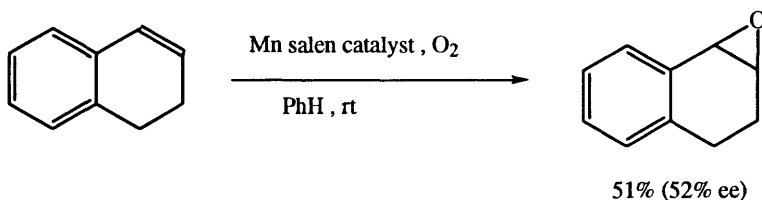
Collman, J.P.; Lee, V.J.; Zhang, X.; Ibers, J.A.; Brauman, J.I. *J. Am. Chem. Soc.*, **1993**, *115*, 3834



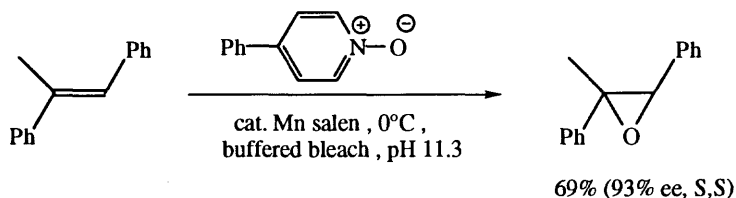
Allain, E.J.; Hager, L.P.; Deng, L.; Jacobsen, E.N. *J. Am. Chem. Soc.*, **1993**, *115*, 4415



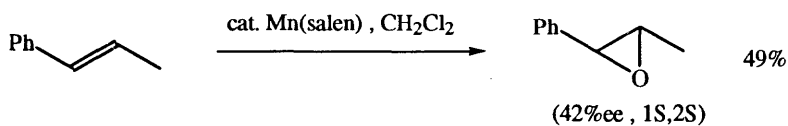
Manoury, E.; Mouloud, H.A.H.; Balavoine, G.G.A. *Tetrahedron Asymmetry*, **1993**, *4*, 2339



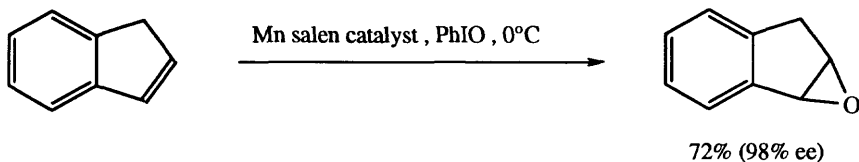
Mukaiyama, T.; Yamada, T.; Nagata, T.; Imagawa, K. *Chem. Lett.*, **1993**, 327



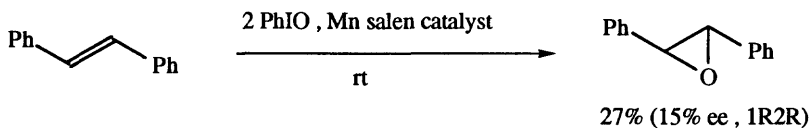
Brandes, B.D.; Jacobsen, E.N. *J. Org. Chem.*, **1994**, *59*, 4378



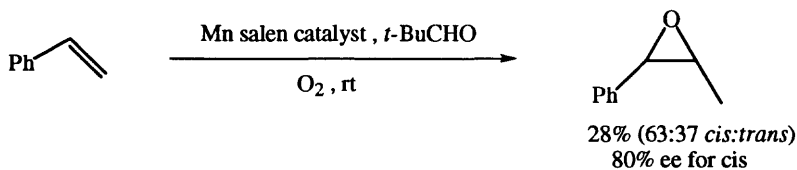
Pietikäinen, P. *Tetrahedron Lett.*, **1994**, *35*, 941



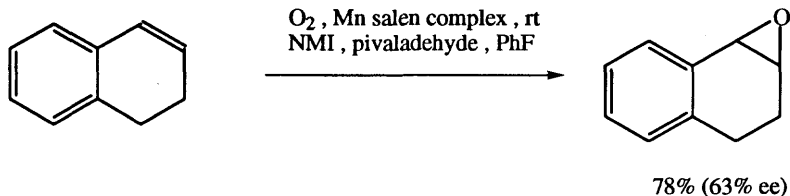
Sasaki, H.; Irie, R.; Katsuki, T. *Synlett*, **1994**, 356



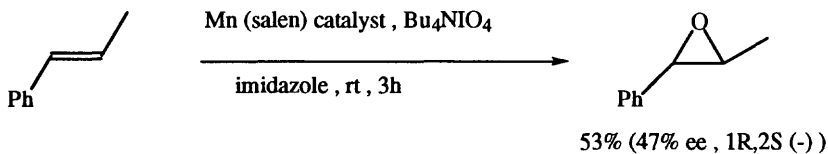
Sasaki, H.; Irie, R.; Hamada, T.; Suzuki, K.; Katsuki, T. *Tetrahedron*, **1994**, 50, 11827



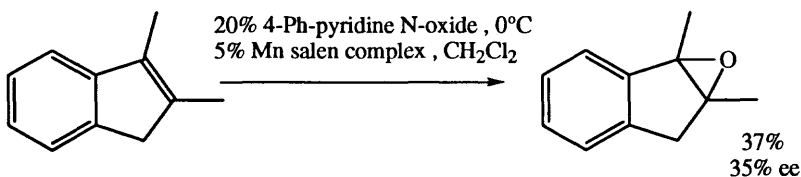
Nagata, T.; Imagawa, K.; Yamada, T.; Mukaiyama, T. *Chem. Lett.*, **1994**, 1259



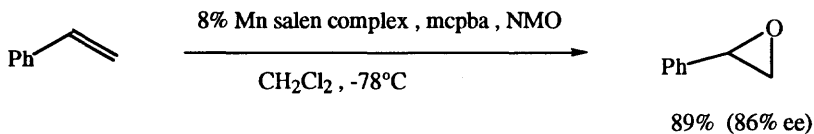
Yamada, T.; Imagawa, K.; Nagata, T.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 2248



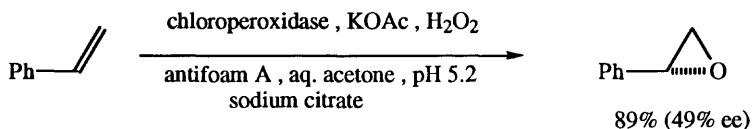
Pietikäinen, P. *Tetrahedron Lett.*, **1995**, 36, 319



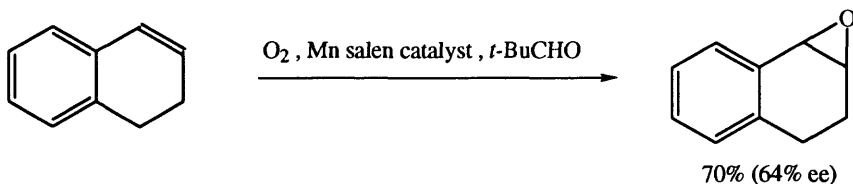
Brandes, B.D.; Jacobsen, E.N. *Tetrahedron Lett.*, **1995**, 36, 5123



Palucki, M.; McCormick, G.J.; Jacobsen, E.N. *Tetrahedron Lett.*, **1995**, 36, 5457

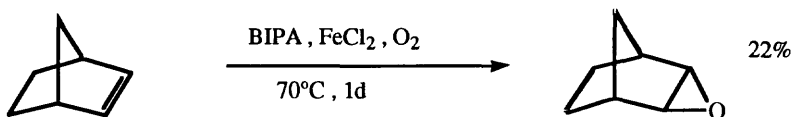


Dexter, A.F.; Lakner, F.J.; Campbell, R.A.; Hager, L.P. *J. Am. Chem. Soc.*, **1995**, 117, 6412



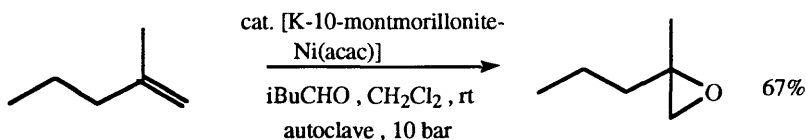
Nagata, T.; Imagawa, K.; Yamada, T.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.*, **1995**, 68, 1455

Non-Asymmetric Epoxidation



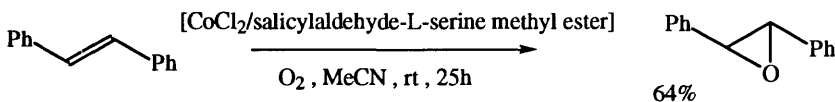
BIPA = N,N'-bis[2-(4-imidazoloyl)ethyl]-2,6-pyridinecarboxamide

Hirao, T.; Moriuchi, T.; Mikami, S.; Ikeda, I.; Ohshiro, Y. *Tetrahedron Lett.*, **1993**, 34, 1031

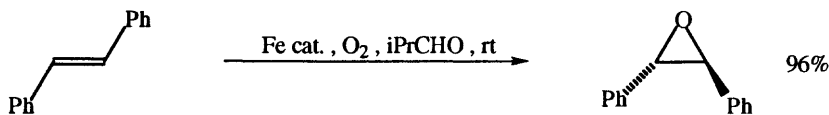


Bouhlef, E.; Laszlo, P.; Levart, M.; Montaufier, M.-T.; Singh, G.P. *Tetrahedron Lett.*, **1993**, 34, 1123

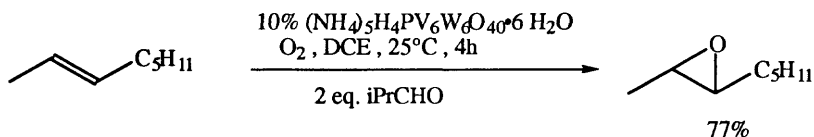
Laszlo, P.; Levart, M. *Tetrahedron Lett.*, **1993**, 34, 1127



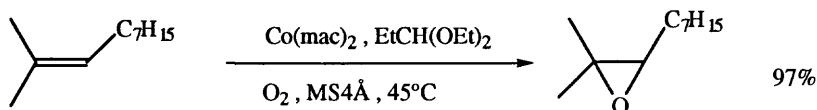
Punniyamurthy, T.; Bhatia, B.; Iqbal, J. *Tetrahedron Lett.*, **1993**, 34, 4657



Saalfrank, R.W.; Reihs, S.; Hug, M. *Tetrahedron Lett.*, **1993**, 34, 6033

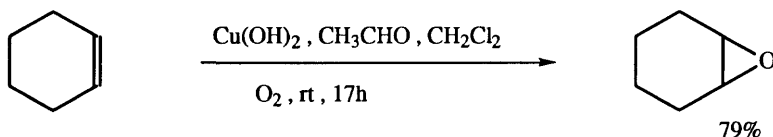


Hamamoto, M.; Nakayama, K.; Nishiyama, Y.; Ishii, Y. *J. Org. Chem.*, **1993**, 58, 6421

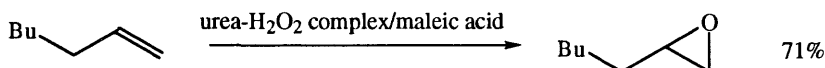


mac = 3-methyl-2,4-pentanedione

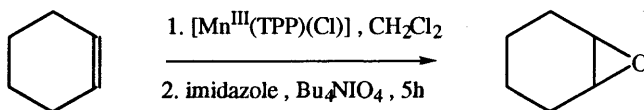
Mukaiyama, T.; Yorozu, K.; Yakai, T.; Yamada, T. *Chem. Lett.*, **1993**, 439



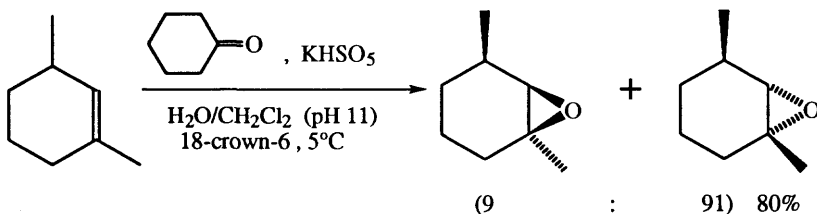
Murahashi, S.-I.; Oda, Y.; Naota, T.; Komiya, N. *J. Chem. Soc. Chem. Commun.*, **1993**, 139



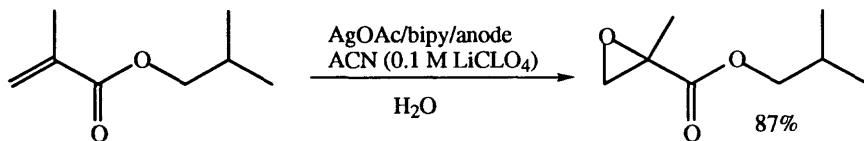
Astudillo, L.; Galindo, A.; González, A.G.; Mansilla, H. *Heterocycles*, **1993**, 36, 1075



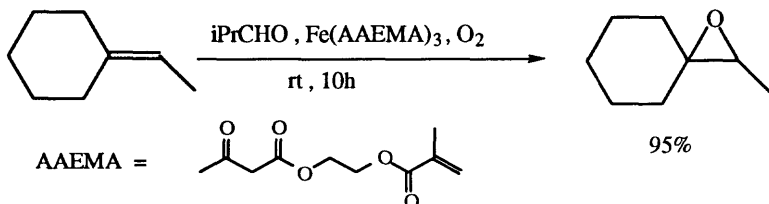
Mohajer, D.; Tangestaninejad, S. *Tetrahedron Lett.*, **1994**, 35, 945



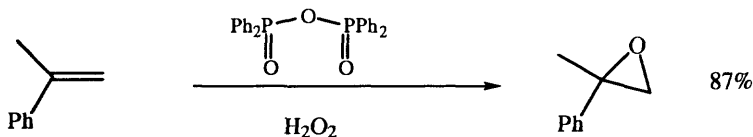
Kurihara, M.; Ito, S.; Tsutsumi, N.; Miyata, N. *Tetrahedron Lett.*, **1994**, 35, 1577



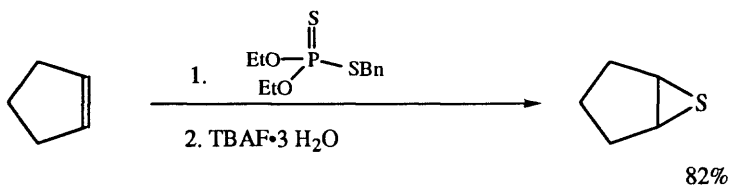
Kandzia, C.; Steckhan, E. *Tetrahedron Lett.*, **1994**, 35, 3695



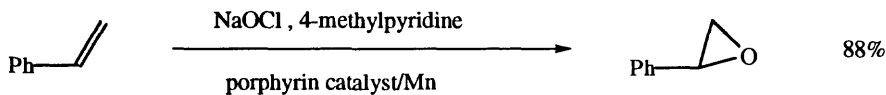
Mastorilli, P.; Nobile, C.E. *Tetrahedron Lett.*, **1994**, 35, 4193



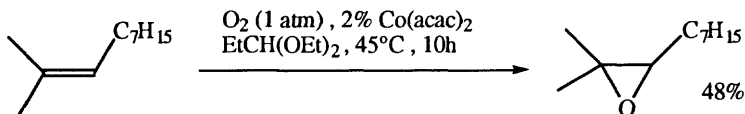
Kende, A.S.; Delair, P.; Blass, B.E. *Tetrahedron Lett.*, **1994**, 35, 8123



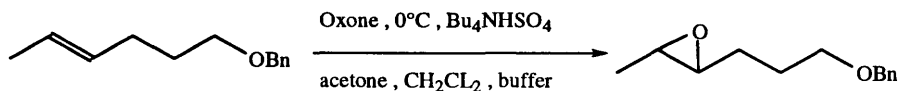
Capozzi, G.; Mecichetti, S.; Neri, S.; Skowronska, A. *Synlett*, **1994**, 267



Gonsalves, A.Md'A.R.; Pereira, M.M.; Serra, A.C.; Johnstone, R.A.W.; Nunes, M.L.P.G. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 2053

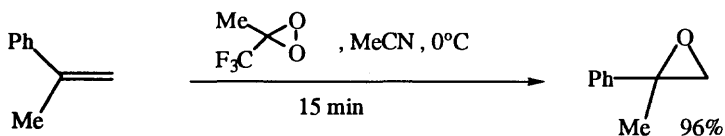


Yorozu, K.; Takai, T.; Yamada, T.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 2195

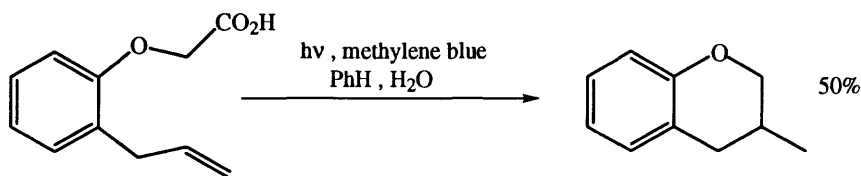


99%

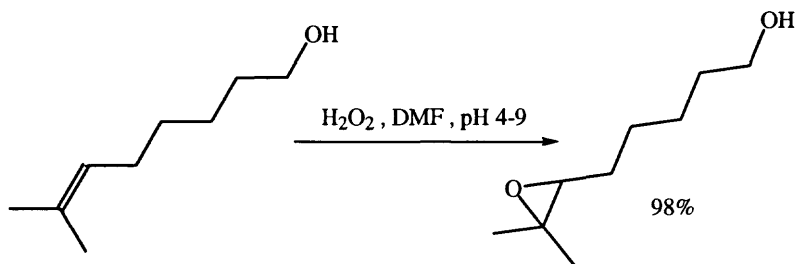
Denmark, S.E.; Forbes, D.C.; Hays, D.S.; DePue, J.S.; Wilde, R.G. *J. Org. Chem.*, **1995**, 60, 1391



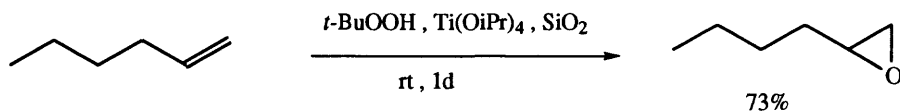
Yang, D.; Wong, M.-K.; Yip, Y.-C. *J. Org. Chem.*, **1995**, 60, 3887



Das, S.; Thanulingam, T.L.; Rajesh, C.S.; George, M.V. *Tetrahedron Lett.*, **1995**, 36, 1337

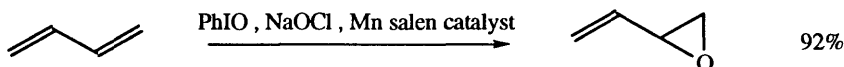


Chen, Y.; Reymond, J.-L. *Tetrahedron Lett.*, **1995**, 36, 4015



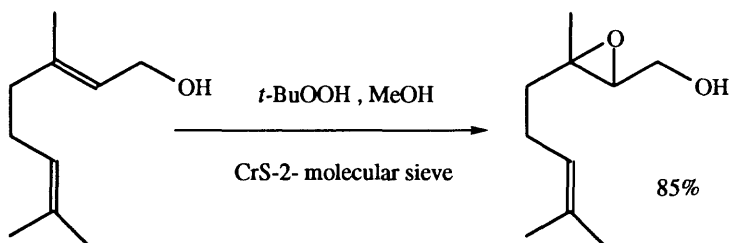
73%

Fraile, J.M.; García, J.I.; Mayoral, J.A.; de Mènorval, L.C.; Rachdi, F. *J. Chem. Soc. Chem. Commun.*, **1995**, 539



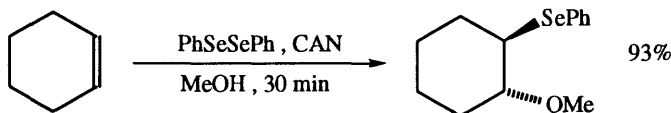
92%

Rasmussen, K.G.; Thomsen, D.S.; Jørgensen, K.A. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 2009

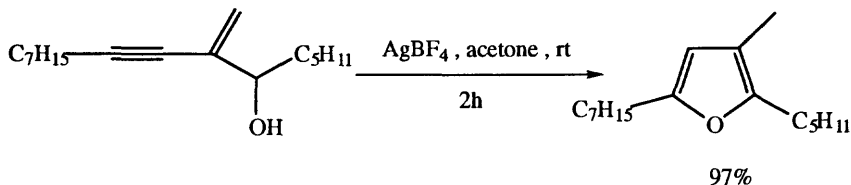


Joseph, R.; Sasidharan, M.; Kumar, R.; Sudalai, A.; Ravindranathan, T. *J. Chem. Soc. Chem. Commun.*, **1995**, 1341

Formation of Other Ethers



Bosman, C.; D'Annibale, A.; Resta, S.; Trogolo, C. *Tetrahedron Lett.*, **1994**, 35, 6525

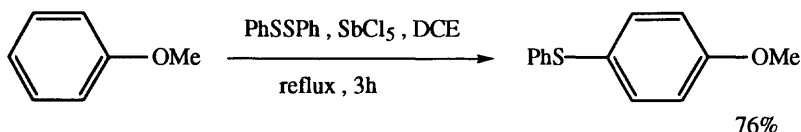


Marshall, J.A.; Schon, C.A. *J. Org. Chem.*, **1995**, 60, 5966

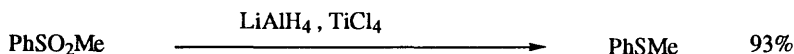
REVIEW:

"Rational Design of Manganese-Salen Epoxidation Catalysts; Preliminary Results," Hosoya, N.; Hatayama, A.; Irie, R.; Sasaki, H.; Katsuki, T. *Tetrahedron*, **1994**, 50, 4311

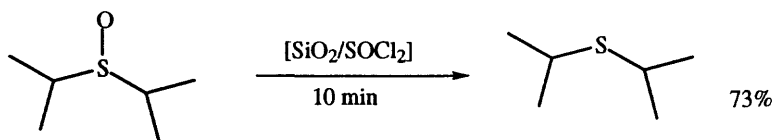
SECTION 135: ETHERS, EPOXIDES AND THIOETHERS FROM MISCELLANEOUS COMPOUNDS



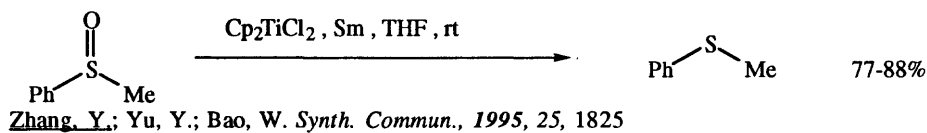
Mukaiyama, T.; Suzuki, K. *Chem. Lett.*, **1993**, 1



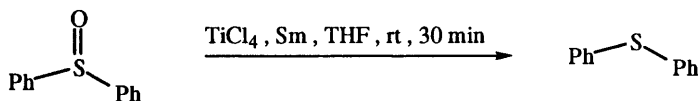
Akgün, E.; Mahmoud, K.; Mathis, C.A. *J. Chem. Soc. Chem. Commun.*, **1994**, 761



Mohanazadeh, F.; Momeni, A.R.; Ranjbar, Y. *Tetrahedron Lett.*, **1994**, 35, 6127



Zhang, Y.; Yu, Y.; Bao, W. *Synth. Commun.*, **1995**, 25, 1825



Wang, J.Q.; Zhang, Y.M. *Synth. Commun.*, **1995**, 25, 3545

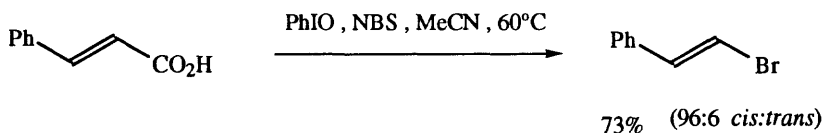
CHAPTER 10

PREPARATION OF HALIDES AND SULFONATES

SECTION 136: HALIDES AND SULFONATES FROM ALKYNES

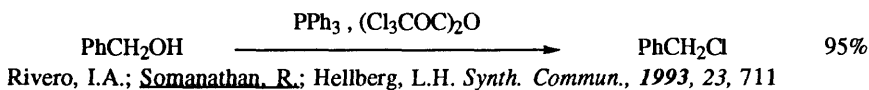
NO ADDITIONAL EXAMPLES

SECTION 137: HALIDES AND SULFONATES FROM ACID DERIVATIVES

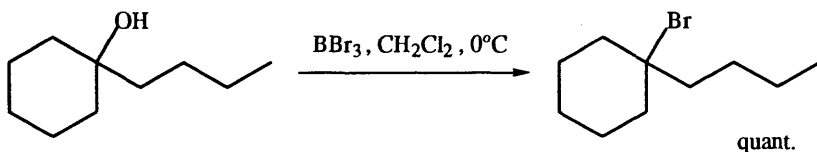


Graven, A.; Jørgensen, K.S.; Dahl, S.; Stanczak, A. *J. Org. Chem.*, **1994**, 59, 3543

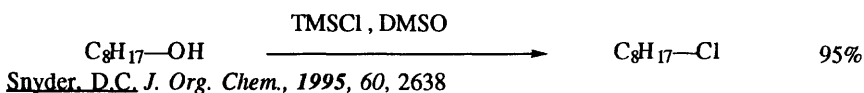
SECTION 138: HALIDES AND SULFONATES FROM ALCOHOLS AND THIOLS



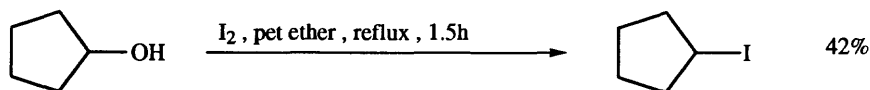
Rivero, I.A.; Somanathan, R.; Hellberg, L.H. *Synth. Commun.*, **1993**, 23, 711



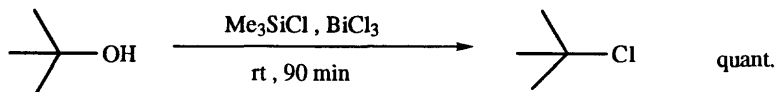
Pelletier, J.D.; Poirier, D. *Tetrahedron Lett.*, **1994**, 35, 1051



Snyder, D.C. *J. Org. Chem.*, **1995**, 60, 2638



Joseph, R.; Pallan, P.S.; Sudalai, A.; Ravindranathan, T. *Tetrahedron Lett.*, 1995, 36, 609



Labrouillère, M.; Le Roux, C.; Oussaid, A.; Gaspard-Iloughmane, H.; Dubac, J. *Bull. Soc. Chim. Fr.*, 1995, 132, 522

REVIEWS:

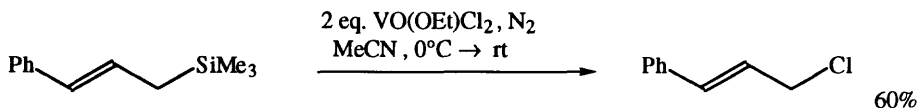
"An Alternative Synthesis of Aryl and Heteroaryl Bromides from Activated Hydroxy Compounds," Katritzky, A.R.; Li, J.; Stevens, C.V.; Ager, D.J. *Org. Prep. Proceed. Int.*, 1994, 26, 439

SECTION 139: HALIDES AND SULFONATES FROM ALDEHYDES

NO ADDITIONAL EXAMPLES

SECTION 140: HALIDES AND SULFONATES FROM ALKYL, METHYLENES AND ARYLS

For the conversion $R-H \rightarrow R-Halogen$, see Section 146 (Halides from Hydrides).

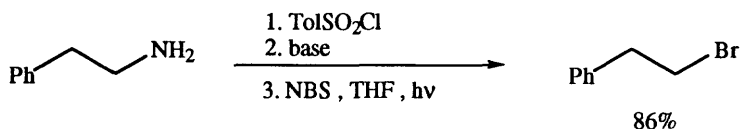


Fujii, T.; Hirao, T.; Ohshiro, Y. *Tetrahedron Lett.*, 1993, 34, 5601

SECTION 141: HALIDES AND SULFONATES FROM AMIDES

NO ADDITIONAL EXAMPLES

SECTION 142: HALIDES AND SULFONATES FROM AMINES



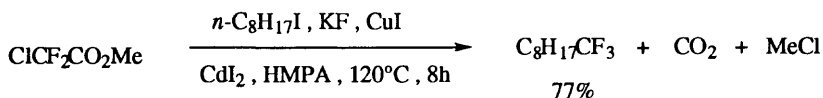
Collazo, L.R.; Guziec Jr., F.S.; Hu, W.-X.; Pankayatselvan, R. *Tetrahedron Lett.*, 1994, 35, 7911

SECTION 143: HALIDES AND SULFONATES FROM ESTERS

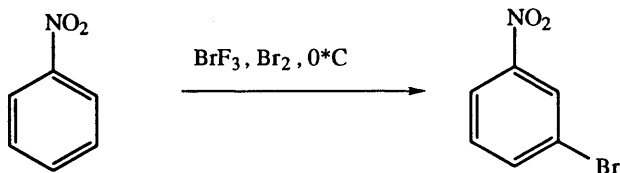
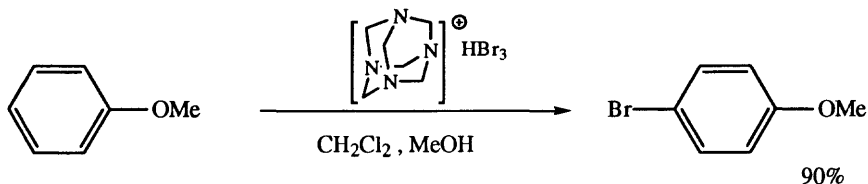
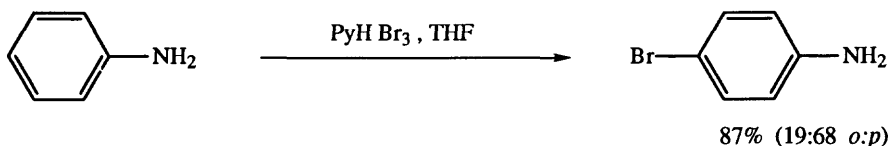
NO ADDITIONAL EXAMPLES

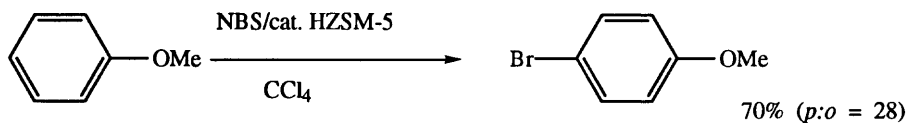
SECTION 144: HALIDES AND SULFONATES FROM ETHERS, EPOXIDES AND THIOETHERS

NO ADDITIONAL EXAMPLES

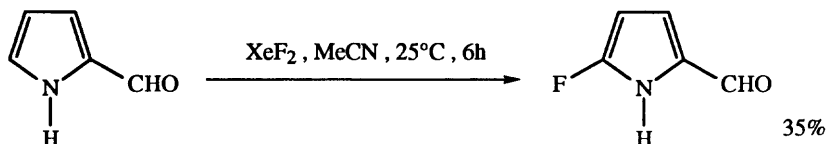
SECTION 145: HALIDES AND SULFONATES FROM HALIDES AND SULFONATESChen, Q.-Y.; Duan, J.-X. *Tetrahedron Lett.*, 1993, 34, 4241**SECTION 146: HALIDES AND SULFONATES FROM HYDRIDES**

α -Halogenations of aldehydes, ketones and acids are found in Sections 338 (Halide-Aldehyde), 369 (Halide-Ketone), 359 (Halide-Esters) and 319 (Halide-Acids).

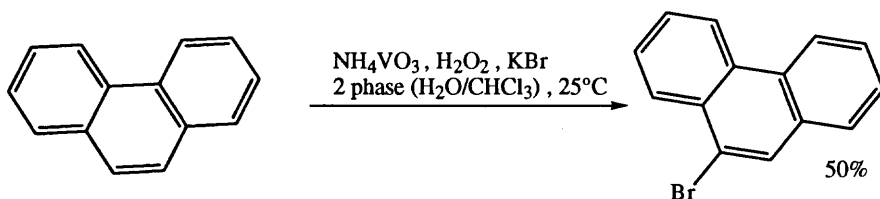
Rozen, S.; Lerman, O. *J. Org. Chem.*, 1993, 58, 239Bisarya, S.C.; Rao, R. *Synth. Commun.*, 1993, 23, 779Reeves, W.P.; King II, R.M. *Synth. Commun.*, 1993, 23, 855



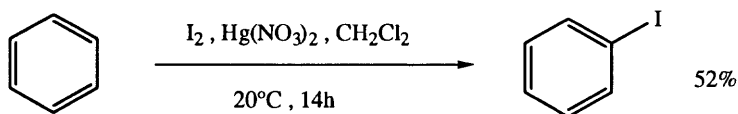
Paul, V.; Sudalai, A.; Daniel, T.; Srinivasan, K.V. *Tetrahedron Lett.*, **1994**, 35, 7055



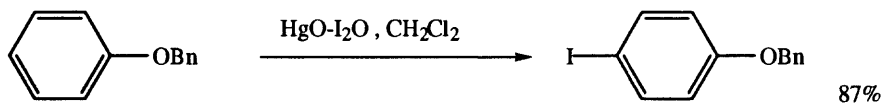
Wang, J.; Scott, A.I. *Tetrahedron Lett.*, **1994**, 35, 3679



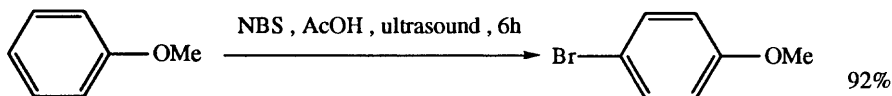
Conte, V.; Di Furia, E.; Moro, S. *Tetrahedron Lett.*, **1994**, 35, 7429



Bachki, A.; Foubelo, F.; Yus, M. *Tetrahedron*, **1994**, 50, 5139

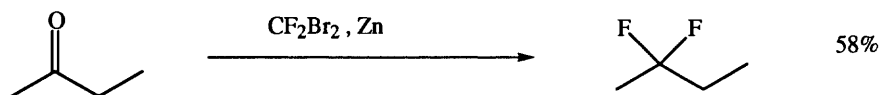


Orto, K.; Hatakeyama, T.; Takeo, M.; Sugimoto, H. *Synthesis*, **1995**, 1273



Paul, V.; Sudalai, A.; Daniel, T.; Srinivasan, K.V. *Synth. Commun.*, **1995**, 25, 2401

SECTION 147: HALIDES AND SULFONATES FROM KETONES



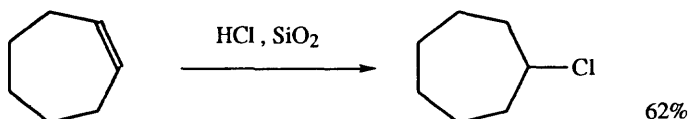
Hu, C.-M.; Qing, F.-L.; Shen, C.-X. *J. Chem. Soc., Perkin Trans. I.*, **1993**, 335

SECTION 148: HALIDES AND SULFONATES FROM NITRILES

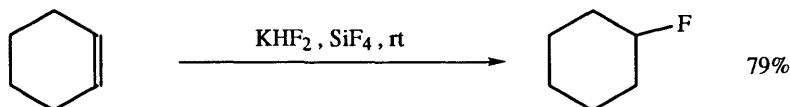
NO ADDITIONAL EXAMPLES

SECTION 149: HALIDES AND SULFONATES FROM ALKENES

For halocyclopropanations, see Section 74E (Alkyls from Alkenes).

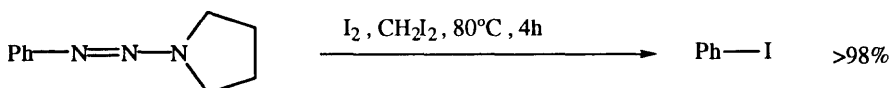


Krupp, P.J.; Daus, K.A.; Tubergen, M.W.; Kepler, K.D.; Wilson, V.P.; Craig, S.L.; Baillargeon, M.M.; Breton, G.W. *J. Am. Chem. Soc.*, **1993**, *115*, 3071

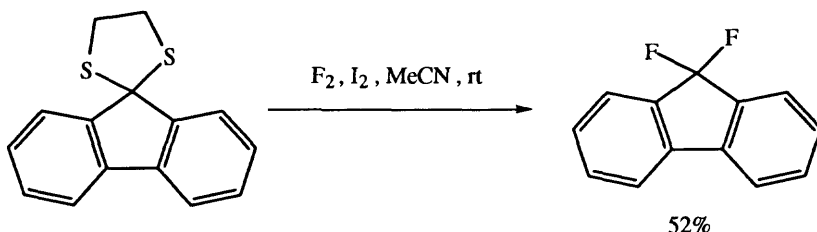


Tamura, M.; Shibakami, M.; Kurosawa, S.; Arimura, T.; Sekiya, A. *J. Chem. Soc. Chem. Commun.*, **1995**, 1891

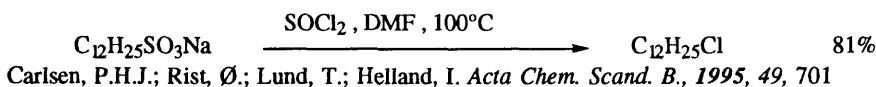
SECTION 150: HALIDES AND SULFONATES FROM MISCELLANEOUS COMPOUNDS



Wu, Z.; Moore, J.S. *Tetrahedron Lett.*, **1994**, *35*, 5539



Chambers, R.D.; Sandford, G.; Atherton, M. *J. Chem. Soc. Chem. Commun.*, **1995**, 177



Carlsen, P.H.J.; Rist, Ø.; Lund, T.; Helland, I. *Acta Chem. Scand. B.*, **1995**, *49*, 701

CHAPTER 11

PREPARATION OF HYDRIDES

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

SECTION 151: HYDRIDES FROM ALKYNES

NO ADDITIONAL EXAMPLES

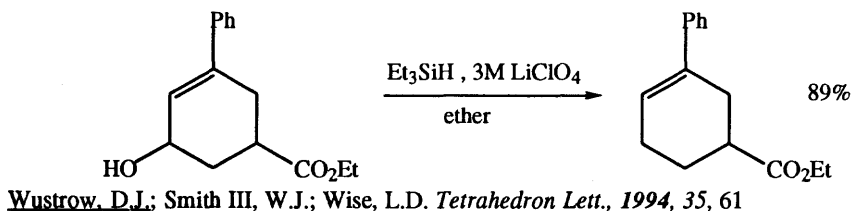
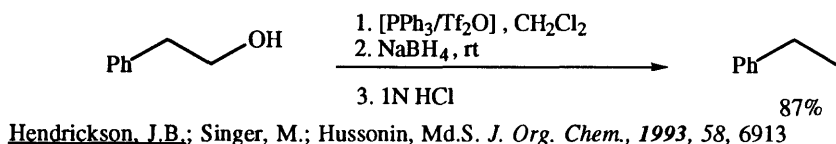
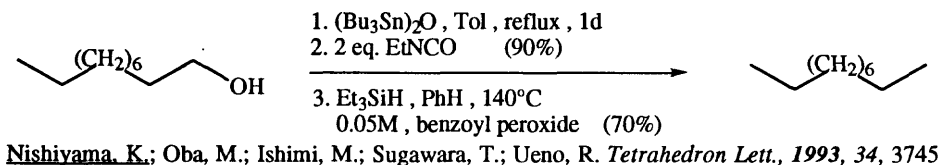
SECTION 152: HYDRIDES FROM ACID DERIVATIVES

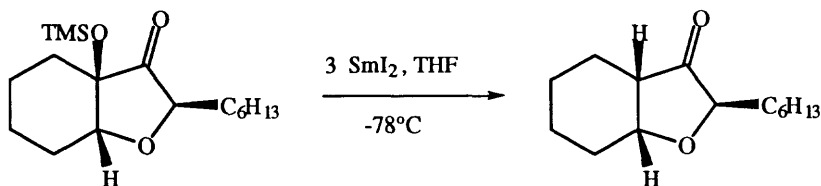
This section lists examples of decarboxylations ($\text{RCO}_2\text{H} \rightarrow \text{R-H}$) and related reactions.

NO ADDITIONAL EXAMPLES

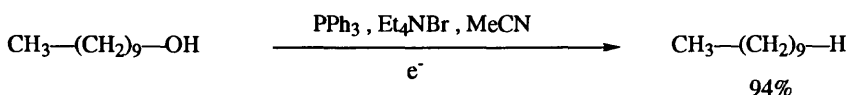
SECTION 153: HYDRIDES FROM ALCOHOLS AND THIOLS

This section lists examples of the hydrogenolysis of alcohols and phenols ($\text{ROH} \rightarrow \text{R-H}$).

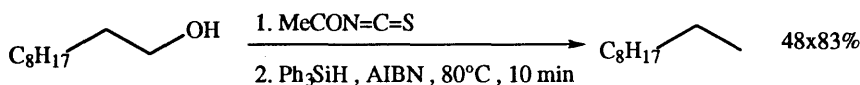




Linderman, R.J.; Cusack, K.P.; Kwochka, W.R. *Tetrahedron Lett.*, **1994**, 35, 1477



Maeda, H.; Maki, T.; Eguchi, K.; Koide, T.; Ohmori, H. *Tetrahedron Lett.*, **1994**, 35, 4129



Oba, M.; Nishiyama, K. *Synthesis*, **1994**, 624

Also via: Section 160 (Halides and Sulfonates).

SECTION 154: HYDRIDES FROM ALDEHYDES

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

NO ADDITIONAL EXAMPLES

SECTION 155: HYDRIDES FROM ALKYLs, METHYLENES AND ARYLs

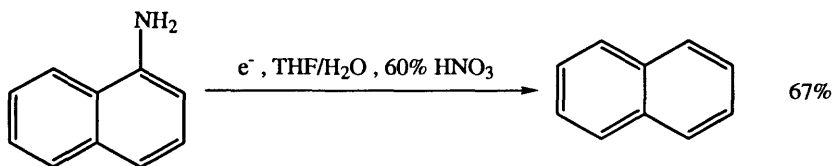
NO ADDITIONAL EXAMPLES

SECTION 156: HYDRIDES FROM AMIDES

NO ADDITIONAL EXAMPLES

SECTION 157: HYDRIDES FROM AMINES

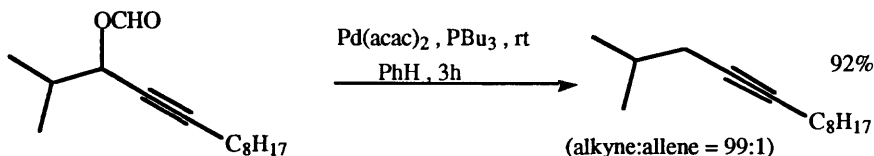
This section lists examples of the conversion RNH_2 (or R_2NH) \rightarrow R-H .



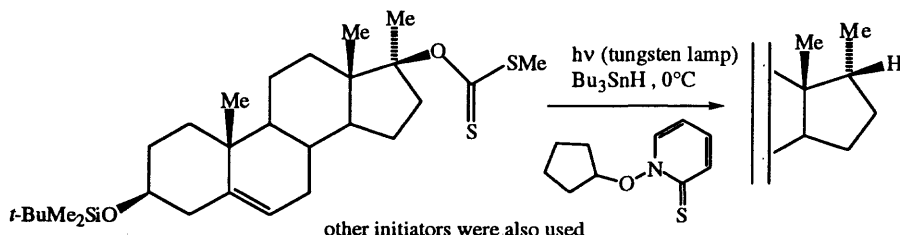
Torii, S.; Okumoto, H.; Satoh, H.; Minoshima, T.; Kurozumi, S. *Synlett*, **1995**, 439

SECTION 158: HYDRIDES FROM ESTERS

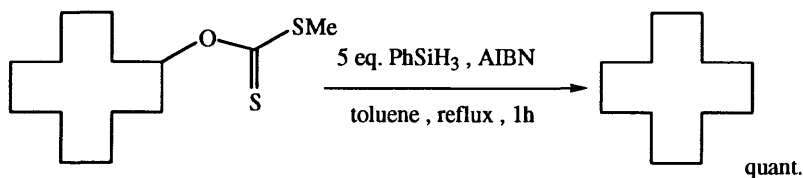
This section lists examples of the reactions $\text{RCO}_2\text{R}' \rightarrow \text{R-H}$ and $\text{RCO}_2\text{R}' \rightarrow \text{R'H}$.



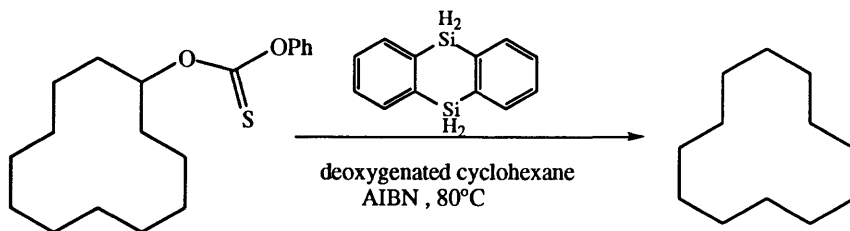
Mandai, T.; Matsumoto, T.; Kawada, M.; Tsuji, J. *Tetrahedron Lett.*, 1993, 34, 2161



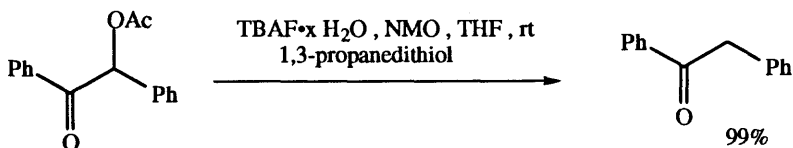
other initiators were also used
Barton, D.H.R.; Parekh, S.I.; Tse, C.-L. *Tetrahedron Lett.*, 1993, 34, 2733



Barton, D.H.R.; Jang, D.O.; Jaszverenyi, J.Cs. *Tetrahedron*, 1993, 49, 2793, 7193



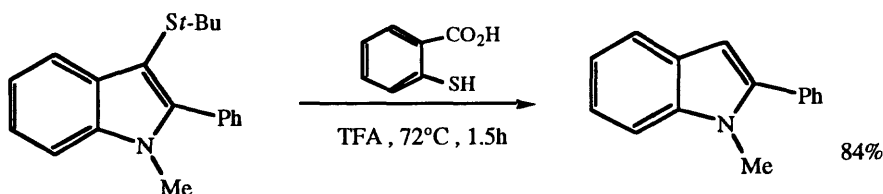
Gimisis, T.; Ballestri, M.; Ferreri, C.; Chatgililoglu, C.; Boukherroub, R.; Manuel, G. *Tetrahedron Lett.*, 1995, 36, 3897



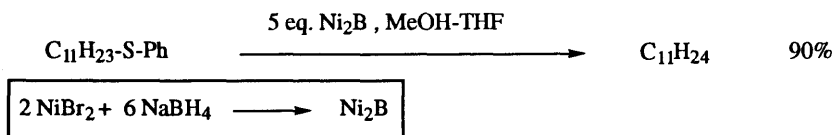
Uelo, M.; Okamura, A.; Yamaguchi, J. *Tetrahedron Lett.*, **1995**, 36, 7467

SECTION 159: HYDRIDES FROM ETHERS, EPOXIDES AND THIOETHERS

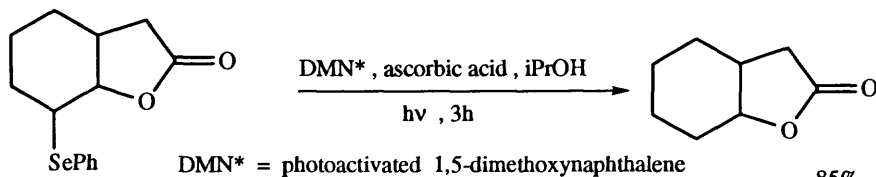
This section lists examples of the reaction $\text{R}-\text{O}-\text{R}' \rightarrow \text{R}-\text{H}$.



Hamel, P.; Zajac, N.; Atkinson, J.G.; Girard, Y. *Tetrahedron Lett.*, **1993**, 34, 2059



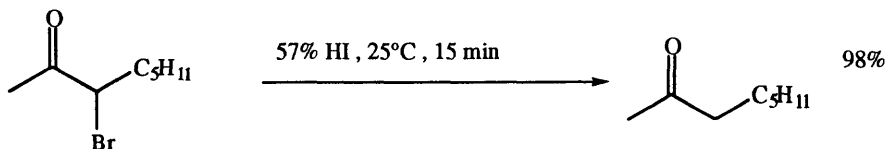
Back, T.G.; Baron, D.L.; Yang, K. *J. Org. Chem.*, **1993**, 58, 2407



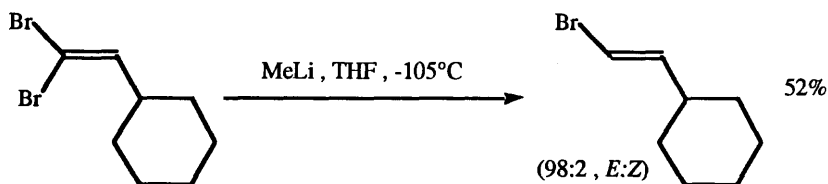
Pandey, G.; Rao, K.S.S.P.; Sekhar, B.B.V.S. *J. Chem. Soc. Chem. Commun.*, **1993**, 1636

SECTION 160: HYDRIDES FROM HALIDES AND SULFONATES

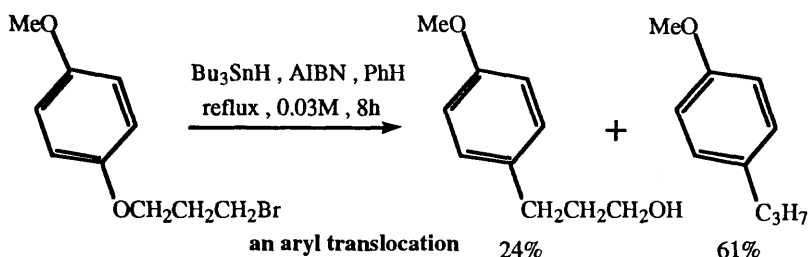
This section lists the reductions of halides and sulfonates, $\text{R}-\text{X} \rightarrow \text{R}-\text{H}$.



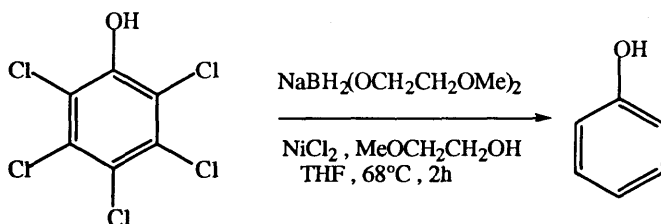
Penso, M.; Mottadelli, S.; Albanese, D. *Synth. Commun.*, **1993**, 23, 1385



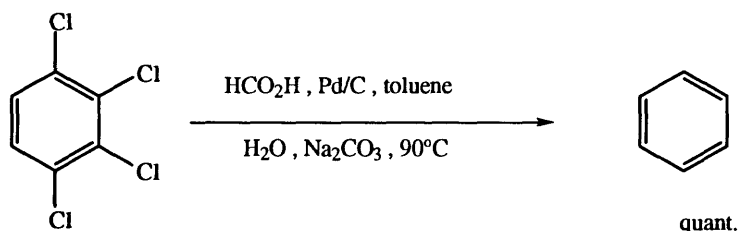
Grandjean, D.; Pale, P. *Tetrahedron Lett.*, **1993**, *34*, 1155



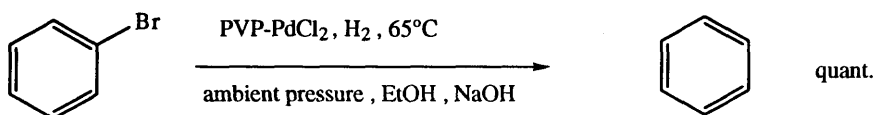
Lee, E.; Lee, C.; Tae, J.S.; Whang, H.S.; Li, K.S. *Tetrahedron Lett.*, **1993**, *34*, 2343



Tabaei, S.H.; Pittman Jr., C.U. *Tetrahedron Lett.*, **1993**, *34*, 3263

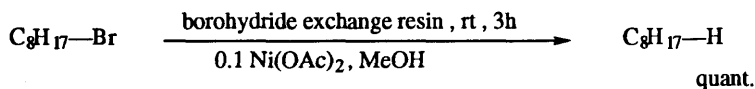


Barren, J.P.; Baghel, S.S.; McCloskey, P.J. *Synth. Commun.*, **1993**, *23*, 1601

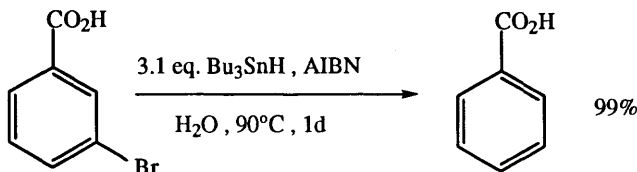


PVP-PdCl₂ = palladium anchored on poly(N-vinyl-2-pyrrolidinone)

Zhang, Y.; Liao, S.; Xu, Y. *Tetrahedron Lett.*, **1994**, *35*, 4599



Yoon, N.M.; Lee, H.J.; Ahn, J.H.; Choi, J. *J. Org. Chem.*, **1994**, *59*, 4687



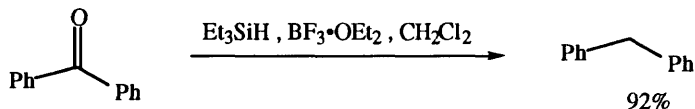
Maitra, U.; Sarma, K.D. *Tetrahedron Lett.*, **1994**, *35*, 7861

SECTION 161: HYDRIDES FROM HYDRIDES

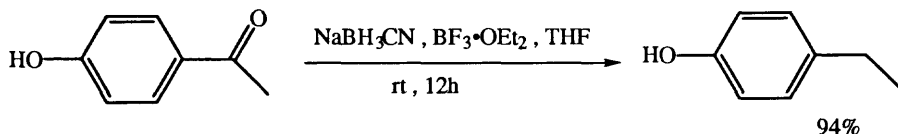
NO ADDITIONAL EXAMPLES

SECTION 162: HYDRIDES FROM KETONES

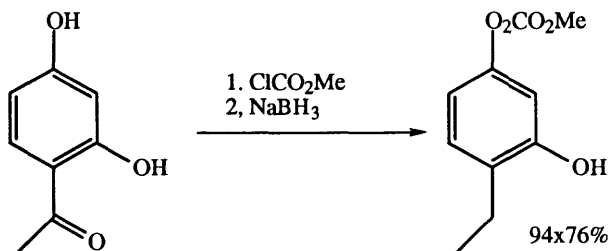
This section lists examples of the reaction $\text{R}_2\text{C}(\text{C}=\text{O})\text{R} \rightarrow \text{R}_2\text{C}\text{—H}$.



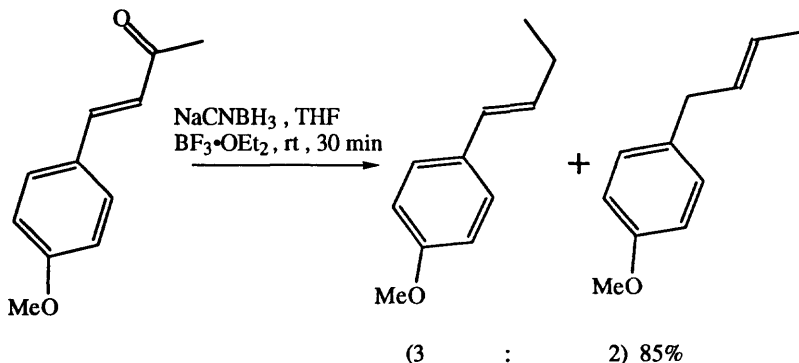
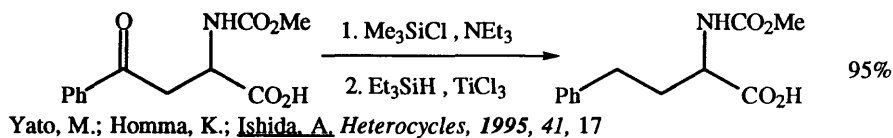
Smonou, I. *Synth. Commun.*, **1994**, *24*, 1999



Srikrishna, A.; Sattigeri, J.A.; Viswajanani, R.; Yelamagadda, C.V. *Synlett*, **1995**, 93



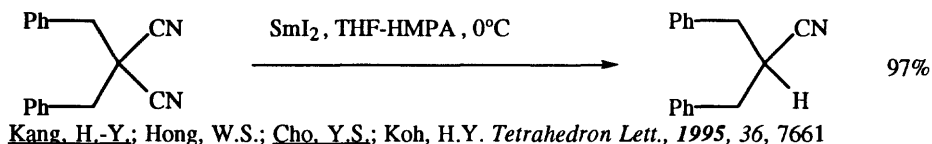
Mitchell, D.; Doecke, C.W.; Hay, L.A.; Koenig, T.M.; Wirth, D.D. *Tetrahedron Lett.*, **1995**, *36*, 5335



Srikrishna, A.; Viswajanani, R.; Sattigeri, J.A.; Yelamaggad, C.V. *Tetrahedron Lett.*, **1995**, *36*, 2347

SECTION 163: HYDRIDES FROM NITRILES

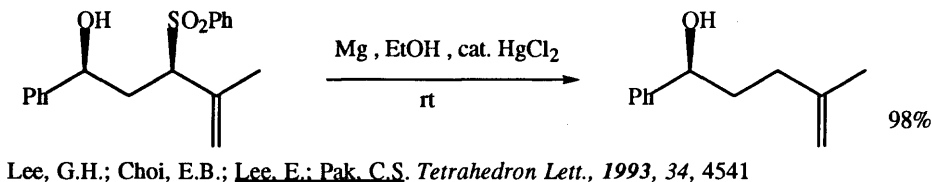
This section lists examples of the reaction, $R-C\equiv N \rightarrow R-H$ (includes reactions of isonitriles ($R-N\equiv C$)).



SECTION 164: HYDRIDES FROM ALKENES

NO ADDITIONAL EXAMPLES

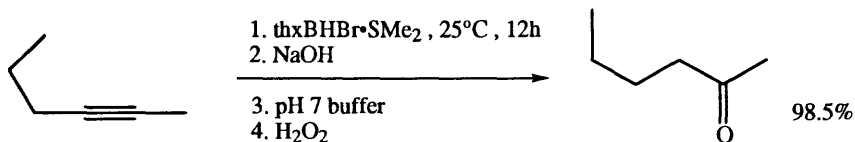
SECTION 165: HYDRIDES FROM MISCELLANEOUS COMPOUNDS



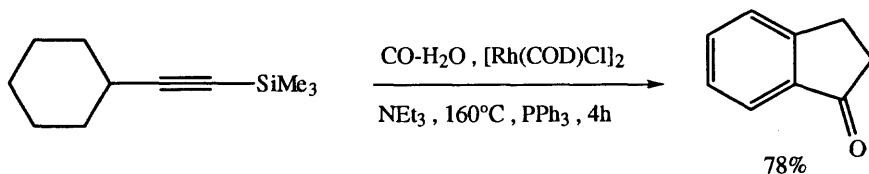
CHAPTER 12

PREPARATION OF KETONES

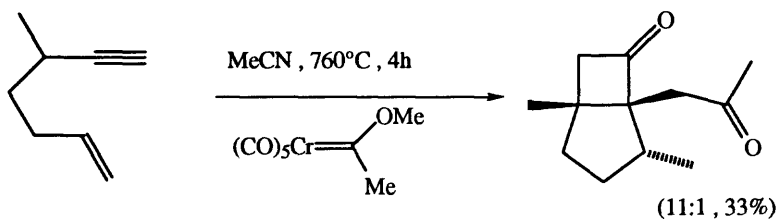
SECTION 166: KETONES FROM ALKYNES



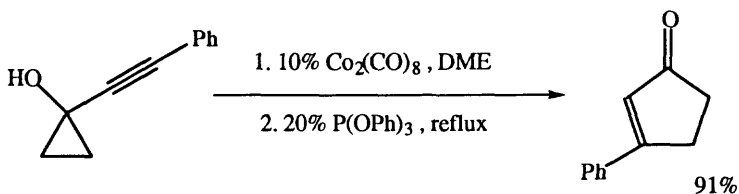
Cha, J.S.; Min, S.J.; Kim, J.M.; Kwon, O.O. *Tetrahedron Lett.*, **1993**, 34, 5113



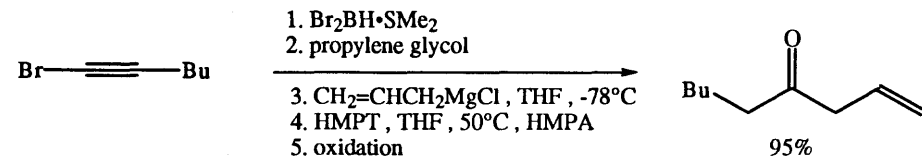
Tekeuchi, R.; Yasue, H. *J. Org. Chem.*, **1993**, 58, 5386



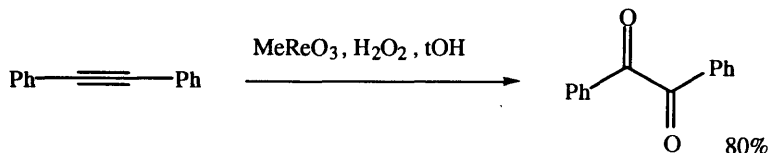
Kim, O.K.; Wulff, W.D.; Jiang, W.; Ball, R.G. *J. Org. Chem.*, **1993**, 58, 5572



Iwasawa, N.; Matsuo, T. *Chem. Lett.*, **1993**, 997

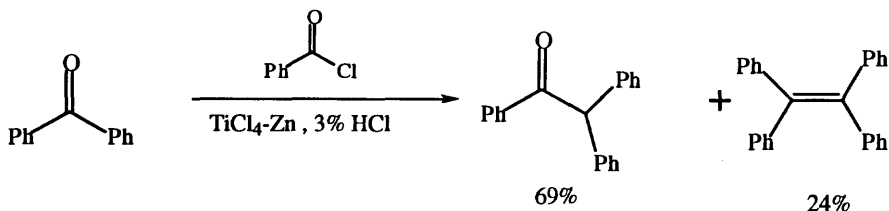


Brown, H.C.; Soundararajan, R. *Tetrahedron Lett.*, **1994**, 35, 6963

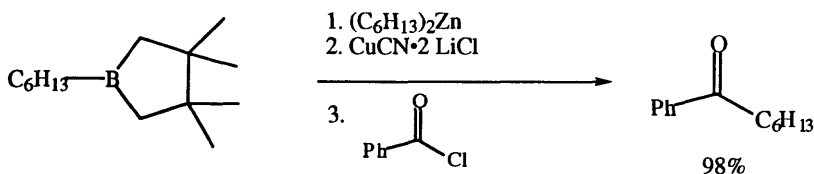


Zhu, Z.; Espenson, J.H. *J. Org. Chem.*, **1995**, 60, 7728

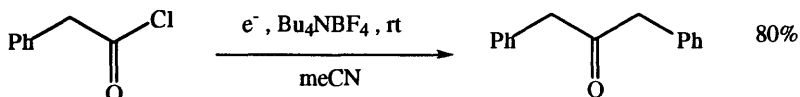
SECTION 167: KETONES FROM ACID DERIVATIVES



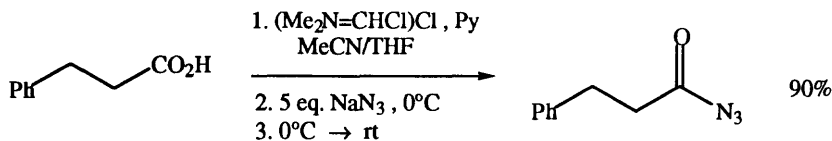
Shi, D.; Chen, J.; Chai, W.; Chen, W.; Kao, T. *Tetrahedron Lett.*, **1993**, 34, 2963



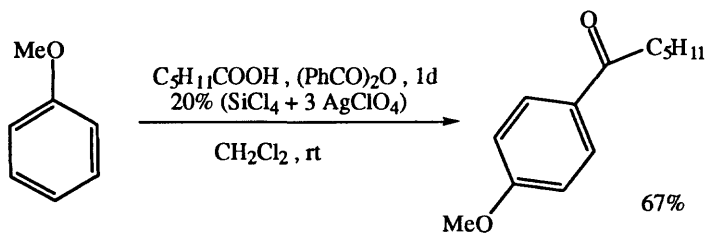
Langer, F.; Waas, J.; Knochel, P. *Tetrahedron Lett.*, **1993**, 34, 5261



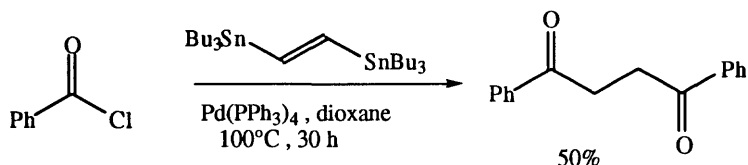
Folest, J.-C.; Pereira-Martins, E.; Troupel, M.; Périchon, J. *Tetrahedron Lett.*, **1993**, 34, 7571



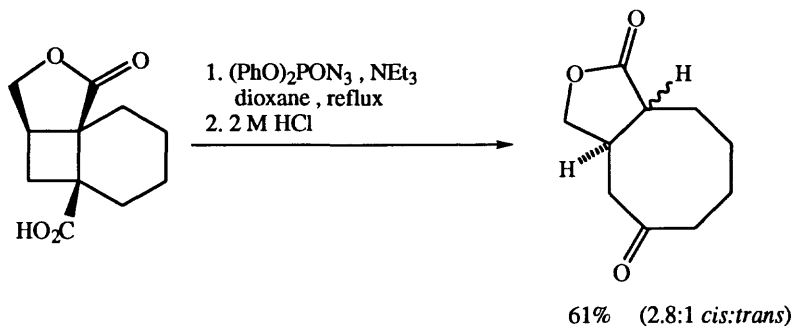
Affandi, H.; Bayguen, A.V.; Read, R.W. *Tetrahedron Lett.*, **1994**, 35, 2729



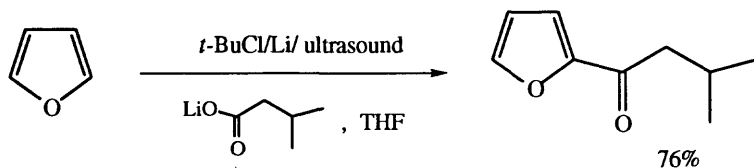
Suzuki, K.; Kitagawa, H.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 3729



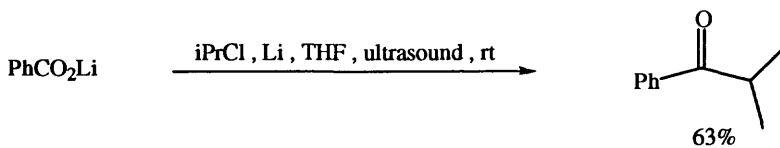
Echavarren, A.M.; Pérez, M.; Castaño, A.M.; Cuerva, J.M. *J. Org. Chem.*, **1994**, 59, 4179



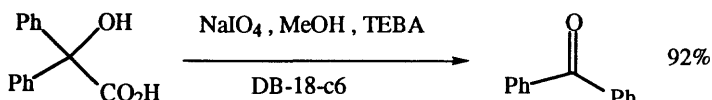
Booker-Milburn, K.L.; Cowell, J.K.; Harris, L.J. *Tetrahedron Lett.*, **1994**, 35, 3883



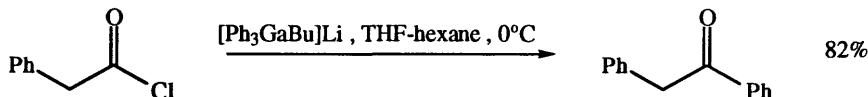
Aurell, M.J.; Einhorn, C.; Einhorn, J.; Lucche, J.L. *J. Org. Chem.*, **1995**, 60, 8



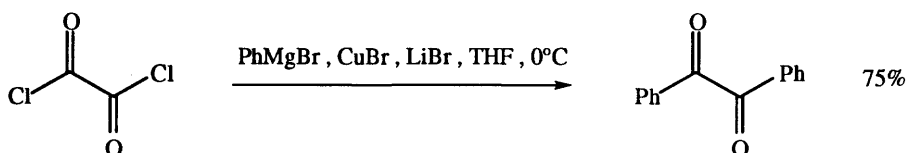
Aurell, M.J.; Danhui, Y.; Einhorn, J.; Einhorn, C.; Lucche, J.L. *Synlett*, **1995**, 459



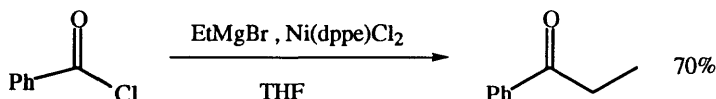
Kore, A.R.; Sagar, A.D.; Salunkhe, M.M. *Org. Prep. Proceed. Int.*, **1995**, 27, 373



Han, Y.; Fang, L.; Tao, W.-T.; Huang, Y.-Z. *Tetrahedron Lett.*, **1995**, 36, 1287

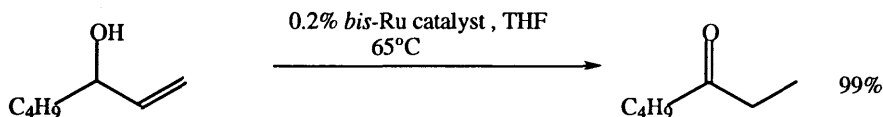


Babudri, F.; Fiandanese, V.; Marchese, G.; Punzi, A. *Tetrahedron Lett.*, **1995**, 36, 7305

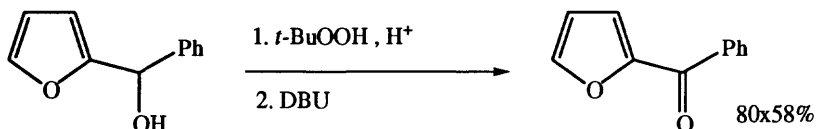


Malanga, C.; Aronica, L.A.; Lardicci, L. *Tetrahedron Lett.*, **1995**, 36, 9185

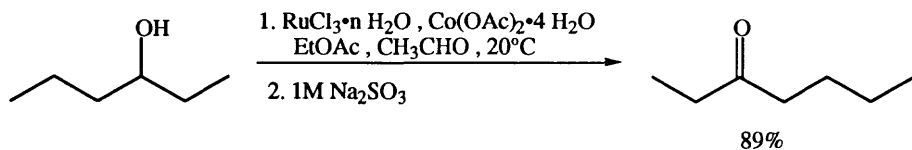
SECTION 168: KETONES FROM ALCOHOLS AND THIOLS



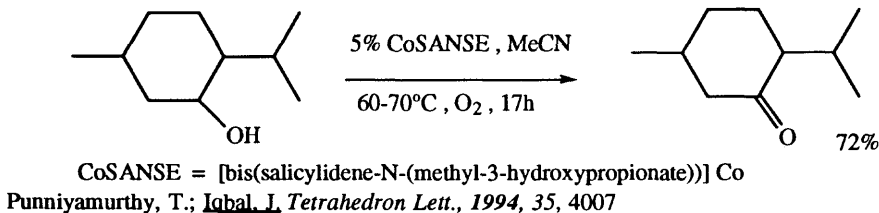
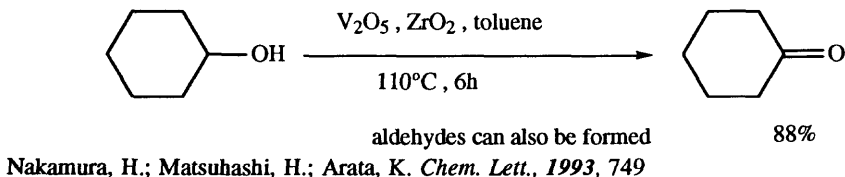
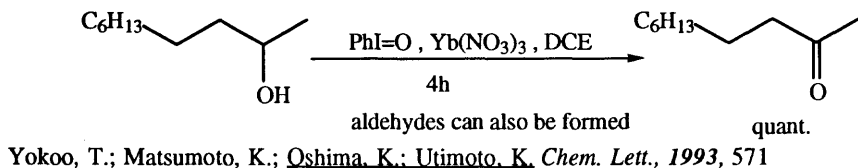
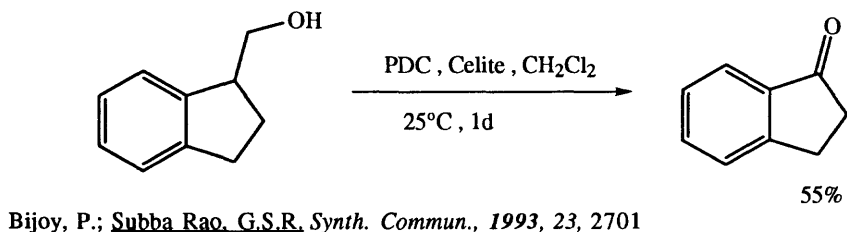
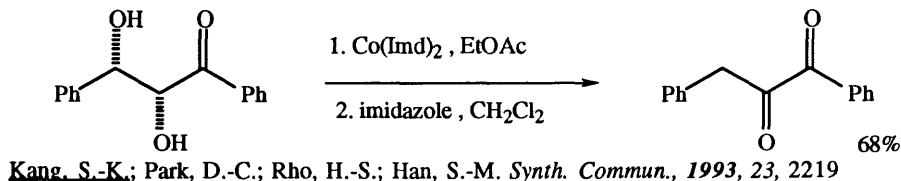
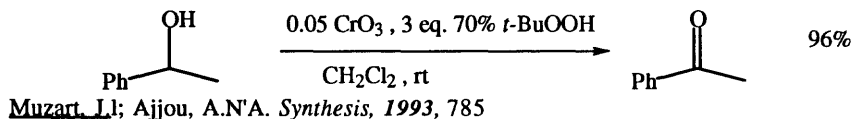
Bäckvall, J.-E.; Andreasson, U. *Tetrahedron Lett.*, **1993**, 34, 5459

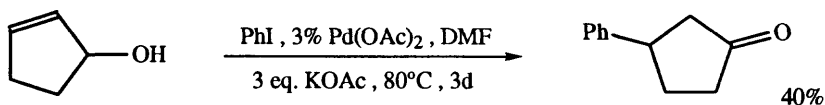


Antonioletti, R.; Arista, L.; Bonadies, F.; Locati, L.; Scettri, A. *Tetrahedron Lett.*, **1993**, 34, 7089

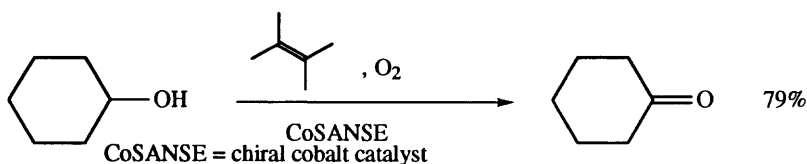


Murahashi, S.-I.; Naota, T.; Hirai, N. *J. Org. Chem.*, **1993**, 58, 7318

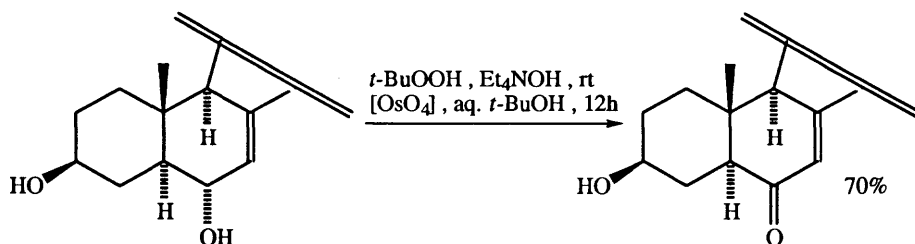




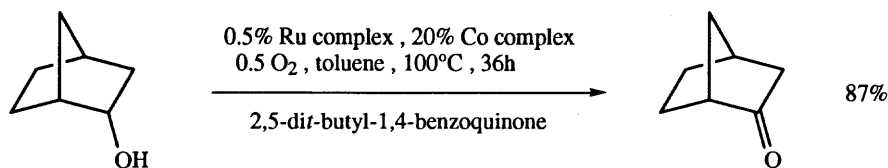
Larock, R.C.; Yum, E.K.; Yang, H. *Tetrahedron*, **1994**, 50, 305



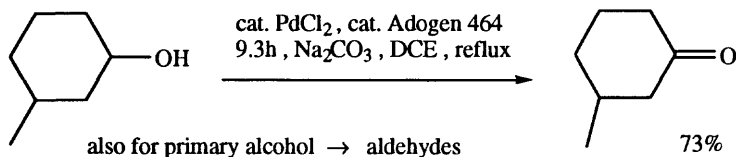
Kalra, S.J.S.; Punniyamurthy, T.; Iqbal, J. *Tetrahedron Lett.*, **1994**, 35, 4847



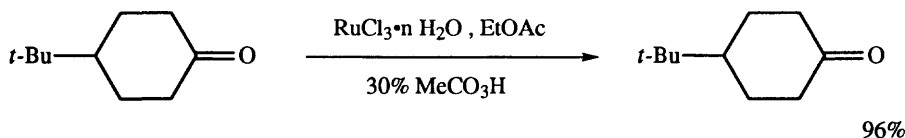
Beck, C.; Seifert, K. *Tetrahedron Lett.*, **1994**, 35, 7221



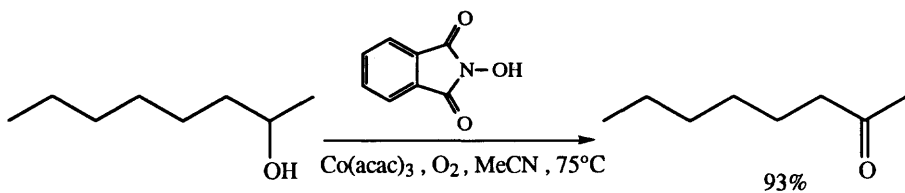
Wang, G.-Z.; Andreasson, U.; Bäckvall, J.-E. *J. Chem. Soc. Chem. Commun.*, **1994**, 1037



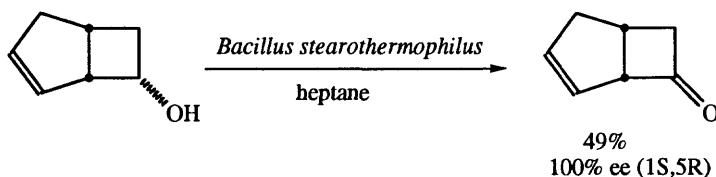
Aït-Mohand, S.; Hénin, F.; Muzart, J. *Tetrahedron Lett.*, **1995**, 36, 2473



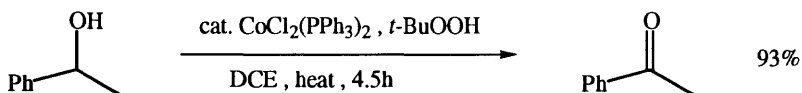
Murahashi, S.-I.; Naota, T.; Oda, Y.; Hirai, N. *Synlett*, **1995**, 733



Iwahama, T.; Sakaguchi, S.; Nishiyama, Y.; Ishii, Y., *Tetrahedron Lett.*, **1995**, 36, 6923

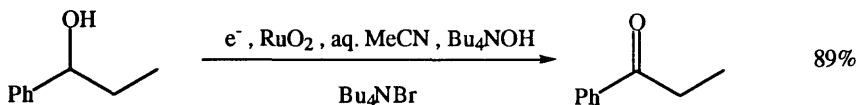


Fantin, G.; Fogagnolo, M.; Giovannini, P.P.; Medici, A.; Pedrini, P.; Poli, S. *Tetrahedron Lett.*, **1995**, 36, 441



aldehydes can also be formed

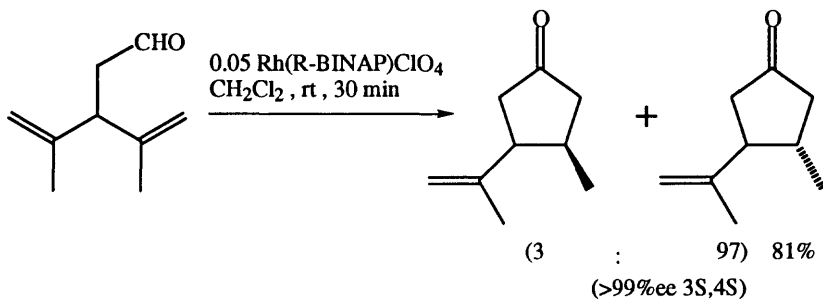
Iyer, S.; Varghese, J.P. *Synth. Commun.*, **1995**, 25, 2261



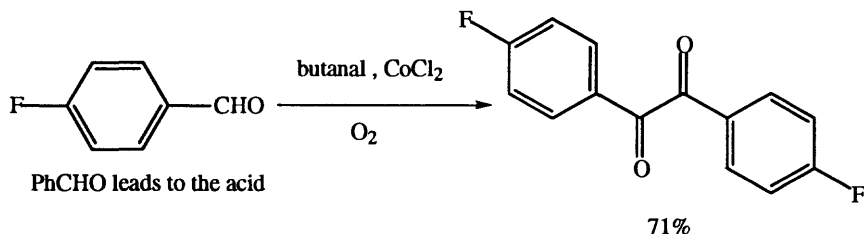
Torii, S.; Yoshida, A. *Chem. Lett.*, **1995**, 369

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

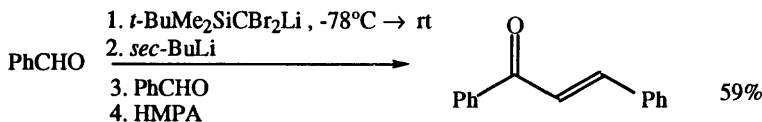
SECTION 169: KETONES FROM ALDEHYDES



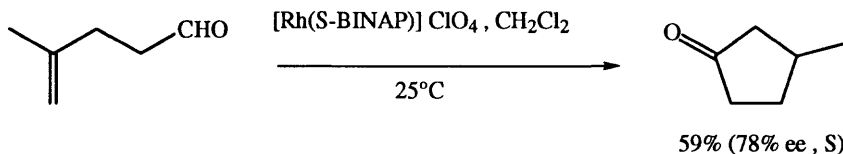
Wu, X.-M.; Funakoshi, K.; Sakai, K., *Tetrahedron Lett.*, **1993**, 34, 5927



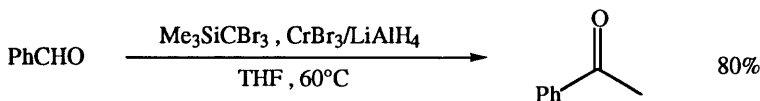
Punniyamurthy, T.; Kalra, S.J.S.; Iqbal, J. *Tetrahedron Lett.*, **1994**, 35, 2959



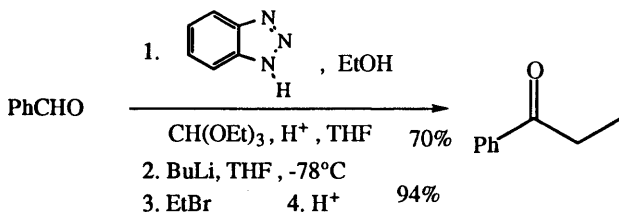
Shinokubo, H.; Oshima, K.; Utimoto, K. *Tetrahedron Lett.*, **1994**, 35, 3741



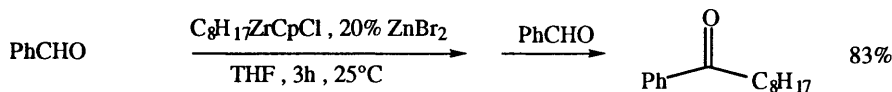
Barnhart, R.W.; Wang, X.; Noheda, P.; Bergens, S.H.; Whelan, J.; Bosnich, B. *J. Am. Chem. Soc.*, **1994**, 116, 1821



Hodgson, D.M.; Comina, P.J. *Synlett*, **1994**, 663



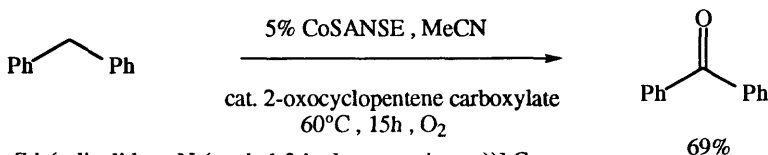
Katritzky, A.R.; Lang, H.; Wang, Z.; Zhang, Z.; Song, H. *J. Org. Chem.*, **1995**, 60, 7619



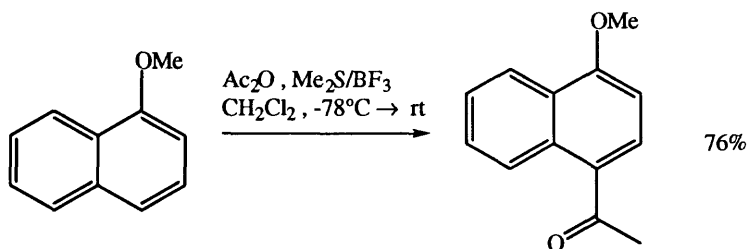
Zheng, B.; Srebnik, M. *J. Org. Chem.*, **1995**, 60, 3278

SECTION 170: KETONES FROM ALKYL, METHYLENES AND ARYL

This section lists examples of the reaction, $R-CH_2-R' \rightarrow R(C=O)-R'$.

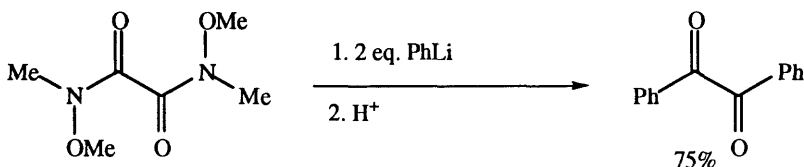


CoSANSE = [bis(salicylidene-N-(methyl-3-hydroxypropionate))] Co
 Punniyamurthy, T.; Iqbal, I. *Tetrahedron Lett.*, **1994**, 35, 4003

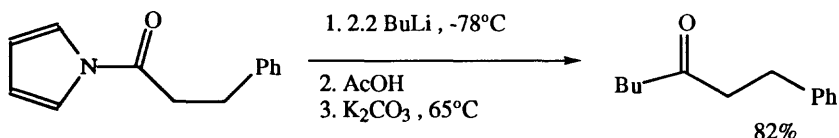


Kiselyov, A.S.; Harvey, R.G. *Tetrahedron Lett.*, **1995**, 36, 4005

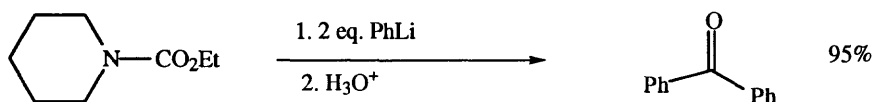
SECTION 171: KETONES FROM AMIDES



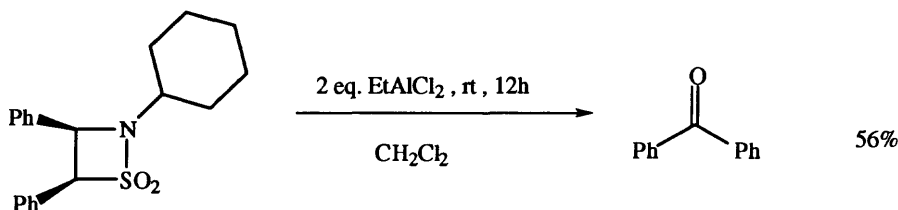
Sibi, M.P.; Marvin, M.; Sharma, R. *J. Org. Chem.*, **1995**, 60, 5016



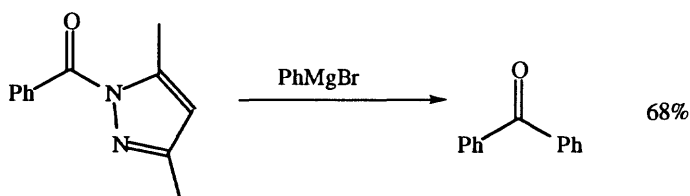
Brandänge, S.; Holmgren, E.; Leijonmarck, H.; Rodriguez, B. *Acta Chem. Scand. B.*, **1995**, 49, 922



Prakash, G.K.S.; York, C.; Liao, Q.; Kotian, K.; Olah, G.A. *Heterocycles*, **1995**, 40, 79



Kataoka, T.; Iwama, T. *Tetrahedron Lett.*, **1995**, 36, 245

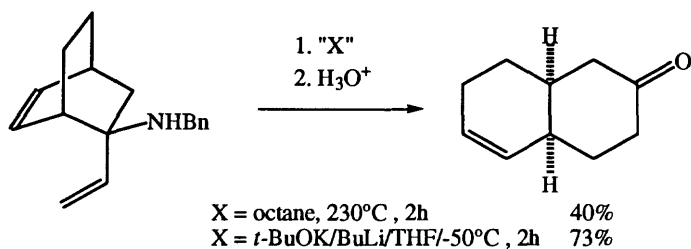


Kashima, C.; Kita, I.; Takahashi, K.; Hosomi, A. *J. Heterocyclic Chem.*, **1995**, 32, 25

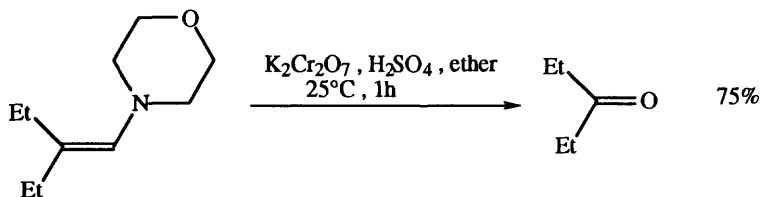
REVIEW:

"Chemistry of N-Methoxy N-Methyl Amides. Applications in Synthesis. A Review," Sibi, M.P. *Org. Prep. Proceed. Int.*, **1993**, 25, 5

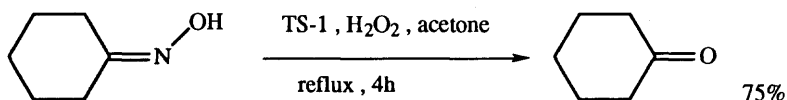
SECTION 172: KETONES FROM AMINES



Sprules, T.J.; Galpin, J.D.; Macdonald, D. *Tetrahedron Lett.*, **1993**, 34, 247

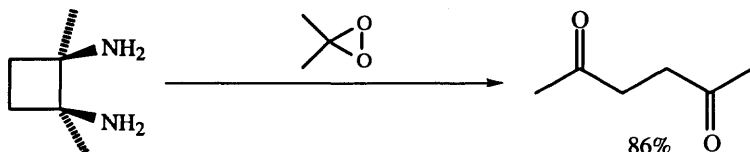


Harris, C.E.; Lee, L.Y.; Dorr, H.; Singaram, B. *Tetrahedron Lett.*, **1995**, 36, 2921



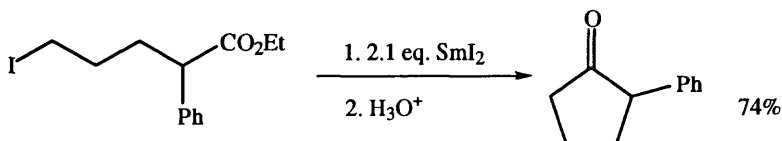
TS-1 = zeolite titanium silicalite

Joseph, R.; Sudalai, A.; Ravindranathan, T. *Tetrahedron Lett.*, **1994**, 35, 5493

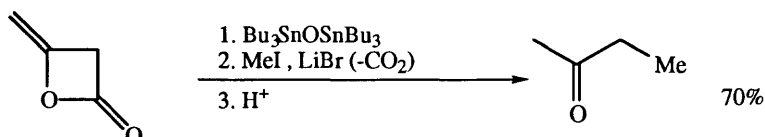


Gagnon, J.L.; Zajac Jr., W.W. *Tetrahedron Lett.*, **1995**, 36, 1803

SECTION 173: KETONES FROM ESTERS

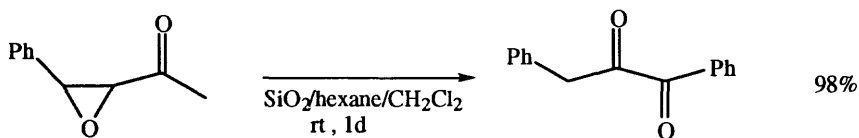


Molander, G.A.; McKie, J.A. *J. Org. Chem.*, **1993**, 58, 7216

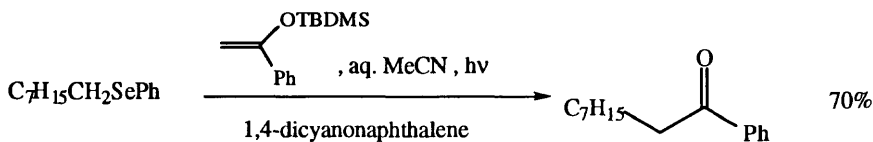


Shibata, I.; Nishio, M.; Baba, A.; Matsuda, H. *Chem. Lett.*, **1993**, 1953

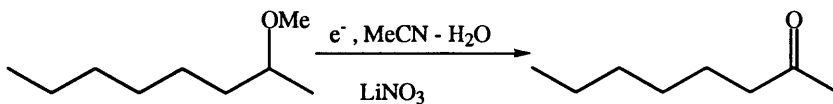
SECTION 174: KETONES FROM ETHERS, EPOXIDES AND THIOETHERS



Rao, T.B.; Rao, J.M. *Synth. Commun.*, **1993**, 23, 1527

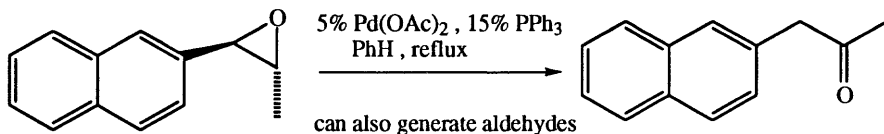


Pandey, G.; Sochanchingwung, R. *J. Chem. Soc. Chem. Commun.*, **1994**, 1945



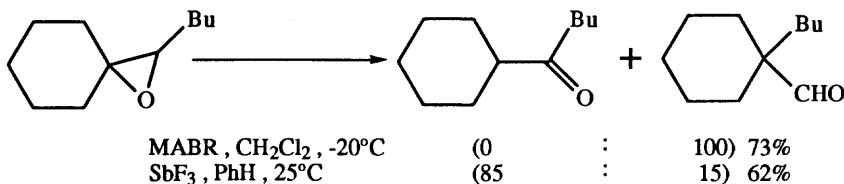
54%

Shono, T.; Yamamoto, Y.; Takigawa, K.; Maekawa, H.; Ishifune, M.; Kashimura, S. *Chem. Lett.*, **1994**, 1045

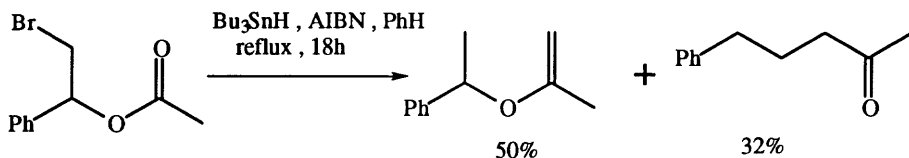


92

Kulasegaram, S.; Kulawiec, R.J. *J. Org. Chem.*, **1994**, 59, 7195



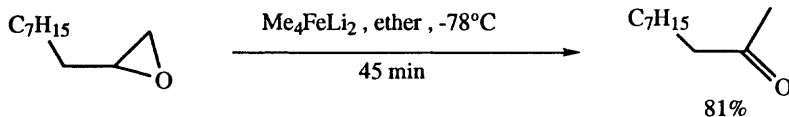
Maruoka, K.; Murase, N.; Bureau, R.; Ooi, T.; Yamamoto, H. *Tetrahedron*, **1994**, 50, 3663



50%

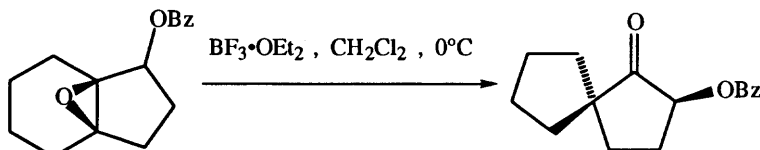
32%

Crich, D.; Yao, Q. *J. Chem. Soc. Chem. Commun.*, **1993**, 1265



81%

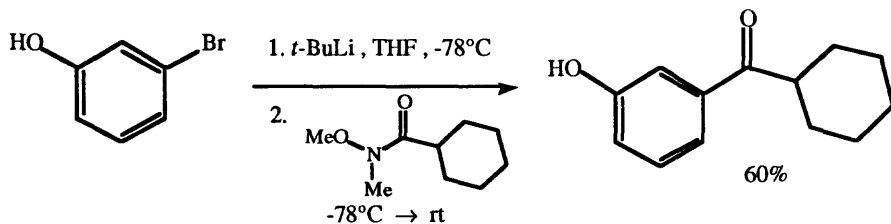
Kauffmann, T.; Neiteler, C.; Neiteler, G. *Chem. Ber.*, **1994**, 127, 659



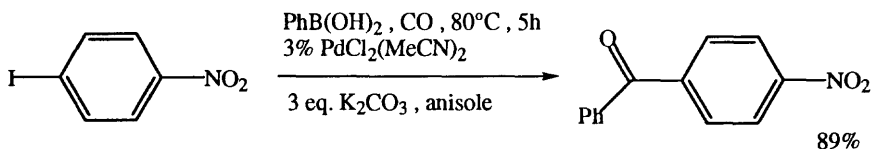
84%

Fujioka, H.; Kitagaki, S.; Imai, R.; Kondo, M.; Okamoto, S.; Yoshida, Y.; Akai, S.; Kita, Y. *Tetrahedron Lett.*, **1995**, 36, 3219

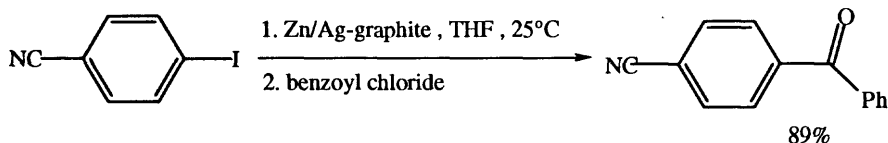
SECTION 175: KETONES FROM HALIDES AND SULFONATES



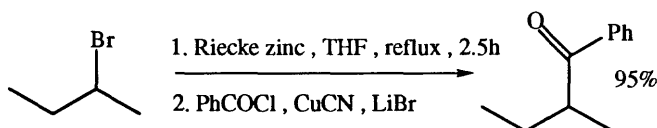
Selnick, H.G.; Bourgeois, M.L.; Butcher, J.W.; Radzilowski, E.M. *Tetrahedron Lett.*, **1993**, 34, 2043



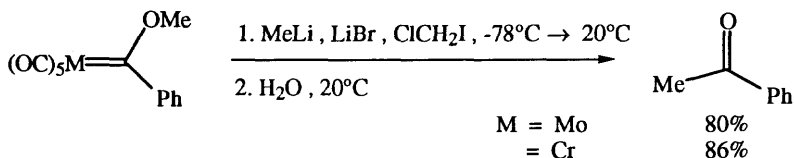
Ishiyama, T.; Kizaki, H.; Miyaura, N.; Suzuki, A. *Tetrahedron Lett.*, **1993**, 34, 7595



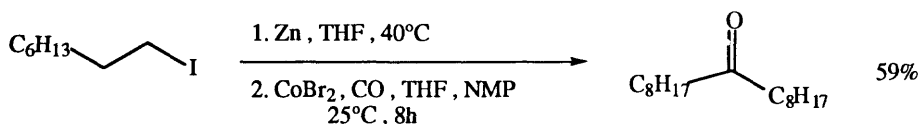
Fürstner, A.; Singer, R.; Knochel, P. *Tetrahedron Lett.*, **1994**, 35, 1047



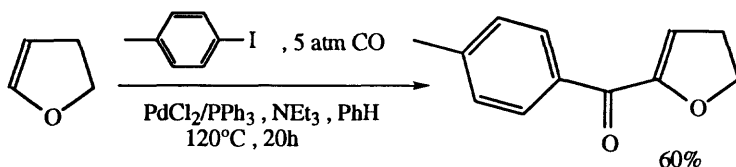
Hanson, M.V.; Brown, J.D.; Riecke, R.D.; Niu, Q.J. *Tetrahedron Lett.*, **1994**, 35, 7205



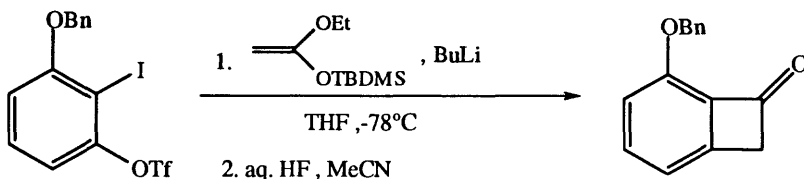
Barluenga, J.; Bernad Jr., P.L.; Concellón, J.M. *Tetrahedron Lett.*, **1994**, 35, 9471



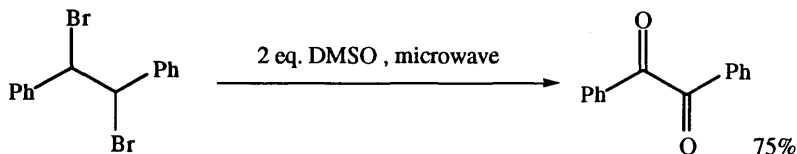
Devasagayaraj, A.; Knochel, P. *Tetrahedron Lett.*, **1995**, 36, 8411



Satoh, T.; Itaya, T.; Okuro, K.; Miura, M.; Nomura, M. *J. Org. Chem.*, **1995**, *60*, 7267



Hosoya, T.; Hasegawa, T.; Kuriyama, Y.; Matsumoto, T.; Suzuki, K. *Synlett*, **1995**, 177



Villemin, D.; Hammadi, M. *Synth. Commun.*, **1995**, *25*, 3145

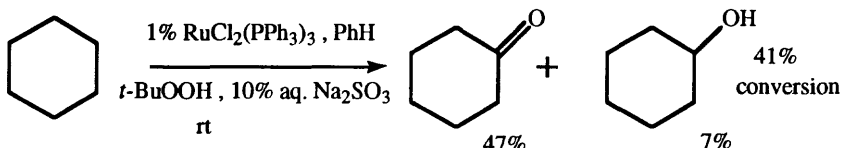
Related Methods:

Section 177 (Ketones from Ketones).

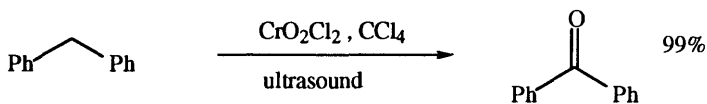
Section 55 (Aldehydes from Halides).

SECTION 176: KETONES FROM HYDRIDES

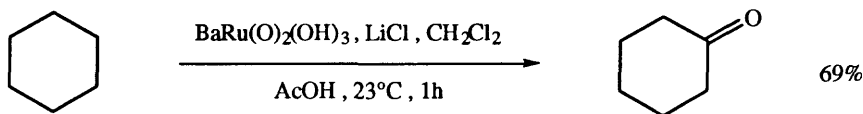
This section lists examples of the replacement of hydrogen by ketonic groups, $R-H \rightarrow R(C=O)-R'$. For the oxidation of methylenes, $R_2CH_2 \rightarrow R_2C=O$, see section 170 (Ketones from Alkyls).



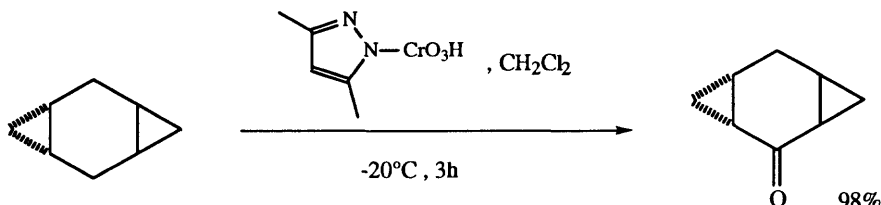
Murahashi, S.; Oda, Y.; Naota, T.; Kuwabara, T. *Tetrahedron Lett.*, **1993**, *34*, 1299



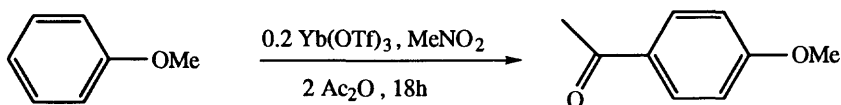
Luzzio, F.A.; Moore, W.J. *J. Org. Chem.*, **1993**, *58*, 512



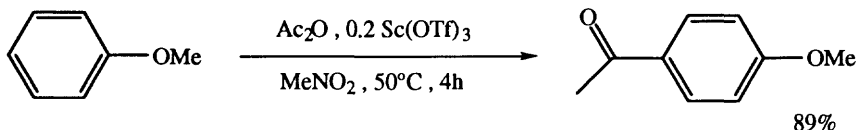
Lau, T.-C.; Mak, C.-K. *J. Chem. Soc. Chem. Commun.*, **1993**, 766



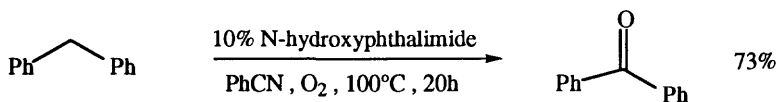
Banwell, M.G.; Haddad, N.; Huglin, J.A.; MacKay, M.F.; Reum, M.E.; Ryan, J.H.; Turner, K.A. *J. Chem. Soc. Chem. Commun.*, **1993**, 954



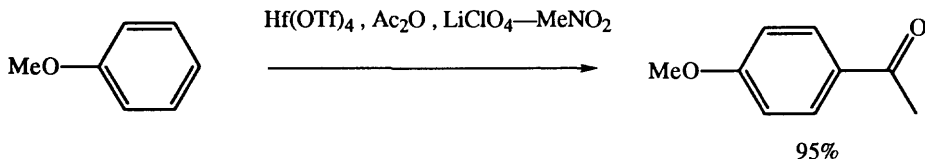
Kawada, A.; Mitamura, S.; Kobayashi, S. *J. Chem. Soc. Chem. Commun.*, **1993**, 1157



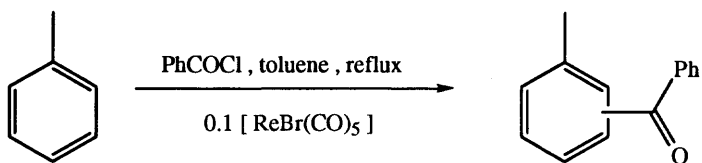
Kawada, A.; Mitamura, S.; Kobayashi, S. *Synlett*, **1994**, 545



Ishii, Y.; Nakayama, K.; Takeno, M.; Sakaguchi, S.; Iwahama, T.; Nishiyama, Y. *J. Org. Chem.*, **1995**, 60, 3934



Hachiya, I.; Moriwaki, M.; Kobayashi, S. *Tetrahedron Lett.*, **1995**, 36, 409

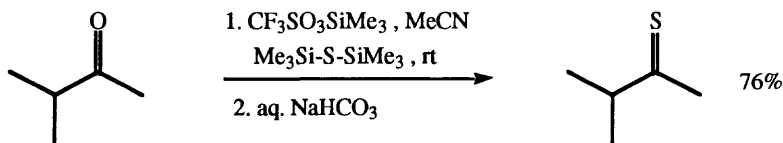


91% (11:4:85 o:m:p)

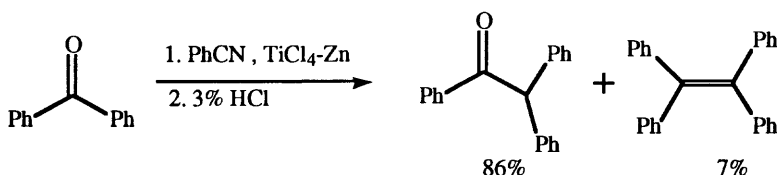
Kusama, H.; Narasaka, K., *Bull. Chem. Soc. Jpn.*, 1995, 68, 2379**SECTION 177: KETONES FROM KETONES**

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

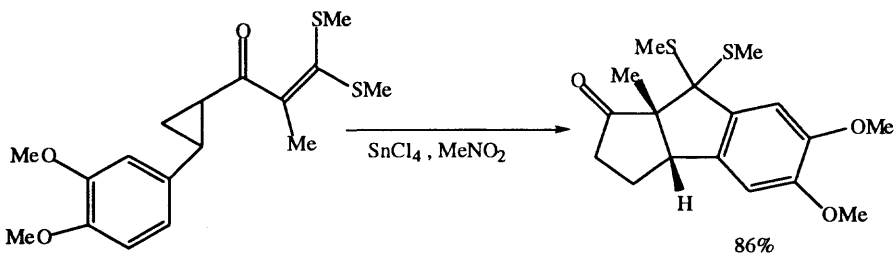
For the preparation of enamines or imines from ketones, see Section 356 (Amine-Alkene).



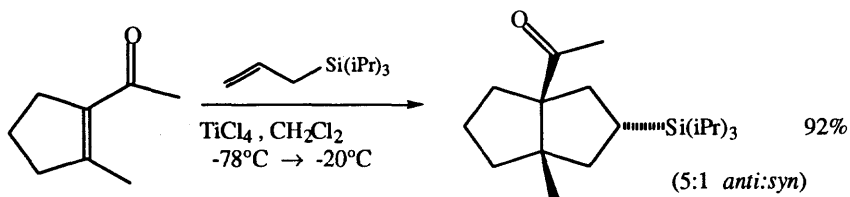
Degl'Innocenti, A.; Capperucci, A.; Mordini, A.; Reginato, G.; Ricci, A.; Cerreta, F.
Tetrahedron Lett., 1993, 34, 873



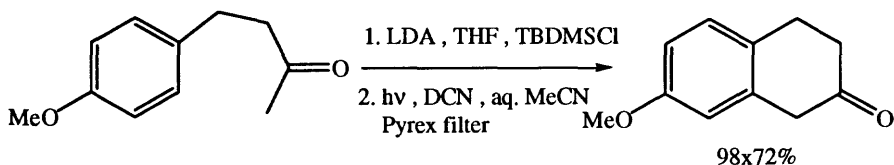
Gao, J.; Hu, M-Y.; Chen, J-x.; Yuan, S.; Chen, W-x *Tetrahedron Lett.*, 1993, 34, 1617



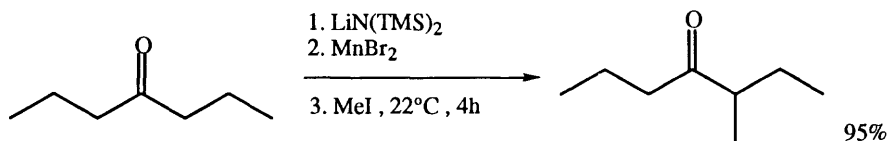
Patra, P.K.; Patro, B.; Ila, H.; Iunjappa, H. *Tetrahedron Lett.*, 1993, 34, 3951



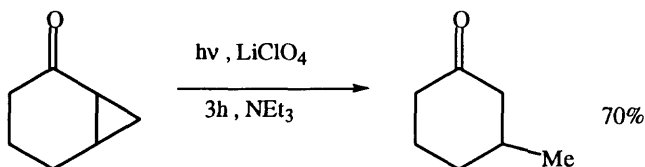
Knölker, H.-J.; Graf, R. *Tetrahedron Lett.*, **1993**, 34, 4765



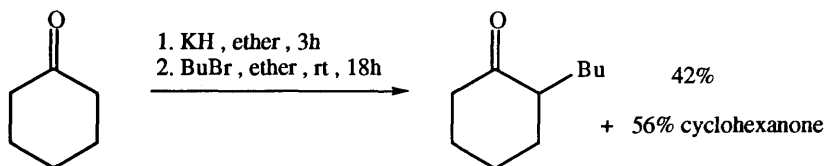
Pandey, G.; Krishna, A.; Girija, K.; Karthikeyan, M. *Tetrahedron Lett.*, **1993**, 34, 6631



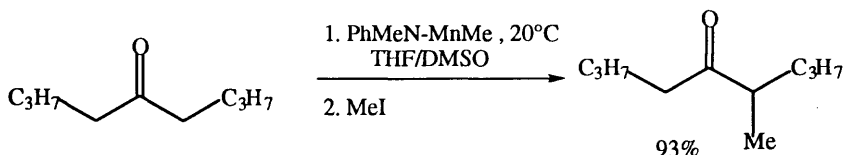
Reetz, M.T.; Haning, H. *Tetrahedron Lett.*, **1993**, 34, 7395



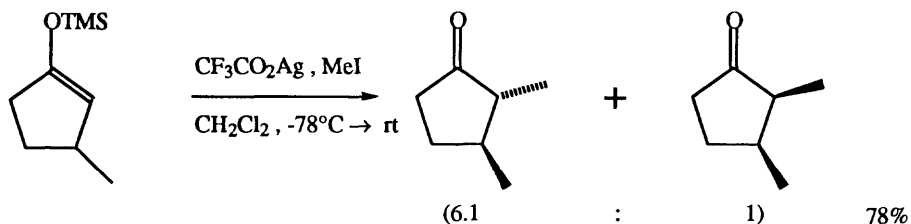
Cossy, J.; Furet, N. *Tetrahedron Lett.*, **1993**, 34, 8107



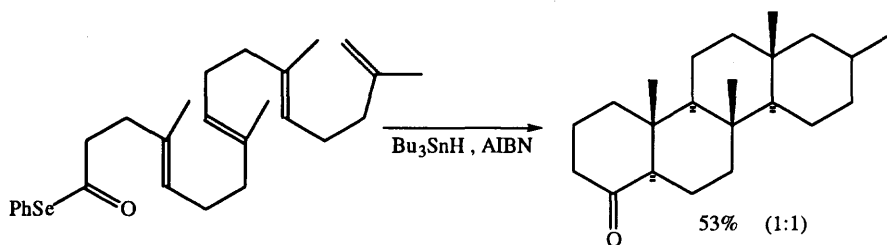
Bates, R.B.; Taylor, S.R. *J. Org. Chem.*, **1993**, 58, 4469



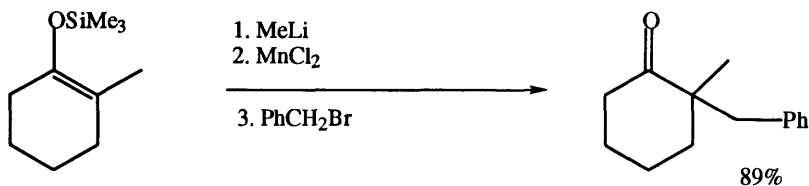
Cahiez, G.; Figadère, B.; Cléry, P. *Tetrahedron Lett.*, **1994**, 35, 3065



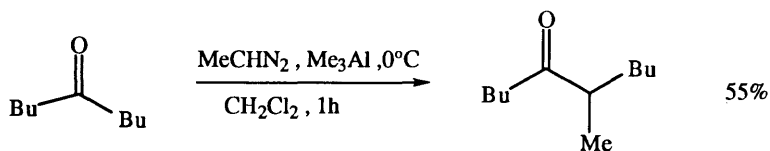
Angers, P.; Canonne, P. *Tetrahedron Lett.*, **1994**, 35, 367



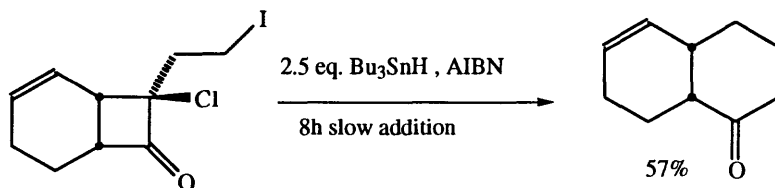
Chen, L.; Gill, G.B.; Pattenden, G. *Tetrahedron Lett.*, **1994**, 35, 2593



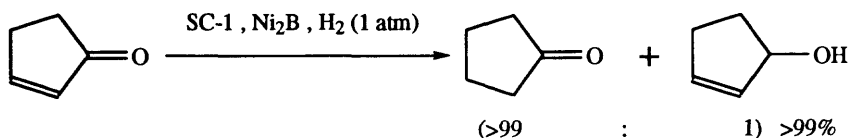
Cahiez, G.; Chau, K.; Cléry, P. *Tetrahedron Lett.*, **1994**, 35, 3069



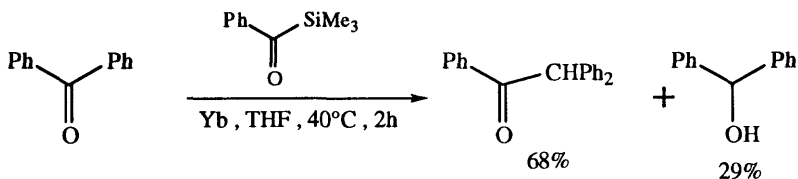
Maruoka, K.; Concepcion, A.B.; Yamamoto, H. *J. Org. Chem.*, **1994**, 59, 4725



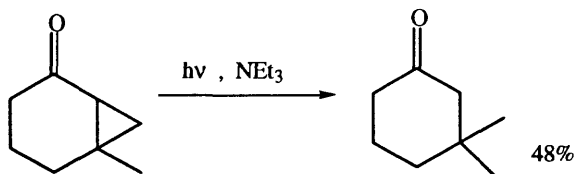
Dowd, P.; Zhang, W.; Mahmood, K. *Tetrahedron Lett.*, **1994**, 35, 5563



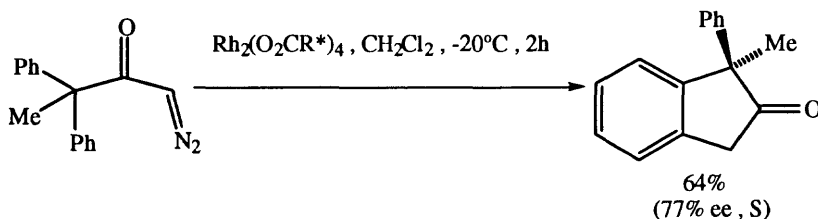
Belisle, C.M.; Young, Y.M.; Singaram, B. *Tetrahedron Lett.*, **1994**, 35, 5595



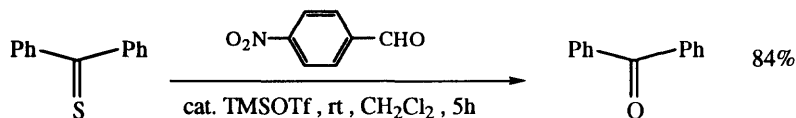
Taniguchi, Y.; Nagafuji, A.; Makioka, Y.; Takaki, K.; Fujiwara, Y. *Tetrahedron Lett.*, **1994**, 35, 6897



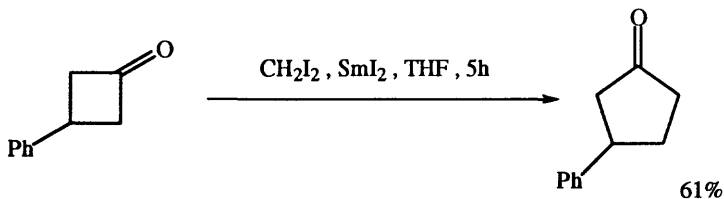
Kirschberg, T.; Mattay, J. *Tetrahedron Lett.*, **1994**, 35, 7217



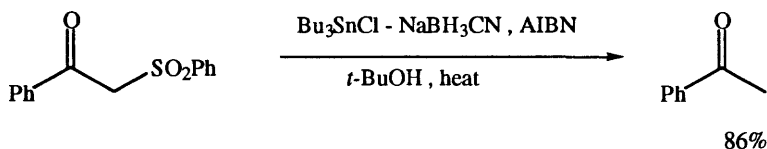
Watanabe, N.; Ohtake, Y.; Hashimoto, S.; Shiro, M.; Ikegami, S. *Tetrahedron Lett.*, **1995**, 36, 1491



Ravindranathan, T.; Chavan, S.P.; Awachat, M.M.; Kelkar, S.V. *Tetrahedron Lett.*, **1995**, 36, 2277



Fukuzawa, S.; Tsuchimoto, T. *Tetrahedron Lett.*, **1995**, 36, 5937



Giovannini, R.; Petrini, M. *Synlett*, **1995**, 973

REVIEW:

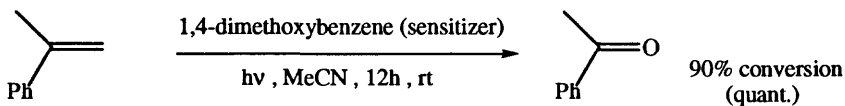
"Organotin Enolates in Organic Synthesis. A Review," Shibata, I.; Baba, A. *Org. Prep. Proceed. Int.*, **1994**, 26, 123

Related Methods: Section 49 (Aldehydes from Aldehydes).

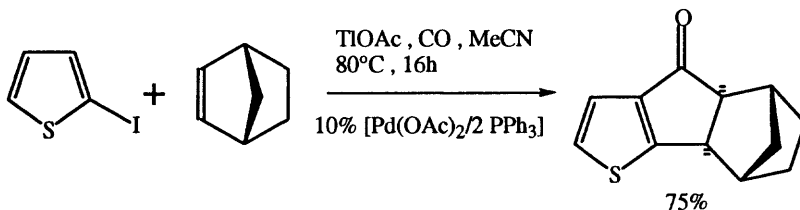
SECTION 178: KETONES FROM NITRILES

NO ADDITIONAL EXAMPLES

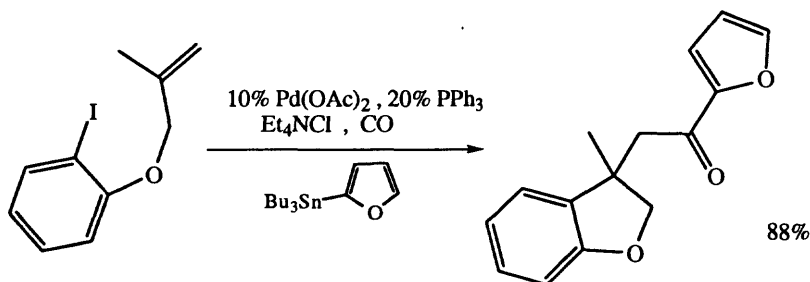
SECTION 179: KETONES FROM ALKENES



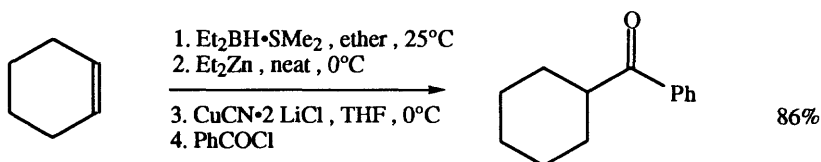
Bhalerao, U.T.; Sridhar, M. *Tetrahedron Lett.*, **1993**, 34, 4341



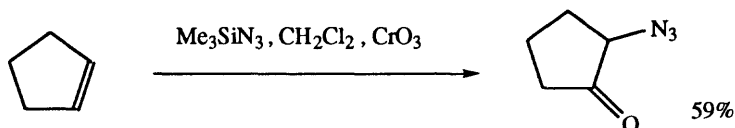
Grigg, R.; Khalil, H.; Levett, P.; Virica, J.; Sridharan, V. *Tetrahedron Lett.*, **1994**, 35, 3197



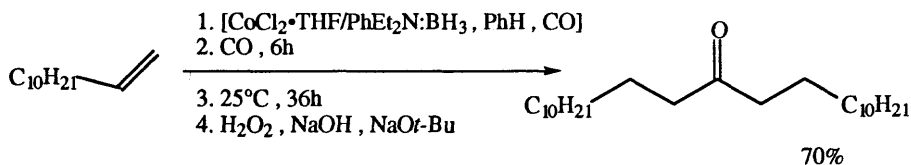
Grigg, R.; Redpath, J.; Sridharan, V.; Wilson, D. *Tetrahedron Lett.*, **1994**, 35, 4429



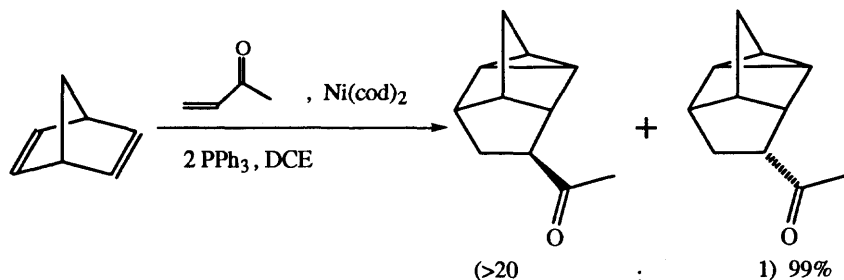
Langer, F.; Devasagayaram, A.; Chavant, P.-Y.; Knochel, P. *Synlett*, **1994**, 410



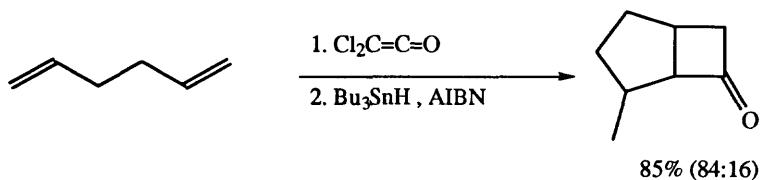
Reddy, M.V.R.; Kumareswaran, R.; Vankar, Y.D. *Tetrahedron Lett.*, **1995**, 36, 6751



Rao, M.L.N.; Periasamy, M. *Tetrahedron Lett.*, **1995**, 36, 9069



Lautens, M.; Edwards, L.G.; Tam, W.; Lough, A.J. *J. Am. Chem. Soc.*, **1995**, 117, 10276



Dowd, P.; Zhang, W.; Geib, S.J. *Tetrahedron*, **1995**, *51*, 3435

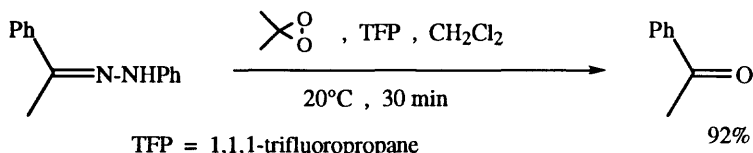
See also:

Section 134 (Ethers from Alkenes).

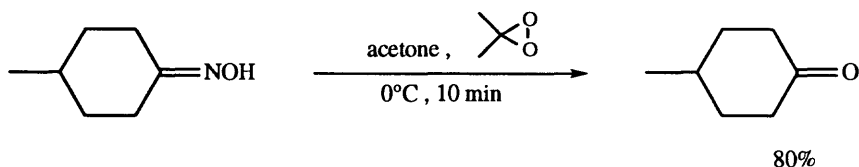
Section 174 (Ketones from Ethers).

SECTION 180: KETONES FROM MISCELLANEOUS COMPOUNDS

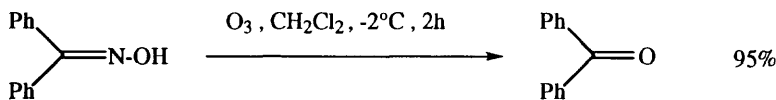
Conjugate reductions and reductive alkylations of enones are listed in Section 74 (Alkyls from Alkenes).



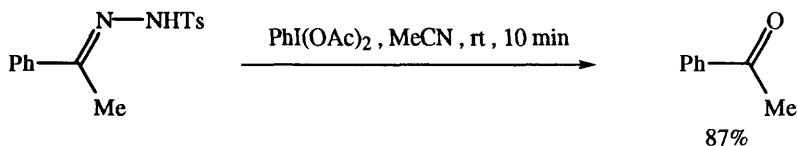
Altamura, A.; Curci, R.; Edwards, J.O. *J. Org. Chem.*, **1993**, *58*, 7289



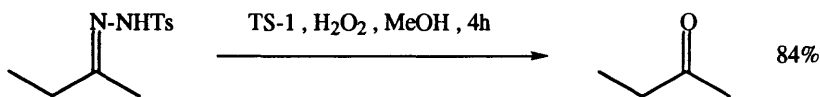
Olah, G.A.; Liao, Q.; Lee, C.-S.; Prakash, G.K.S. *Synlett*, **1993**, 427



Yang, Y.; Li, T.; Li, Y. *Synth. Commun.*, **1993**, *23*, 1121

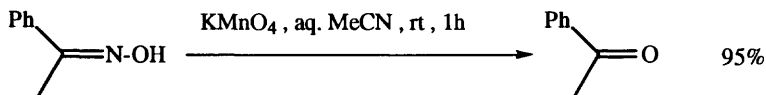


Zeng, H.; Chen, Z.-C. *Synth. Commun.*, **1993**, *23*, 2497

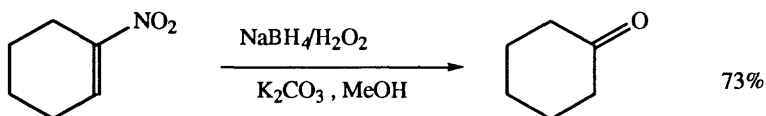


TS-1 = titanium silicate molecular sieves

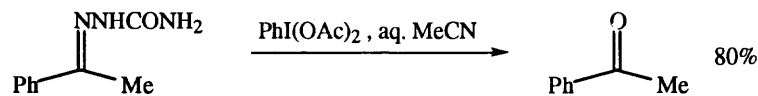
Kumar, P.; Hegde, V.R.; Pandey, B.; Ravindranathan, T. *J. Chem. Soc. Chem. Commun.*, **1993**, 1553



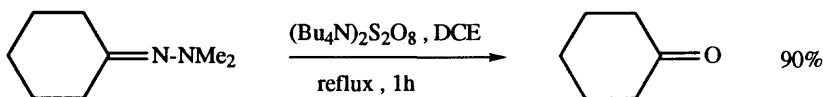
Wali, A.; Ganeshpure, P.A.; Satish, S. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 1847



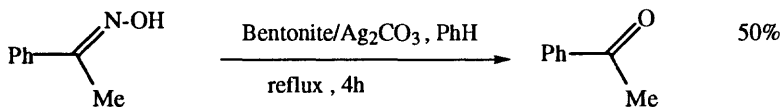
Ballini, R.; Bosica, G. *Synthesis*, **1994**, 723



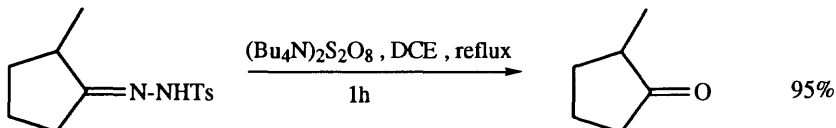
Chen, D.W.; Chen, Z.C. *Synthesis*, **1994**, 777



Choi, H.C.; Kim, Y.H. *Synth. Commun.*, **1994**, 24, 2307



Sanabria, R.; Miranda, R.; Lara, V.; Delgado, F. *Synth. Commun.*, **1994**, 24, 2805

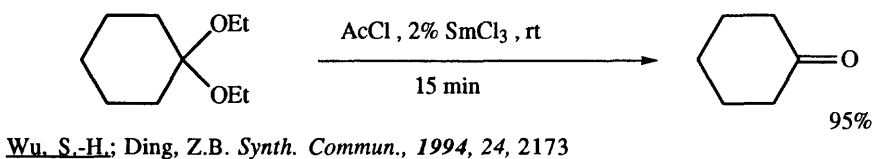
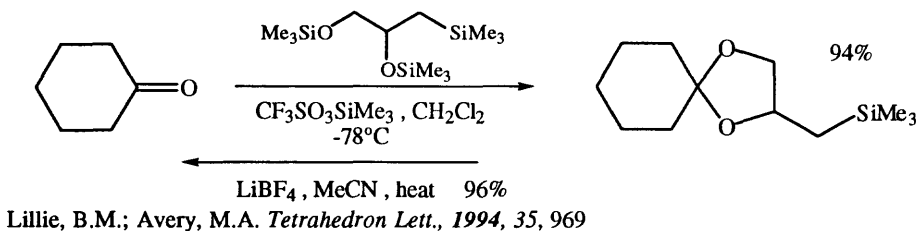
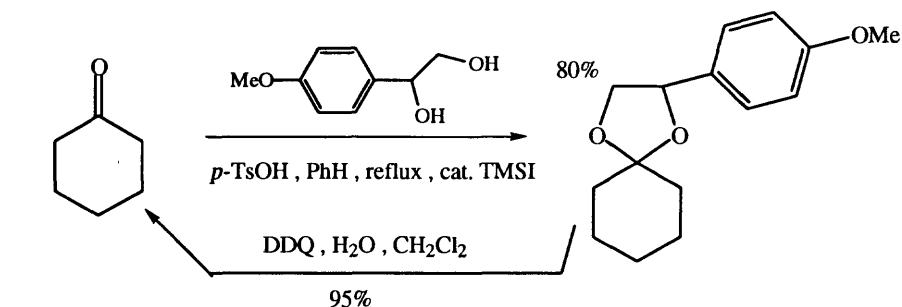
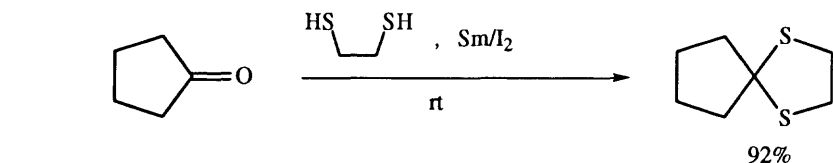
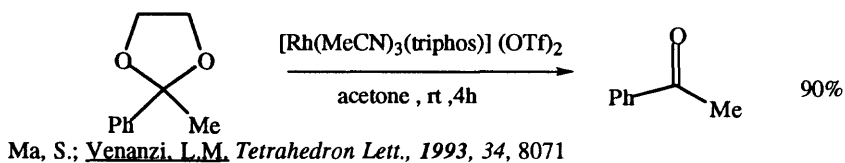


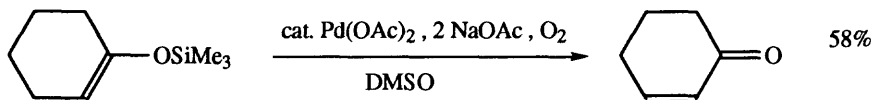
Chen, F.; Yang, J.; Zhang, H.; Guan, C.; Wan, J. *Synth. Commun.*, **1995**, 25, 3163

REVIEW:

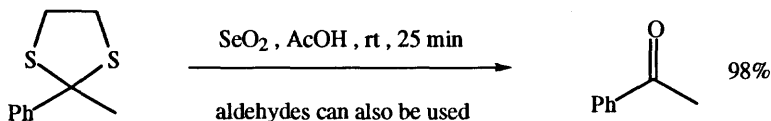
"Macrocyclic Synthesis: Cyclic Ketones, Ketoalkenes, Diketones and Dienes of Ring Size C₂₁ to C₂₆," Forbes, M.D.E.; Dang, Y. *Org. Prep. Proceed. Int.*, **1993**, 25, 309

SECTION 180A: PROTECTION OF KETONES

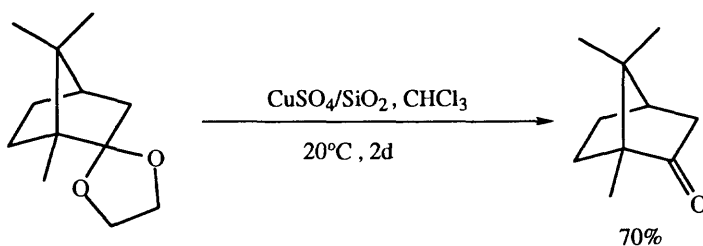




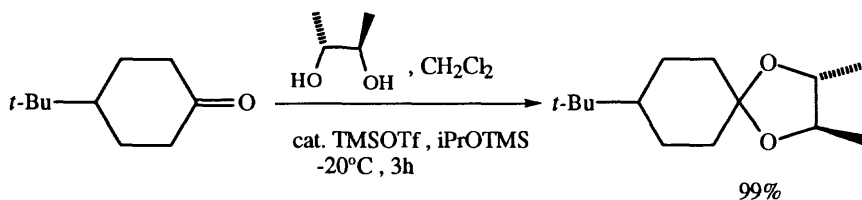
Larock, R.C.; Hightower, T.R.; Kraus, G.A.; Hahn, P.; Zheng, D. *Tetrahedron Lett.*, **1995**, 36, 2423



Haroutounian, S.A. *Synthesis*, **1995**, 39



Caballero, G.M.; Gros, E.G. *Synth. Commun.*, **1995**, 25, 395



Kurihara, M.; Miyata, N. *Chem. Lett.*, **1995**, 263

See Section 362 (Ester-Alkene) for the formation of enol esters and Section 367 (Ether-Alkenes) for the formation of enol ethers. Many of the methods in Section 60A (Protection of Aldehydes) are also applicable to ketones.

CHAPTER 13

PREPARATION OF NITRILES

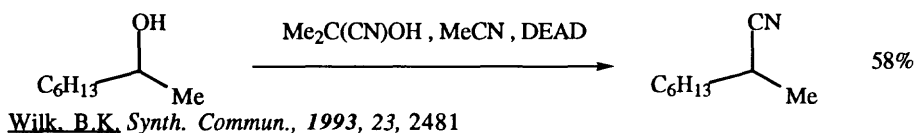
SECTION 181: NITRILES FROM ALKYNES

NO ADDITIONAL EXAMPLES

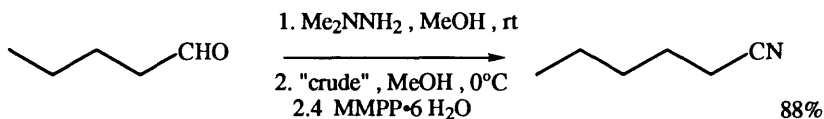
SECTION 182: NITRILES FROM ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

SECTION 183: NITRILES FROM ALCOHOLS AND THIOLS



SECTION 184: NITRILES FROM ALDEHYDES



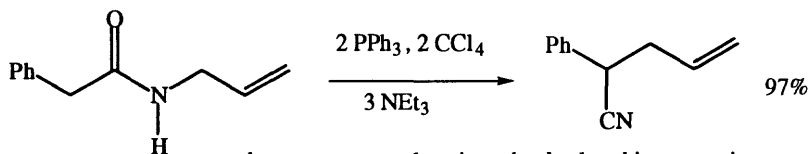
MMPP = magnesium monoperoxyphthalate

Fernández, R.; Gasch, C.; Lassalwita, J.-M.; Llera, J.-M.; Vázquez, J.
Tetrahedron Lett., 1993, 34, 141

SECTION 185: NITRILES FROM ALKYL, METHYLENES AND ARYL

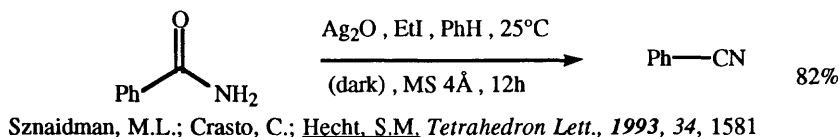
NO ADDITIONAL EXAMPLES

SECTION 186: NITRILES FROM AMIDES

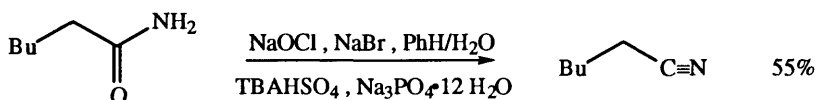


other reagents are also given that lead to this conversion

Walters, M.A.; Hoem, A.B.; Arcand, H.R.; Hegeman, A.D.; McDonough, C.S. *Tetrahedron Lett.*, **1993**, *34*, 1453



Sznaidman, M.L.; Crasto, C.; Hecht, S.M. *Tetrahedron Lett.*, **1993**, *34*, 1581

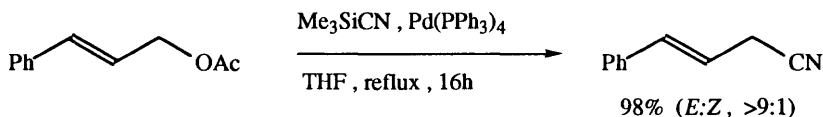


Correia, J. *Synthesis*, **1994**, 1127

SECTION 187: NITRILES FROM AMINES

NO ADDITIONAL EXAMPLES

SECTION 188: NITRILES FROM ESTERS

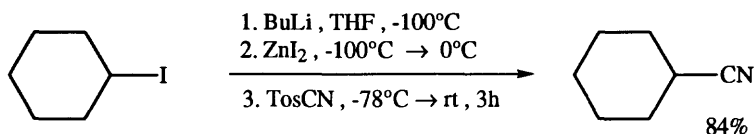


Tsuji, Y.; Yamada, N.; Tanaka, S. *J. Org. Chem.*, **1993**, *58*, 16

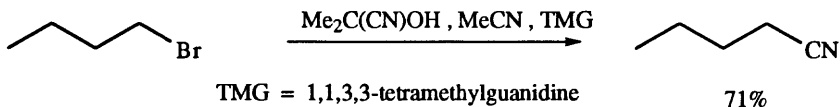
SECTION 189: NITRILES FROM ETHERS, EPOXIDES AND THIOETHERS

NO ADDITIONAL EXAMPLES

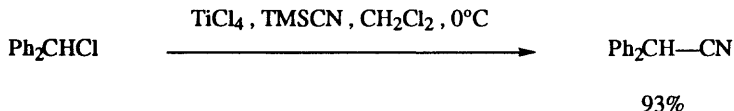
SECTION 190: NITRILES FROM HALIDES AND SULFONATES



Klement, I.; Lennick, K.; Tucker, C.E.; Knochel, P. *Tetrahedron Lett.*, **1993**, *34*, 4623



Dowd, P.; Wilk, B.K.; Wlostowski, M. *Synth. Commun.*, **1993**, *23*, 2323

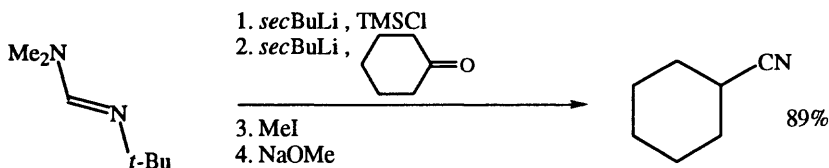


Zieger, H.E.; Wo, S. J. *Org. Chem.*, **1994**, *59*, 3838

SECTION 191: NITRILES FROM HYDRIDES

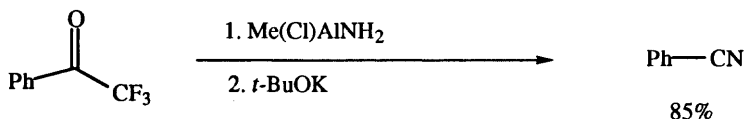
NO ADDITIONAL EXAMPLES

SECTION 192: NITRILES FROM KETONES



also works with aldehyde substrates

Santiago, B.; Meyers, A.I. *Tetrahedron Lett.*, **1993**, *34*, 5839



Kende, A.S.; Liu, K. *Tetrahedron Lett.*, **1995**, *36*, 4035

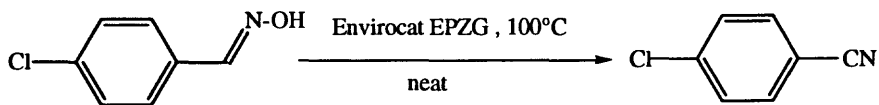
SECTION 193: NITRILES FROM NITRILES

Conjugate reductions and Michael alkylations of alkene nitriles are found in Section 74D (Alkyls from Alkenes).

NO ADDITIONAL EXAMPLES

SECTION 194: NITRILES FROM ALKENES

NO ADDITIONAL EXAMPLES

SECTION 195: NITRILES FROM MISCELLANEOUS COMPOUNDS

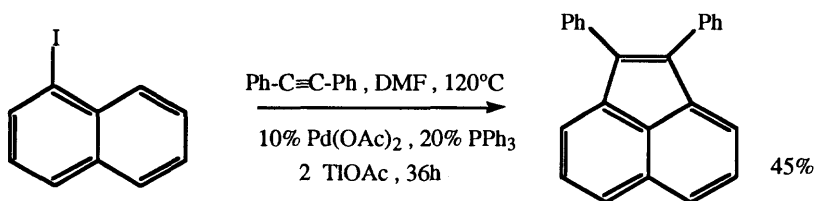
83%

Dandgar, B.P.; Jagtap, S.R.; Ghodeswar, S.B.; Wadgaonkar, P.P. *Synth. Commun.*, **1995**, 25, 2993

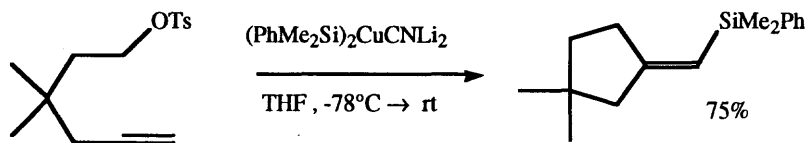
CHAPTER 14

PREPARATION OF ALKENES

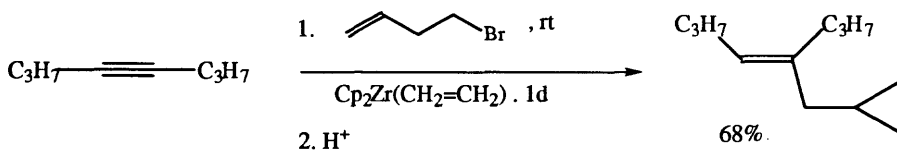
SECTION 196: ALKENES FROM ALKYNES



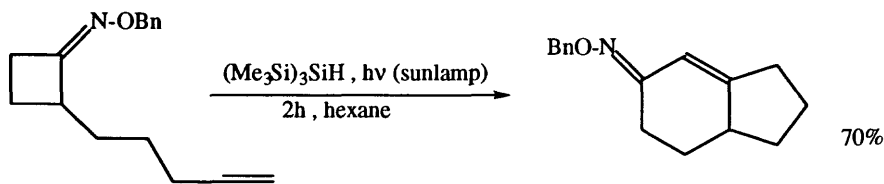
Grigg, R.; Kennewell, P.; Teasdale, A.; Sridharan, V. *Tetrahedron Lett.*, **1993**, 34, 153



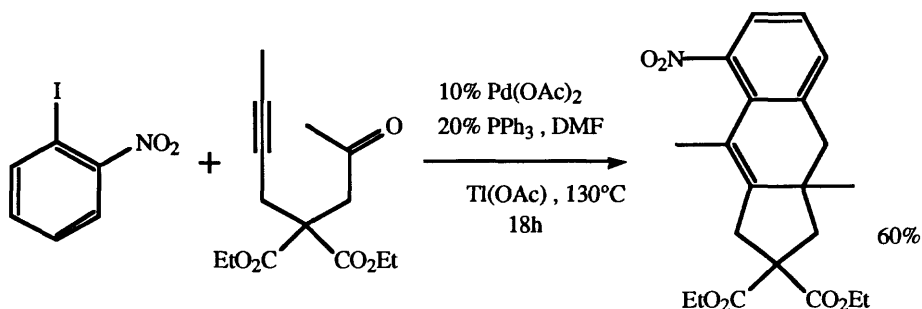
Fleming, I.; de Marigorta, E.M. *Tetrahedron Lett.*, **1993**, 34, 1201



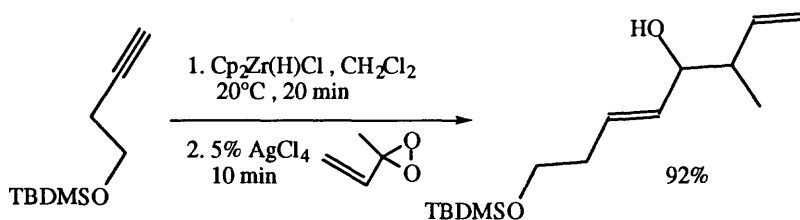
Takahashi, T.; Kondakov, D.Y.; Suzuki, N. *Tetrahedron Lett.*, **1993**, 34, 6571



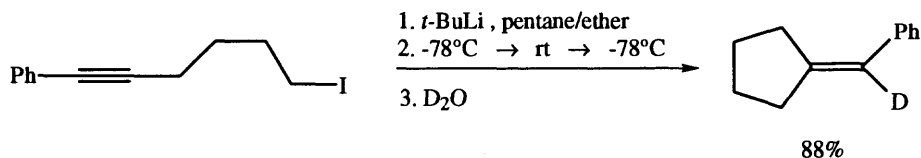
Pattenden, G.; Schulz, D.J. *Tetrahedron Lett.*, **1993**, 34, 6787



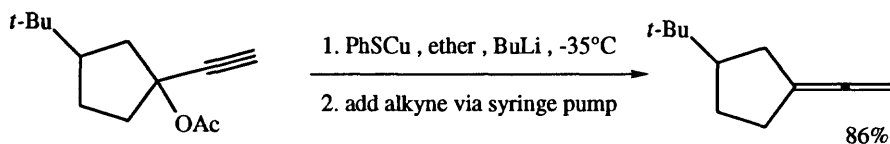
Brown, S.; Clarkson, S.; Grigg, R.; Sridharan, V. *Tetrahedron Lett.*, **1993**, *34*, 157



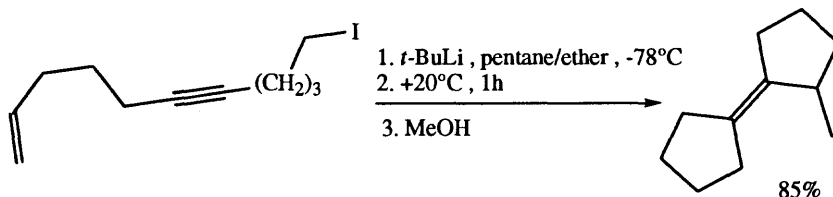
Wipf, P.; Xu, W. *J. Org. Chem.*, **1993**, *58*, 825



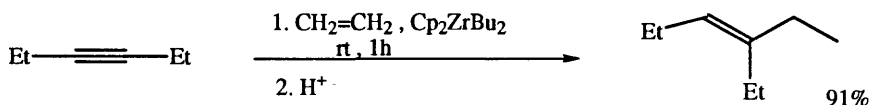
Bailey, W.E.; Ovaska, T.V. *J. Am. Chem. Soc.*, **1993**, *115*, 3080



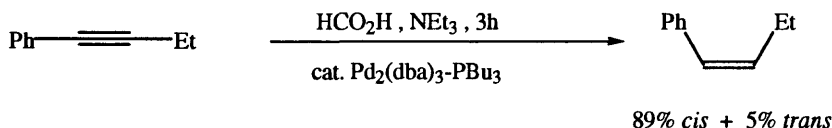
Nantz, M.H.; Bender, D.M.; Janaki, S. *Synthesis*, **1993**, 577



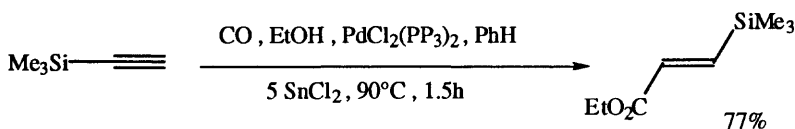
Bailey, W.E.; Ovaska, T.V. *Chem. Lett.*, **1993**, 819



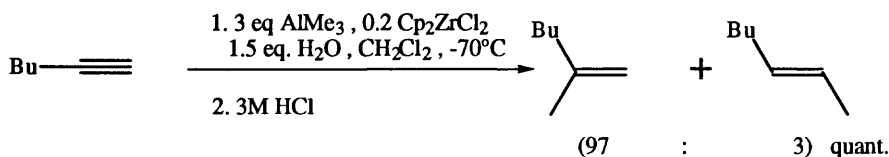
Takahashi, T.; Xi, Z.; Rousset, C.J.; Suzuki, N. *Chem. Lett.*, **1993**, 1001



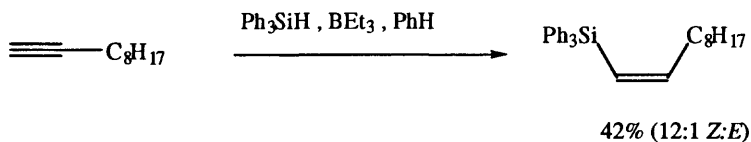
Tani, K.; Ono, N.; Okamoto, S.; Sato, F. *J. Chem. Soc. Chem. Commun.*, **1993**, 386



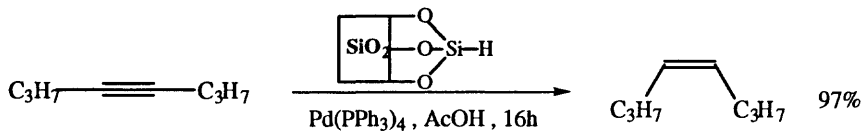
Takeuchi, R.; Sugiura, M. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1031



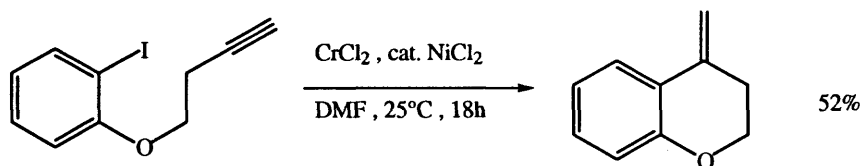
Wipf, P.; Lim, S. *Angew. Chem. Int. Ed. Engl.*, **1993**, 32, 1068



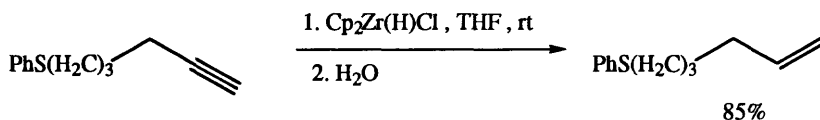
Miura, K.; Oshima, K.; Utimoto, K. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 2356



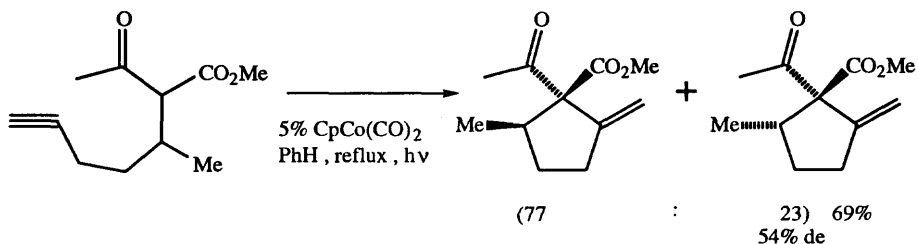
Kini, A.D.; Nadkarni, D.V.; Fry, J.L. *Tetrahedron Lett.*, **1994**, 35, 1507



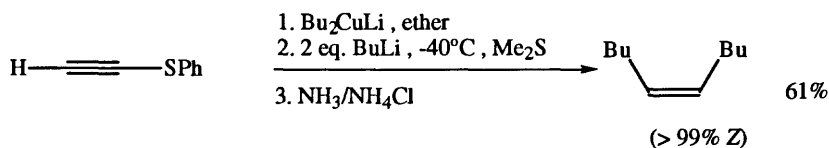
Hodgson, D.M.; Wells, C. *Tetrahedron Lett.*, **1994**, 35, 1601



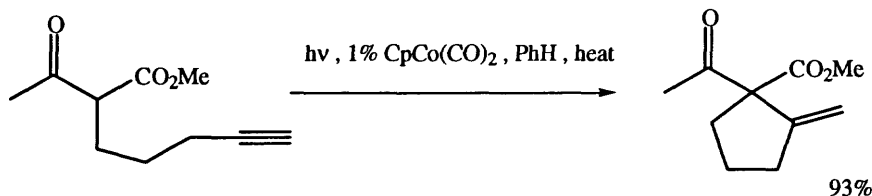
Lipshutz, B.H.; Lindsley, C.; Bhandari, A. *Tetrahedron Lett.*, 1994, 35, 4669



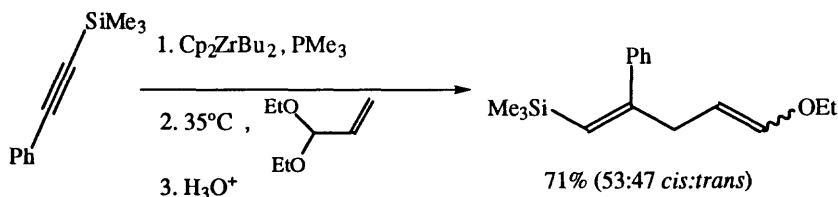
Cruciani, P.; Aubert, C.; Malacria, M. *Tetrahedron Lett.*, **1994**, *35*, 6677



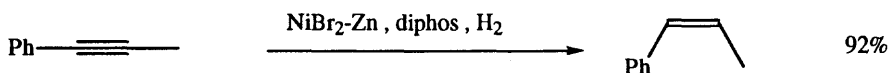
Creton, I.; Marek, I.; Brasseur, D.; Jestin, J.-L.; Normant, J.-F. *Tetrahedron Lett.*, **1994**, *35*, 6877



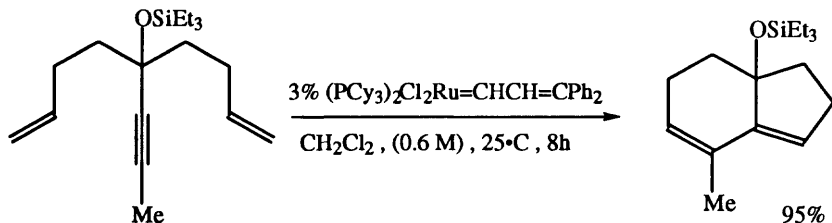
Stammler, R.; Malacria, M. Synlett, 1994, 92



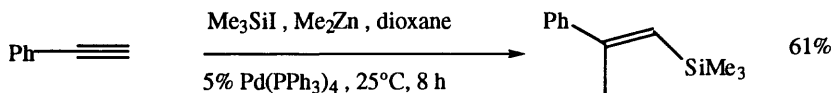
Takahashi, T.; Kondakov, D.Y.; Suzuki, N. *Chem. Lett.*, 1994, 259



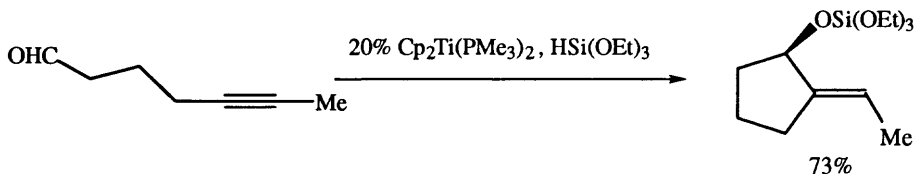
Sakai, M.; Takai, Y.; Mochizuki, H.; Sasaki, K.; Sakakibara, Y. *Bull. Chem. Soc. Jpn.*, **1994**, *67*, 1984



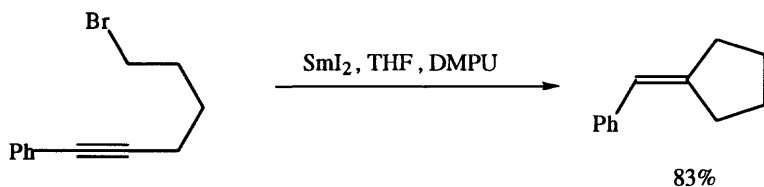
Kim, S.-H.; Bowden, N.; Grubbs, R.H. *J. Am. Chem. Soc.*, **1994**, *116*, 10801



Chatani, N.; Amishiro, N.; Morii, T.; Yamashita, T.; Murai, S. *J. Org. Chem.*, **1995**, *60*, 1834

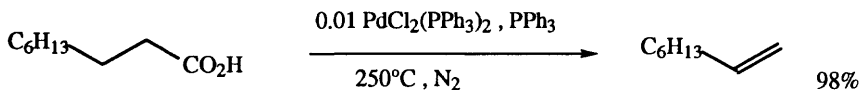


Crowe, W.E.; Rachita, M.J. *J. Am. Chem. Soc.*, **1995**, *117*, 6787

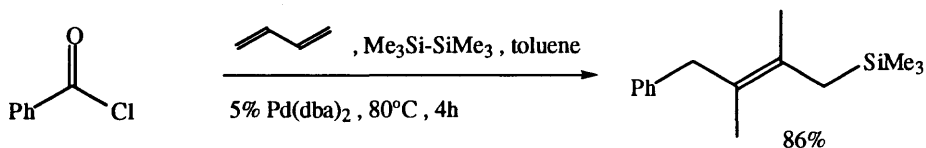


Zhou, Z.; Larouche, D.; Bennett, S.M. *Tetrahedron*, **1995**, *51*, 11623

SECTION 197: ALKENES FROM ACID DERIVATIVES

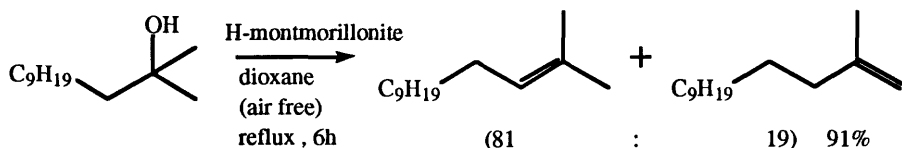


Miller, J.A.; Nelson, J.A.; Byrne, M.P. *J. Org. Chem.*, **1993**, *58*, 18

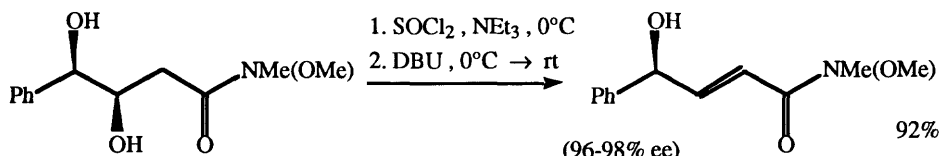


Obora, Y.; Tsuji, Y.; Kawamura, T. *J. Am. Chem. Soc.*, **1995**, *117*, 9814

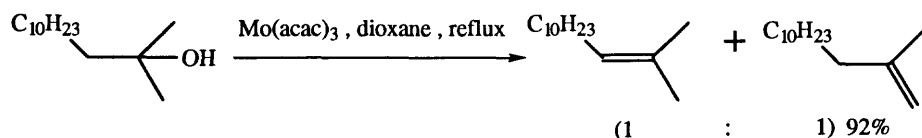
SECTION 198: ALKENES FROM ALCOHOLS AND THIOLS



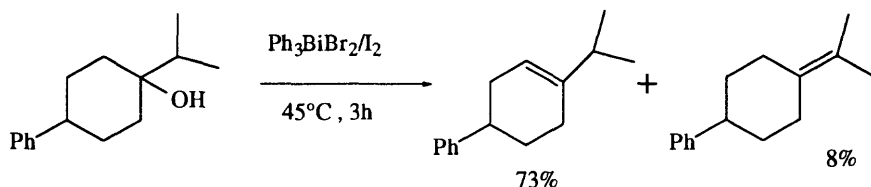
Kantam, M.L.; Santhi, P.L.; Siddiqui, M.F. *Tetrahedron Lett.*, **1993**, *34*, 1185



Bennani, Y.L.; Sharpless, K.B. *Tetrahedron Lett.*, **1993**, *34*, 2083

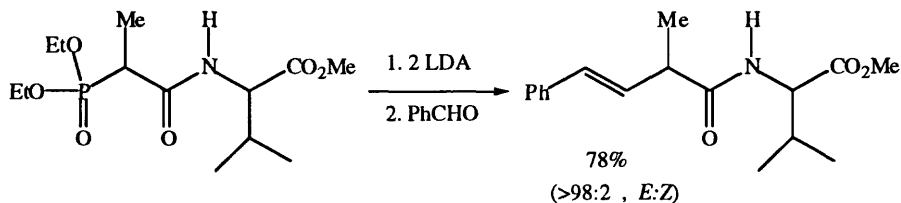


Kantam, M.L.; Prasad, A.D.; Santhi, P.L. *Synth. Commun.*, **1993**, *23*, 45

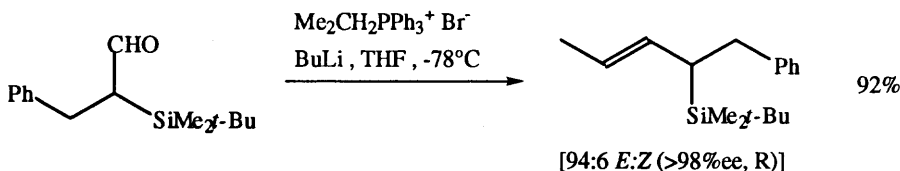


Dorta, R.L.; Suárez, E.; Betancor, C. *Tetrahedron Lett.*, **1994**, *35*, 5035

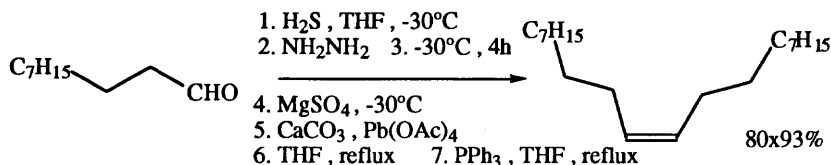
SECTION 199: ALKENES FROM ALDEHYDES



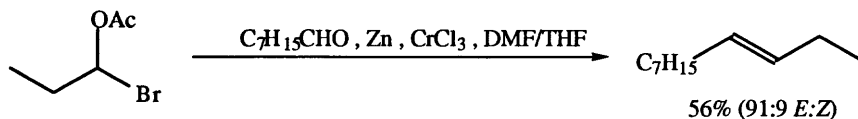
Coutrot, Ph.; Grison, C.; Gérardin-Charbonnier, C.; Lecouvery, M. *Tetrahedron Lett.*, **1993**, *34*, 2767



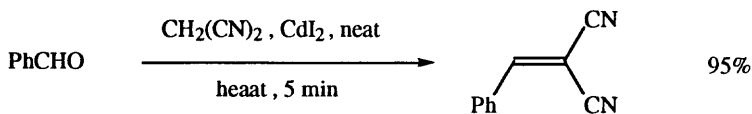
Bhushan, V.; Lohray, B.B.; Enders, D. *Tetrahedron Lett.*, **1993**, 34, 5067



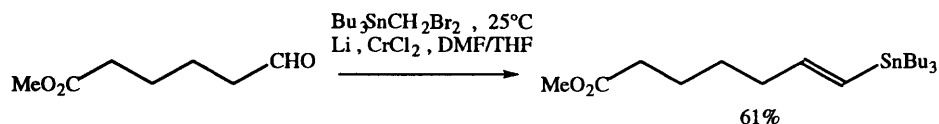
Collazo, L.R.; Guzic Jr., E.S. *J. Org. Chem.*, **1993**, 58, 43



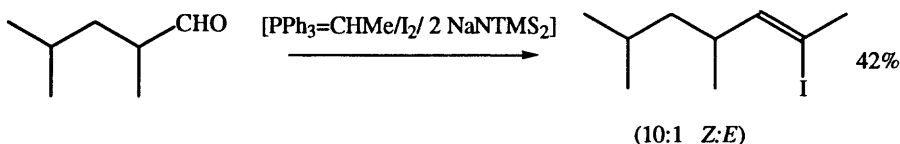
Knecht, M.; Boland, W. *Synlett*, **1993**, 837



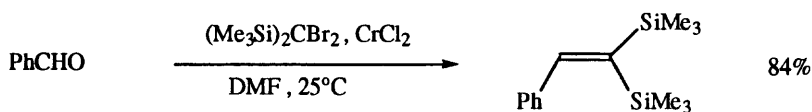
Prajapati, D.; Sandhu, J.S. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 739



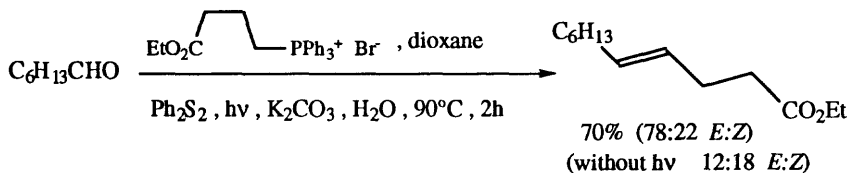
Hodgson, D.M.; Boulton, L.T.; Maw, G.N. *Tetrahedron Lett.*, **1994**, 35, 2231



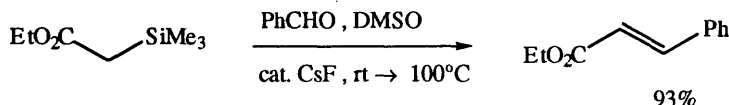
Chen, J.; Wang, T.; Zhao, K. *Tetrahedron Lett.*, **1994**, 35, 2827



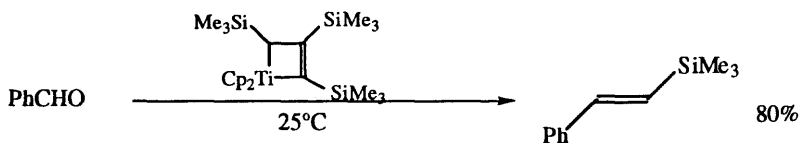
Hodgson, D.M.; Comina, P.J. *Tetrahedron Lett.*, **1994**, 35, 9469



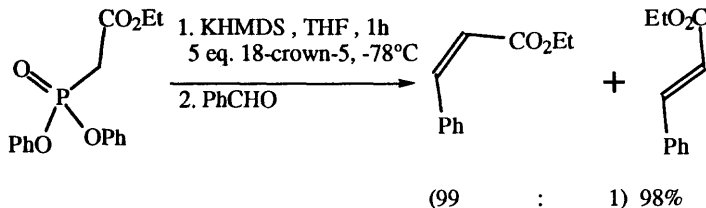
Matikainen, J.K.; Kaltia, S.; Hase, T. *Synlett*, 1994, 817



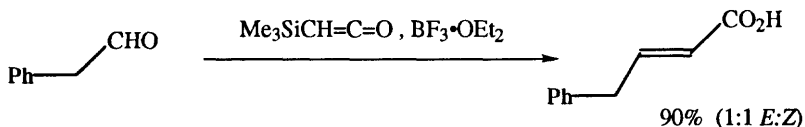
Bellassoued, M.; Ozanne, N. *J. Org. Chem.*, 1995, 60, 6582



Petasis, N.A.; Staszewski, J.P.; Fuk, D.-K. *Tetrahedron Lett.*, 1995, 36, 3619



Ando, K. *Tetrahedron Lett.*, 1995, 36, 4107

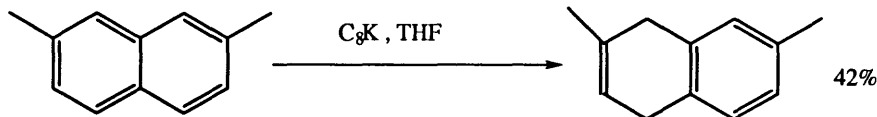


Black, T.H.; Zhang, Y.; Huang, J.; Smith, D.C.; Yates, B.E. *Synth. Commun.*, 1995, 25, 15

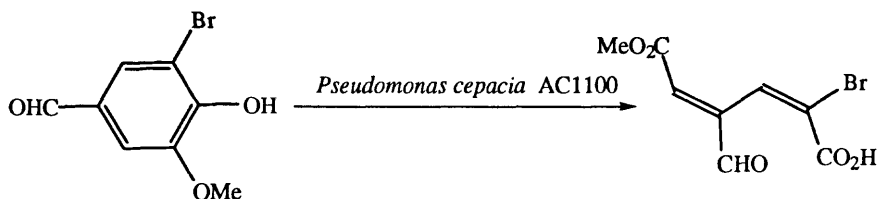
Related Methods: Section 207 (Alkenes from Ketones).

SECTION 200: ALKENES FROM ALKYLs, METHYLENES AND ARYLs

This section contains dehydrogenations to form alkenes and unsaturated ketones, esters and amides. It also includes the conversion of aromatic rings to alkenes. Reduction of aryls to dienes is found in Section 377 (Alkene-Alkene). Hydrogenation of aryls to alkanes and dehydrogenations to form aryls are included in Section 74 (Alkyls from Alkenes).



Weitz, I.S.; Rabinovitz, M. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 117



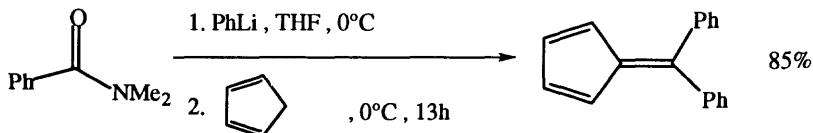
Artaud, I.; Tomasi, I.; Martin, G.; Petre, D.; Mansuy, D. *Tetrahedron Lett.*, **1995**, 36, 869

SECTION 201: ALKENES FROM AMIDES

Related Methods:

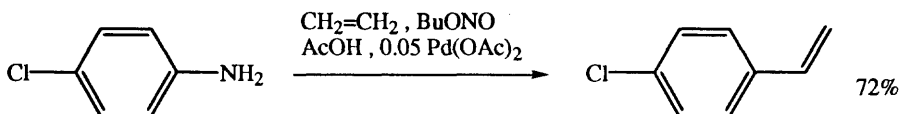
Section 65 (Alkyls from Alkyls).

Section 74 (Alkyls from Alkenes).



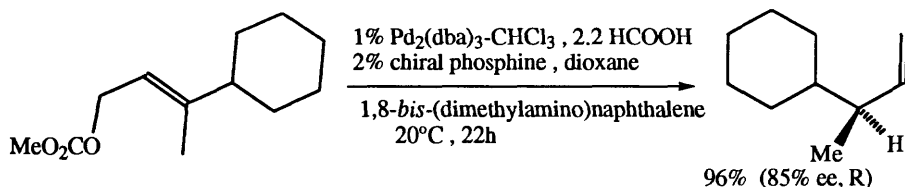
Jurata, H.; Ekinaka, T.; Kawase, T.; Oda, M. *Tetrahedron Lett.*, **1993**, 34, 3445

SECTION 202: ALKENES FROM AMINES



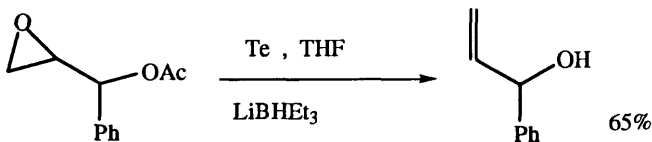
Beller, M.; Fischer, H.; Kühlein, K. *Tetrahedron Lett.*, **1994**, 35, 8773

SECTION 203: ALKENES FROM ESTERS

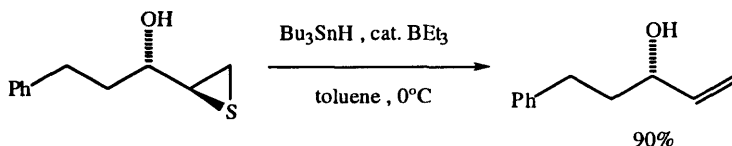


Hayashi, T.; Iwamura, H.; Naito, M.; Matsumoto, Y.; Uozumi, Y.; Miki, M.; Yanagi, K. *J. Am. Chem. Soc.*, **1994**, 116, 775

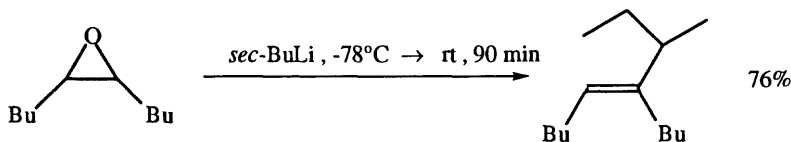
SECTION 204: ALKENES FROM ETHERS, EPOXIDES AND THIOETHERS



Dittmer, D.C.; Zhang, Y.; Discordia, R.P. *J. Org. Chem.*, **1994**, *59*, 1004

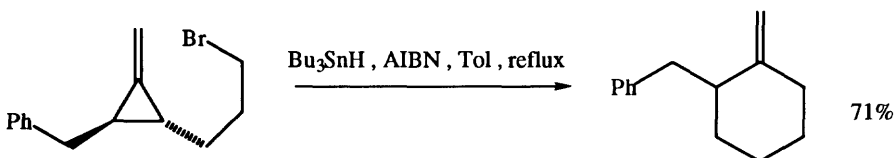


Uenishi, J.; Kubo, Y. *Tetrahedron Lett.*, **1994**, *35*, 6697

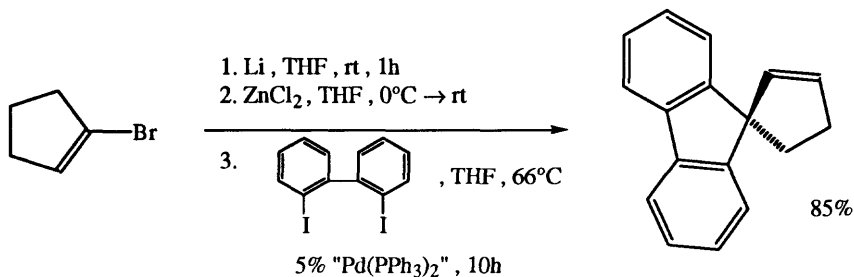


Doris, E.; Deschoux, L.; Mioskowski, C. *Tetrahedron Lett.*, **1994**, *35*, 7943

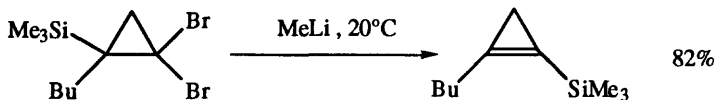
SECTION 205: ALKENES FROM HALIDES AND SULFONATES



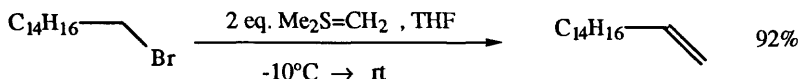
Destabel, C.; Kilburn, J.D.; Knight, J. *Tetrahedron Lett.*, **1993**, *34*, 3151



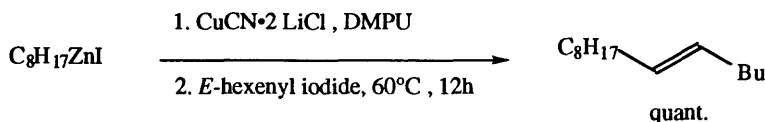
Katz, T.J.; Gilbert, A.M.; Huttenloch, M.E.; Min-Min, G.; Brintzinger, H.H. *Tetrahedron Lett.*, **1993**, *34*, 3551



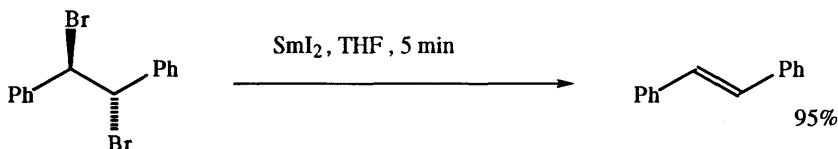
Baird, M.S.; Dale, C.M.; Al Dulayym, J.B. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1373



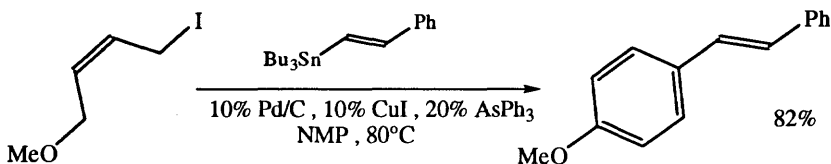
Alcaraz, L.; Harnett, J.J.; Mioskowski, C.; Martel, J.P.; Le Gall, T.; Shin, D.-S.; Falck, J.R. *Tetrahedron Lett.*, **1994**, 35, 5453



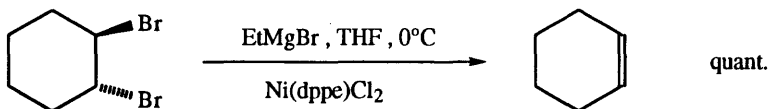
Marquais, S.; Cahiez, G.; Knochel, P. *Synlett*, **1994**, 849



Yanada, R.; Bessho, K.; Yanada, K. *Chem. Lett.*, **1994**, 1279



Roth, G.P.; Farina, V.; Liebeskind, L.S.; Peña-Cabrera, E. *Tetrahedron Lett.*, **1995**, 36, 2191



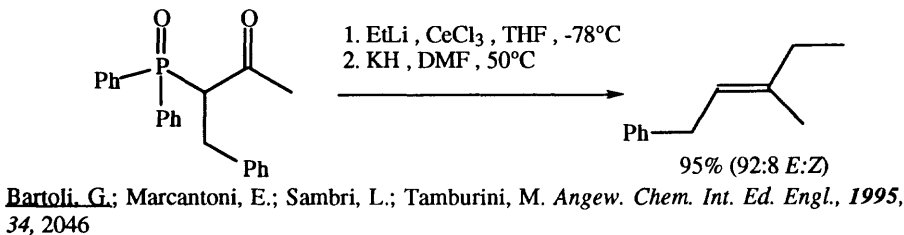
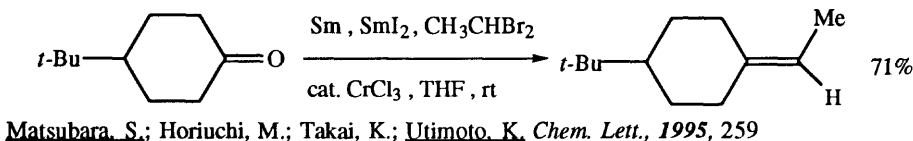
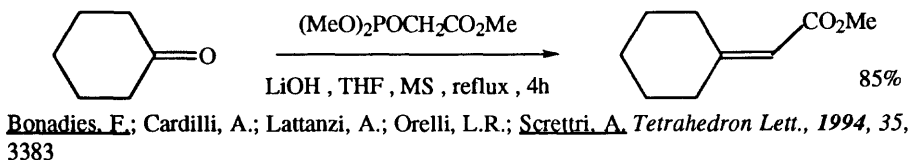
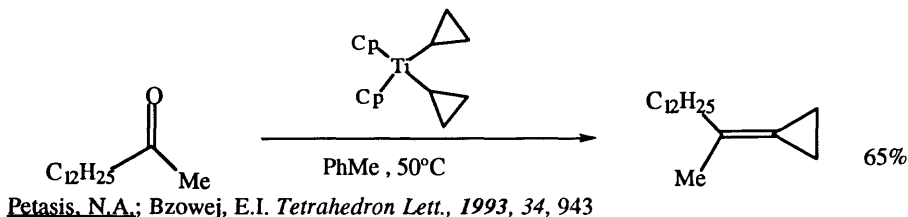
Malanga, C.; Aronica, L.A.; Lardicci, L. *Tetrahedron Lett.*, **1995**, 36, 9189

SECTION 206: ALKENES FROM HYDRIDES

For conversions of methylenes to alkenes ($\text{RCH}_2\text{R}' \rightarrow \text{RR}'\text{C}=\text{CH}_2$), see Section 200 (Alkenes from Alkyls).

NO ADDITIONAL EXAMPLES

SECTION 207: ALKENES FROM KETONES

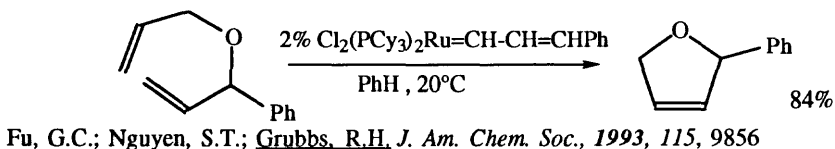


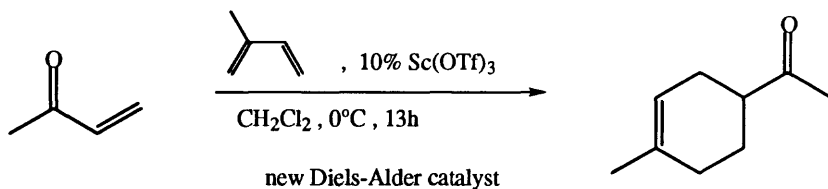
Related Methods: Section 199 (Alkenes from Aldehydes).

SECTION 208: ALKENES FROM NITRILES

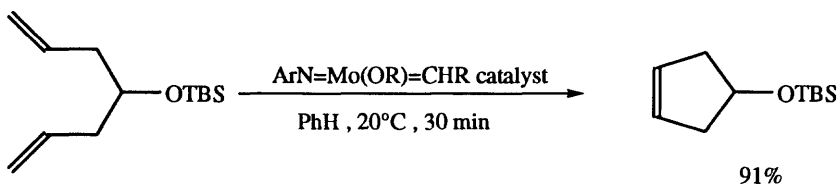
NO ADDITIONAL EXAMPLES

SECTION 209: ALKENES FROM ALKENES

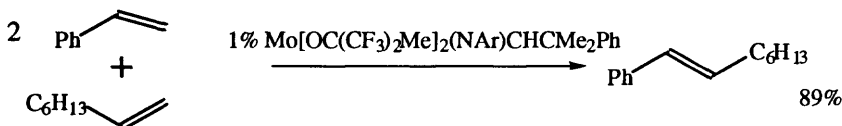




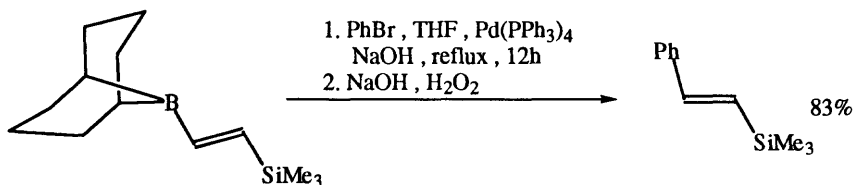
Kobayashi, S.; Hachiya, I.; Araki, M.; Ishitani, H. *Tetrahedron Lett.*, **1993**, 34, 3755



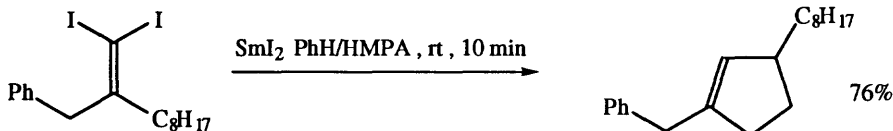
Fu, G.C.; Grubbs, R.H. *J. Am. Chem. Soc.*, **1993**, 115, 3800



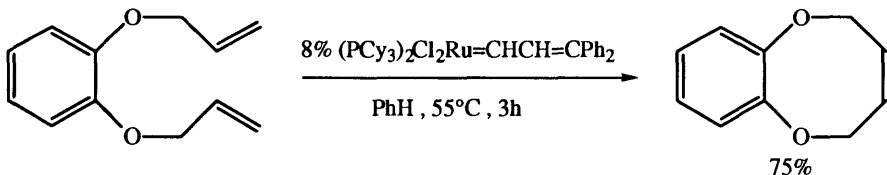
Crowe, W.E.; Zhang, Z.J. *J. Am. Chem. Soc.*, **1993**, 115, 10998



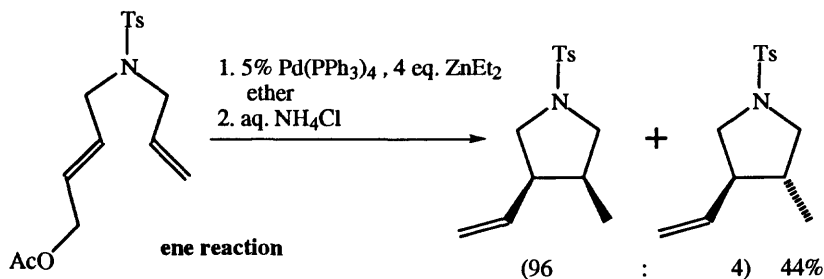
Soderquist, J.A.; Colbert, J.C. *Tetrahedron Lett.*, **1994**, 35, 27



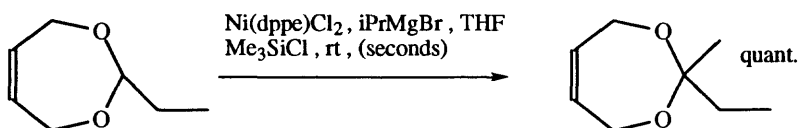
Kunishima, M.; Hioki, K.; Tani, S.; Kato, A. *Tetrahedron Lett.*, **1994**, 35, 7253



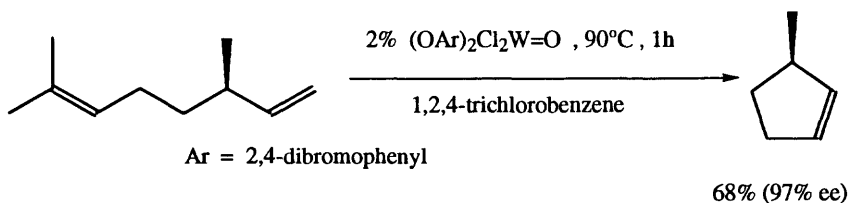
Miller, S.J.; Kim, S.-H.; Chen, Z.-R.; Grubbs, R.H. *J. Am. Chem. Soc.*, **1995**, 117, 2108



Oppolzer, W.; Schröder, F. *Tetrahedron Lett.*, **1994**, 35, 7935



Malanga, C.; Urso, A.; Lardicci, L. *Tetrahedron Lett.*, **1995**, 36, 1133

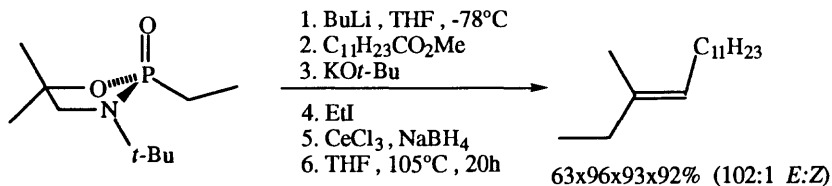


Nugent, W.A.; Feldman, J.; Calabrese, J.C. *J. Am. Chem. Soc.*, **1995**, 117, 8992

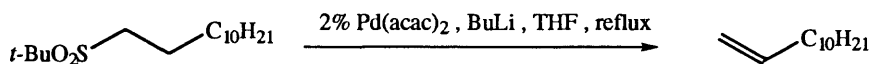
REVIEW:

"Reagent-Controlled Asymmetric Diels-Alder Reactions," Oh, T.; Reilly, M. *Org. Prep. Proceed. Int.*, **1994**, 26, 129

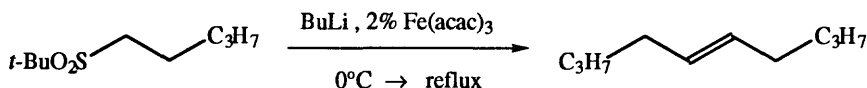
SECTION 210: ALKENES FROM MISCELLANEOUS COMPOUNDS



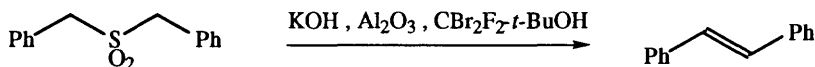
Denmark, S.E.; Amburgey, J. *J. Am. Chem. Soc.*, **1993**, 115, 10386



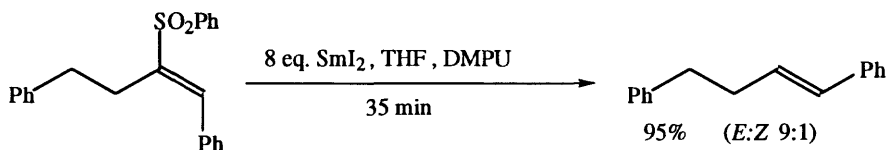
70%

Gai, Y.; Jin, L.; Julia, M.; Verpeaux, J.-N. *J. Chem. Soc. Chem. Commun.*, **1993**, 1625

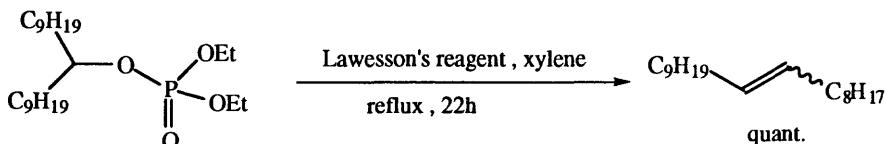
79% (76:24 E:Z)

Jin, L.; Julia, M.; Verpeaux, J.N. *Synlett*, **1994**, 215

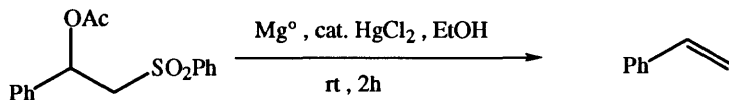
96%

Chan, T.-L.; Fong, S.F.; Li, Y.; Man, T.-O.; Poon, C.-D. *J. Chem. Soc. Chem. Commun.*, **1994**, 1771

95% (E:Z 9:1)

Keck, G.E.; Savin, K.A.; Weglarz, M.A. *J. Org. Chem.*, **1995**, 60, 3194

quant.

Shimagaki, M.; Fujieda, Y.; Kimura, T.; Makata, T. *Tetrahedron Lett.*, **1995**, 36, 719

98%

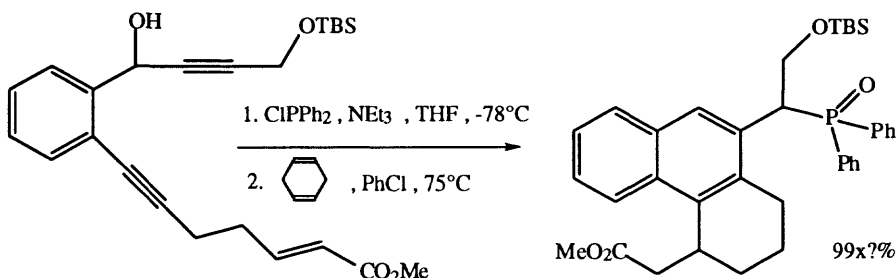
Lee, G.H.; Lee, H.K.; Choi, E.B.; Kim, B.T.; Pak, C.S. *Tetrahedron Lett.*, **1995**, 36, 5607**REVIEW:**"Rare Earth Metal Trifluoromethanesulfonates as Water-Tolerated Lewis Acid Catalysts in Organic Synthesis," Kobayashi, S. *Synlett*, **1994**, 679

CHAPTER 15

PREPARATION OF OXIDES

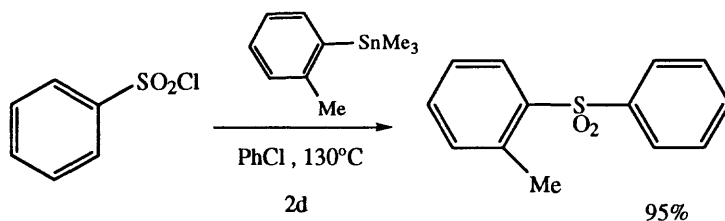
This chapter contains reactions which prepare the oxides of nitrogen, sulfur and selenium. Included are *N*-oxides, nitroso and nitro compounds, nitrile oxides, sulfoxides, selenoxides and sulfones. Oximes are considered to be amines and appear in those sections. Preparation of sulfonic acid derivatives are found in Chapter Two and the preparation of sulfonates in Chapter Ten.

SECTION 211: OXIDES FROM ALKYNES



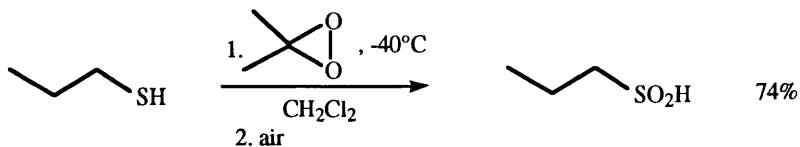
Grissom, J.W.; Slattery, B.J. *Tetrahedron Lett.*, **1994**, 35, 5137

SECTION 212: OXIDES FROM ACID DERIVATIVES



Neumann, W.P.; Wicmec, C. *Chem. Ber.*, **1993**, 126, 763

SECTION 213: OXIDES FROM ALCOHOLS AND THIOLS



Gu, D.; Harpp, D.N. *Tetrahedron Lett.*, **1993**, 34, 67

SECTION 214: OXIDES FROM ALDEHYDES

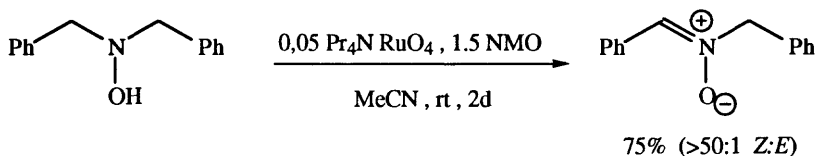
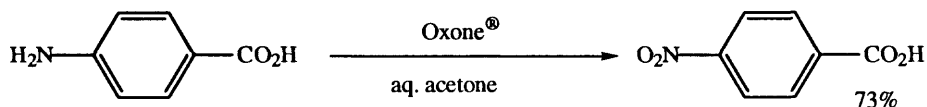
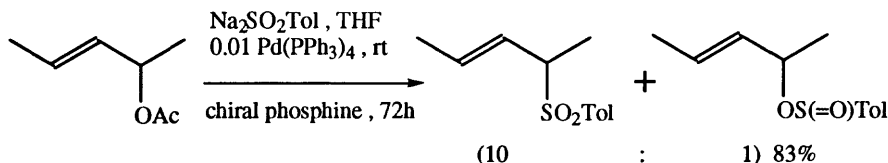
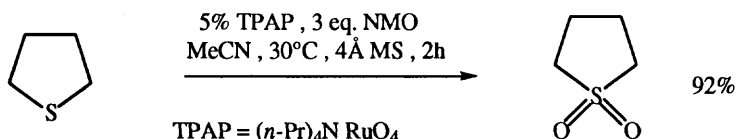
NO ADDITIONAL EXAMPLES

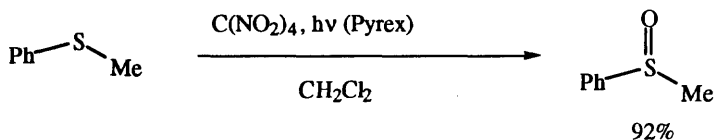
SECTION 215: OXIDES FROM ALKYL, METHYLENES AND ARYLS

NO ADDITIONAL EXAMPLES

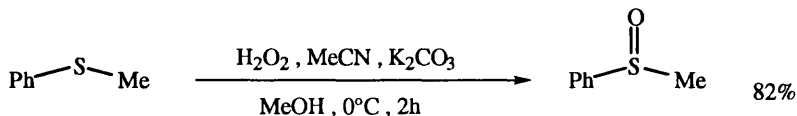
SECTION 216: OXIDES FROM AMIDES

NO ADDITIONAL EXAMPLES

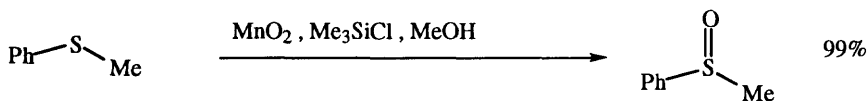
SECTION 217: OXIDES FROM AMINESGoti, A.; De Sarlo, F.; Romani, M. *Tetrahedron Lett.*, 1994, 35, 6571Webb, K.S.; Seneviratne, V. *Tetrahedron Lett.*, 1995, 36, 2377**SECTION 218: OXIDES FROM ESTERS**Eichelmann, H.; Gais, H.-J. *Tetrahedron Asymmetry*, 1995, 6, 643**SECTION 219: OXIDES FROM ETHERS, EPOXIDES AND THIOETHERS**Guertin, K.R.; Kende, A.S. *Tetrahedron Lett.*, 1993, 34, 5369



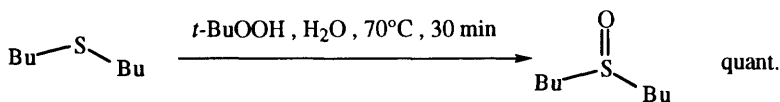
Ramkumar, D.; Sankararaman, S. *Synthesis*, **1993**, 1057



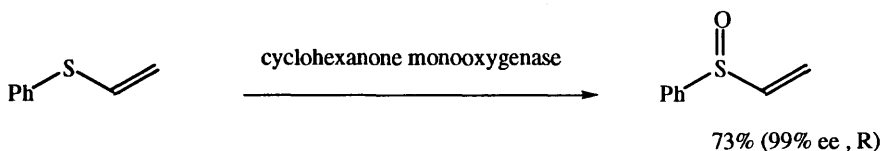
Page, P.C.B.; Graham, A.E.; Bethell, D.; Park, B.K. *Synth. Commun.*, **1993**, 23, 1507



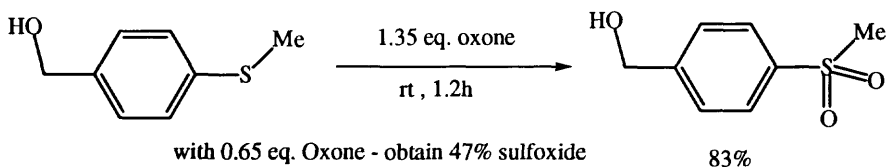
Bellesia, F.; Ghelfi, E.; Pagnoni, U.M.; Pinetti, A. *Synth. Commun.*, **1993**, 23, 1759



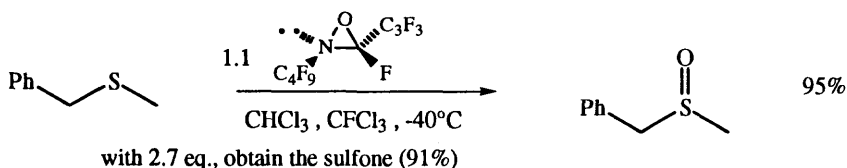
Fringelli, F.; Pellegrino, R.; Pizzo, F. *Synth. Commun.*, **1993**, 23, 3157



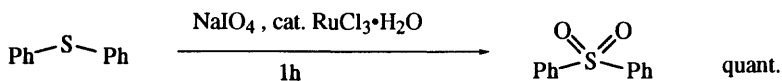
Secundo, F.; Carrea, G.; Dallavalle, S.; Franzosi, G. *Tetrahedron Asymmetry*, **1993**, 4, 1981



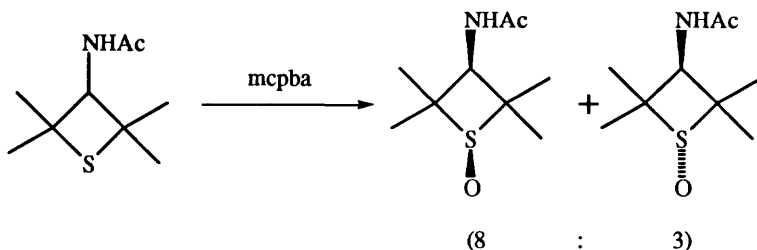
Webb, K.S. *Tetrahedron Lett.*, **1994**, 35, 3457



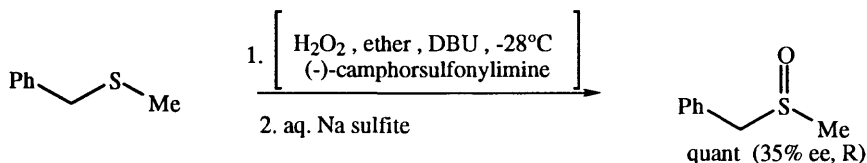
DesMarceau, D.D.; Petrov, V.A.; Montanari, V.; Pregnotato, M.; Resnati, G. *J. Org. Chem.*, **1994**, 59, 2762



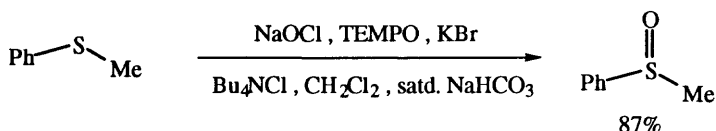
Su, W. *Tetrahedron Lett.*, **1994**, 35, 4955



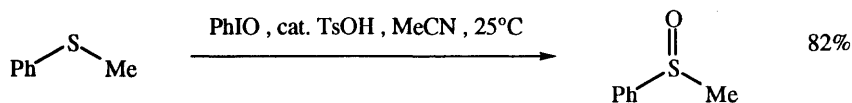
Glass, R.S.; Singh, W.P.; Hay, B.A. *Tetrahedron Lett.*, **1994**, 35, 5809



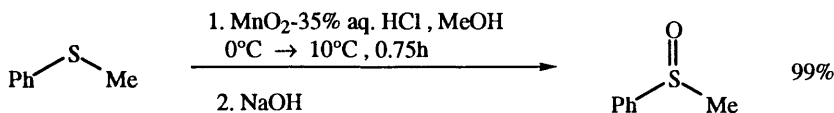
Page, P.C.B.; Heer, J.P.; Bethell, D.; Collington, E.W.; Andrews, D.M. *Tetrahedron Lett.*, **1994**, 35, 9629



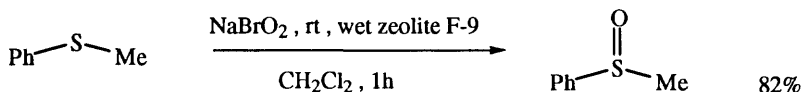
Siedlecka, R.; Skarzewski, J. *Synthesis*, **1994**, 401



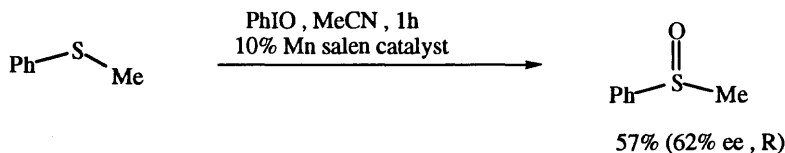
Cavicchioni, G. *Synth. Commun.*, **1994**, 24, 2223



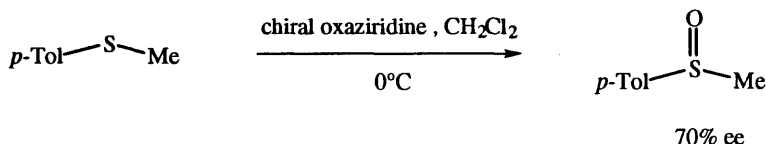
Fabretti, A.; Ghelfi, F.; Grandi, R.; Pagnoni, U.M. *Synth. Commun.*, **1994**, 24, 2393



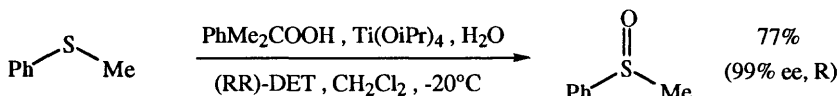
Hirano, M.; Kudo, H.; Morimoto, T. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 1492



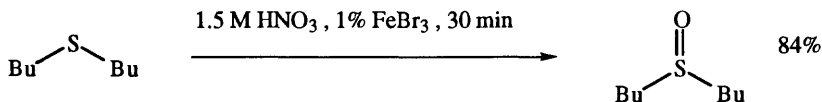
Noda, K.; Hosoya, N.; Irie, R.; Yamashita, Y.; Katsuki, T. *Tetrahedron*, **1994**, *50*, 9609



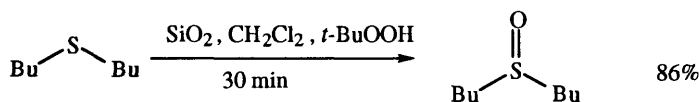
Jennings, W.B.; Kochanewyczm, M.J.; Lovely, C.J.; Boyd, D.R. *J. Chem. Soc. Chem. Commun.*, **1994**, 2569



Brunel, J.-M.; Diter, P.; Duetsch, M.; Kagan, H.B. *J. Org. Chem.*, **1995**, *60*, 8086

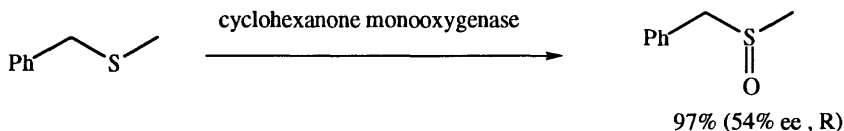


Suárez, A.R.; Rossi, L.I.; Martín, S.E. *Tetrahedron Lett.*, **1995**, *36*, 1201

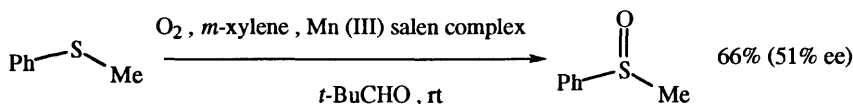


with 2 eq. *t*-BuOOH, obtain 83% of sulfone

Breton, G.W.; Fields, J.D.; Kropp, P.J. *Tetrahedron Lett.*, **1995**, *36*, 3825

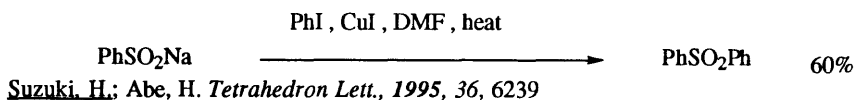


Pasta, P.; Carrea, G.; Holland, H.L.; Dallavalle, S. *Tetrahedron Asymmetry*, **1995**, *6*, 933

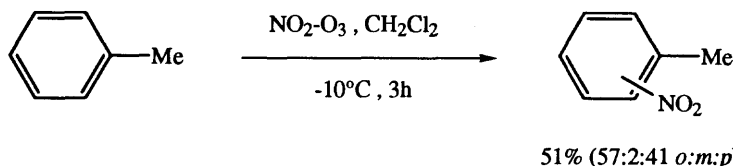


Nagata, T.; Imagawa, K.; Yamada, T.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.*, **1995**, *68*, 3241

SECTION 220: OXIDES FROM HALIDES AND SULFONATES



SECTION 221: OXIDES FROM HYDRIDES



Suzuki, H.; Murashima, T.; Kozai, I.; Mori, T. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1591

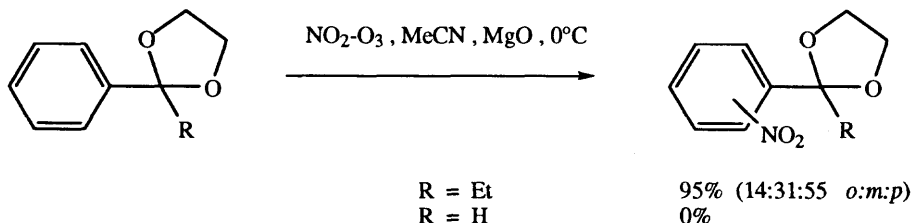
Suzuki, H.; Mori, T. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 291

From aryl esters: meta-nitro is the major product

Suzuki, H.; Tomaru, J.-i.; Murashima, T. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 2413

From aryl acetates: ortho:para predominates (60:40)

Suzuki, H.; Tatsumi, A.; Ishibashi, T.; Mori, T. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 339

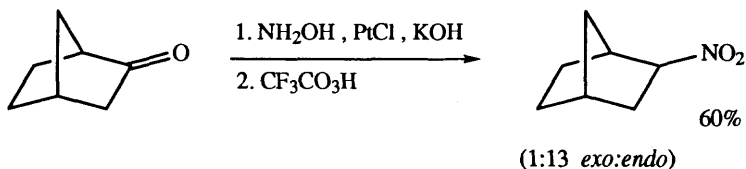


Suzuki, H.; Yonezawa, S.; Mori, T. *Bull. Chem. Soc. Jpn.*, **1995**, 68, 1535

REVIEW:

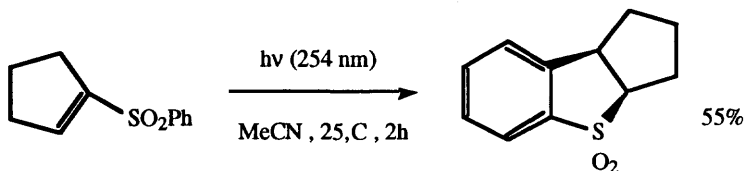
"Ozone-Mediated Nitration of Aromatic Compounds with Lower Oxides of Nitrogen," Mori, T.; Suzuki, H. *Synlett*, **1995**, 383

SECTION 222: OXIDES FROM KETONES



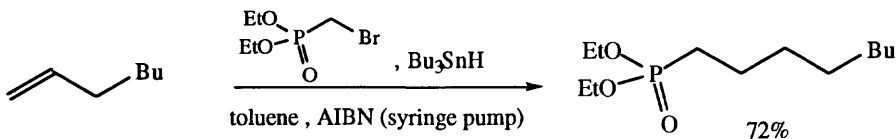
Olah, G.A.; Ramaiah, P.; Prakash, C.K.S. *J. Org. Chem.*, **1993**, 58, 763

SECTION 223: OXIDES FROM NITRILES



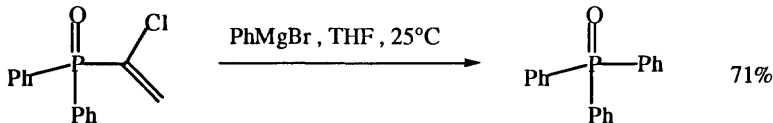
Li, C.; Fuchs, P.L. *Tetrahedron Lett.*, **1993**, *34*, 1855

SECTION 224: OXIDES FROM ALKENES

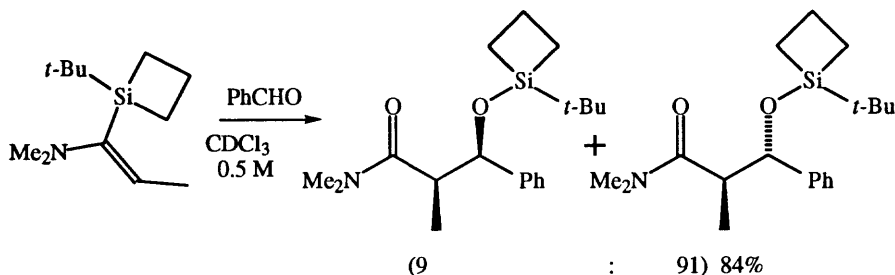


Balczewski, P.; Mikołajczyk, M. *Synthesis*, **1995**, 392

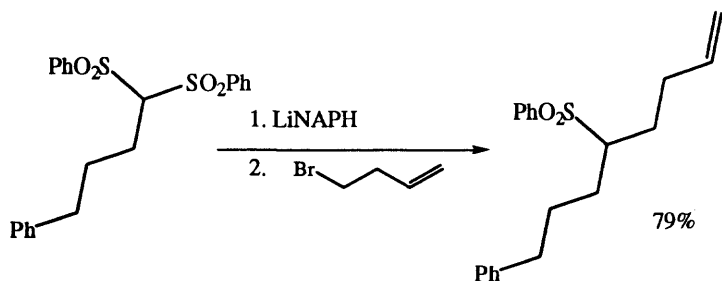
SECTION 225: OXIDES FROM MISCELLANEOUS COMPOUNDS



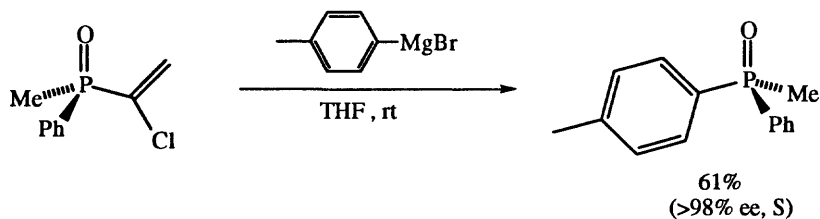
Cardellicchio, C.; Fiandanese, V.; Naso, F.; Pietrusiewicz, K.M.; Wiśniewski, W. *Tetrahedron Lett.*, **1993**, *34*, 3135



Denmark, S.E.; Griedel, B.D.; Coe, D.M. *J. Org. Chem.*, **1993**, *58*, 988



Yu, J.; Cho, H.-S.; Chandrasekhar, S.; Falck, J.R.; Mioskowski, C. *Tetrahedron Lett.*, **1994**, 35, 5437

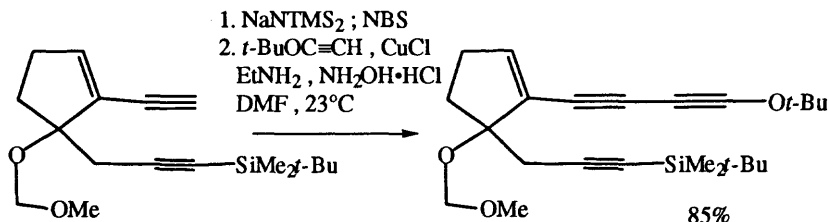


Cardellicchio, C.; Fiandanese, V.; Naso, E.; Pacifico, S.; Koprowski, M.; Pietrusiewicz, K.M. *Tetrahedron Lett.*, **1994**, 35, 6343

CHAPTER 16

PREPARATION OF DIFUNCTIONAL COMPOUNDS

SECTION 300: ALKYNE - ALKYNE

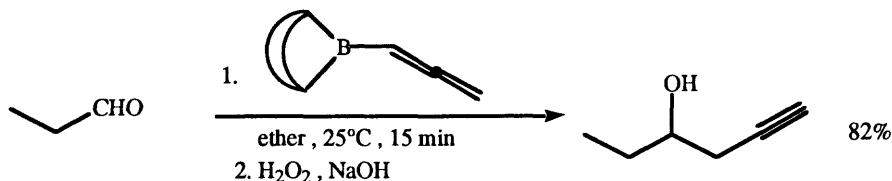


Magriotis, P.A.; Vourloumis, D.; Scott, M.E.; Tarli, A. *Tetrahedron Lett.*, **1993**, 34, 2071

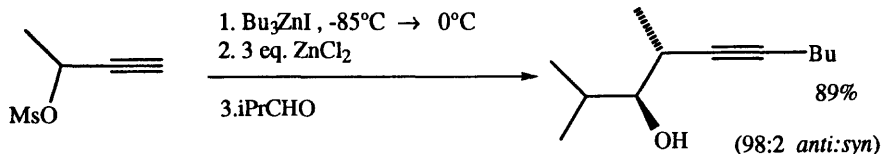
SECTION 301: ALKYNE - ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

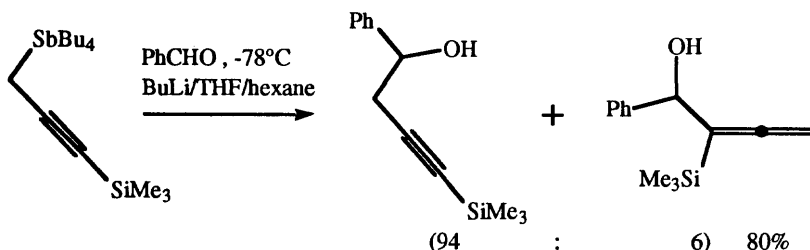
SECTION 302: ALKYNE - ALCOHOL, THIOL



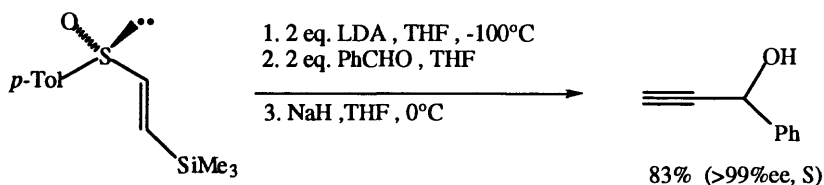
Brown, H.C.; Khire, U.R.; Racherla, U.S. *Tetrahedron Lett.*, **1993**, 34, 15



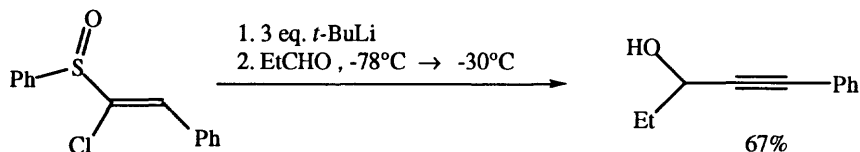
Katsuhira, T.; Harada, T.; Maejima, K.; Osada, A.; Oku, A. *J. Org. Chem.*, **1993**, 58, 6166



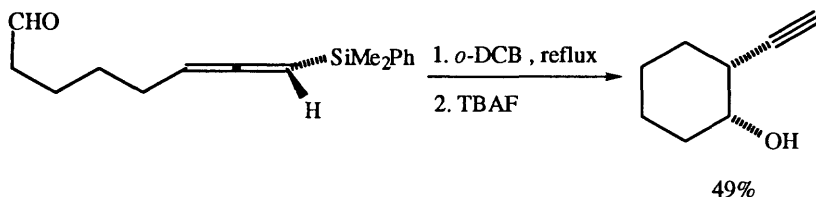
Zhang, L.-T.; Mo, X.-S.; Huang, J.-L.; Huang, Y.-Z. *Tetrahedron Lett.*, **1993**, 34, 1621



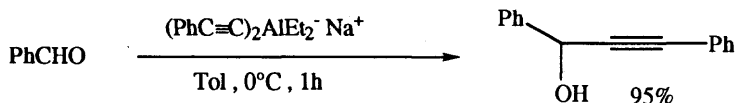
Kusuda, S.; Kawamura, K.; Ueno, Y.; Toru, T. *Tetrahedron Lett.*, **1993**, 34, 6587



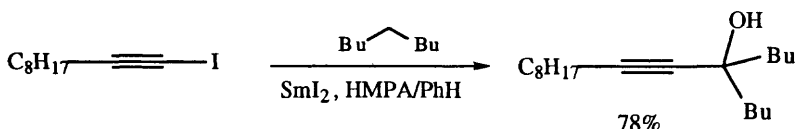
Satoh, T.; Hayashi, Y.; Yamakawa, K. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 1866



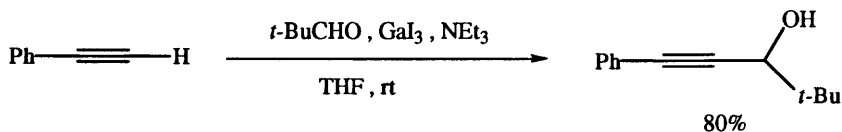
Jin, J.; Smith, D.T.; Weinreb, S.M. *J. Org. Chem.*, **1995**, 60, 5366



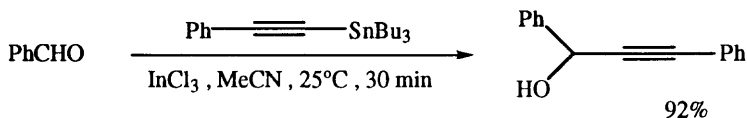
Ahn, J.H.; Joung, M.J.; Yoon, N.M. *J. Org. Chem.*, **1995**, 60, 6173



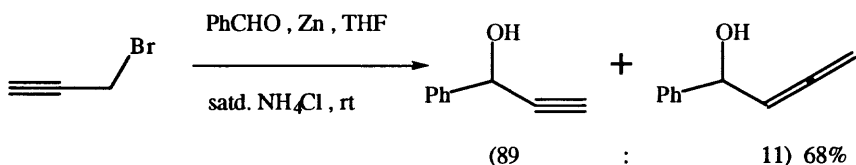
Kunishima, M.; Tanaka, S.; Kono, K.; Hioki, K.; Tani, S. *Tetrahedron Lett.*, **1995**, 36, 3707



Han, Y.; Huanag, Y.-Z. *Tetrahedron Lett.*, **1995**, 36, 7277

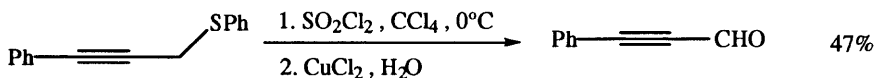


Yasuda, M.; Miyai, T.; Shibata, I.; Baba, A.; Nomura, R.; Matsuda, H. *Tetrahedron Lett.*, **1995**, 36, 9497



Yavari, J.; Riazi-Kermani, F. *Synth. Commun.*, **1995**, 25, 2923

SECTION 303: ALKYNE - ALDEHYDE

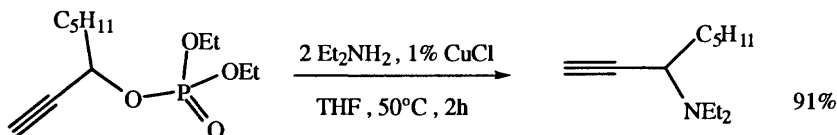


Fortes, C.C.; Garrote, C.F.D. *Synth. Commun.*, **1993**, 23, 2869

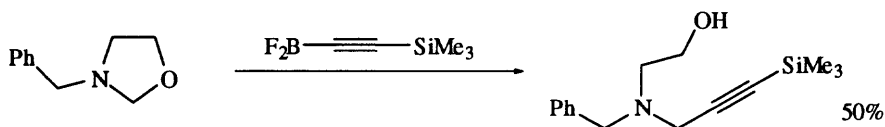
SECTION 304: ALKYNE - AMIDE

NO ADDITIONAL EXAMPLES

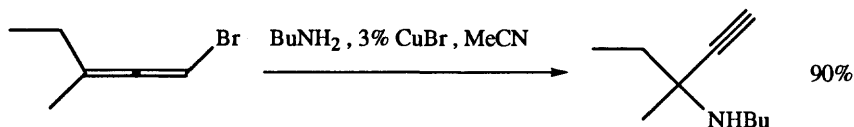
SECTION 305: ALKYNE - AMINE



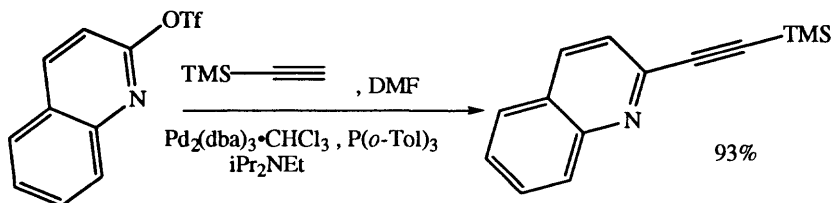
Imada, Y.; Yuasa, M.; Nakamura, I.; Murahashi, S.-I. *J. Org. Chem.*, **1994**, 59, 2282



Wu, M.-J.; Yan, D.-S.; Tsai, H.-W.; Chen, S.-H. *Tetrahedron Lett.*, **1994**, 35, 5003



Geri, R.; Polizzi, C.; Lardicci, L.; Caporusso, A.M. *Gazz. Chim. Ital.*, **1994**, *124*, 241

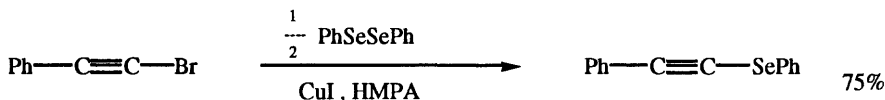


Okita, T.; Isobe, M. *Tetrahedron*, **1995**, *51*, 3737

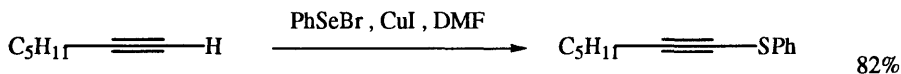
SECTION 306: ALKYNE - ESTER

NO ADDITIONAL EXAMPLES

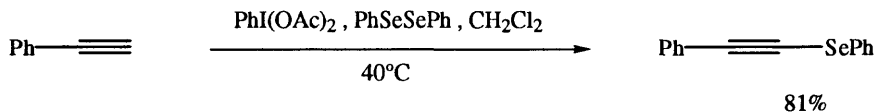
SECTION 307: ALKYNE - ETHER, EPOXIDE, THIOETHER



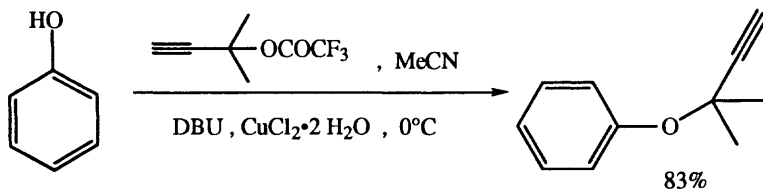
Braga, A.L.; Reckziegel, A.; Menezes, P.H.; Stefani, H.A. *Tetrahedron Lett.*, **1993**, *34*, 393



Braga, A.L.; Silveira, C.C.; Reckziegel, A.; Menezes, P.H. *Tetrahedron Lett.*, **1993**, *34*, 8041

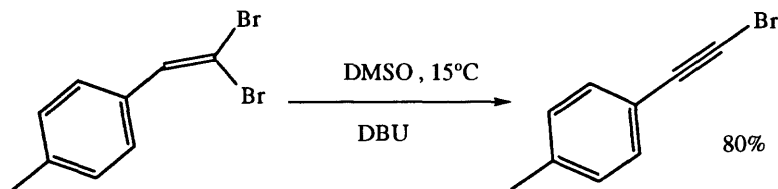


Tingoli, M.; Tiecco, M.; Testaferri, L.; Balducci, R. *Synlett*, **1993**, 211

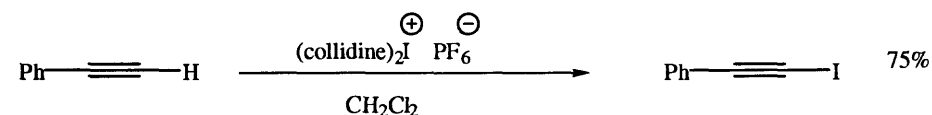


Godfrey Jr., J.D.; Mueller, R.H.; Sedergran, T.C.; Soundararajan, N.; Colandrea, V.J. *Tetrahedron Lett.*, **1994**, *35*, 6405

SECTION 308: ALKYNE - HALIDE

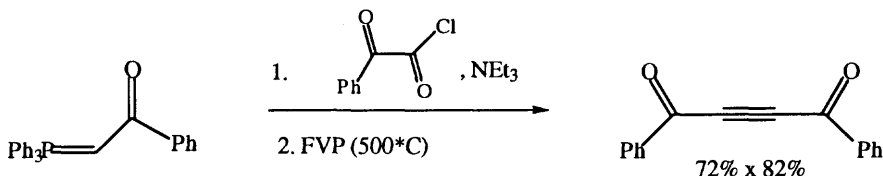


Ratovelomanana, V.; Rollin, Y.; G  b  henne, C.; Gosmini, C.; P  richon, J. *Tetrahedron Lett.*, **1994**, *35*, 4777



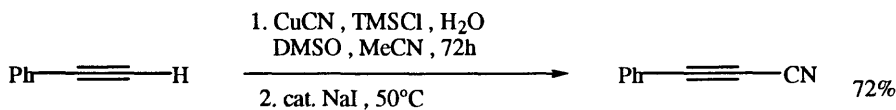
Brunel, Y.; Rousseau, G. *Tetrahedron Lett.*, **1995**, *36*, 2619

SECTION 309: ALKYNE - KETONE



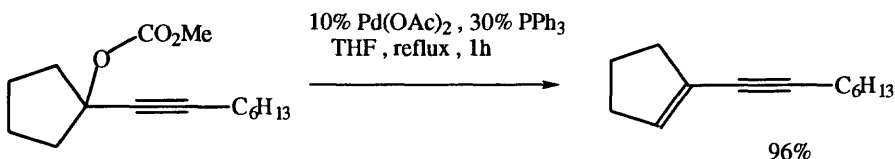
Aitken, R.A.; H  rion, H.; Janosi, A.; Raut, S.V.; Seth, S.; Shannon, I.J.; Smith, F.C. *Tetrahedron Lett.*, **1993**, *34*, 5621

SECTION 310: ALKYNE - NITRILE

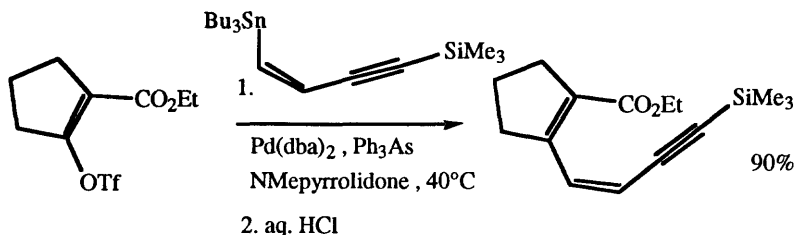


Luo, F.-T.; Wang, R.-T. *Tetrahedron Lett.*, **1993**, *34*, 5911

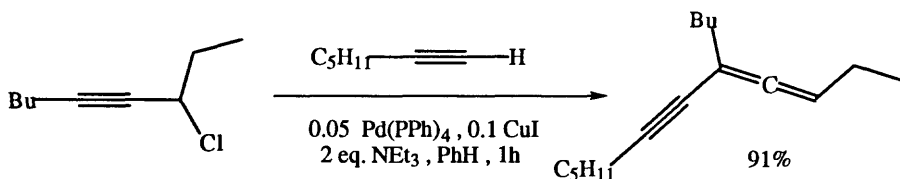
SECTION 311: ALKYNE - ALKENE



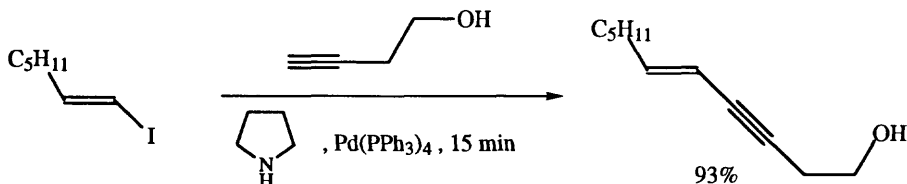
Mandai, T.; Tsujiguchi, Y.; Matsuoka, S. *Tetrahedron Lett.*, **1993**, *34*, 7615



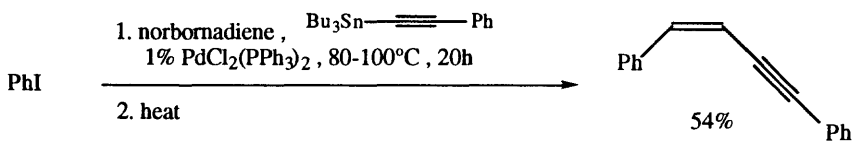
Lipshutz, B.H.; Alami, M. *Tetrahedron Lett.*, **1993**, *34*, 1433



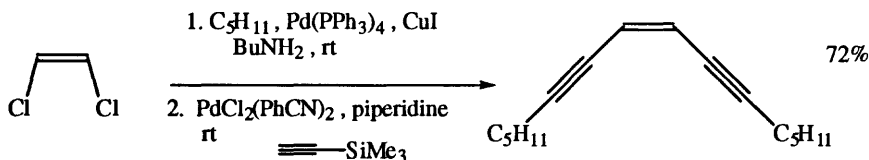
Gueugnot, S.; Linstrumelle, G. *Tetrahedron Lett.*, **1993**, *34*, 3853



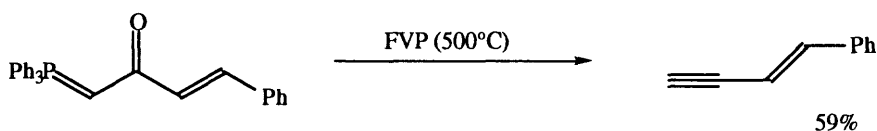
Alami, M.; Ferri, F.; Linstrumelle, G. *Tetrahedron Lett.*, **1993**, *34*, 6403



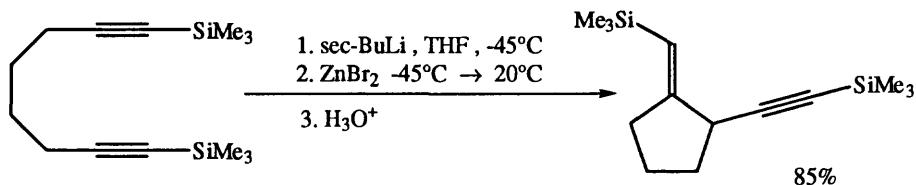
Kosugi, M.; Kimura, T.; Oda, H.; Migita, T. *Bull. Chem. Soc. Jpn.*, **1993**, *66*, 3522



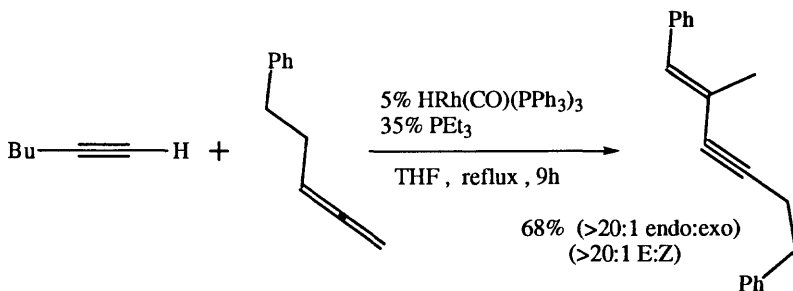
Alami, M.; Crousse, B.; Linstrumelle, G. *Tetrahedron Lett.*, **1994**, *35*, 3543



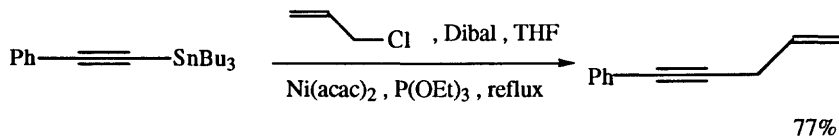
Aitken, R.A.; Boeters, C.; Morrison, J.J. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 2473



Meyer, C.; Marek, J.; Normant, J.-E.; Platzer, N. *Tetrahedron Lett.*, **1994**, 35, 5645



Yamaguchi, M.; Omata, K.; Hiram, M. *Tetrahedron Lett.*, **1994**, 35, 5689

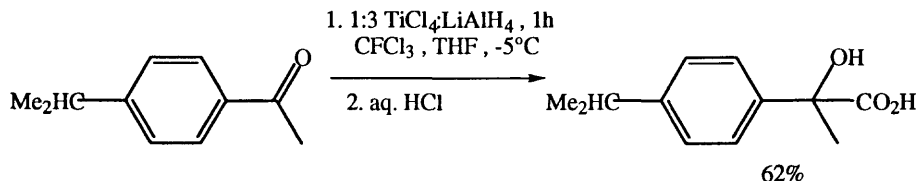


Cui, D.-M.; Hashimoto, N.; Ikeda, S.; Sato, Y. *J. Org. Chem.*, **1995**, 60, 5752

SECTION 312: CARBOXYLIC ACID - CARBOXYLIC ACID

NO ADDITIONAL EXAMPLES

SECTION 313: CARBOXYLIC ACID - ALCOHOL, THIOL

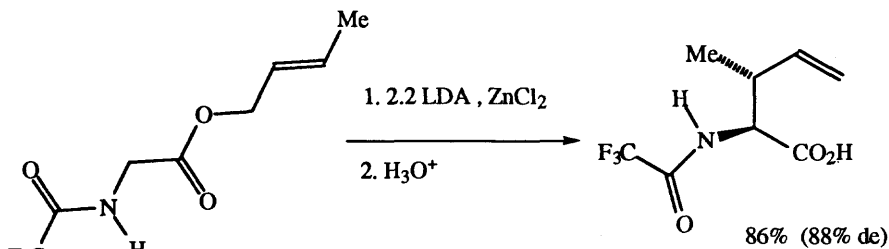


García, M.; del Campo, C.; Sinisterra, J.V.; Llana, E.F. *Tetrahedron Lett.*, **1993**, 34, 7973

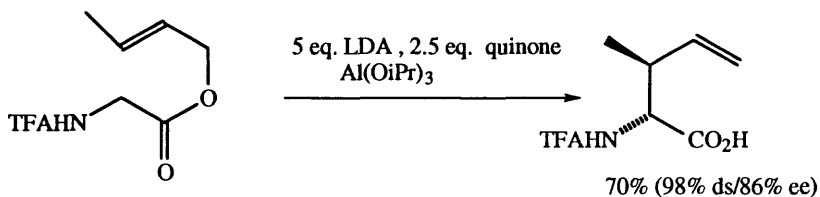
SECTION 314: CARBOXYLIC ACID - ALDEHYDE

NO ADDITIONAL EXAMPLES

SECTION 315: CARBOXYLIC ACID - AMIDE

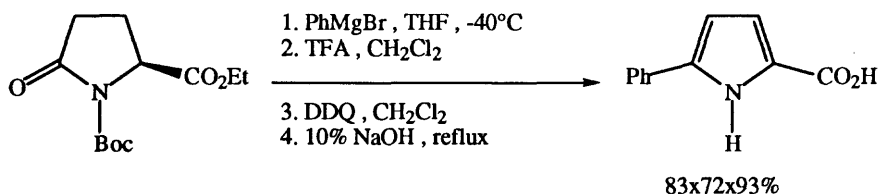


Kazmaier, U.; Maier, S. *J. Chem. Soc. Chem. Commun.*, 1995, 1991

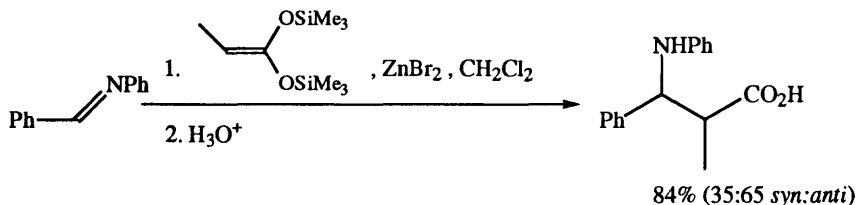


Kazmaier, U.; Krebs, A. *Angew. Chem. Int. Ed. Engl.*, 1995, 34, 2012

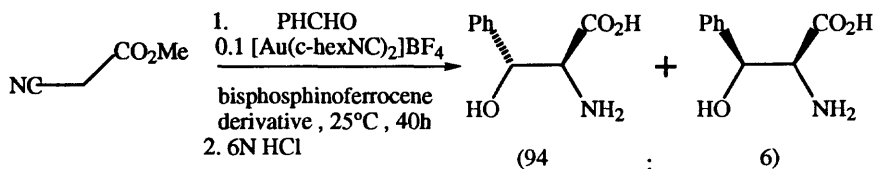
SECTION 316: CARBOXYLIC ACID - AMINE



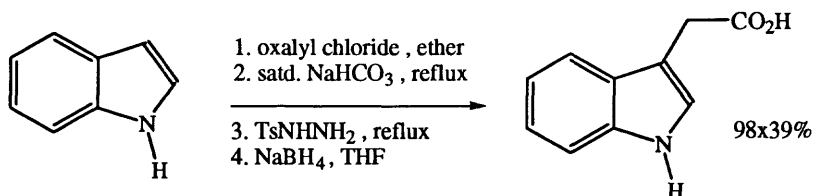
Ezquerro, I.; Pedregal, C.; Rubio, A.; Valenciano, J.; Navio, J.L.G.; Alvarez-Builla, J.; Vaquero, J.L. *Tetrahedron Lett.*, 1993, 34, 6317



Mladenova, M.; Bellassoued, M. *Synth. Commun.*, 1993, 23, 725



Soloshonok, V.A.; Hayashi, T. *Tetrahedron Lett.*, **1994**, 35, 2713



Guan, X.; Borchardt, R.T. *Tetrahedron Lett.*, **1994**, 35, 3013

REVIEWS:

"Recent Developments in the Stereoselective Synthesis of α -Amino Acids," Duthaler, R.O. *Tetrahedron*, **1994**, 50, 1539

"Recent Stereoselective Synthetic Approaches to β -Amino Acids," Cole, D.C. *Tetrahedron*, **1994**, 50, 9517

Related Methods:

Section 315 (Carboxylic Acid - Amide).

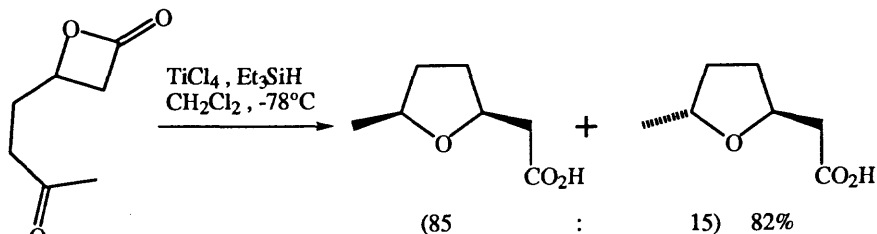
Section 344 (Amide - Ester).

Section 351 (Amine - Ester).

SECTION 317: CARBOXYLIC ACID - ESTER

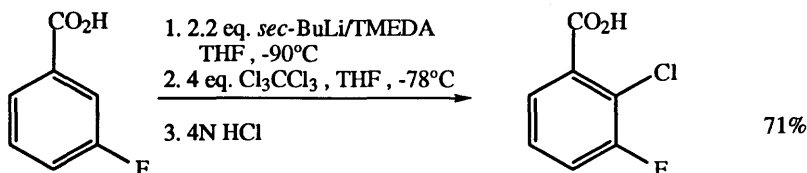
NO ADDITIONAL EXAMPLES

SECTION 318: CARBOXYLIC ACID - ETHER, EPOXIDE, THIOETHER



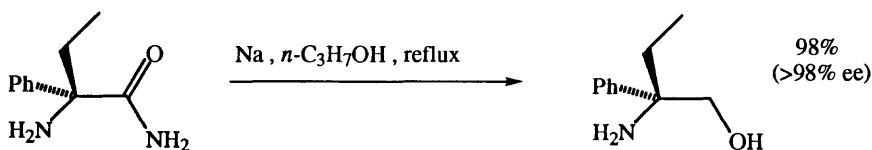
Mead, K.T.; Pillai, S.K. *Tetrahedron Lett.*, **1993**, 34, 6997

SECTION 319: CARBOXYLIC ACID - HALIDE, SULFONATE

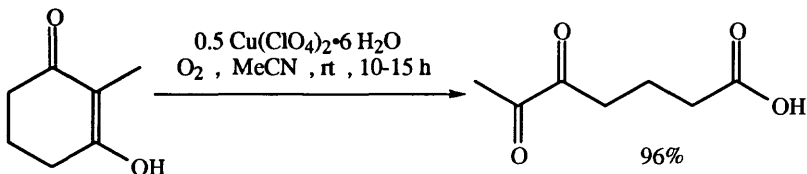


Moyroud, J.; Guesnet, J.-L.; Bennetau, B.; Mortier, J. *Tetrahedron Lett.*, **1995**, 36, 881

SECTION 320: CARBOXYLIC ACID - KETONE



Moody, H.M.; Kapteina, B.; Broxterman, Q.B.; Boesten, W.H.J.; Kamphuis, J. *Tetrahedron Lett.*, **1994**, 35, 1777



Cossy, J.; Belotti, D.; Bellosta, V.; Brocca, D. *Tetrahedron Lett.*, **1994**, 35, 6089

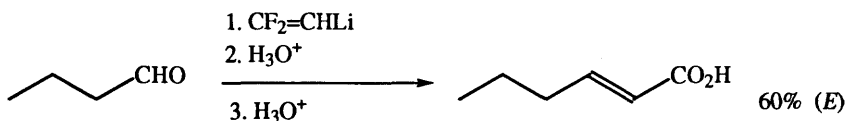
Also via: Section 360 (Ketone - Ester).

SECTION 321: CARBOXYLIC ACID - NITRILE

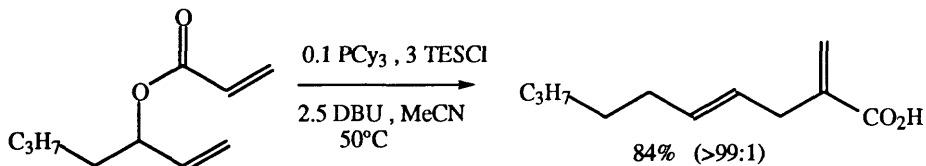
NO ADDITIONAL EXAMPLES

Also via: Section 361 (Nitrile - Ester).

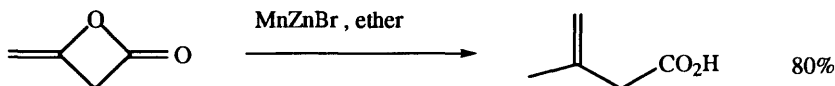
SECTION 322: CARBOXYLIC ACID - ALKENE



Tellier, E.; Sauvêtre, R. *Tetrahedron Lett.*, **1993**, 34, 5433



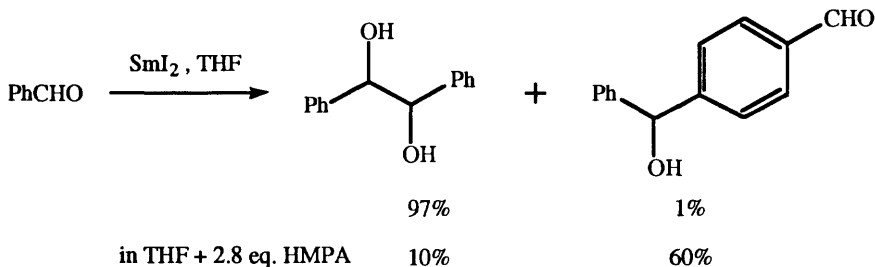
Hanamoto, T.; Baba, Y.; Inanaga, J. *J. Org. Chem.*, **1993**, *58*, 299



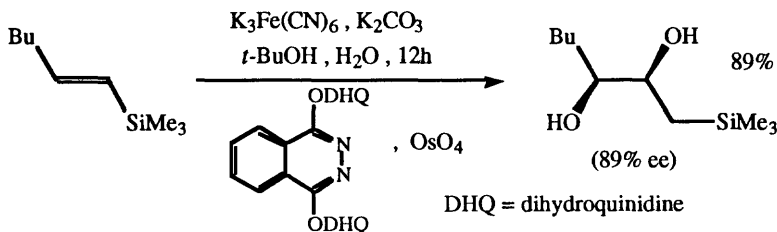
Duchêne, A.; Abarbi, M.; Parrain, J.-L.; Kitamura, M.; Noyori, R. *Synlett*, **1994**, 524

Also via: Section 313 (Alcohol - Carboxylic Acids).
 Section 349 (Amide - Alkene).
 Section 362 (Ester - Alkene).
 Section 376 (Nitrile - Alkene).

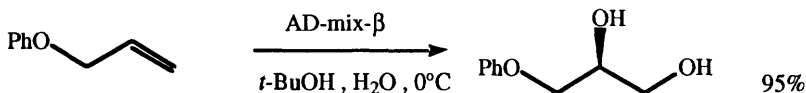
SECTION 323: ALCOHOL, THIOL - ALCOHOL, THIOL



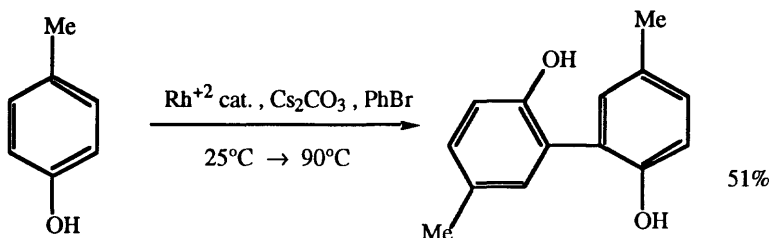
Shiue, J.-S.; Lin, C.-C.; Fang, J.-M. *Tetrahedron Lett.*, **1993**, *34*, 335



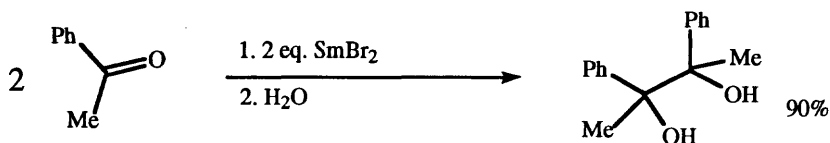
Soderquist, J.A.; Rane, A.M.; López, C.J. *Tetrahedron Lett.*, **1993**, *34*, 1893



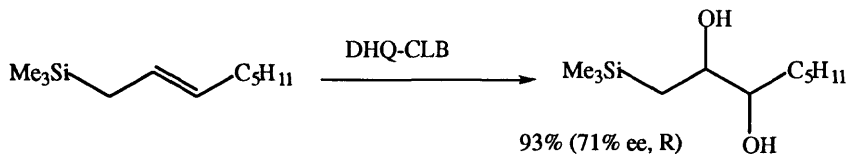
Wang, Z.-M.; Zhang, X.-L.; Sharpless, K.B. *Tetrahedron Lett.*, **1993**, *34*, 2267



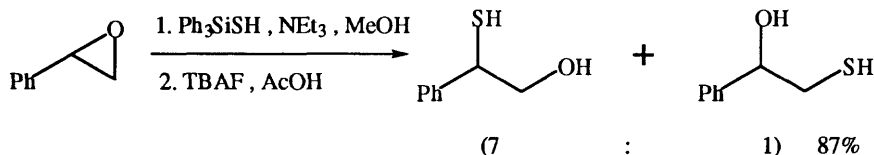
Barrett, A.G.M.; Itoh, T.; Wallace, E.M. *Tetrahedron Lett.*, 1993, 34, 2233



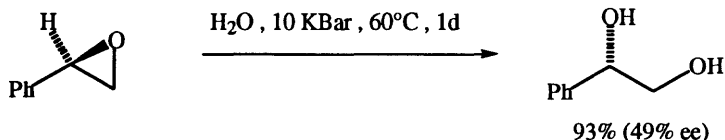
Lebrun, A.; Namy, J.-L.; Kagan, H.B. *Tetrahedron Lett.*, 1993, 34, 2311



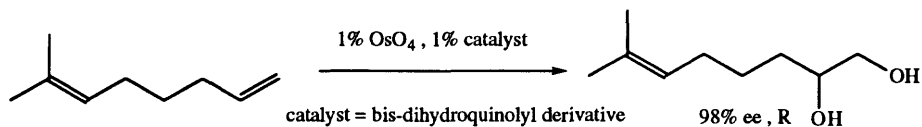
Okamoto, S.; Tani, K.; Sato, F.; Sharpless, K.B.; Zargarian, D. *Tetrahedron Lett.*, 1993, 34, 2509



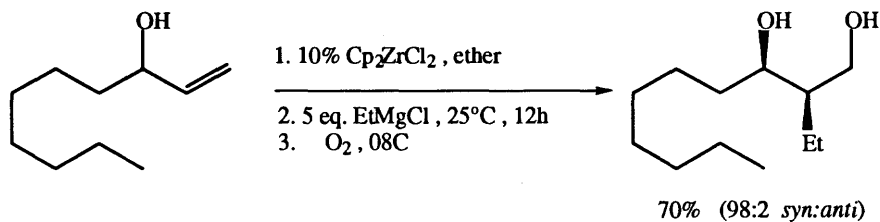
Brittain, J.; Gareau, Y. *Tetrahedron Lett.*, 1993, 34, 3363



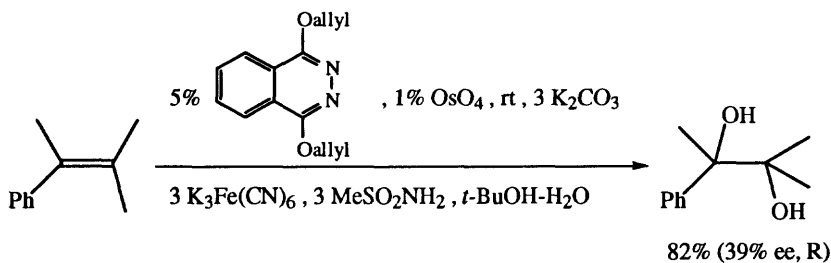
Kotsuki, H.; Kataoka, M.; Nishizawa, H. *Tetrahedron Lett.*, 1993, 34, 4037



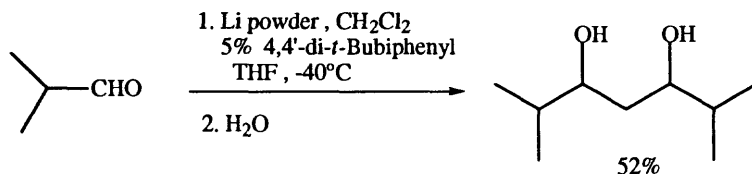
Crispino, G.A.; Jeong, K.-S.; Kolb, H.C.; Wang, Z.-M.; Xu, D.; Sharpless, K.B. *J. Org. Chem.*, 1993, 58, 3785



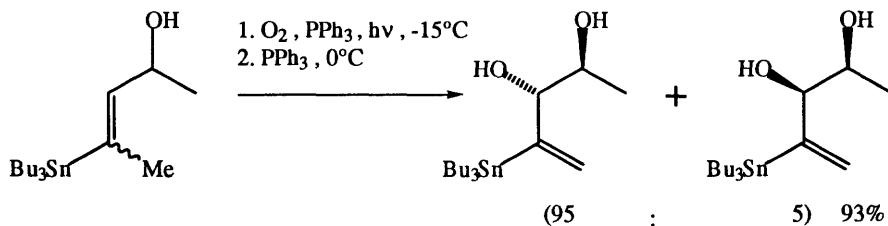
Hoveyda, A.H.; Morken, J.P. *J. Org. Chem.*, **1993**, 58, 4237



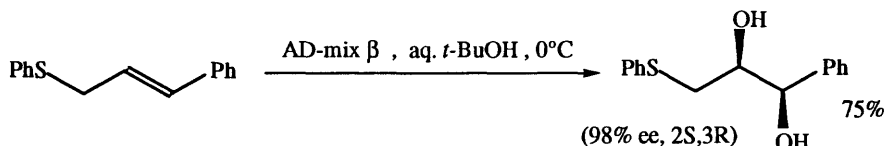
Morikawa, K.; Park, J.; Andersson, P.G.; Hashiyama, T.; Sharpless, K.B. *J. Am. Chem. Soc.*, **1993**, 115, 8463



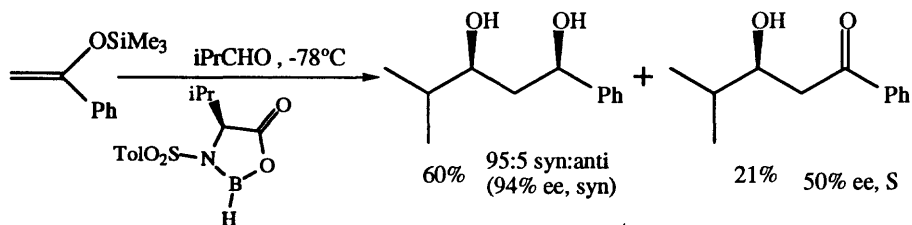
Guijarro, A.; Yus, M. *Tetrahedron Lett.*, **1994**, 35, 253



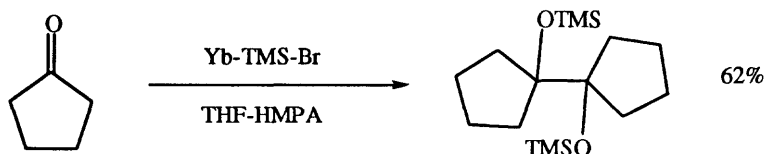
Adam, W.; Gevert, O.; Klug, P. *Tetrahedron Lett.*, **1994**, 35, 1681



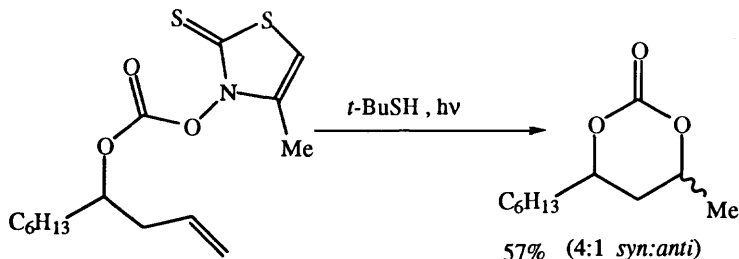
Walsh, P.J.; Ho, P.T.; King, S.B.; Sharpless, K.B. *Tetrahedron Lett.*, **1994**, 35, 5129



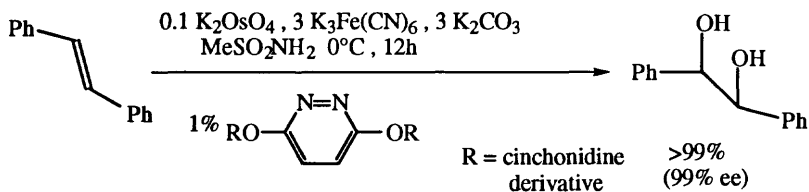
Kaneko, Y.; Matsuo, T.; Kiyooka, S. *Tetrahedron Lett.*, **1994**, 35, 4107



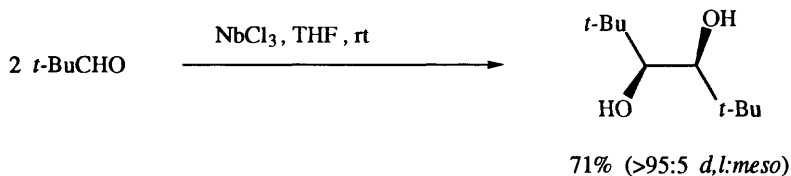
Taniguchi, Y.; Nakahashi, M.; Kuno, T.; Tsuno, M.; Makioka, Y.; Takaki, K.; Fujiwara, Y. *Tetrahedron Lett.*, **1994**, 35, 4111



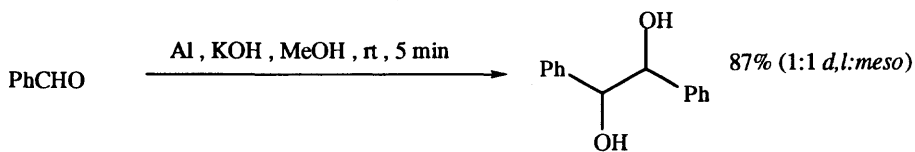
Newcomb, M.; Dhanabalasingam, B. *Tetrahedron Lett.*, **1994**, 35, 5193



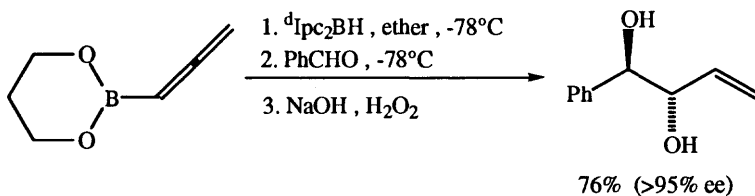
Corey, E.J.; Noe, M.C.; Grogan, M.J. *Tetrahedron Lett.*, **1994**, 35, 6405



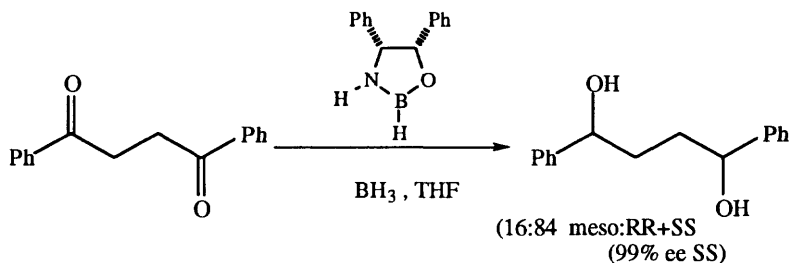
Szymoniak, J.; Besançon, J.; Moise, C. *Tetrahedron*, **1994**, 50, 2841



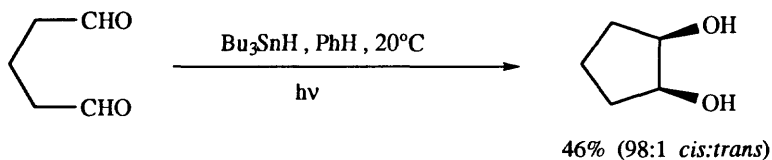
Khurana, J.M.; Sehgal, A. *J. Chem. Soc. Chem. Commun.*, **1994**, 571



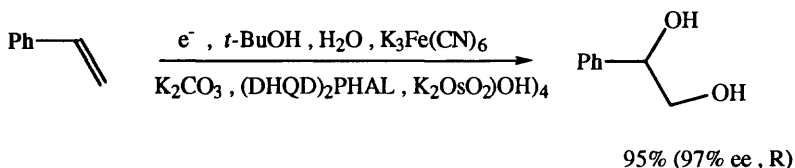
Brown, H.C.; Narla, G. *J. Org. Chem.*, **1995**, 60, 4686



Quallich, G.J.; Keavey, K.N.; Woodall, T.M. *Tetrahedron Lett.*, **1995**, 36, 4729



Hays, D.S.; Fu, G.C. *J. Am. Chem. Soc.*, **1995**, 117, 7283



Torii, S.; Liu, P.; Tanaka, H. *Chem. Lett.*, **1995**, 319

REVIEWS:

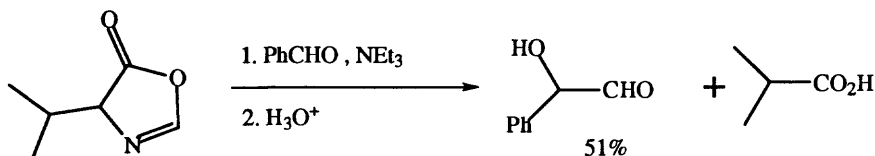
"Synthesis of α,ω -Alkenediols. A Review," Patwardhan, S.A. *Org. Prep. Proceed. Int.*, **1994**, 26, 645

"The Oxygenation of Vinyl Cyclopropanes as an Entry Into Stereoselective 1,3-Diol Synthesis," Feldman, K.S. *Synlett*, **1995**, 217

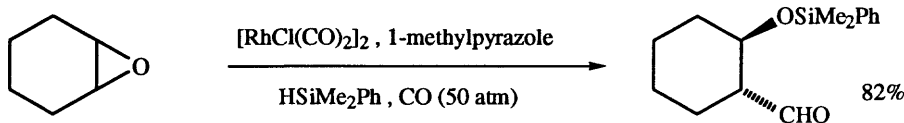
"Catalytic Asymmetric Dihydroxylation," Kolb, H.C.; Van Nieuwenhze, M.S.; Sharpless, K.B. *Chem. Rev.*, **1994**, 94,, 2483

Also via: Section 327 (Alcohol - Ester). Section 357 (Ester - Ester).

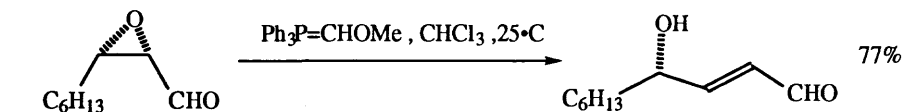
SECTION 324: ALCOHOL, THIOL - ALDEHYDE



Barco, A.; Benetti, S.; De Risi, C.; Pollini, G.P.; Spalluto, G.; Zanirato, V. *Tetrahedron Lett.*, **1993**, 34, 3907



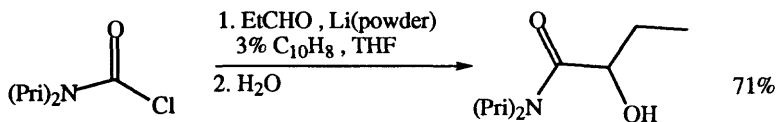
Fukumoto, Y.; Chatani, N.; Murai, S. *J. Org. Chem.*, **1993**, 58, 4187



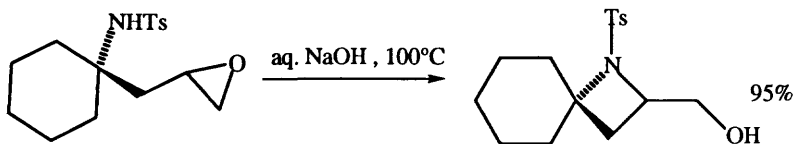
Yu, L.; Wang, Z. *J. Chem. Soc. Chem. Commun.*, **1993**, 232

Related Methods: Section 330 (Alcohol - Ketone).

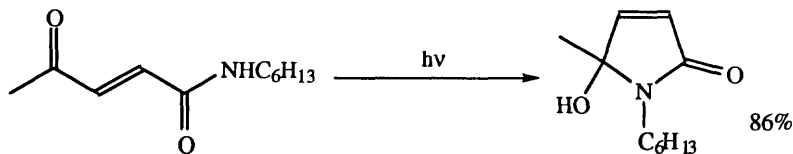
SECTION 325: ALCOHOL, THIOL - AMIDE



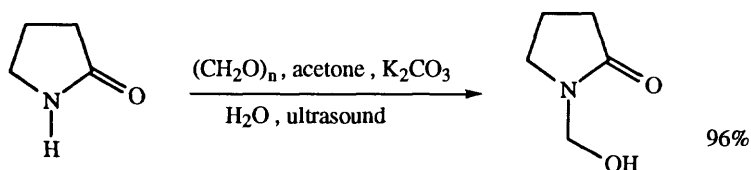
Ramón, D.J.; Yus, M. *Tetrahedron Lett.*, **1993**, 34, 7115



Moulines, J.; Bats, J-P.; Hautefaye, P.; Nuhrich, A.; Lamidey, A-M. *Tetrahedron Lett.*, **1993**, 34, 2315

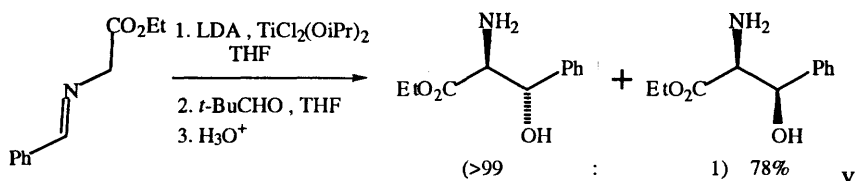


Dittami, J.P.; Xu, F.; Qi, H.; Martin, M.W.; Bordner, J.; Decosta, D.L.; Kiplinger, J.; Reiche, P.; Ware, R. *Tetrahedron Lett.*, **1995**, *36*, 4197

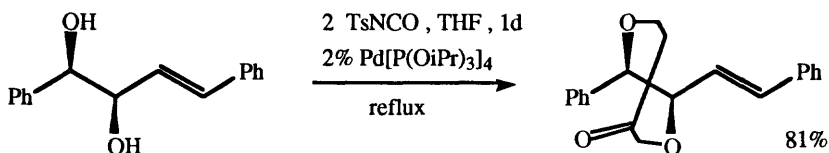


Jouglet, B.; Oumoch, S.; Rosseau, G. *Synth. Commun.*, **1995**, *25*, 3869

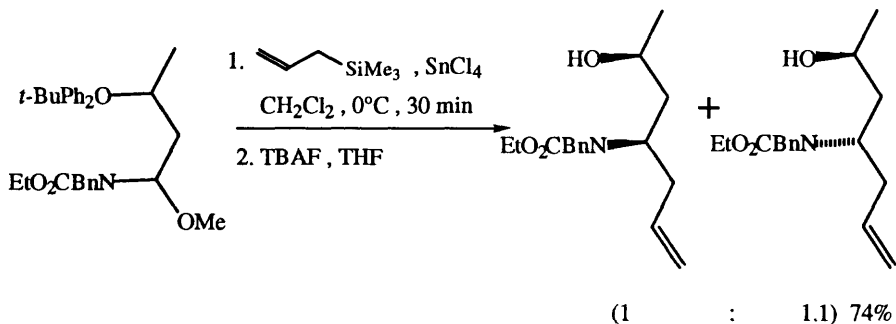
SECTION 326: ALCOHOL, THIOL - AMINE



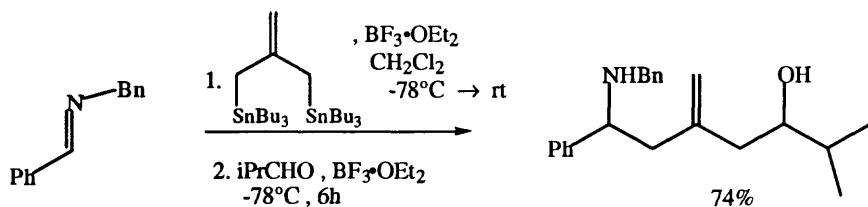
Kanemasa, S.; Mori, T.; Wada, E.; Tatsukawa, A. *Tetrahedron Lett.*, **1993**, *34*, 677



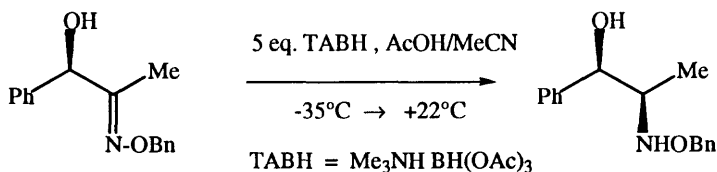
Xu, D.; Sharpless, K.B. *Tetrahedron Lett.*, **1993**, *34*, 951



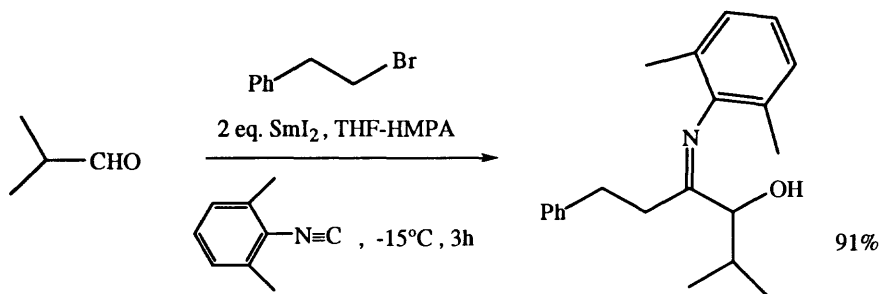
Hioki, H.; Okauda, M.; Miyagi, W.; Itô, S. *Tetrahedron Lett.*, **1993**, *34*, 6131



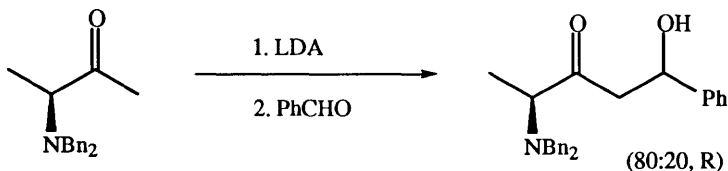
Keck, G.E.; Palani, A. *Tetrahedron Lett.*, **1993**, 34, 3223



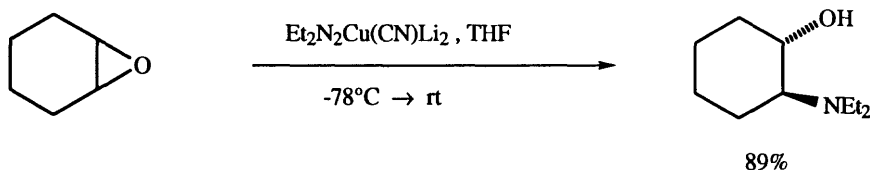
Williams, D.R.; Osterhout, M.H.; Reddy, J.P. *Tetrahedron Lett.*, **1993**, 34, 3271



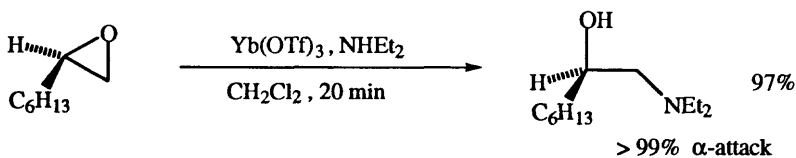
Murakami, M.; Kawano, T.; Ito, H.; Ito, Y. *J. Org. Chem.*, **1993**, 58, 1458



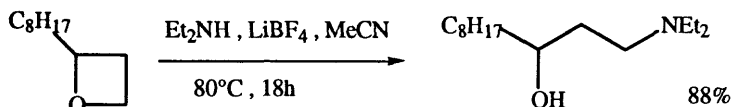
Lagu, B.R.; Crane, H.M.; Liotta, D.C. *J. Org. Chem.*, **1993**, 58, 4191



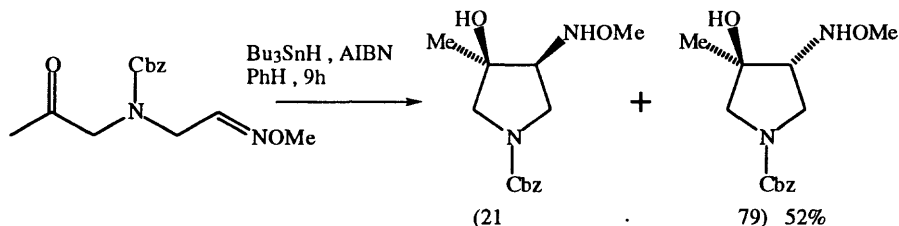
Yamamoto, Y.; Asao, N.; Meguro, M.; Tsukuda, N.; Nemoto, H.; Sadayori, N.; Wilson, J.G.; Nakamura, H. *J. Chem. Soc. Chem. Commun.*, **1993**, 1201



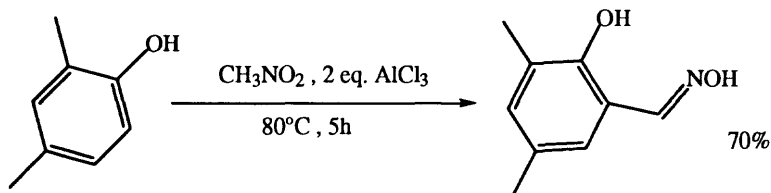
Chini, M.; Crotti, P.; Favero, L.; Macchia, F.; Pineschi, M. *Tetrahedron Lett.*, **1994**, 35, 433



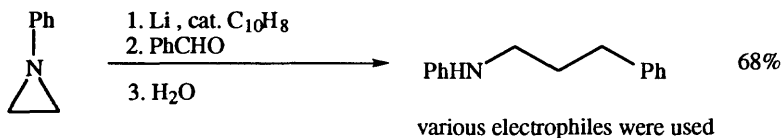
Chini, M.; Crotti, P.; Favero, L.; Macchia, F. *Tetrahedron Lett.*, **1994**, 35, 761



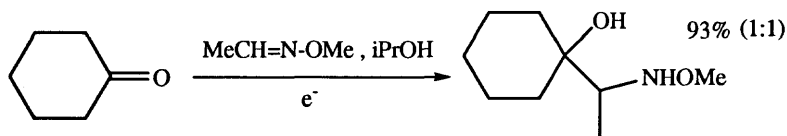
Naito, T.; Tajiri, K.; Harimoto, T.; Ninomiya, I.; Kiguchi, T. *Tetrahedron Lett.*, **1994**, 35, 2205



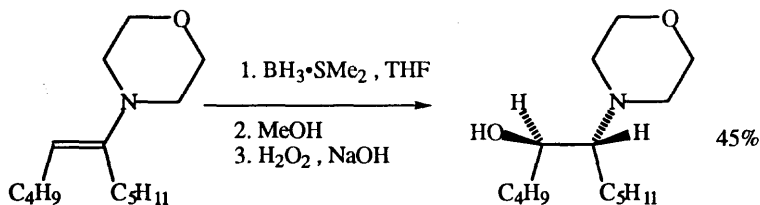
Sartori, G.; Bigi, F.; Maggi, R.; Tomasini, F. *Tetrahedron Lett.*, **1994**, 35, 2393



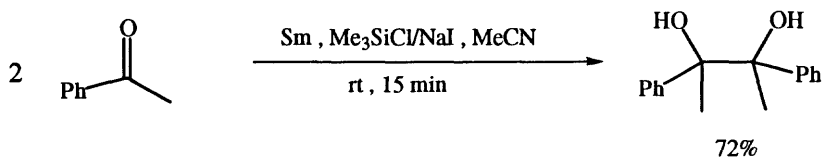
Almena, J.; Foubelo, F.; Yus, M. *J. Org. Chem.*, **1994**, 59, 3210



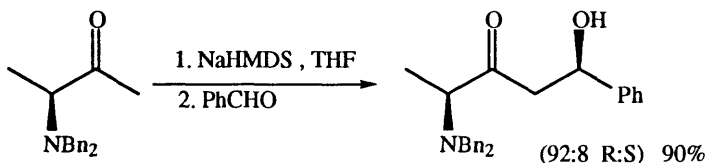
Shono, T.; Kise, N.; Fujimoto, T.; Yamanami, A.; Nomura, R. *J. Org. Chem.*, **1994**, 59, 1730



Goralski, C.T.; Hasha, D.L.; Nicholson, L.W.; Zakett, D.; Fisher, G.B.; Singaram, B. *Tetrahedron Lett.*, **1994**, 35, 3251

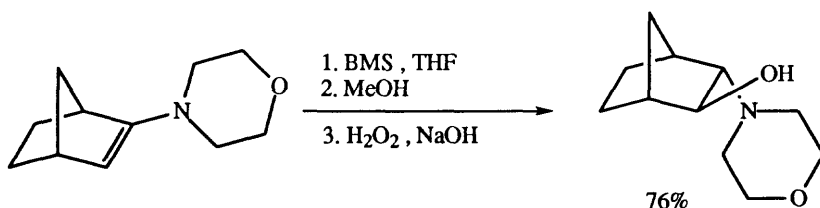


Akane, N.; Hatano, T.; Kusui, H.; Nishiyama, Y.; Ishii, Y. *J. Org. Chem.*, **1994**, 59, 7902

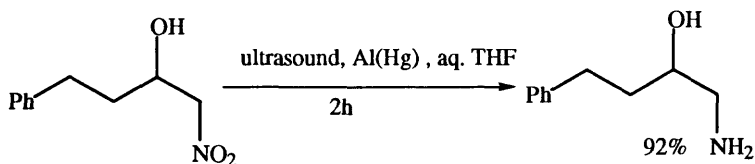


with LDA (63:7 R:S) 90%

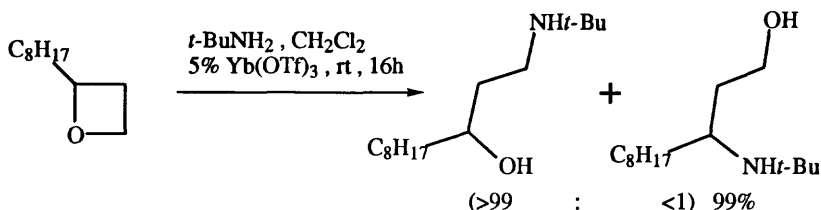
Lagu, B.R.; Liotta, D.C. *Tetrahedron Lett.*, **1994**, 35, 4485



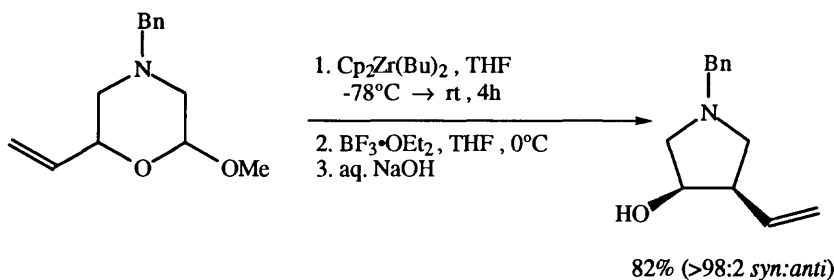
Goralski, C.T.; Hasha, D.L.; Nicholson, L.W.; Singaram, B. *Tetrahedron Lett.*, **1994**, 35, 5165



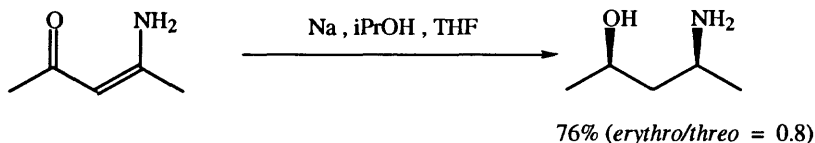
Fitch, R.W.; Luzzio, F.A. *Tetrahedron Lett.*, **1994**, 35, 6013



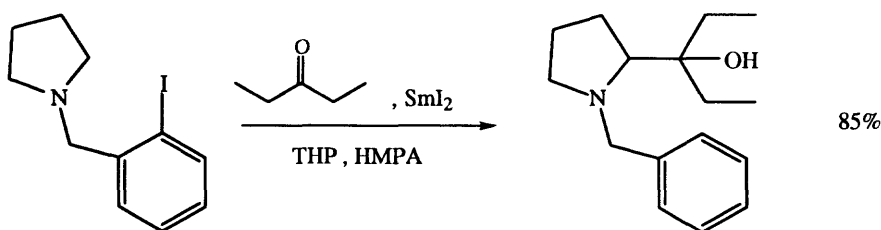
Crotti, P.; Favero, L.; Macchia, F.; Pineschi, M. *Tetrahedron Lett.*, **1994**, 35, 7089



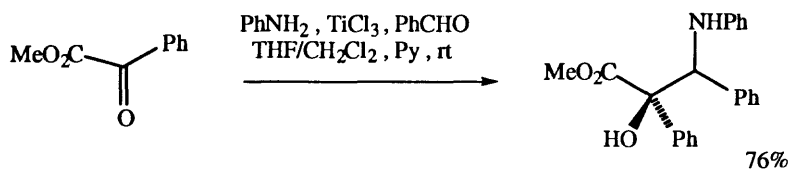
Ito, H.; Ikeuchi, Y.; Taguchi, T.; Hanzawa, Y.; Shiro, M. *J. Am. Chem. Soc.*, **1994**, 116, 5469



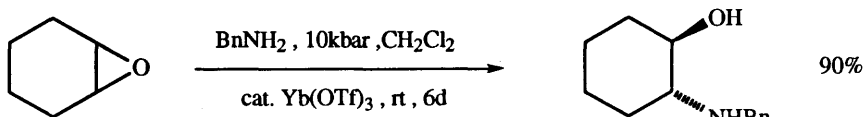
Bartoli, G.; Cimarelli, C.; Palmieri, G. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 537



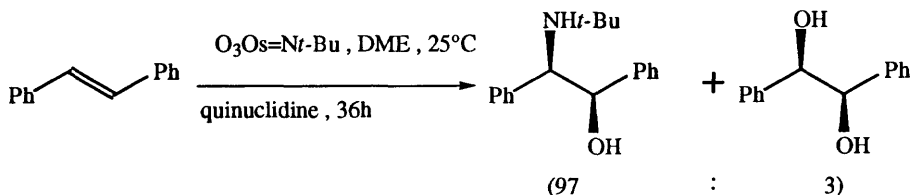
Booth, S.E.; Benneche, T.; Undheim, K. *Tetrahedron*, **1995**, 51, 3665



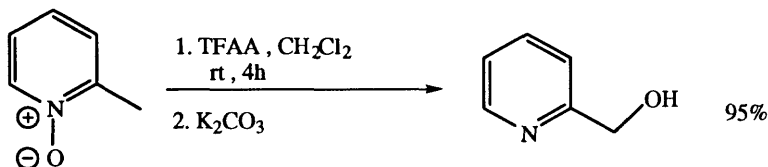
Clerici, A.; Clerici, L.; Porta, O. *Tetrahedron Lett.*, **1995**, 36, 5955



Meguro, M.; Asao, N.; Yamamoto, Y. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 2597

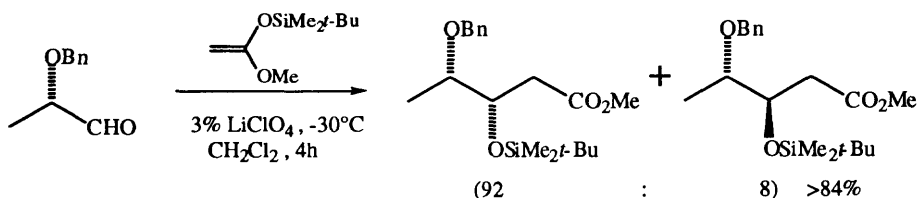


Rubinstein, H.; Svendsen, J.S. *Acta Chem. Scand. B.*, **1994**, 48, 439

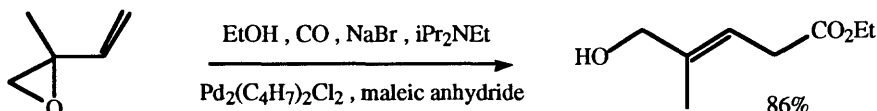


Fontenas, C.; Bejan, E.; Haddon, H.A.; Belavoine, G.G.A. *Synth. Commun.*, **1995**, 25, 629

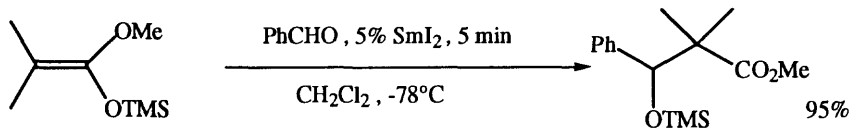
SECTION 327: ALCOHOL, THIOL - ESTER



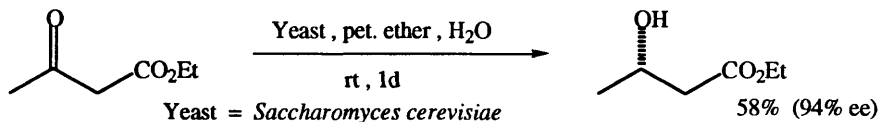
Reetz, M.T.; Fox, D.N.A. *Tetrahedron Lett.*, **1993**, 34, 1119



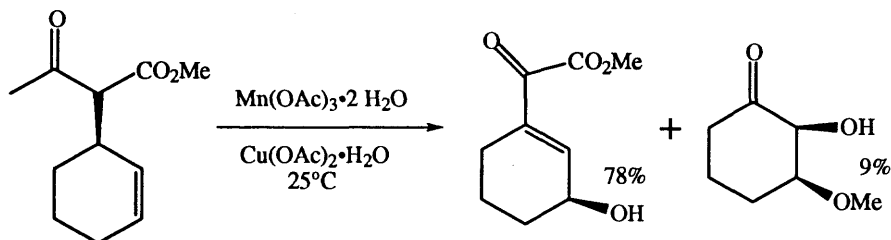
Shimizu, I.; Maruyama, T.; Makuta, T.; Yamamoto, A. *Tetrahedron Lett.*, **1993**, 34, 2135



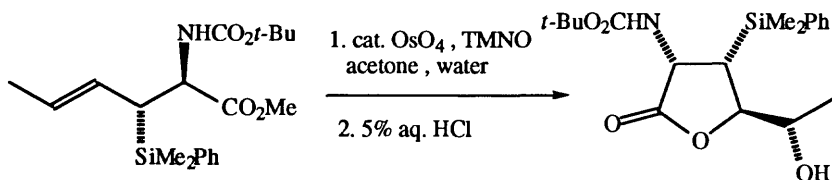
Van de Weghe, P.; Collin, J. *Tetrahedron Lett.*, **1993**, 34, 3881



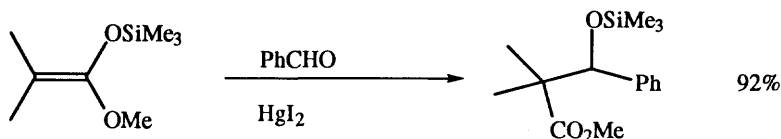
Jayasinghe, L.Y.; Smallridge, A.L.; Trehwella, M.A. *Tetrahedron Lett.*, **1993**, 34, 3949



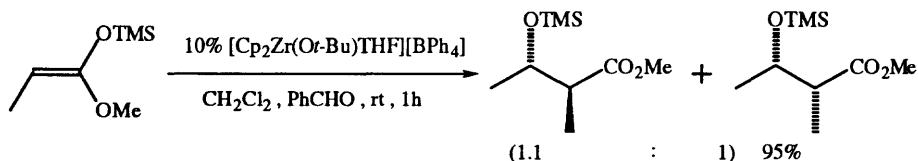
Oshima, T.; Sodeoka, M.; Shibasaki, M. *Tetrahedron Lett.*, **1993**, 34, 8509



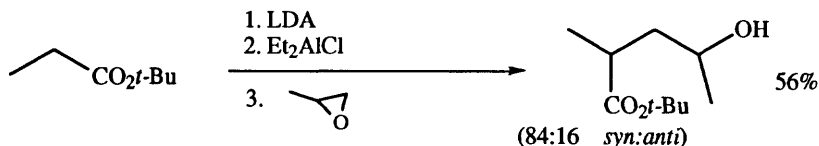
Panek, J.S.; Zhang, J. *J. Org. Chem.*, **1993**, 58, 294



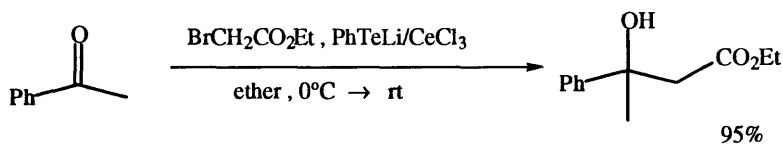
Dicker, I.B. *J. Org. Chem.*, **1993**, 58, 2324



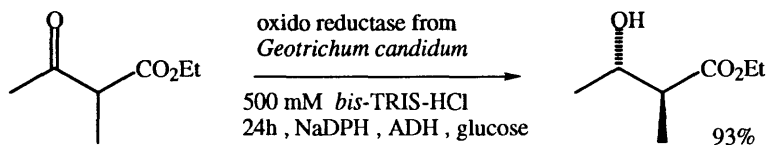
Hong, Y.; Norris, D.J.; Collins, S. *J. Org. Chem.*, **1993**, 58, 3591



Taylor, S.K.; Fried, J.A.; Grassl, Y.N.; Marolewski, A.E.; Pelton, E.A.; Poel, T.-J.; Rezanka, D.S.; Whittaker, M.R. *J. Org. Chem.*, **1993**, 58, 7304

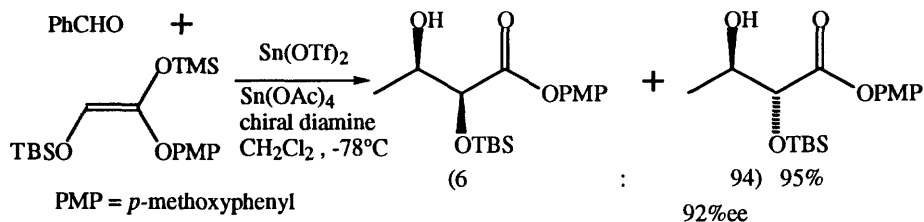


Fukuzawa, S.-i.; Hirai, K. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1963

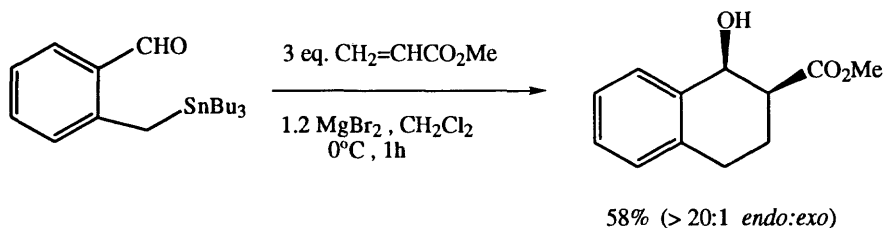


(>99% de; 92% ee)

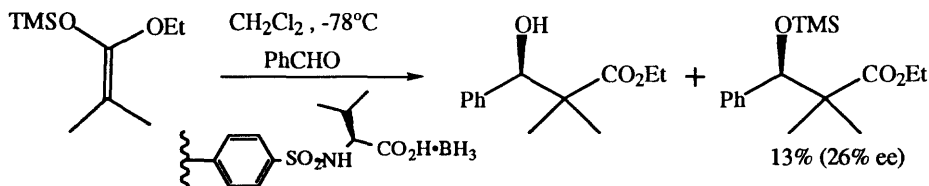
Kawai, Y.; Takanobe, K.; Tsujimoto, M.; Ohno, A. *Tetrahedron Lett.*, **1994**, 35, 147



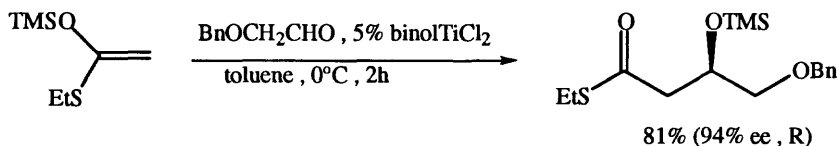
Kobayashi, S.; Kawasuji, T. *Tetrahedron Lett.*, **1994**, 35, 3329



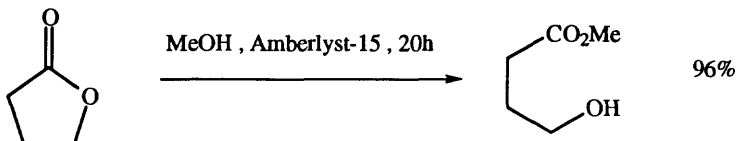
Woo, S.H. *Tetrahedron Lett.*, **1994**, 35, 3975



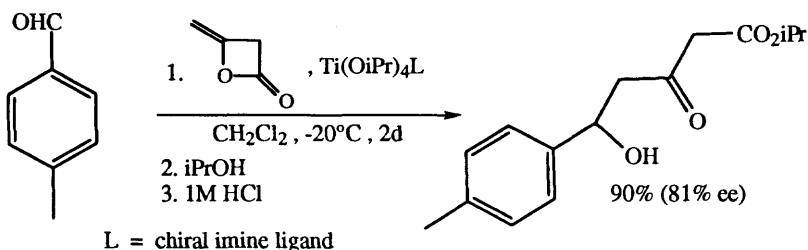
Kiyooka, S.; Kido, Y.; Kaneko, Y. *Tetrahedron Lett.*, **1994**, 35, 5243



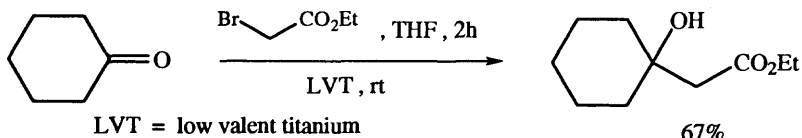
Mikami, K.; Matsukawa, S. *J. Am. Chem. Soc.*, **1994**, *116*, 4077



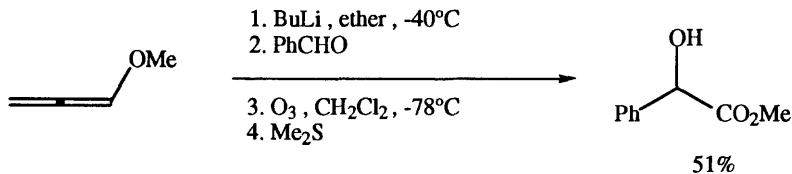
Anand, R.C.; Selvapalam, N. *Synth. Commun.*, **1994**, *24*, 2743



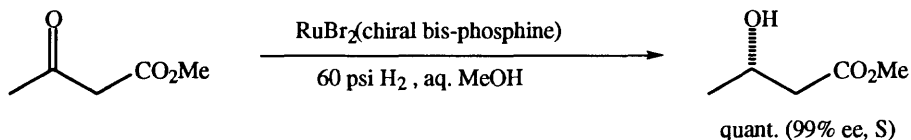
Hayashi, M.; Inoue, T.; Oguni, N. *J. Chem. Soc. Chem. Commun.*, **1994**, 341



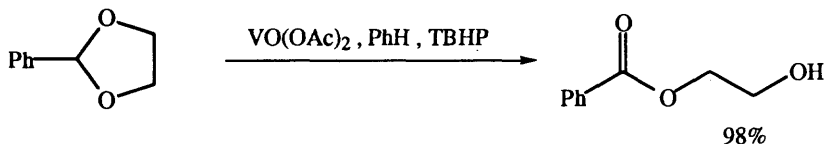
Aoyagi, Y.; Tanaka, W.; Ohta, A. *J. Chem. Soc. Chem. Commun.*, **1994**, 1225



Hormuth, S.; Reißig, H.-U.; Dorsch, D. *Liebigs Ann. Chem.*, **1994**, 121



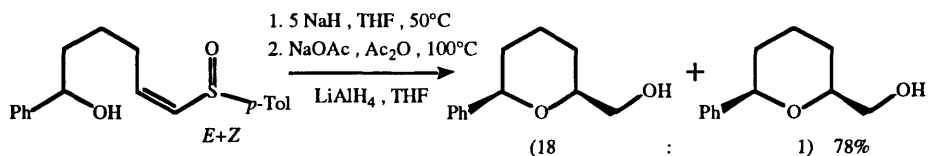
Burk, M.L.; Harper, T.G.P.; Kalberg, C.S. *J. Am. Chem. Soc.*, **1995**, *117*, 4423



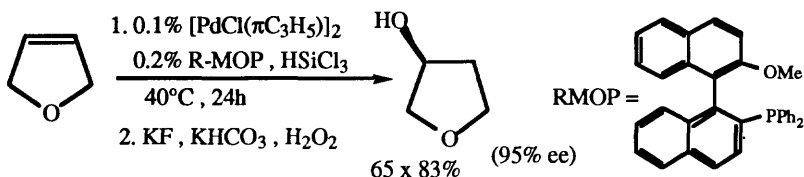
Choudary, B.M.; Reddy, P.N. *Synlett*, **1995**, 959

Also via: Section 313 (Alcohol - Carboxylic Acid).

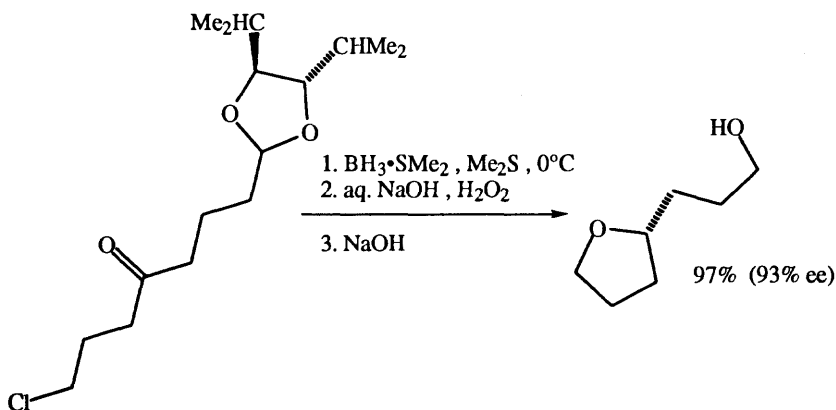
SECTION 328: ALCOHOL, THIOL - ETHER, EPOXIDE, THIOETHER



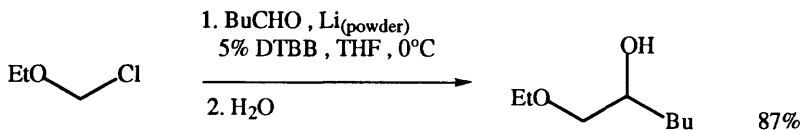
Mandai, T.; Ueda, M.; Kashiwagi, K.; Kawada, M. *Tetrahedron Lett.*, **1993**, 34, 111



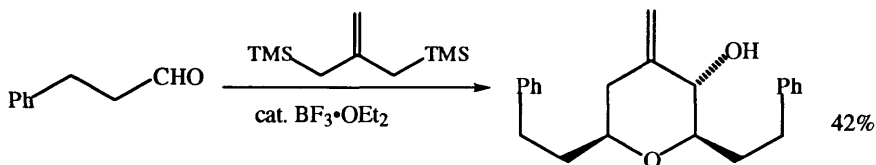
Uozumi, Y.; Hayashi, T. *Tetrahedron Lett.*, **1993**, 34, 2335



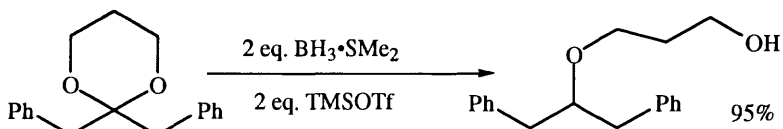
Molander, G.A.; Bobbitt, K.L. *J. Am. Chem. Soc.*, **1993**, 115, 7517



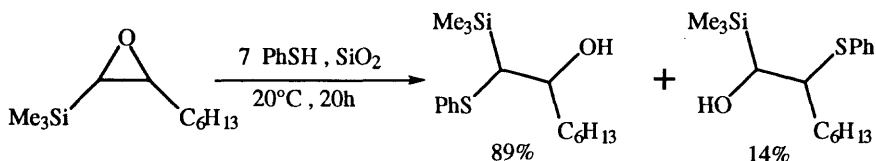
Guijarro, A.; Yus, M. *Tetrahedron Lett.*, 1993, 34, 3487



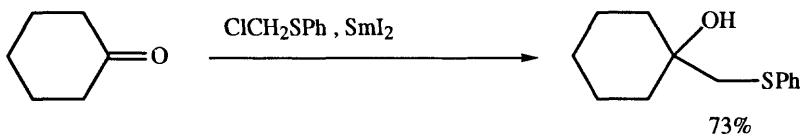
Markó, I.E.; Bayston, D.J. *Tetrahedron Lett.*, 1993, 34, 6595



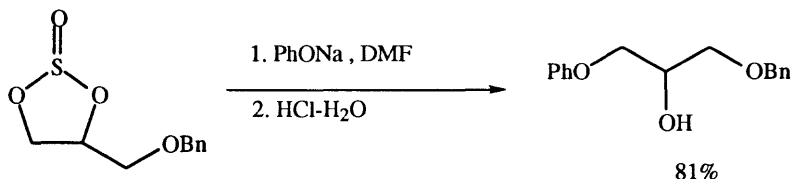
Bartels, B.; Hunter, R. *J. Org. Chem.*, 1993, 58, 6756



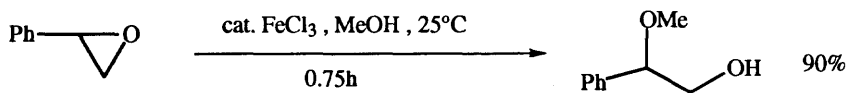
Raubo, P.; Wicha, J. *Synlett*, 1993, 25



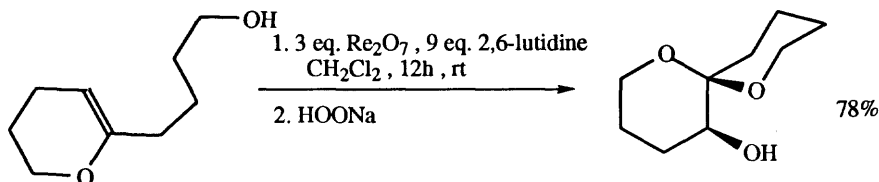
Yamashita, M.; Kitagawa, K.; Ohhara, T.; Iida, Y.; Masumi, A.; Kawasaki, I.; Ohta, S. *Chem. Lett.*, 1993, 653



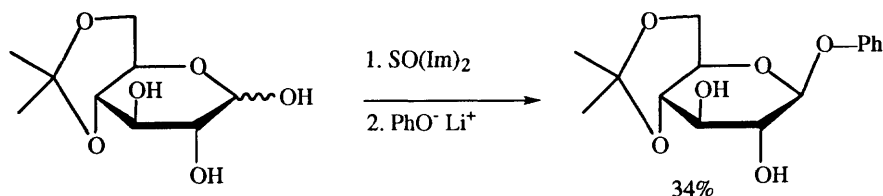
Carlsen, P.H.J.; Aase, K. *Acta Chem. Scand. B.*, 1993, 47, 617



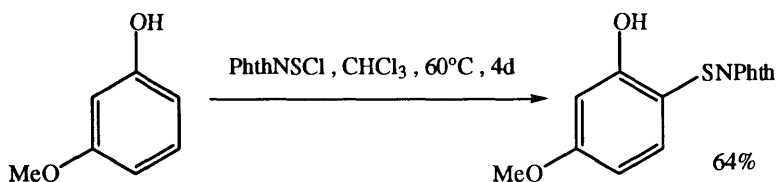
Iranpoor, N.; Salehi, P. *Synthesis*, **1994**, 1152



Boyce, R.S.; Kennedy, R.M. *Tetrahedron Lett.*, **1994**, 35, 5133

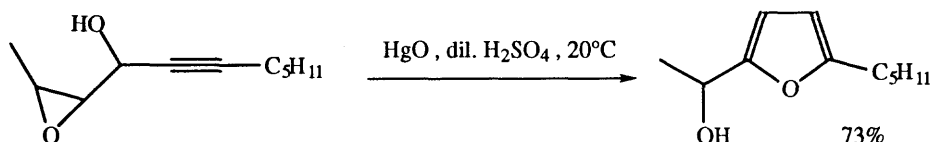


El Arabi Aouad, M.; El Meslouti, A.; Uzan, R.; Beaupere, D. *Tetrahedron Lett.*, **1994**, 35, 6279

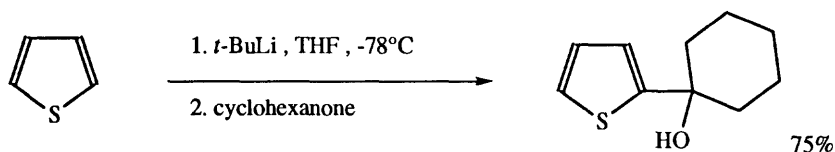


precursor to *o*-thioquinones

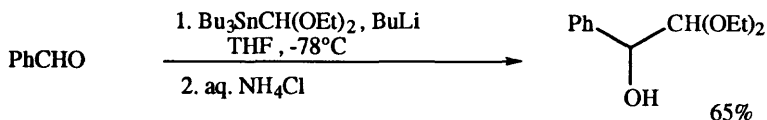
Capozzi, G.; Menichetti, S.; Nativi, C.; Simonti, M.C. *Tetrahedron Lett.*, **1994**, 35, 9451



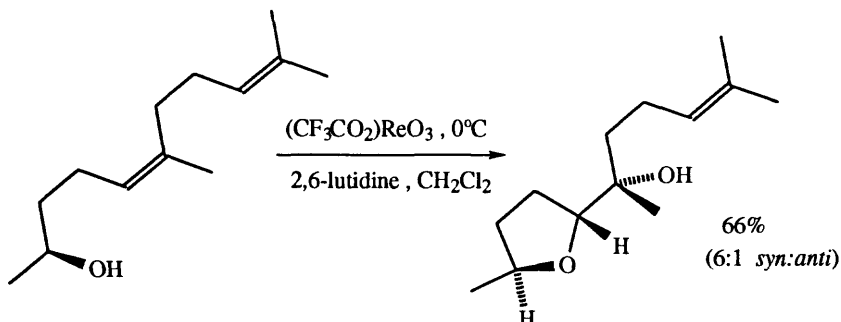
Marson, C.M.; Harper, S.; Wrigglesworth, R. *J. Chem. Soc. Chem. Commun.*, **1994**, 1879



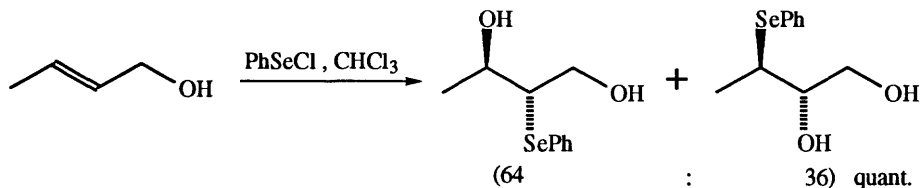
Paquette, L.A.; Dullweber, U.; Branan, B.M. *Heterocycles*, **1994**, 37, 187



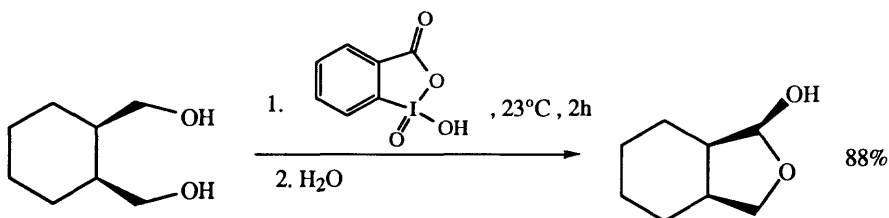
Parrain, J.-L.; Beaudet, I.; Cintrat, J.-C.; Duchêne, A.; Quintard, J.-P. *Bull. Soc. Chim. Fr.*, **1994**, 131, 304



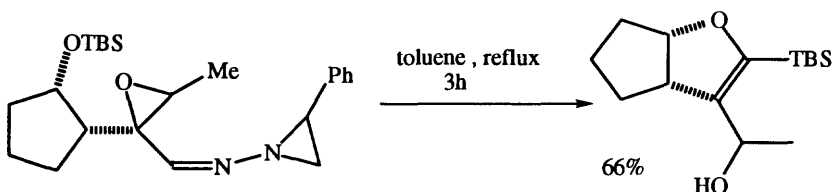
McDonald, F.E.; Towne, T.B. *J. Org. Chem.*, **1995**, 60, 5750



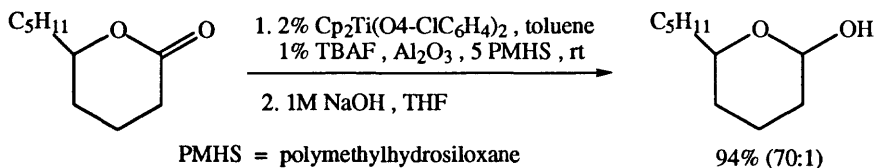
Cooper, M.A.; Ward, A.D. *Tetrahedron Lett.*, **1995**, 36, 2327



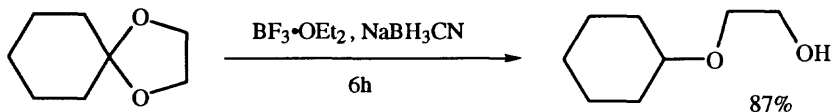
Corey, E.L.; Palani, A. *Tetrahedron Lett.*, **1995**, 36, 3485



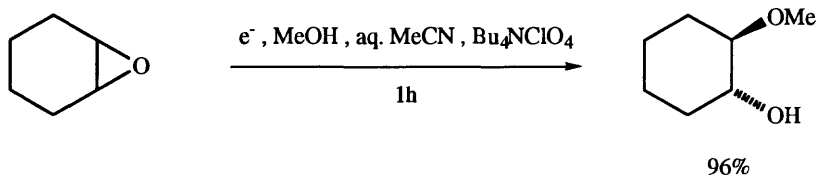
Kim, S.; Cho, C.M. *Tetrahedron Lett.*, **1995**, 36, 4845



Verdagauer, X.; Berk, S.C.; Buchwald, S.L. *J. Am. Chem. Soc.*, **1995**, *117*, 12641



Srikrishna, A.; Viswajanani, R. *Tetrahedron*, **1995**, *51*, 3339

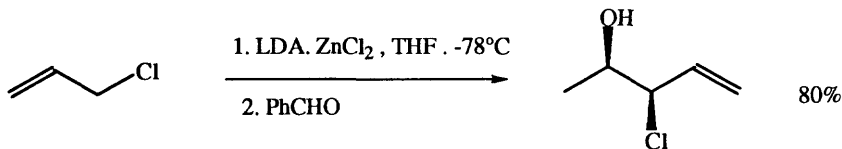


Safavi, A.; Iranpoor, N.; Fotuhi, L. *Bull. Chem. Soc. Jpn.*, **1995**, *68*, 2591

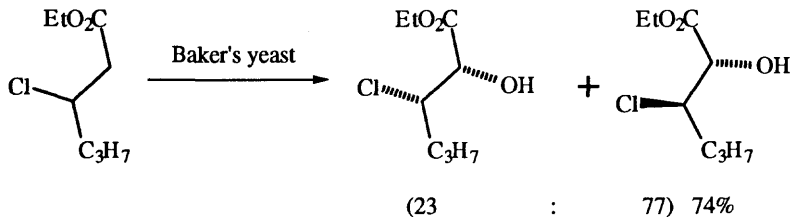
REVIEW:

"Metal-Catalyzed Direct Hydroxy-Epoxidation of Olefins," Adam, W.; Richter, M.J. *Accs. Chem. Res.*, **1994**, *27*, 57

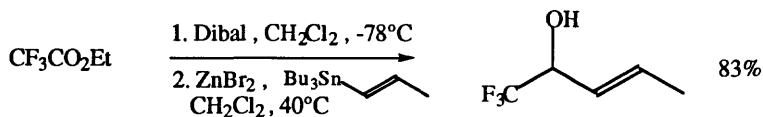
SECTION 329: ALCOHOL, THIOL - HALIDE, SULFONATE



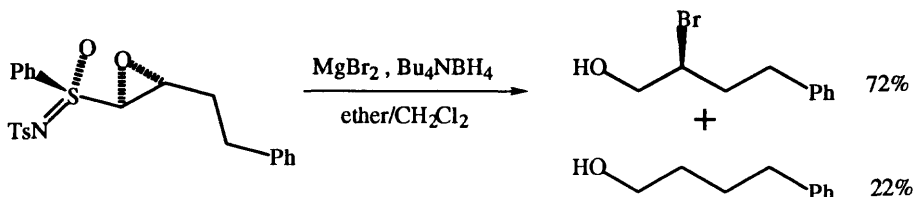
Mallaiah, K.; Satyanarayana, J.; Ila, H.; Junjappa, H. *Tetrahedron Lett.*, **1993**, *34*, 3145



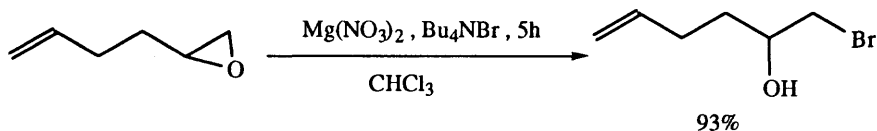
Tsuboi, S.; Furutani, H.; Ansari, M.H.; Sakai, T.; Utaka, M.; Takeda, A. *J. Org. Chem.*, **1993**, *58*, 486



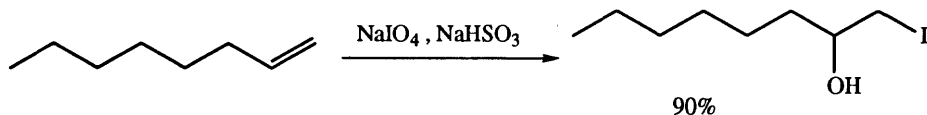
Ishihara, T.; Hayashi, H.; Yamanaka, H. *Tetrahedron Lett.*, 1993, 34, 5777



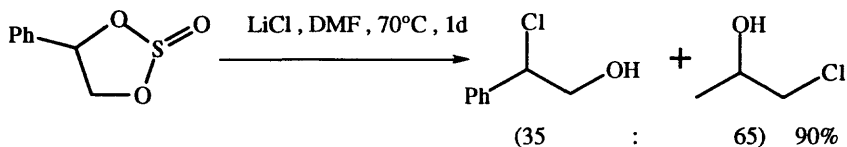
Bailey, P.L.; Briggs, A.D.; Jackson, R.F.W.; Pietruszka, J. *Tetrahedron Lett.*, 1993, 34, 6611



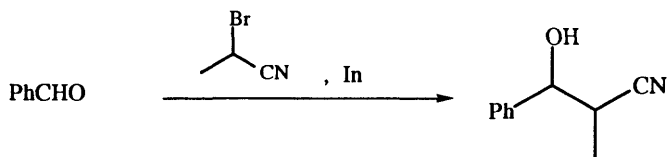
Suh, Y.-G.; Koo, B.-A.; Ko, J.-A.; Cho, Y.-S. *Chem. Lett.*, 1993, 1907



Masuda, H.; Takase, K.; Nishio, M.; Hasegawa, A.; Nishiyama, Y.; Ishii, Y. *J. Org. Chem.*, 1994, 59, 5550



Nymann, K.; Svendsen, J.S. *Acta Chem. Scand. B.*, 1994, 48, 183

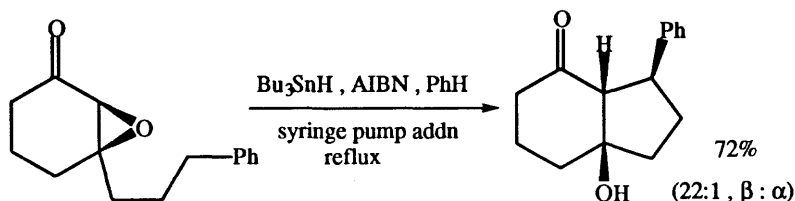


84% (56:44 erythro:threo)

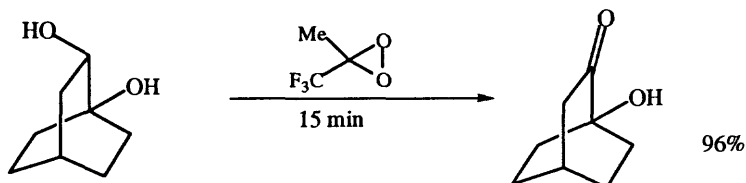
Araki, S.; Yamada, M.; Butsugan, Y. *Bull. Chem. Soc. Jpn.*, 1994, 67, 1126

REVIEW:

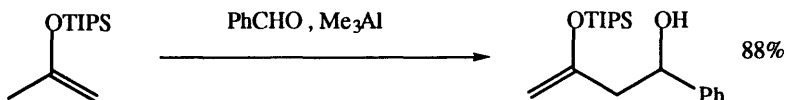
"Regioselective and Chemoselective Synthesis of Halohydrins by Cleavage of Oxiranes with Metal Halides," Bonini, C.; Righi, G. *Synthesis*, **1994**, 225

SECTION 330: ALCOHOL, THIOL - KETONE

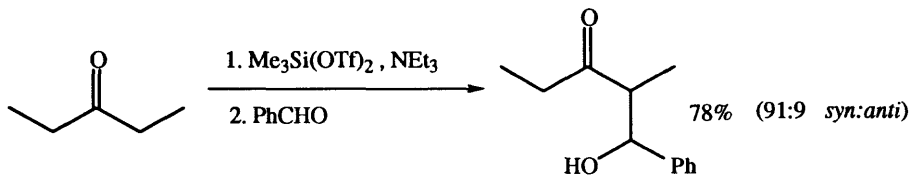
Rawal, V.H.; Krishnamurthy, V.; Fabre, A. *Tetrahedron Lett.*, **1993**, 34, 2899



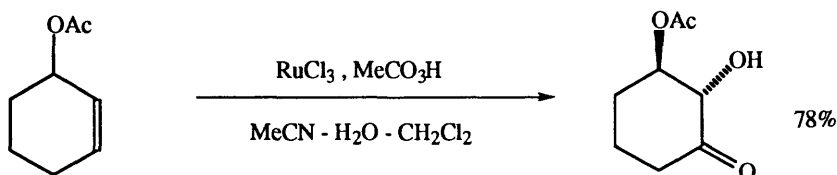
Curci, R.; D'Accolti, L.; Detomaso, A.; Fusco, C.; Takeuchi, K.; Ohga, Y.; Eaton, P.E. *Tetrahedron Lett.*, **1993**, 34, 4559



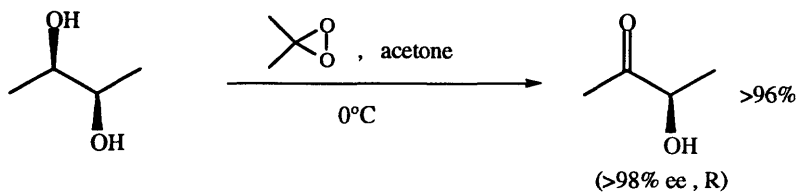
Shoda, H.; Nakamura, T.; Tanino, K.; Kuwajima, I. *Tetrahedron Lett.*, **1993**, 34, 6281



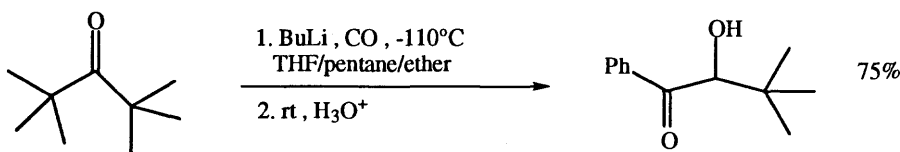
Kobayashi, S.; Nishio, K. *J. Org. Chem.*, **1993**, 58, 2647



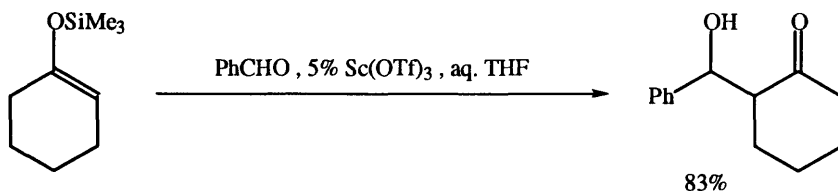
Murahashi, S.-I.; Saito, T.; Hanaoka, H.; Murakami, Y.; Naota, T.; Kumobayashi, H.; Akutagawa, S. *J. Org. Chem.*, **1993**, 58, 2929



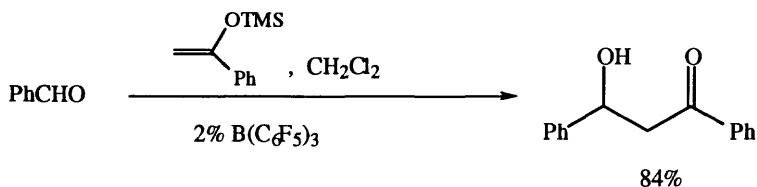
D'Accolti, L.; Detomaso, A.; Fusco, C.; Rosa, A.; Curci, R. *J. Org. Chem.*, **1993**, 58, 3600



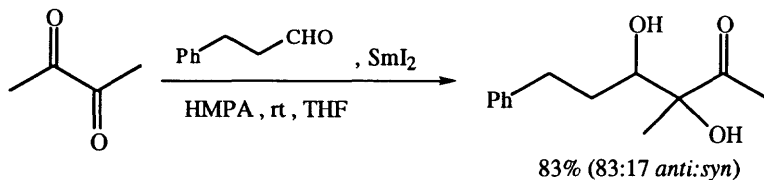
Seyferth, D.; Hui, R.C.; Wang, W.-L. *J. Org. Chem.*, **1993**, 58, 5843



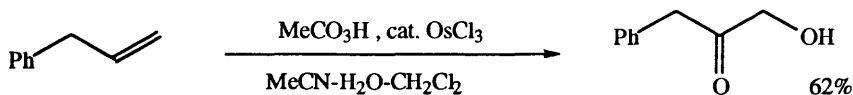
Kobayashi, S.; Hachiya, I.; Ishitani, H.; Araki, M. *Synlett*, **1993**, 472



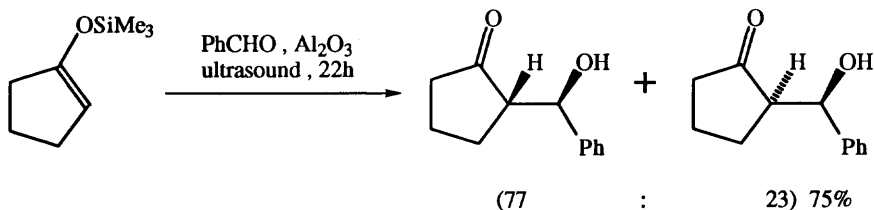
Ishihara, K.; Hananki, N.; Yamamoto, H. *Synlett*, **1993**, 577



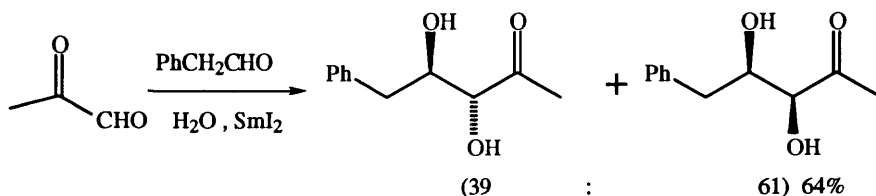
Miyoshi, N.; Takeuchi, S.; Ohgo, Y. *Chem. Lett.*, **1993**, 959



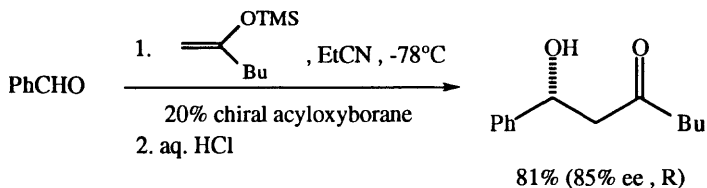
Murahashi, S.-I.; Naota, T.; Hanaoka, H. *Chem. Lett.*, **1993**, 1767



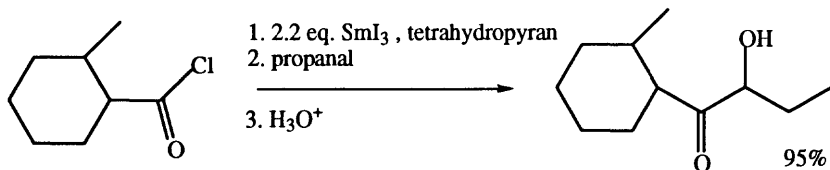
Ranu, B.C.; Chakraborty, R. *Tetrahedron*, **1993**, *49*, 5333



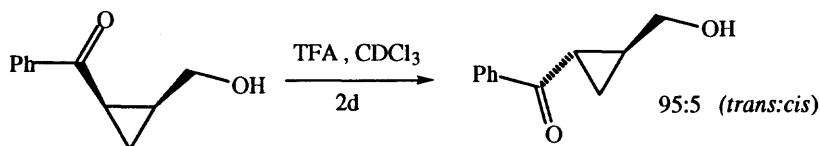
Miyoshi, N.; Takeuchi, S.; Ohgo, Y. *Chem. Lett.*, **1993**, 2129



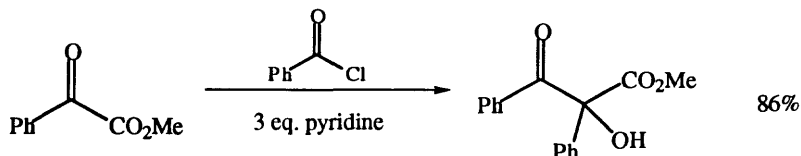
Ishihara, K.; Maruyama, T.; Mouri, M.; Gao, Q.; Furuta, K.; Yamamoto, H. *Bull. Chem. Soc. Jpn.*, **1993**, *66*, 3483



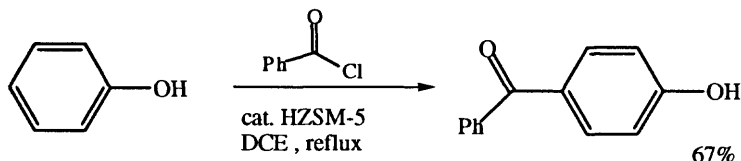
Namy, J.-L.; Colomb, M.; Kagan, H.B. *Tetrahedron Lett.*, **1994**, *35*, 1723



Dechoux, L.; Doris, E. *Tetrahedron Lett.*, **1994**, *35*, 2017

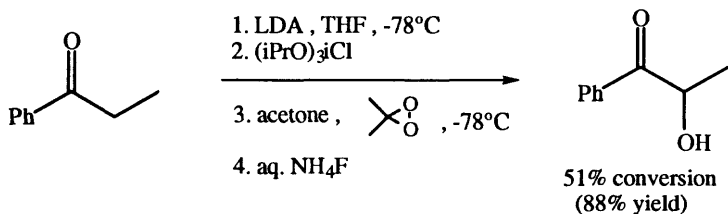


Araneo, S.; Clerici, A.; Porta, O. *Tetrahedron Lett.*, **1994**, 35, 2213

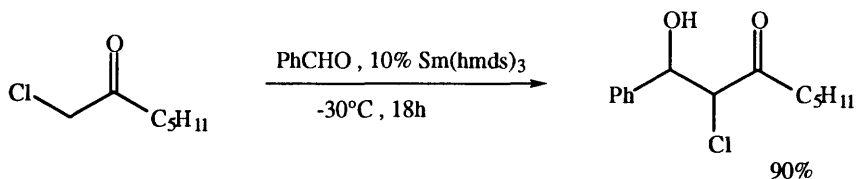


HZSM-5 = acidic zeolite [$\text{SiO}_2/\text{Al}_2\text{O}_3 = 40$]

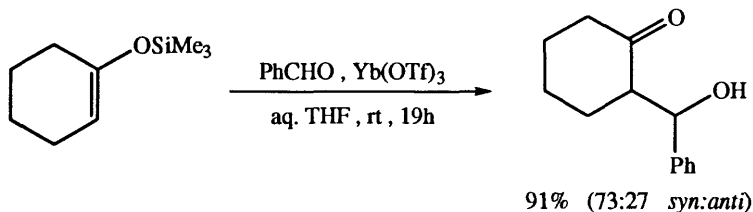
Paul, V.; Sudalai, A.; Daniel, T.; Srinivasan, K.V. *Tetrahedron Lett.*, **1994**, 35, 2601



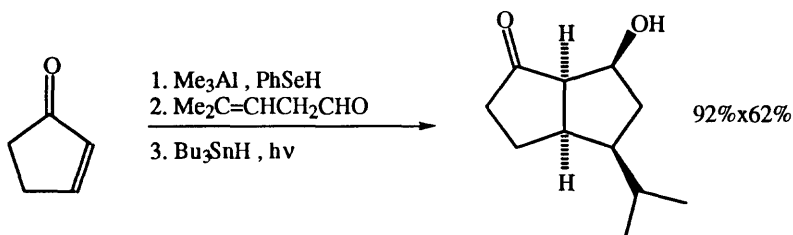
Adam, W.; Müller, M.; Precht, F. *J. Org. Chem.*, **1994**, 59, 2358



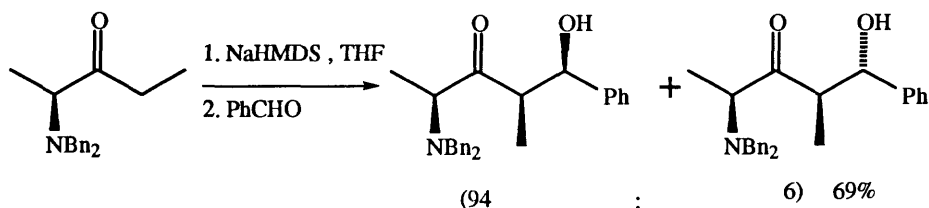
Sasai, H.; Arai, S.; Shibasaki, M. *J. Org. Chem.*, **1994**, 59, 2661



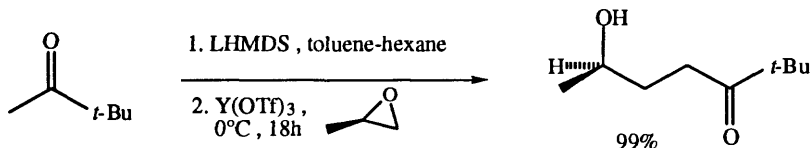
Kobayashi, S.; Hachiya, I. *J. Org. Chem.*, **1994**, 59, 3590



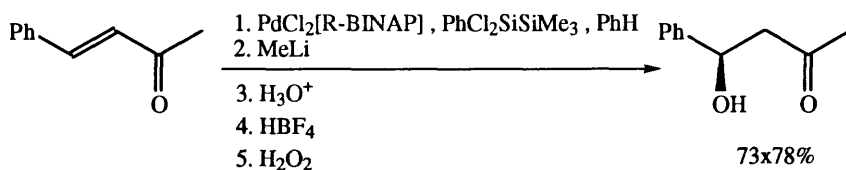
Lee, J.-Y.C.; Lee, J.H.; Lee, H.W. *Tetrahedron Lett.*, **1994**, 35, 4173



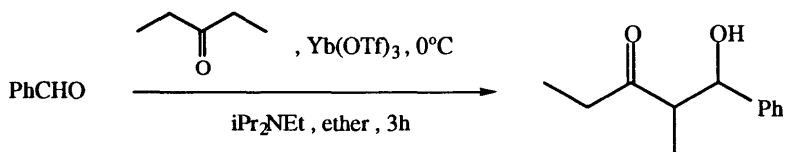
Goh, J.B.; Lagu, B.R.; Wurster, J.; Liotta, D.C. *Tetrahedron Lett.*, **1994**, 35, 6029



Crotti, P.; Di Bussolo, V.; Favero, L.; Macchia, F.; Pineschi, M. *Tetrahedron Lett.*, **1994**, 35, 6537

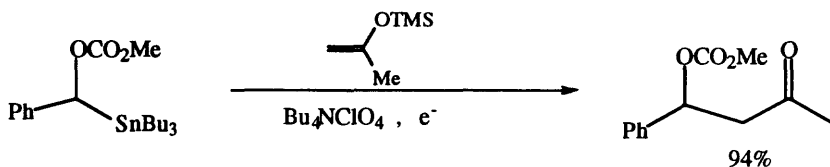


Matsumoto, Y.; Hayashi, T.; Ito, Y. *Tetrahedron*, **1994**, 50, 335

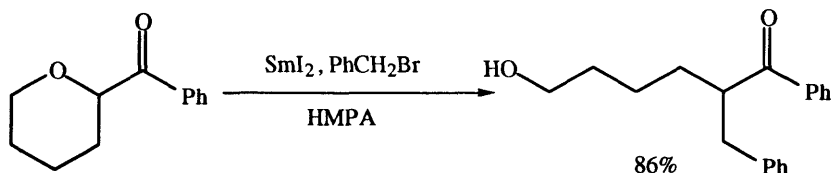


92% (34:66 *threo*:*erythro*)

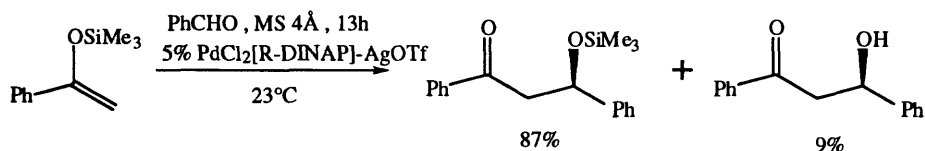
Fukuzawa, S.-i.; Tsuchimoto, T.; Kanai, T. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 2227



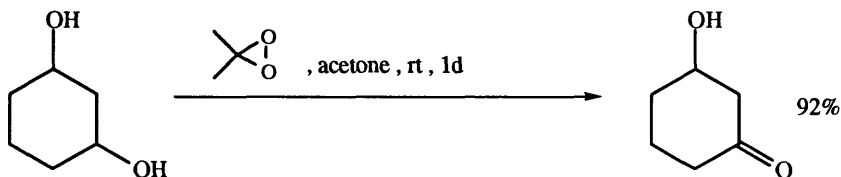
Yoshida, J.; Morita, Y.; Ishichi, Y.; Isoe, S. *Tetrahedron Lett.*, **1994**, 35, 5247



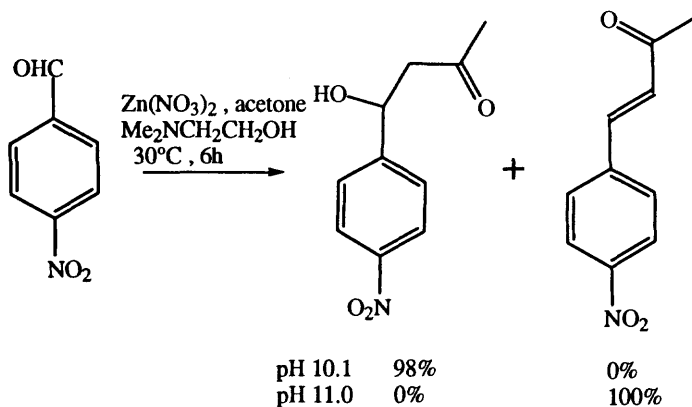
Enholm, E.J.; Schreier, J.A. *J. Org. Chem.*, **1995**, 60, 1110



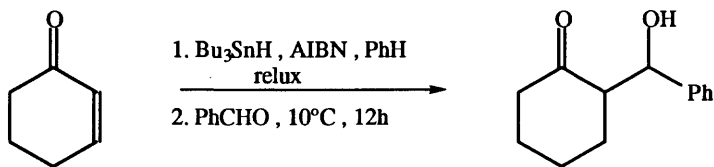
Sodeoka, M.; Ohrai, K.; Shibasaki, M. *J. Org. Chem.*, **1995**, 60, 2648



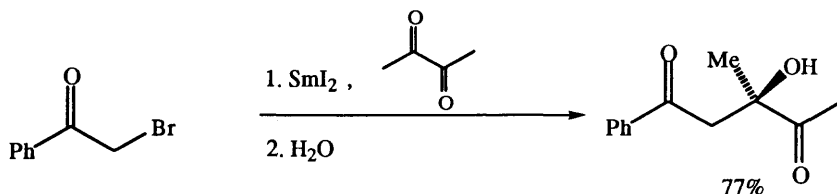
Bovicelli, P.; Lupattelli, P.; Sanetti, A.; Mincione, E. *Tetrahedron Lett.*, **1995**, 36, 3031



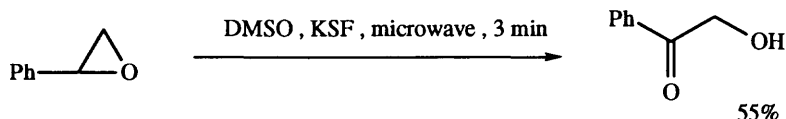
Buonora, P.T.; Rosauer, K.G.; Dai, L. *Tetrahedron Lett.*, **1995**, 36, 4009



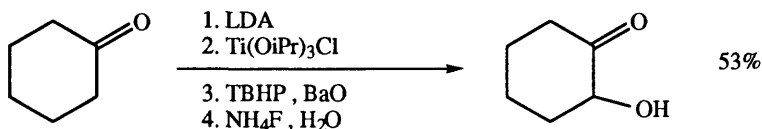
73% (6:1 erythro:threo)

Enholm, E.J.; Whitley, P.E. *Tetrahedron Lett.*, 1995, 36, 9157

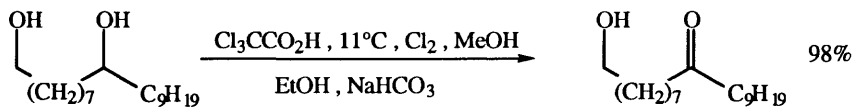
77%

Arime, T.; Takahashi, H.; Kobayashi, S.; Yamaguchi, S.; Mori, N. *Synth. Commun.*, 1995, 25, 389

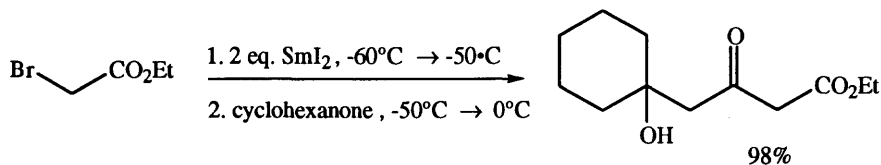
55%

Villemin, D.; Hammadi, M. *Synth. Commun.*, 1995, 25, 3141

53%

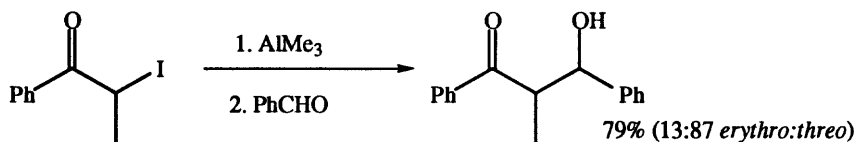
Schulz, M.; Kluge, R.; Schüßer, M.; Hoffmann, G. *Tetrahedron*, 1995, 51, 3175

98%

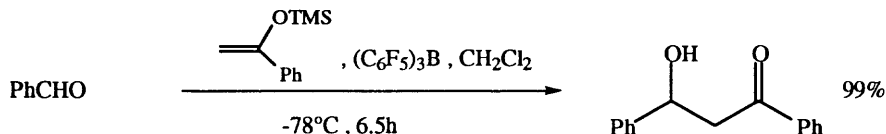
Tassignon, P.S.G.; De Wit, D.; De Rijk, T.C.; De Buyck, L.F. *Tetrahedron*, 1995, 51, 11863

98%

Utimoto, K.; Matsui, T.; Takai, T.; Matsubara, S. *Chem. Lett.*, 1995, 197

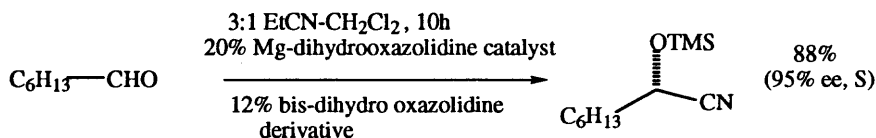


Aoki, Y.; Oshima, K.; Utimoto, K. *Chem. Lett.*, 1995, 463

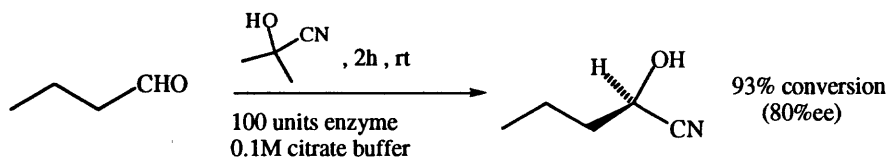


Ishihara, K.; Hanaki, N.; Funawashi, M.; Miyata, M.; Yamamoto, H. *Bull. Chem. Soc. Jpn.*, 1995, 68, 1721

SECTION 331: ALCOHOL, THIOL - NITRILE

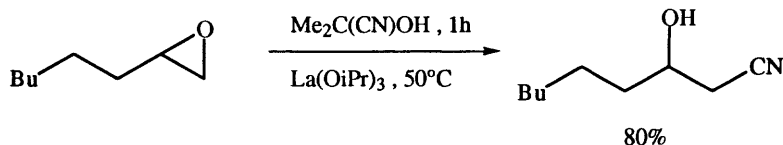


Corey, E.J.; Wang, Z. *Tetrahedron Lett.*, 1993, 34, 4001

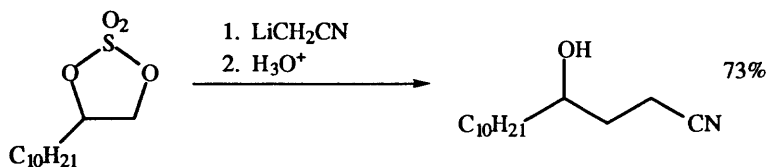


enzyme = hydroxynitrile lyase from *Hevea brasiliensis*

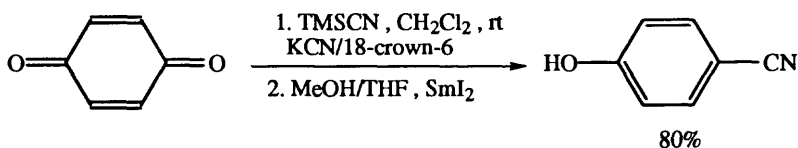
Klempier, N.; Griengl, H.; Hayn, M. *Tetrahedron Lett.*, 1993, 34, 4769



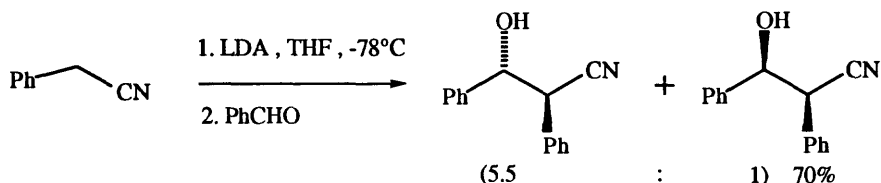
Ohno, H.; Mori, A.; Inoue, S. *Chem. Lett.*, 1993, 975



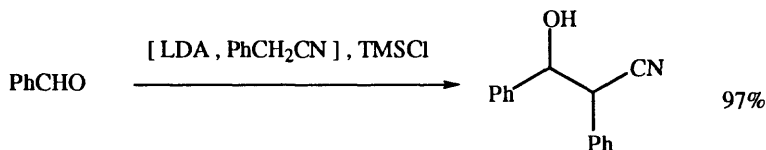
Hoye, T.R.; Crawford, K.B. *J. Org. Chem.*, 1994, 59, 520



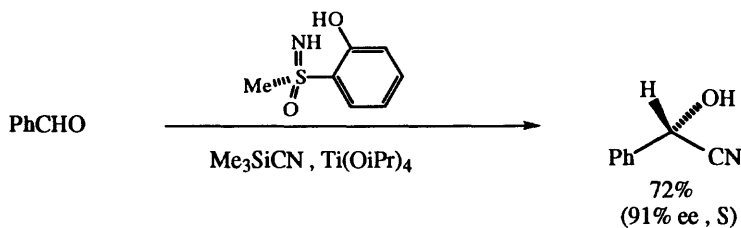
Olson, S.H.; Danishefsky, S.J. *Tetrahedron Lett.*, **1994**, 35, 7901



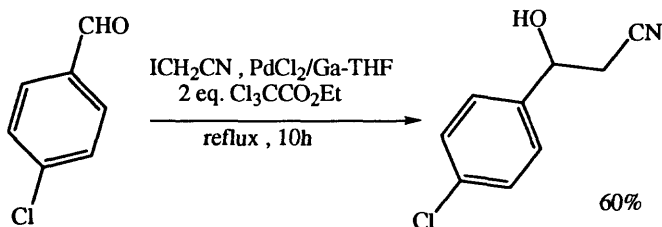
Carlier, P.R.; Lo, K.M.; Lo, M.M.-C.; Williams, I.D. *J. Org. Chem.*, **1995**, 60, 7511



Zhou, J.J.P.; Zhong, B.; Silverman, R.B. *J. Org. Chem.*, **1995**, 60, 2261



Bolm, C.; Müller, P. *Tetrahedron Lett.*, **1995**, 36, 1625



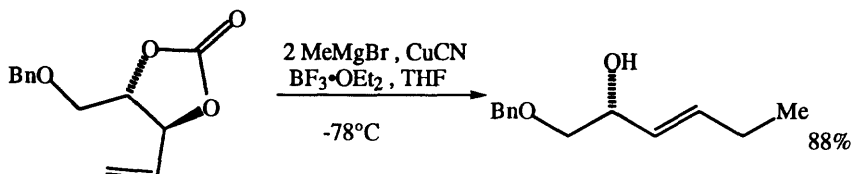
Zhang, X.-L.; Han, Y.; Tao, W.-T.; Huang, Y.-Z. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 189

Review:

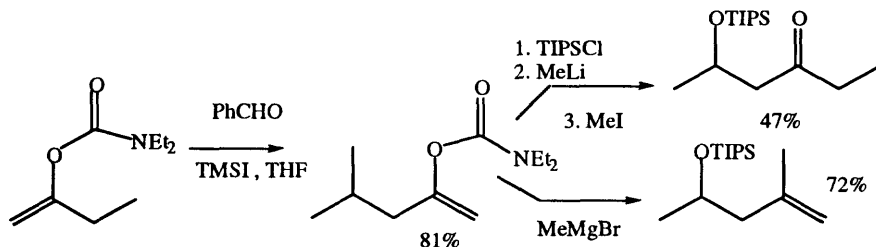
"Catalytic Asymmetric Cyanohydrin Synthesis," North, M. *Synlett*, **1993**, 807

SECTION 332: ALCOHOL, THIOL - ALKENE

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

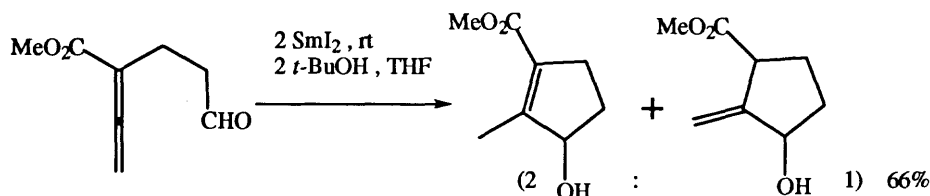


Kang, S.-K.; Lee, D.-H.; Sim, H.-S.; Lim, J.-S. *Tetrahedron Lett.*, 1993, 34, 91

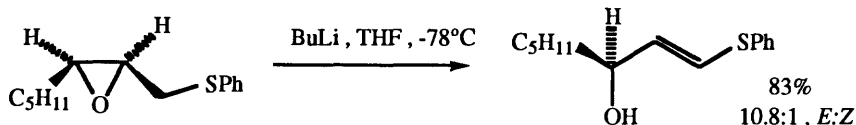


Tsukazaki, M.; Snieckus, V. *Tetrahedron Lett.*, 1993, 34, 411

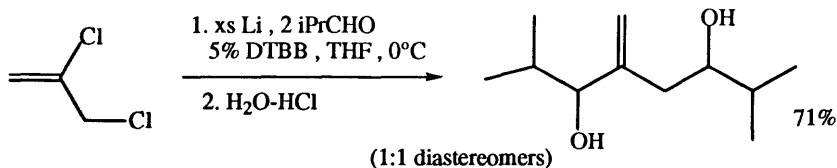
Lee, J.; Tsukazaki, M.; Snieckus, V. *Tetrahedron Lett.*, 1993, 34, 415



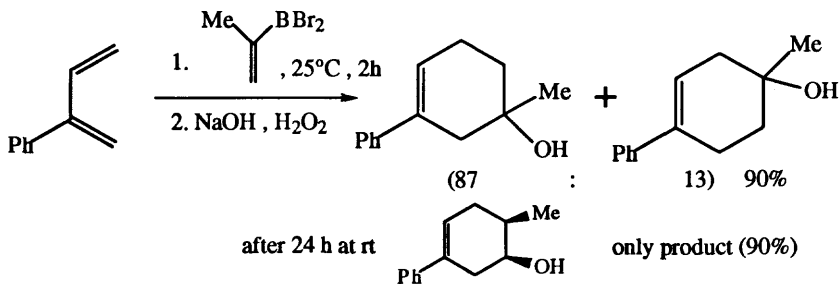
Gillmann, T. *Tetrahedron Lett.*, 1993, 34, 607



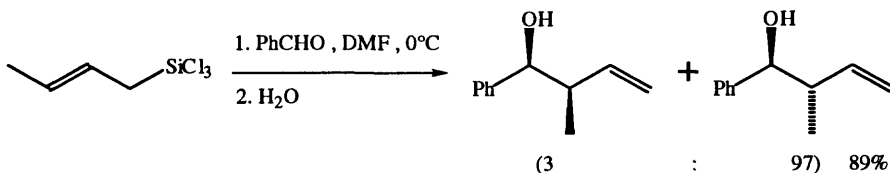
Takano, S.; Sugihara, Y.; Ogasawara, K. *Tetrahedron Lett.*, 1993, 34, 845



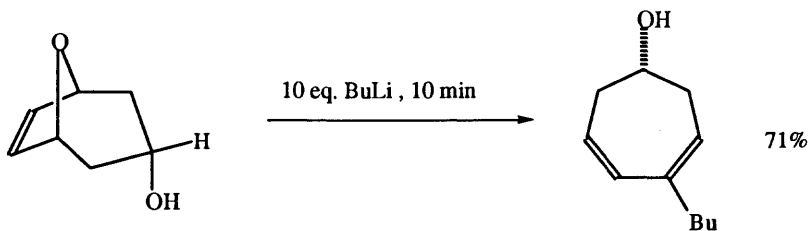
Guijarro, A.; Yus, M. *Tetrahedron Lett.*, 1993, 34, 2011



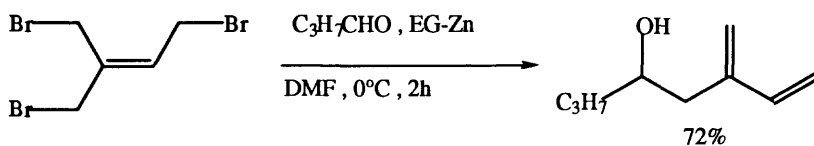
Singleton, D.A.; Kim, K.; Martinez, J.P. *Tetrahedron Lett.*, 1993, 34, 3071



Kobayashi, S.; Nishio, K. *Tetrahedron Lett.*, 1993, 34, 3453

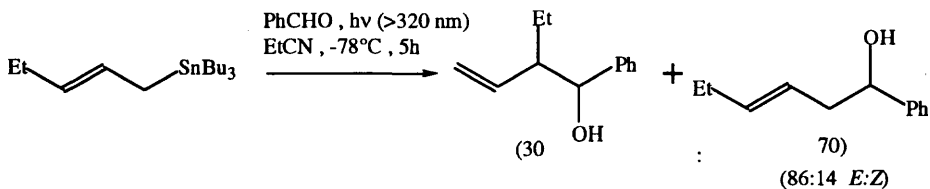


Lautens, M.; Gajda, C. *Tetrahedron Lett.*, 1993, 34, 4591

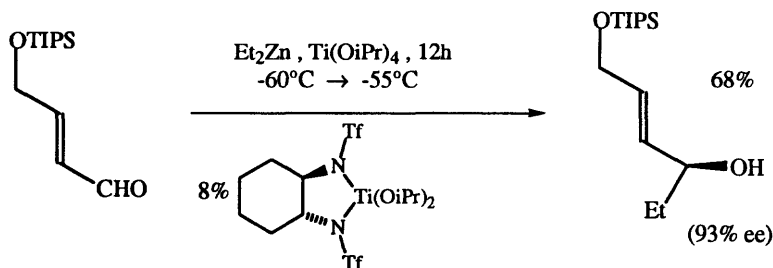


EG-Zn = electrogenerated reactive zinc

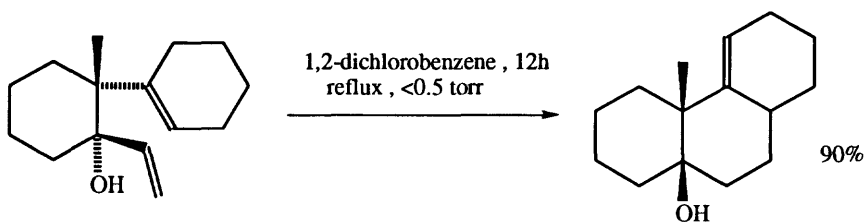
Tokuda, M.; Mimura, N.; Karasawa, T.; Fujita, H.; Suginome, H. *Tetrahedron Lett.*, 1993, 34, 7607



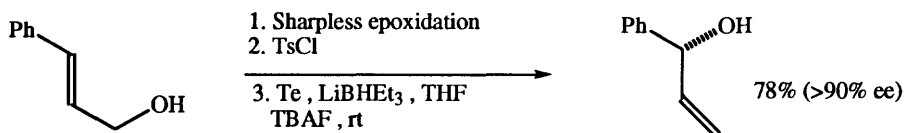
Takuwa, A.; Shiigi, J.; Nishigaichi, Y. *Tetrahedron Lett.*, 1993, 34, 3457



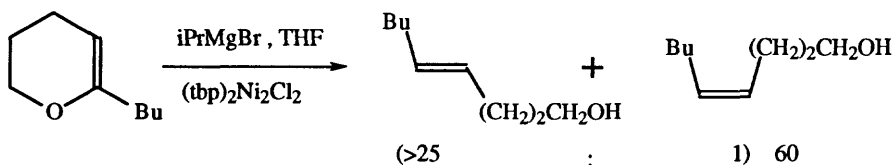
Rozema, M.J.; Eisenberg, C.; Lütjens, H.; Ostwald, R.; Belyk, K.; Knochel, P. *Tetrahedron Lett.*, **1993**, *34*, 3115



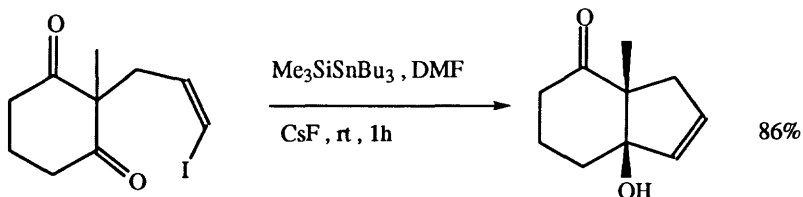
Janardhanam, S.; Devan, B.; Rajogopalan, K. *Tetrahedron Lett.*, **1993**, *34*, 6761



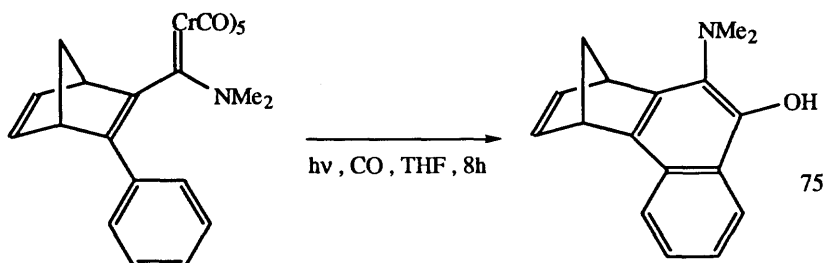
Dittmer, D.C.; Discordia, R.P.; Zhang, Y.; Murphy, C.K.; Kumar, A.; Pepito, A.S.; Wang, Y. *J. Org. Chem.*, **1993**, *58*, 718



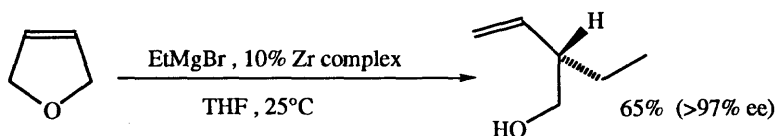
Ducoux, J.-P.; LeMénez, P.; Kunesch, N.; Wenkert, E. *J. Org. Chem.*, **1993**, *58*, 1290



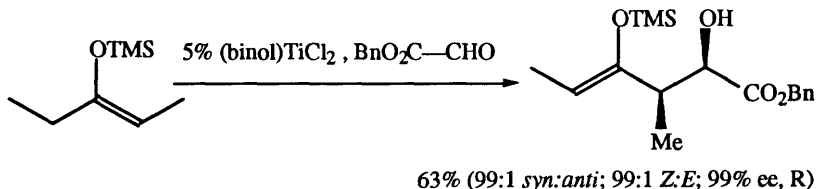
Mori, M.; Isono, N.; Kaneta, N.; Shibasaki, M. *J. Org. Chem.*, **1993**, *58*, 2972



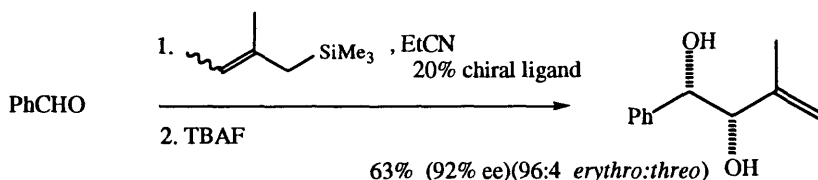
Merlic, C.A.; Xu, D.; Gladstone, B.G. *J. Org. Chem.*, **1993**, *58*, 538



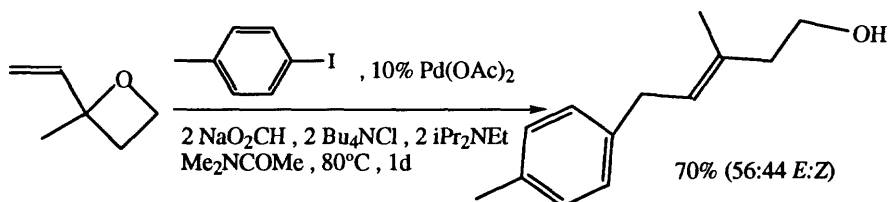
Morken, J.P.; Didiuk, M.T.; Hoveyda, A.H. *J. Am. Chem. Soc.*, **1993**, *115*, 6997



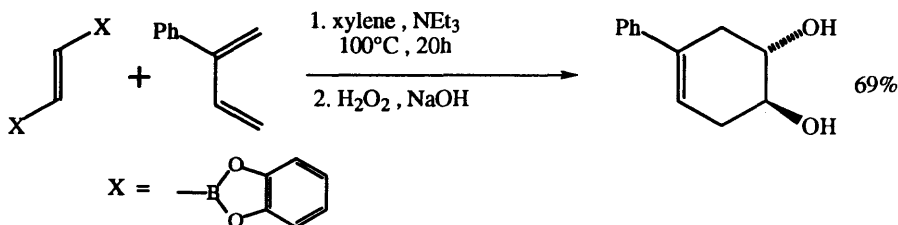
Mikami, K.; Matsukawa, S. *J. Am. Chem. Soc.*, **1993**, *115*, 7039



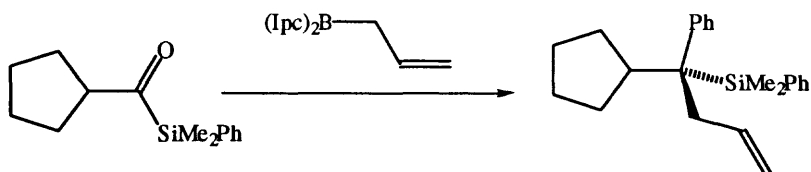
Ishihara, K.; Mouri, M.; Gao, Q.; Maruyama, T.; Furuta, K.; Yamamoto, H. *J. Am. Chem. Soc.*, **1993**, *115*, 11490



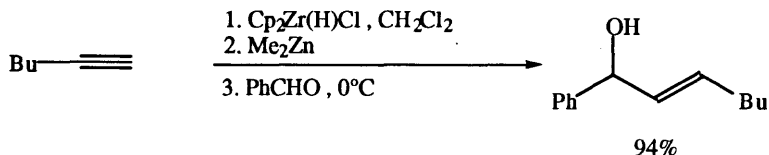
Larock, R.C.; Ding, S.; Tu, C. *Synlett*, **1993**, 145



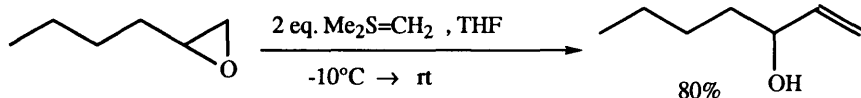
Singleton, D.A.; Redman, A.M. *Tetrahedron Lett.*, 1994, 35, 509



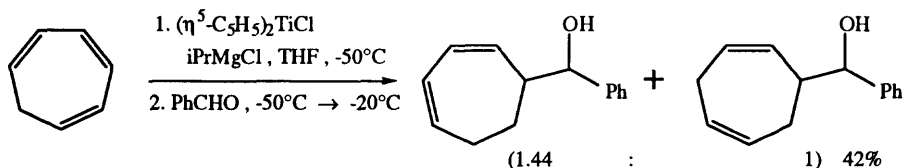
Buynak, J.D.; Geng, B.; Uang, S.; Strickland, J.B. *Tetrahedron Lett.*, 1994, 35, 985



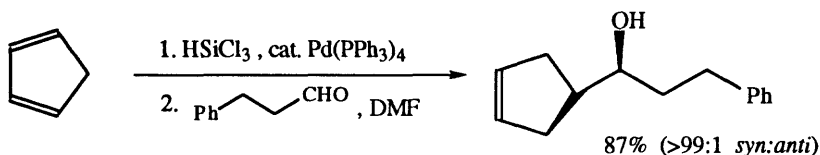
Wipf, P.; Xu, W. *Tetrahedron Lett.*, 1994, 35, 5197



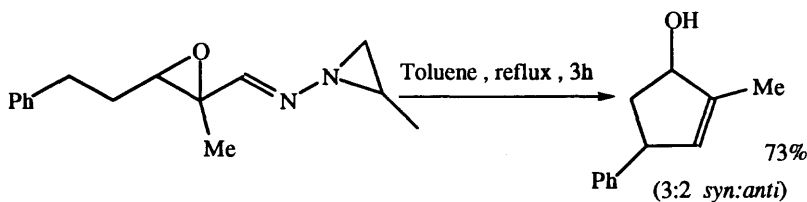
Alcaraz, L.; Harnett, J.J.; Mioskowski, C.; Martel, J.P.; Le Gall, T.; Shin, D.-S.; Falck, J.R. *Tetrahedron Lett.*, 1994, 35, 5449



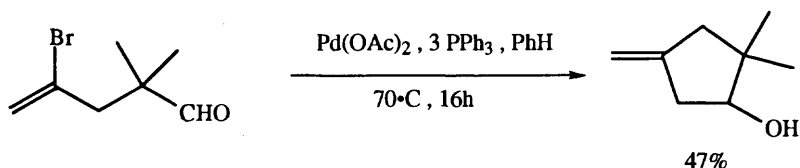
Szymoniak, J.; Felix, D.; Moïse, C. *Tetrahedron Lett.*, 1994, 35, 8613



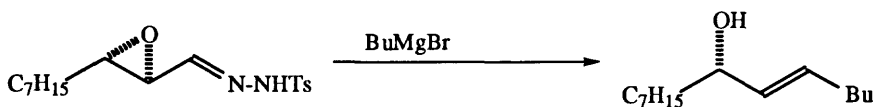
Kobayashi, S.; Nishio, K. *Synthesis*, 1994, 457



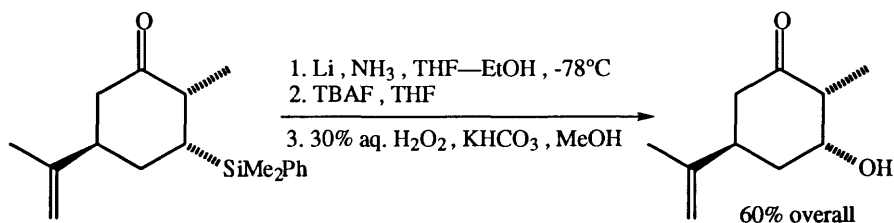
Kim, S.; Cho, C.M. *Tetrahedron Lett.*, **1994**, 35, 8405



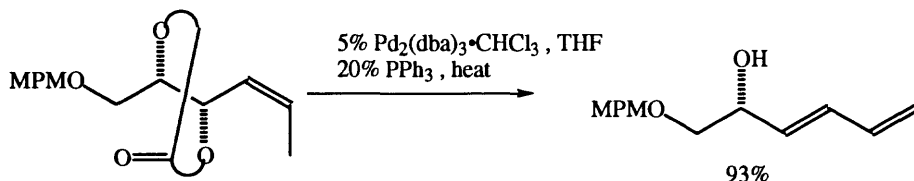
Watanabe, T.; Sakai, M.; Miyaura, N.; Suzuki, A. *J. Chem. Soc. Chem. Commun.*, **1994**, 467



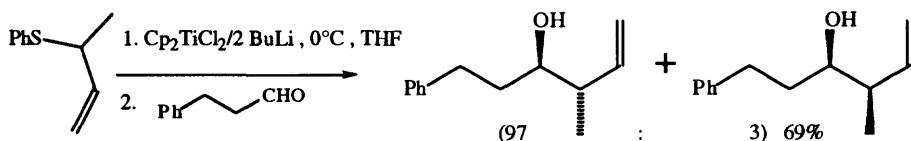
Chandrasekhar, S.; Takhi, M.; Yadav, J.S. *Tetrahedron Lett.*, **1995**, 36, 307



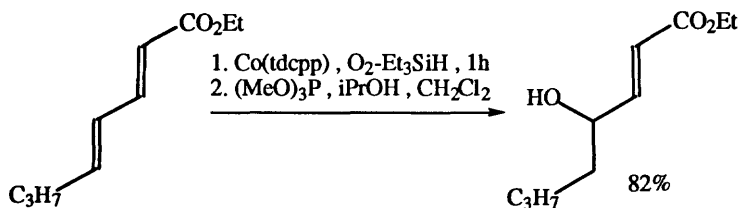
Taber, D.E.; Yet, L.; Bhamidipati, R.S. *Tetrahedron Lett.*, **1995**, 36, 351



Kang, S.-K.; Park, D.-C.; Park, C.-H.; Hong, R.-K. *Tetrahedron Lett.*, **1995**, 36, 405

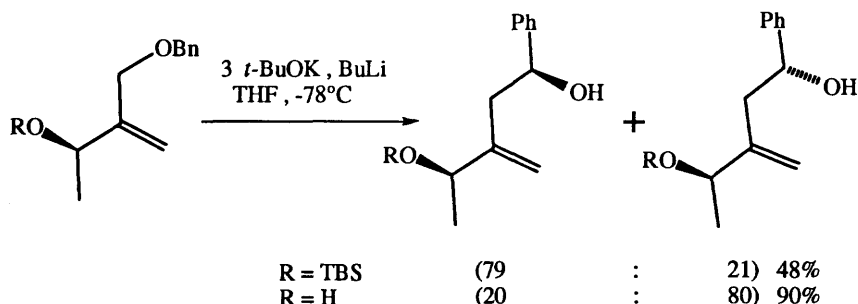


Takeda, T.; Miura, I.; Horikawa, Y.; Fujiwara, T. *Tetrahedron Lett.*, **1995**, 36, 1495

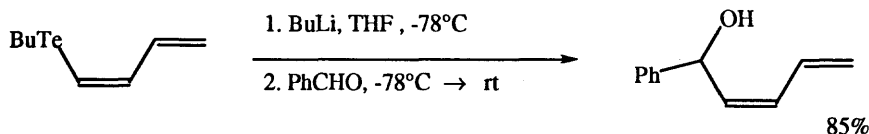


Co(tdcpp) = [5,10,15,20-tetrakis(2,6-dichlorophenyl)
porphinato] Cobalt (II)

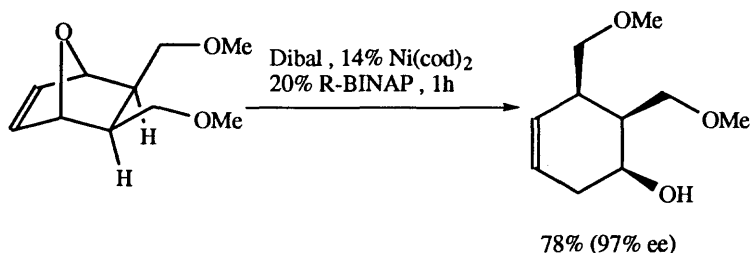
Matsushita, Y.; Sugamoto, K.; Nakama, T.; Sakamoto, T.; Matsui, T.; Nakayama, M.
Tetrahedron Lett., 1995, 36, 1879



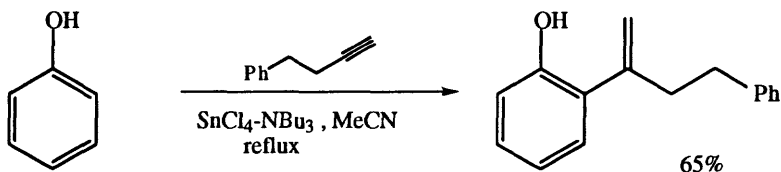
Tomooka, K.; Keong, P.-H.; Nakai, T. *Tetrahedron Lett.*, 1995, 36, 2789



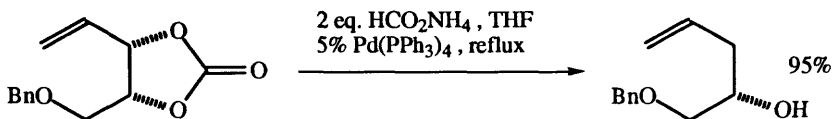
Mo, X.-S.; Huang, Y.-Z. *Tetrahedron Lett.*, 1995, 36, 3589



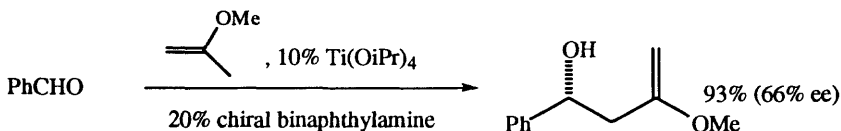
Lautens, M.; Chiu, P.; Ma, S.; Rovis, T. *J. Am. Chem. Soc.*, 1995, 117, 532



Yamaguchi, M.; Hayashi, A.; Hiram, M. *J. Am. Chem. Soc.*, **1995**, *117*, 1151



Kang, S.-K.; Park, D.-C.; Rho, H.-S.; Yu, C.-M.; Hong, J.-H. *Synth. Commun.*, **1995**, *25*, 203



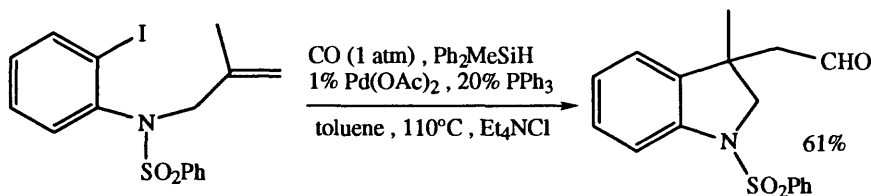
Berrisford, D.J.; Bolm, C. *Angew. Chem. Int. Ed. Engl.*, **1995**, *34*, 1717

Also via: Section 302 (Alkyne - Alcohol).

SECTION 333: ALDEHYDE - ALDEHYDE

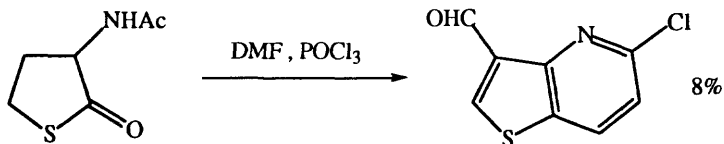
NO ADDITIONAL EXAMPLES

SECTION 334: ALDEHYDE - AMIDE



Brown, S.; Clarkson, S.; Grigg, R.; Sridharan, V. *J. Chem. Soc. Chem. Commun.*, **1995**, 1135

SECTION 335: ALDEHYDE - AMINE

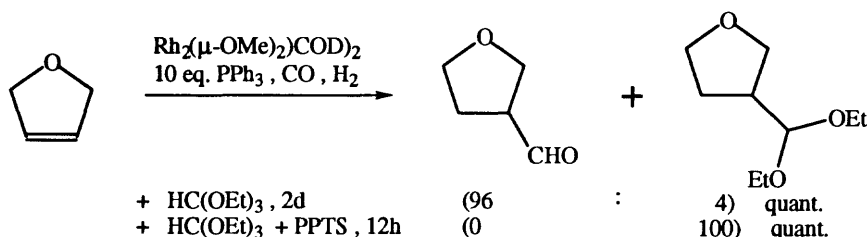
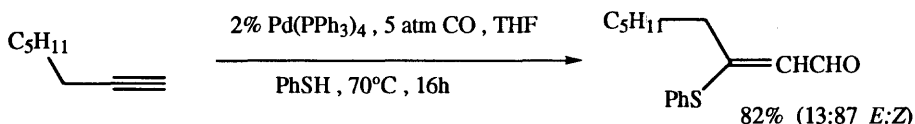


Balasundaram, B.; Venugopal, M.; Perumal, P.T. *Tetrahedron Lett.*, **1993**, *34*, 4249

SECTION 336: ALDEHYDE - ESTER

NO ADDITIONAL EXAMPLES

SECTION 337: ALDEHYDE - ETHER, EPOXIDE, THIOETHER

Fernández, E.; Castillón, S. *Tetrahedron Lett.*, 1994, 35, 2361Ogawa, A.; Takeba, M.; Kawakami, J.; Ryu, I.; Kambe, N.; Sonoda, N. *J. Am. Chem. Soc.*, 1995, 117, 7564

SECTION 338: ALDEHYDE - HALIDE, SULFONATE

NO ADDITIONAL EXAMPLES

SECTION 339: ALDEHYDE - KETONE

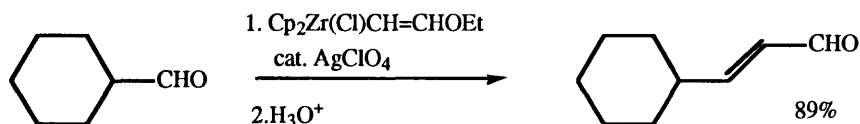
NO ADDITIONAL EXAMPLES

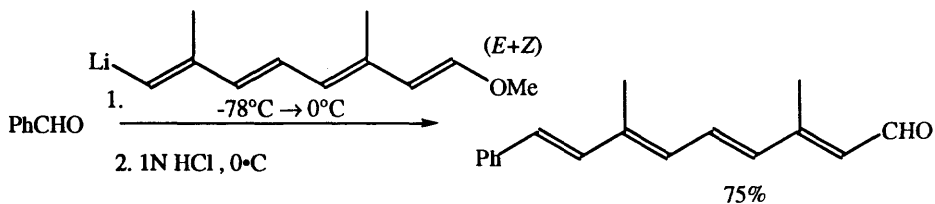
SECTION 340: ALDEHYDE - NITRILE

NO ADDITIONAL EXAMPLES

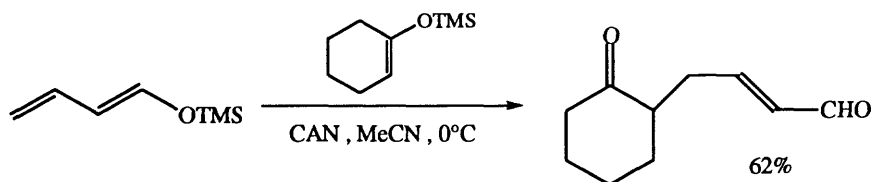
SECTION 341: ALDEHYDE - ALKENE

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

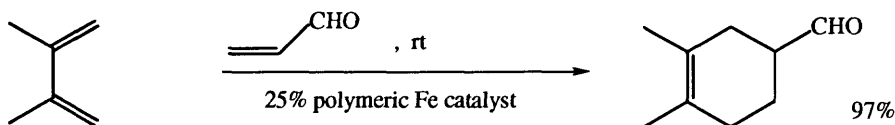
Maeta, H.; Suzuki, K. *Tetrahedron Lett.*, 1993, 34, 341



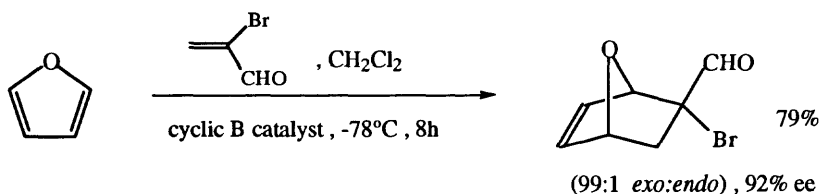
Duhamel, L.; Duhamel, P.; Le Gallic, Y. *Tetrahedron Lett.*, **1993**, 34, 319



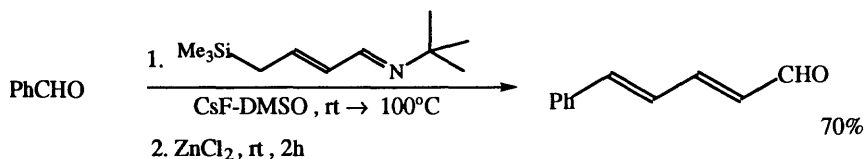
Paolobelli, A.B.; Latini, D.; Ruzziconi, R. *Tetrahedron Lett.*, **1993**, 34, 721



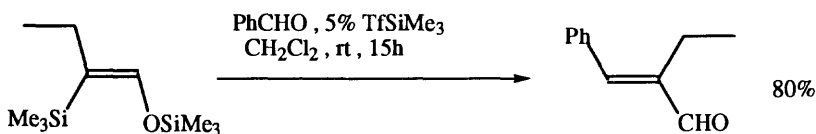
Saha, A.K.; Hossain, M.M. *Tetrahedron Lett.*, **1993**, 34, 3833



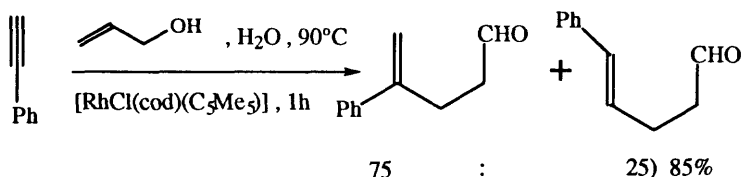
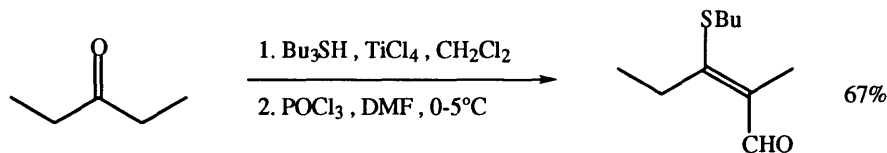
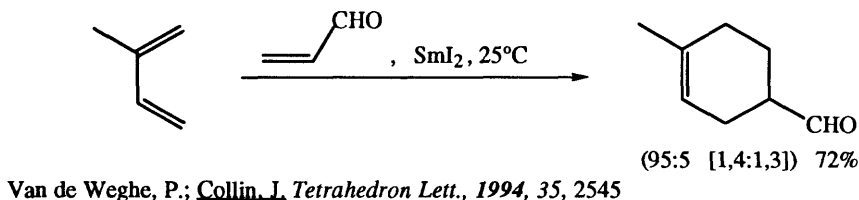
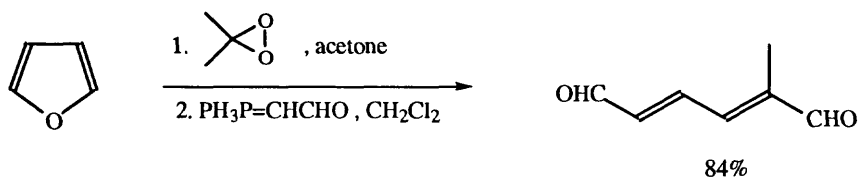
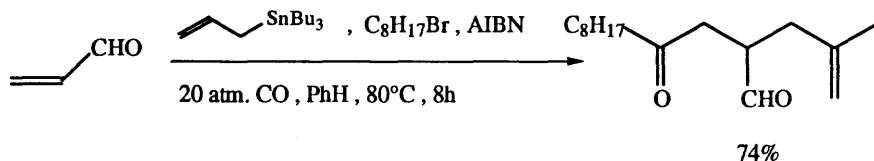
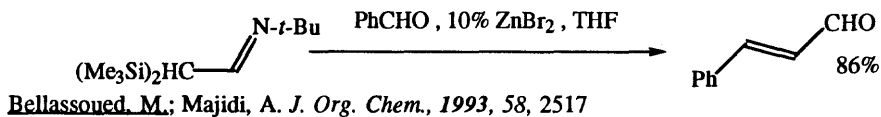
Corey, E.L.; Loh, T.-P. *Tetrahedron Lett.*, **1993**, 34, 3979

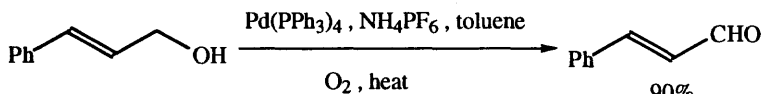


Bellassoued, M.; Salemkour, M. *Tetrahedron Lett.*, **1993**, 34, 5281

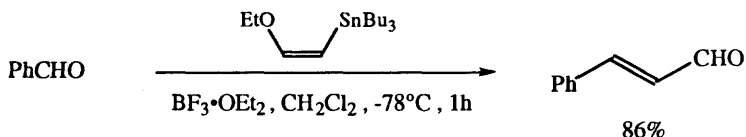


Duhamel, L.; Gralek, J.; Bouyanzer, A. *Tetrahedron Lett.*, **1993**, 34, 7745

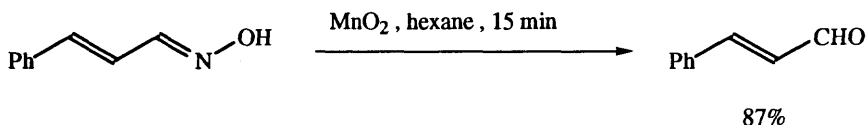




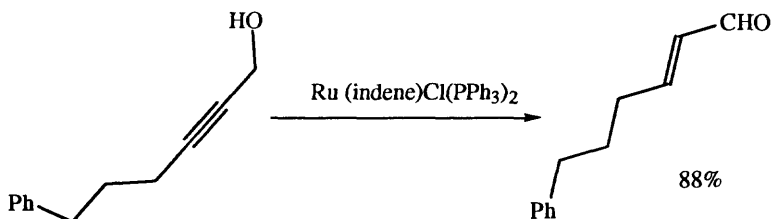
Gómez-Bengoa, E.; Noheda, P.; Echavarren, A.M. *Tetrahedron Lett.*, **1994**, 35, 7097



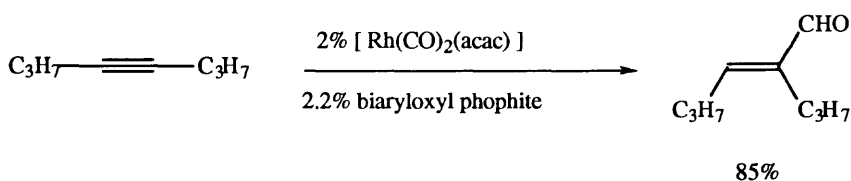
Cabezas, J.A.; Oehlschlager, A.C. *Tetrahedron Lett.*, **1995**, 36, 5127



Shinada, T.; Yoshihara, K. *Tetrahedron Lett.*, **1995**, 36, 6701



Trost, B.M.; Livingston, R.C. *J. Am. Chem. Soc.*, **1995**, 117, 9586



Johnson, J.R.; Cuny, G.D.; Buchwald, S.L. *Angew. Chem. Int. Ed. Engl.*, **1995**, 34, 1760

Also via β -Hydroxy aldehydes: Section 324 (Alcohols - Aldehyde).

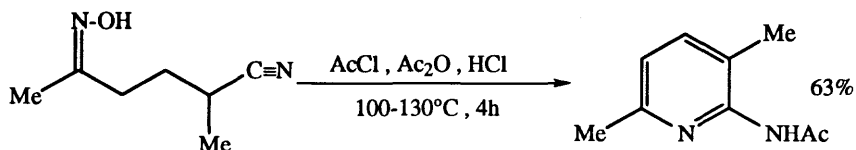
SECTION 342: AMIDE - AMIDE

NO ADDITIONAL EXAMPLES

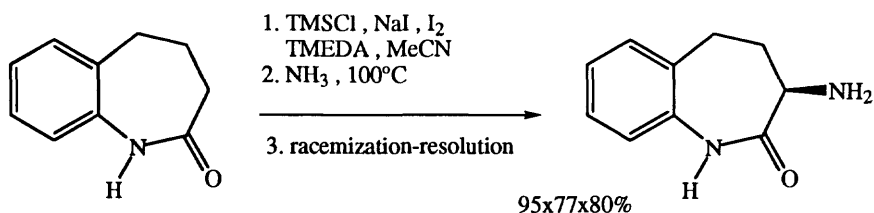
Also via Dicarboxylic Acids:
Diamines

Section 312 (Carboxylic Acid - Carboxylic Acid)
Section 350 (Amines - Amines)

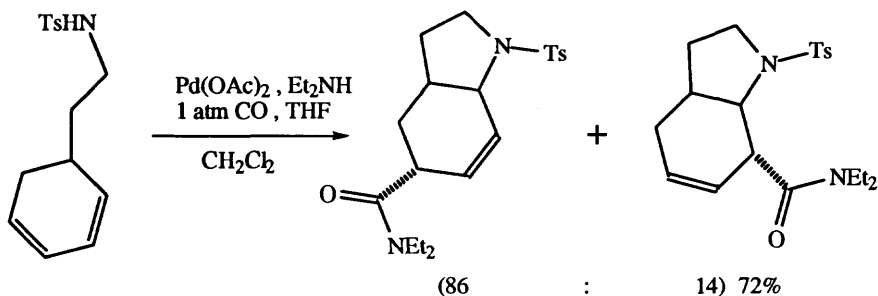
SECTION 343: AMIDE - AMINE



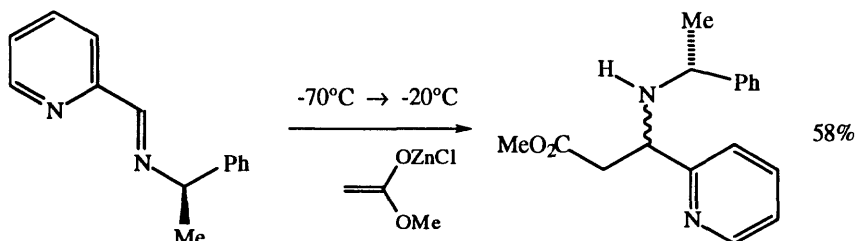
Vijn, R.J.; Arts, H.J.; Maas, P.J.; Castelijns, A.M. *J. Org. Chem.*, **1993**, *58*, 887



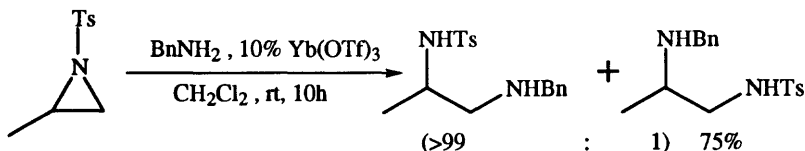
Armstrong III, J.E.; Eng, K.K.; Keller, J.L.; Purick, R.M.; Hartner Jr., F.W.; Choi, W.-B.; Askin, D.; Volante, R.P. *Tetrahedron Lett.*, **1994**, *35*, 3239



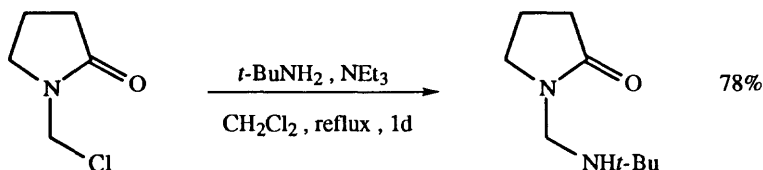
Andersson, P.G.; Aranyos, A. *Tetrahedron Lett.*, **1994**, *35*, 4441



van Maanen, H.L.; Kleijn, H.; Jastrebski, T.B.H.; van Koten, G. *Recl. Trav. Chim. Pays-Bas*, **1994**, *113*, 567

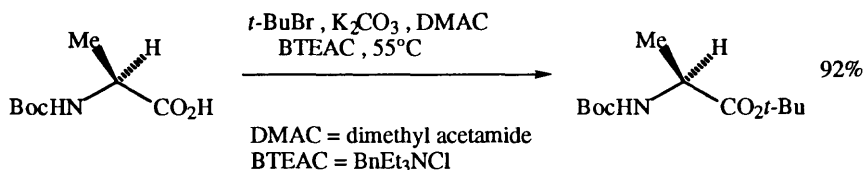


Meguro, M.; Asao, N.; Yamamoto, Y. *Tetrahedron Lett.*, **1994**, 35, 7395

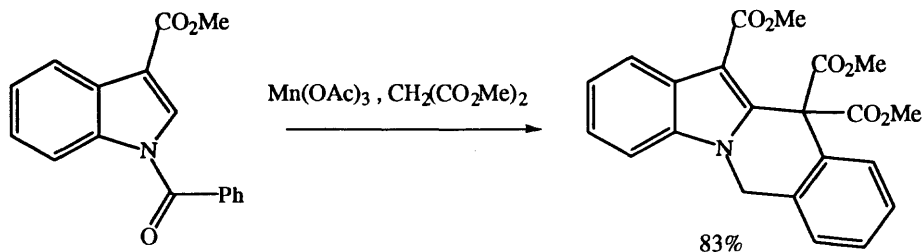


Chen, P.; Suh, D.-J.; Smith, M.B. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 1317

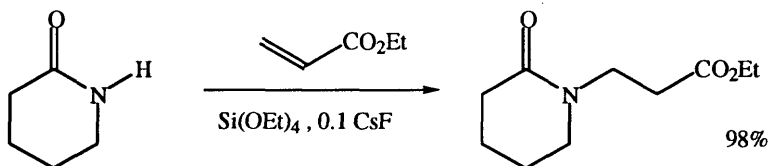
SECTION 344: AMIDE - ESTER



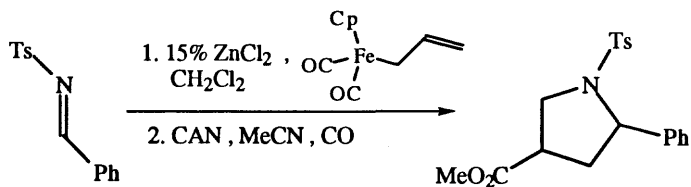
Chevallet, P.; Garroust, P.; Malawska, B.; Martinez, J. *Tetrahedron Lett.*, **1993**, 34, 7409



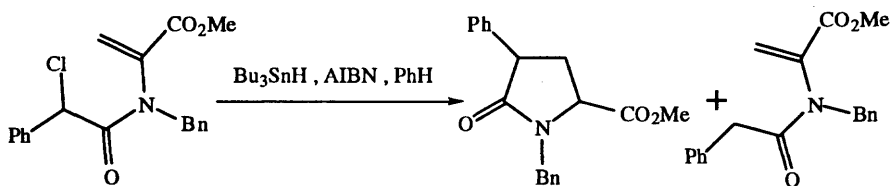
Chuang, C.-P.; Wang, S.-F. *Tetrahedron Lett.*, **1994**, 35, 1283



Ahn, K.H.; Lee, S.J. *Tetrahedron Lett.*, **1994**, 35, 1875

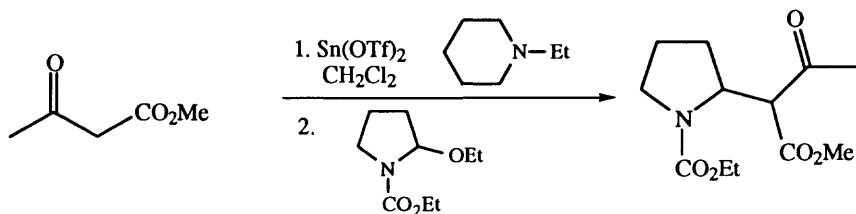


Chen, T.; Jiang, S.; Turos, E. *Tetrahedron Lett.*, **1994**, 35, 8325



52%

Goodall, K.; Parsons, A.F. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 3257



78%

Nagasaka, T.; Nishida, S.; Sugihara, S.; Kawahara, T.; Adachi, K.; Hamaguchi, F. *Heterocycles*, **1994**, 39, 171

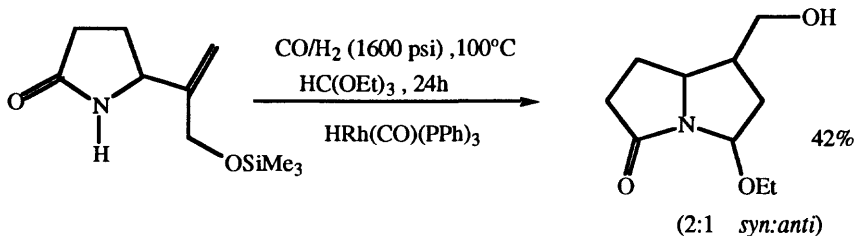
Related Methods:

Section 315 (Carboxylic Acid - Amide)

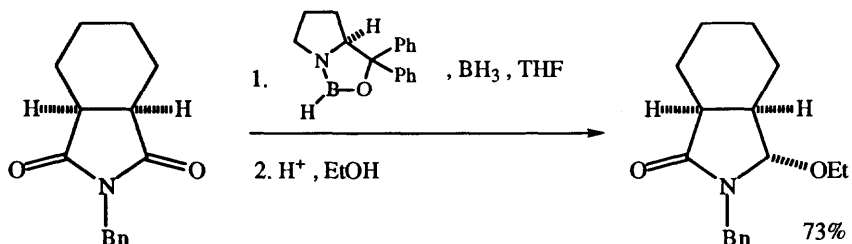
Section 316 (Carboxylic Acid - Amine)

Section 351 (Amine - Ester)

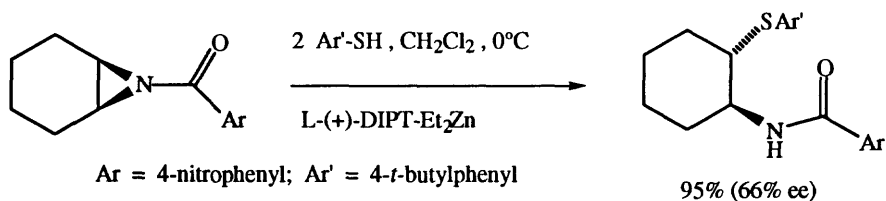
SECTION 345: AMIDE - ETHER, EPOXIDE, THIOETHER



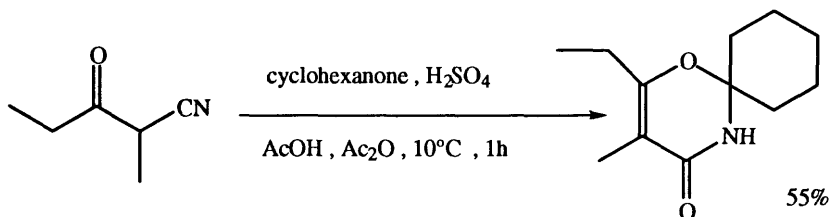
Eguchi, M.; Zeng, Q.; Korda, A.; Ojima, I. *Tetrahedron Lett.*, **1993**, 34, 915



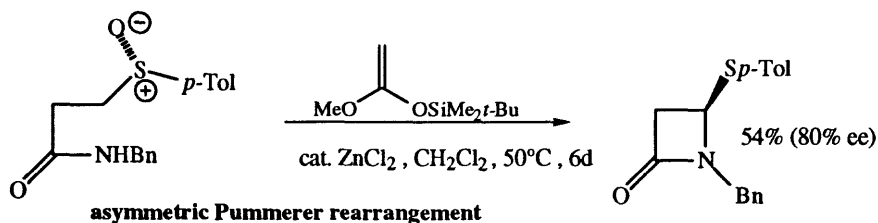
Romagnoli, R.; Roos, E.C.; Hiemstra, H.; Mollenaar, M.H.; Speckamp, W.N.; Kaptein, B.; Schoemaker, H.E. *Tetrahedron Lett.*, **1994**, 35, 1087



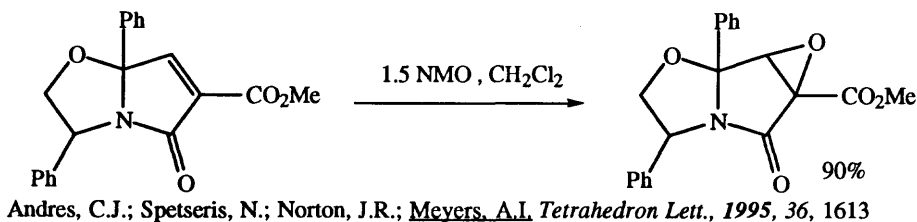
Hayashi, M.; Ono, K.; Hoshimi, H.; Oguni, N. *J. Chem. Soc. Chem. Commun.*, **1994**, 2699



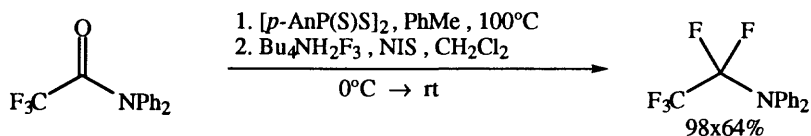
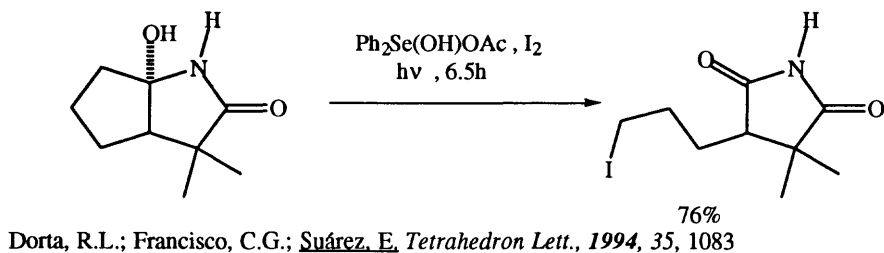
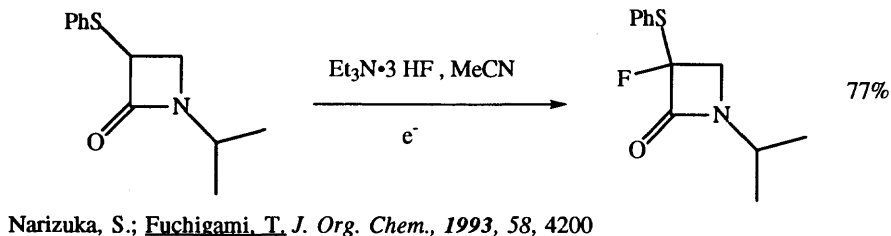
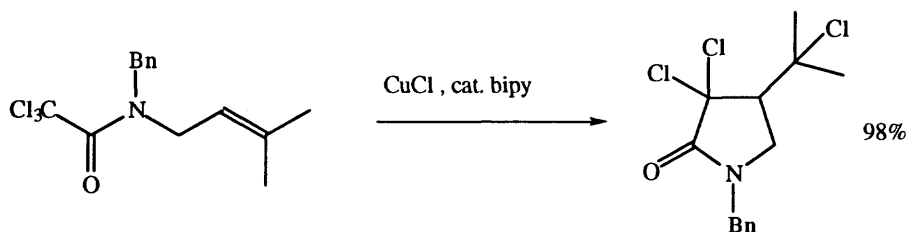
Stambach, J.-F.; Jung, L.; Hug, R. *Heterocycles*, **1994**, 38, 297

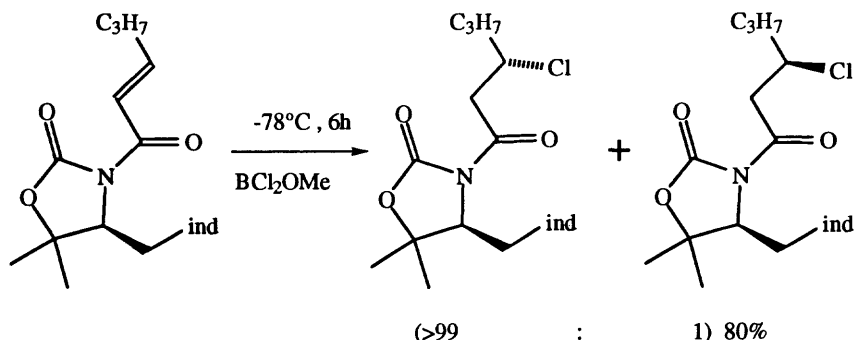


Kita, Y.; Shibata, N.; Kawano, N.; Toho, T.; Fujimori, C.; Matsumoto, K. *Tetrahedron Lett.*, **1995**, 36, 115



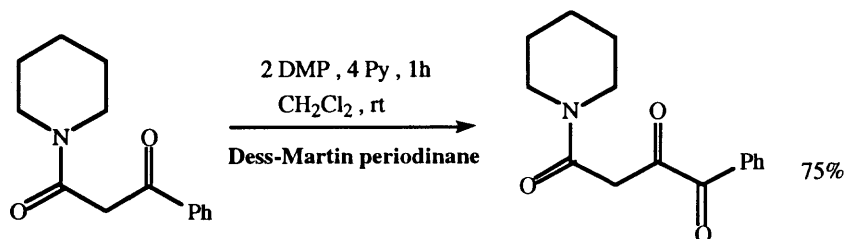
SECTION 346: AMIDE - HALIDE, SULFONATE





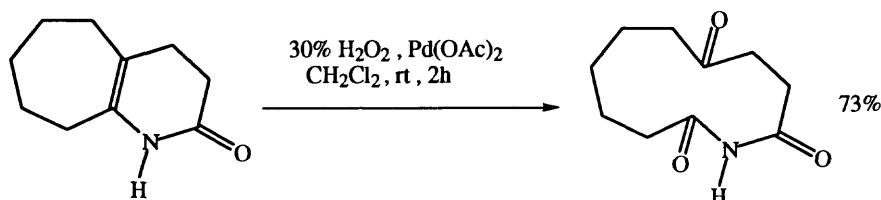
Cardillo, G.; Di Martino, E.; Gentilucci, L.; Tomasini, C.; Tomasoni, L. *Tetrahedron Asymmetry*, **1995**, *6*, 1957

SECTION 347: AMIDE - KETONE

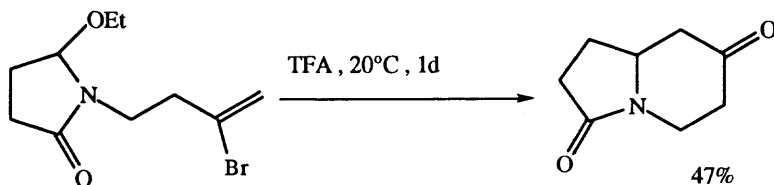


DMP = 1,1,1-triacetoxy-1,1'-dihydro-1,2-benzodioxol-3(1H)-one

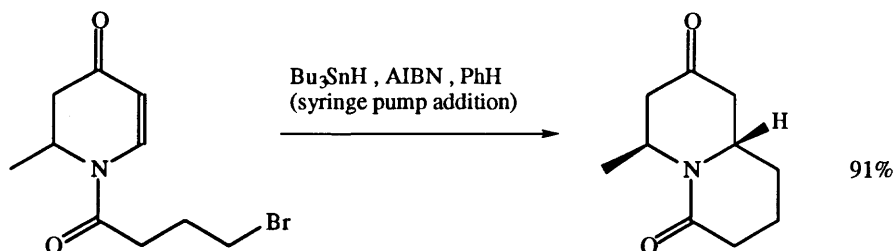
Batchelor, M.J.; Gillespie, R.J.; Golec, J.M.C.; Hedgecock, C.J.R. *Tetrahedron Lett.*, **1993**, *34*, 167



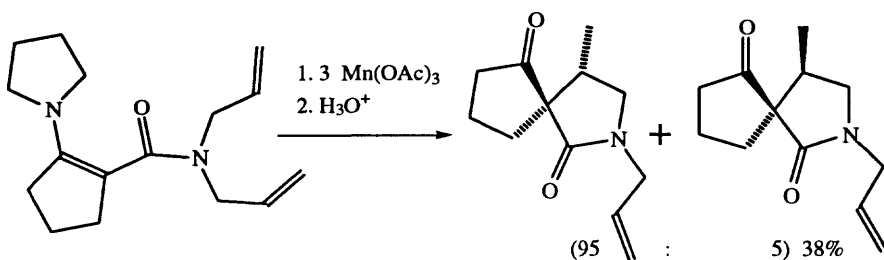
Naota, T.; Sasao, S.; Tanaka, K.; Yamamoto, H.; Murahashi, S. *Tetrahedron Lett.*, **1993**, *34*, 4843



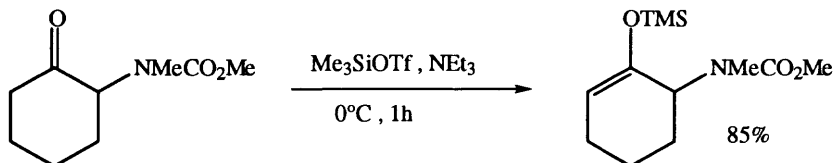
Gesson, L.-P.; Jacquesy, J.-C.; Rambaud, D. *Tetrahedron*, **1993**, *49*, 2239



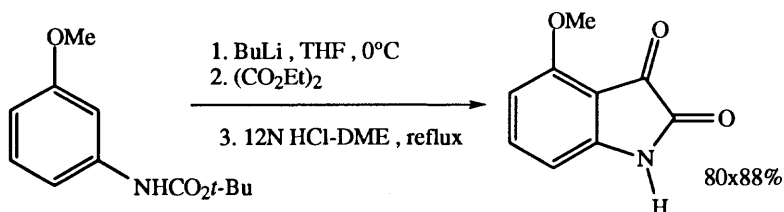
Beckwith, A.L.J.; Joseph, S.P.; Mayadunne, R.T.A. *J. Org. Chem.*, **1993**, 58, 4198



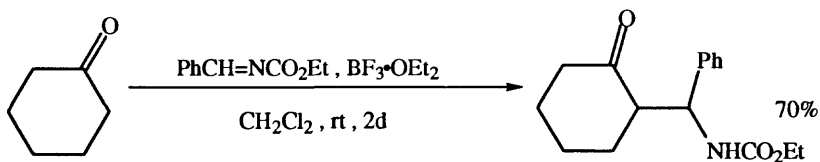
Cossy, J.; Bouzide, A.; Leblanc, C. *Synlett*, **1993**, 202



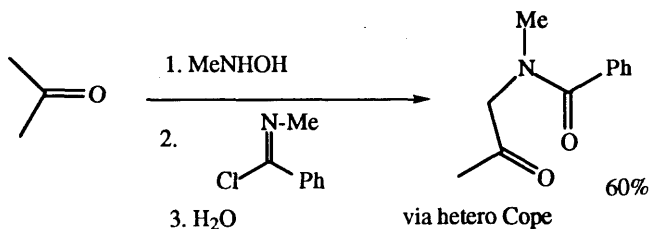
Rossi, L.; Pecunioso, A. *Tetrahedron Lett.*, **1994**, 35, 5285



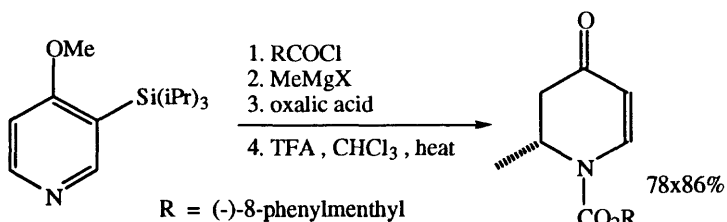
Hewawasam, P.; Meanwell, N.A. *Tetrahedron Lett.*, **1994**, 35, 7303



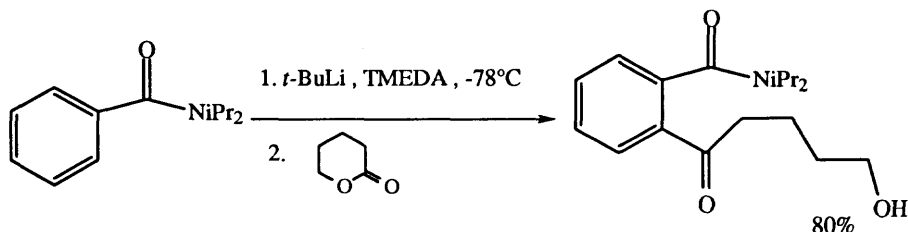
ten Hoeve, W.; Wynberg, H. *Synth. Commun.*, **1994**, 24, 899



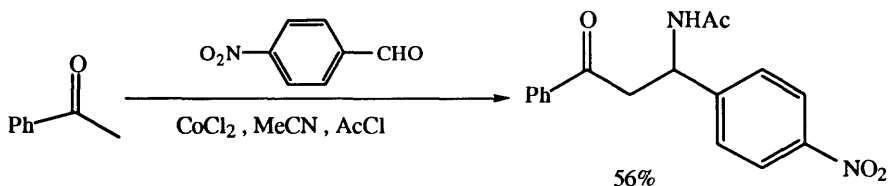
Lantos, I.; Zhang, W.-Y. *Tetrahedron Lett.*, **1994**, 35, 5977



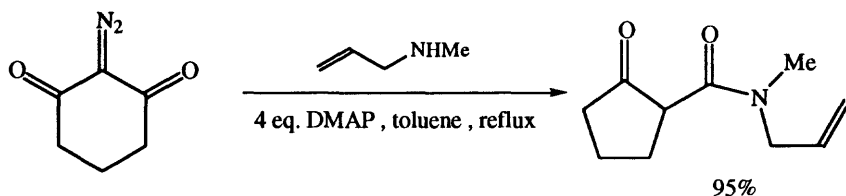
Comins, D.L.; LaMunyon, D.H. *Tetrahedron Lett.*, **1994**, 35, 7343



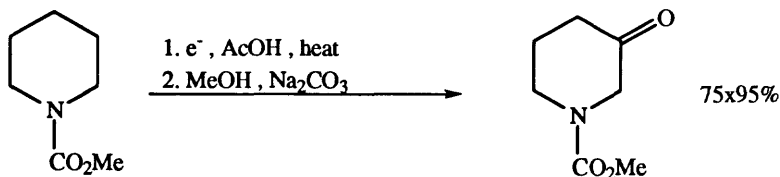
Brenstrum, T.J.; Brimble, M.A.; Stevenson, R.J. *Tetrahedron*, **1994**, 50, 4897



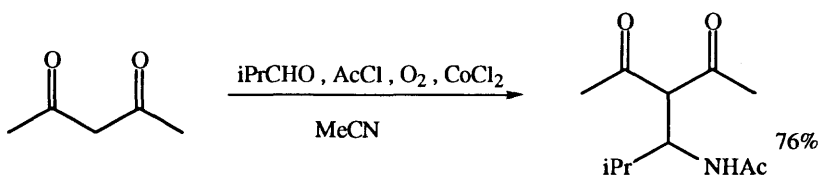
Bhatia, B.; Reddy, M.M.; Iqbal, J. *J. Chem. Soc. Chem. Commun.*, **1994**, 713



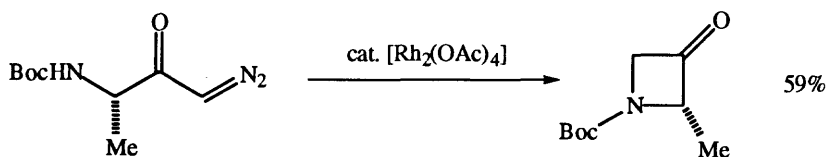
Cossy, J.; Belotti, D.; Bouzide, A.; Thelland, A. *Bull. Soc. Chim. Fr.*, **1994**, 131, 723



Matsumura, Y.; Takeshima, Y.-i.; Okita, H. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 304

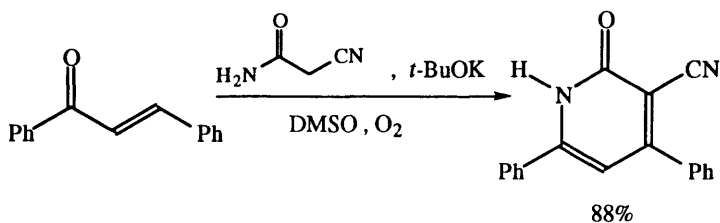


Reddy, M.M.; Bhatia, B.; Iqbal, J. *Tetrahedron Lett.*, **1995**, 36, 4877



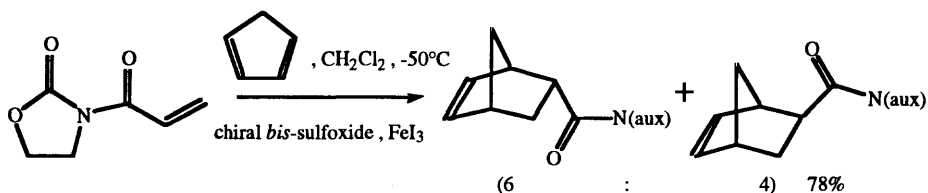
Podlech, J.; Seebach, D. *Helv. Chim. Acta*, **1995**, 78, 1238

SECTION 348: AMIDE - NITRILE

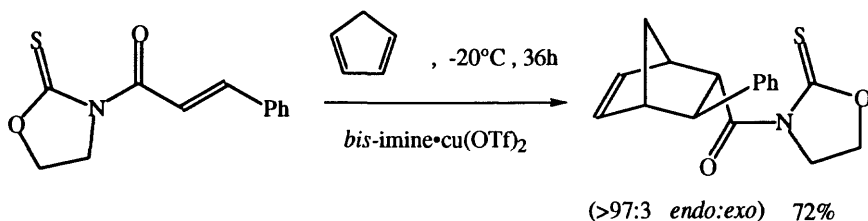
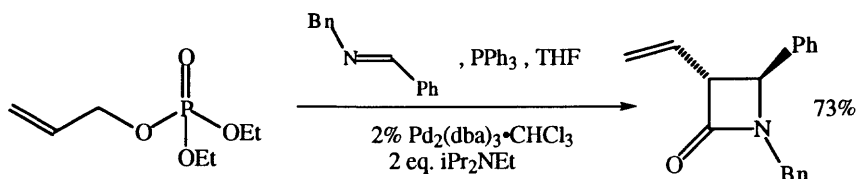
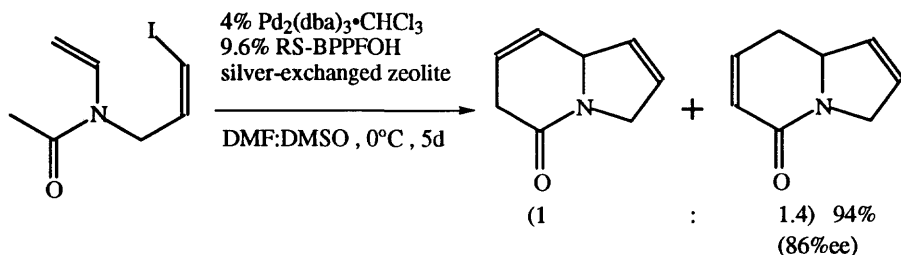
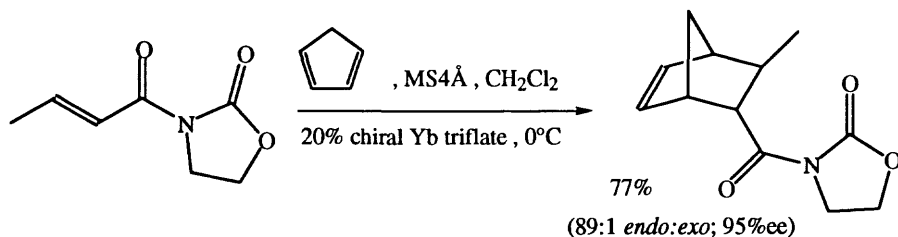
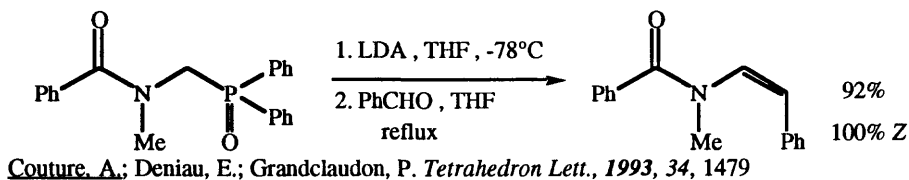


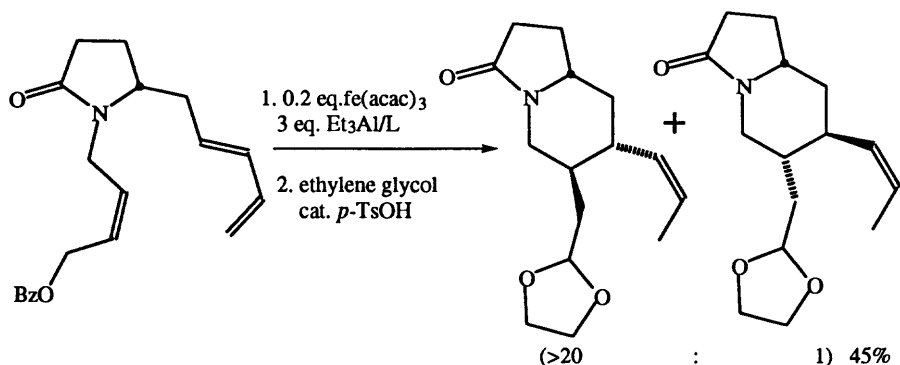
Jain, R.; Roschangar, F.; Ciufolini, M.A. *Tetrahedron Lett.*, **1995**, 36, 3307

SECTION 349: AMIDE - ALKENE

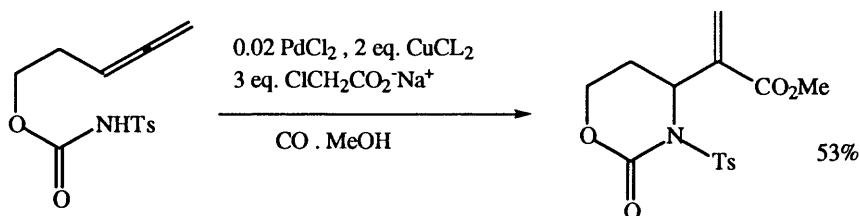


Khier, N.; Fernández, I.; Alcudia, F. *Tetrahedron Lett.*, **1993**, 34, 111

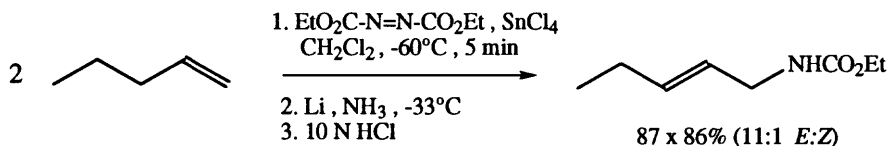




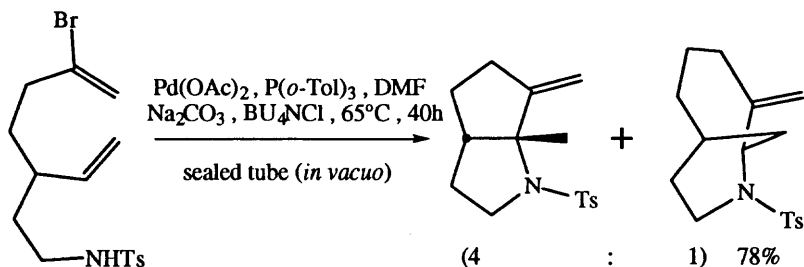
Takacs, J.M.; Weidner, J.J.; Takacs, B.E. *Tetrahedron Lett.*, 1993, 34, 6219



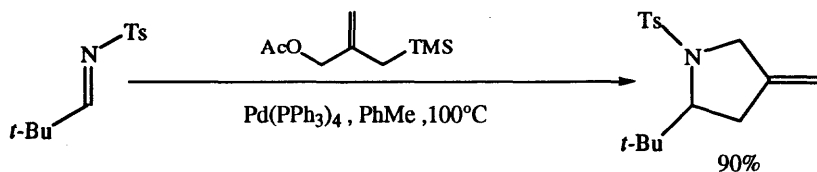
Kimura, M.; Saeki, N.; Uchida, S.; Harayama, H.; Tanaka, S.; Fugami, K.; Tamaru, Y. *Tetrahedron Lett.*, 1993, 34, 7611



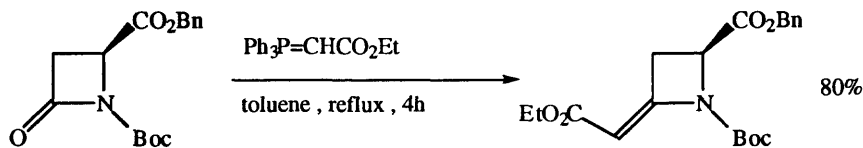
Brimble, M.A.; Heathcock, C.H. *J. Org. Chem.*, 1993, 58, 5261



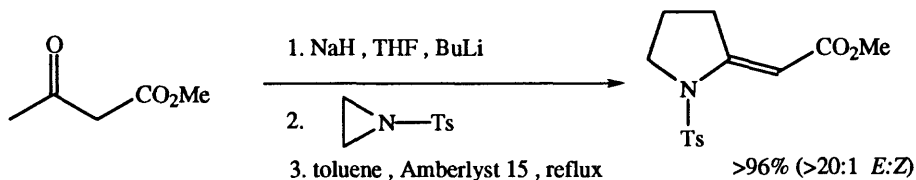
Harris Jr., G.D.; Herr, R.J.; Weinreb, S.M. *J. Org. Chem.*, 1993, 58, 5452



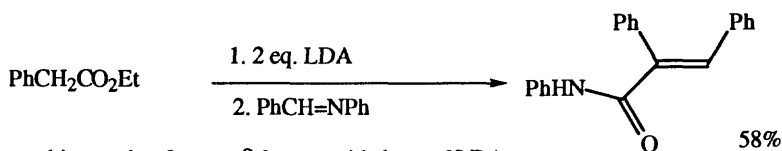
Trost, B.M.; Marrs, C.M. *J. Am. Chem. Soc.*, **1993**, *115*, 6636



Baldwin, J.E.; Edwards, A.J.; Farthing, C.N.; Russell, A.T. *Synlett*, **1993**, 49

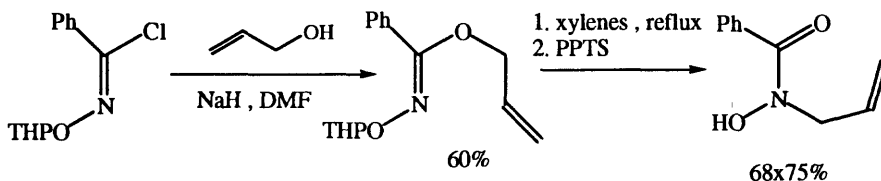


Lygo, B. *Synlett*, **1993**, 764

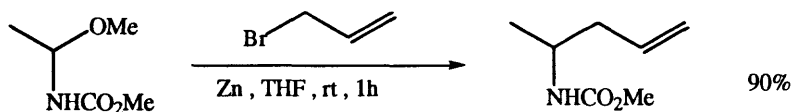


this reaction forms a β -lactam with 1 eq. of LDA

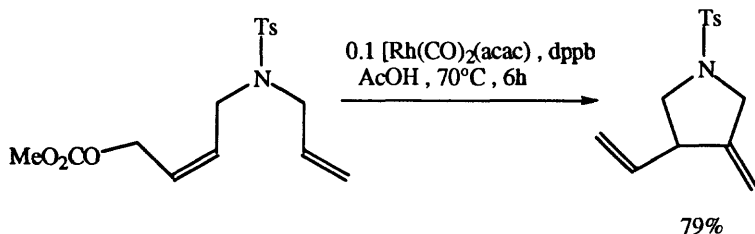
Manhas, M.S.; Chaudhary, A.G.; Raju, V.S.; Robbi, E.W.; Bose, A.K. *Heterocycles*, **1993**, *35*, 635



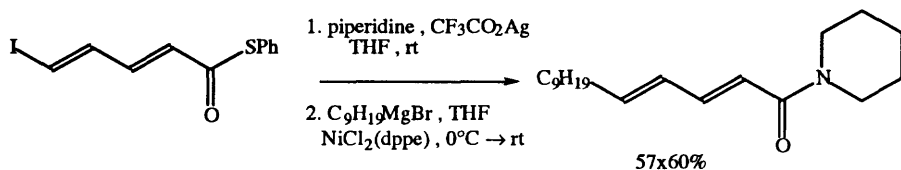
De la Torre, J.A.; Fernandez, M.; Morgans Jr., D.; Smith, D.B.; Talamas, F.X.; Trejo, A. *Tetrahedron Lett.*, **1994**, *35*, 15



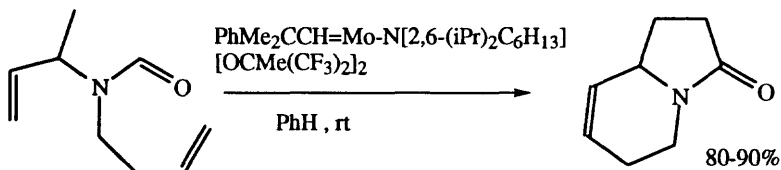
Kise, N.; Yamazaki, H.; Mabuchi, T.; Shono, T. *Tetrahedron Lett.*, **1994**, *35*, 1561



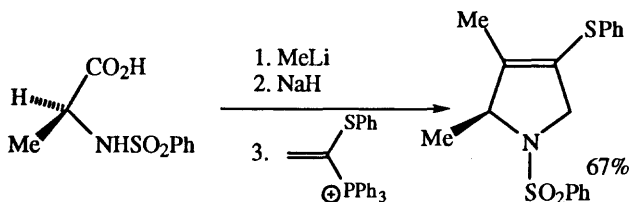
Oppolzer, W.; Fürstner, A. *Helv. Chim. Acta*, **1993**, 76, 2329



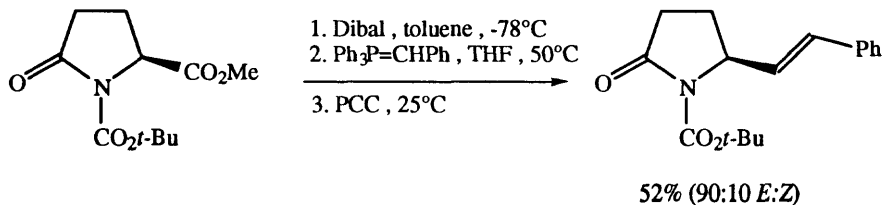
Babudri, F.; Fiandrese, V.; Naso, F.; Punzi, A. *Tetrahedron Lett.*, **1994**, 35, 2067



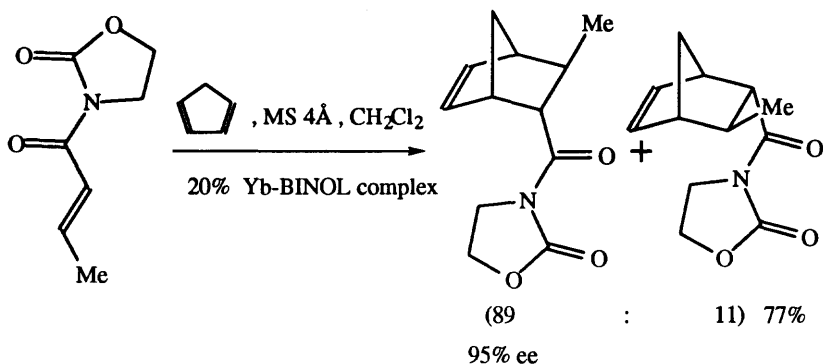
Martin, S.E.; Liao, Y.; Chen, H.-J.; Pätzelt, M.; Ramser, M.N. *Tetrahedron Lett.*, **1994**, 35, 6005



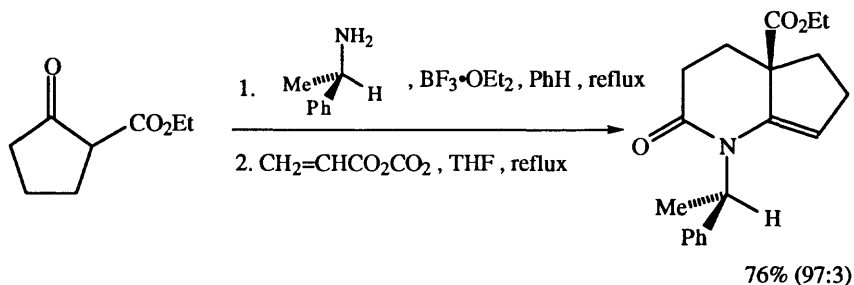
Burley, I.; Hewson, A.T. *Tetrahedron Lett.*, **1994**, 35, 7099



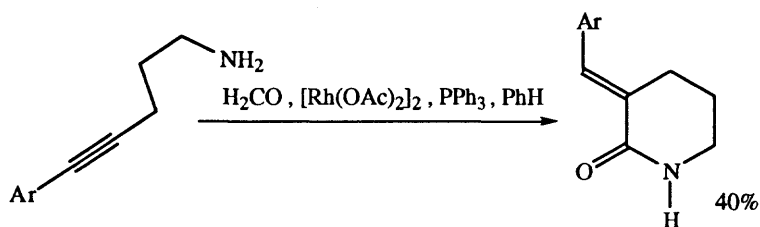
Wei, Z.Y.; Knaus, E.E. *Synlett*, **1994**, 345



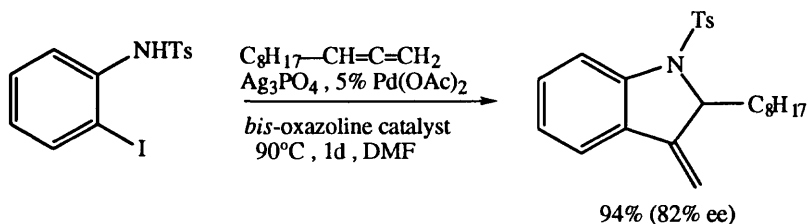
Kobayashi, S.; Ishitani, H.; Araki, M.; Hachiya, I. *Tetrahedron Lett.*, 1994, 35, 6325



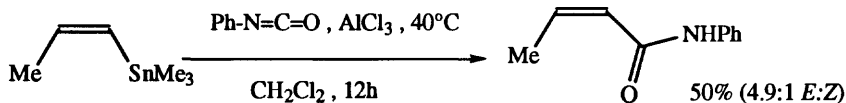
Barta, N.S.; Brode, A.; Stille, J.R. *J. Am. Chem. Soc.*, **1994**, *116*, 6201



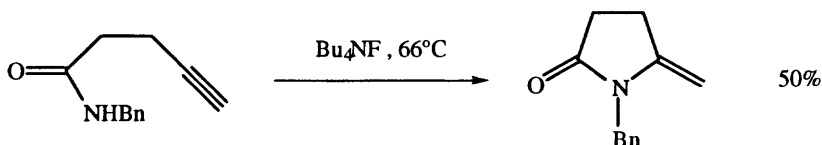
Campi, E.M.; Chong, J.M.; Jackson, W.R.; Van Der Schoot, M. *Tetrahedron*, **1994**, *50*, 2533



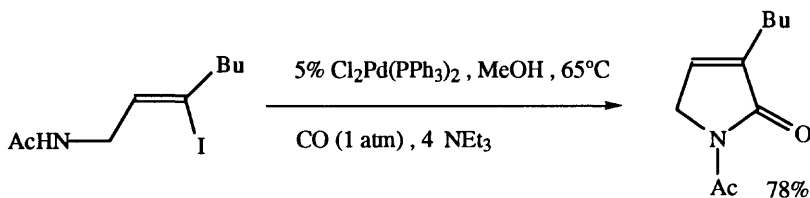
Larock, R.C.; Zenner, J.M. *J. Org. Chem.*, 1995, 60, 482



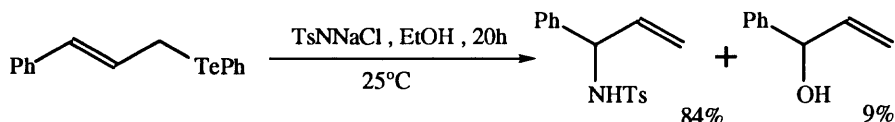
Niestroj, M.; Neumann, W.P.; Thies, O. *Chem. Ber.*, **1994**, *127*, 1131



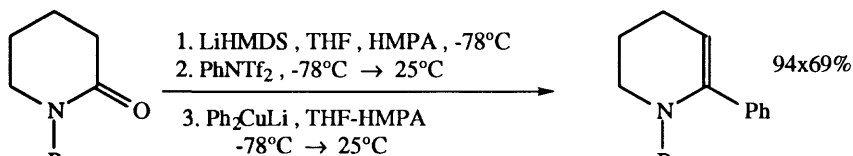
Jacobi, P.A.; Briemann, H.L.; Hauck, S.I. *Tetrahedron Lett.*, **1995**, *36*, 1193



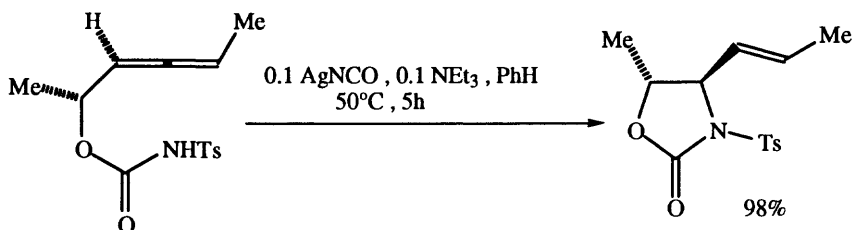
Copéret, C.; Sugihara, T.; Negishi, E. *Tetrahedron Lett.*, **1995**, *36*, 1771



Nishibayashi, Y.; Srivastava, S.K.; Ohe, K.; Uemura, S. *Tetrahedron Lett.*, **1995**, *36*, 6725



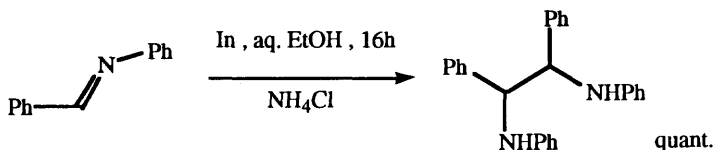
Tsushima, K.; Hirade, T.; Hasegawa, H.; Murai, A. *Chem. Lett.*, **1995**, 801



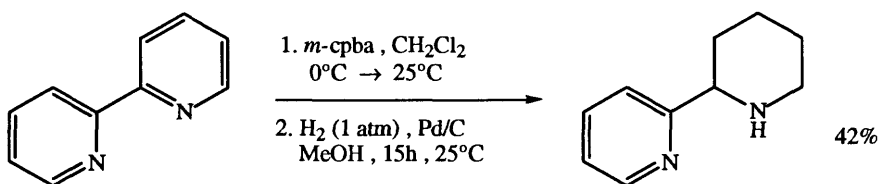
Kimura, M.; Tanaka, S.; Tamaru, Y. *Bull. Chem. Soc. Jpn.*, **1995**, *68*, 1689

Also via Alkenyl Acids: Section 322 (Carboxylic Acid -Alkene)

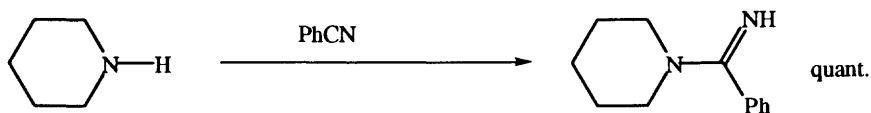
SECTION 350: AMINE - AMINE



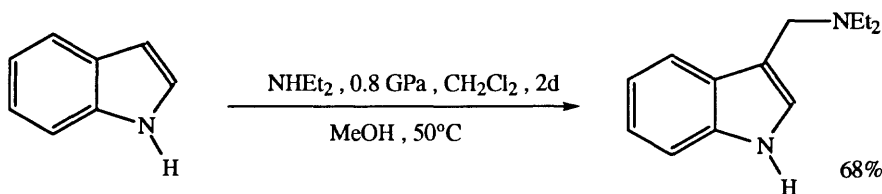
Kalyanam, N.; Rao, G.V. *Tetrahedron Lett.*, **1993**, *34*, 1647



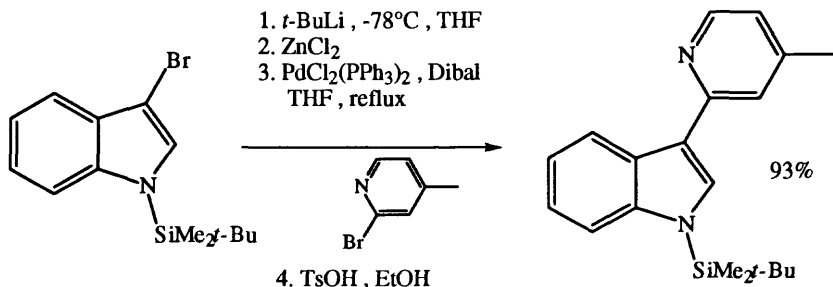
Plaquet, J.-C.; Chichaoui, I. *Tetrahedron Lett.*, **1993**, *34*, 5287



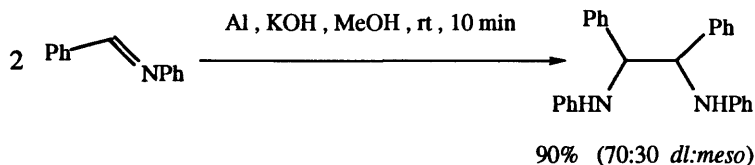
Rousselet, G.; Capdevielle, P.; Maumy, M. *Tetrahedron Lett.*, **1993**, *34*, 6395



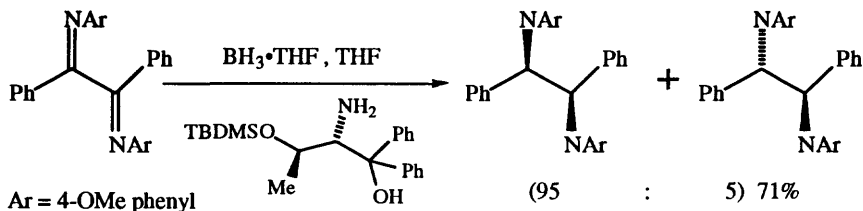
Matsumoto, K.; Uchida, T.; Hashimoto, S.; Yonezawa, Y.; Iida, H.; Kakehi, A.; Otani, S. *Heterocycles*, **1993**, *36*, 2215



Amat, M.; Hadida, S.; Bosch, J. *Tetrahedron Lett.*, **1994**, *35*, 793

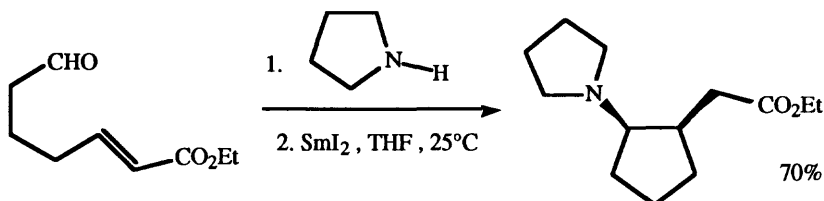


Baruah, B.; Prajapati, D.; Sandhu, J.S. *Tetrahedron Lett.*, 1995, 36, 6747

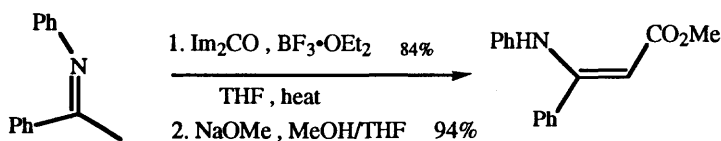


Shimizu, M.; Kami, M.; Fujisawa, T. *Tetrahedron Lett.*, 1995, 36, 8607

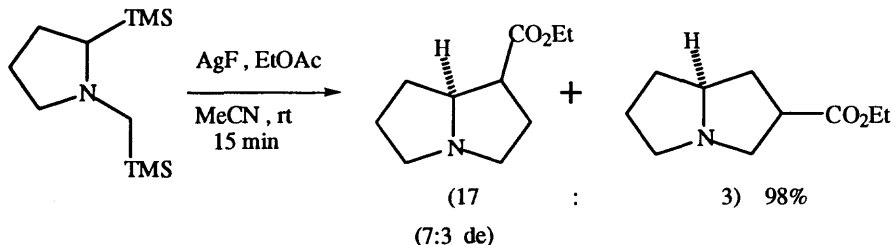
SECTION 351: AMINE - ESTER



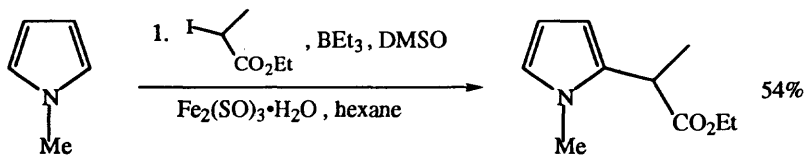
Aurrechoechea, J.M.; Fernández-Acebes, A. *Tetrahedron Lett.*, 1993, 34, 549



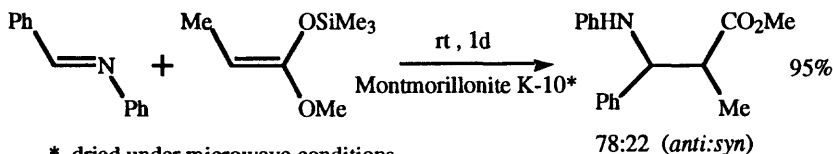
Eustero, S.; Díaz, M.D.; Carlón, R.P. *Tetrahedron Lett.*, 1993, 34, 725



Pandey, G.; Lakshmaiah, G. *Tetrahedron Lett.*, 1993, 34, 4861

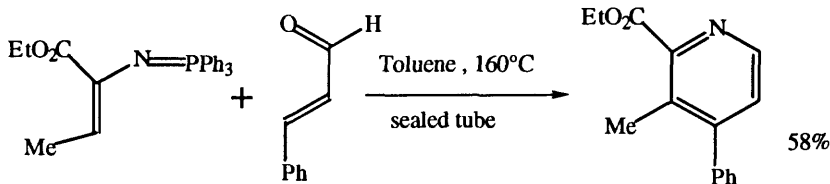


Baciacchi, E.; Muraglia, E. *Tetrahedron Lett.*, 1993, 34, 5015

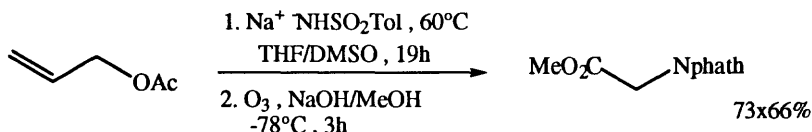


* dried under microwave conditions

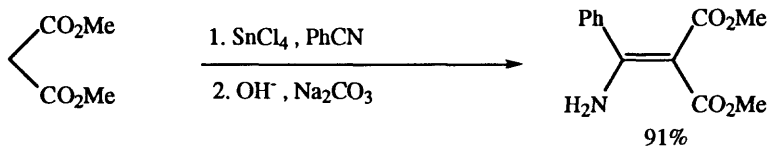
Texier-Boullet, E.; Latouche, R.; Hamelin, J. *Tetrahedron Lett.*, 1993, 34, 2123



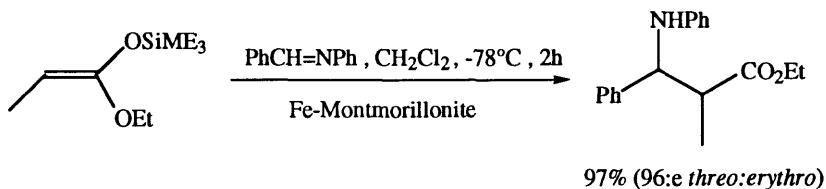
Molina, P.; Pastor, A.; Vilaplana, M.J. *Tetrahedron Lett.*, 1993, 34, 3773



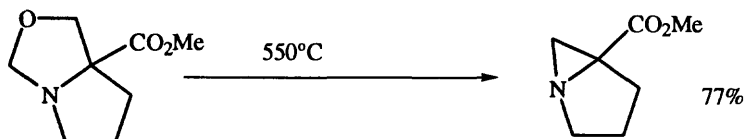
Jumnah, R.; Williams, J.M.J. *Tetrahedron Lett.*, 1993, 34, 6619



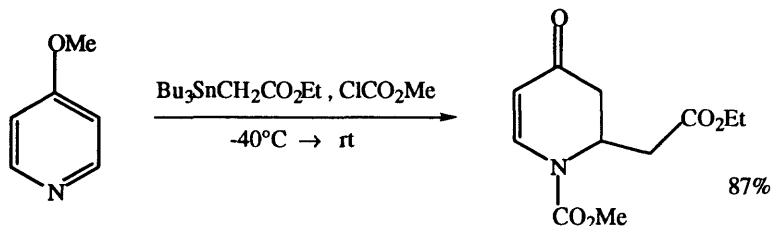
Nicolini, M.; Citterio, A. *Org. Prep. Proceed. Int.*, 1993, 25, 229



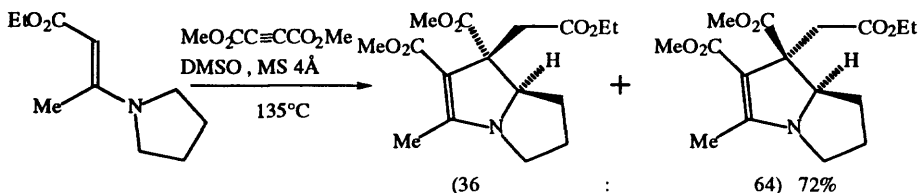
Onaka, M.; Ohno, R.; Yanigiya, N.; Izumi, Y. *Synlett*, 1993, 141



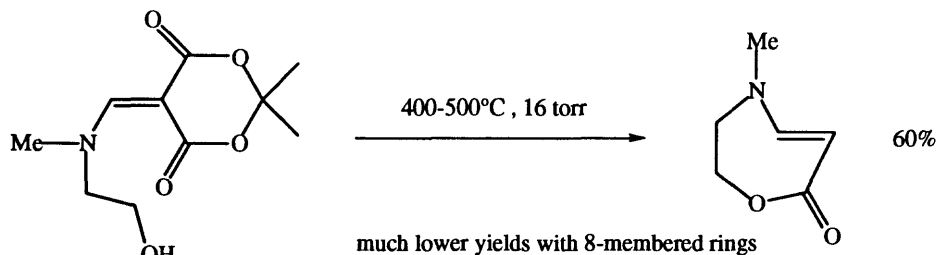
Bureau, R.; Mortier, J.; Joucla, M. *Bull. Soc. Chim. Fr.*, **1993**, 130, 584



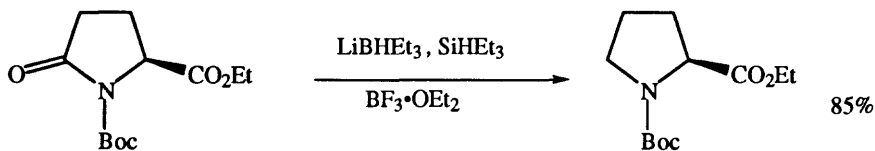
Dhar, T.G.M.; Gluchowski, C. *Tetrahedron Lett.*, **1994**, 35, 989



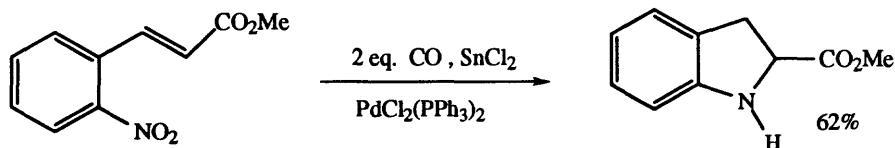
Jiang, S.; Janousek, Z.; Viehe, H.G. *Tetrahedron Lett.*, **1994**, 35, 1185



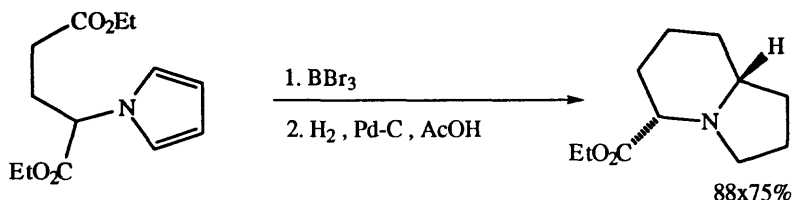
Jourdain, F.; Pommelet, J.C. *Tetrahedron Lett.*, **1994**, 35, 1545



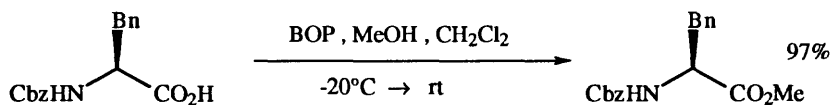
Pedregal, C.; Ezquerro, J.; Escribano, A.; Carreño, M.C.; García Ruano, J.L.G. *Tetrahedron Lett.*, **1994**, 35, 2053



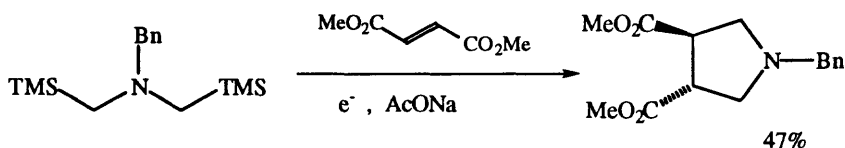
Akazome, M.; Kondo, T.; Watanabe, Y. *J. Org. Chem.*, **1994**, *59*, 3375



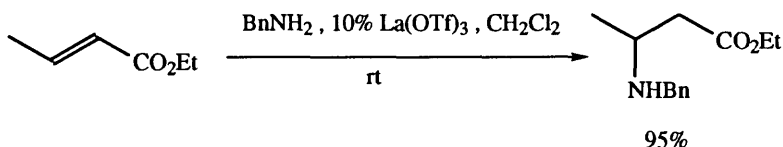
Jefford, C.W.; Thornton, S.R.; Sienkiewicz, K. *Tetrahedron Lett.*, **1994**, *35*, 3905



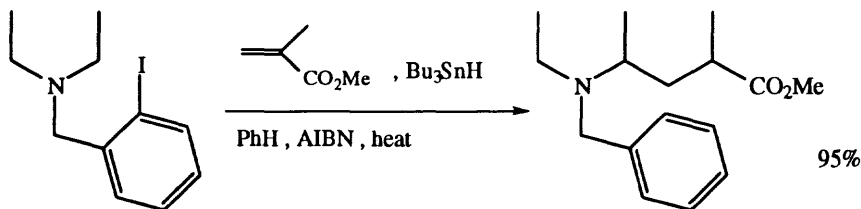
BOP = benzotriazol-1-yloxy(dimethylamino)phosphonium hexafluorophosphate
Kim, M.H.; Patel, D.V. *Tetrahedron Lett.*, **1994**, *35*, 5603



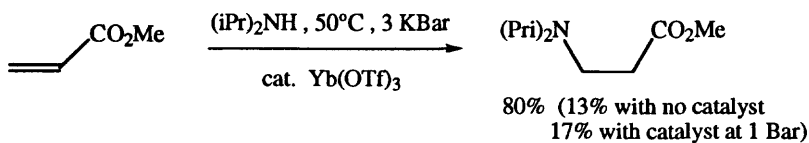
Torii, S.; Okumoto, H.; Genba, A. *Synlett*, **1994**, 217



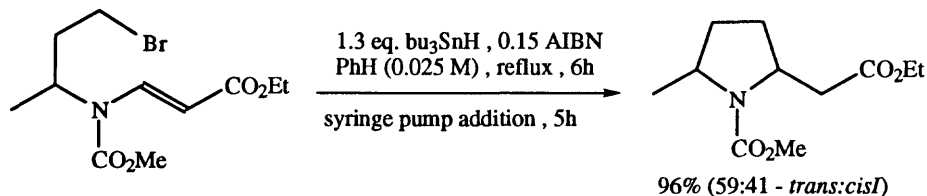
Matsubara, S.; Yoshioka, M.; Utimoto, K. *Chem. Lett.*, **1994**, 827



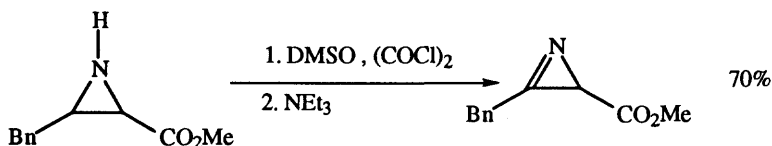
Undheim, K.; Williams, L. *J. Chem. Soc. Chem. Commun.*, **1994**, 883



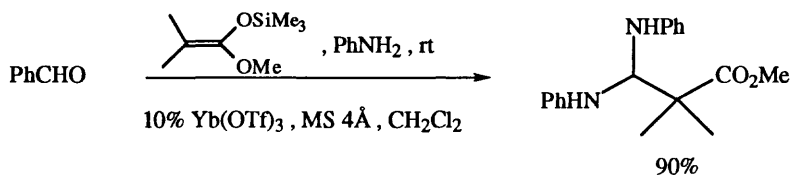
Jenner, G. *Tetrahedron Lett.*, 1995, 36, 233



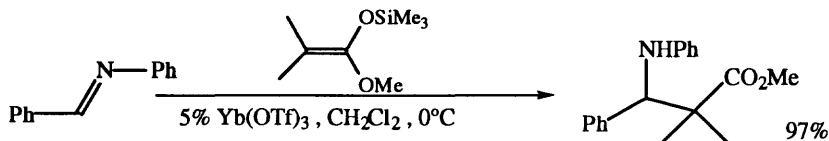
Lee, E.; Kang, T.S.; Joo, B.J.; Tae, J.S.; Li, K.S.; Chung, C.K. *Tetrahedron Lett.*, 1995, 36, 417



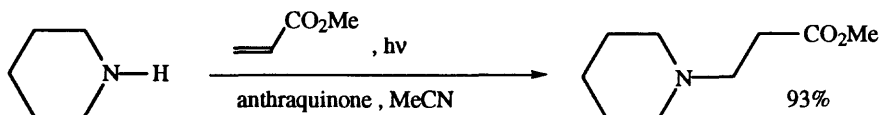
Gentilucci, L.; Grijzen, Y.; Thijs, L.; Zwanenburg, B. *Tetrahedron Lett.*, 1995, 36, 4665



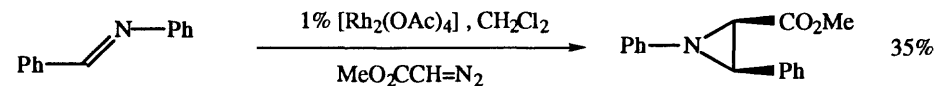
Kobayashi, S.; Araki, M.; Yasuda, M. *Tetrahedron Lett.*, 1995, 36, 5773



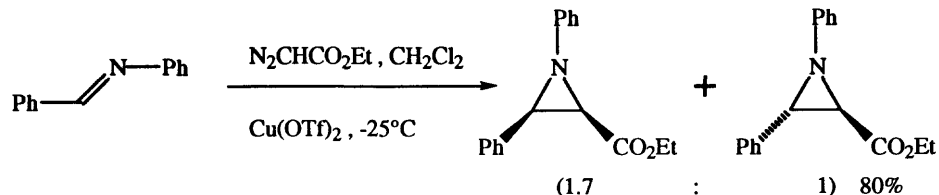
Kobayashi, S.; Araki, M.; Ishitani, H.; Nagayama, S.; Hachiya, I. *Synlett*, 1995, 233



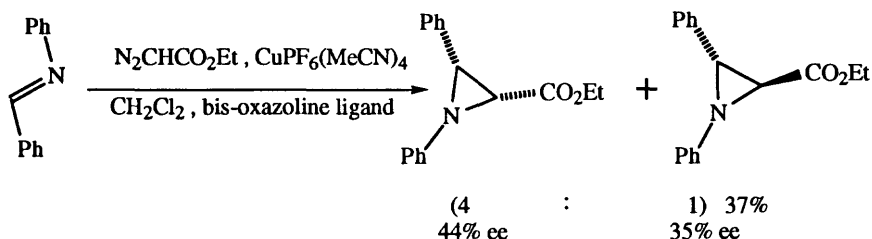
Das, S.; Kumar, J.S.D.; Shivaramayya, K.; George, M.V. *J. Chem. Soc., Perkin Trans. 1.*, 1995, 1797



Moran, M.; Bernardinelli, G.; Müller, P. *Helv. Chim. Acta*, **1995**, *78*, 2048



Rasmussen, K.G.; Jørgensen, K.A. *J. Chem. Soc. Chem. Commun.*, **1995**, 1401



Hansen, K.B.; Finney, N.S.; Jacobsen, E.N. *Angew. Chem. Int. Ed. Engl.*, **1995**, *34*, 676

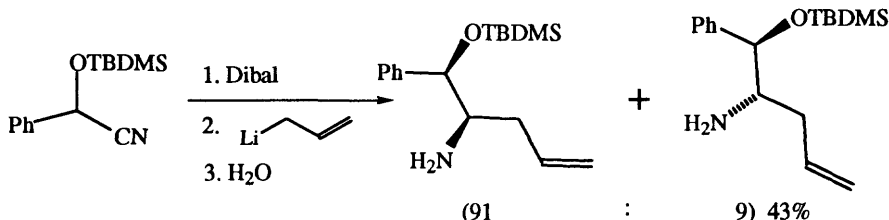
Related Methods:

Section 315 (Carboxylic Acid - Amide)

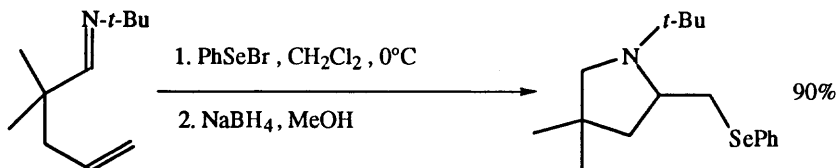
Section 316 (Carboxylic Acid - Amine)

Section 344 (Amide - Ester)

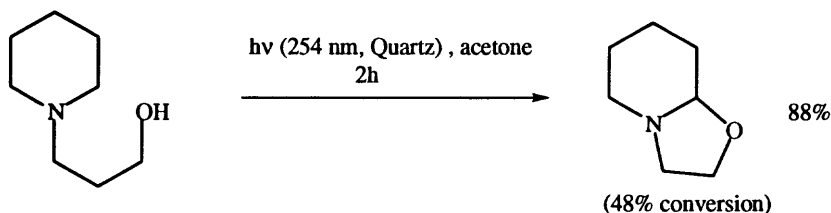
SECTION 352: AMINE - ETHER, EPOXIDE, THIOETHER



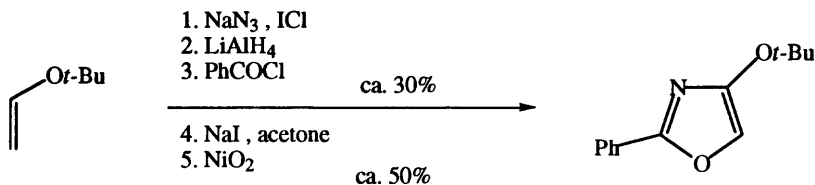
Cainelli, G.; Panunzio, M.; Contento, M.; Giacomini, D.; Mezzina, E.; Giovagnoli, D. *Tetrahedron*, **1993**, *49*, 3809



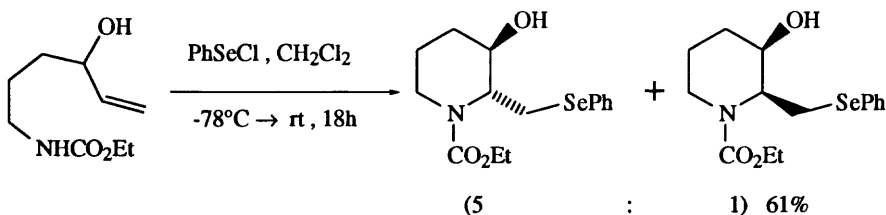
De Kimpe, N.; Boelens, M. *J. Chem. Soc. Chem. Commun.*, **1993**, 916



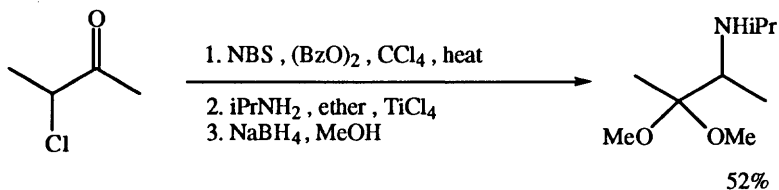
Cossy, J.; Guha, M. *Tetrahedron Lett.*, **1994**, 35, 1715



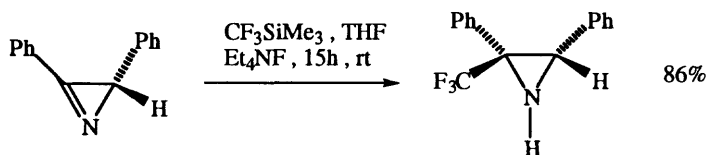
Eastwood, F.W.; Perlmuter, P.; Yang, Q. *Tetrahedron Lett.*, **1994**, 35, 2039



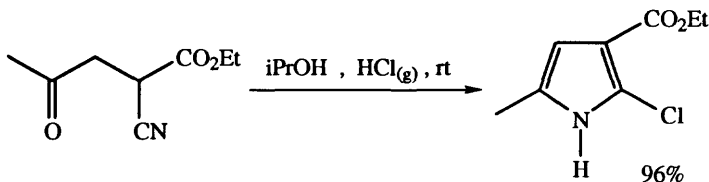
Cooper, M.A.; Ward, A.D. *Tetrahedron Lett.*, **1994**, 35, 5065



De Kimpe, N.; Stanoeva, E. *Synthesis*, **1994**, 695

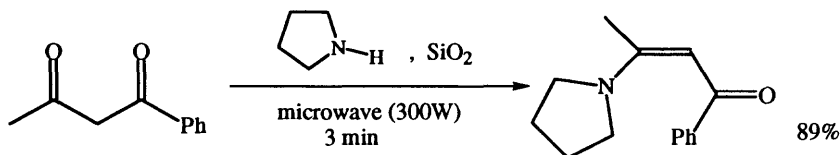


Félix, C.P.; Khatimi, N.; Laurent, A.J. *Tetrahedron Lett.*, **1994**, *35*, 3303

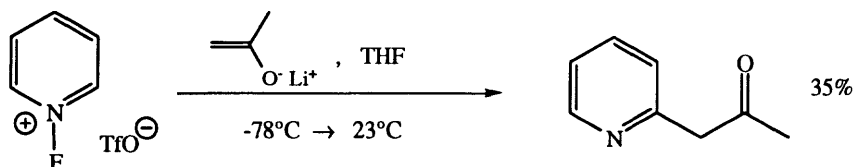


Foley, L.H. *Tetrahedron Lett.*, **1994**, *35*, 5989

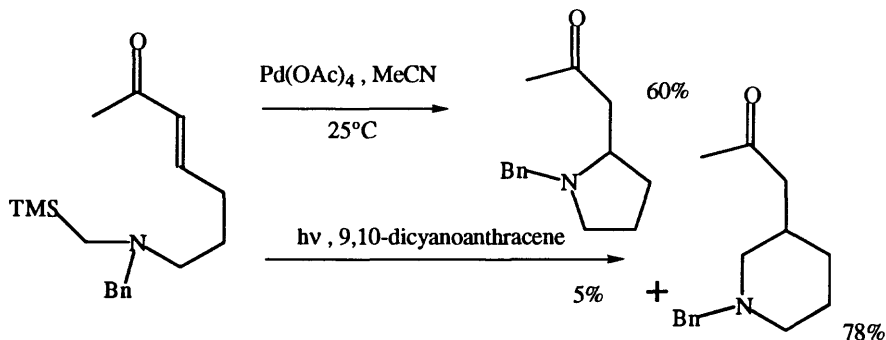
SECTION 354: AMINE - KETONE



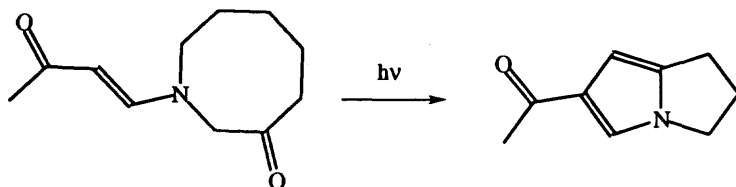
Rechsteiner, B.; Texier-Boullet, F.; Hamelin, J. *Tetrahedron Lett.*, **1993**, *34*, 5071



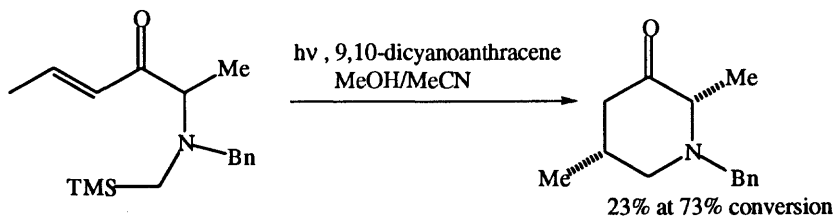
Kiselyov, A.S.; Strekowski, L. *J. Org. Chem.*, **1993**, *58*, 4476



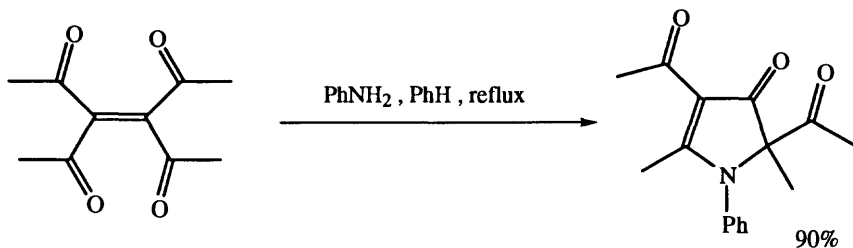
Zhang, X.; Jung, Y.S.; Mariano, P.S.; Fox, M.A.; Martin, P.S.; Merkert, J. *Tetrahedron Lett.*, **1993**, *34*, 5239



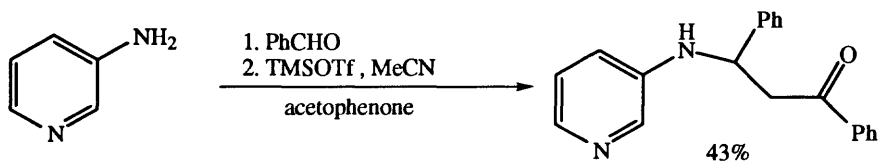
Winkler, J.D.; Siegel, M.G. *Tetrahedron Lett.*, **1993**, 34, 7697



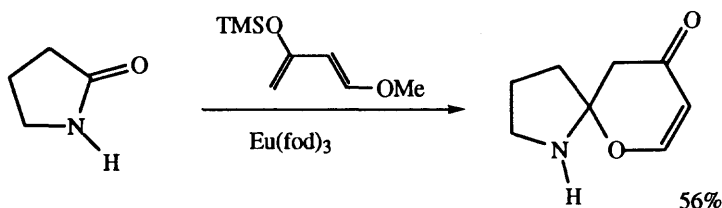
Khim, S.K.; Mariano, P.S. *Tetrahedron Lett.*, **1994**, 35, 999



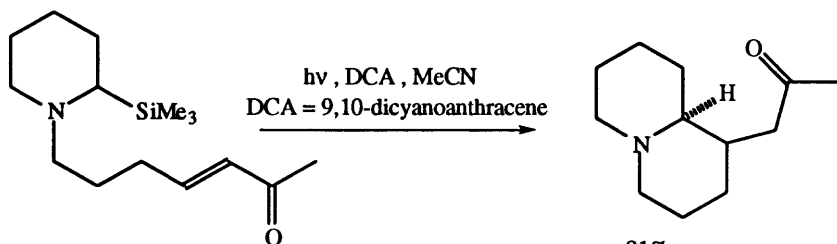
Adembri, G.; Celli, A.M.; Lampariello, L.R.; Scotton, M.; Sega, A. *Tetrahedron Lett.*, **1994**, 35, 4023



Moutou, J.L.; Schmitt, M.; Wermuth, C.G.; Bourguignon, J.J. *Tetrahedron Lett.*, **1994**, 35, 6883



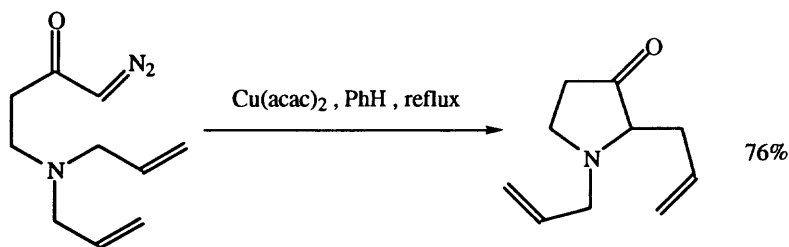
Degnan, A.P.; Kim, C.S.; Stout, C.W.; Kalivretenos, A.G. *J. Org. Chem.*, **1995**, 60, 7724



syn, 81%
anti, 18%

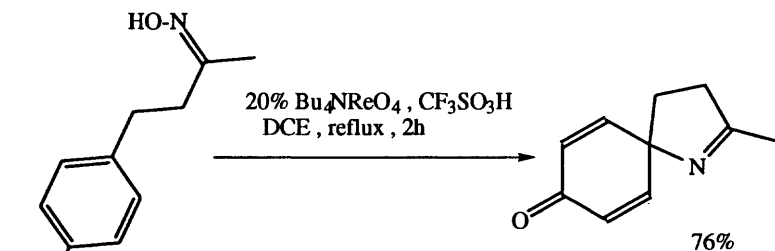
less selective with pyrrolidine derivatives

Hoegy, S.E.; Mariano, P.S. *Tetrahedron Lett.*, **1994**, 35, 8319



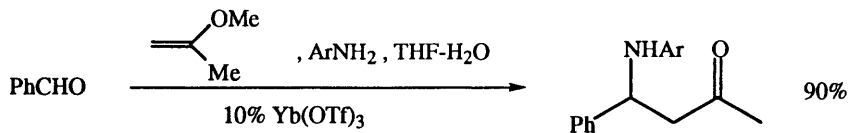
76%

Clark, J.S.; Hodgson, P.B. *J. Chem. Soc. Chem. Commun.*, **1994**, 2701



76%

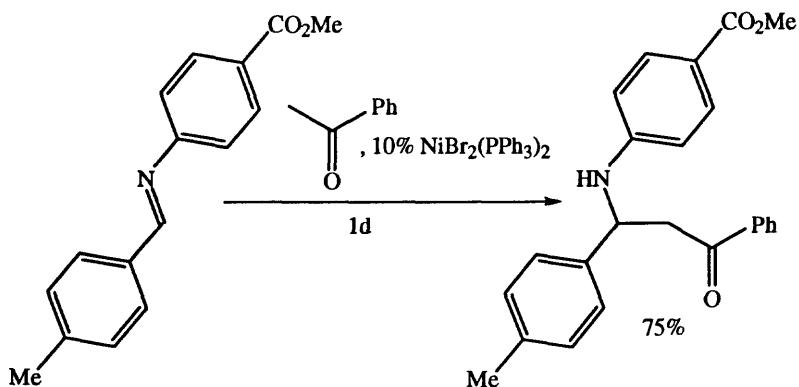
Kusama, H.; Uchiyama, K.; Yamashita, Y.; Narasaka, K. *Chem. Lett.*, **1995**, 715



90%

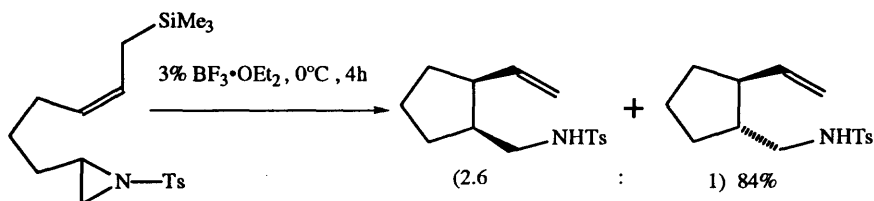
Ar = 4-chlorophenyl

Kobayashi, S.; Ishitani, H. *J. Chem. Soc. Chem. Commun.*, **1995**, 1379



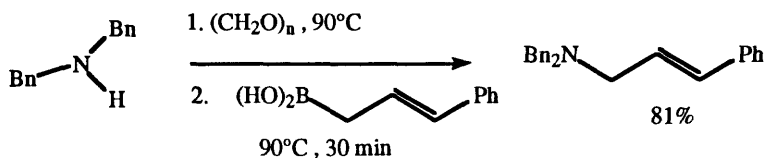
Shida, N.; Kubota, Y.; Fukui, H.; Asao, N.; Kadoata, I.; Yamamoto, Y. *Tetrahedron Lett.*, **1995**, 36, 5023

SECTION 355: AMINE - NITRILE

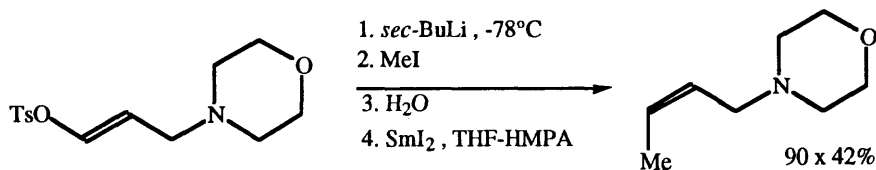


Bergmeier, S.C.; Seth, P.P. *Tetrahedron Lett.*, **1995**, 36, 3793

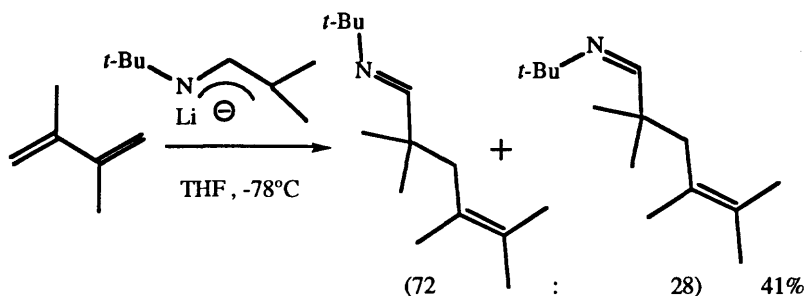
SECTION 356: AMINE - ALKENE



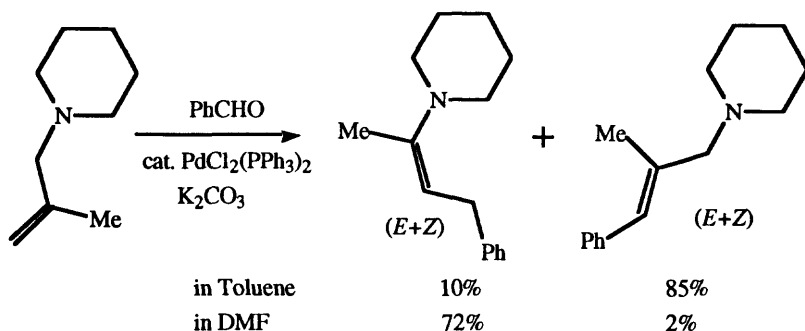
Petasis, N.A.; Akritopoulou, I. *Tetrahedron Lett.*, **1993**, 34, 583



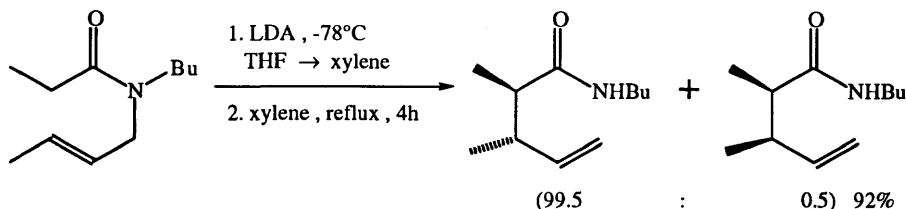
Ibáñez, P.L.; Nájera, C. *Tetrahedron Lett.*, **1993**, 34, 2003



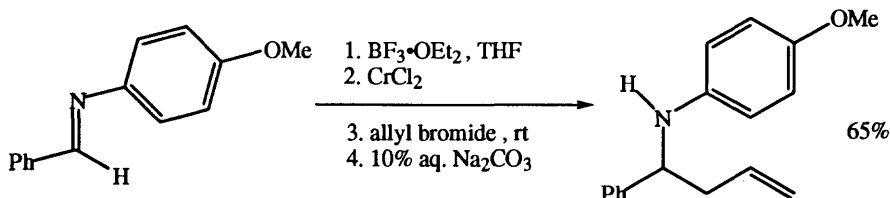
Wegman, S.; Würthwein, E.U. *Tetrahedron Lett.*, 1993, 34, 307



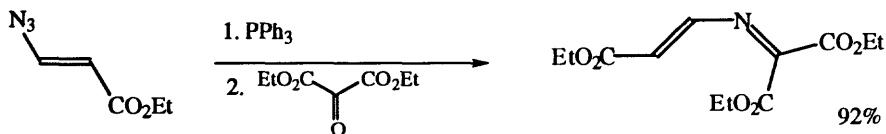
Filippini, L.; Gusmeroli, M.; Riva, R. *Tetrahedron Lett.*, 1993, 34, 1643



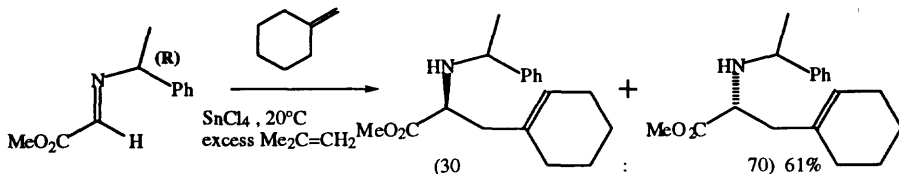
Tsunoda, T.; Tatsuki, S.; Shiraishi, Y.; Akasaka, M.; Itô, S. *Tetrahedron Lett.*, 1993, 34, 3297



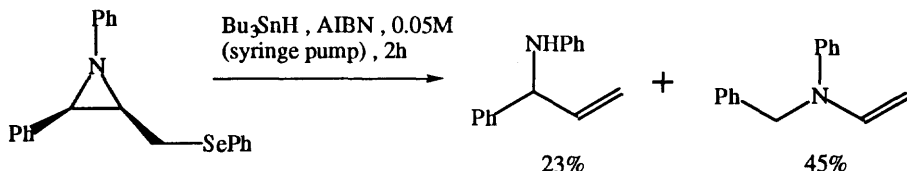
Giammaruco, M.; Taddei, M.; Ulivi, P. *Tetrahedron Lett.*, 1993, 34, 3635



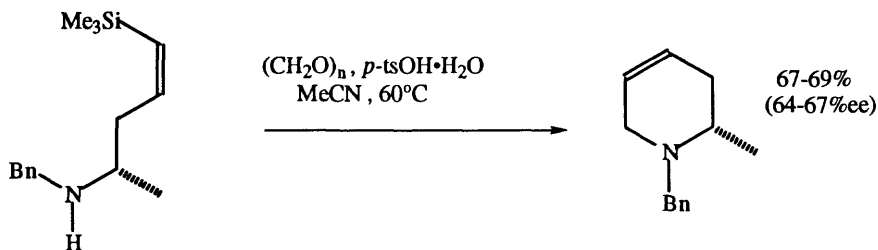
Palacios, F.; Perez de Heredia, I.; Rubiales, G. *Tetrahedron Lett.*, 1993, 34, 4377



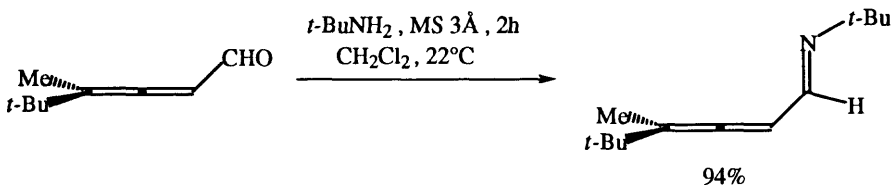
Mikami, K.; Kaneko, M.; Yajima, T. *Tetrahedron Lett.*, 1993, 34, 4841



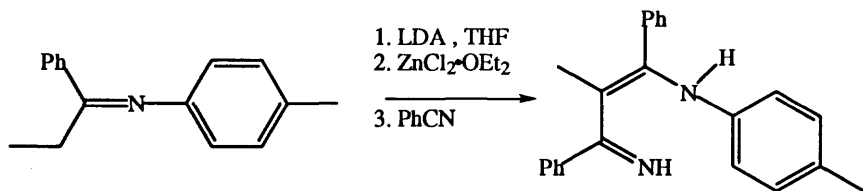
Schwan, A.L.; Refvik, M.D. *Tetrahedron Lett.*, 1993, 34, 4901



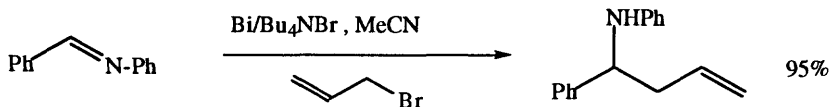
Castro, P.; Overman, L.E.; Zhang, X.; Mariano, P.S. *Tetrahedron Lett.*, 1993, 34, 5243



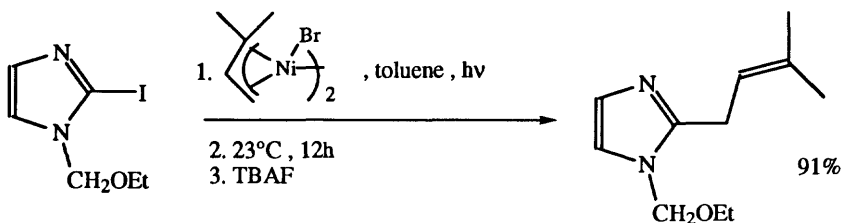
Sigman, M.S.; Eaton, B.E. *Tetrahedron Lett.*, 1993, 34, 5367



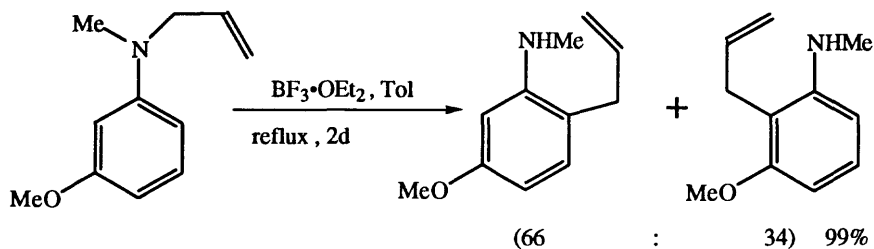
Barluenga, J.; del Pozo Losada, C.; Olano, B. *Tetrahedron Lett.*, **1993**, *34*, 5497



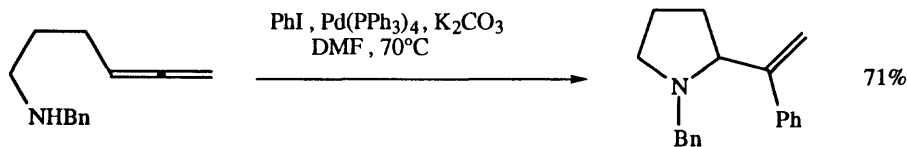
Bhuyan, P.J.; Prajapati, D.; Sandhu, J.S. *Tetrahedron Lett.*, **1993**, *34*, 7975



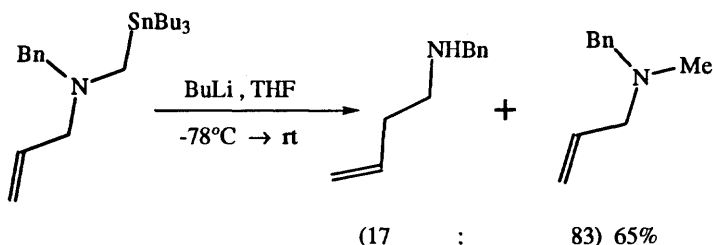
Knapp, S.; Albaneze, J.; Schugar, H.J. *J. Org. Chem.*, **1993**, *58*, 997



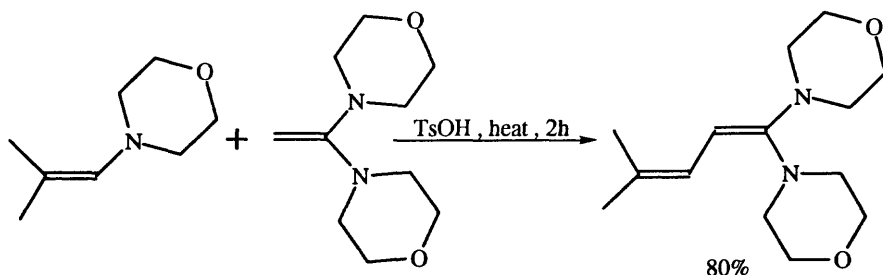
Beholz, L.G.; Stille, J.R. *J. Org. Chem.*, **1993**, *58*, 5095



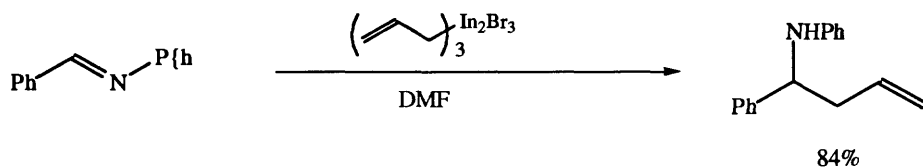
Davies, I.W.; Scopes, D.I.C.; Gallagher, T. *Synlett*, **1993**, 85



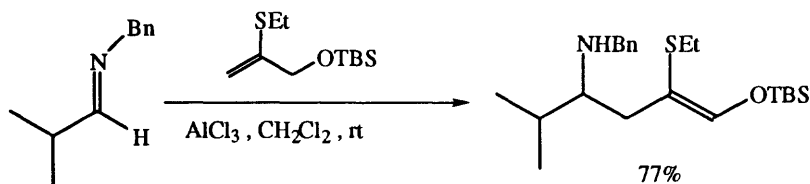
Coldham, I. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1275



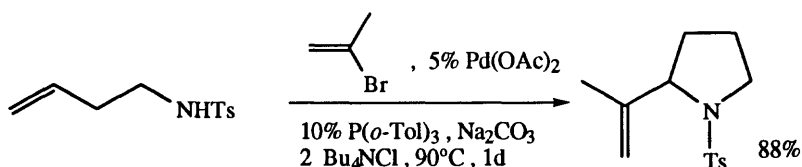
Leurs, S.; Vanderbulcke-Coyette, B.; Viehe, H.G. *Bull. Soc. Chim. Belg.*, **1993**, 102, 645



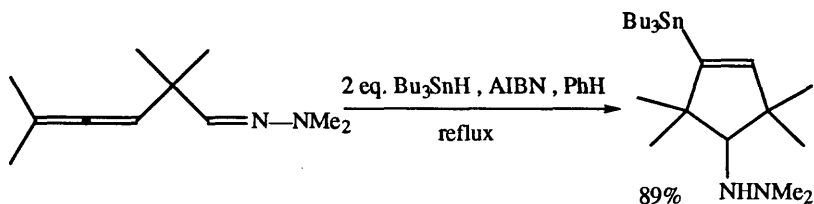
Jin, S.-J.; Araki, S.; Butsugan, Y. *Bull. Chem. Soc. Jpn.*, **1993**, 66, 1528



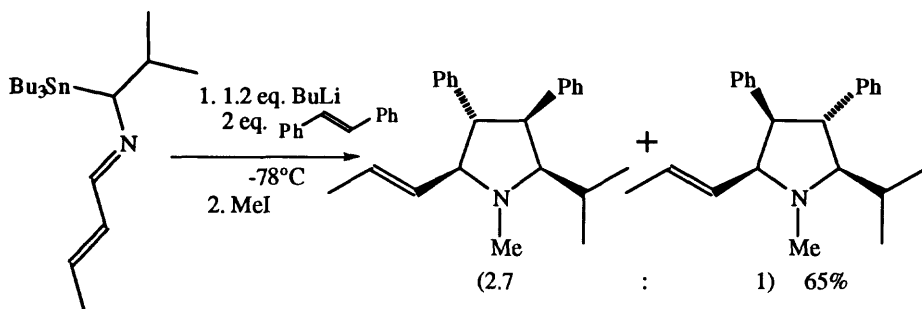
Tohyama, Y.; Tanino, K.; Kuwajima, I. *J. Org. Chem.*, **1994**, 59, 518



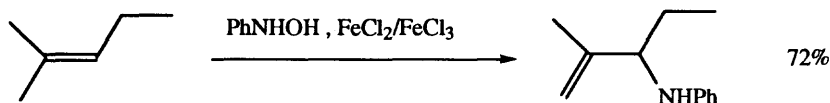
Larock, R.C.; Yang, H.; Weinreb, S.M.; Herr, R.J. *J. Org. Chem.*, **1994**, 59, 4172



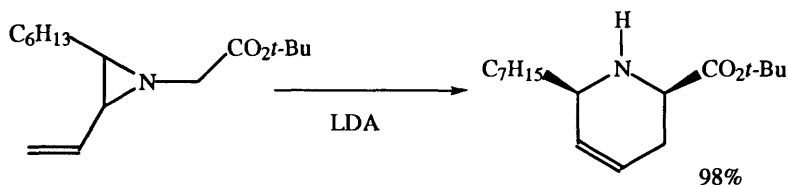
Bernard-Henriet, C.; Grimaldi, J.R.; Hatem, J.M. *Tetrahedron Lett.*, **1994**, 35, 3699



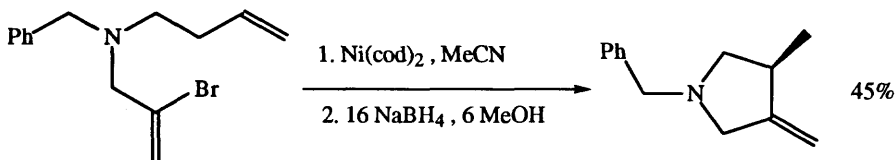
Pearson, W.H.; Jacobs, V.A. *Tetrahedron Lett.*, **1994**, 35, 7001



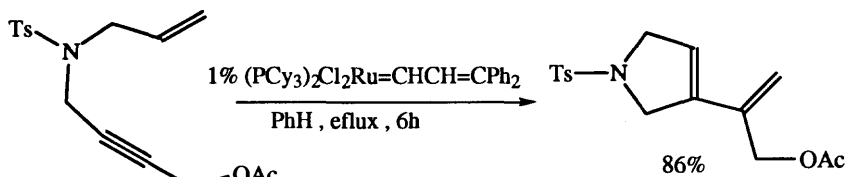
Srivastava, R.S.; Nicholas, K.M. *Tetrahedron Lett.*, **1994**, 35, 8739



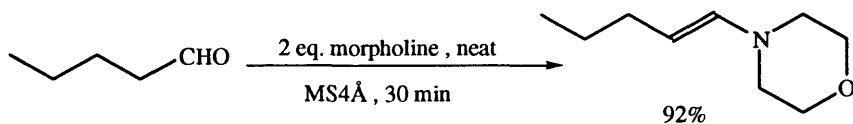
Ahman, J.; Somfai, P. *J. Am. Chem. Soc.*, **1994**, 116, 9781



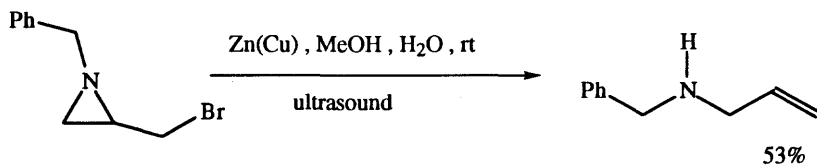
Solé, D.; Cancho, Y.; Llebaria, A.; Moretó, J.M.; Delgado, A. *J. Am. Chem. Soc.*, **1994**, 116, 12133



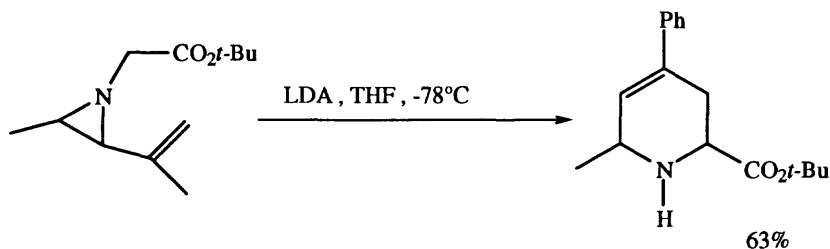
Kinoshita, A.; Mori, M. *Synlett*, **1994**, 1020



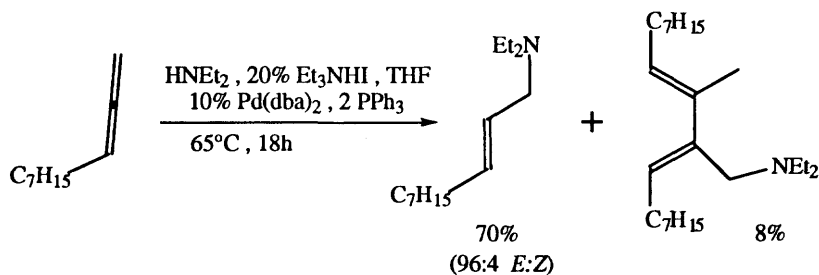
Fisher, G.B.; Lee, L.; Klettke, F.W. *Synth. Commun.*, **1994**, 24, 1541



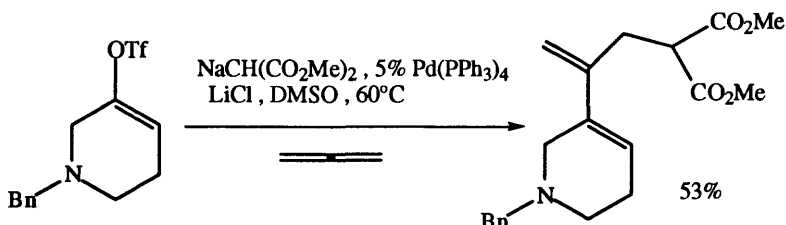
De Kimpe, N.; Jolie, R.; De Smaele, D. *J. Chem. Soc. Chem. Commun.*, **1994**, 1221



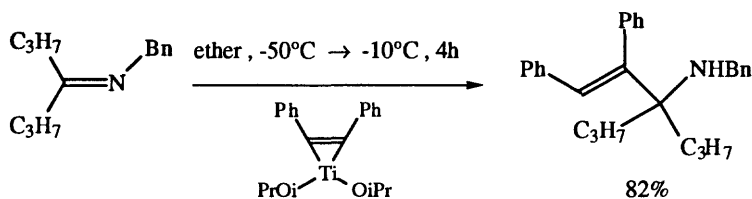
Coldham, I.; Collis, A.J.; Mould, R.J.; Rathmell, R.E. *Tetrahedron Lett.*, **1995**, 36, 3557



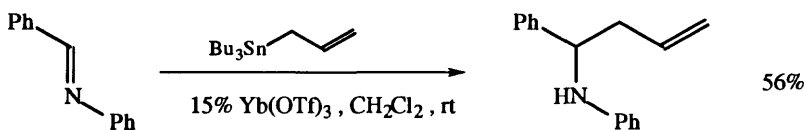
Besson, L.; Goré, J.; Cazes, B. *Tetrahedron Lett.*, **1995**, 36, 3857



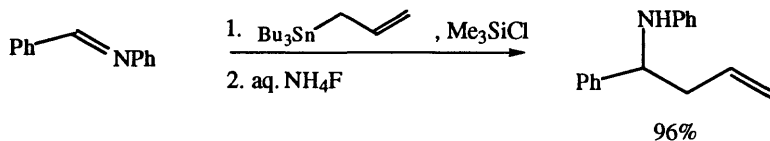
Vicart, N.; Cazes, B.; Goré, J. *Tetrahedron Lett.*, **1995**, *36*, 5015



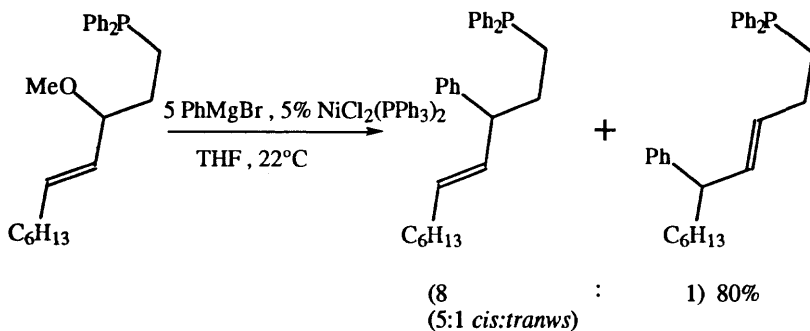
Gao, Y.; Harada, K.; Usato, F. *Tetrahedron Lett.*, **1995**, *36*, 5913



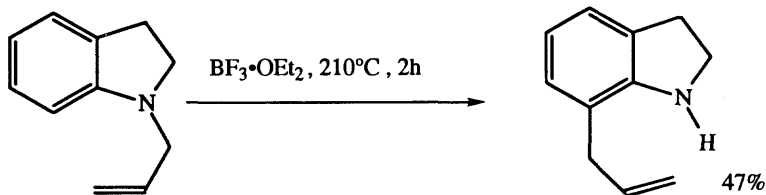
Bellucci, C.; Cozzi, P.G.; Umani-Ronchi, A. *Tetrahedron Lett.*, **1995**, *36*, 7289



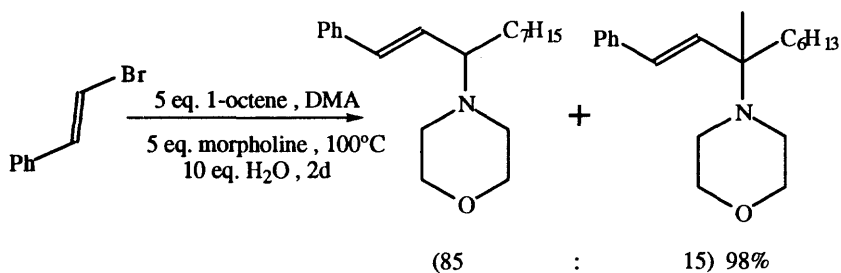
Wang, D.-K.; Dai, L.-X.; Hou, X.-L. *Tetrahedron Lett.*, **1995**, *36*, 8649



Didiuk, M.T.; Morken, J.P.; Hoveyda, A.H. *J. Am. Chem. Soc.*, **1995**, *117*, 7273

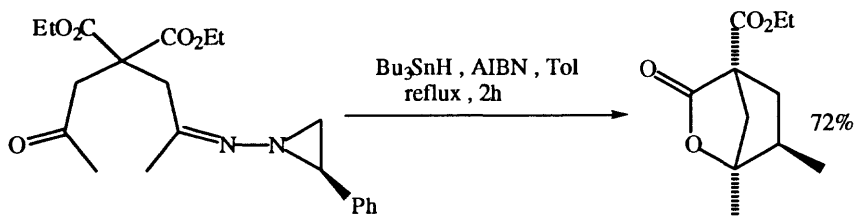


Anderson, W.K.; Lai, G. *Synthesis*, **1995**, 1287

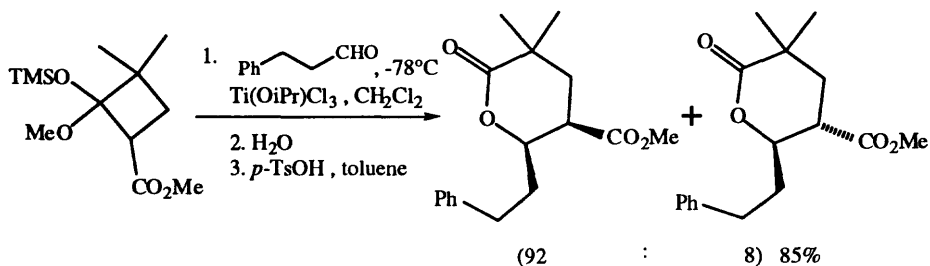


Larock, R.C.; Tu, C. *Tetrahedron*, **1995**, 51, 6635

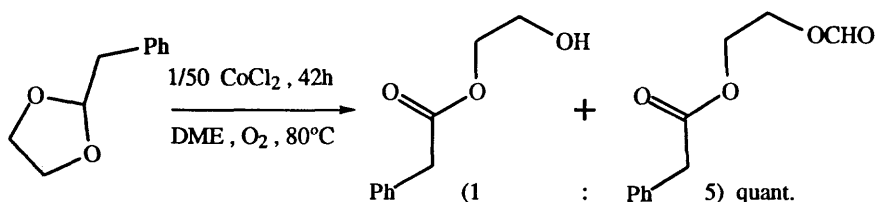
SECTION 357: ESTER - ESTER



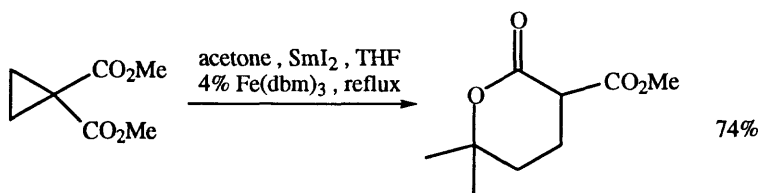
Kim, S.; Kee, I.S. *Tetrahedron Lett.*, **1993**, 34, 4213



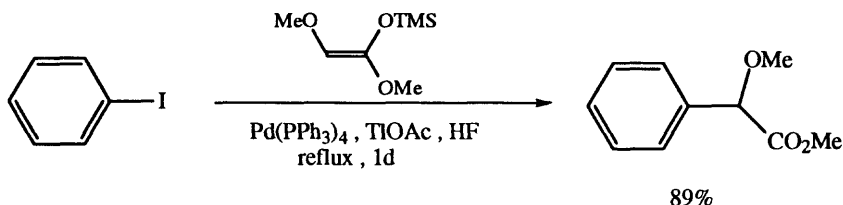
Shimada, S.; Tohno, I.; Hashimoto, Y.; Saigo, K. *Chem. Lett.*, **1993**, 1117



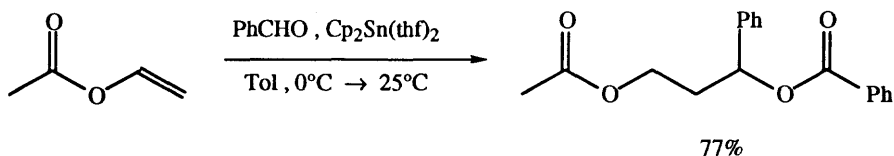
Li, P.; Alper, H. *Can. J. Chem.*, **1993**, *71*, 84



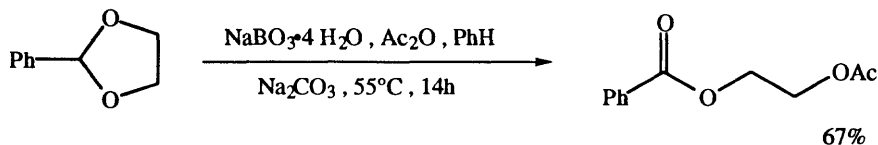
Imamoto, T.; Hatajima, T.; Yoshizawa, T. *Tetrahedron Lett.*, **1994**, *35*, 7805



Sakamoto, T.; Kondo, Y.; Masumoto, K.; Yamanaka, H. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 235



Takano, M.; Kikuchi, S.; Morita, K.; Nishiyama, Y.; Ishii, Y. *J. Org. Chem.*, **1995**, *60*, 4974

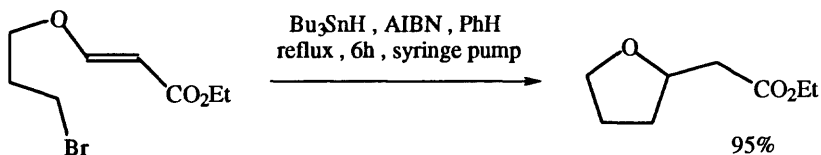


Bhat, S.; Ramesha, A.R.; Chandrasekaran, S. *Synlett*, **1995**, 329

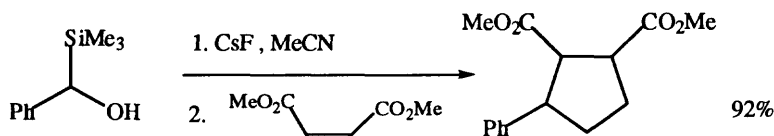
Also via Dicarboxylic Acids:
Hydroxy-esters
Diols

Section 312 (Carboxylic Acids - Carboxylic Acids)
Section 327 (Alcohol - Ester)
Section 323 (Alcohol - Alcohol)

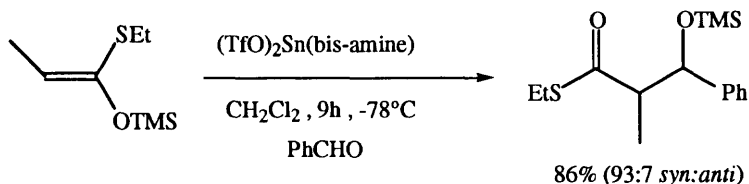
SECTION 358: ESTER - ETHER, EPOXIDE, THIOETHER



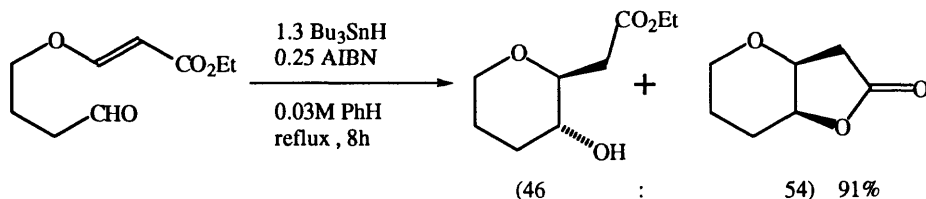
Lee, E.; Tae, J.S.; Lee, C.; Park, C.M. *Tetrahedron Lett.*, **1993**, *34*, 4831



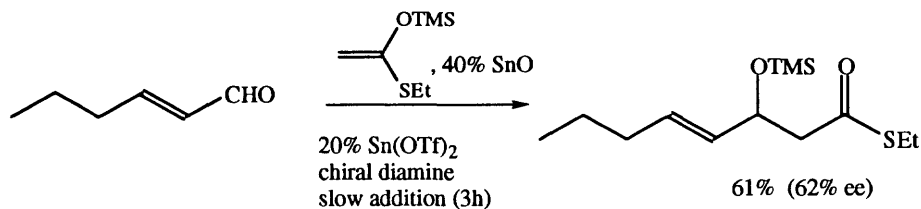
Hojo, M.; Ohkuma, M.; Ishibashi, N.; Hosomi, A. *Tetrahedron Lett.*, **1993**, *34*, 5943



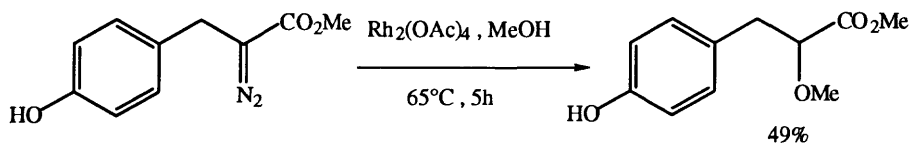
Kobayashi, S.; Uchiro, H.; Shiina, I.; Mukaiyama, T. *Tetrahedron*, **1993**, *49*, 1761



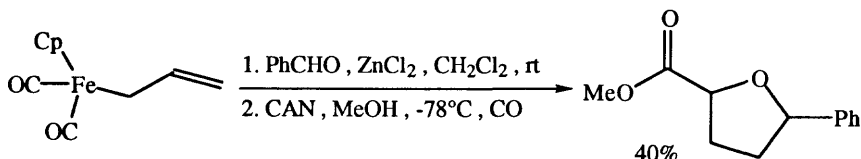
Lee, E.; Tae, J.S.; Chong, Y.H.; Park, Y.C.; Yun, M.; Kim, S. *Tetrahedron Lett.*, **1994**, *35*, 129



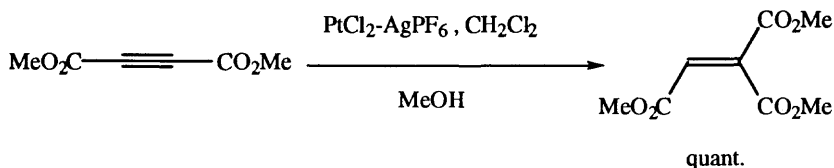
Kobayashi, S.; Kawasuji, T.; Mori, N. *Chem. Lett.*, **1994**, 217



Cox, G.G.; Haigh, D.; Hindley, R.M.; Miller, D.J.; Moody, C.J. *Tetrahedron Lett.*, **1994**, 35, 3139

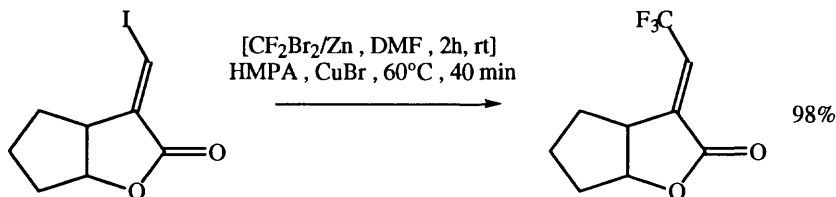


Jiang, S.; Turos, E. *Tetrahedron Lett.*, **1994**, 35, 7889

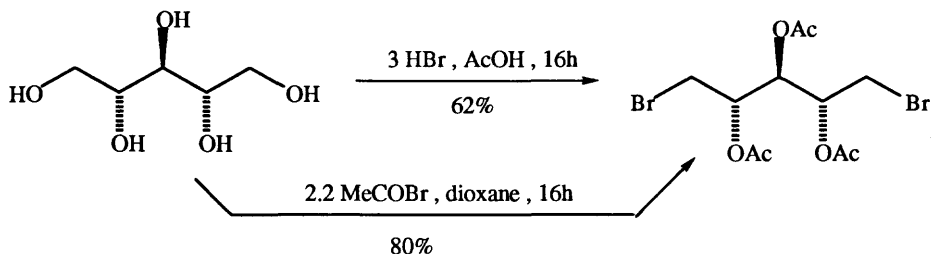


Kataoka, Y.; Matsumoto, O.; Ohashi, M.; Yamagata, T.; Tani, K. *Chem. Lett.*, **1994**, 1283

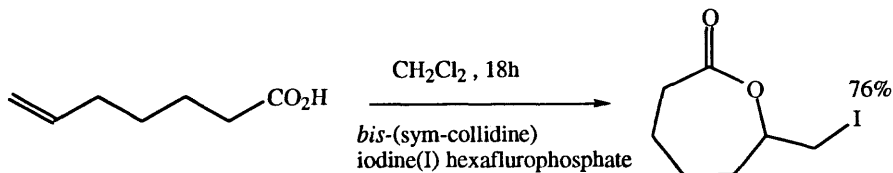
SECTION 359: ESTER - HALIDE, SULFONATE



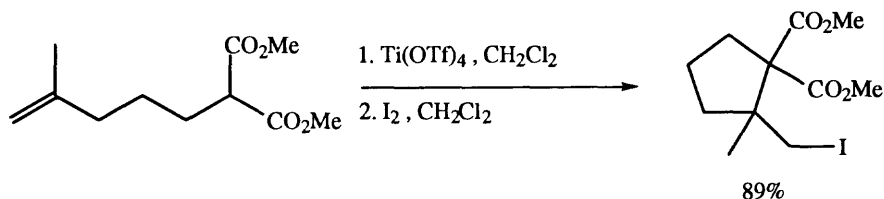
Mawson, S.D.; Weavers, R.T. *Tetrahedron Lett.*, **1993**, 34, 3139



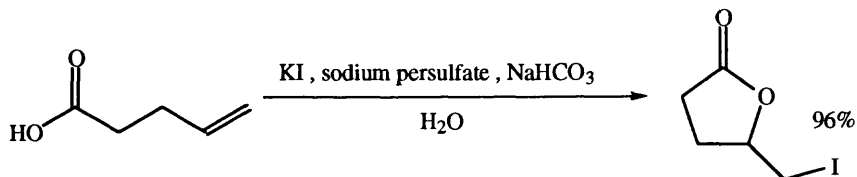
El Anzi, A.; Benazza, M.; Fréchou, C.; Demailly, G. *Tetrahedron Lett.*, **1993**, 34, 3741



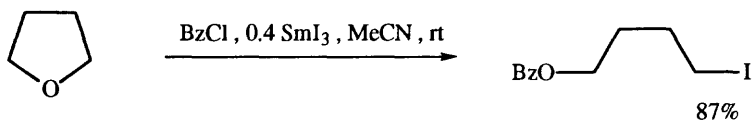
Simonot, B.; Rousseau, G. *J. Org. Chem.*, **1993**, 58, 4



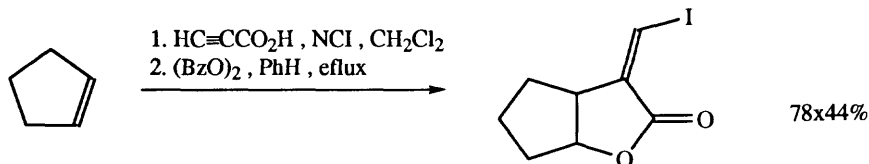
Kitagawa, O.; Inoue, T.; Hirano, K.; Takuchi, T. *J. Org. Chem.*, **1993**, 58, 3106



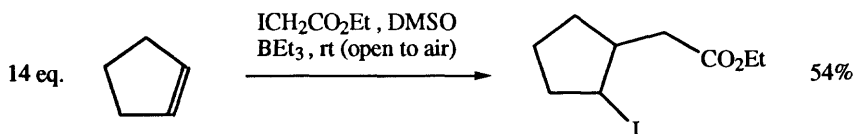
Royer, A.C.; Mebane, R.C.; Swafford, A.M. *Synlett*, **1993**, 899



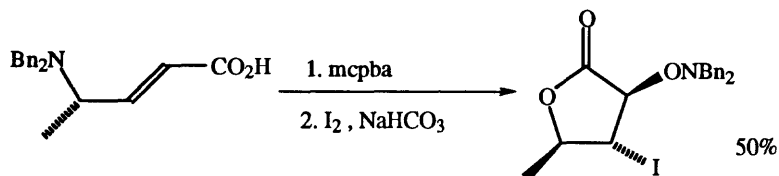
Yu, Y.; Zhang, Y.; Ling, R. *Synth. Commun.*, **1993**, 23, 1973



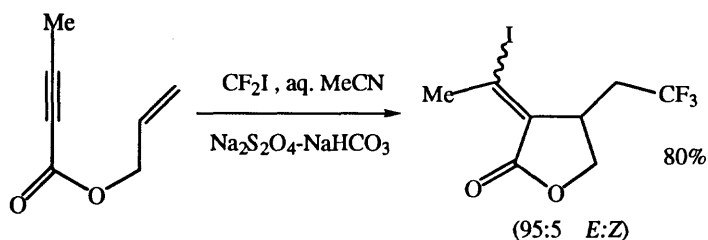
Haaime, G.; Lunch, M.-J.; Routledge, A.; Weavers, R.T. *Tetrahedron*, **1993**, 49, 4229



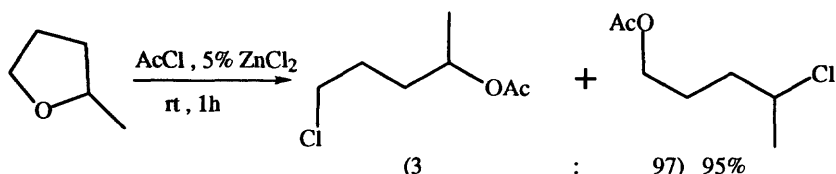
Bachicchi, E.; Muraglia, E. *Tetrahedron Lett.*, **1994**, 35, 2763



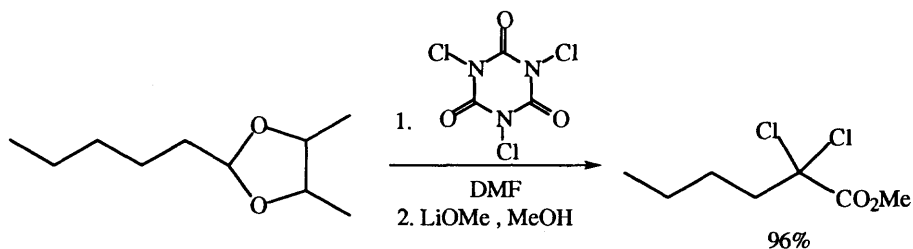
Reetz, M.T.; Lauterbach, E.H. *Heterocycles*, **1993**, 35, 627



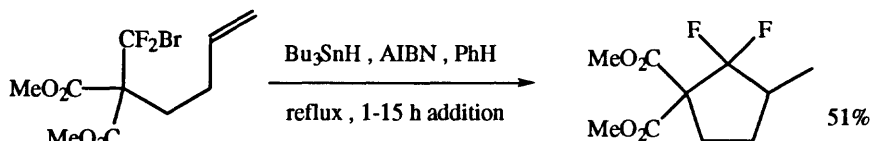
Lu, X.; Wang, Z.; Ji, J. *Tetrahedron Lett.*, **1994**, 35, 613



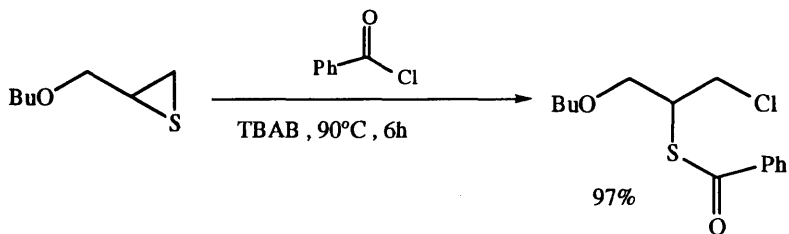
Mimero, P.; Saluzzo, C.; Amouroux, R. *Tetrahedron Lett.*, **1994**, 35, 1553



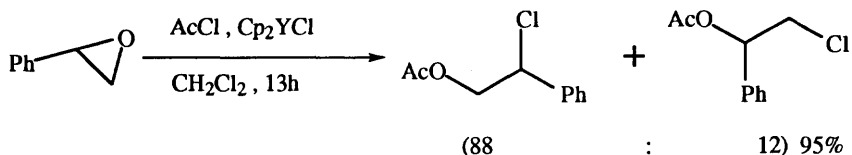
Bellesia, F.; Boni, M.; Ghelfi, F.; Pagnoni, U.M. *Tetrahedron Lett.*, **1994**, 35, 2961



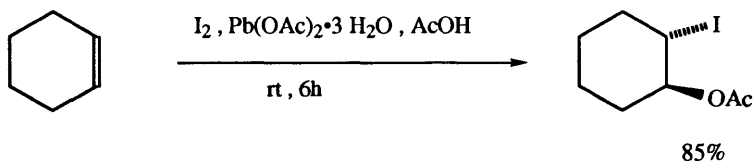
Buttle, L.A.; Motherwell, W.B. *Tetrahedron Lett.*, **1994**, 35, 3995



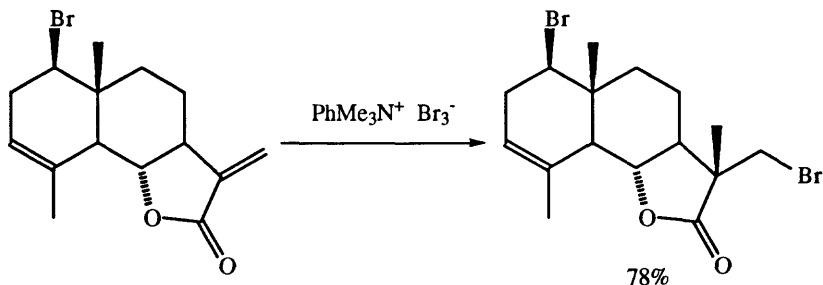
Kameyama, A.; Kiyota, M.; Nishikubo, T. *Tetrahedron Lett.*, **1994**, 35, 4571



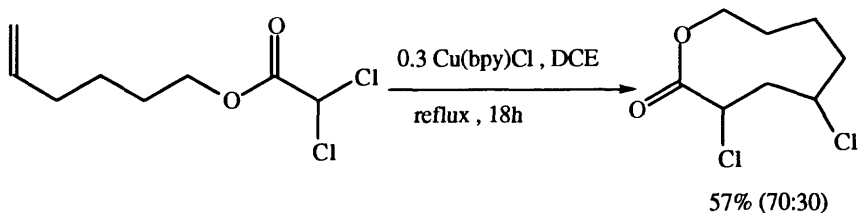
Qian, C.; Zhu, D. *Synth. Commun.*, **1994**, 24, 2203



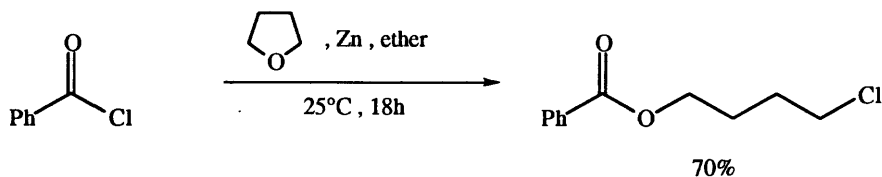
Bedekar, A.V.; Nair, K.B.; Soman, R. *Synth. Commun.*, **1994**, 24, 2299



Collado, I.G.; Galán, R.H.; Massanet, G.M.; Alonso, M.S. *Tetrahedron*, **1994**, 50, 6433

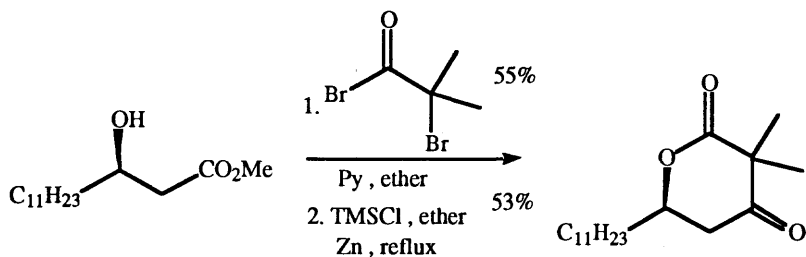


Pirrung, F.O.H.; Hiemstra, H.; Speckamp, W.N.; Kaptein, B.; Schoemaker, H.E. *Tetrahedron*, **1994**, 50, 12415

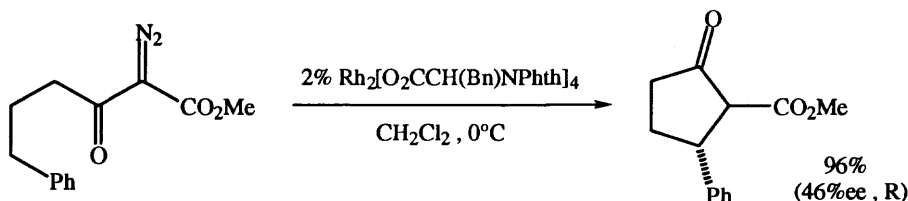


Bhar, S.; Rana, B.C. *J. Org. Chem.*, 1995, 60, 745

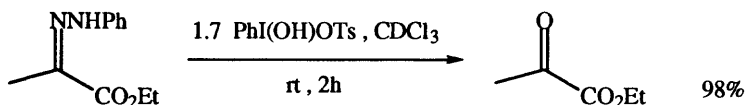
SECTION 360: ESTER - KETONE



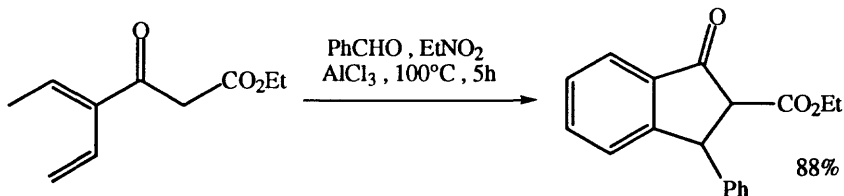
Landi Jr., J.J.; Garafalo, L.M.; Ramig, K. *Tetrahedron Lett.*, 1993, 34, 277



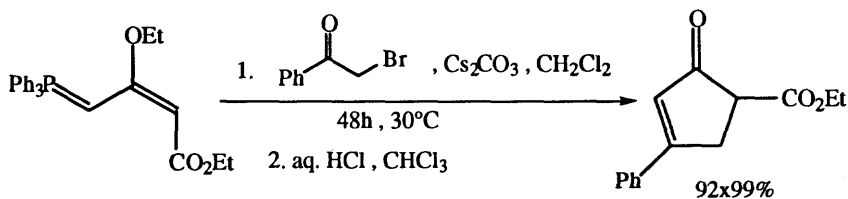
Hashimoto, S.; Watanabe, N.; Sato, T.; Shiro, M.; Ikegami, S. *Tetrahedron Lett.*, 1993, 34, 5109



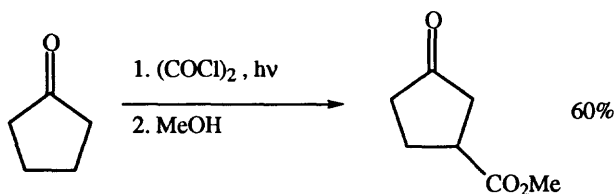
Barton, D.H.R.; Jaszberenyi, J.Cs.; Shinada, T. *Tetrahedron Lett.*, 1993, 34, 7191



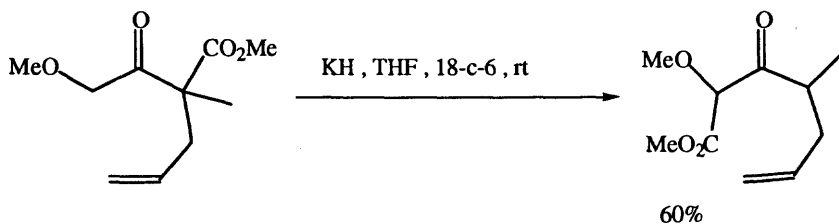
Sartori, G.; Bigi, E.; Maggi, R.; Bernardi, G.L. *Tetrahedron Lett.*, 1993, 34, 7339



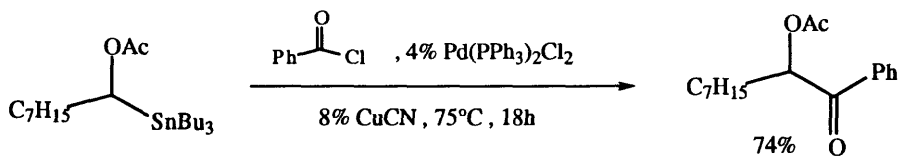
Hatanaka, M.; Himeda, Y.; Imashiro, Y.; Tanaka, Y.; Ueda, I. *J. Org. Chem.*, **1994**, *59*, 111



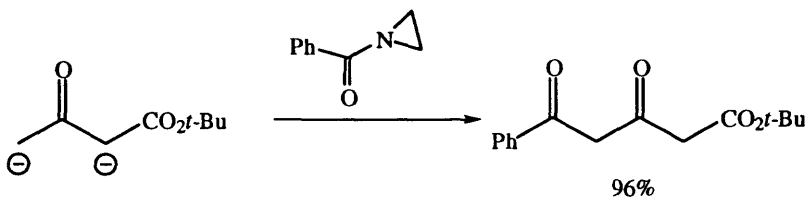
Bashir-Hashemi, A.; Hardee, J.R.; Gelber, N.; Qi, L.; Axenrod, T. *J. Org. Chem.*, **1994**, *59*, 2131



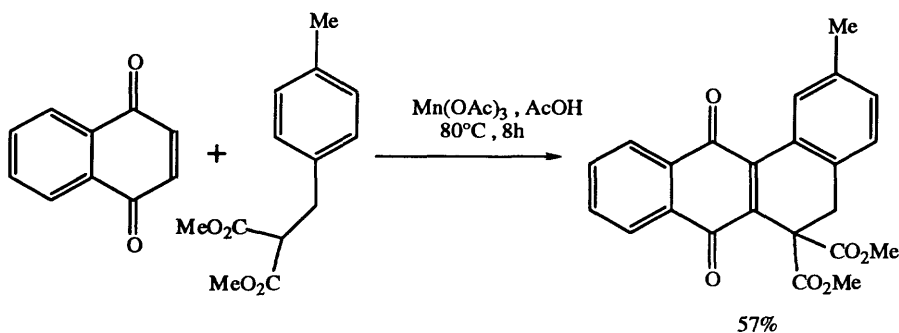
Habi, A.; Gravel, D. *Tetrahedron Lett.*, **1994**, *35*, 4315



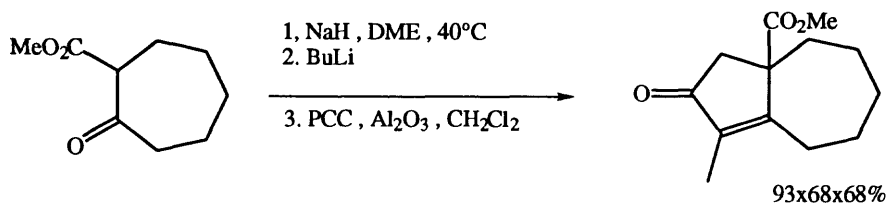
Ye, J.; Bhatt, R.K.; Falck, J.R. *J. Am. Chem. Soc.*, **1994**, *116*, 1



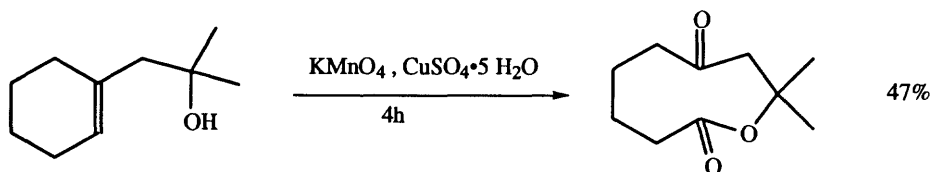
Lygo, B. *Tetrahedron Lett.*, **1994**, *35*, 5073



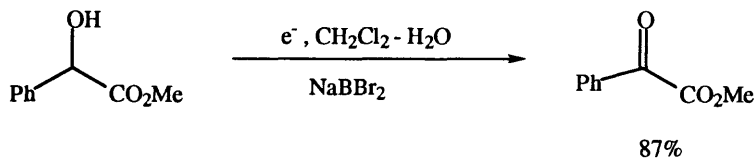
Chuang, C.-P.; Wang, S.-F. *Tetrahedron Lett.*, **1994**, 35, 4365



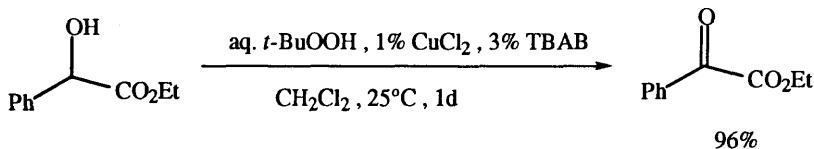
Piers, E.; Cook, K.L.; Rogers, C. *Tetrahedron Lett.*, **1994**, 35, 8573



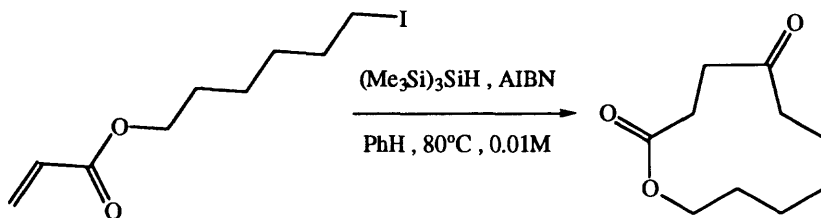
Das, J.; Chandrasekaran, S. *Tetrahedron*, **1994**, 50, 11709



Maekawa, H.; Ishino, Y.; Nishiguchi, I. *Chem. Lett.*, **1994**, 1017

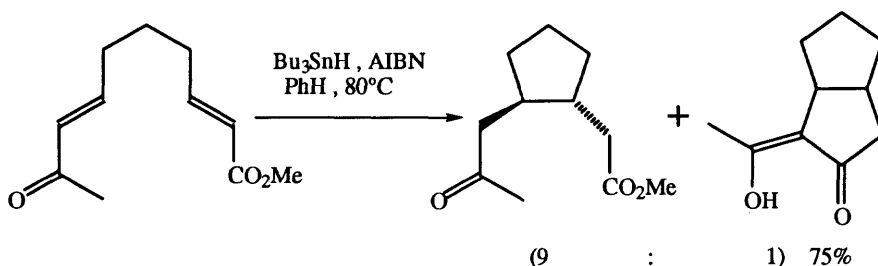


Feldberg, L.; Sasson, Y. *J. Chem. Soc. Chem. Commun.*, **1994**, 1807



68%

Ryu, I.; Nagahara, K.; Yamazaki, H.; Tsunoi, S.; Sonoda, N. *Synlett*, 1994, 643

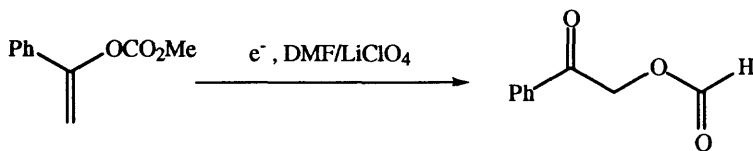


(9)

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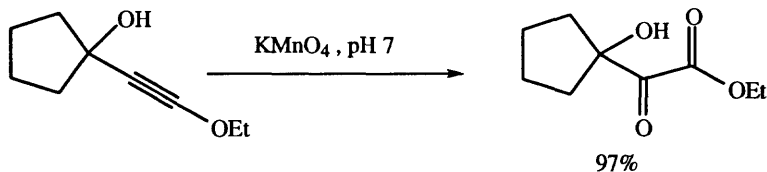
1) 75%

Enholm, E.J.; Kinter, K.S. *J. Org. Chem.*, 1995, 60, 4850



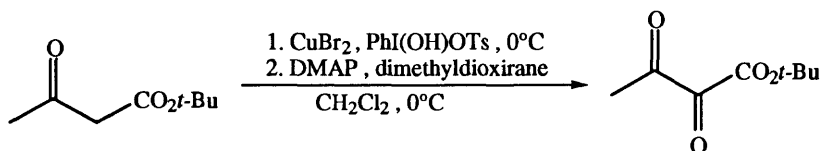
67%

Barba, F.; Quintanilla, M.G.; Montero, G. *J. Org. Chem.*, 1995, 60, 5658



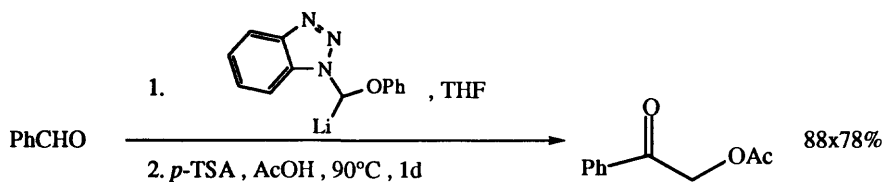
97%

Tatlock, J.H. *J. Org. Chem.*, 1995, 60, 6221

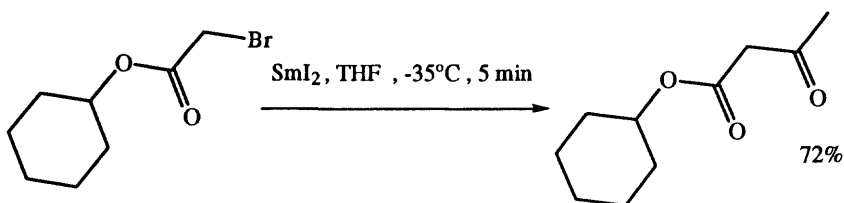


1st step is quant

Coats, S.J.; Wasserman, H.H. *Tetrahedron Lett.*, 1995, 36, 7735



Katritzky, A.R.; Yang, Z.; Moutou, J.-L. *Tetrahedron Lett.*, 1995, 36, 841



Park, H.S.; Lee, I.S.; Kim, Y.H. *Tetrahedron Lett.*, 1995, 36, 1673

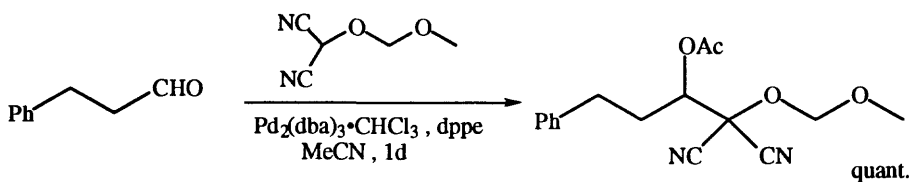
REVIEW:

"Alternate Preparations Of α -Keto Esters From Acid Chlorides," Katritzky, A.R.; Wang, Z.; Wells, A.P. *Org. Prep. Proceed. Int.*, 1995, 27, 457

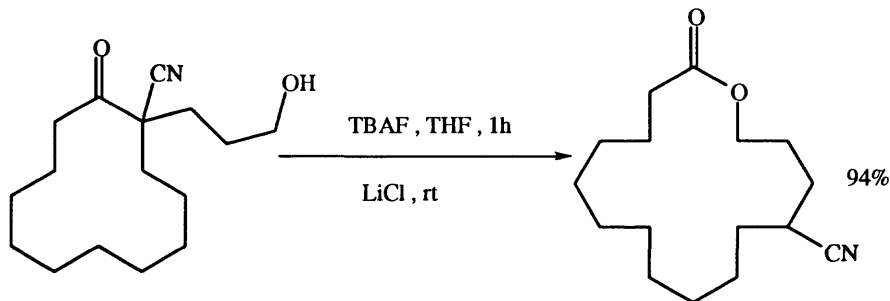
Also via Ketoacids
Hydroxyketones

Section 320 (Carboxylic Acid - Ketone)
Section 330 (Alcohol - Ketone)

SECTION 361: ESTER - NITRILE



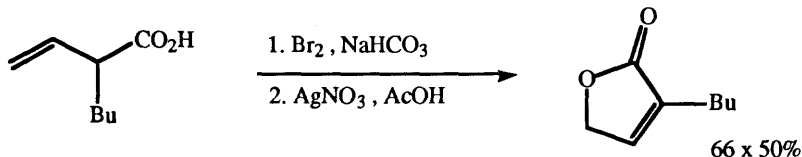
Nemoto, H.; Kubota, Y.; Yamamoto, Y. *J. Chem. Soc. Chem. Commun.*, 1994, 1665



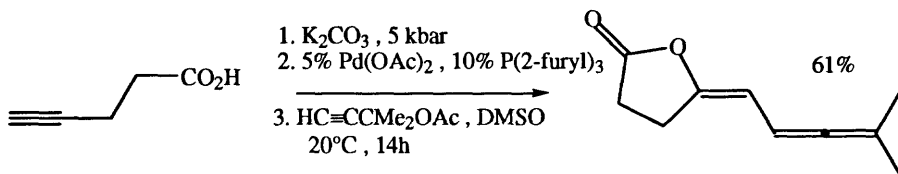
Stojanova, D.S.; Milenkov, B.; Hesse, M. *Helv. Chim. Acta*, 1993, 76, 2303

SECTION 362: ESTER - ALKENE

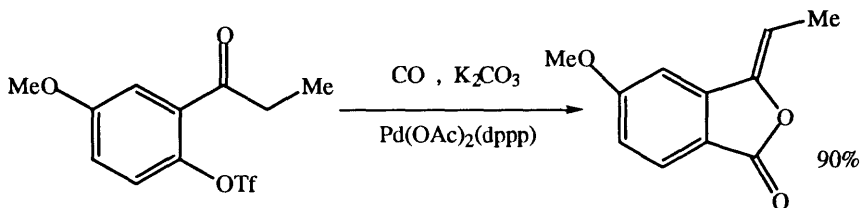
This section contains syntheses of enol esters and esters of unsaturated acids as well as ester molecules bearing a remote alkenyl unit.



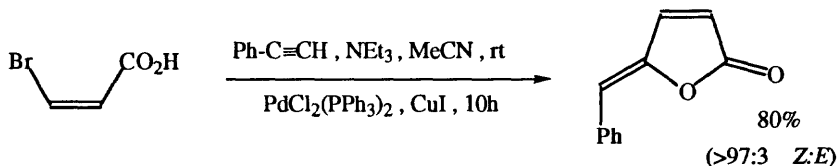
Black, T.H.; Huang, J. *Tetrahedron Lett.*, 1993, 34, 1411



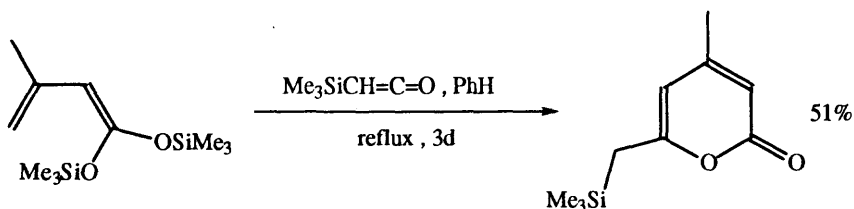
Bouyssi, D.; Gore, J.; Balme, G.; Louis, D.; Wallach, J. *Tetrahedron Lett.*, 1993, 34, 3129



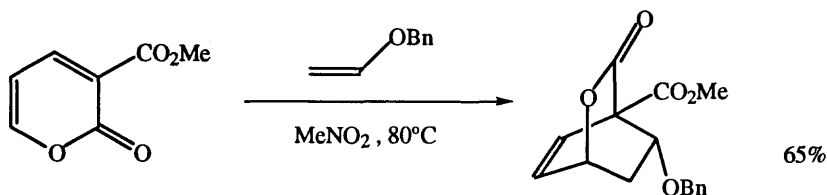
Ciattini, P.G.; Mastropietro, G.; Morera, E.; Ortar, G. *Tetrahedron Lett.*, 1993, 34, 3763



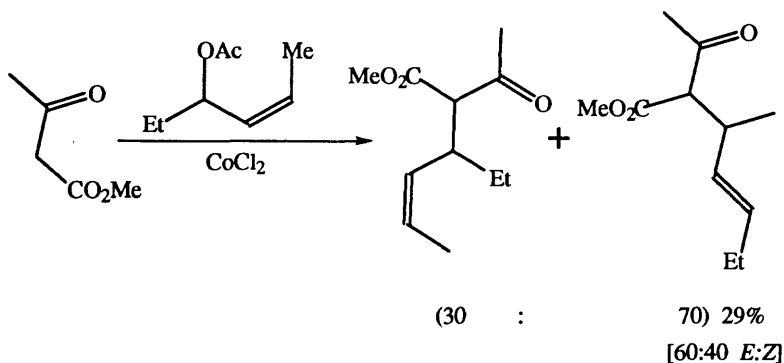
Lu, X.; Huang, X.; Ma, S. *Tetrahedron Lett.*, 1993, 34, 5963



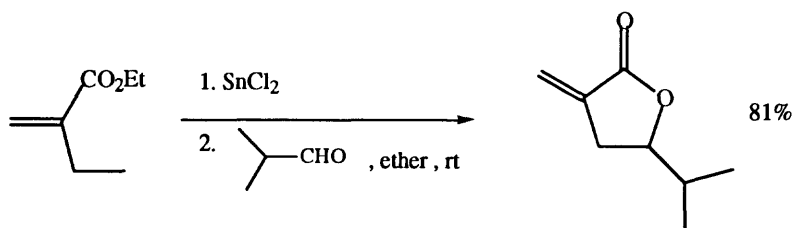
Ito, T.; Aoyama, T.; Shioiri, T. *Tetrahedron Lett.*, 1993, 34, 6583



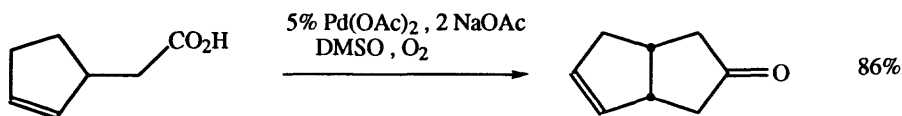
Markó, I.E.; Evans, G.R. *Tetrahedron Lett.*, 1993, 34, 7309



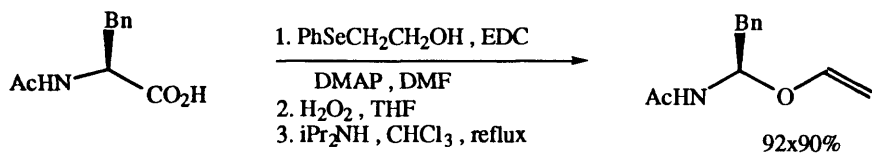
Bhatia, B.; Reddy, M.M.; Iqbal, I. *Tetrahedron Lett.*, 1993, 34, 6301



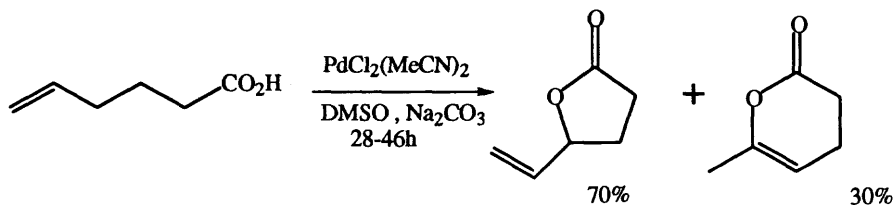
Fouquet, E.; Gabriel, A.; Maillard, B.; Pereyre, M. *Tetrahedron Lett.*, 1993, 34, 7749



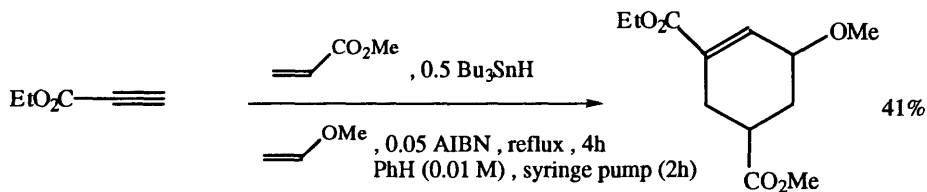
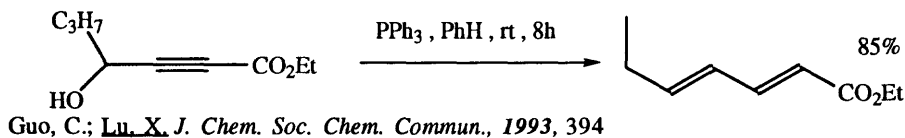
Larock, R.C.; Hightower, T.R. *J. Org. Chem.*, 1993, 58, 5298



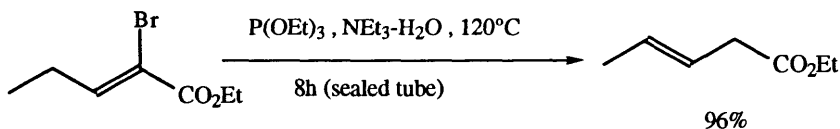
Weinhouse, M.I.; Janda, K.D. *Synthesis*, 1993, 81



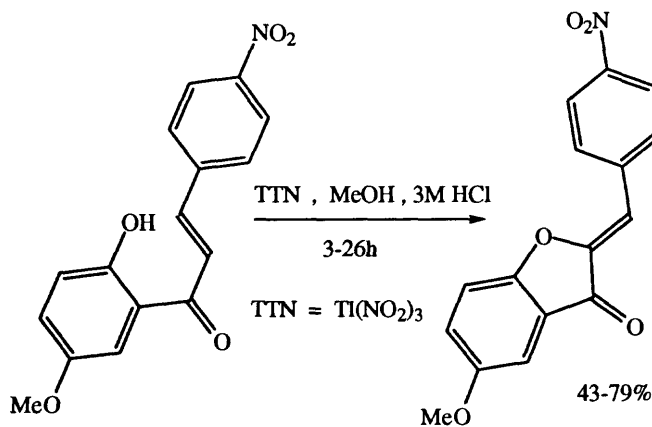
Annby, U.; Stenkula, M.; Andersson, C.-M. *Tetrahedron Lett.*, **1993**, *34*, 8545



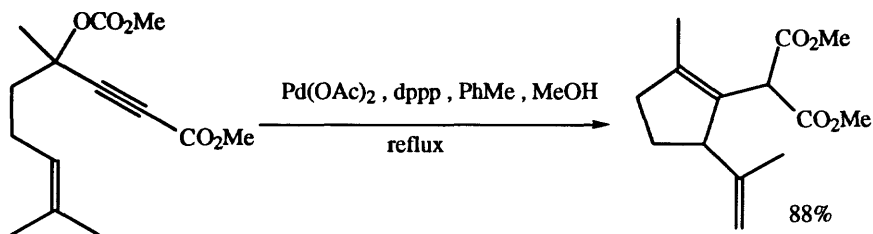
Lee, E.; Hur, C.U.; Rhee, Y.H.; Park, Y.C.; Kim, S.Y. *J. Chem. Soc. Chem. Commun.*, **1993**, 1466



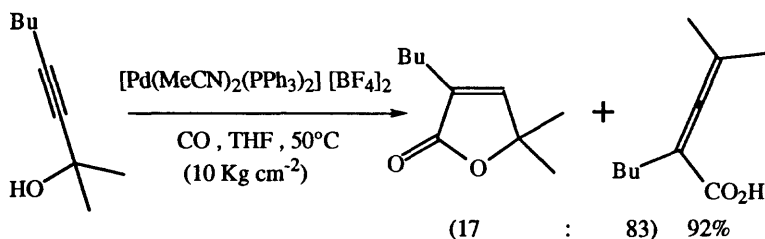
Hirao, T.; Hirano, K.; Ohshiro, Y. *Bull. Chem. Soc. Jpn.*, **1993**, *66*, 2781



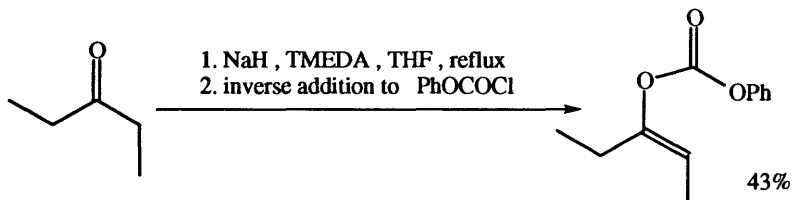
Thakkar, K.; Cushman, M. *Tetrahedron Lett.*, **1994**, *35*, 6441



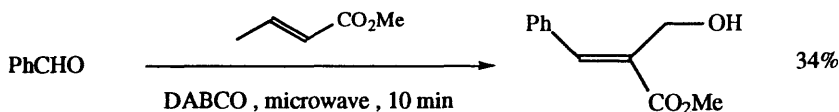
Mandai, T.; Tsujiguchi, Y.; Tsuji, J.; Saito, S. *Tetrahedron Lett.*, **1994**, 35, 5701



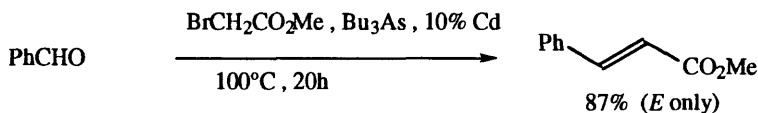
Matsushita, K.; Komori, T.; Oi, S.; Inoue, Y. *Tetrahedron Lett.*, **1994**, 35, 5889



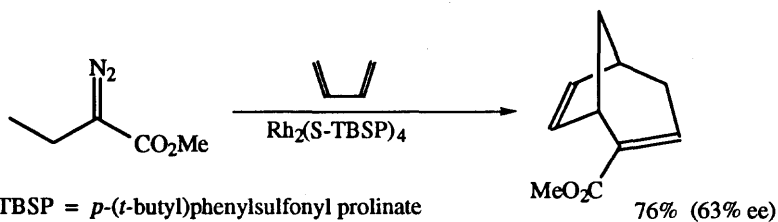
Harwood, L.M.; Houminer, Y.; Manage, A.; Seeman, J.I. *Tetrahedron Lett.*, **1994**, 35, 8027



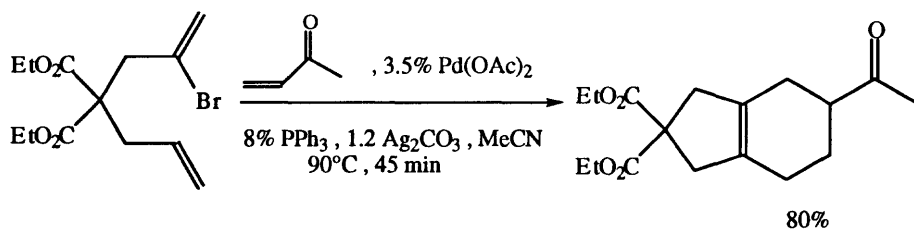
Kundu, M.K.; Mukherjee, S.B.; Balu, N.; Padmakumar, R.; Bhat, S.V. *Synlett*, **1994**, 444



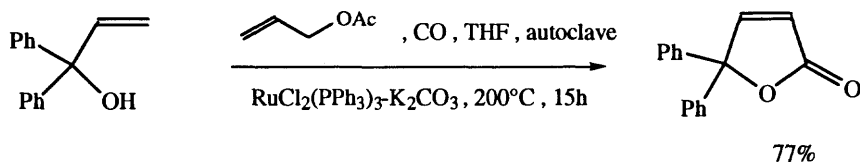
Zheng, J.; Shen, Y. *Synth. Commun.*, **1994**, 24, 2069



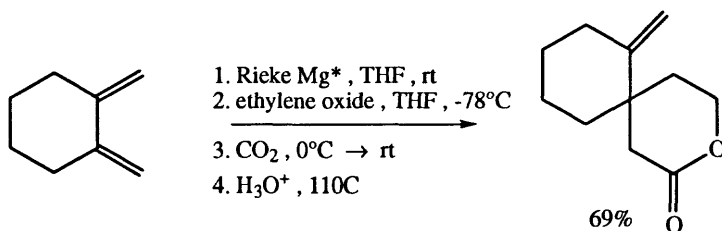
Davies, H.M.L.; Peng, Z.-Q.; Houser, J.H. *Tetrahedron Lett.*, **1994**, 35, 8939



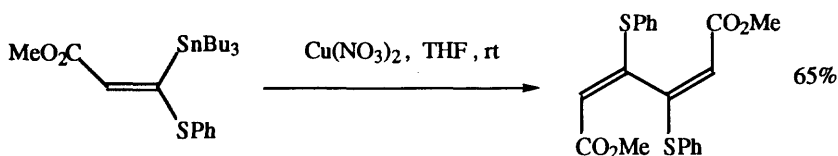
Meyer, F.E.; Ang, K.H.; Stenig, A.G.; de Meijere, A. *Synlett*, **1994**, 191



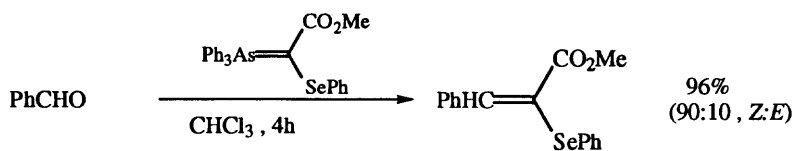
Kondo, T.; Kodoi, K.; Mitsudo, T.-u.; Watanabe, Y. *J. Chem. Soc. Chem. Commun.*, **1994**, 755



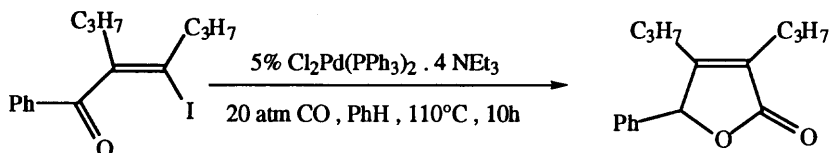
Rieke, R.D.; Sell, M.S.; Xiong, H. *J. Org. Chem.*, **1995**, 60, 5143



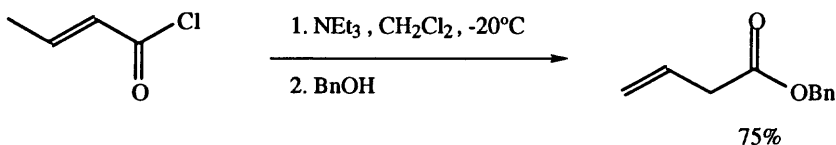
Beddoes, R.L.; Cheeseright, T.; Wang, J.; Quayle, P. *Tetrahedron Lett.*, **1995**, 36, 283



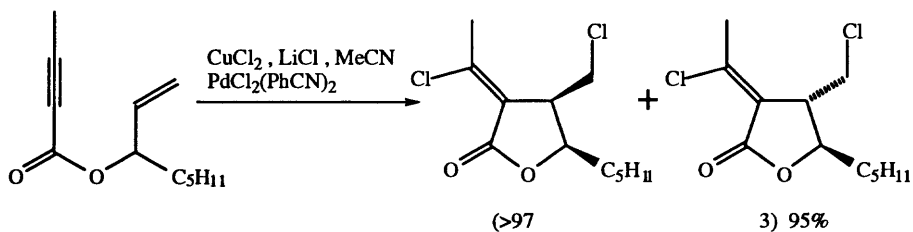
Huang, Z.-Z.; Huang, X.; Huang, Y.-Z. *Tetrahedron Lett.*, 1995, 36, 425



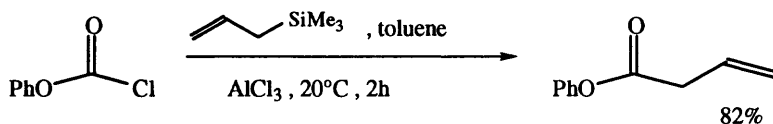
Copéret, C.; Sugihara, T.; Wu, G.; Shimoyama, I.; Negishi, E. *J. Am. Chem. Soc.*, 1995, 117, 3422



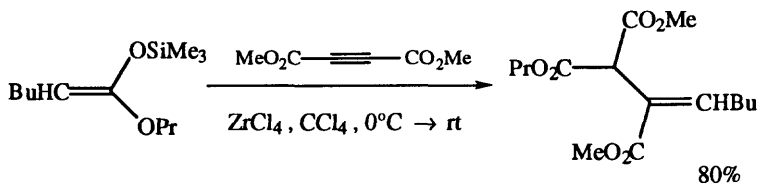
Cardillo, G.; De Simone, A.; Mingardi, A.; Tomasini, C. *Synlett*, 1995, 1131



Zhu, G.; Lu, X. *Tetrahedron Asymmetry*, 1995, 6, 345



Mayr, H.; Gabriel, A.O.; Schumacher, R. *Liebigs Ann. Chem.*, 1995, 1583



Mitani, M.; Sudoh, T.; Koyama, K. *Bull. Chem. Soc. Jpn.*, **1995**, *68*, 1683

Related Methods:

Section 60A (Protection of Aldehydes).

Section 180A (Protection of Ketones).

Also via Acetylenic Esters:

Section 306 (Alkyne - Ester).

Alkenyl Acids:

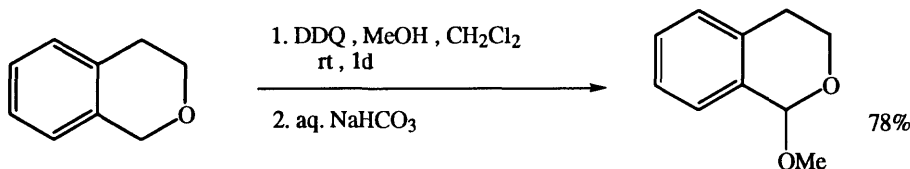
Section 322 (Carboxylic Acid - Alkene).

β -Hydroxy-esters:

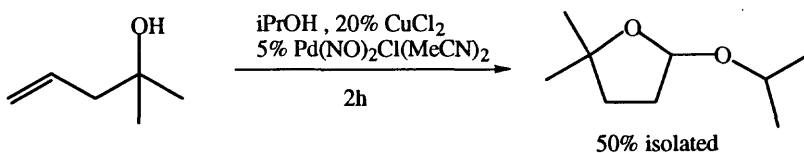
Section 327 (Alcohol - Ester).

SECTION 363: ETHER, EPOXIDE, THIOETHER - ETHER, EPOXIDE, THIOETHER

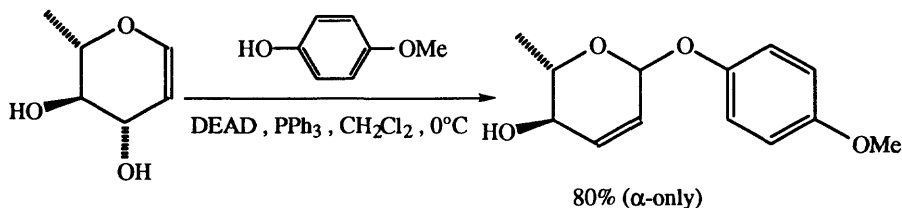
See Section 60A (Protection of Aldehydes) and Section 180A (Protection of Ketones) for reactions involving formation of Acetals and Ketals.



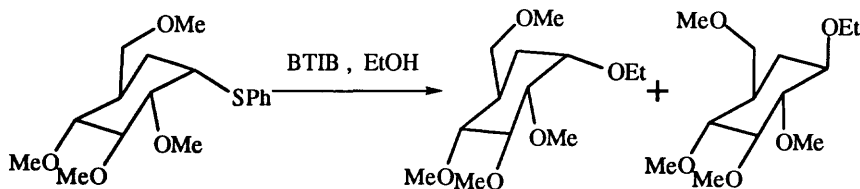
Xu, Y.-C.; Lebeau, E.; Gillard, J.W.; Attardo, G. *Tetrahedron Lett.*, **1993**, *34*, 3841



Meulemans, T.M.; Kiers, N.H.; Feringa, B.L.; van Leeuwen, P.W.N.M. *Tetrahedron Lett.*, **1994**, *35*, 455



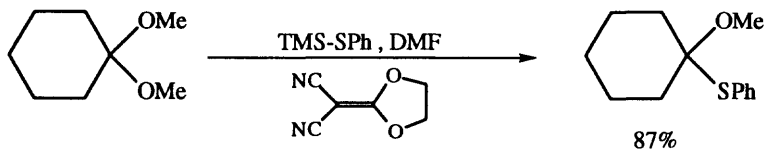
Sobti, A.; Sulikowski, G.A. *Tetrahedron Lett.*, **1994**, *35*, 3661



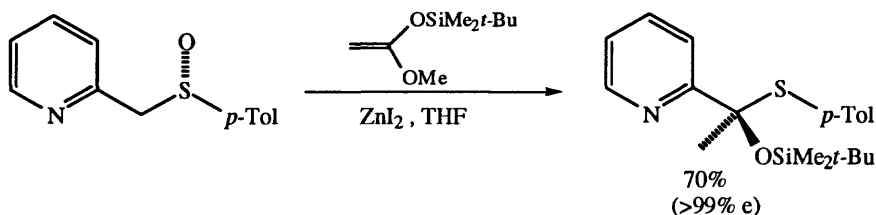
BTIB = bis-(trifluoroacetoxy)iodobenzene

($\alpha:\beta = 1:15$) 81%

Sun, L.; Li, P.; Zhao, K. *Tetrahedron Lett.*, 1994, 35, 7147



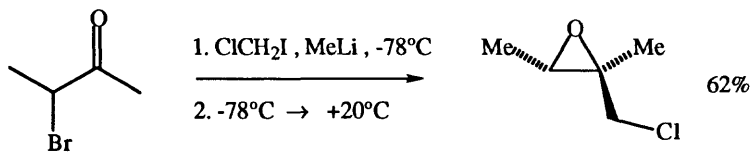
Miura, T.; Masaki, Y. *Tetrahedron Lett.*, 1994, 35, 7961



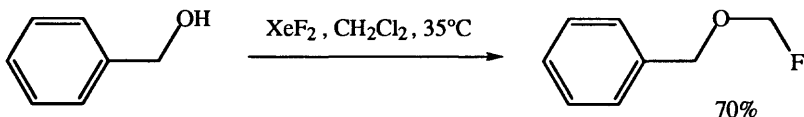
Kita, Y.; Shibata, N.; Fukui, S.; Fujita, S. *Tetrahedron Lett.*, 1994, 35, 9733

SECTION 364:

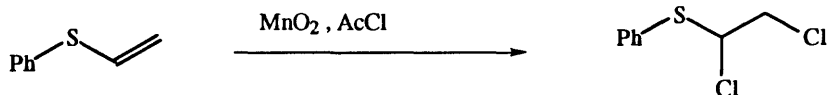
ETHER, EPOXIDE, THIOETHER - HALIDE, SULFONATE



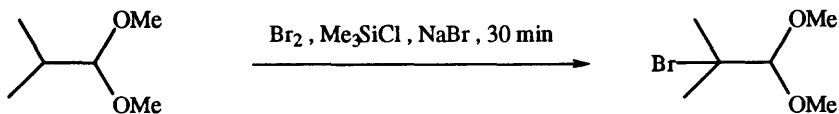
Barluenga, J.; Llavona, L.; Bernad, P.L.; Concellón, J.M. *Tetrahedron Lett.*, 1993, 34, 3173



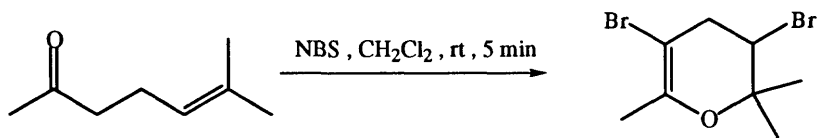
Stavber, S.; Zupan, M. *Tetrahedron Lett.*, 1993, 34, 4355



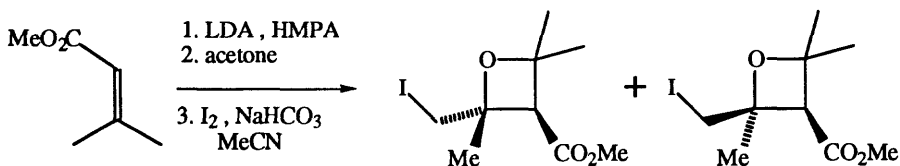
82%

Bellesia, F.; Ghelfi, F.; Pagnoni, U.M.; Pinetti, A. *Gazz. Chim. Ital.*, **1993**, 123, 289

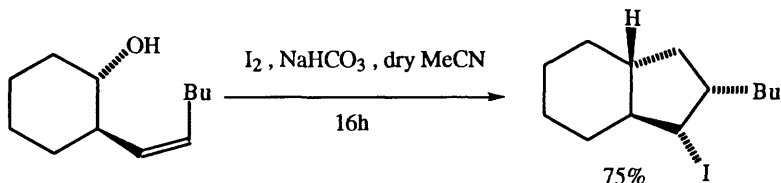
98%

Bellesia, F.; Boni, M.; Ghelfi, F.; Pagnoni, U.M. *Gazz. Chim. Ital.*, **1993**, 123, 629

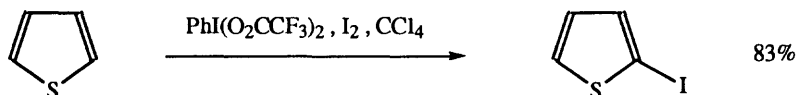
60%

Antonioletti, R.; Magnanti, S.; Screttri, A. *Tetrahedron Lett.*, **1994**, 35, 2619

32x47%

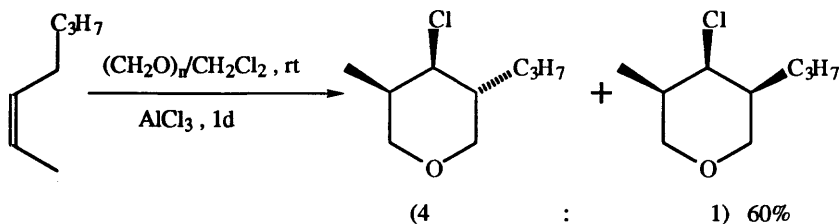
Galatsis, P.; Parks, D.J. *Tetrahedron Lett.*, **1994**, 35, 6611

75%

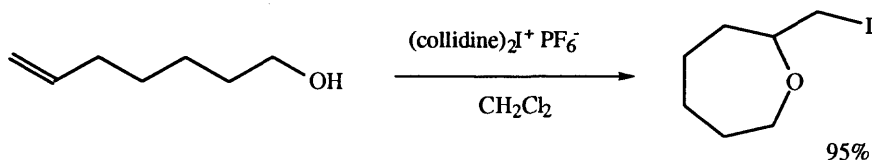
Barks, J.M.; Knight, D.W.; Weingarten, G.G. *J. Chem. Soc. Chem. Commun.*, **1994**, 719

83%

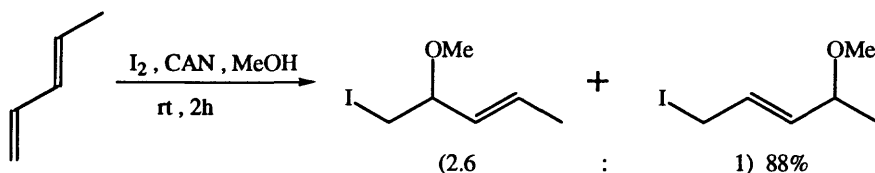
D'Auria, M.; Mauriello, G. *Tetrahedron Lett.*, **1995**, 36, 4883



Metzger, I.O.; Biermann, U. *Bull. Soc. Chim. Belg.*, **1994**, *103*, 393

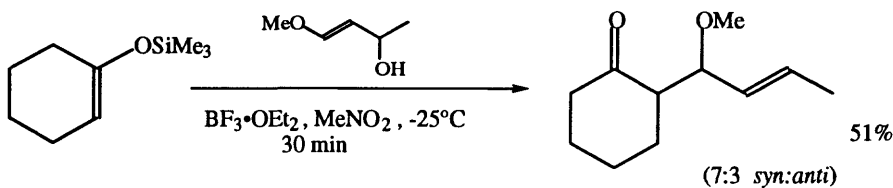


Brunel, Y.; Rousseau, G. *Synlett*, **1995**, 323

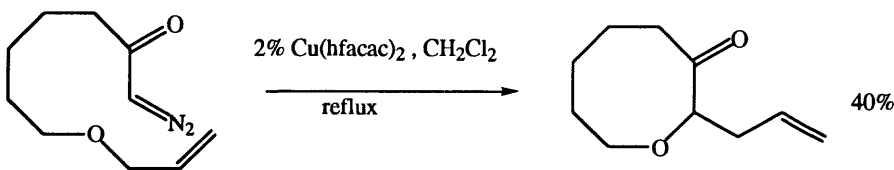


Horiuchi, C.A.; Hosokawa, H.; Kanamori, M.; Muramatsu, Y.; Ochiai, K.; Takahashi, E. *Chem. Lett.*, **1995**, 13

SECTION 365: ETHER, EPOXIDE, THIOETHER - KETONE

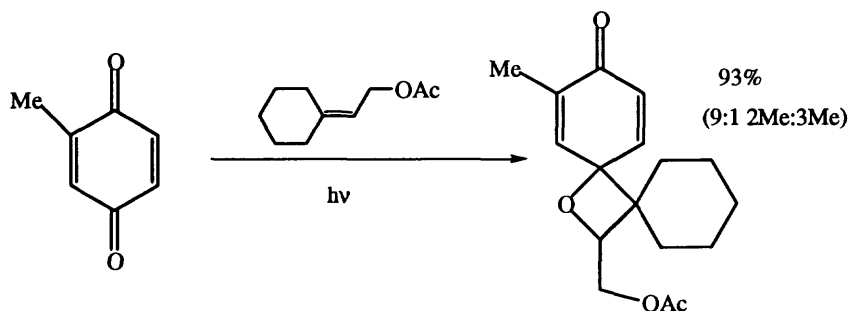


Duhamel, P.; Guillemont, J.; Poirier, J.-M. *Tetrahedron Lett.*, **1993**, *34*, 4197

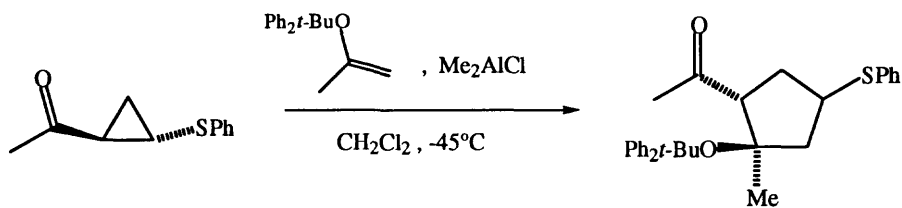


hfacac = hexafluoroacetyl acetone

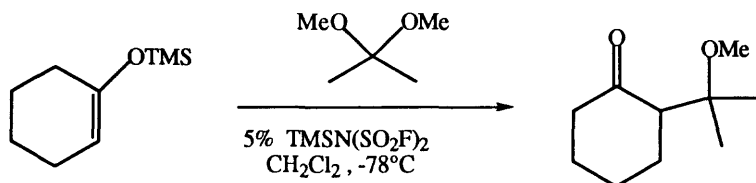
Clark, J.S.; Krowiak, S.A.; Street, L.J. *Tetrahedron Lett.*, **1993**, *34*, 4385



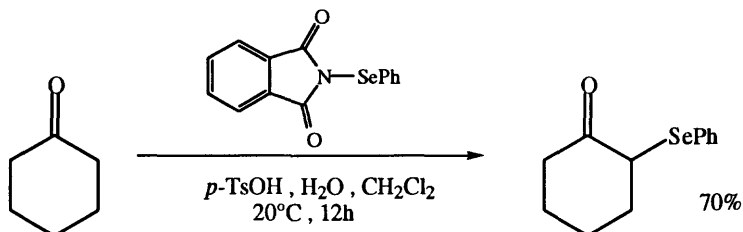
Ciufolini, M.A.; Rivera-Fortin, M.A.; Byrne, N.E. *Tetrahedron Lett.*, **1993**, *34*, 3505



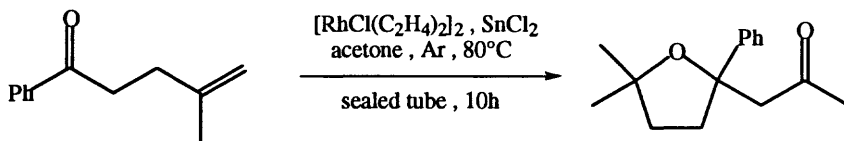
Horiguchi, Y.; Suehiro, I.; Sasaki, A.; Kuwajima, I. *Tetrahedron Lett.*, **1993**, *34*, 6077



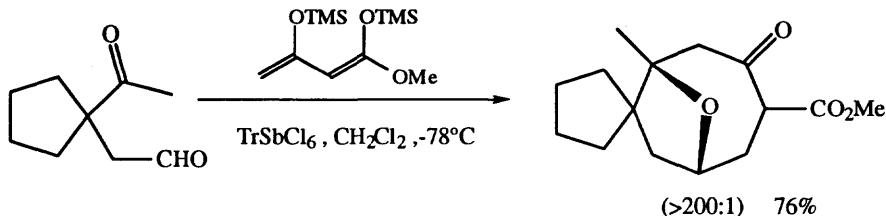
Trehan, A.; Vij, A.; Walia, M.; Kaur, G.; Verma, R.D.; Trehan, S. *Tetrahedron Lett.*, **1993**, *34*, 7335



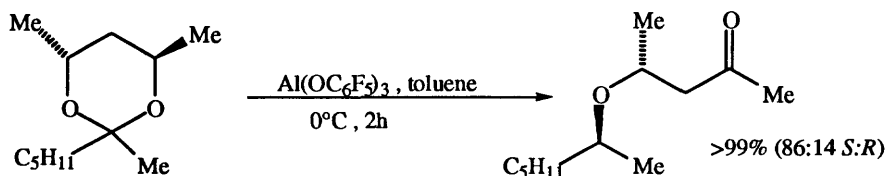
Cossy, J.; Furet, N. *Tetrahedron Lett.*, **1993**, *34*, 7755



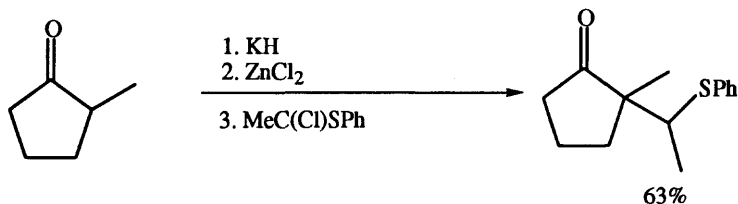
Ipatkin, V.V.; Kovalev, I.P.; Ignatenko, A.V.; Nikishin, G.I. *Tetrahedron Lett.*, **1993**, 34, 7971



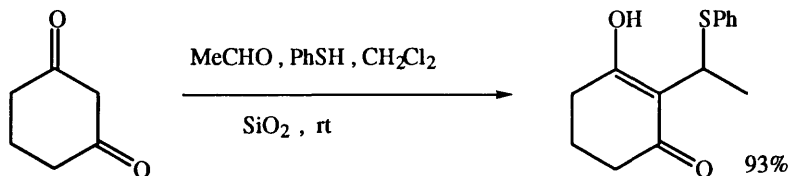
Molander, G.A.; Cameron, K.O. *J. Org. Chem.*, **1993**, 58, 5931



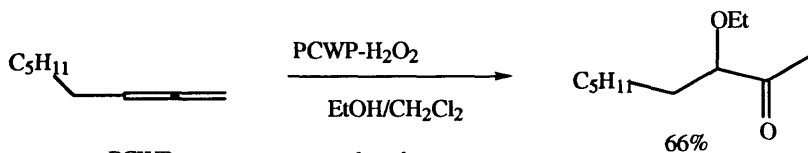
Ishihara, K.; Hanaki, N.; Yamamoto, H. *Synlett*, **1993**, 127



Groth, U.; Huhn, T.; Richter, N. *Liebigs Ann. Chem.*, **1993**, 49

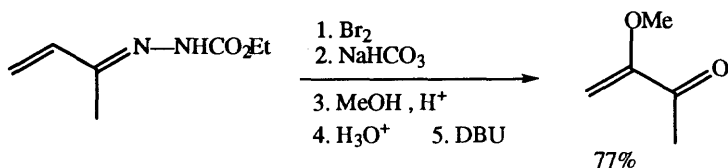


Fuchs, K.; Paquette, L.A. *J. Org. Chem.*, **1994**, 59, 528

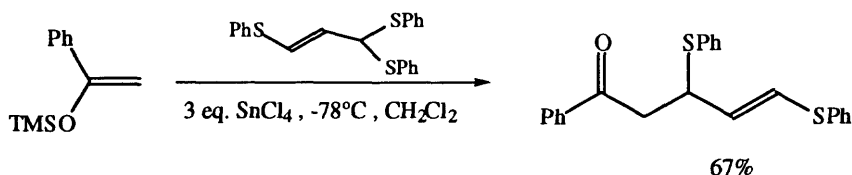


PCWP = peroxotungstophosphate

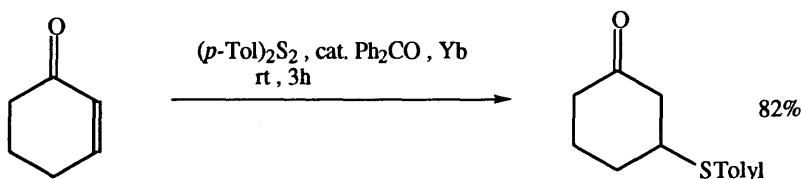
Sakaguchi, S.; Watase, S.; Katayama, Y.; Sakata, Y.; Nishiyama, Y.; Ishii, Y. *J. Org. Chem.*, **1994**, *59*, 5681



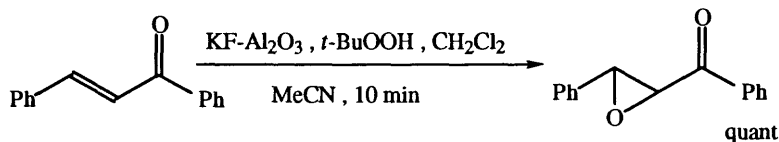
Feuerer, A.; Severin, T. *J. Org. Chem.*, **1994**, *59*, 6026



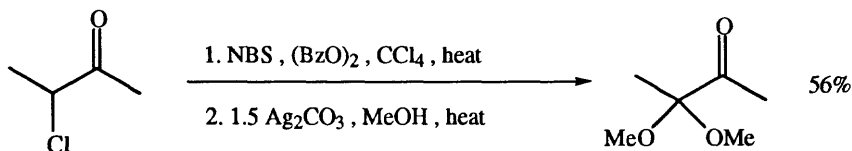
Hunter, R.; Michael, J.P.; Walter, D.S. *Tetrahedron Lett.*, **1994**, *35*, 5481



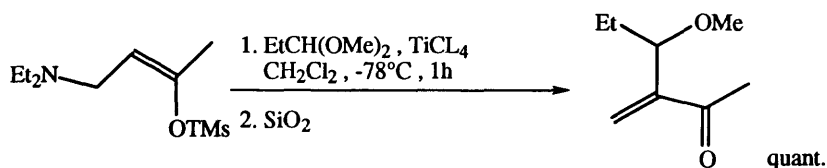
Taniguchi, Y.; Maruo, M.; Takaki, K.; Fujiwara, Y. *Tetrahedron Lett.*, **1994**, *35*, 7789



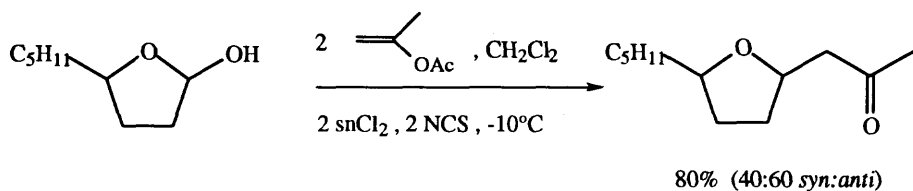
Yadav, V.K.; Kapoor, K.K. *Tetrahedron Lett.*, **1994**, *35*, 9481



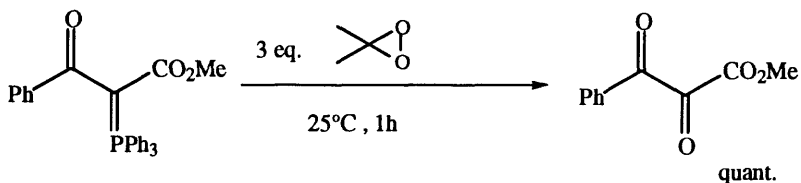
De Kimpe, N.; Stanoeva, E.; Boeykens, M. *Synthesis*, **1994**, 427



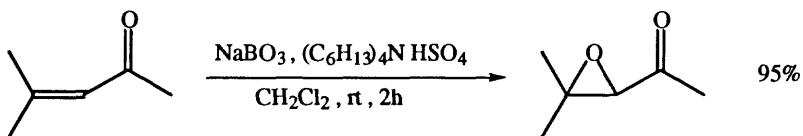
Hojo, M.; Nagoyoshi, M.; Fujii, A.; Yanagi, T.; Ishibashi, N.; Miura, K.; Hosomi, A. *Chem. Lett.*, 1994, 719



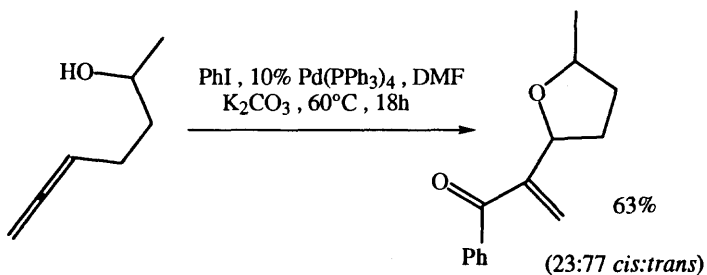
Masuyama, Y.; Kobayashi, Y.; Kurusu, Y. *J. Chem. Soc. Chem. Commun.*, 1994, 1123



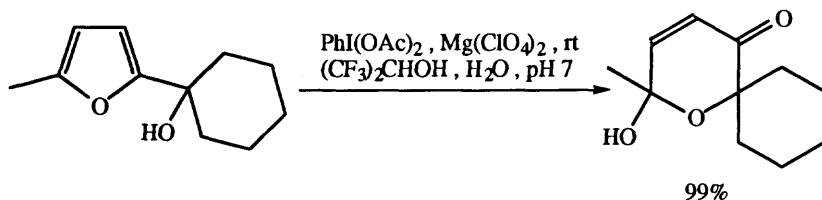
Wasserman, H.H.; Baldino, C.M.; Coats, S.J. *J. Org. Chem.*, 1995, 60, 8231



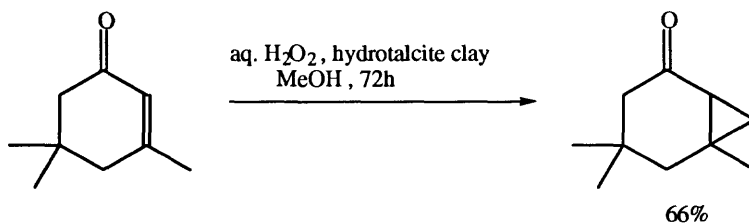
Straub, T.S. *Tetrahedron Lett.*, 1995, 36, 663



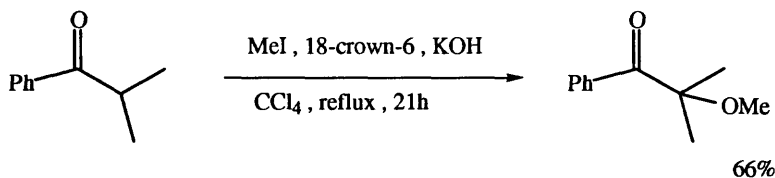
Walkup, R.D.; Guan, L.; Kim, Y.S.; Kim, S.W. *Tetrahedron Lett.*, 1995, 36, 3805



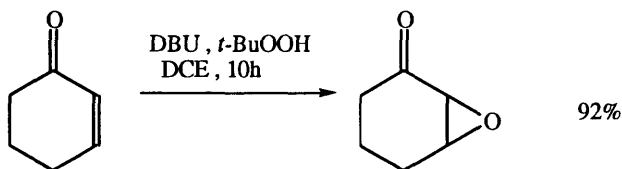
De Mico, A.; Magarita, R.; Piancatelli, G. *Tetrahedron Lett.*, **1995**, 36, 3553



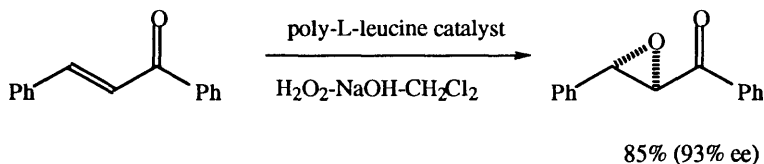
Cativiela, C.; Figueras, F.; Fraile, J.M.; García, J.I.; Mayoral, J.A. *Tetrahedron Lett.*, **1995**, 36, 4125



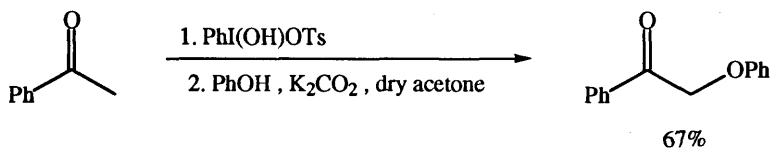
Abele, E.; Rubina, K.; Shymanska, M.; Kukevics, E. *Synth. Commun.*, **1995**, 25, 1371



Yadav, V.K.; Kapoor, K.K. *Tetrahedron*, **1995**, 51, 8573

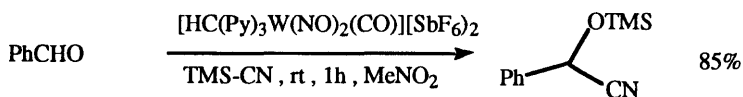


Sánchez, M.E.L.; Roberts, S.M. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 1467

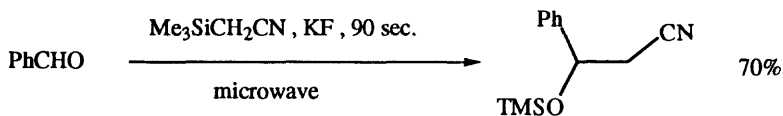


Prakash, O.; Saini, N.; Sharma, P.K. *J. Indian Chem. Soc.*, **1995**, 72, 129

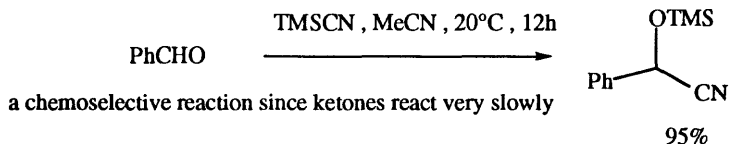
SECTION 366: ETHER, EPOXIDE, THIOETHER - NITRILE



Faller, J.W.; Gundersen, L-L. *Tetrahedron Lett.*, **1993**, 34, 2275



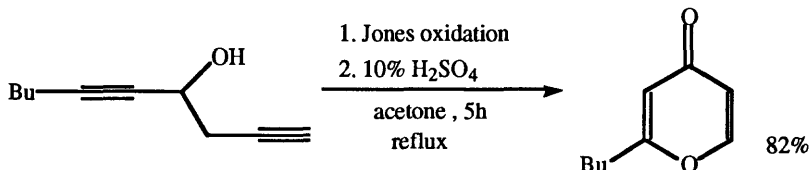
Latouche, R.; Texier-Boullet, F.; Hamelin, J. *Bull. Soc. Chim. Fr.*, **1993**, 130, 535



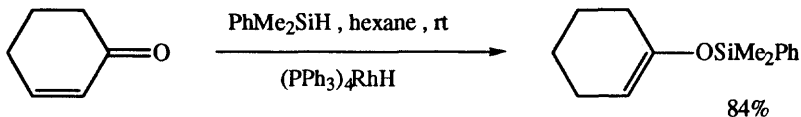
Manju, K.; Trehan, S. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 2383

SECTION 367: ETHER, EPOXIDE, THIOETHER - ALKENE

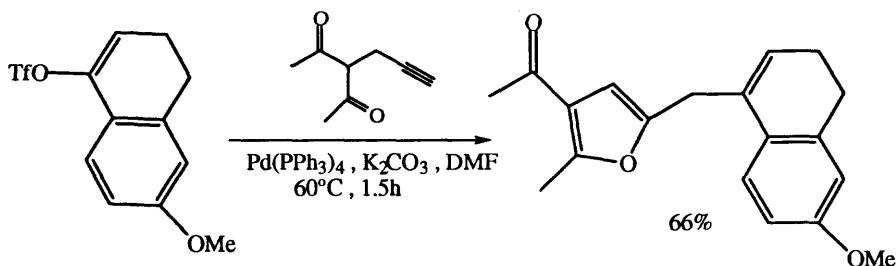
Enol ethers are found in this section as well as alkenyl ethers.



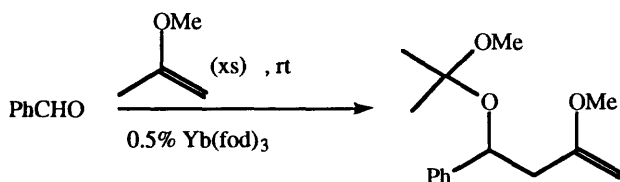
Majetich, G.; Zhang, Y.; Dreyer, G. *Tetrahedron Lett.*, **1993**, 34, 449



Chan, T.H.; Zheng, G.Z. *Tetrahedron Lett.*, **1993**, 34, 3095

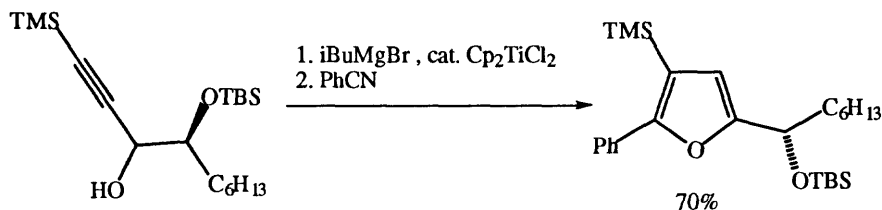


Arcadi, A.; Cacchi, S.; Larock, R.C.; Marinelli, F. *Tetrahedron Lett.*, **1993**, 34, 2813

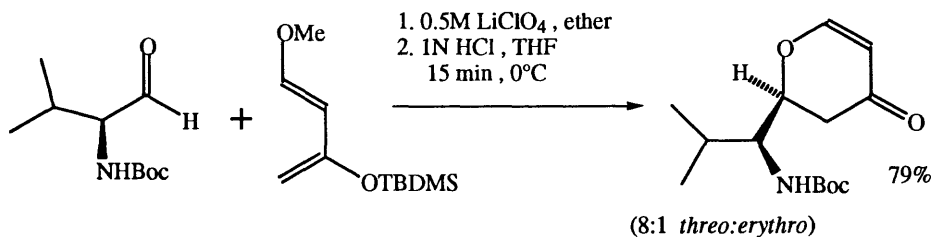


addition of K_2CO_3 prevents formation of this

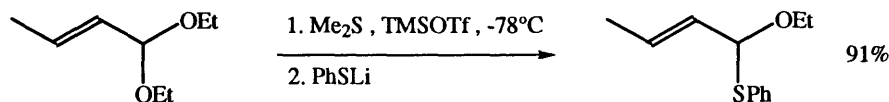
Deaton, M.V.; Ciufolini, M.A. *Tetrahedron Lett.*, **1993**, 34, 2409



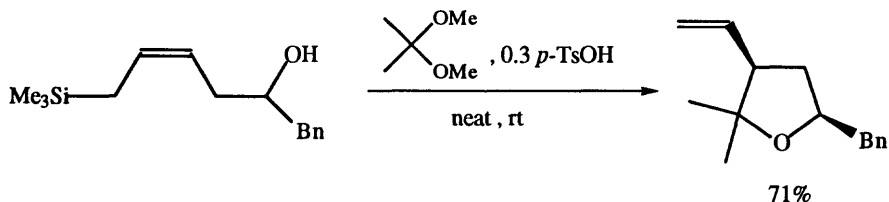
Tani, K.; Sato, Y.; Okamoto, S.; Sato, E. *Tetrahedron Lett.*, **1993**, 34, 4977



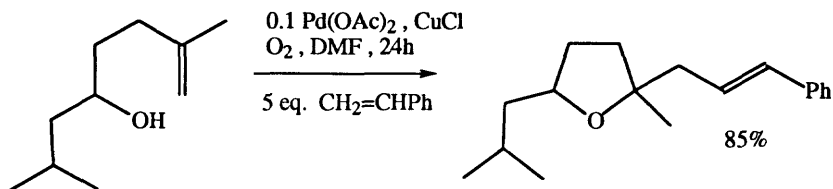
Grieco, P.A.; Moher, E.D. *Tetrahedron Lett.*, **1993**, 34, 5567



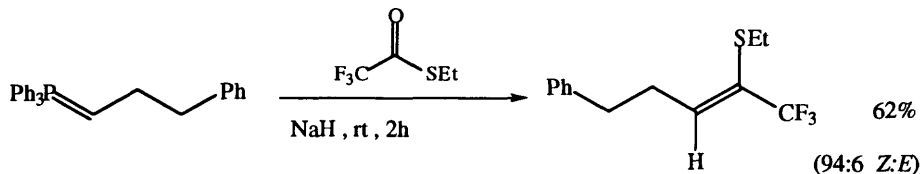
Kim, S.; Park, J.H.; Lee, J.M. *Tetrahedron Lett.*, **1993**, 34, 5769



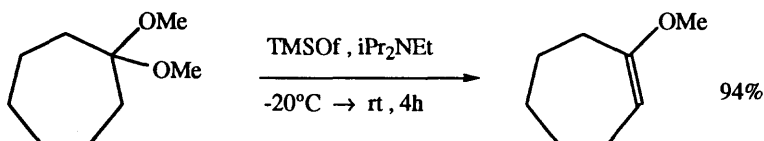
Mohr, P. *Tetrahedron Lett.*, **1993**, *34*, 6251



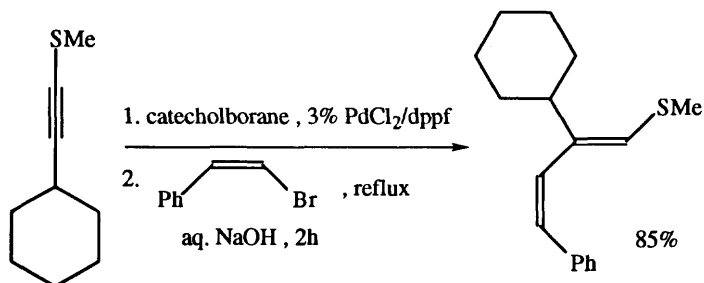
Semmelhack, M.E.; Epa, W.R. *Tetrahedron Lett.*, **1993**, *34*, 7205



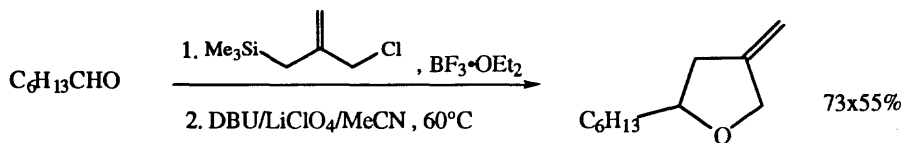
Bégué, J.-P.; Bonnet-Delpon, D.; M'Bida, A. *Tetrahedron Lett.*, **1993**, *34*, 7753



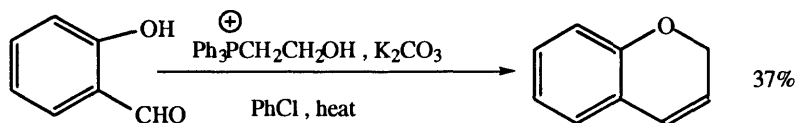
Gassman, P.G.; Burns, S.J.; Pfister, K.B. *J. Org. Chem.*, **1993**, *58*, 1449



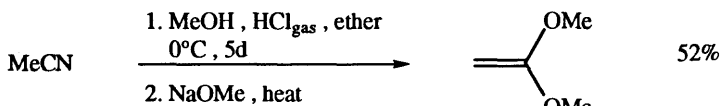
Gridnev, I.D.; Miyaura, N.; Suzuki, A. *J. Org. Chem.*, **1993**, *58*, 5351



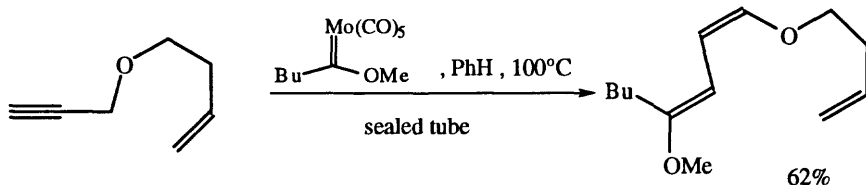
D'Aniello, F.; Mattii, D.; Taddei, M. *Synlett*, **1993**, 119



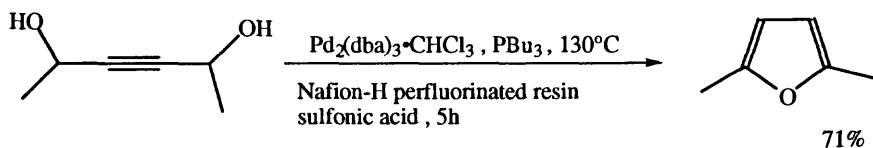
Billeret, D.; Blondeau, D.; Sliwa, H. *Synthesis*, **1993**, 881



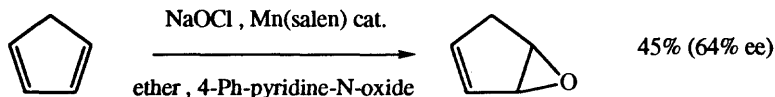
Argade, A.B.; Joglekar, B.R. *Synth. Commun.*, **1993**, 23, 1979



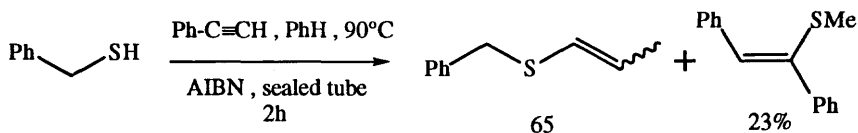
Harvey, D.E.; Neil, D.A. *Tetrahedron*, **1993**, 49, 2145



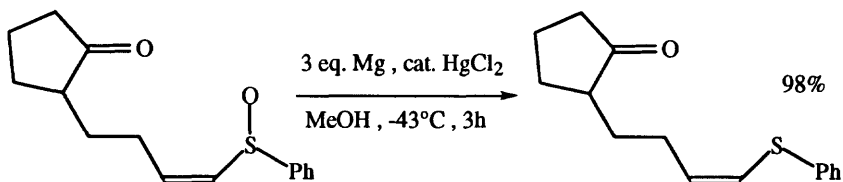
Ji, J.; Lu, X. *J. Chem. Soc. Chem. Commun.*, **1993**, 764



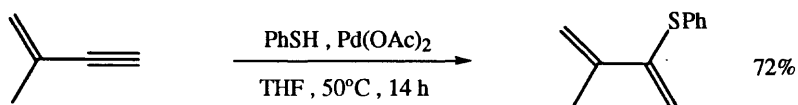
Chang, S.; Heid, R.M.; Jacobsen, E.W. *Tetrahedron Lett.*, **1994**, 35, 669



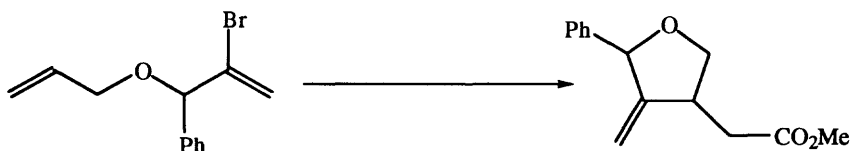
Benati, L.; Capella, L.; Montecocchi, P.C.; Spagnolo, P. *J. Org. Chem.*, **1994**, 59, 2818



Lee, G.H.; Choi, E.B.; Lee, E.; Pak, C.S. *Tetrahedron Lett.*, **1994**, 35, 2195



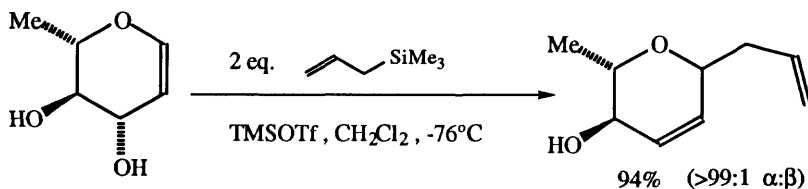
Bäckvall, J.-E.; Ericsson, A. *J. Org. Chem.*, **1994**, 59, 5850



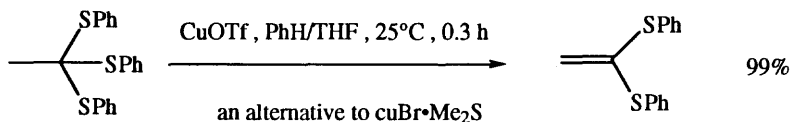
Ni(CO)₄, MeCN, MeOH 76% (80:20 *cis:trans*)

Ni(CO)₄, TIOAc, MeOH 66% (30:70 *cis:trans*)

Delgado, A.; Llebaria, A.; Camps, F.; Moretó, J.M. *Tetrahedron Lett.*, **1994**, 35, 4011

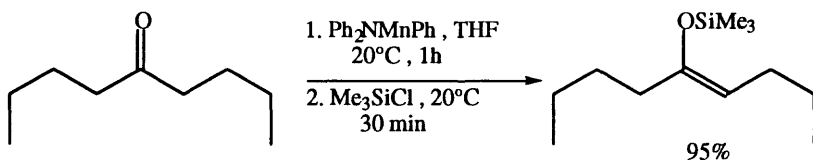


Toshima, K.; Ishizuka, T.; Matsuo, G.; Nakata, M. *Tetrahedron Lett.*, **1994**, 35, 5673

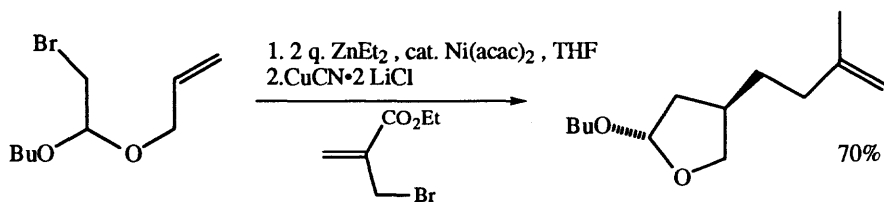


an alternative to $\text{CuBr} \cdot \text{Me}_2\text{S}$

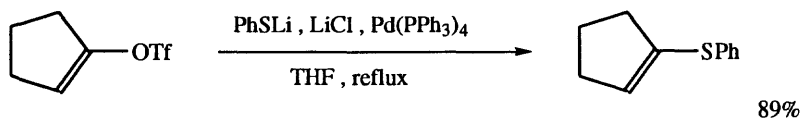
Cohen, T.; Shook, C.; Thiruvazhi, M. *Tetrahedron Lett.*, **1994**, 35, 6041



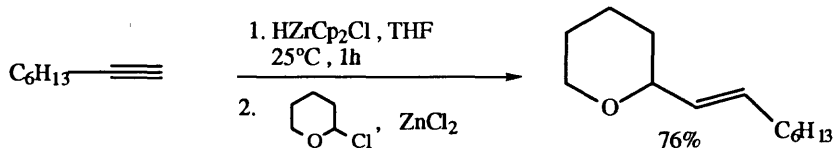
Cahiez, G.; Figadère, B.; Cléry, P. *Tetrahedron Lett.*, **1994**, 35, 6295



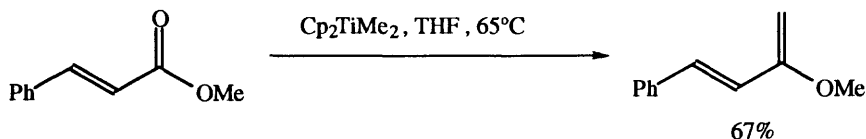
Vaupel, A.; Knochel, P. *Tetrahedron Lett.*, **1994**, 35, 8349



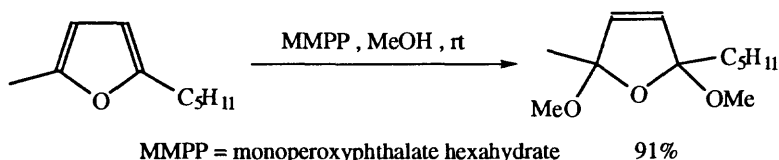
Martínez, A.G.; Barcina, J.O.; Cerezo, A. de F.; Subramanian, L.R. *Synlett*, **1994**, 561



Pereira, S.; Zheng, B.; Srebnik, M. *J. Org. Chem.*, **1995**, 60, 6260

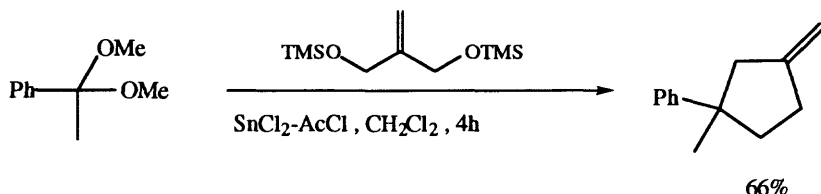


Petasis, N.A.; Lu, S.-P. *Tetrahedron Lett.*, **1995**, 36, 2393

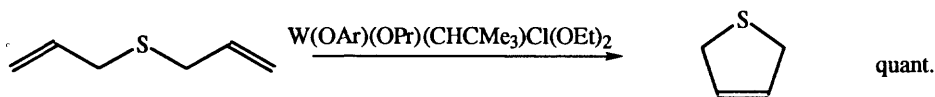


MMPP = monoperoxyphthalate hexahydrate

D'Annibale, A.; Scettri, A. *Tetrahedron Lett.*, **1995**, 36, 4659



Oriyama, T.; Ishiwata, A.; Sano, T.; Matsuda, T.; Takahashi, M.; Koga, G. *Tetrahedron Lett.*, **1995**, 36, 5581



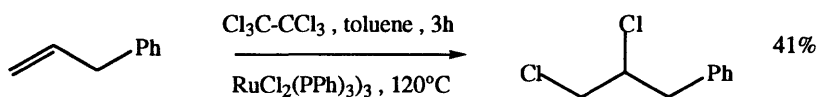
Leconte, M.; Pagano, S.; Mutch, A.; Lefebvre, F.; Basset, J.M. *Bull. Soc. Chim. Fr.*, **1995**, 132, 1069

Related Methods:

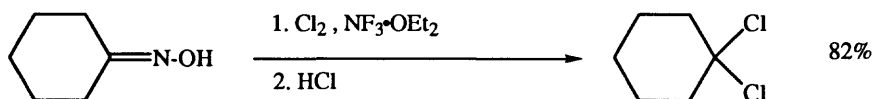
Section 180A (Protection of Ketones)

SECTION 368: HALIDE, SULFONATE - HALIDE, SULFONATE

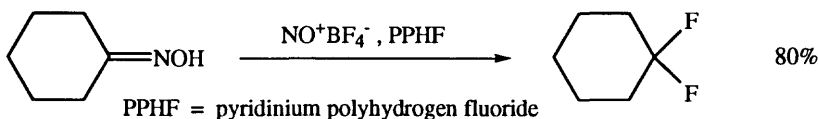
Halocyclopropanations are found in Section 74F (Alkyls from Alkenes).



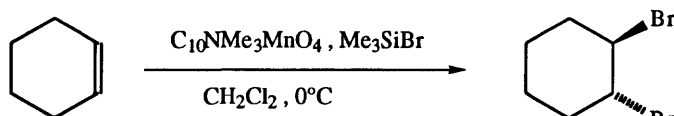
Sakai, K.; Sugimoto, K.; Shigeizumi, S.; Kondo, K. *Tetrahedron Lett.*, **1994**, 35, 737



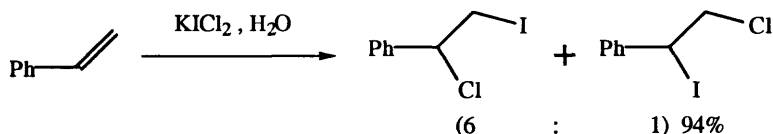
Tordeux, M.; Boumizane, K.; Wakselman, C. *J. Org. Chem.*, **1993**, 58, 1939



York, C.; Prakash, G.K.S.; Wang, Q.; Olah, G.A. *Synlett*, **1994**, 425

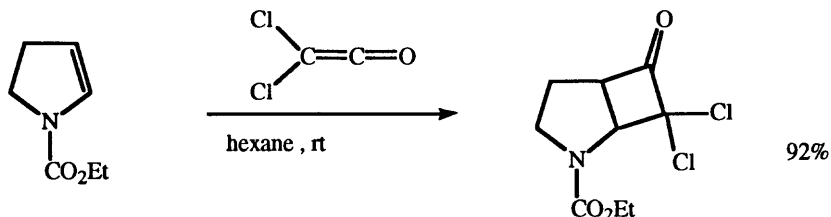


Hazra, B.G.; Chordia, M.D.; Bahule, B.B.; Pore, V.S.; Basu, S. *J. Chem. Soc., Perkin Trans. 1.*, **1994**, 1667

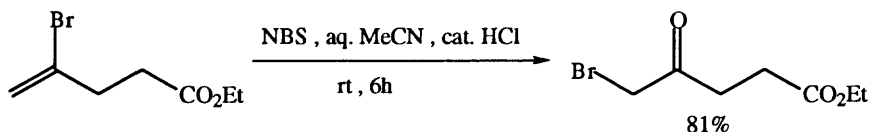


Zefirov, N.S.; Sereda, G.A.; Sosonuk, S.E.; Zyk, N.V.; Likhomanova, T.I. *Synthesis*, **1995**, 1359

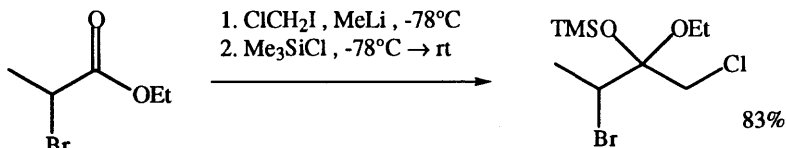
SECTION 369: HALIDE, SULFONATE - KETONE



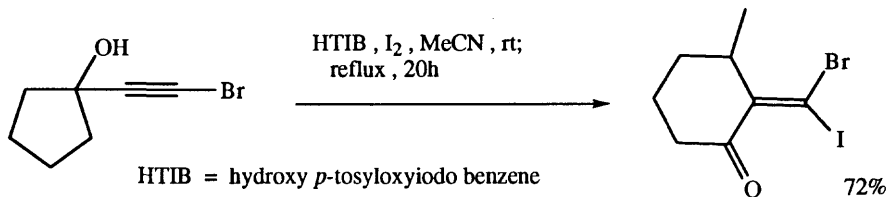
de Faria, A.R.; Matos, C.R.; Correia, C.R.D. *Tetrahedron Lett.*, **1993**, *34*, 27



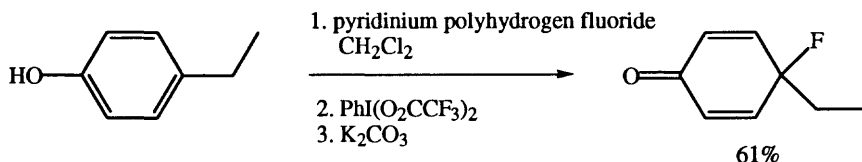
Morton, H.E.; Leanna, M.R. *Tetrahedron Lett.*, **1993**, *34*, 4481



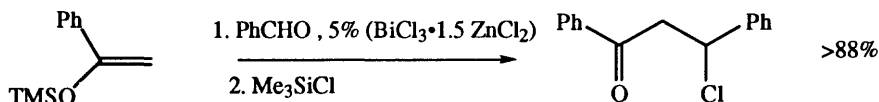
Barluenga, J.; Pedregal, B.; Concellón, J.M. *Tetrahedron Lett.*, **1993**, *34*, 4563



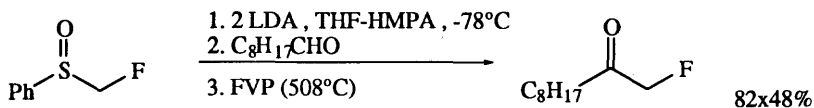
Bovonsombat, P.; McNelis, E. *Tetrahedron*, **1993**, *49*, 1525



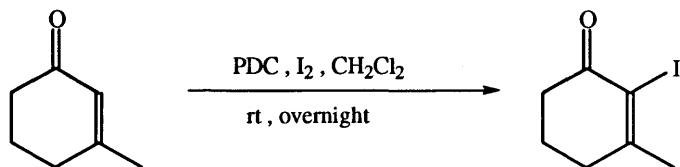
Karam, O.; Jacquesy, J.-C.; Jouannetaud, M.-P. *Tetrahedron Lett.*, **1994**, *35*, 2541



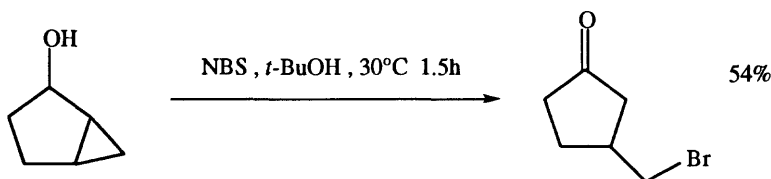
Le Roux, C.; Gaspard-loughmane, H.; Dubac, J. *J. Org. Chem.*, **1994**, *59*, 2238



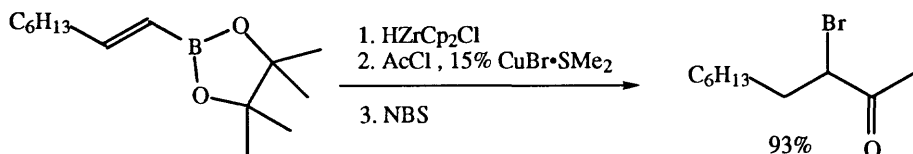
Reutrakul, V.; Kruahong, T.; Pohmakotr, M. *Tetrahedron Lett.*, **1994**, 35, 4853



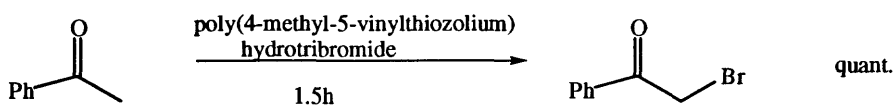
Bovonsombat, P.; Angara, G.J.; McNelis, E. *Tetrahedron Lett.*, **1994**, 35, 6787



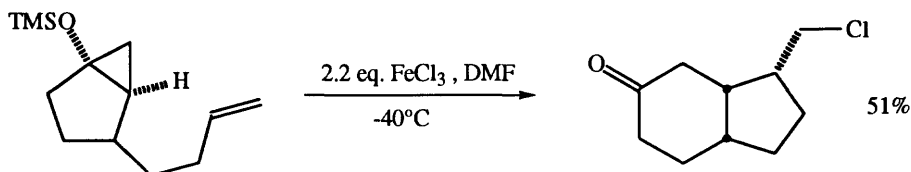
Cossy, J.; Furet, N. *Tetrahedron Lett.*, **1995**, 36, 3691



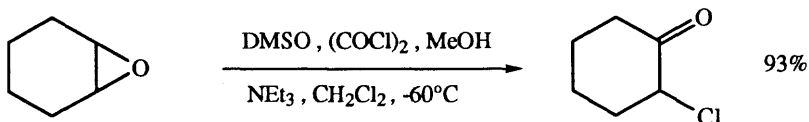
Zheng, B.; Srebnik, M. *Tetrahedron Lett.*, **1995**, 36, 5665



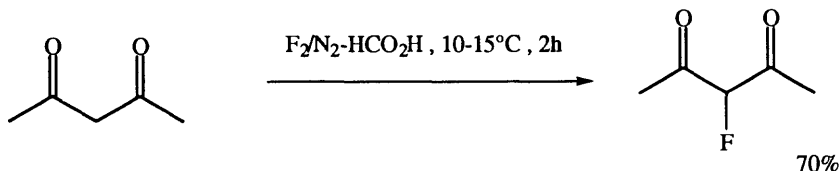
Babadjamian, A.; Kessat, A. *Synth. Commun.*, **1995**, 25, 2203



Booker-Milburn, K.I.; Thompson, D.F. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 2315



Raina, S.; Singh, V.K. *Tetrahedron*, 1995, 51, 2467

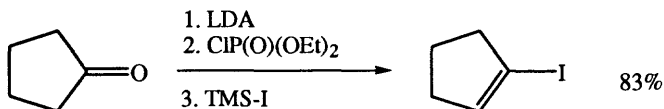


Chambers, R.D.; Greenhall, M.P.; Hutchinson, J. *J. Chem. Soc. Chem. Commun.*, 1995, 21

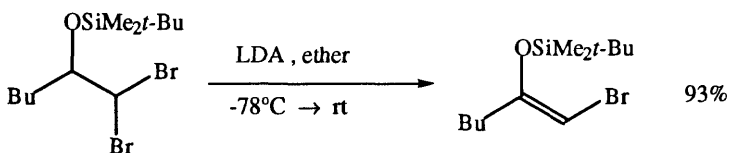
SECTION 370: HALIDE, SULFONATE - NITRILE

NO ADDITIONAL EXAMPLES

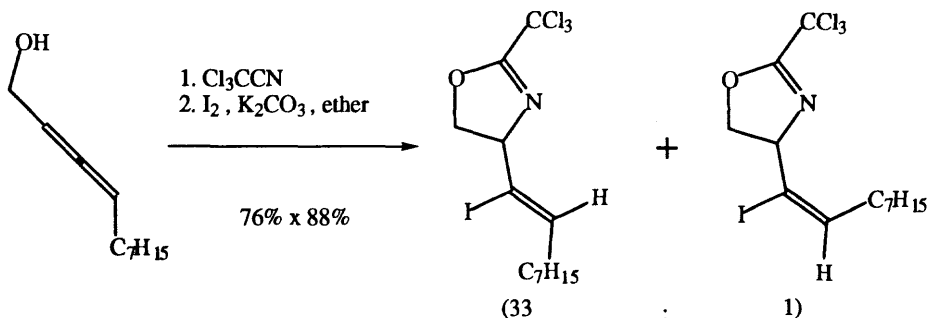
SECTION 371: HALIDE, SULFONATE - ALKENE



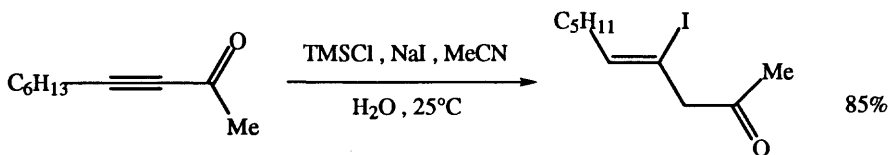
Lee, K.; Wiemer, D.F. *Tetrahedron Lett.*, 1993, 34, 2433



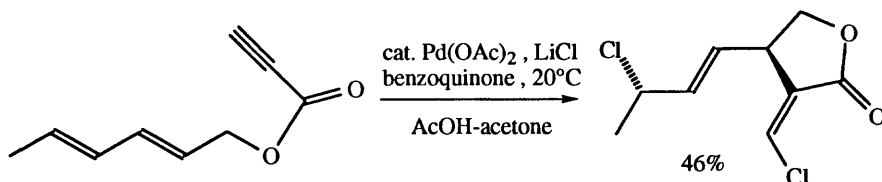
Shinokubo, H.; Oshima, K.; Utimoto, K. *Tetrahedron Lett.*, 1993, 34, 4985



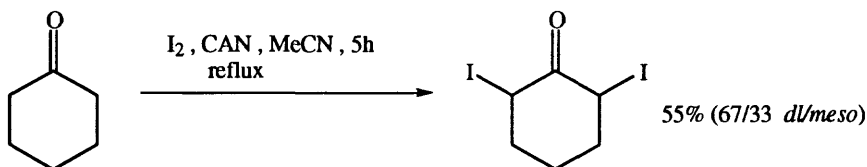
Friesen, R.W.; Giroux, A.; Cook, K.L. *Tetrahedron Lett.*, 1993, 34, 5983



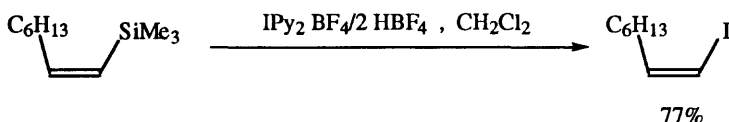
Luo, F.-T.; Kumar, K.A.; Hsieh, L.-C.; Wang, R.-T. *Tetrahedron Lett.*, **1994**, 35, 2553



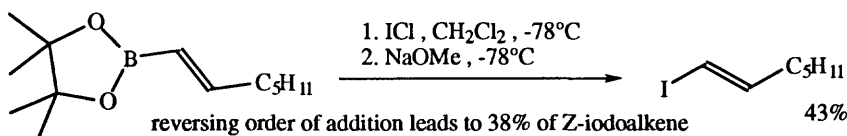
Bäckvall, J.-E.; Nilsson, Y.I.M.; Andersson, P.G.; Gatti, R.G.P.; Wu, J. *Tetrahedron Lett.*, **1994**, 35, 5713



Horiuchi, C.A.; Takahashi, E. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 271

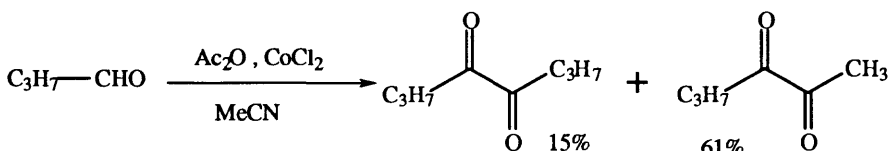


Barluenga, J.; Alvarez-García, L.J.; González, J.M. *Tetrahedron Lett.*, **1995**, 36, 2153

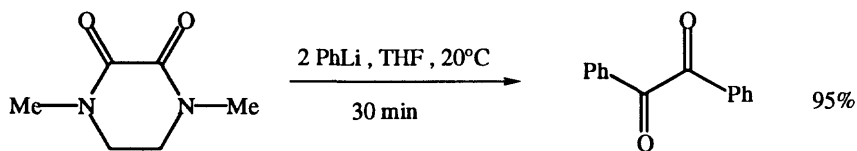


Stewart, S.K.; Whiting, A. *Tetrahedron Lett.*, **1995**, 36, 3929

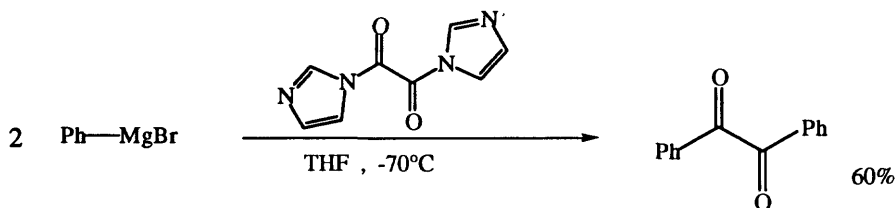
SECTION 372: KETONE - KETONE



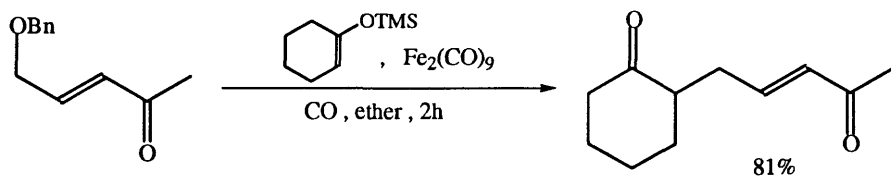
Bhatia, B.; Punniyamurthy, T.; Iqbal, J. *J. Org. Chem.*, **1993**, 58, 5518



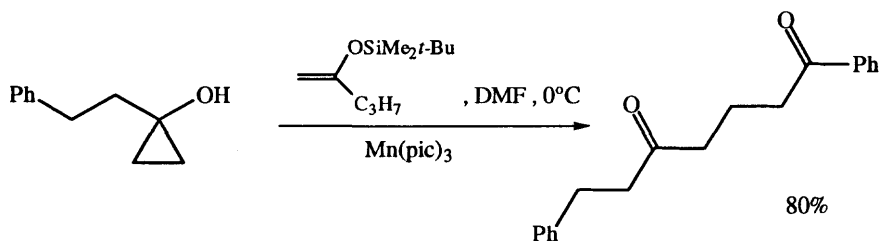
Mueller-Westerhoff, U.T.; Zhou, M. *Tetrahedron Lett.*, 1993, 34, 571



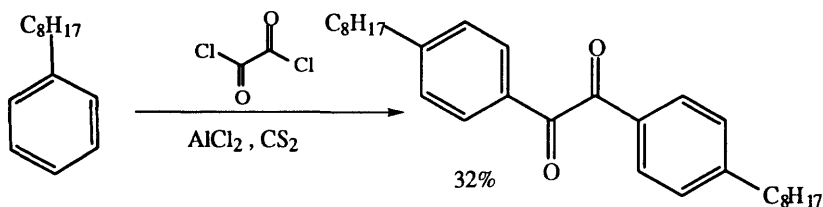
Mitchell, R.H.; Iyer, V.S. *Tetrahedron Lett.*, 1993, 34, 3683



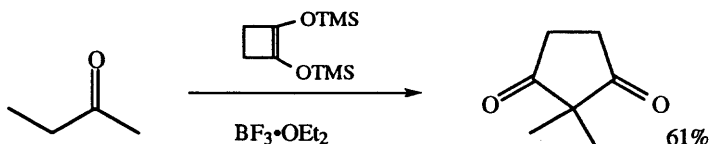
Zhou, T.; Green, J.R. *Tetrahedron Lett.*, 1993, 34, 4497



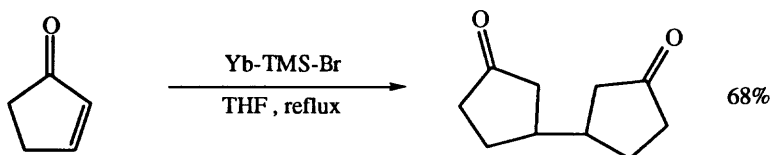
Iwasawa, N.; Hayakawa, S.; Funahashi, M.; Isobe, K.; Narasaka, K. *Bull. Chem. Soc. Jpn.*, 1993, 66, 819



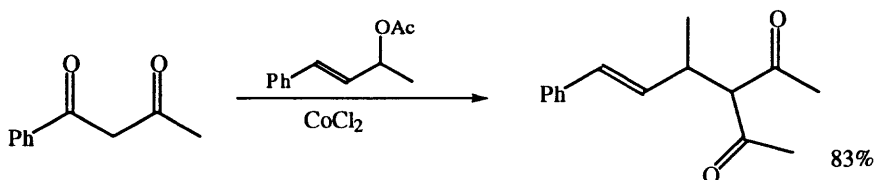
Mohr, B.; Enkelmann, V.; Wegner, G. *J. Org. Chem.*, 1994, 59, 635



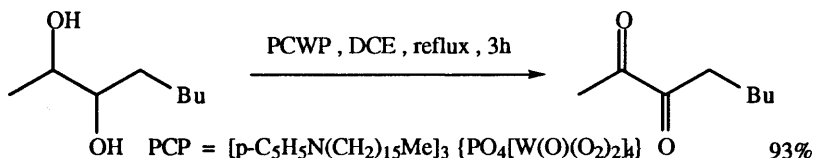
Jenkins, T.J.; Burnell, D.J. *J. Org. Chem.*, **1994**, *59*, 1485



Taniguchi, Y.; Nakahashi, M.; Kuno, T.; Tsuno, M.; Makioka, Y.; Takaki, K.; Fujiwara, Y. *Tetrahedron Lett.*, **1994**, *35*, 4111



Maikap, G.C.; Reddy, M.M.; Mukhopadhyay, M.; Bhatia, B.; Iqbal, I. *Tetrahedron*, **1994**, *50*, 9145

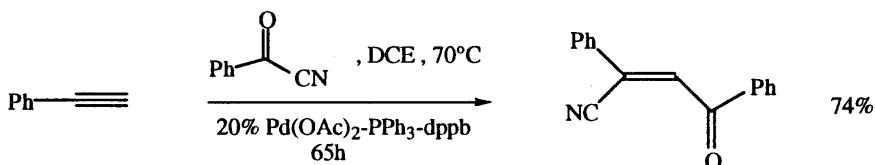


Iwahama, T.; Sakaguchi, S.; Nishiyama, Y.; Ishii, Y. *Tetrahedron Lett.*, **1995**, *36*, 1523

REVIEW:

" α -Diones from Cyclic Oxamides and Organolithium Reagents: A New, General and Environmentally Beneficial Synthetic Method," Mueller-Westerhoff, U.T.; Zhou, M. *Synlett*, **1994**, 975

SECTION 373: KETONE - NITRILE



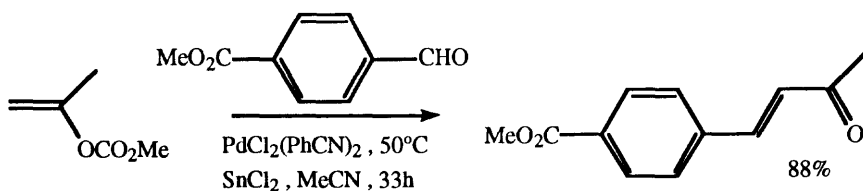
Nozaki, K.; Sato, N.; Takaya, H. *J. Org. Chem.*, **1994**, *59*, 2679

SECTION 374: KETONE - ALKENE

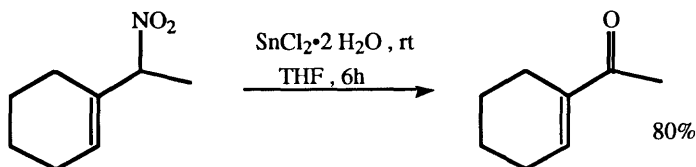
For the oxidation of allylic alcohols to alkene ketones, see Section 168 (Ketones from Alcohols and Phenols)

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

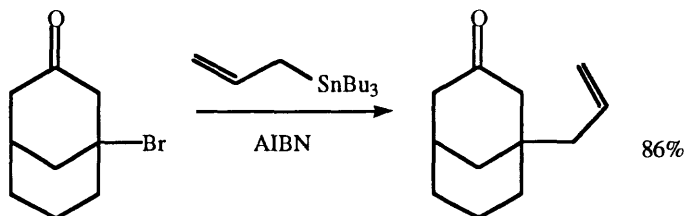
For the alkylation of alkene ketones, also see Section 177 (Ketones from Ketones) and for conjugate alkylations see Section 74E (Alkyls form Alkenes).



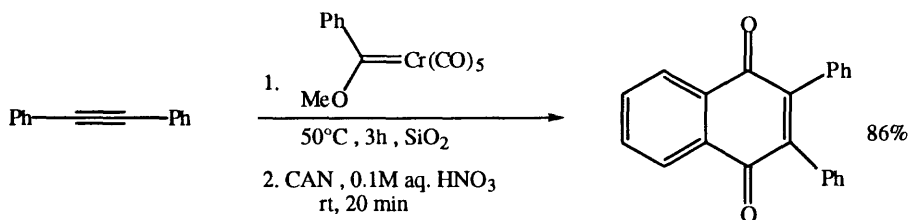
Masuyama, Y.; Sakai, T.; Kurusu, Y. *Tetrahedron Lett.*, 1993, 34, 653



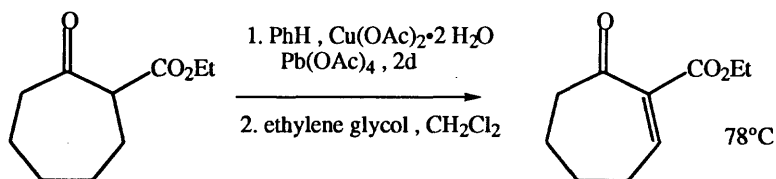
Das, N.B.; Sarma, J.C.; Sharma, R.P.; Bordoloi, M. *Tetrahedron Lett.*, 1993, 34, 869



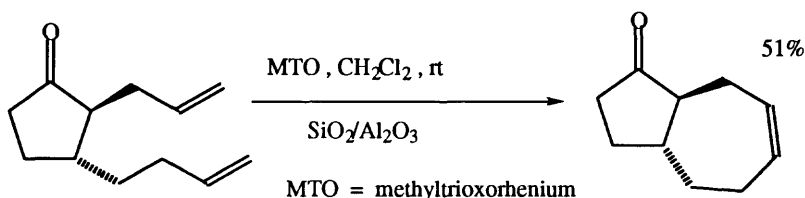
Kraus, G.A.; Andersh, B.; Su, Q.; Shi, J. *Tetrahedron Lett.*, 1993, 34, 1741



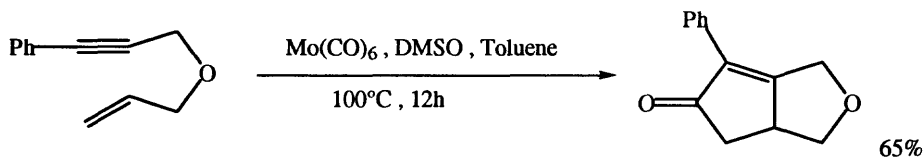
Harrity, J.P.A.; Kerr, W.L.; Middlemiss, D. *Tetrahedron Lett.*, 1993, 34, 2995



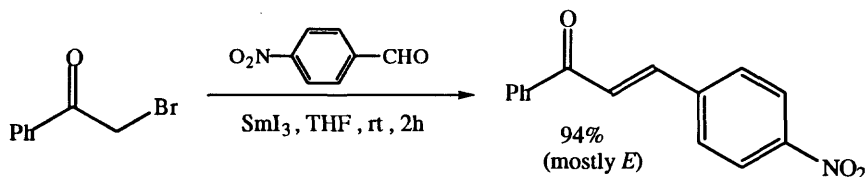
Schultz, A.G.; Holoboski, M.A. *Tetrahedron Lett.*, 1993, 34, 3021



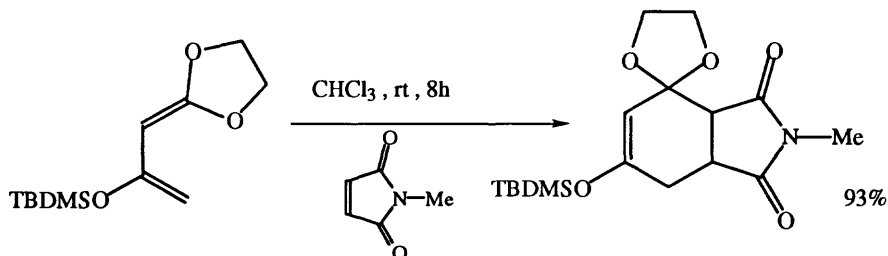
Junga, H.; Blechert, S. *Tetrahedron Lett.*, 1993, 34, 3731



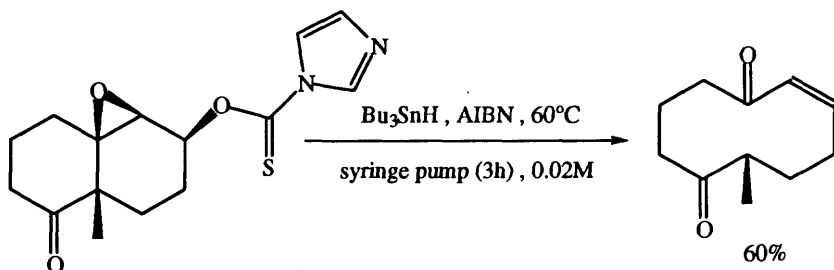
Jeong, N.; Lee, S.J.; Lee, B.Y.; Chung, Y.K. *Tetrahedron Lett.*, 1993, 34, 4027



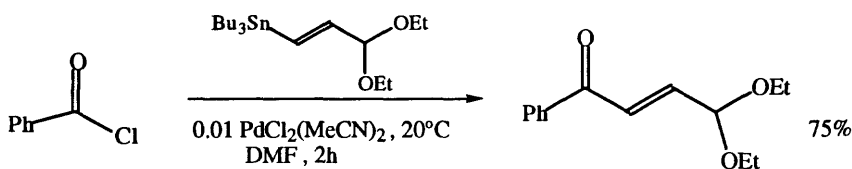
Yu, Y.; Lin, R.; Zhang, Y. *Tetrahedron Lett.*, 1993, 34, 4547



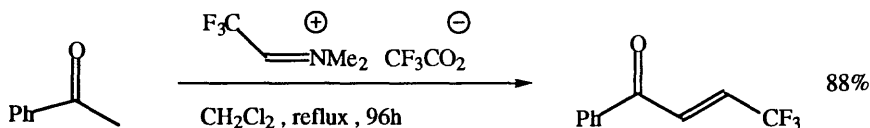
Konopelski, J.P.; Kasar, R.A. *Tetrahedron Lett.*, 1993, 34, 4587



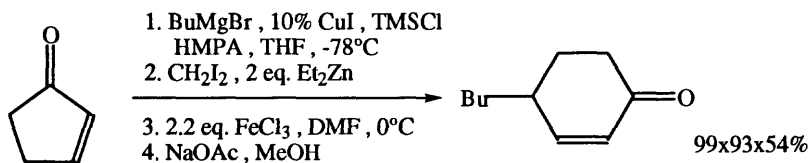
Rawal, V.H.; Zhong, H.M. *Tetrahedron Lett.*, 1993, 34, 5197



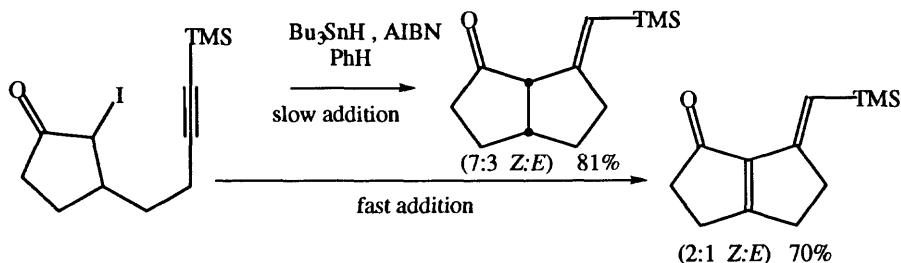
Parrain, J.-L.; Beaudet, I.; Duchêne, A.; Watrelot, S.; Quintard, J.-P. *Tetrahedron Lett.*, 1993, 34, 5445



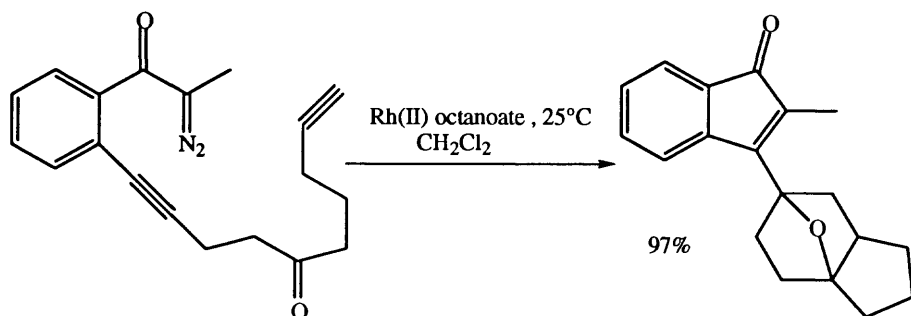
Ales, C.; Janousek, Z.; Viche, H.G. *Tetrahedron Lett.*, 1993, 34, 5711



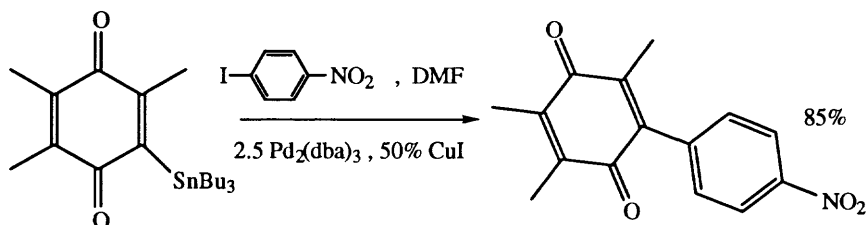
Booker-Milburn, K.L.; Thompson, D.F. *Tetrahedron Lett.*, 1993, 34, 7291



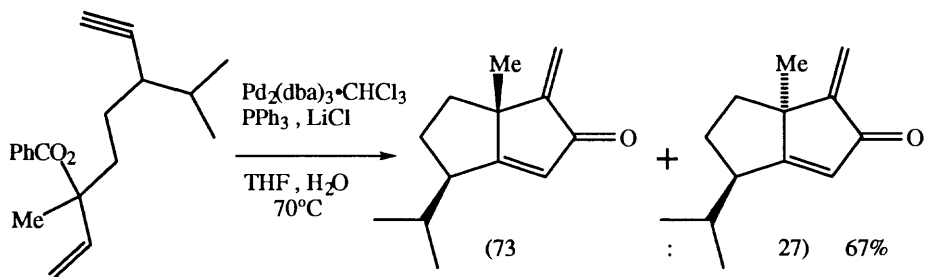
Sha, C.-K.; Shen, C.-Y.; Jean, T.-S.; Chiu, R.-T.; Tseng, W.-H. *Tetrahedron Lett.*, 1993, 34, 7641



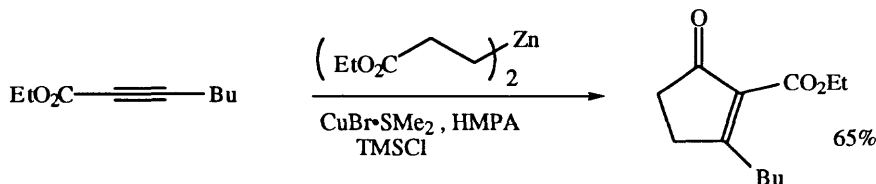
Padwa, A.; Kassir, J.M.; Semones, M.A.; Weingarten, M.D. *Tetrahedron Lett.*, **1993**, *34*, 7853



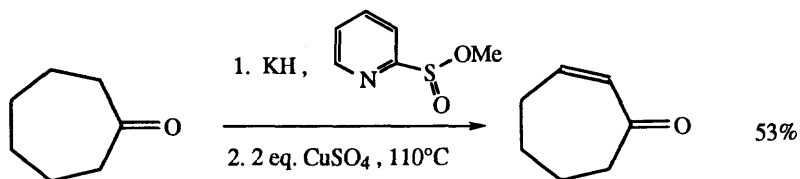
Liebeskind, L.S.; Riesinger, S.W. *J. Org. Chem.*, **1993**, *58*, 408



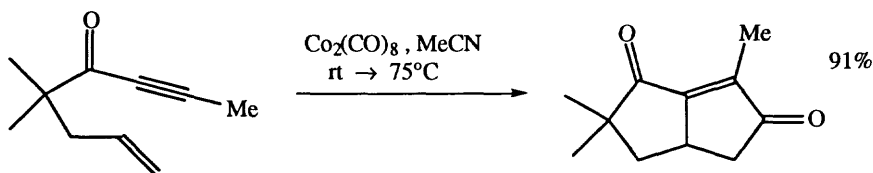
Ihle, N.C.; Heathcock, C.H. *J. Org. Chem.*, **1993**, *58*, 560



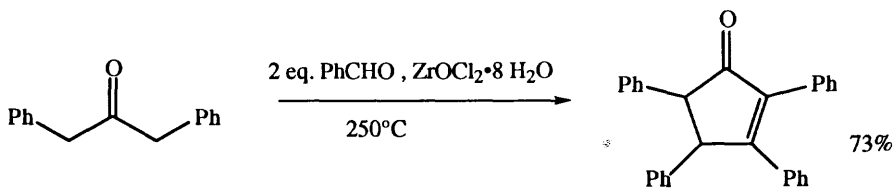
Crimmins, M.T.; Nantermet, P.G.; Trotter, B.W.; Vallin, I.M.; Watson, P.S.; McKerlie, L.A.; Reinhold, T.L.; Cheung, A.W.; Stetson, K.A.; Dedopoulou, D.; Gray, J.L. *J. Org. Chem.*, **1993**, *58*, 1038



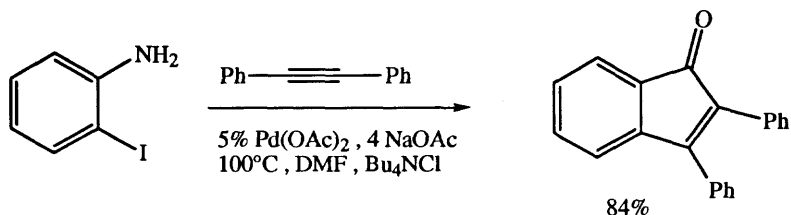
Trost, B.M.; Parquette, J.R. *J. Org. Chem.*, **1993**, *58*, 1579



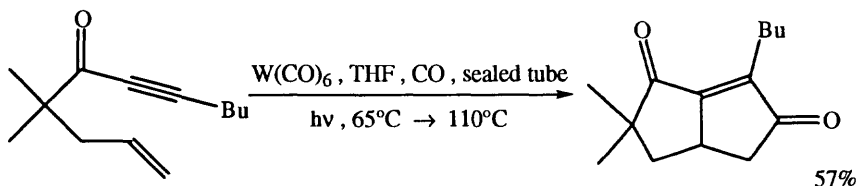
Hoye, T.R.; Suriano, J.A. *J. Org. Chem.*, **1993**, *58*, 1659



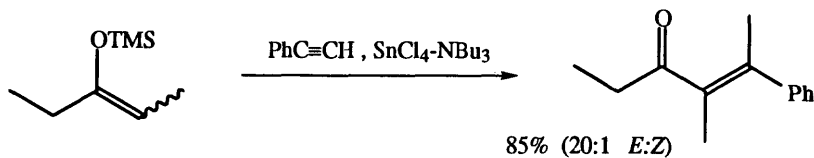
Yuki, T.; Hashimoto, M.; Nishiyama, Y.; Ishii, Y. *J. Org. Chem.*, **1993**, *58*, 4497



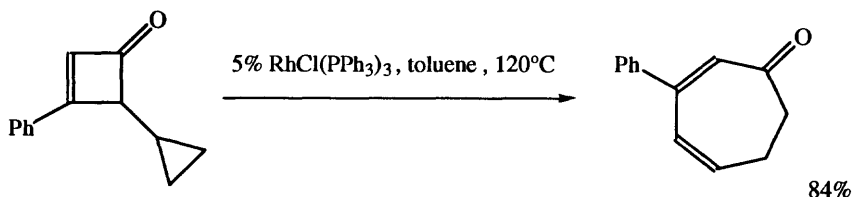
Larock, R.C.; Doty, M.J.; Cacchi, S. *J. Org. Chem.*, **1993**, *58*, 4579



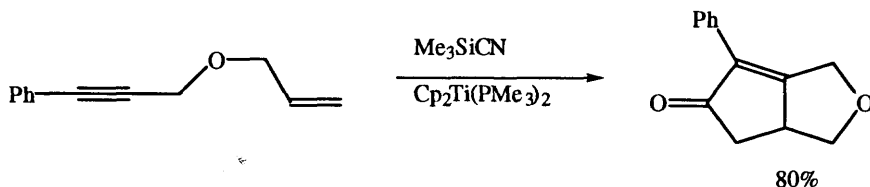
Hoye, T.R.; Suriano, J.A. *J. Am. Chem. Soc.*, **1993**, *115*, 1154



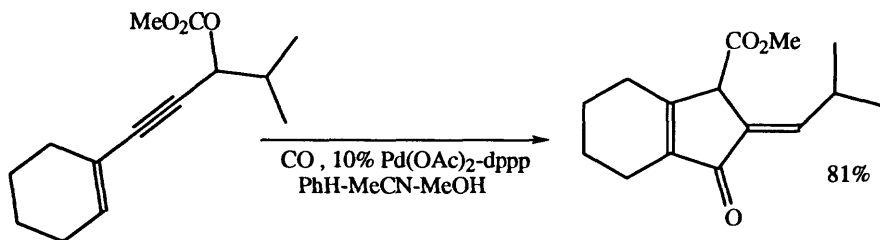
Yamaguchi, M.; Hayashi, A.; Hiram, M. *J. Am. Chem. Soc.*, **1993**, *115*, 3362



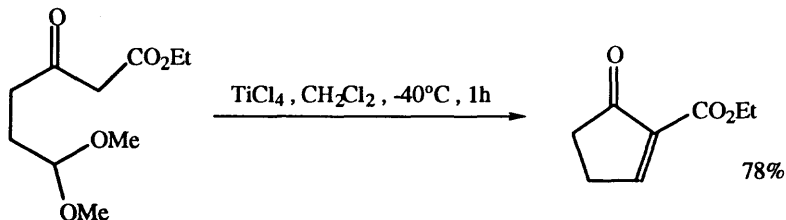
Huffman, M.A.; Liebeskind, L.S. *J. Am. Chem. Soc.*, **1993**, *115*, 4895



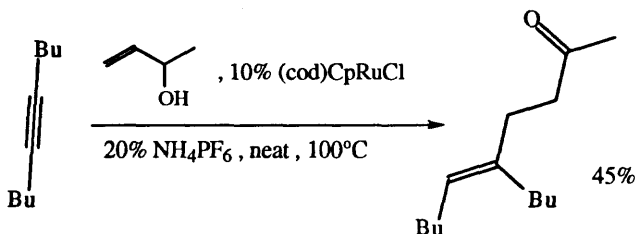
Berk, S.C.; Grossman, R.B.; Buchwald, S.L. *J. Am. Chem. Soc.*, **1993**, *115*, 4912



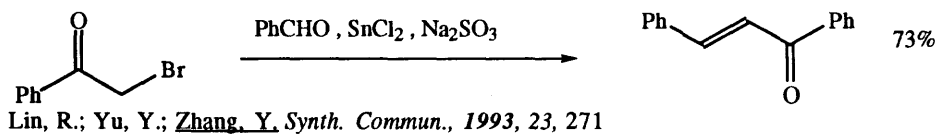
Mandai, T.; Tsuji, J.; Tsujiguchi, Y.; Saito, S. *J. Am. Chem. Soc.*, **1993**, *115*, 5865



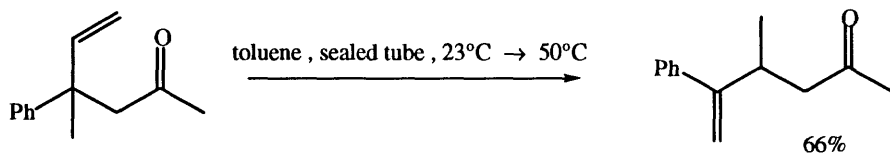
Funk, R.L.; Fitzgerald, J.F.; Olmstead, T.A.; Para, K.S.; Wos, J.A. *J. Am. Chem. Soc.*, **1993**, *115*, 8849



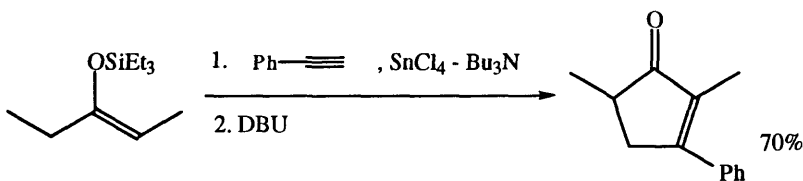
Trost, B.M.; Martinez, J.A.; Kulawiec, R.J.; Indolese, A.F. *J. Am. Chem. Soc.*, **1993**, *115*, 10402



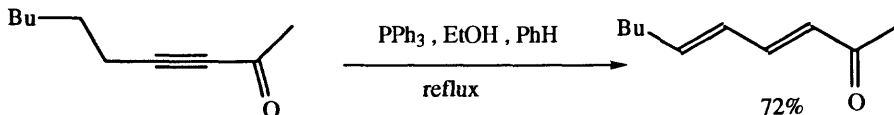
Lin, R.; Yu, Y.; Zhang, Y. *Synth. Commun.*, **1993**, *23*, 271



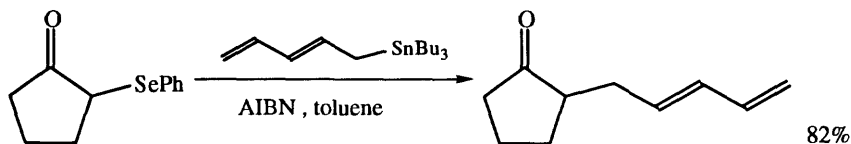
Srikrishna, A.; Krishnan, K.; Van Kateswarlu, S. *J. Chem. Soc. Chem. Commun.*, **1993**, 143



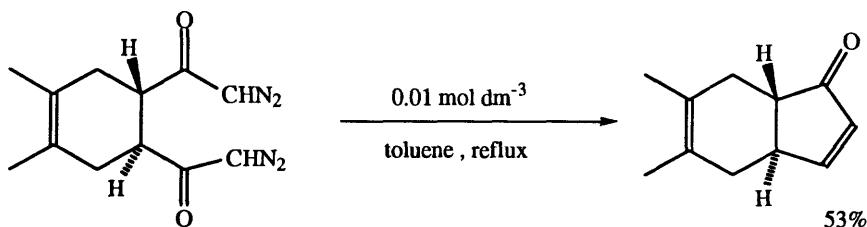
Yamaguchi, M.; Sehata, M.; Hayashi, A.; Hiram, M. *J. Chem. Soc. Chem. Commun.*, **1993**, 1708



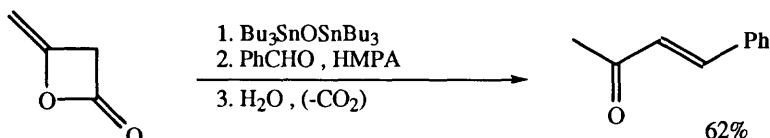
Guo, C.; Lu, X. *J. Chem. Soc., Perkin Trans. 1.*, **1993**, 1921



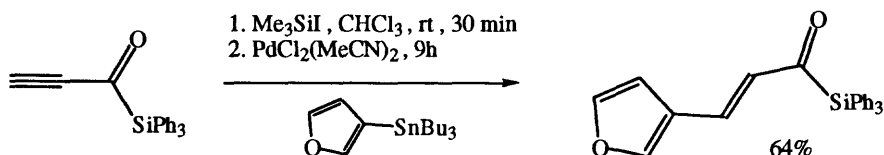
Watanabe, Y.; Yoneda, T.; Okumura, T.; Ueno, Y.; Toru, T. *Bull. Chem. Soc. Jpn.*, **1993**, *66*, 3030



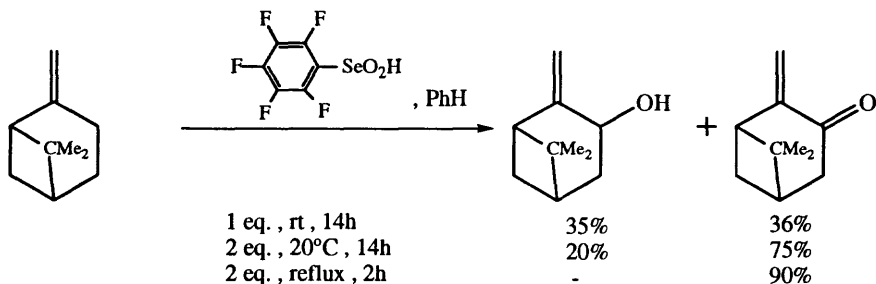
Makatani, K.; Takada, K.; Odagaki, Y.; Isoe, S. *J. Chem. Soc. Chem. Commun.*, **1993**, 556



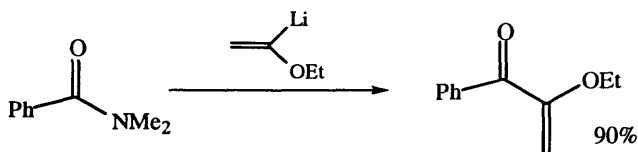
Shibata, I.; Nishio, M.; Baba, A.; Matsuda, H. *Chem. Lett.*, **1993**, 1219



Degl'Innocenti, A.; Capperucci, A.; Bartoletti, L.; Mordini, A.; Reginato, G. *Tetrahedron Lett.*, **1994**, 35, 2081

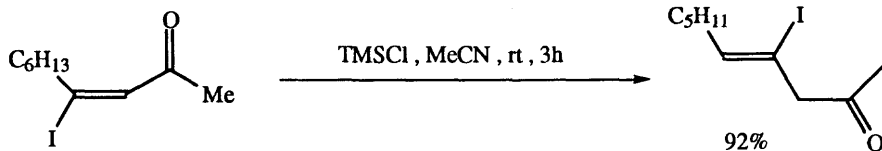


Barton, D.H.R.; Wang, T.-L. *Tetrahedron Lett.*, **1994**, 35, 5149

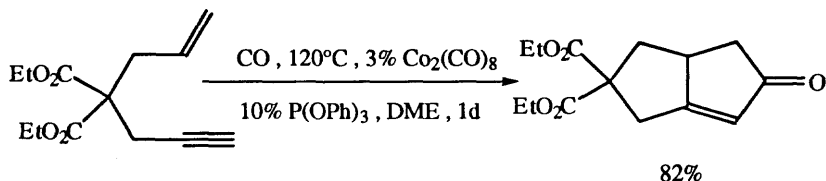


**enolate free α -alkoxy vinyl lithium reagent -
improved prep & procedure**

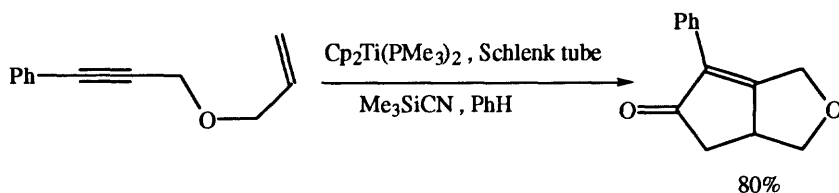
Shimano, M.; Meyers, A.I. *Tetrahedron Lett.*, **1994**, 35, 7727



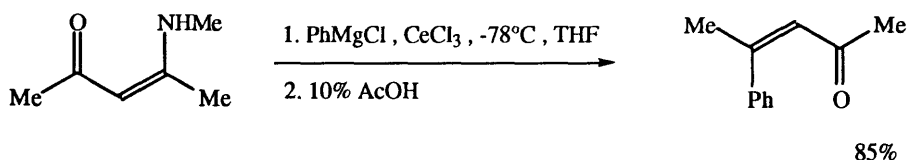
Luo, F.-T.; Hsieh, L.-C. *Tetrahedron Lett.*, **1994**, 35, 9585



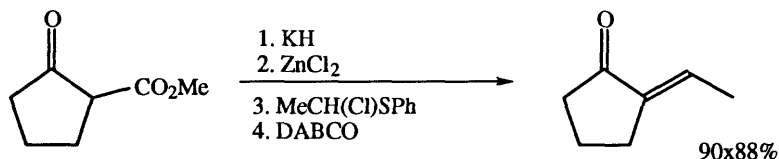
Jeong, N.; Hwang, S.H.; Lee, Y.; Chung, Y.K. *J. Am. Chem. Soc.*, **1994**, 116, 3159



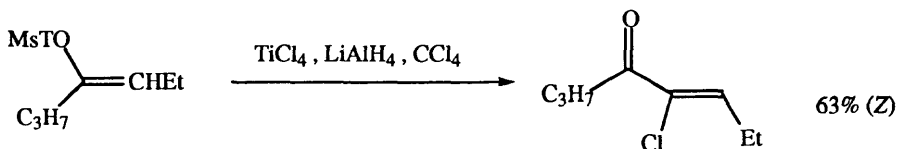
Berk, S.C.; Grossman, R.B.; Buchwald, S.L. *J. Am. Chem. Soc.*, **1994**, 116, 8593



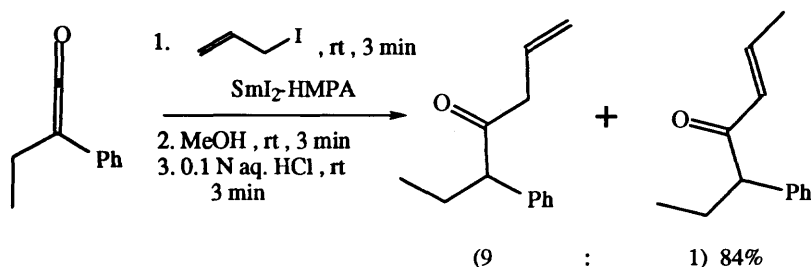
Bartoli, G.; Cimarelli, C.; Marcantoni, E.; Palmieri, G.; Petrini, M. *J. Chem. Soc. Chem. Commun.*, **1994**, 715



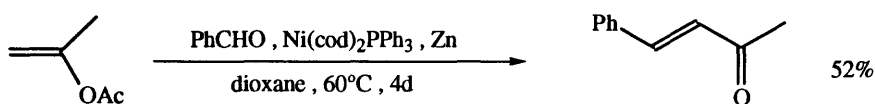
Arnecke, R.; Groth, U.; Köhler, T. *Liebigs Ann. Chem.*, **1994**, 891



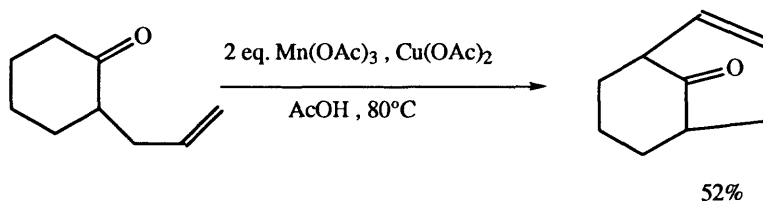
Mitani, M.; Kabayashi, Y. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 284



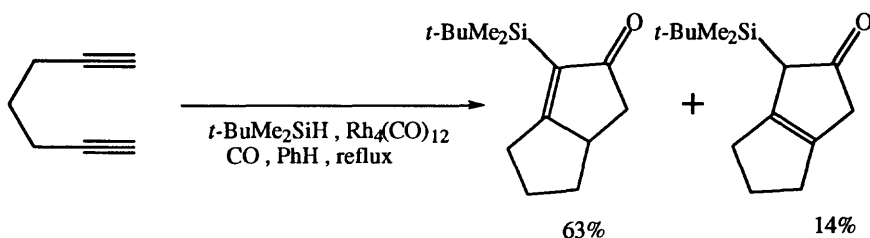
Miyoshi, N.; Takenchi, S.; Ohgo, Y. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 445



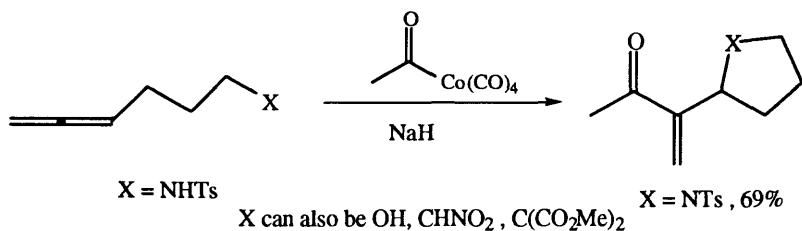
Masuyama, Y.; Sakai, T.; Kato, T.; Kurusu, Y. *Bull. Chem. Soc. Jpn.*, **1994**, 67, 2265



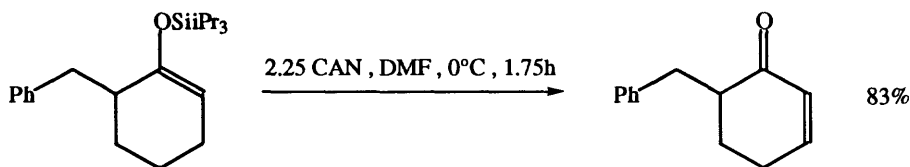
Snider, B.B.; Cole, B.M. *J. Org. Chem.*, **1995**, 60, 5376



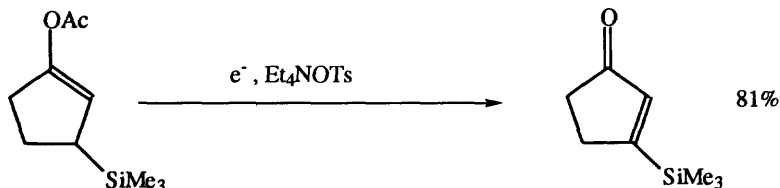
Matsuda, I.; Ishibashi, H.; Ii, N. *Tetrahedron Lett.*, **1995**, 36, 241



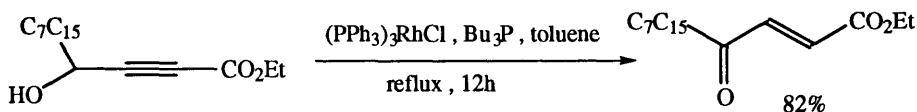
Bates, R.W.; Devi, T.R. *Tetrahedron Lett.*, **1995**, 36, 509



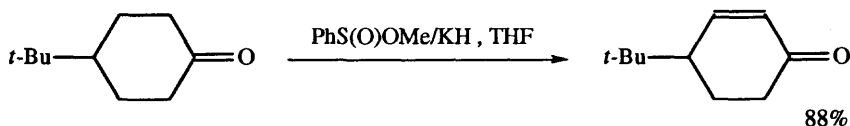
Evans, P.A.; Longmire, J.M.; Modi, D.P. *Tetrahedron Lett.*, **1995**, 36, 3985



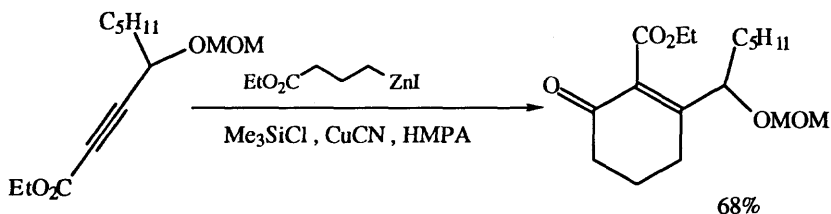
Lin, L.C.; Chueh, L.L.; Tsay, S.-C.; Hwu, J.R. *Tetrahedron Lett.*, **1995**, 36, 4093



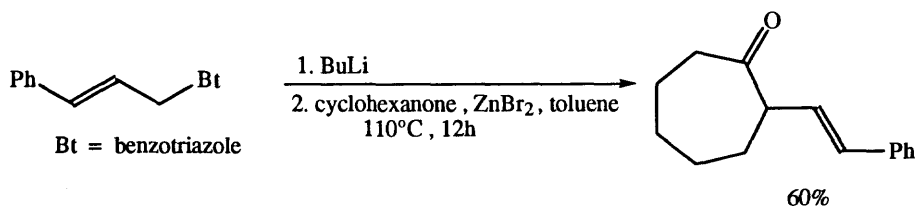
Saiah, M.K.E.; Pellicciari, R. *Tetrahedron Lett.*, **1995**, 36, 4497



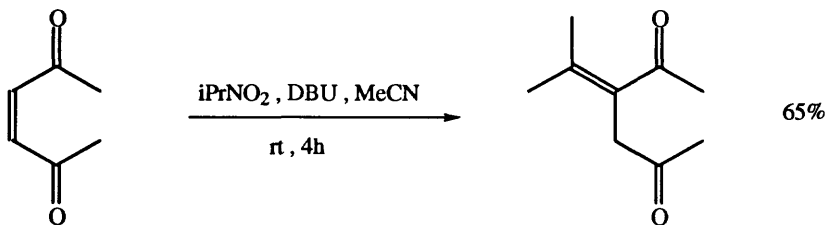
Resek, J.E.; Meyers, A.I. *Tetrahedron Lett.*, **1995**, 36, 7051



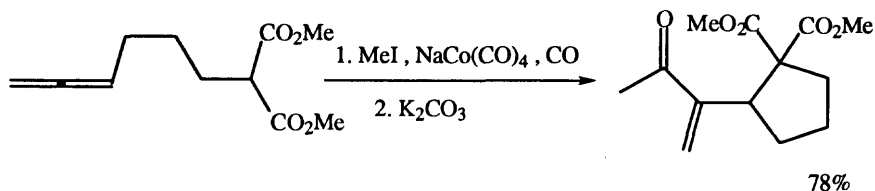
Crimmins, M.T.; Huang, S.; Guise, L.E.; Lacy, D.B. *Tetrahedron Lett.*, **1995**, 36, 7061



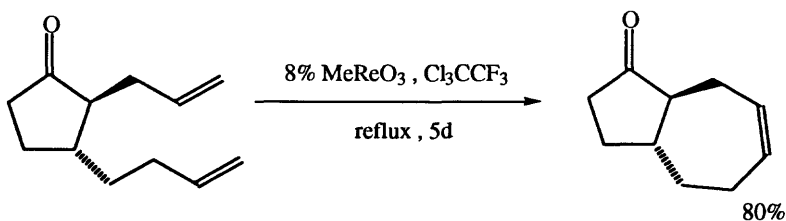
Katritzky, A.R.; Xie, L.; Toader, D.; Serdyuk, L. *J. Am. Chem. Soc.*, **1995**, 117, 12015



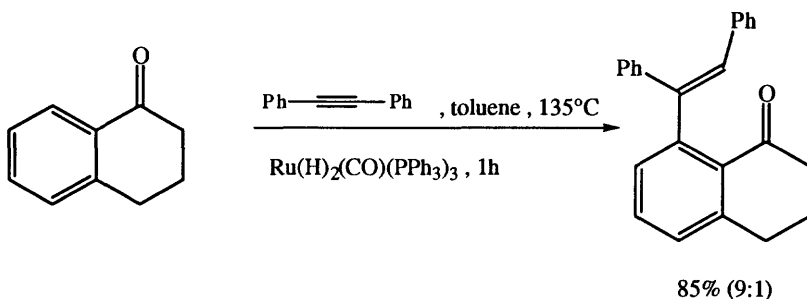
Ballini, R.; Bosica, G. *Tetrahedron*, **1995**, *51*, 4213



Bates, R.W.; Rama-Devi, T.; Ko, H.-H. *Tetrahedron*, **1995**, *51*, 12939



Schneider, M.F.; Junga, H.; Bleichert, S. *Tetrahedron*, **1995**, *51*, 13003

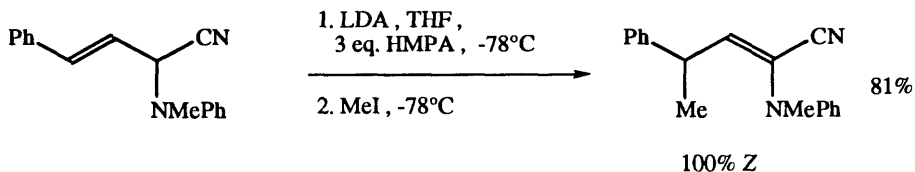


Kakiuchi, F.; Yamamoto, Y.; Chatani, N.; Murai, S. *Chem. Lett.*, **1995**, 681

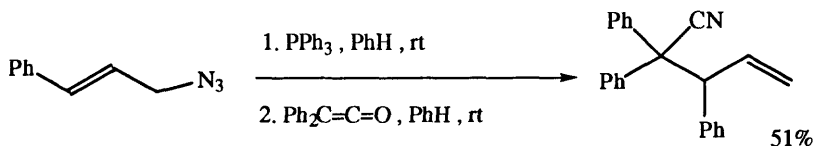
SECTION 375: NITRILE - NITRILE

NO ADDITIONAL EXAMPLES

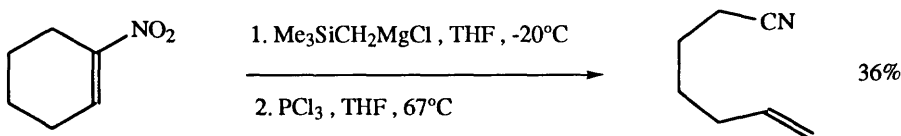
SECTION 376: NITRILE - ALKENE



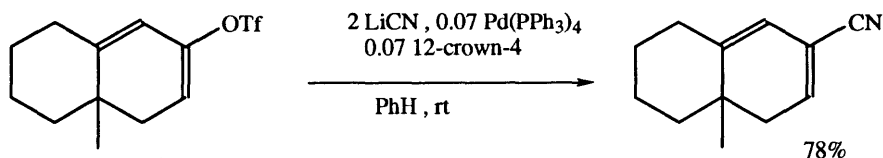
Chang, C.-J.; Fang, L.-M.; Liao, L.-F. *J. Org. Chem.*, **1993**, *58*, 1754



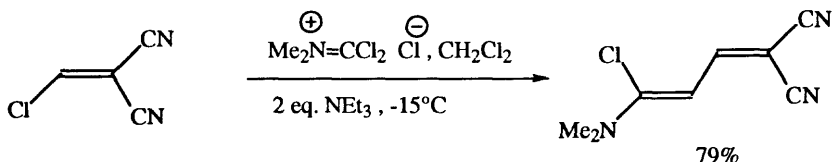
Molina, P.; Alajarín, M.; López-Leonardo, C.; Alcántara, J. *Tetrahedron*, **1993**, *49*, 5153



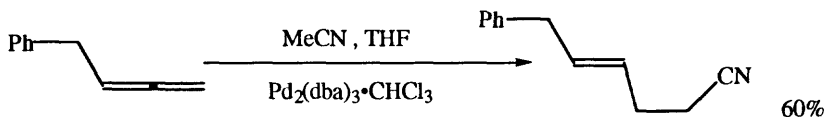
Tso, H.-H.; Gilbert, B.A.; Hwu, J.R. *J. Chem. Soc. Chem. Commun.*, **1993**, 669



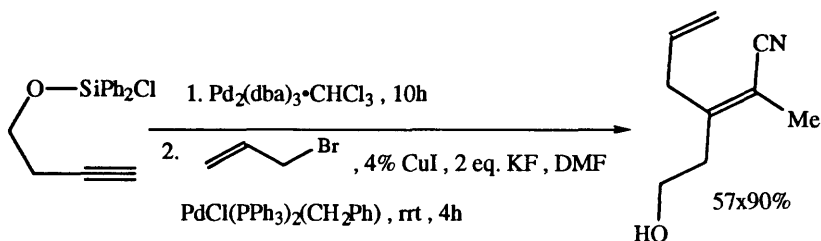
Piers, E.; Fleming, F.F. *Can. J. Chem.*, **1993**, *71*, 1867



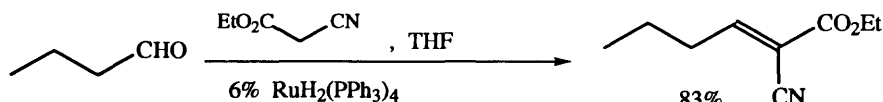
Bouvry, D.; Janousek, Z.; Viehe, H.G. *Bull. Soc. Chim. Belg.*, **1993**, *102*, 129



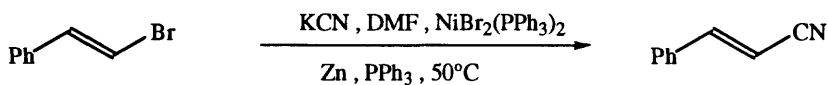
Yamamoto, Y.; Al-Masum, M.; Asao, N. *J. Am. Chem. Soc.*, **1994**, *116*, 6019



Suginome, M.; Kinugasa, H.; Ito, Y. *Tetrahedron Lett.*, 1994, 35, 8635

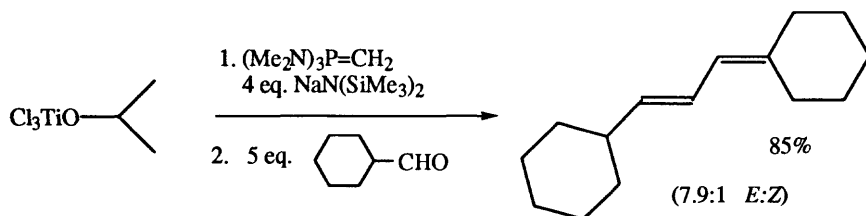


Murahashi, S.-I.; Naota, T.; Taki, H.; Mizuno, M.; Takaya, H.; Komiya, S.; Mizuho, Y.; Oyasato, N.; Hiraoka, M.; Hirano, M.; Fukuoka, A. *J. Am. Chem. Soc.*, 1995, 117, 12436

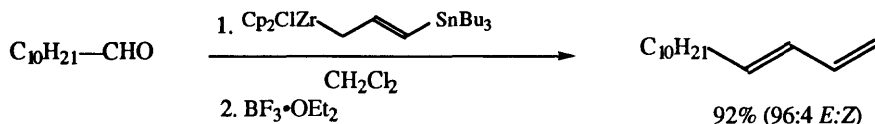


Sakakibara, Y.; Enami, H.; Ogawa, H.; Fujimoto, S.; Kato, H.; Kunitake, K.; Sasaki, K.; Sakai, M. *Bull. Chem. Soc. Jpn.*, 1995, 68, 3137

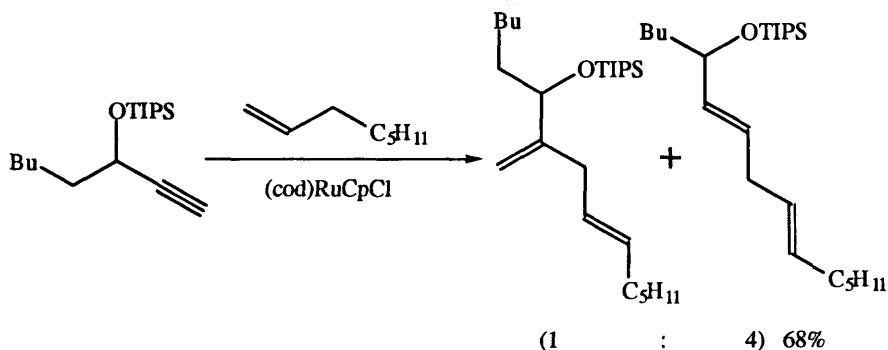
SECTION 377: ALKENE - ALKENE



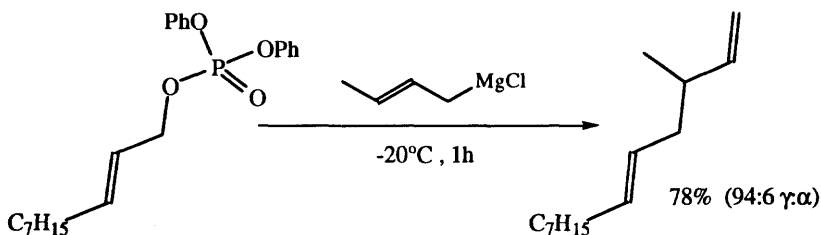
Reynolds, K.A.; Dopico, P.G.; Sundermann, M.J.; Hughes, K.A.; Finn, M.G. *J. Org. Chem.*, 1993, 58, 1298



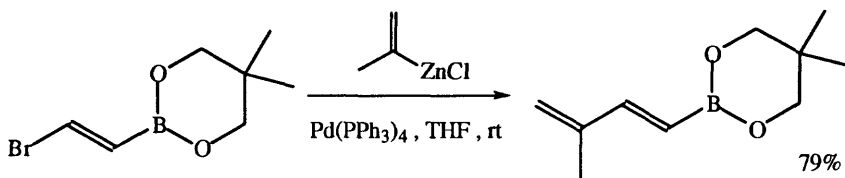
Maeta, H.; Hasegawa, T.; Suzuki, K. *Synlett*, 1993, 341



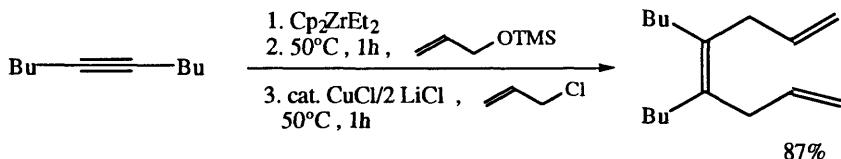
Trost, B.M.; Indolese, A. *J. Am. Chem. Soc.*, **1993**, *115*, 4361



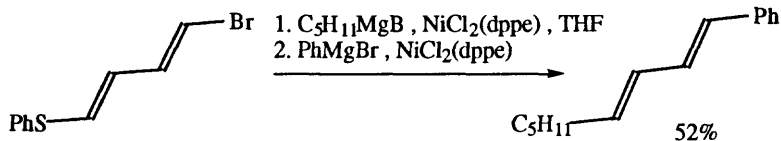
Yanagisawa, A.; Hibino, H.; Nomura, N.; Yamamoto, H. *J. Am. Chem. Soc.*, **1993**, *115*, 5879



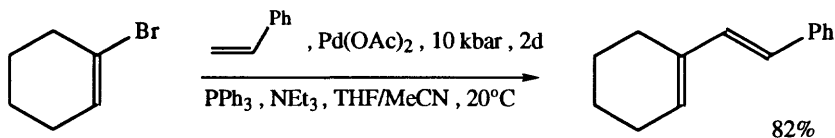
Mazal, C.; Vaultier, M. *Tetrahedron Lett.*, **1994**, *35*, 3089



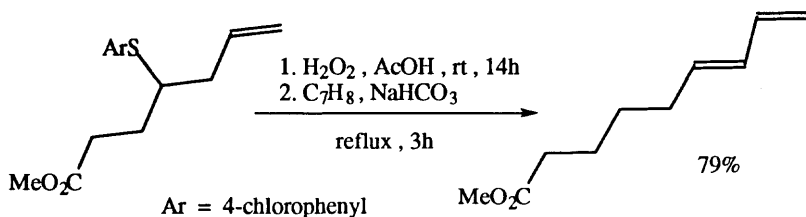
Takahashi, T.; Kitora, M.; Kasai, K.; Suzuki, N. *Tetrahedron Lett.*, **1994**, *35*, 5685



Babudri, F.; Fiandanese, V.; Mazzone, L.; Naso, F. *Tetrahedron Lett.*, **1994**, *35*, 8847

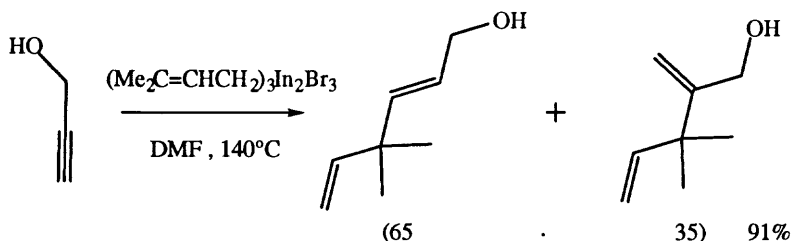


Voigt, K.; Schick, U.; Meyer, F.E.; de Meijere, A. *Synlett*, **1994**, 189

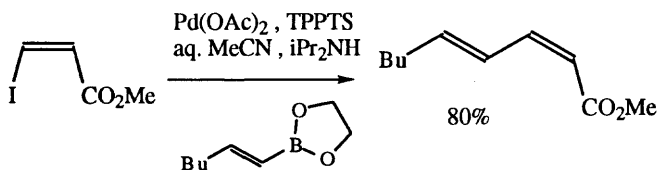


Ar = 4-chlorophenyl

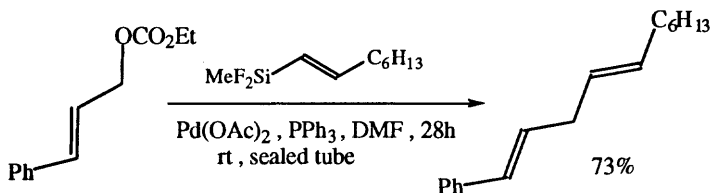
Schmitz, C.; Harvey, J.N.; Viehe, H.G. *Bull. Soc. Chim. Belg.*, **1994**, 103, 105



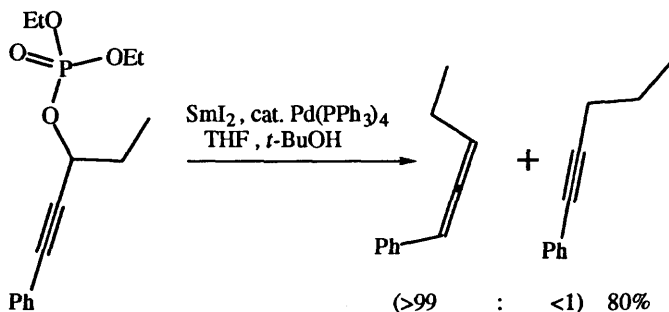
Araki, S.; Imai, A.; Shimizu, K.; Yamada, M.; Mori, A.; Butsugan, Y. *J. Org. Chem.*, **1995**, 60, 1841



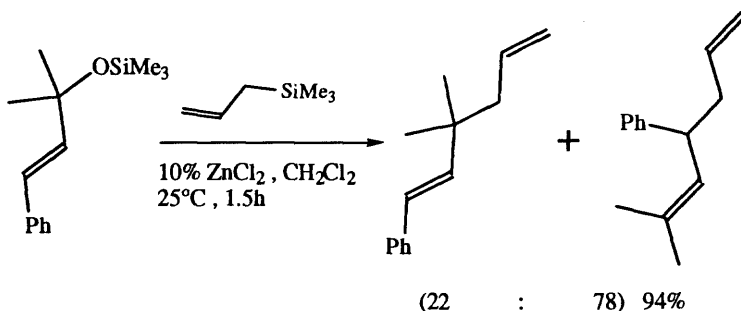
Genêt, J.P.; Linqvist, A.; Blart, E.; Mouriès, V.; Savignac, M.; Vaultier, M. *Tetrahedron Lett.*, **1995**, 36, 1443



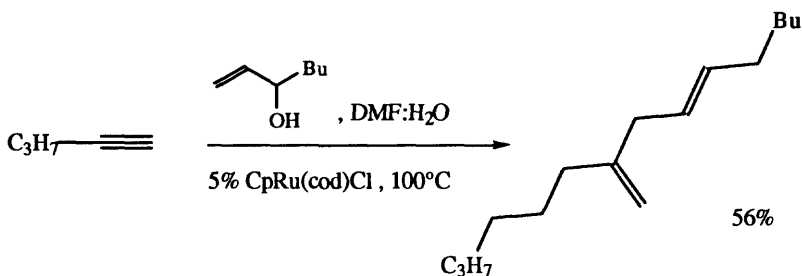
Matsuhashi, H.; Hatanaka, Y.; Kuroboshi, M.; Hiyama, T. *Tetrahedron Lett.*, **1995**, 36, 1539



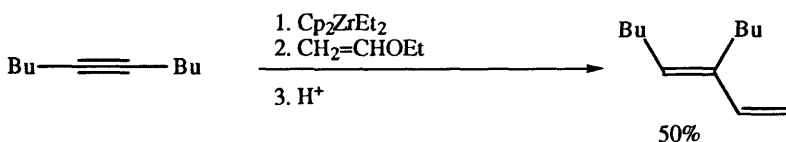
Mikami, K.; Yoshida, A.; Matsumoto, S.; Feng, F.; Matsumoto, Y.; Sugino, A.; Hanamoto, T.; Inanaga, J. *Tetrahedron Lett.*, **1995**, 36, 907



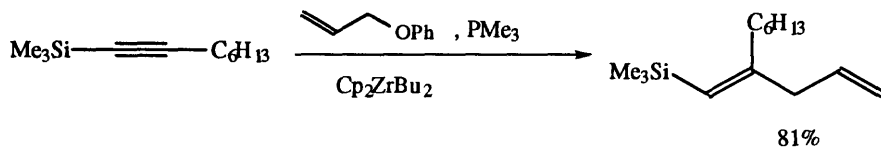
Yokozawa, T.; Furuhashi, K.; Natsume, H. *Tetrahedron Lett.*, **1995**, 36, 5243



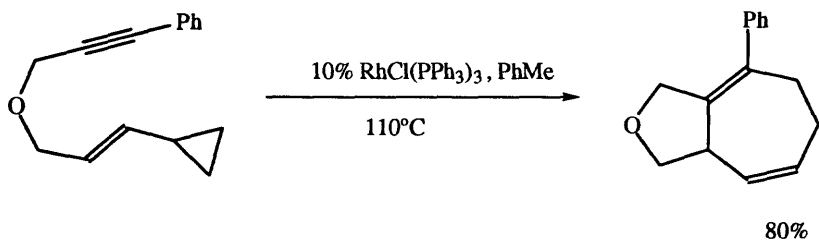
Trost, B.M.; Indolese, A.F.; Müller, T.J.J.; Trepton, B. *J. Am. Chem. Soc.*, **1995**, 117, 615



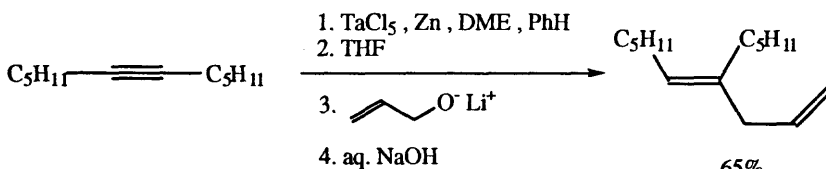
Takahashi, T.; Kondakov, D.Y.; Xi, Z.; Suzuki, N. *J. Am. Chem. Soc.*, **1995**, 117, 5871



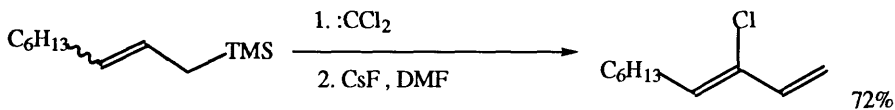
Suzuki, N.; Kondakov, D.Y.; Kageyama, M.; Kitora, M.; Hara, R.; Takahashi, T. *Tetrahedron*, **1995**, *51*, 4519



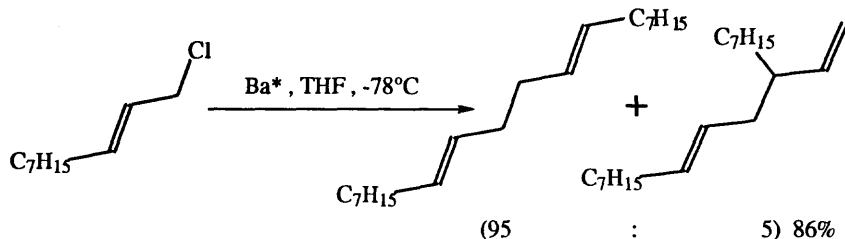
Wender, P.A.; Takahashi, H.; Witulski, B. *J. Am. Chem. Soc.*, **1995**, *117*, 4720



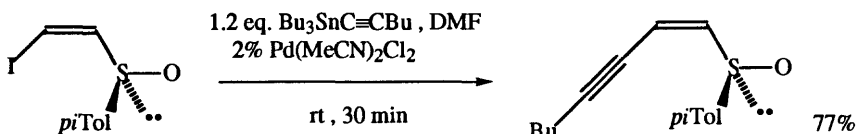
Takai, K.; Yamada, M.; Odaka, H.; Utimoto, K.; Fujii, T.; Furukawa, I. *Chem. Lett.*, **1995**, 315



Mitani, M.; Kobayashi, Y.; Koyama, K. *J. Chem. Soc., Perkin Trans. 1.*, **1995**, 653



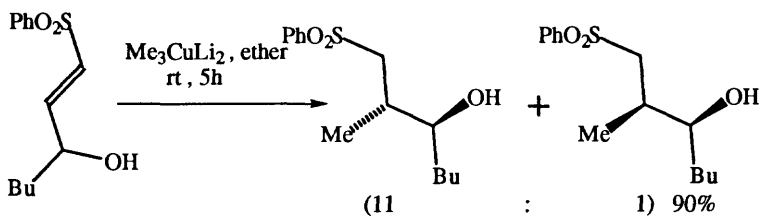
Yanagisawa, A.; Hibino, H.; Habaue, S.; Hisada, Y.; Yasue, K.; Yamamoto, H. *Bull. Chem. Soc. Jpn.*, **1995**, *68*, 1263

SECTION 378: OXIDES - ALKYNES

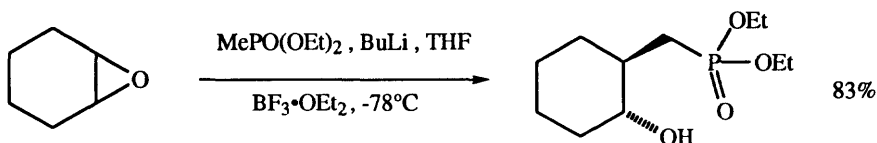
Paley, R.S.; Lafontaine, J.A.; Ventura, M.P. *Tetrahedron Lett.*, **1993**, *34*, 3663

SECTION 379: OXIDES - ACID DERIVATIVES

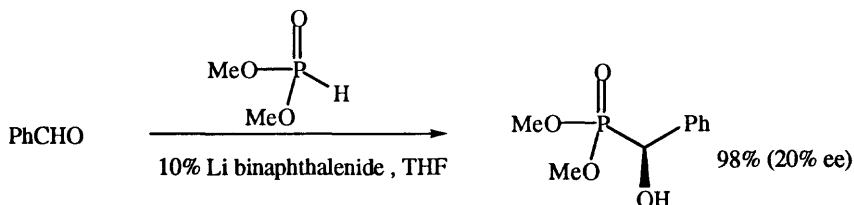
NO ADDITIONAL EXAMPLES

SECTION 380: OXIDES - ALCOHOLS, THIOLS

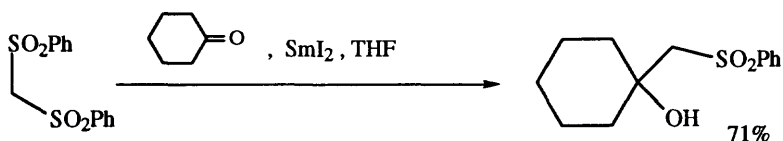
Domínguez, E.; Carretero, J.C. *Tetrahedron Lett.*, **1993**, *34*, 5803



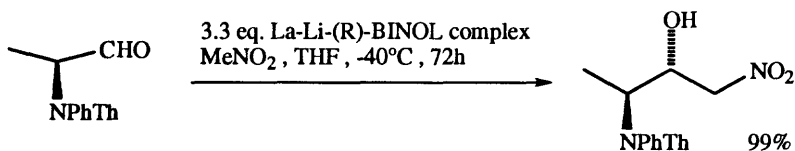
Li, Z.; Racha, S.; Dan, L.; El-Subbagh, H.; Abushanab, E. *J. Org. Chem.*, **1993**, *58*, 5779



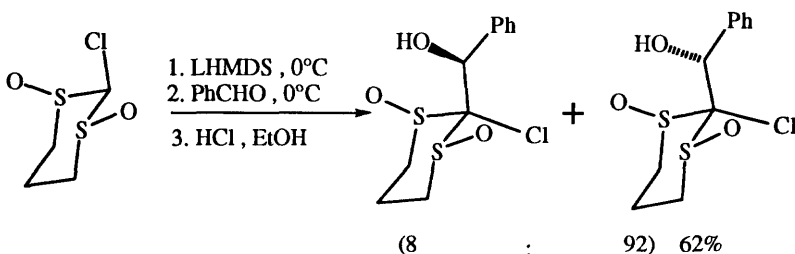
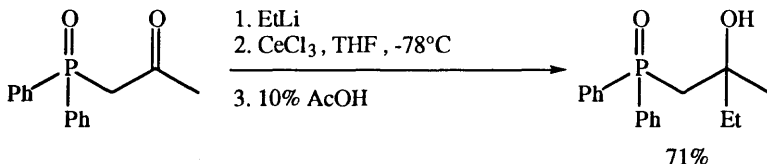
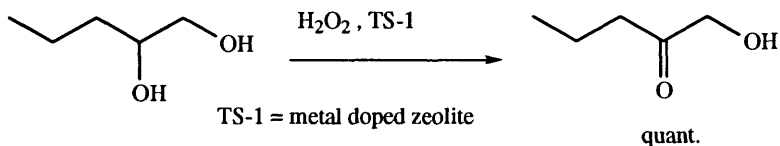
Rath, N.P.; Spilling, C.D. *Tetrahedron Lett.*, **1994**, *35*, 227



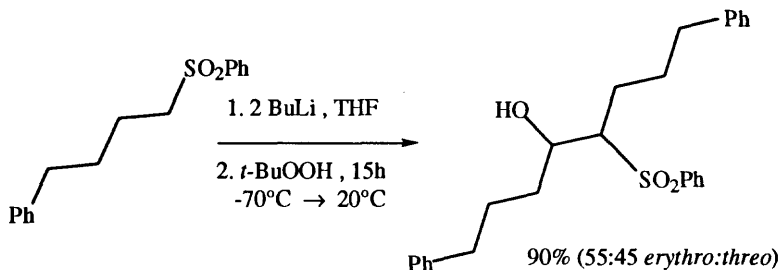
Chandrasekhar, S.; Yu, J.; Falck, J.R.; Mioskowski, C. *Tetrahedron Lett.*, **1994**, *35*, 5441

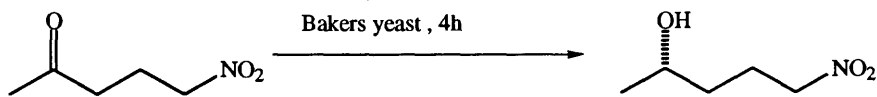


(99:1 erythro:threo; 96% ee)

Sasai, H.; Kim, W.-S.; Suzuki, T.; Shibasaki, M. *Tetrahedron Lett.*, **1994**, 35, 6123Aggarwal, V.K.; Worrall, J.M.; Adams, H.; Alexander, R. *Tetrahedron Lett.*, **1994**, 35, 6167Bartoli, G.; Sambri, L.; Marcantoni, E.; Petrini, M. *Tetrahedron Lett.*, **1994**, 35, 8453

TS-1 = metal doped zeolite

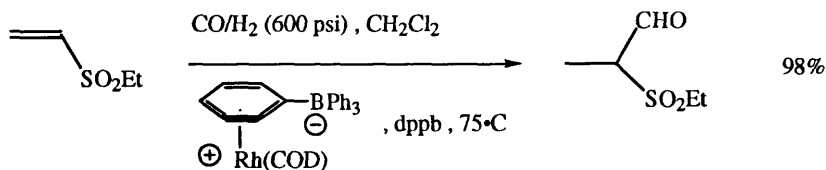
Bovicelli, P.; Lupattelli, P.; Sanetti, A.; Mincione, E. *Tetrahedron Lett.*, **1994**, 35, 8477Chemla, F.; Julia, M.; Uguen, D. *Bull. Soc. Chim. Fr.*, **1994**, 131, 639



74% (99% ee, S)

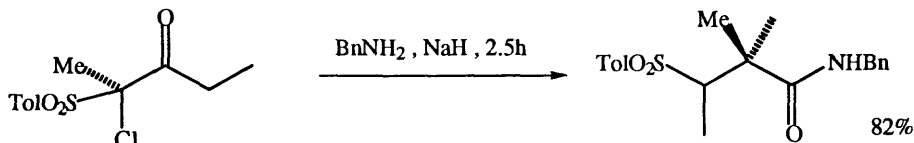
Guarna, A.; Occhiato, E.G.; Spinetti, L.M.; Vallecchi, M.E.; Scaarpi, D. *Tetrahedron*, **1995**, *51*, 1775

SECTION 381: OXIDES - ALDEHYDES

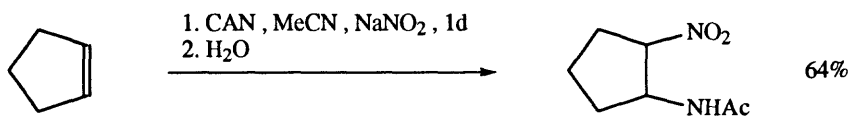


Totland, K.; Alper, H. *J. Org. Chem.*, **1993**, *58*, 3326

SECTION 382: OXIDES - AMIDES

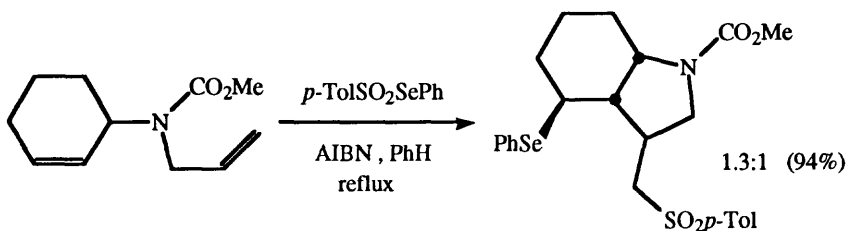


Satoh, T.; Motohashi, S.; Kimura, S.; Tokutake, N.; Yamakawa, K. *Tetrahedron Lett.*, **1993**, *34*, 4823

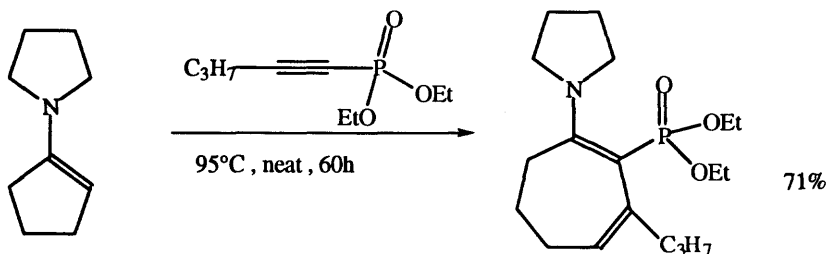


Reddy, M.V.R.; Mehrotra, B.; Vankar, Y.D. *Tetrahedron Lett.*, **1995**, *36*, 4861

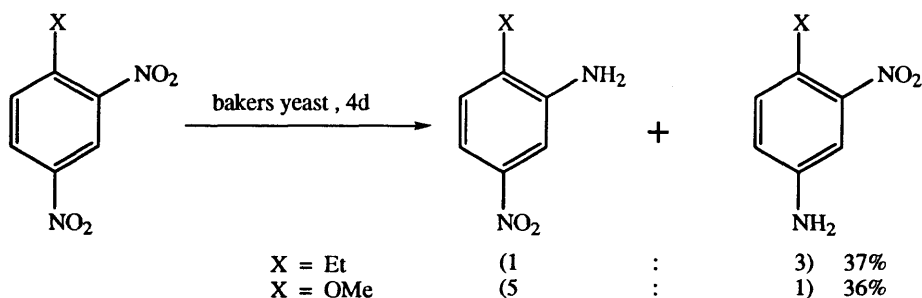
SECTION 383: OXIDES - AMINES



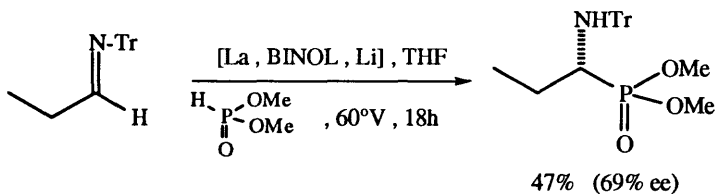
Brumwell, J.E.; Simpkins, N.S.; Terrett, N.K. *Tetrahedron Lett.*, **1993**, *34*, 1215



Ruder, S.M.; Norwood, B.K. *Tetrahedron Lett.*, **1994**, 35, 3473

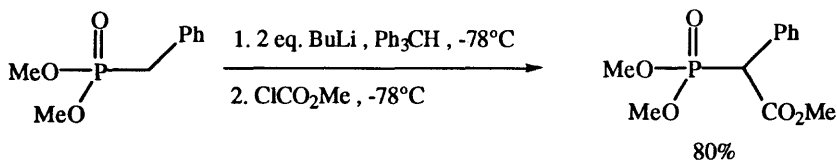


Davey, C.L.; Powell, L.W.; Turner, N.J.; Wells, A. *Tetrahedron Lett.*, **1994**, 35, 7867

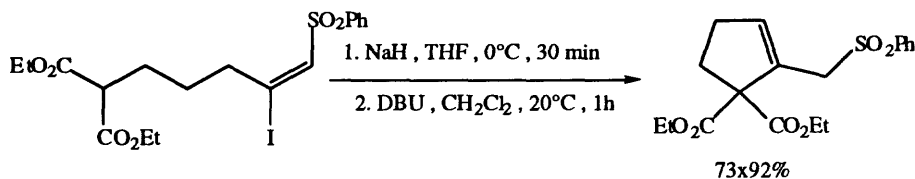


Sasai, H.; Arai, S.; Tahara, Y.; Shibasaki, M. *J. Org. Chem.*, **1995**, 60, 6656

SECTION 384: OXIDES - ESTERS

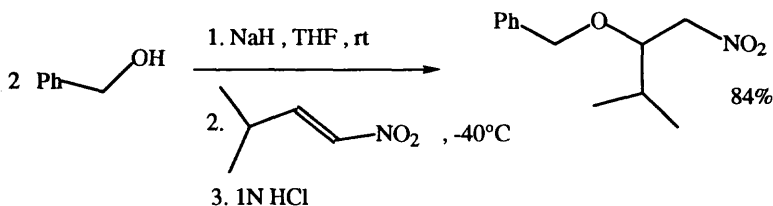


Geirsson, J.K.E.; Njardarson, J.T. *Tetrahedron Lett.*, **1994**, 35, 9071

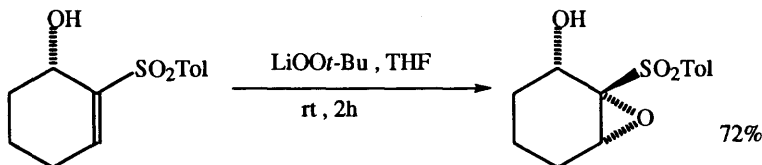


Short, K.M.; Ziegler Jr., C.B. *Tetrahedron Lett.*, **1995**, 36, 355

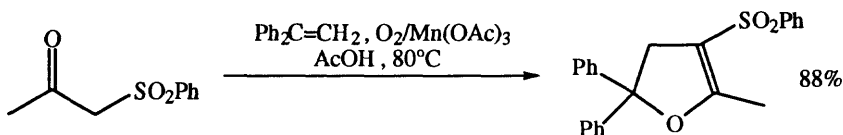
SECTION 385: OXIDES - ETHERS, EPOXIDES, THIOETHERS



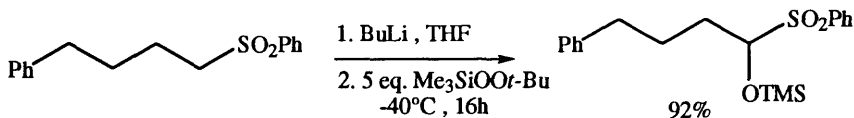
Duffy, J.L.; Kurth, J.A.; Kurth, M.J. *Tetrahedron Lett.*, **1993**, 34, 1259



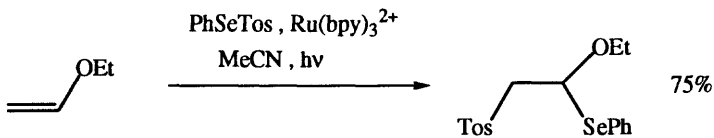
Bueno, A.B.; Carreño, M.C.; Ruano, J.L.G. *Tetrahedron Lett.*, **1993**, 34, 5007



Qian, C.-Y.; Nishino, H.; Kurosawa, K. *J. Heterocyclic Chem.*, **1993**, 30, 209

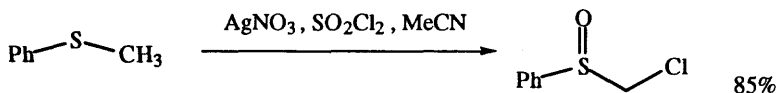


Chemla, F.; Julia, M.; Uguen, D. *Bull. Soc. Chim. Fr.*, **1993**, 130, 547

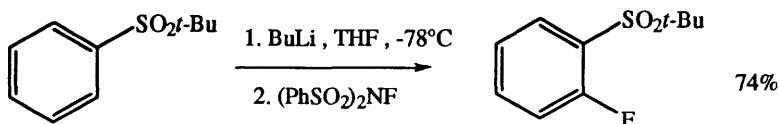


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SECTION 386: OXIDES - HALIDES, SULFONATES

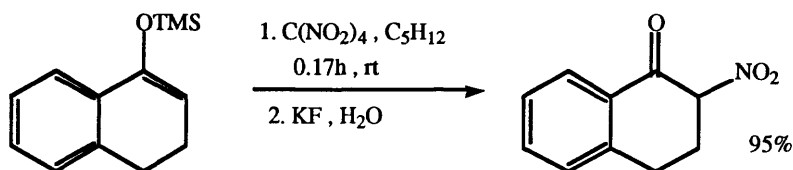


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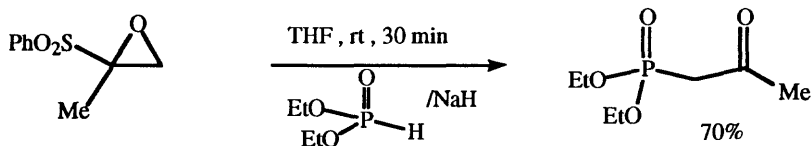


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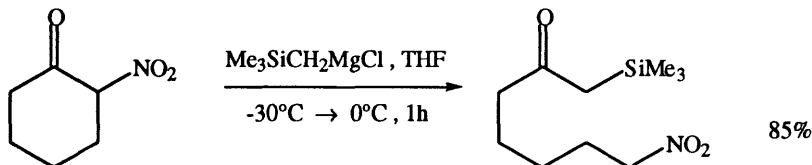
SECTION 387: OXIDES - KETONES



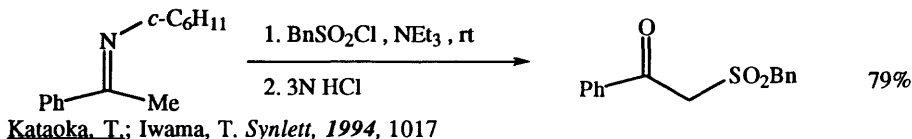
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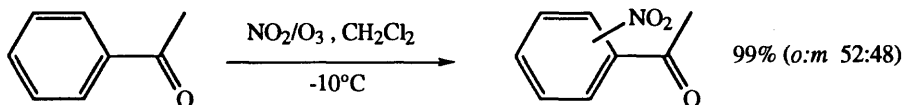


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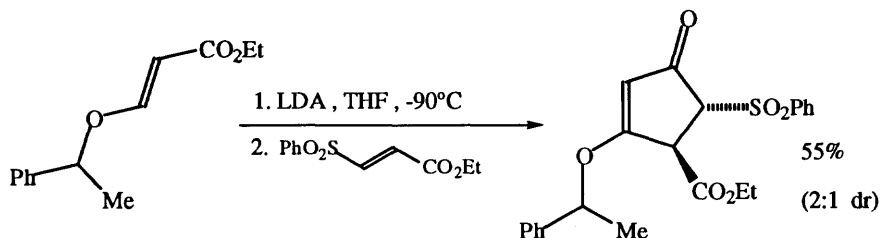


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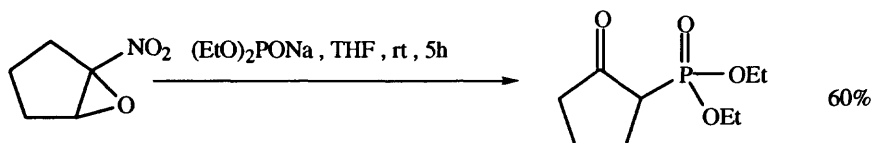




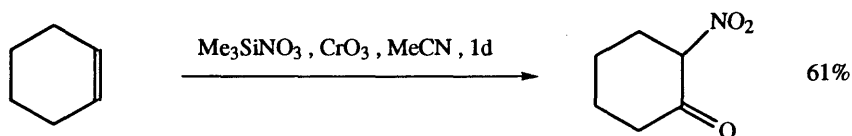
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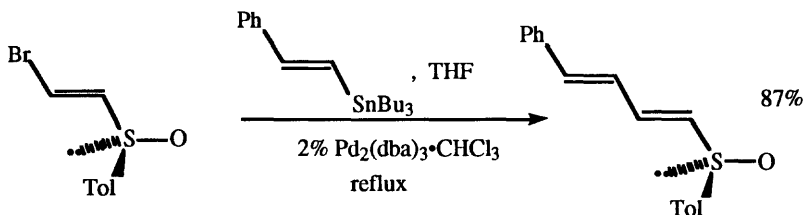


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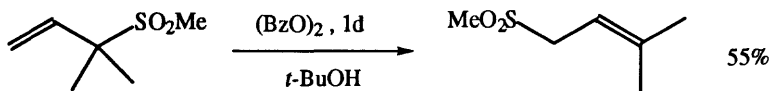
SECTION 388: OXIDES - NITRILES

NO ADDITIONAL EXAMPLES

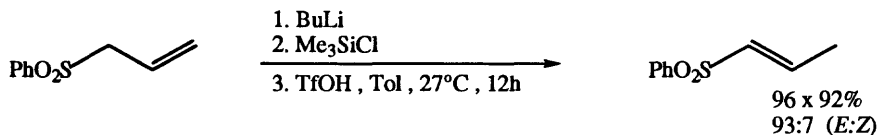
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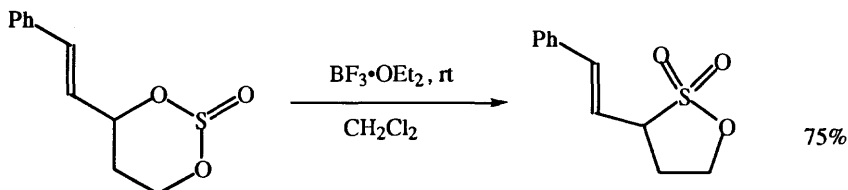
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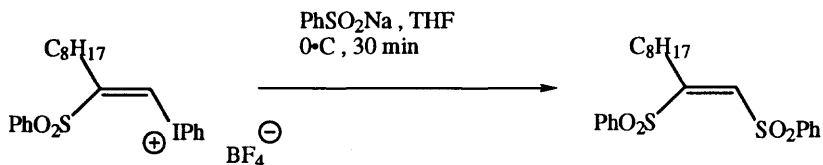
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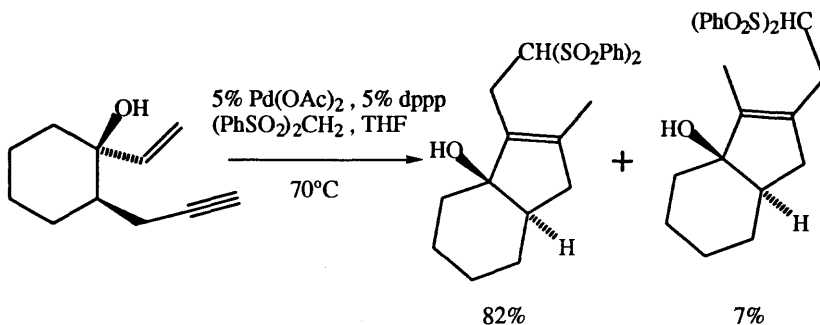
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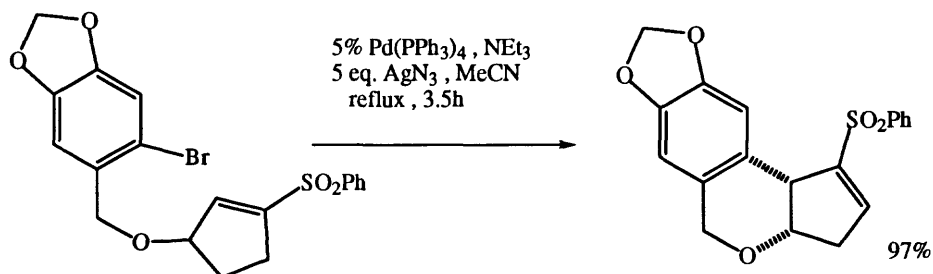
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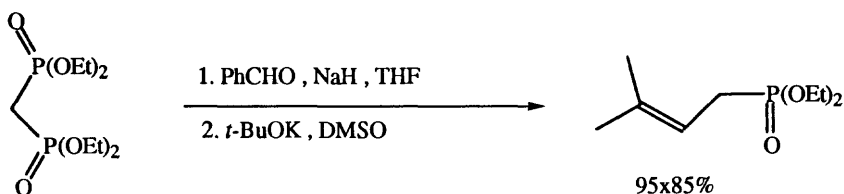
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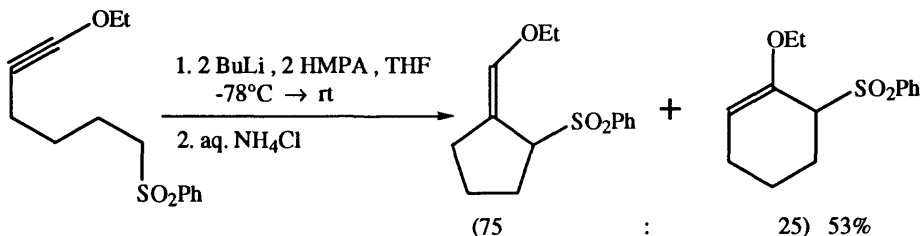
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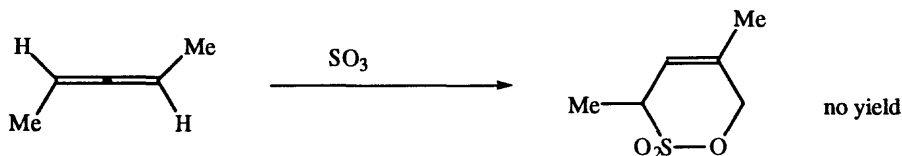
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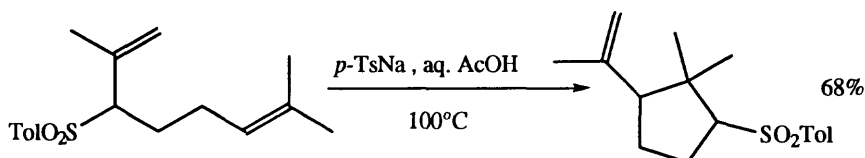
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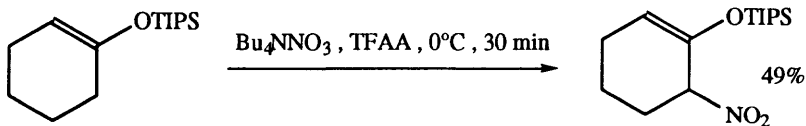
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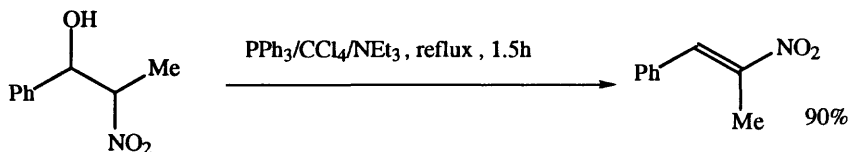
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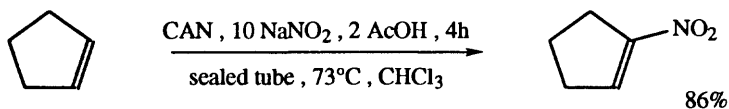
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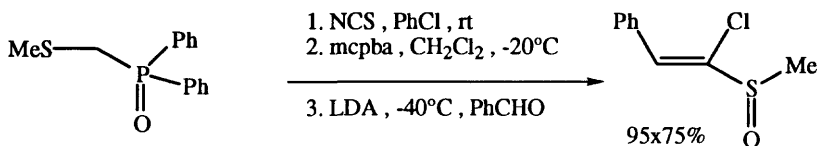
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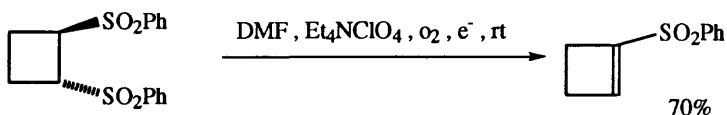
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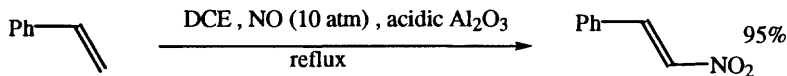
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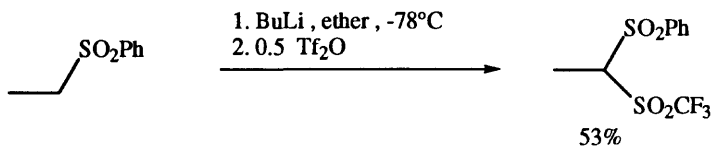


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