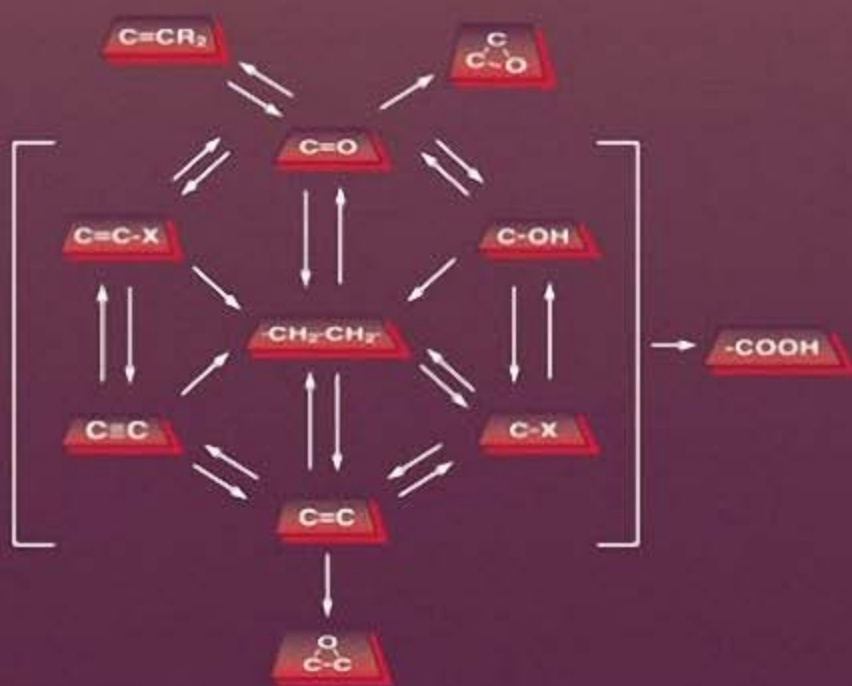


Volume 12

COMPENDIUM OF ORGANIC SYNTHETIC METHODS

MICHAEL B. SMITH



Compendium of Organic Synthetic Methods

Volume 12

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The University of Connecticut
Storrs, Connecticut



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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* has been 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. Professor 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 remains a valuable tool to the working organic chemist, allowing a quick check of the literature. Even in the era of powerful computer searching, the *Compendium* allows one to "browse" for new reactions and transformations that may be of interest in a rapid and logical manner. The body of Organic chemistry literature is very large and the *Compendium* is a focused and highly representative survey of the literature, and is offered in that context.

Compendium of Organic Synthetic Methods, Volume 12 contains both functional group transformations and carbon-carbon bond-forming reactions from the literature appearing in the years 2002, 2003, and 2004. The classification schemes used for Volumes 6-11 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 12. Author citations and the Author Index have been continued as in Volumes 6-11.

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 given below.

As I have throughout my writing career, I thank my wife, Sarah, and my son, Steven, for their encouragement and support during this work. I also thank Dr. Darla Henderson, Michael Forster, Jonathan Rose, Lauren Hilger, Rebekah Amos, and Angioline Loredó of Wiley for their help in the publication of this volume.

MICHAEL B. SMITH

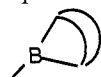
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Storrs, Connecticut
December 2008

ABBREVIATIONS

Ac
acac
AIBN
aq.



9-BBN
BER
BINAP
Bmim
Bn

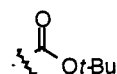
Acetyl
Acetylacetonate
azobis-isobutyronitrile
Aqueous

9-Borabicyclo[3.3.1]nonylboryl
9-Borabicyclo[3.3.1]nonane
Borohydride exchange resin
2*R*,3*S*-2,2'-*bis*-(diphenylphosphino)-1,1'-binaphthyl
1-butyl-3-methylimidazolium
benzyl



BOC
bpy (Bipy)
Bu
Bz
°C
CAM
CAN
c-
cat.

tert-Butoxycarbonyl
2,2'-Bipyridyl
n-Butyl
Benzoyl
Temperature in degrees Celsius
Carboxamidomethyl
Ceric ammonium nitrate
Cyclo-
Catalytic

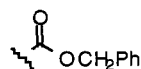


-CH₂CH₂CH₂CH₃

(NH)₂Ce(NO₃)₆

Cbz

Carbobenzyloxy



Chirald
COD
COT
Cp
CSA
CTAB

2*S*,3*R*-(+)-4-Dimethylamino-1,2-diphenyl-3-methylbutan-2-ol
1,5-Cyclooctadienyl
1,3,5-Cyclooctatrienyl
Cyclopentadienyl
Camphorsulfonic acid
Cetyltrimethylammonium bromide

C₁₆H₃₃NMe₃⁺ Br⁻

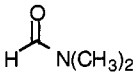






Cy (*c*-C₆H₁₁)
DABCO
dba
DBE
DBN
DBU
DCC

Cyclohexyl
1,4-Diazabicyclo[2.2.2]octane
Dibenzylidene acetone
1,2-Dibromoethane
1,5-Diazabicyclo[4.3.0]non-5-ene
1,8-Diazabicyclo[5.4.0]undec-7-ene
1,3-Dicyclohexylcarbodiimide

BrCH₂CH₂Br

c-C₆H₁₁-N=C=N-*c*-C₆H₁₁

DCE	1,2-Dichloroethane	$\text{ClCH}_2\text{CH}_2\text{Cl}$
DCM	Dichloromethane	CH_2Cl_2
DDQ	2,3-Dichloro-5,6-dicyano-1,4-benzoquinone	
% de	% Diastereomeric 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	$\text{Ph}_2\text{P}(\text{CH}_2)_4\text{PPh}_2$
DMA	Dimethylacetamide	
DMAP	4-Dimethylaminopyridine	
DME	Dimethoxyethane	$\text{MeOCH}_2\text{CH}_2\text{OMe}$
DMF	<i>N,N'</i> -Dimethylformamide	
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	
EDA	Ethylenediamine	$\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$
EDTA	Ethylenediaminetetraacetic acid	
EE	1-Ethoxyethoxy	$\text{EtO}(\text{Me})\text{CHO}-$
Et	Ethyl	$-\text{CH}_2\text{CH}_3$
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)	
hν	Irradiation with light	
1,5-HD	1,5-Hexadienyl	
HMPA	Hexamethylphosphoramide	$(\text{Me}_2\text{N})_3\text{P}=\text{O}$
HMPT	Hexamethylphosphorus triamide	$(\text{Me}_2\text{N})_3\text{P}$
iPr	Isopropyl	$-\text{CH}(\text{CH}_3)_2$
LICA (LIPCA)	Lithium cyclohexylisopropylamide	
LDA	Lithium diisopropylamide	$\text{LiN}(\text{iPr})_2$
LHMDS	Lithium hexamethyldisilazide	$\text{LiN}(\text{SiMe}_2)_2$
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>tert</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 (3 or 4 Å)	
MTM	Methylthiomethyl	CH ₃ SCH ₂ -
NAD	Nicotinamide adenine dinucleotide	
NADP	Sodium triphosphopyridine nucleotide	
Naph	Naphthyl (C ₁₀ H ₈)	
NBD	Norbornadiene	
NBS	<i>N</i> -Bromosuccinimide	
NCS	<i>N</i> -Chlorosuccinimide	
Ni(R)	Raney nickel	
NIS	<i>N</i> -Iodosuccinimide	
NMP	<i>N</i> -Methyl-2-pyrrolidinone	
Oxone	2 KHSO ₅ •KHSO ₄ •K ₂ SO ₄	
	Polymeric backbone	
PCC	Pyridinium chlorochromate	
PDC	Pyridinium dichromate	
PEG	Polyethylene glycol	
Ph	Phenyl	
PhH	Benzene	
PhMe	Toluene	
Phth	Phthaloyl	
pic	2-Pyridinecarboxylate	
Pip	Piperidino	
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
s-Bu	<i>sec</i> -Butyl	CH ₃ CH ₂ CH(CH ₃)
s-BuLi	<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>tert</i> -Butyldimethylsilyl	<i>t</i> -BuMe ₂ Si
TBDPS	<i>tert</i> -Butyldiphenylsilyl	<i>t</i> -BuPh ₂ Si
TBHP (<i>t</i> -BuOOH)	<i>tert</i> -Butylhydroperoxide	Me ₃ COOH
<i>t</i> -Bu	<i>tert</i> -Butyl	-C(CH ₃) ₃
TEBA	Triethylbenzylammonium	Bn(Et) 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	
TMP	2,2,6,6-Tetramethylpiperidine	
TMS	Trimethylsilyl	$-\text{Si}(\text{CH}_3)_3$
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	$4-\text{MeC}_6\text{H}_4\text{SO}_2$
X _c	Chiral auxiliary	

INDEX, MONOFUNCTIONAL COMPOUNDS

Sections—**heavy type**
Pages—light type

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	Oxides	
Alkynes	1 1	16 9	31 17	46 51	61 67	76 151	91 177	106 209	121 227			166 259		196 289			
Carboxylic acid derivatives	2 4	17 9	32 17	47 51	62 69	77 151		107 209	122 227			167 259		197 295	212 307		
Alcohols, phenols		18 10	33 18	48 51	63 70	78 153	93 178	108 212	123 227	138 245	153 253	168 261	183 283	198 295	213 307		
Aldehydes	4 5	19 10	34 18	49 56	64 71	79 153	94 179	109 216	124 230	139 246	154 254	169 265	184 283	199 297			
Alkyls, methylenes, aryls		20 11	35 31		65 72	80 155		110 217	125 231	140 247	155 254	170 266		200 298	215 308		
Amides			36 32			81 155	96 181	111 217				171 267	186 284		216 308		
Amines					67 74	82 162	97 182	112 217				172 267			217 308		
Esters		23 11	38 32	53 57	68 74	83 165	98 191	113 217	128 232	143 247	158 254	173 268		203 299	218 309		
Ethers, epoxides		24 12	39 33	54 57	69 78	84 166	99 191	114 220	129 232	144 247		174 269		204 299	219 309		
Halides, sulfonates	10 6	25 13	40 36	55 58	70 79	85 166	100 192	115 221	130 233	145 247	160 255	175 270	190 285	205 300	220 311		
Hydrides (RH)		26 13	41 36	56 59	71 96	86 168	101 196	116 222	131 236	146 248		176 271	191 287		221 312		
Ketones		27 13	42 37		72 99	87 169	102 196	117 223			162 256	177 273		207 301			
Nitriles	13 8		43 45	58 59	73 99	88 170	103 198	118 224				178 276	193 287				
Alkenes	14 8	29 14	44 45	59 59	74 100	89 171	104 200	119 225	134 237	149 252		179 276		209 302	224 314		
Miscellaneous	15 8	30 15	45 46	60 60	75 148	90 173	105 202	120 225	135 242	150 252		180 278	195 287	210 304	225 315		

PROTECTION

	Sect.	Pg.
Carboxylic acids	30A	15
Alcohols, thiols	45A	46
Aldehydes	60A	61
Amides	90A	176
Amines	105A	206
Ketones	180A	279

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

INDEX, DIFUNCTIONAL COMPOUNDS

Sections—**heavy type**
Pages—light type

Alkyne												
300 317												
Carboxylic acid												
301 318												
Alcohol. Thiols												
302 318	313 333	323 336										
Aldehyde												
		324 340										
Amide												
304 321	315 333	325 341	334 381	342 385								
Amine												
305 323	316 334	326 344	335 381	343 386	350 408							
Ester												
306 326		327 348	336 381	344 388	351 409	357 430						
Ether. Epoxide												
307 327		328 352	337 382	345 390	352 416	358 431	363 447					
Halide												
		329 356	338 382	346 392	353 416	359 432	364 447	368 465				
Ketone												
309 327	320 334	330 359	339 383	347 393	354 418	360 434	365 449	369 466	372 473			
Nitrile												
		331 368		348 397	355 421	361 437	366 453		373 476			
Alkene												
311 329	322 335	332 370	341 383	349 398	356 423	362 438	367 455	371 469	374 477	376 488	377 489	
Oxide												
378 496		380 496	381 498	382 499	383 499	384 501	385 501	386 502	387 502	388 503	389 503	390 506

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

INTRODUCTION

Relationship Between Volume 12 and Previous Volumes. *Compendium of Organic Synthetic Methods, Volume 12* presents about 2500 examples of published reactions for the preparation of monofunctional compounds, updating the more than 15,500 examples found in Volumes 1-11. Volume 12 contains about 1500 examples of reactions that prepare difunctional compounds with various functional groups. Reviews have long been a feature of this series, and Volume 12 adds 97 pertinent reviews in the various sections.

Chapters 1-14 present the same functional group transformations as found in Volumes 1-11, as does Chapter 15, introduced in Volume 6. Difunctional compounds appear in Chapter 16, as in Volumes 6-11. The sections on oxides as part of difunctional compounds, introduced in Volume 7, continues in Chapter 16 of Volumes 8-11 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 principal author is indicated by underlining (i.e., Kwon, T.W.; Smith, M.B.), as done previously in Volumes 7-11.

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, 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. Sections 74D (Alkyls from Alkenes: Conjugate Reductions) and 74E (Alkyls from Alkenes: Conjugate Alkylations) contain the reactions conjugate reduction or conjugate alkylation of unsaturated ketones, aldehydes, esters, acids, and nitriles, 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 given in Section 74 (Alkyls, Methylenes, and Aryls from Alkenes).

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

RCH=CHCOOH	\rightarrow	RCH=CH_2	Hydrides from carboxylic acids
RCH=CH_2	\rightarrow	RCH=CHCOOH	Carboxylic acids from hydrides
ArH	\rightarrow	ArCOOH	Carboxylic acids from hydrides

ArH	→	ArOAc	Esters from hydrides
RCHO	→	RH	Hydrides from aldehydes
RCH=CHCHO	→	RCH=CH ₂	Hydrides from aldehydes
RCHO	→	RCH ₂	Alkyls from aldehydes
R ₂ CH ₂	→	R ₂ CO	Ketones from methylenes
RCH ₂ COR	→	R ₂ CHCOR	Ketones from ketones
RCH=CH ₂ →		RCH ₂ CH ₃	Alkyls from alkenes (Hydrogenation of Alkenes)
RBr + HC≡CH	→	RC≡CR	Acetylenes from halides; also acetylenes from acetylenes
ROH + RCOOH	→	RCOOR	Esters from alcohols; also esters from carboxylic acids
RCH=CHCHO	→	RCH ₂ CH ₂ CHO	Alkyls from alkenes (Conjugate Reduction)
RCH=CHCN	→	RCH ₂ CH ₂ 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 given in the monofunctional index on p. xiii, which lists the corresponding section and page. Sections that contain examples of the reactions of a functional group are given in the horizontal rows of this index. Section 1 gives examples of the reactions of acetylenes that form new acetylenes; Section 16 gives reactions of acetylenes that form carboxylic acids; and Section 31 gives reactions of acetylenes that form alcohols.

Examples of alkylation, dealkylation, homologation, isomerization, and transposition are given in Sections 1, 17, 33, and so on, lying close to a diagonal of the index. These sections correspond to such topics as the preparation of acetylenes from acetylenes; carboxylic acids from carboxylic acids; and alcohols, thiols, and phenols from alcohols, thiols, and phenols. Alkylations that involve conjugate additions across a double bond are given in Section 74E (Alkyls, Methylenes, and Aryls from Alkenes).

Examples of name reactions may be found by first considering the nature of the starting material and product. The Wittig reaction, for instance, is given in Section 199 (Alkenes from Aldehydes) and in Section 207 (Alkenes from Ketones). The aldol condensation may be found in the chapters on difunctional compounds in Section 324 (Alcohol, Thiol-Aldehyde) and in Section 330 (Alcohol, Thiol-Ketone). Examples of the synthetically important alkene metathesis reaction are provided primarily in Section 209 (Alkenes from Alkenes).

Examples of the protection of acetylenes, carboxylic acids, alcohols, phenols, aldehydes, amides, amines, esters, ketones, and alkenes are also presented. Sections (designated with an A: 15A, 30A, etc.) are labeled "Protection of" and 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 done only 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-aminoalcohols, 1,3-aminoalcohols, and 1,4-aminoalcohols are included in a single section (Section 326, Alcohol, Thiol-Amine). Difunctional compounds that have an oxide as the second group may be found in the appropriate section (Sections 278-290). The nitroketone product of oxidation of a nitroalcohol is given in Section 384 (Ketone-Oxide). Conversion of an oxide (such as nitro or a sulfone moiety) to another functional group is generally given in the Miscellaneous section of the sections concerning monofunctional compounds. Conversion of a nitroalkane to an amine, for example, is given in Section 105 (Amines from Miscellaneous Compounds). The following examples illustrate applications of this classification system:

<i>Difunctional Product</i>	<i>Section Title</i>
$\text{RC}\equiv\text{C}-\text{C}\equiv\text{CR}$	Acetylene-Acetylene
$\text{RCH}(\text{OH})\text{COOH}$	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. xiv gives the section and page corresponding to each difunctional product. Thus, Section 327 (Alcohol, Thiol-Ester) contains examples of the preparation of hydroxyesters; Section 323 (Alcohol, Thiol-Alcohol, Thiol) contains examples of the preparation of diols.

Some preparations of 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 $\text{RCH=CHBr} \rightarrow \text{RCH=CHCOOH}$ could be considered as preparing carboxylic acids from halides (Section 25, monofunctional compounds) or as preparing a carboxylic acid-alkene (Section 322, difunctional compounds). The choice usually depends on the focus of the particular paper where this reaction appeared. 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. Similarly, many citations for reactions found in the Aldehyde-X sections include examples that could be placed in the Ketone-X section. Again, the choice is dictated by the original publication in which the reaction appeared.

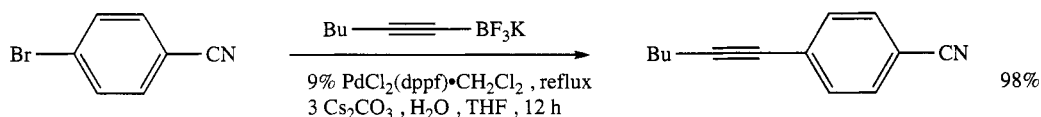
Many literature preparations of difunctional compounds are extensions of the methods applicable to monofunctional compounds. As an example, the reaction $\text{RCl} \rightarrow \text{ROH}$ might be used for the preparation of diols from an appropriate dichloro compound. Such methods are difficult to 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 $\text{RCH(OAc)CH}_2\text{OAc}$ (Ester-Ester) would thus be of interest to anyone preparing the diol $\text{RCH(OH)CH}_2\text{OH}$ (Alcohol-Alcohol).

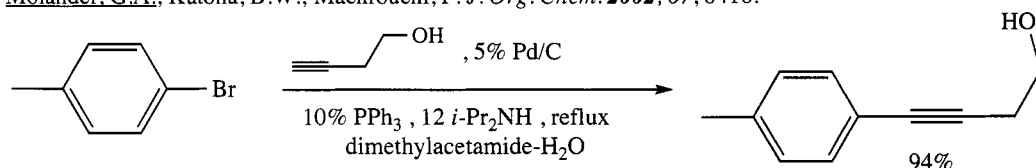
CHAPTER 1

PREPARATION OF ALKYNES

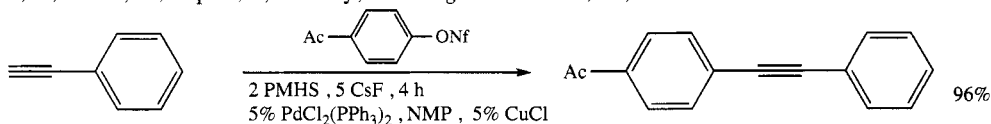
SECTION 1: ALKYNES FROM ALKYNES



Molander, G.A.; Katona, B.W.; Machrouchi, F. *J. Org. Chem.* **2002**, 67, 8416.

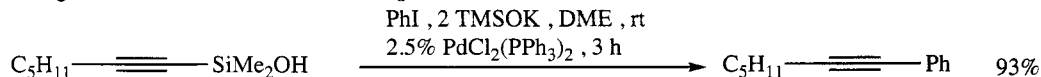


Novák, Z.; Szabó, A.; Répási, J.; Kotschy, A. *J. Org. Chem.* **2003**, 68, 3327.

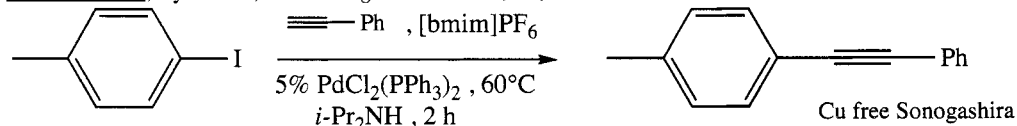


PMHS = poly(methylhydrosiloxane)

Gallagher, W.P.; Maleczka Jr. R.E. *J. Org. Chem.* **2003**, 68, 6775.

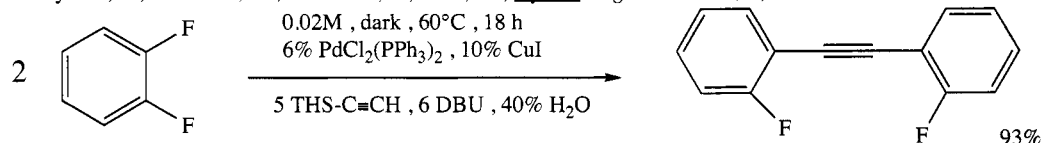


Denmark, S.E.; Tymonko, S.A. *J. Org. Chem.* **2003**, 68, 9151.

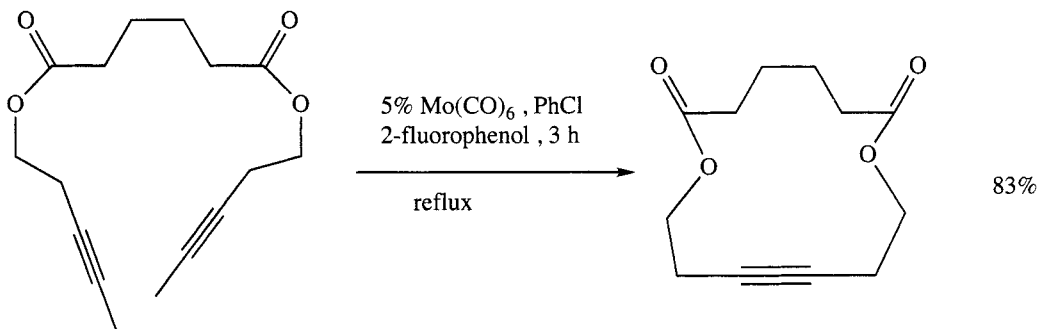


Cu free Sonogashira

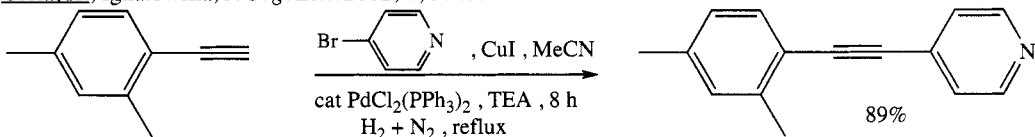
Fukuyama, T.; Shinmen, M.; Nishitani, S.; Sato, M.; Ryu, I. *Org. Lett.* **2002**, 4, 1691.



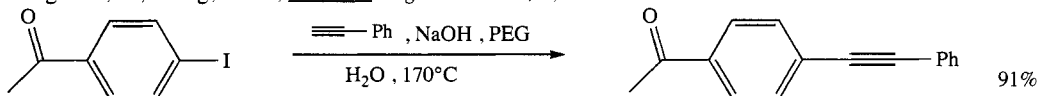
Mio, M.J.; Kopel, L.C.; Braun, J.B.; Gadzikwa, T.L.; Hull, K.L.; Brisbois, R.G.; Markworth, C.J.; Grieco, P.A. *Org. Lett.* **2002**, 4, 3199.



Grela, K.; Ignatowska, J. *Org. Lett.* **2002**, 4, 3747.

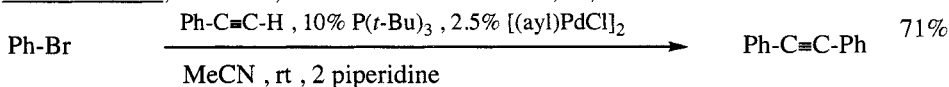


Elangovan, A.; Wang, Y.-H.; Ho, T.-I. *Org. Lett.* **2003**, 5, 1841.

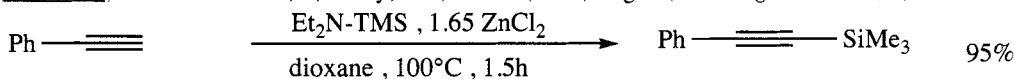


Leadbeater, N.E.; Marco, M.T.; Tominack, B.J. *Org. Lett.* **2003**, 5, 3919.

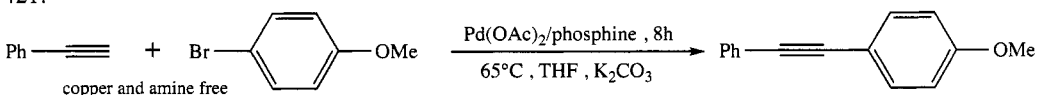
Leadbeater, N.E.; Tominack, B.J. *Tetrahedron Lett.* **2003**, 44, 8653.



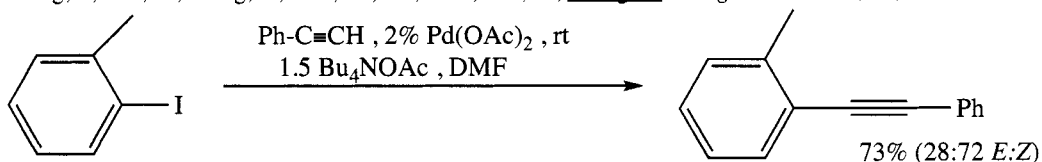
Soheili, A.; Albaneze-Walker, J.; Murry, J.A.; Dormer, P.G.; Hughes, D.L. *Org. Lett.* **2003**, 5, 4191.



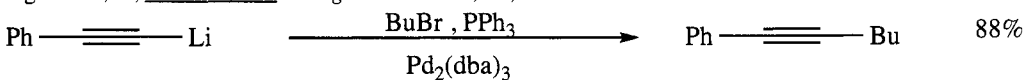
Andreev, A.A.; Konshin, V.V.; Komarov, N.V.; Rubin, M.; Brouwer, C.; Gevorgyan, V. *Org. Lett.* **2004**, 6, 421.



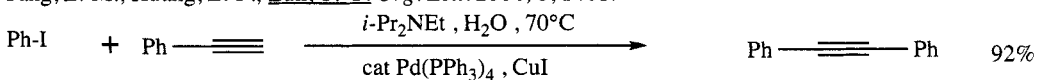
Cheng, J.; Sun, Y.; Wang, F.; Guo, M.; Xu, J.-H.; Pan, Y.; Zhang, Z. *J. Org. Chem.* **2004**, 69, 5428.



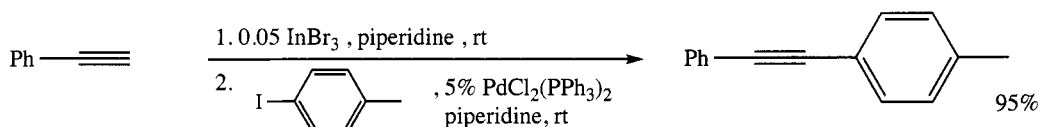
Urgaonkar, S.; Verkade, J.G. *J. Org. Chem.* **2004**, 69, 5752.



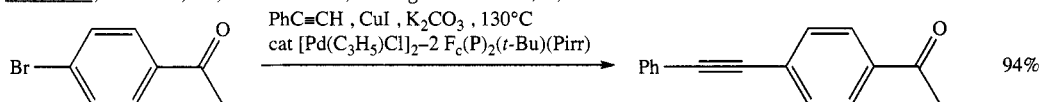
Yang, L.-M.; Huang, L.-F.; Luh, T.-Y. *Org. Lett.* **2004**, 6, 1461.



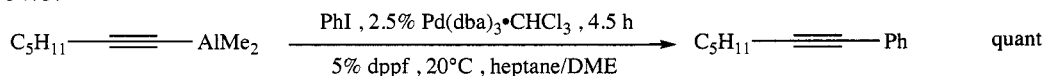
Bhattacharya, S.; Sengupta, S. *Tetrahedron Lett.* **2004**, 45, 8733.



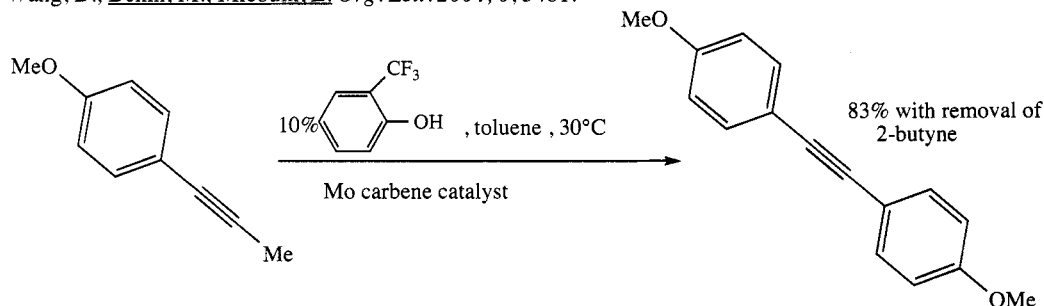
Sakai, N.; Annaka, K.; Konakahara, T. *Org. Lett.* **2004**, 6, 1527.



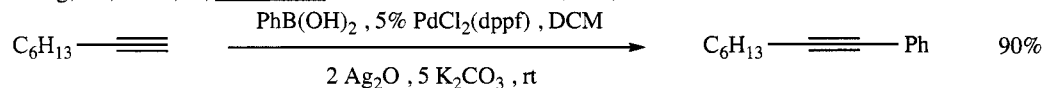
Hierso, J.-C.; Fihri, A.; Amardeil, R.; Meunier, P.; Doucet, H.; Santelli, M.; Ivanov, V.V. *Org. Lett.* **2004**, 6, 3473.



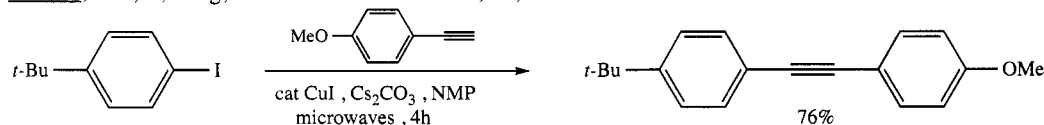
Wang, B.; Benin, M.; Micouin, L. *Org. Lett.* **2004**, 6, 3481.



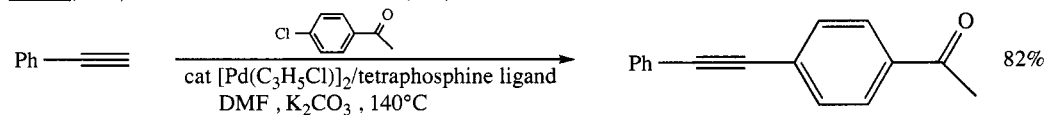
Zhang, W.; Kraft, S.; Moore, J.S. *J. Am. Chem. Soc.* **2004**, 126, 329.



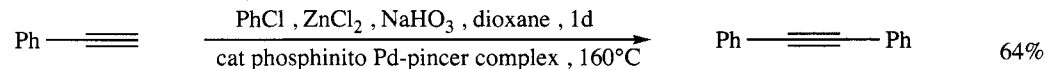
Zou, G.; Zhu, J.; Tang, J. *Tetrahedron Lett.* **2003**, 44, 8709.



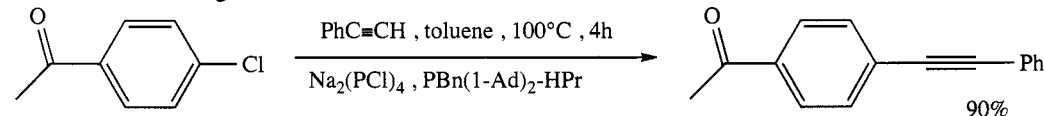
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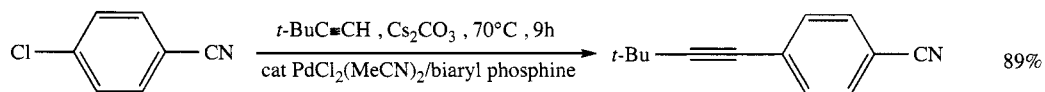
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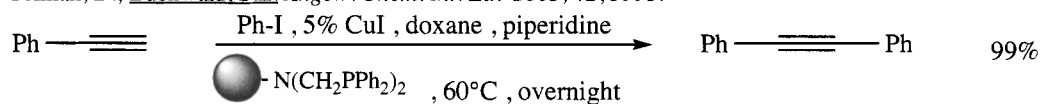
Eberhard, M.R.; Wang, Z.; Jensen, C.M. *Chem. Commun.* **2002**, 818.



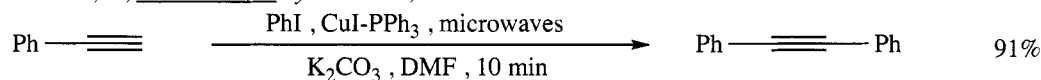
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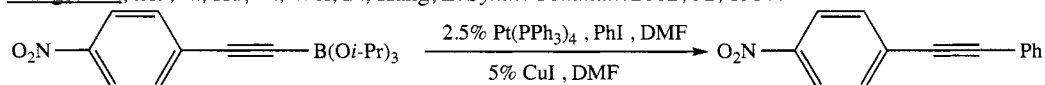
Gelman, D.; Buchwald, S.L. *Angew. Chem. Int. Ed.* **2003**, 42, 5993.



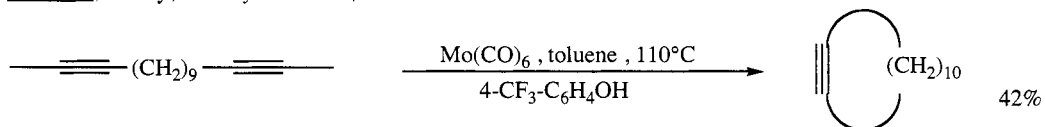
Gonthier, E.; Breinbauer, R. *Synlett* **2003**, 999.



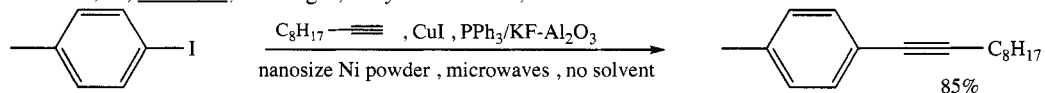
Wang, J.-X.; Liu, Z.; Hu, Y.; Wei, B.; Kang, L. *Synth. Commun.* **2002**, 32, 1937.



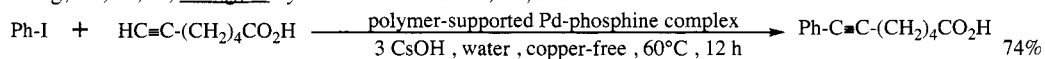
Oh, C.H.; Reddy, V.R. *Synlett* **2004**, 2091.



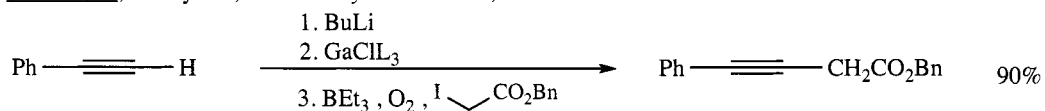
Hellbach, B.; Gleitr, R.; Rominger, F. *Synthesis* **2003**, 2535.



Wang, M.; Li, P.; Wang, L. *Synth. Commun.* **2004**, 34, 2803.

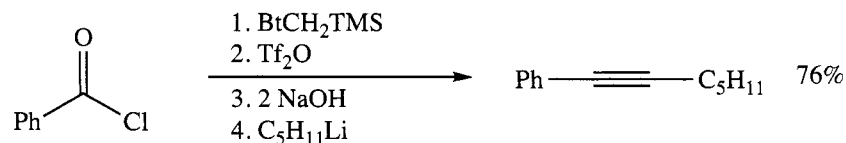


Uozumi, Y.; Kobayashi, Y. *Heterocycles* **2003**, 59, 71.



Usugi, S.-i.; Yorimitsu, H.; Shinokubo, H.; Oshima, K. *Bull. Chem. Soc. Jpn.* **2002**, 75, 2687.

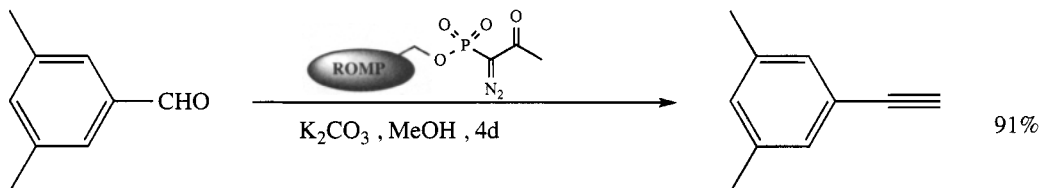
SECTION 2: ALKYNES FROM ACID DERIVATIVES



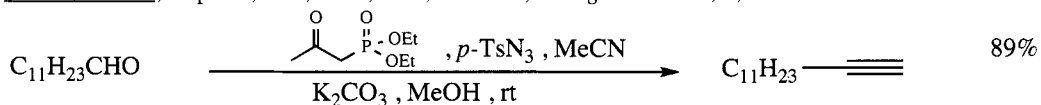
Katritzky, A.R.; Abdel-Fathah, A.A.A.; Wang, M. *J. Org. Chem.* **2002**, 67, 7526.

SECTION 3: ALKYNES FROM ALCOHOLS AND THIOLS

NO ADDITIONAL EXAMPLES

SECTION 4: ALKYNES FROM ALDEHYDES

Barrett, A.G.M.; Hopkins, B.T.; Love, A.C.; Tadeschi, L. *Org. Lett.* **2004**, 6, 835.



Roth, G.J.; Liepold, B.; Müller, S.G.; Bestmann, H.J. *Synthesis* **2004**, 59.

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

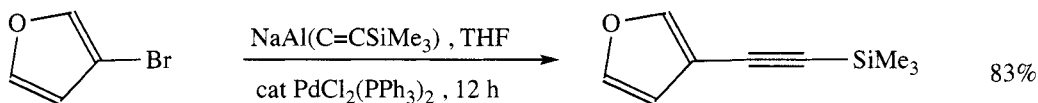
SECTION 8: ALKYNES FROM ESTERS

NO ADDITIONAL EXAMPLES

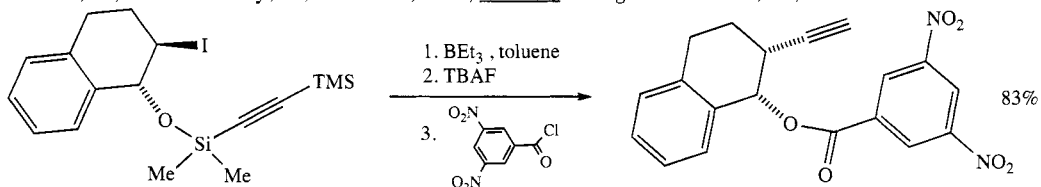
SECTION 9: ALKYNES FROM ETHERS, EPOXIDES, AND THIOETHERS

NO ADDITIONAL EXAMPLES

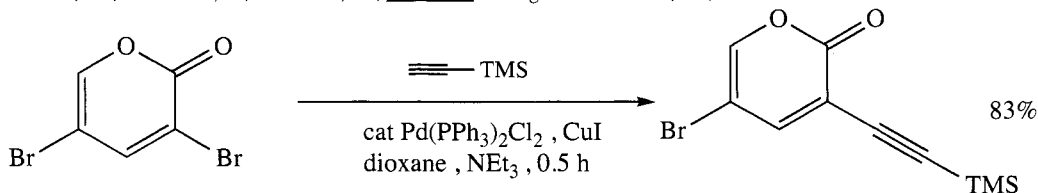
SECTION 10: ALKYNES FROM HALIDES AND SULFONATES



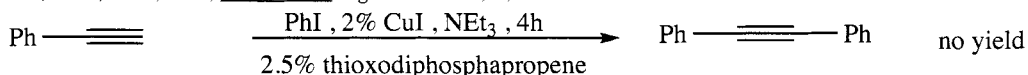
Gelman, D.; Tsvelikhovsky, D.; Molander, G.A.; Blum, J. *J. Org. Chem.* **2002**, 67, 6287.



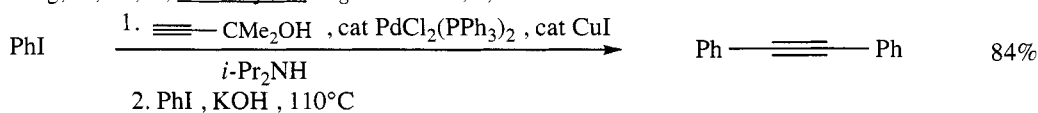
Sukeda, M.; Ichikawa, S.; Matsuda, A.; Shuto, S. *J. Org. Chem.* **2003**, 68, 3465.



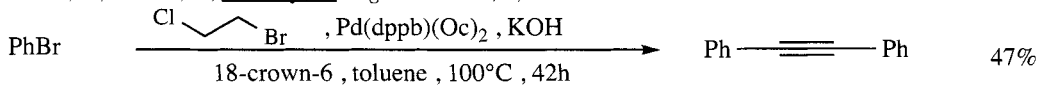
Lee, J.-H.; Park, J.-S.; Cho, C.-G. *Org. Lett.* **2002**, 4, 1171.



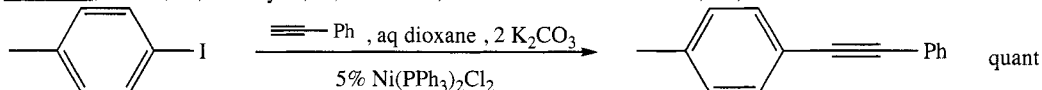
Liang, H.; Ito, S.; Yoshifuji, M. *Org. Lett.* **2004**, 6, 425.



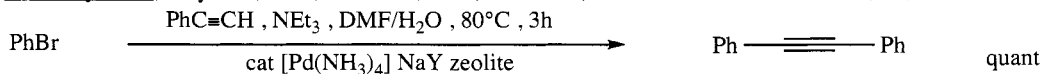
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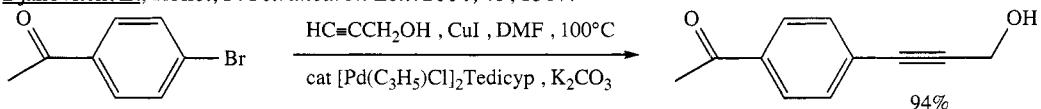
Abele, E.; Abele, R.; Arsenyan, P.; Kukevics, E. *Tetrahedron Lett.* **2003**, 44, 3911.



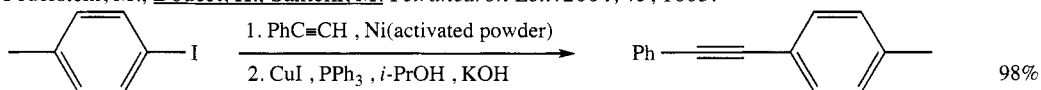
Beletskaya, I.P.; Latyshev, G.V.; Tsvetkov, A.V.; Lukashev, N.V. *Tetrahedron Lett.* **2003**, 44, 5011.



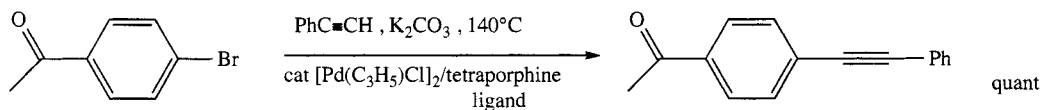
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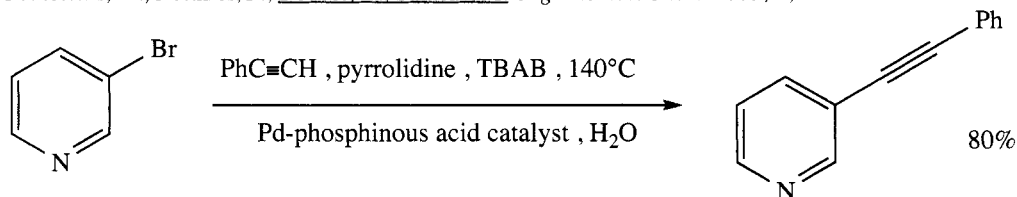
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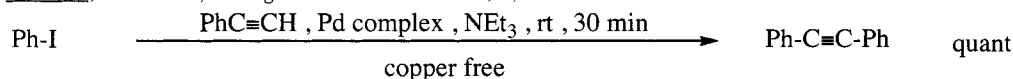
Wang, L.; Li, P.; Zhang, Y. *Chem. Commun.* **2004**, 514.



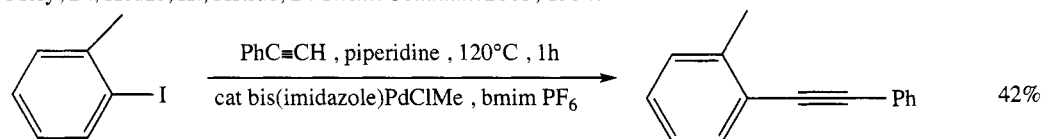
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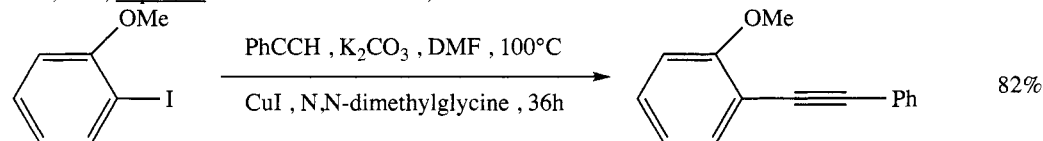
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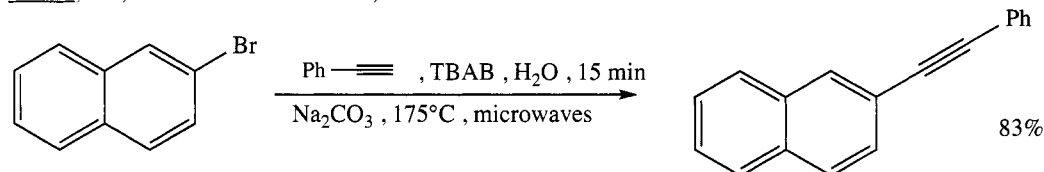
Méry, D.; Heuzé, K.; Astruc, D. *Chem. Commun.* **2003**, 1934.



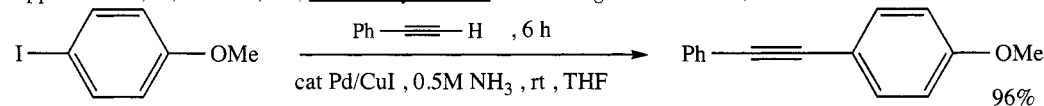
Park, S.B.; Alper, H. *Chem. Commun.* **2004**, 1306.



Ma, D.; Liu, F. *Chem. Commun.* **2004**, 1934.



Appukkuthan, P.; Dehaen, W.; van der Eycken, E. *Eur. J. Org. Chem.* **2003**, 4713.



Mori, A.; Ahmed, M.S.M.; Sekiguchi, A.; Masui, K.; Koike, T. *Chem. Lett.* **2002**, 31, 756.

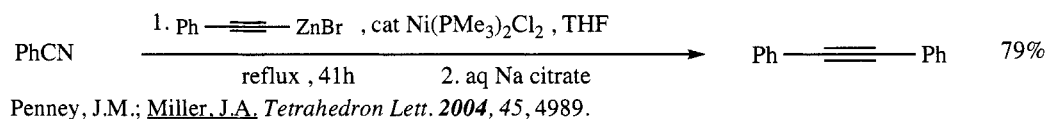
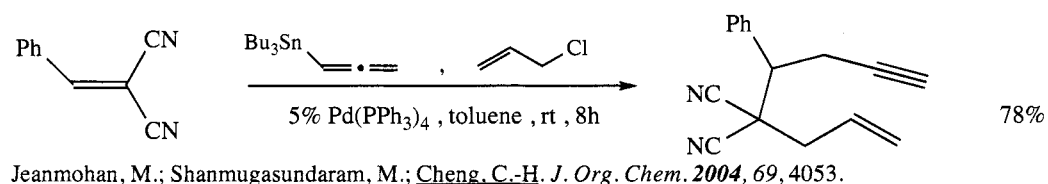
SECTION 11: ALKYNES FROM HYDRIDES

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

NO ADDITIONAL EXAMPLES

SECTION 12: ALKYNES FROM KETONES

NO ADDITIONAL EXAMPLES

SECTION 13: ALKYNES FROM NITRILES**SECTION 14: ALKYNES FROM ALKENES****SECTION 15: ALKYNES FROM MISCELLANEOUS COMPOUNDS**

NO ADDITIONAL EXAMPLES

REVIEW:

“One Century of Aryne Chemistry”

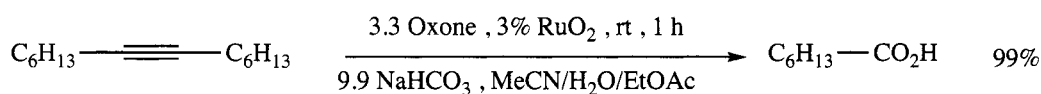
Wenk, H.H.; Winkler, M.; Sander, W., *Angew. Chem. Int. Ed.* **2003**, 42, 502.**SECTION 15A: PROTECTION OF ALKYNES**

NO ADDITIONAL EXAMPLES

CHAPTER 2

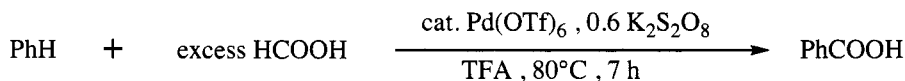
PREPARATION OF ACID DERIVATIVES

SECTION 16: ACID DERIVATIVES FROM ALKYNES

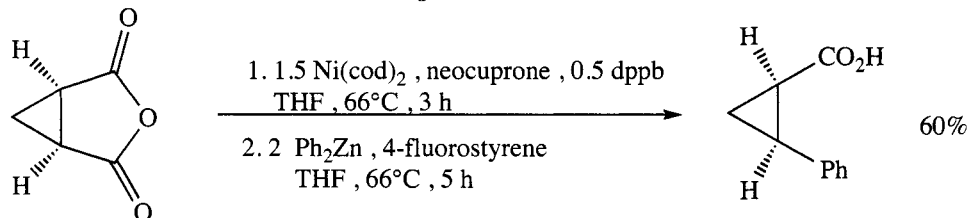


Yang, D.; Chen, F.; Dong, Z.-M. *J. Org. Chem.* **2004**, 69, 2221.

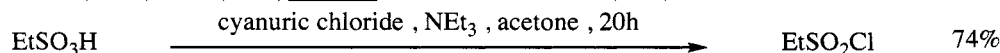
SECTION 17: ACID DERIVATIVES FROM ACID DERIVATIVES



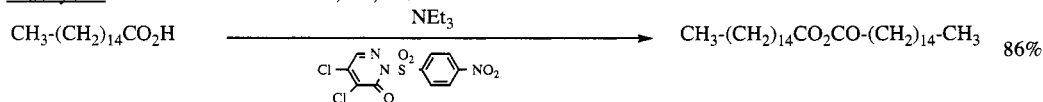
Shibahara, F.; Kinoshita, S.; Nozaki, K. *Org. Lett.* **2004**, 6, 2437.



O'Brien, E.M.; Bercot, E.A.; Rovis, T. *J. Am. Chem. Soc.* **2003**, 125, 10498.



Blotny, G. *Tetrahedron Lett.* **2003**, 44, 1499.



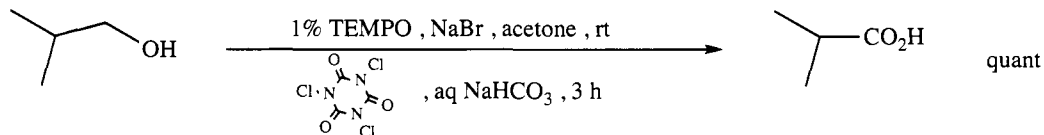
Kim, J.-J.; Park, Y.-D.; Lee, W.S.; Cho, S.-D. *Synthesis* **2003**, 1517.

REVIEW:

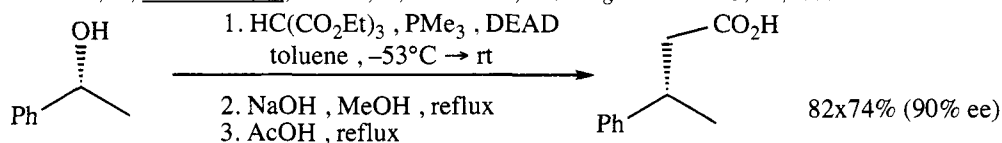
"Asymmetric Alcoholysis of Cyclic Anhydrides"

Chen, Y.; McDaid, P.; Deng, L. *Chem. Rev.* **2003**, 103, 2965.

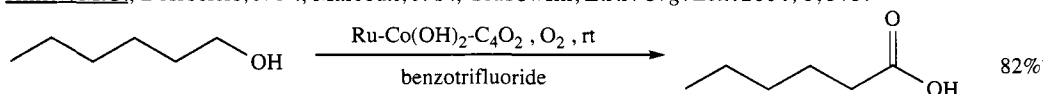
SECTION 18: ACID DERIVATIVES FROM ALCOHOLS AND THIOLS



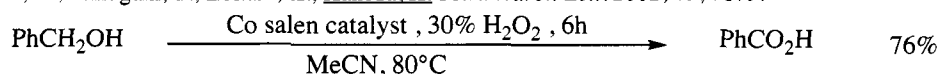
De Lucca, L.; Giacomelli, G.; Masala, S.; Purcheddu, A. *J. Org. Chem.* **2003**, 68, 4999.



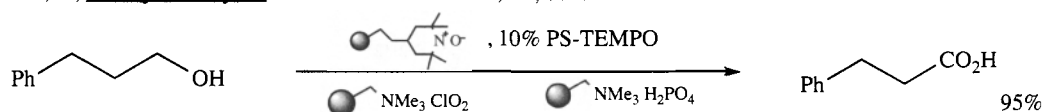
Hillier, M.C.; Desrosiers, J.-N.; Marcoux, J.-F.; Grabowski, E.J.J. *Org. Lett.* **2004**, 6, 573.



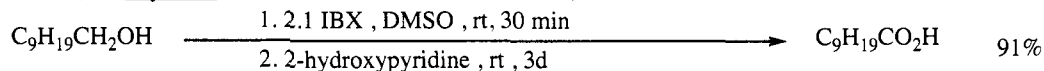
Ji, H.; Mizugaki, T.; Ebitani, K.; Kaneda, K. *Tetrahedron Lett.* **2002**, 43, 7179.



Das, S.; Punniyamurthy, T. *Tetrahedron Lett.* **2003**, 44, 6033.



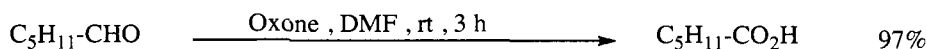
Yasuda, K.; Ley, S.V. *J. Chem. Soc. Perkin Trans. 1* **2002**, 1024.



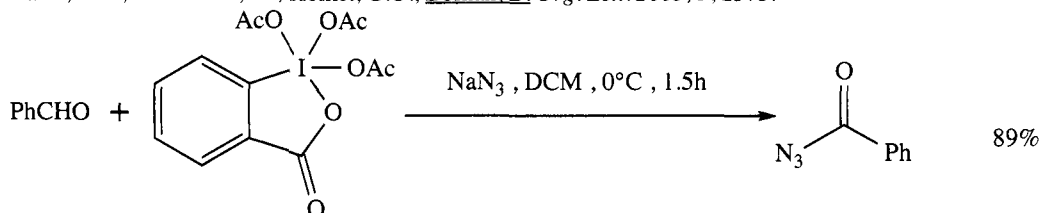
IBX = 1-hydroxy-1,2-benzoidoxol-3(1H)-one-1-oxide

Mazitschek, R.; Müllbauer, M.; Giannis, A. *Angew. Chem. Int. Ed.* **2002**, 41, 4059.

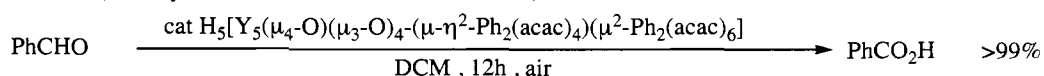
SECTION 19: ACID DERIVATIVES FROM ALDEHYDES



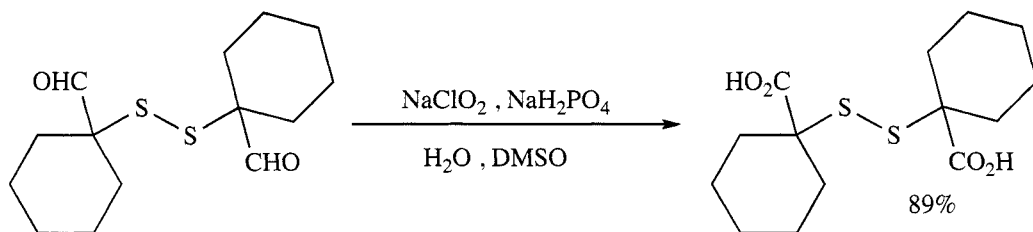
Travis, B.R.; Sivakumar, M.; Hollist, G.O.; Borhan, B. *Org. Lett.* **2003**, 5, 2573.



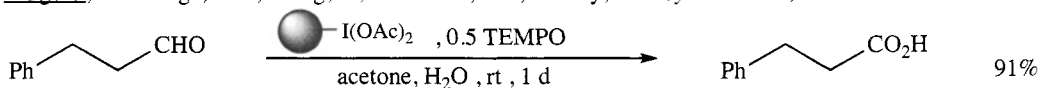
Bose, D.S.; Reddy, A.V.N. *Tetrahedron Lett.* **2003**, 44, 3543.



Roesky, P.W.; Canseco-Melchor, G.; Zulys, A. *Chem. Commun.* **2004**, 738.

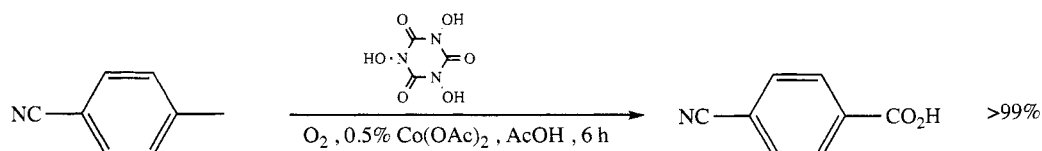


Fang, X.; Bandarage, U.P.; Wang, T.; Schroeder, J.D.; Garvey, D.S. *Synlett* **2003**, 489.

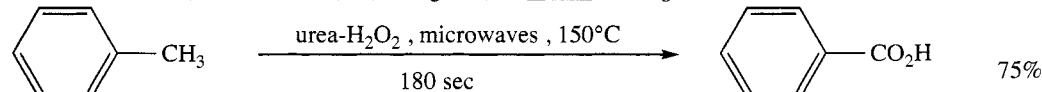


Tashino, Y.; Togo, H. *Synlett* **2004**, 2010.

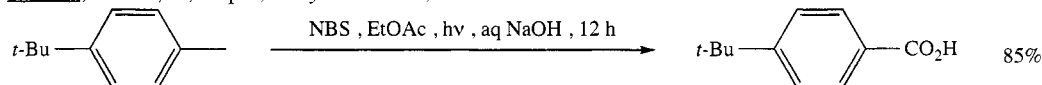
SECTION 20: ACID DERIVATIVES FROM ALKYL, METHYLENES, AND ARYLS



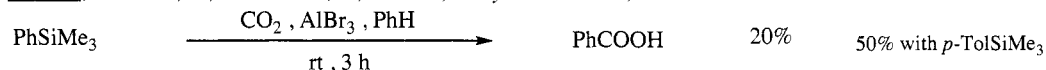
Hirai, N.; Sawatari, N.; Nakamura, N.; Sakaguchi, S.; Ishii, Y. *J. Org. Chem.* **2003**, 68, 6585.



Paul, S.; Nanda, P.; Gupta, R. *Synlett* **2004**, 531.



Itoh, A.; Kodama, T.; Hashimoto, S.; Masaki, Y. *Synthesis* **2003**, 2289.



50% with *p*-TolSiMe₃

Hattori, T.; Suzuki, Y.; Miyano, S. *Chem. Lett.* **2003**, 32, 454.

SECTION 21: ACID DERIVATIVES FROM AMIDES

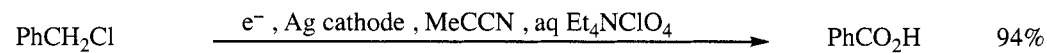
NO ADDITIONAL EXAMPLES

SECTION 22: ACID DERIVATIVES FROM AMINES

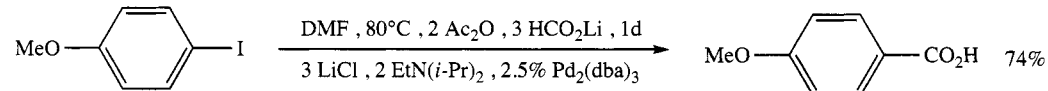
NO ADDITIONAL EXAMPLES

SECTION 23: ACID DERIVATIVES FROM ESTERS

SECTION 25: ACID DERIVATIVES FROM HALIDES AND SULFONATES



Isse, A.A.; Gennaro, A. *Chem. Commun.* **2002**, 2798.

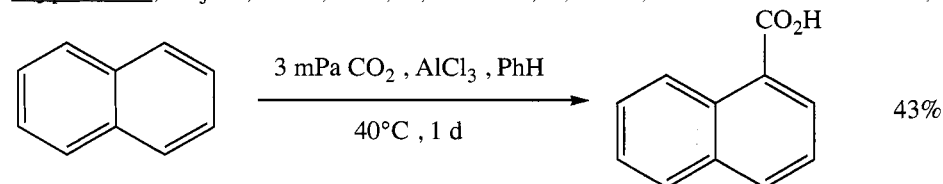


Cacchi, S.; Fabrizi, G.; Goggiamani, A. *Org. Lett.* **2003**, 5, 4269.

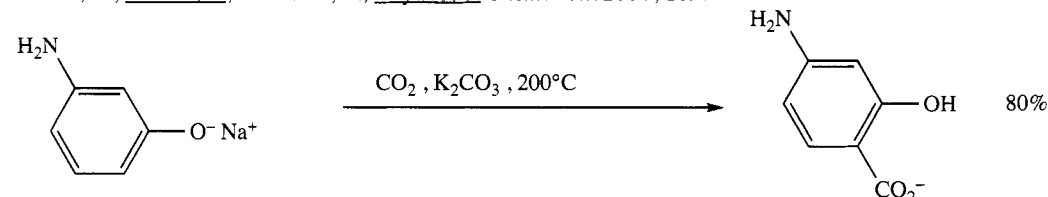
SECTION 26: ACID DERIVATIVES FROM HYDRIDES



Hajipour, A.R.; Mirjalili, B.B.F.; Zarei, A.; Khazdooz, L.; Ruoho, A.E. *Tetrahedron Lett.* **2004**, 45, 6607.

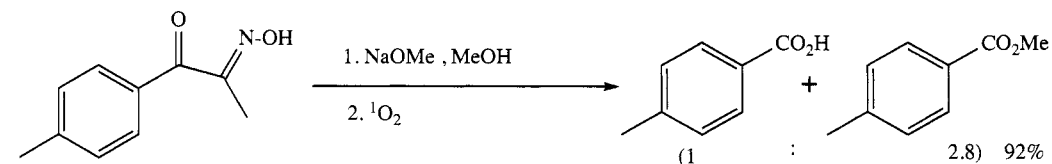


Suzuki, Y.; Hattori, T.; Okuzawa, T.; Miyano, S. *Chem. Lett.* **2002**, 102.

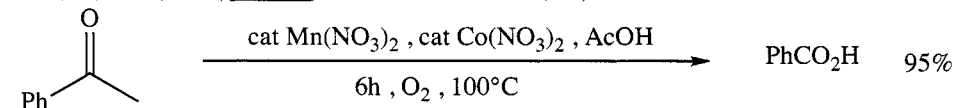


Rahim, M.A.; Matsui, Y.; Matusyama, T.; Kosugi, Y. *Bull. Chem. Soc. Jpn.* **2003**, 76, 2191.

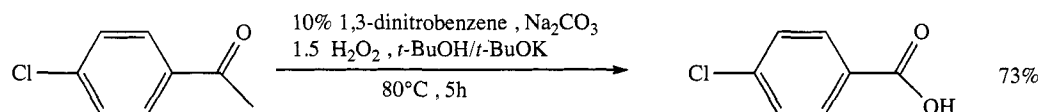
SECTION 27: ACID DERIVATIVES FROM KETONES



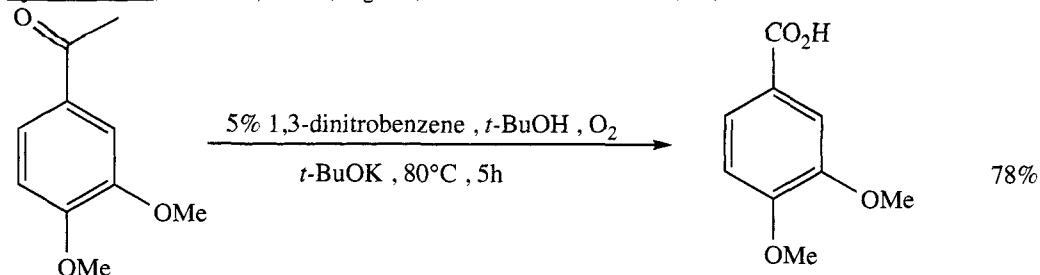
Öcal, N.; Yano, L.M.; Erden, I. *Tetrahedron Lett.* **2003**, 44, 6947.



Minisci, F.; Recupero, F.; Fontana, F.; Biørsvik, H.-R.; Liguori, L. *Synlett* **2002**, 610.



Bjørsvik, H.-R.; Merinero, J.A.V.; Liguori, L. *Tetrahedron Lett.* **2004**, 45, 8615.



Bjørsvik, H.-R.; Liguori, L.; González, R.R.; Merinero, J.A.V. *Tetrahedron Lett.* **2002**, 43, 4985.

REVIEW:

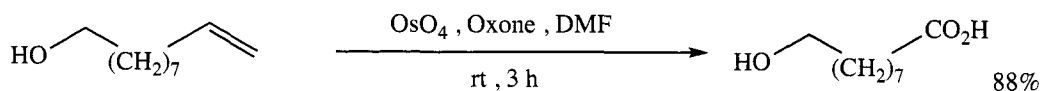
“Homologation of Ketones into Carboxylic Acids”

Badham, N.F. *Tetrahedron* **2004**, 60, 11.

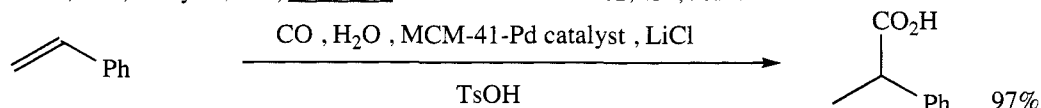
SECTION 28: ACID DERIVATIVES FROM NITRILES

NO ADDITIONAL EXAMPLES

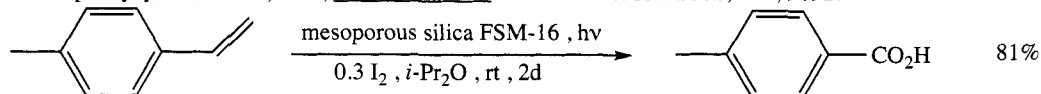
SECTION 29: ACID DERIVATIVES FROM ALKENES



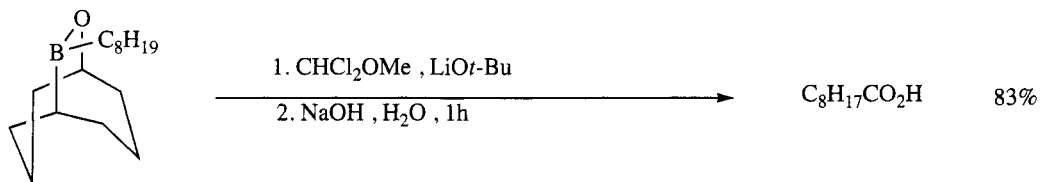
Travis, B.R.; Narayam, R.S.; Borhan, B. *J. Am. Chem. Soc.* **2002**, 124, 3824.



Mukhopadhyay, K.; Sarkar, B.R.; Chaudhari, R.V. *J. Am. Chem. Soc.* **2002**, 124, 9692.



Itoh, A.; Kodama, T.; Masaki, Y.; Inagaki, S. *Synlett* **2002**, 522.

SECTION 30: ACID DERIVATIVES FROM MISCELLANEOUS COMPOUNDS

Soderquist, J.A.; Martinez, J.; Oyola, Y.; Kock, I. *Tetrahedron Lett.* **2004**, 45, 5541.

SECTION 30A: PROTECTION OF CARBOXYLIC ACID DERIVATIVES

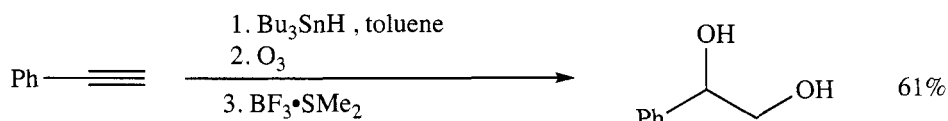
NO ADDITIONAL EXAMPLES

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

CHAPTER 3

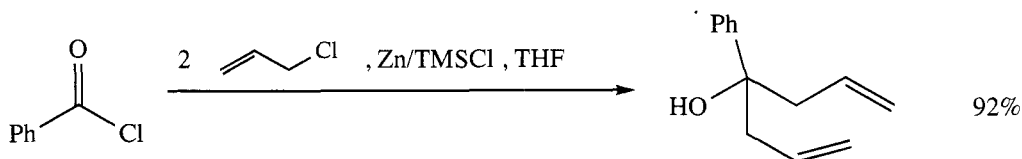
PREPARATION OF ALCOHOLS

SECTION 31: ALCOHOLS AND THIOLS FROM ALKYNES

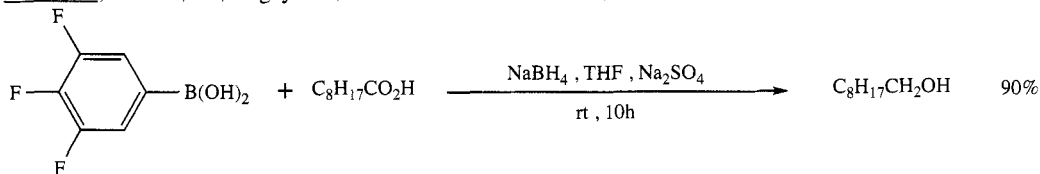


Gómez, A.M.; Company, M.D.; Valverde, S.; López, J.C. *Org. Lett.* **2002**, *4*, 383.

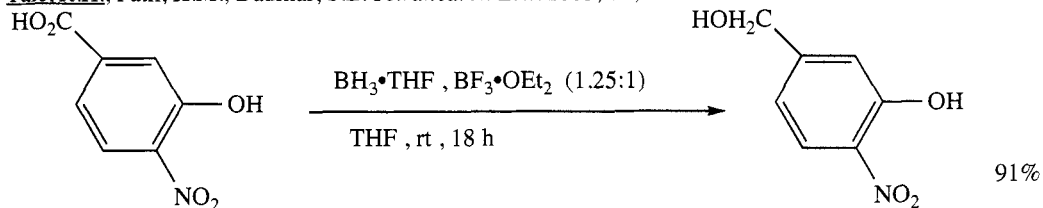
SECTION 32: ALCOHOLS AND THIOLS FROM ACID DERIVATIVES



Ishino, Y.; Mihara, M.; Kageyama, M. *Tetrahedron Lett.* **2002**, *43*, 6601.



Tale, R.H.; Patil, K.M.; Daurkar, S.E. *Tetrahedron Lett.* **2003**, *44*, 3427.

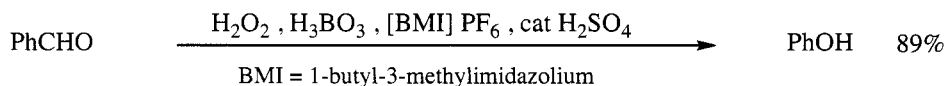


Chen, M.H.; Kesten, E.I.S.; Magano, J.; Rodriguez, D.; Sexton, K.E.; Zhang, J.; Lee, H.T. *Org. Prep. Proceed. Int.* **2002**, *34*, 665.

SECTION 33: ALCOHOLS AND THIOLS FROM ALCOHOL AND THIOLS

NO ADDITIONAL EXAMPLES

SECTION 34: ALCOHOLS AND THIOLS FROM ALDEHYDES



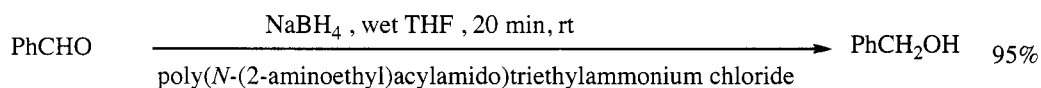
Zambrano, J.L.; Dorta, R. *Synlett* **2003**, 1545.

The following reaction types are included in this section:

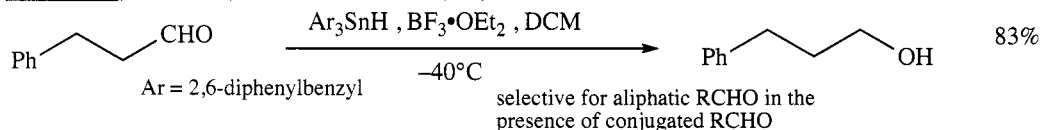
A. Reductions of Aldehydes to Alcohols

B. Alkylation of Aldehydes, Forming Alcohols

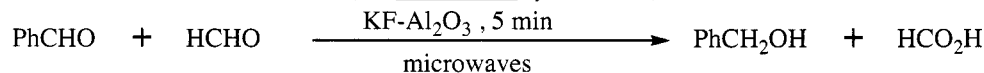
SECTION 34A: REDUCTIONS OF ALDEHYDES TO ALCOHOLS



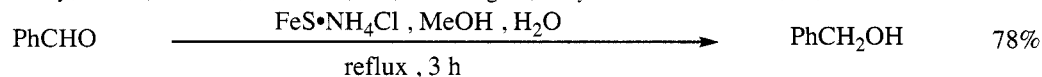
Tamami, B.; Maahdavi, H. *Tetrahedron* **2003**, 59, 821.



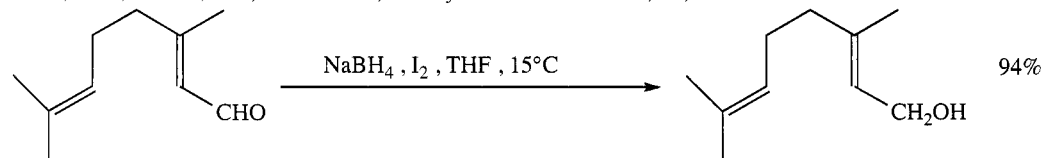
Sasaki, K.; Komatsu, N.; Shirakawa, S.; Maruoka, K. *Synlett* **2002**, 575.



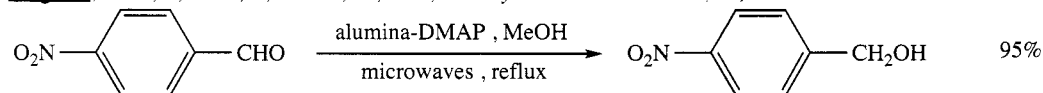
Reddy, B.V.S.; Srinivas, R.; Yadav, J.S.; Ramalingam, T. *Synth. Commun.* **2002**, 32, 219.



Desai, D.G.; Swami, S.S.; Nandudikar, R.S. *Synth. Commun.* **2002**, 32, 931.



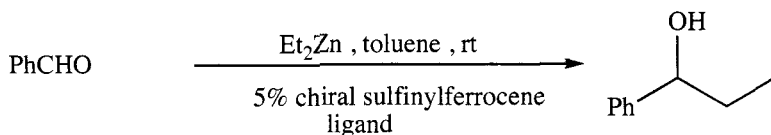
Singh, J.; Kaur, I.; Kaur, J.; Bhalla, A.; Kad, G.L. *Synth. Commun.* **2003**, 33, 191.



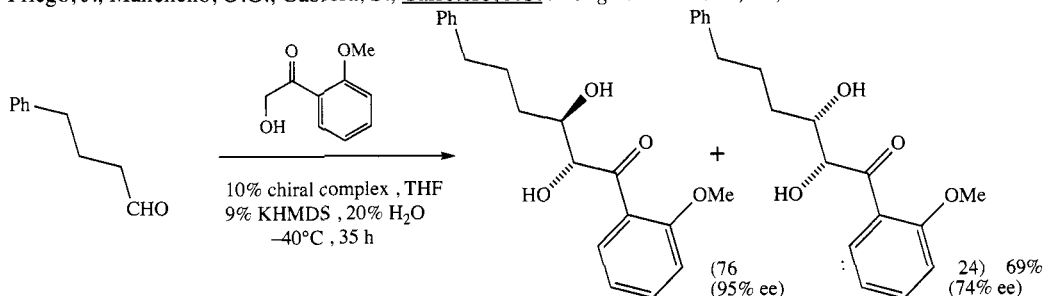
Pradhan, P.K.; Jaisankar, P.; Pal, B.; Dey, S.; Giri, V.S. *Synth. Commun.* **2004**, 34, 2863.

SECTION 34B: ALKYLATION OF ALDEHYDES, FORMING ALCOHOLS

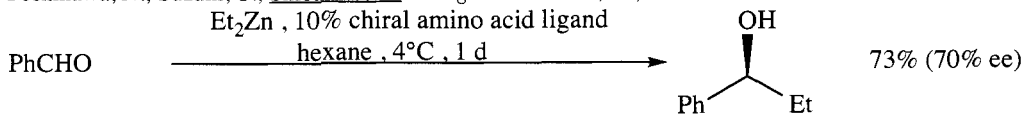
ASYMMETRIC ALKYLATIONS



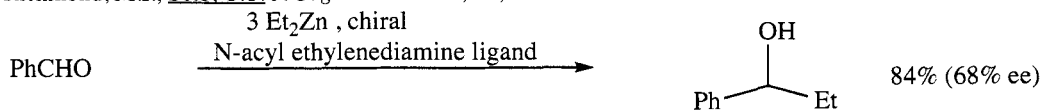
Priego, J.; Mancheño, O.G.; Cabrera, S.; Carretero, J.C. *J. Org. Chem.* **2002**, 67, 1346.



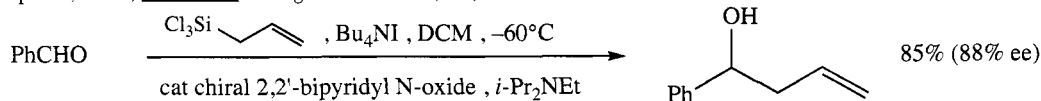
Yoshikawa, N.; Suzuki, T.; Shibasaki, M. *J. Org. Chem.* **2002**, 67, 2556.



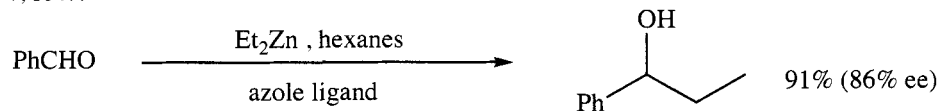
Richmond, M.I.; Seto, C.T. *J. Org. Chem.* **2003**, 68, 7509.



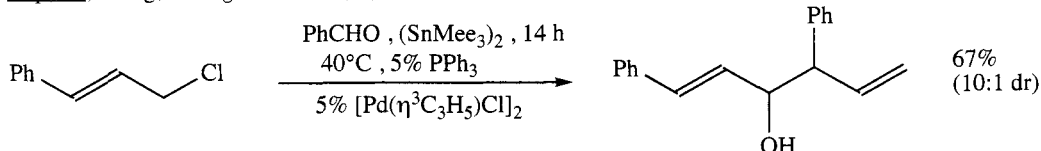
Sprout, C.M.; Seto, C.T. *J. Org. Chem.* **2003**, 68, 7788.



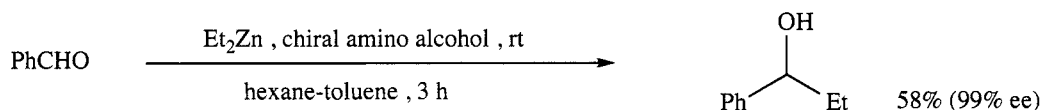
Malkov, A.V.; Orsini, M.; Pernazza, D.; Muir, K.W.; Langer, V.; Meghani, P.; Kocovsky, P. *Org. Lett.* **2002**, 4, 1047.



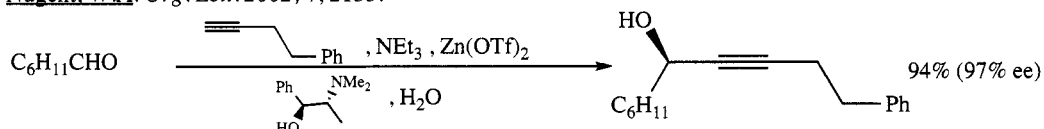
Wipf, P.; Wang, X. *Org. Lett.* **2002**, 4, 1197.



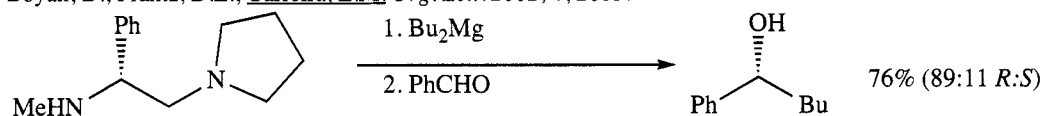
Wallner, O.A.; Szabó, K.J. *Org. Lett.* **2002**, 4, 1563.



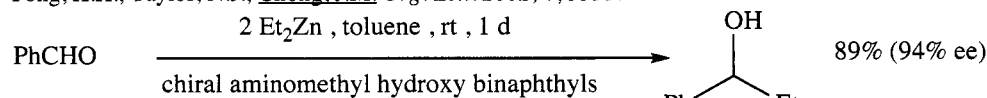
Nugent, W.A. *Org. Lett.* **2002**, 4, 2133.



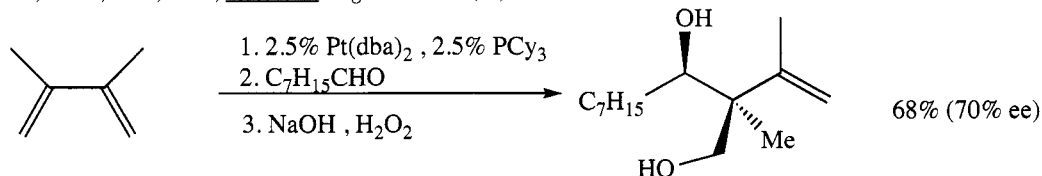
Boyll, D.; Frantz, D.E.; Carreira, E.M. *Org. Lett.* **2002**, 4, 2605.



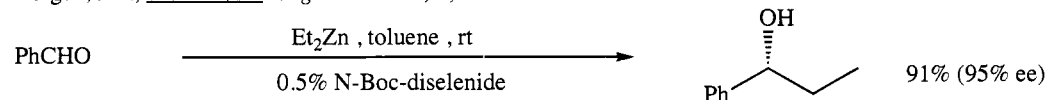
Yong, K.H.; Taylor, N.J.; Chong, J.M. *Org. Lett.* **2002**, 4, 3553.



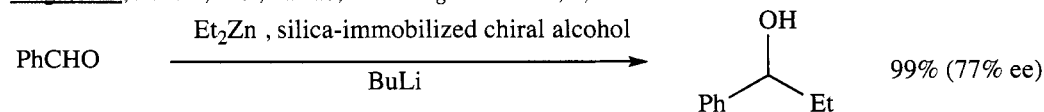
Ko, D.-H.; Kim, K.H.; Ha, D.-C. *Org. Lett.* **2002**, 4, 3759.



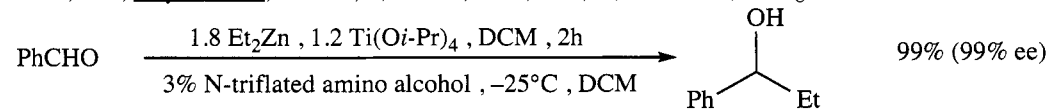
Morgen, J.B.; Morken, J.P. *Org. Lett.* **2003**, 5, 2573.



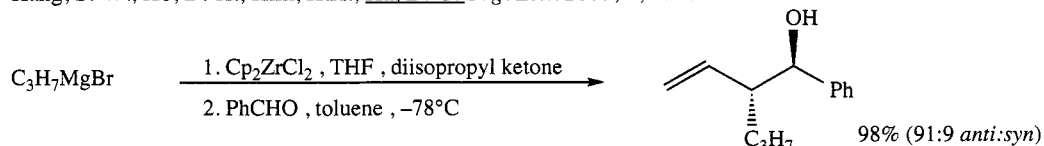
Braga, A.L.; Lüdtkke, D.S.; Paixao, M.W. *Org. Lett.* **2003**, 5, 2635.



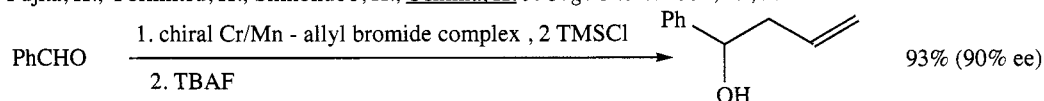
Fraile, J.M.; Mayoral, J.A.; Serrano, J.; Pericàs, M.A.; Solà, L.; Castellnou, D. *Org. Lett.* **2003**, 5, 4333.



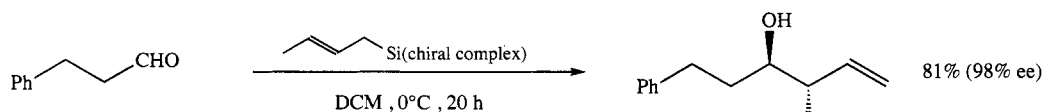
Kang, S.-W.; Ko, D.-H.; Kim, K.H.; Ha, D.-C. *Org. Lett.* **2003**, 5, 4517.



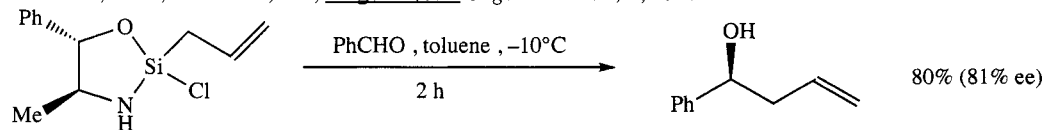
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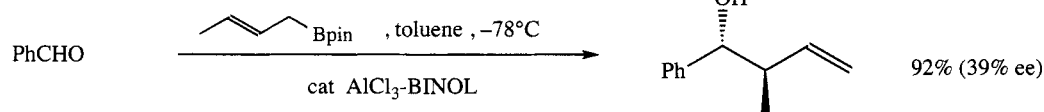
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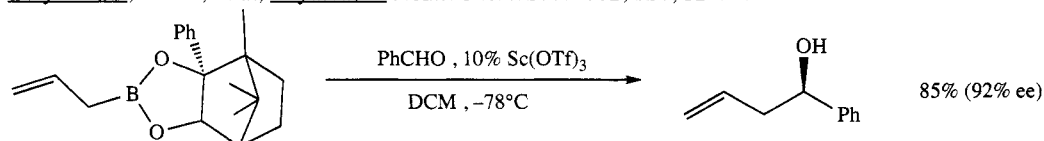
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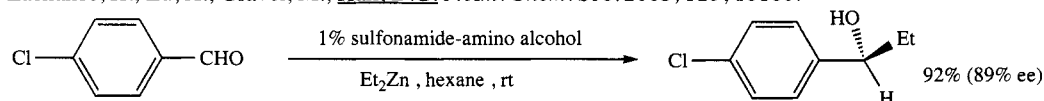
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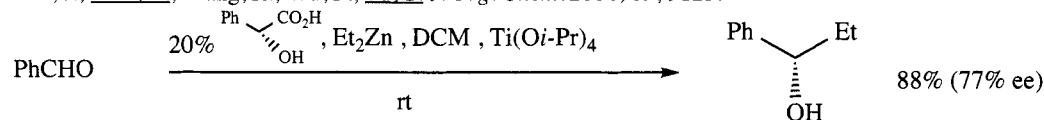
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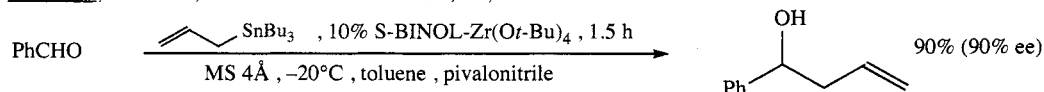
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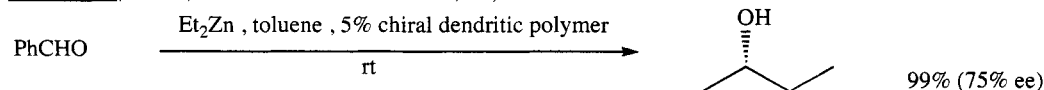
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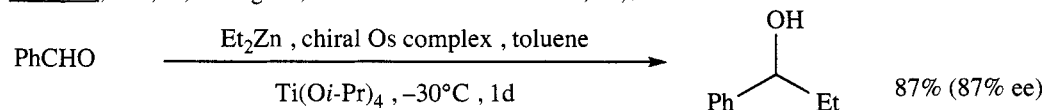
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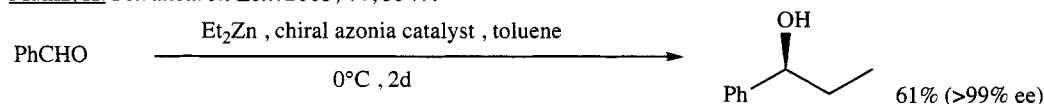
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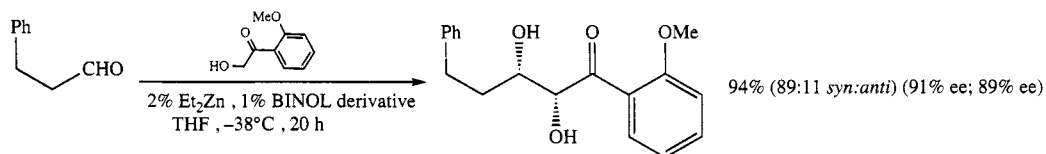
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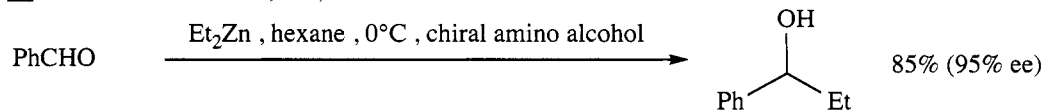
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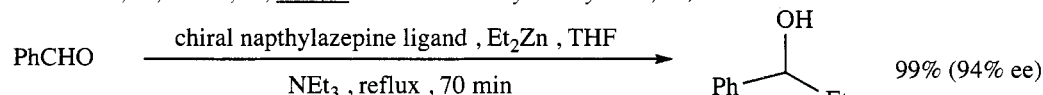
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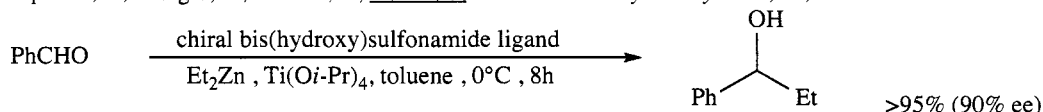
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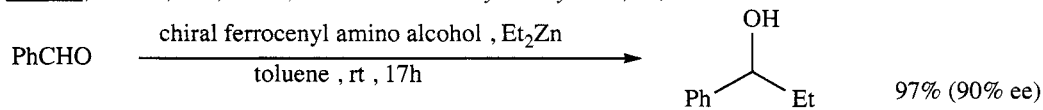
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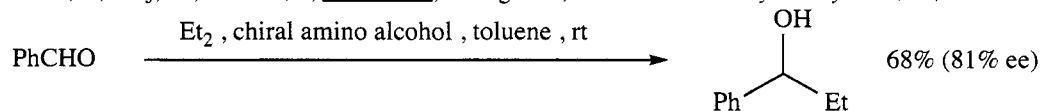
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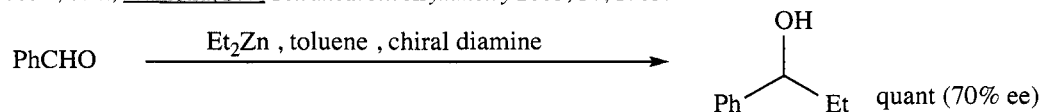
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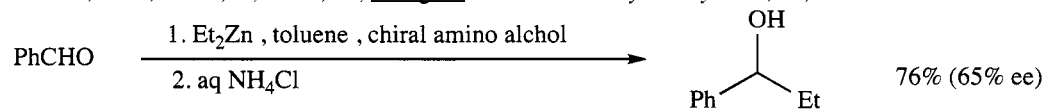
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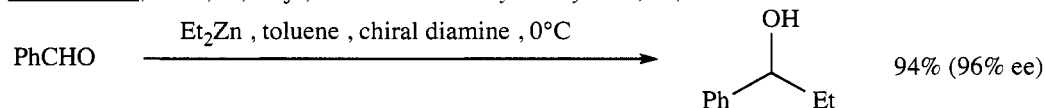
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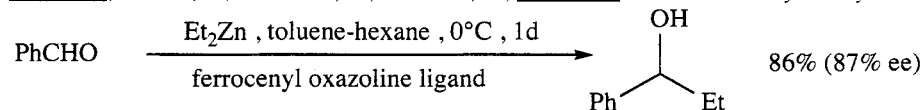
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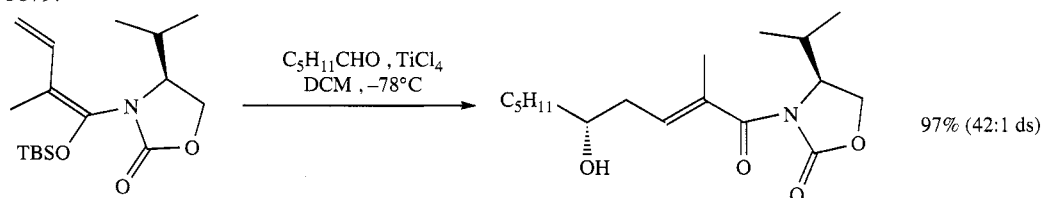
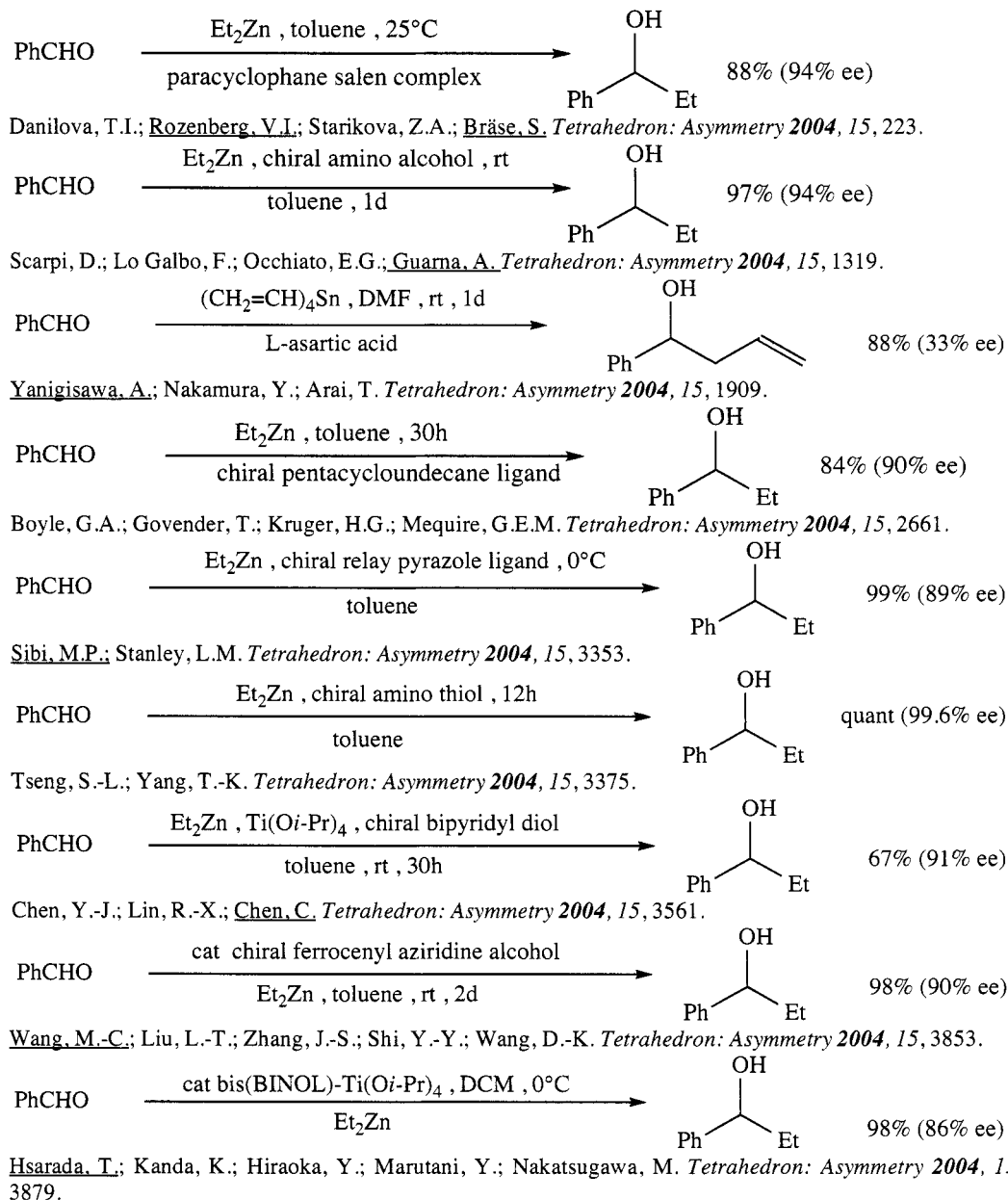
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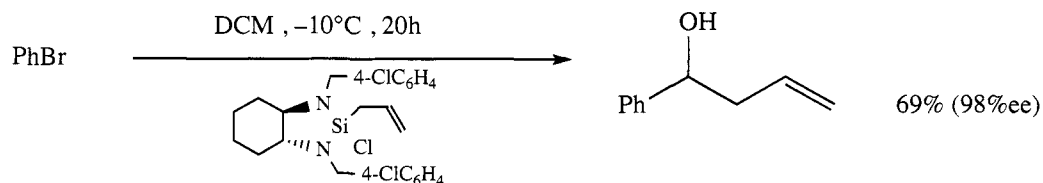
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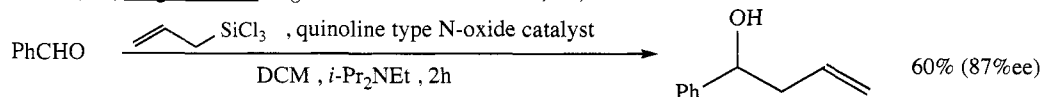
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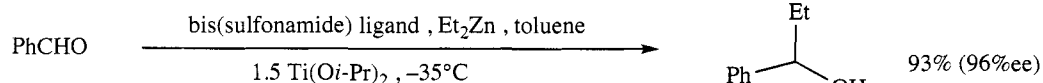
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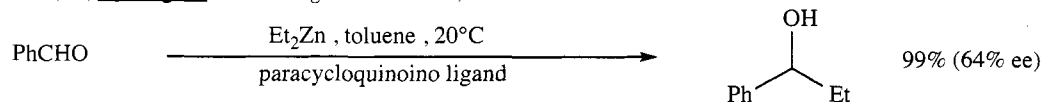
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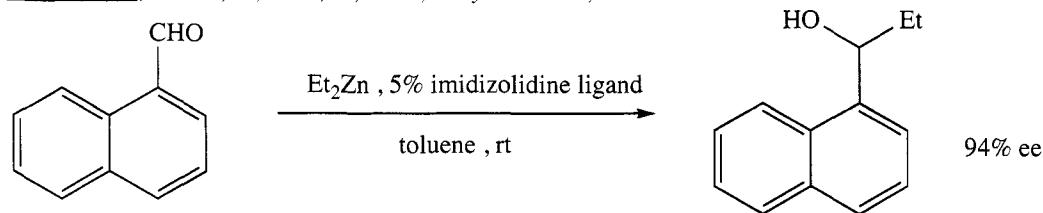
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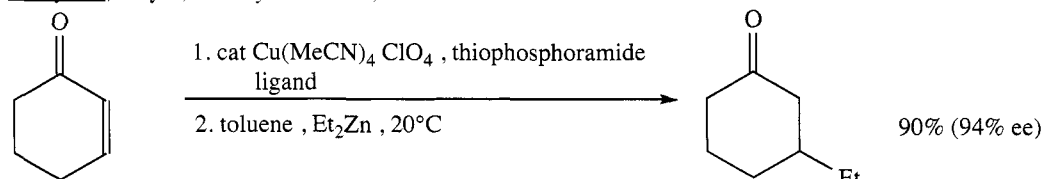
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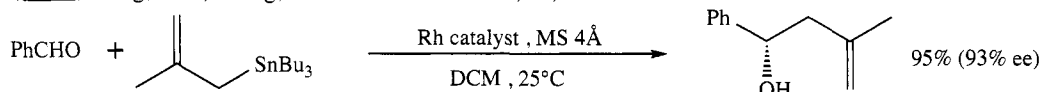
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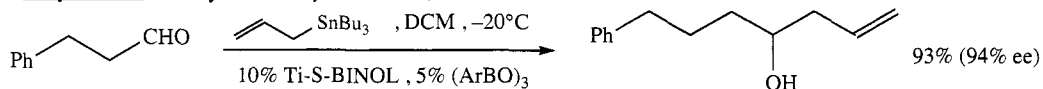
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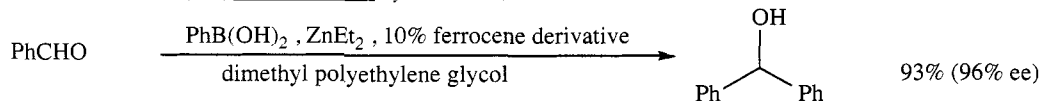
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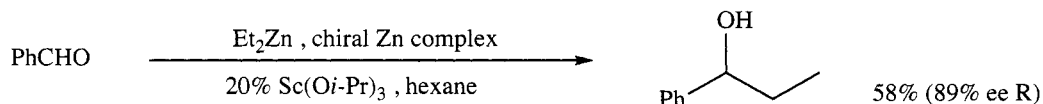
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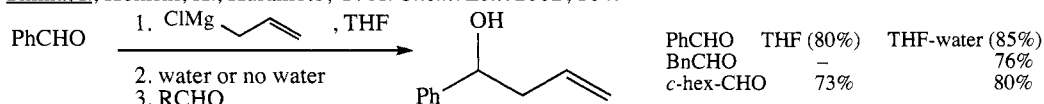
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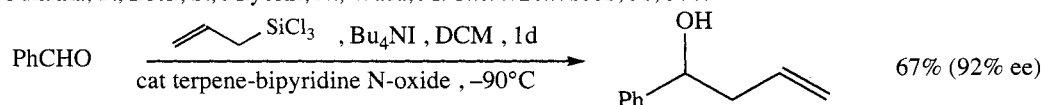
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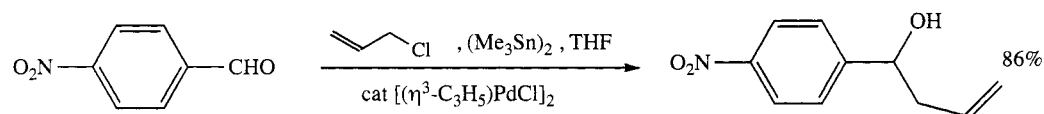


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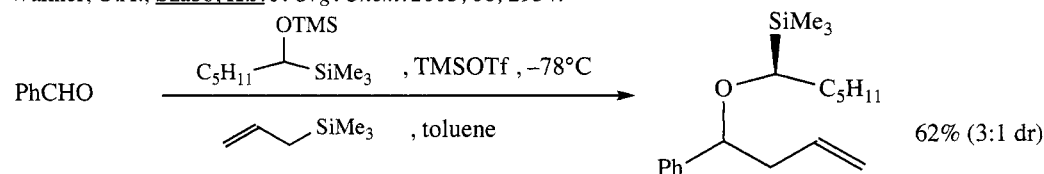


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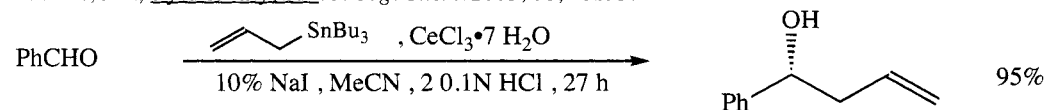
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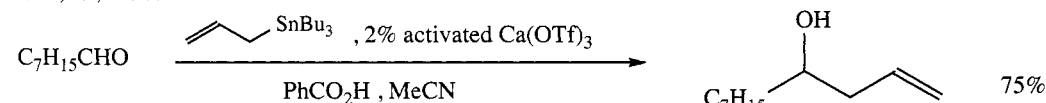
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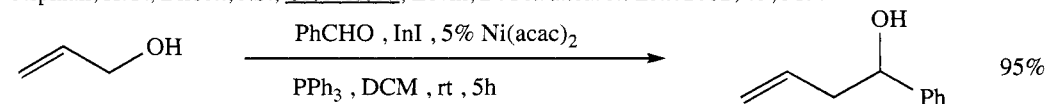
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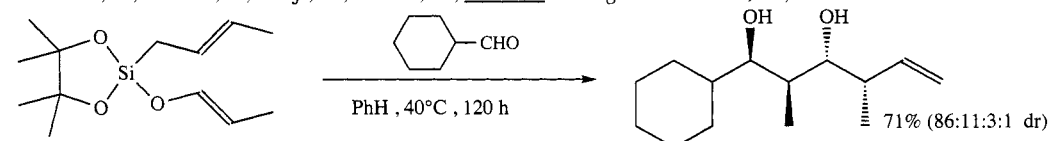
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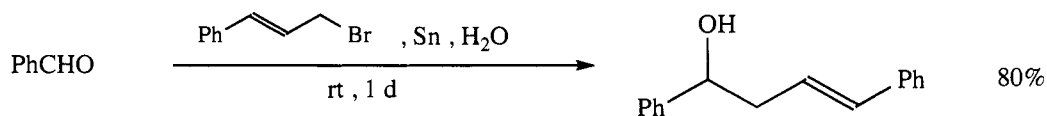
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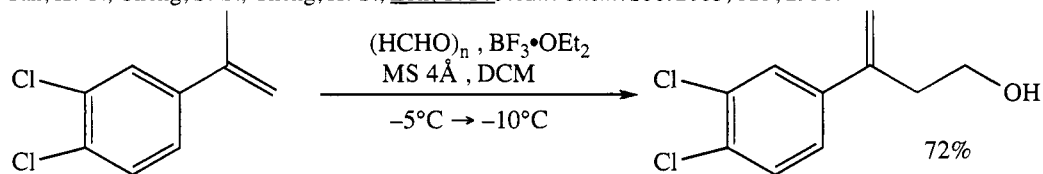
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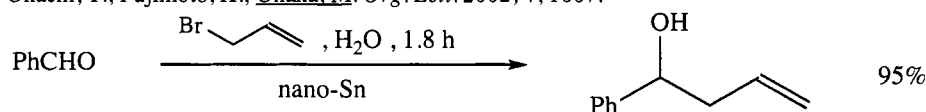
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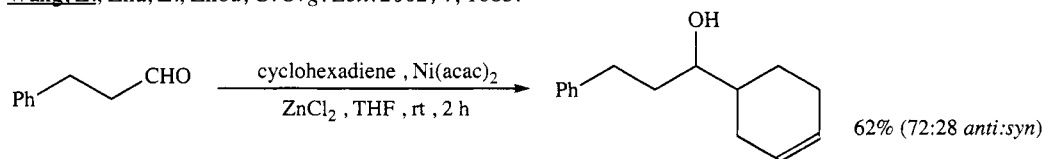
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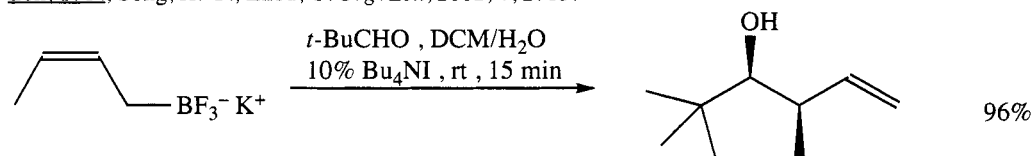
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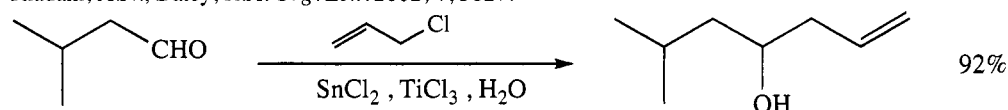
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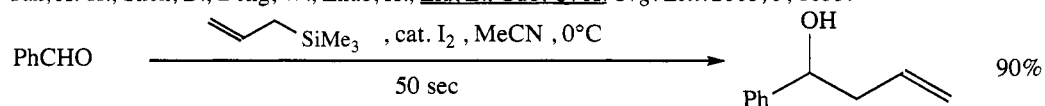
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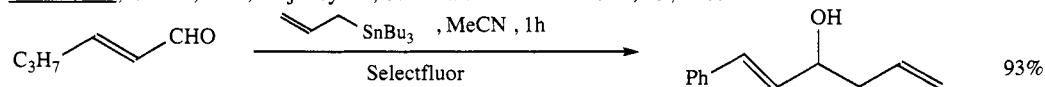
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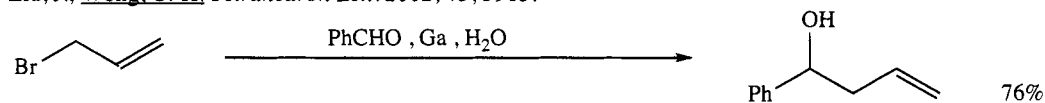
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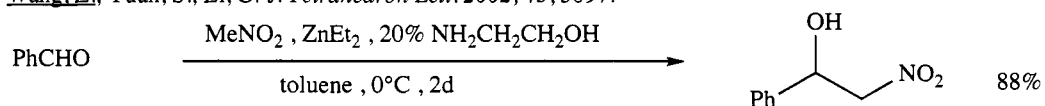
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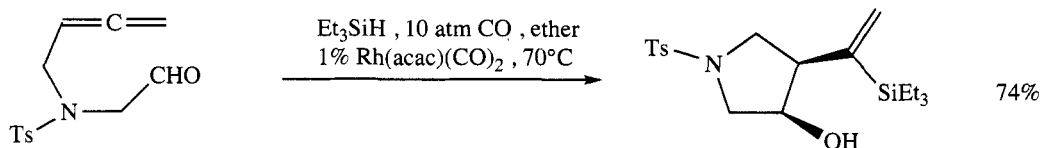
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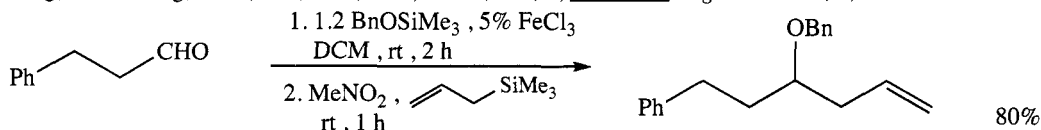
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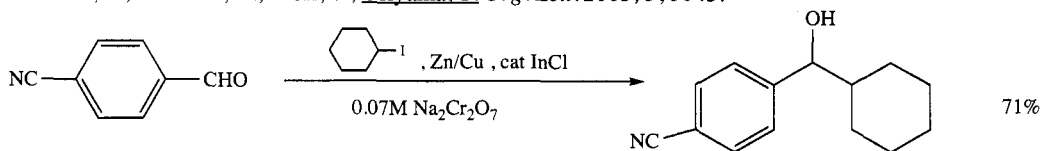
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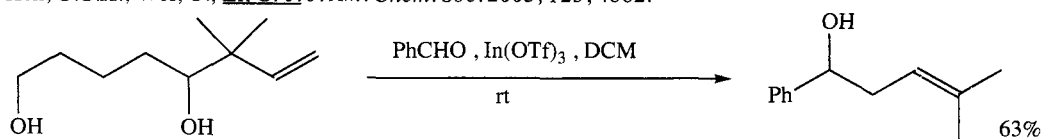
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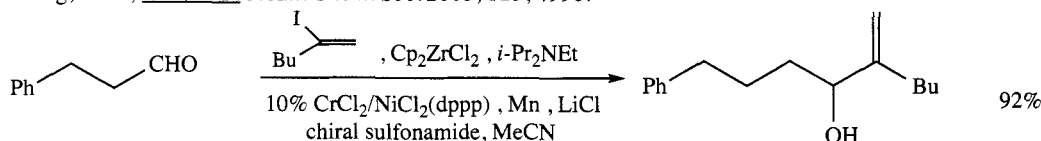
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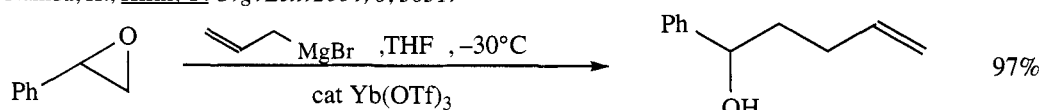
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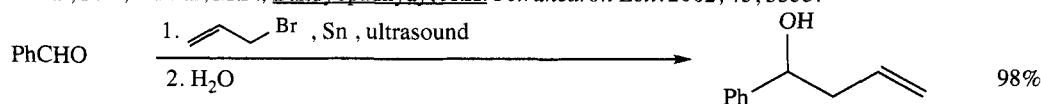
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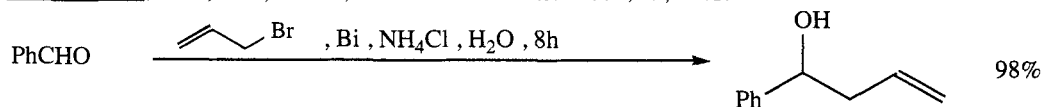
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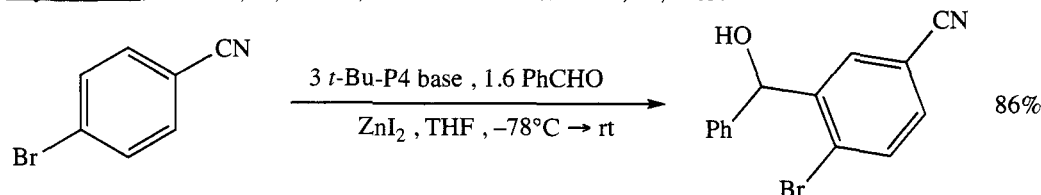
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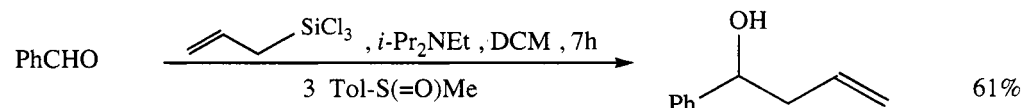
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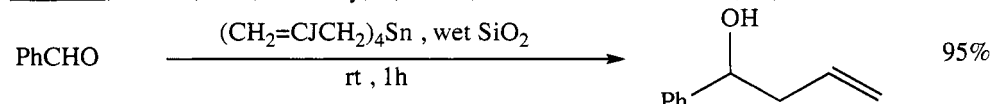
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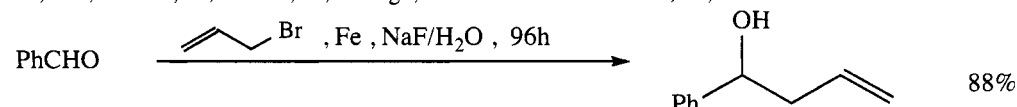
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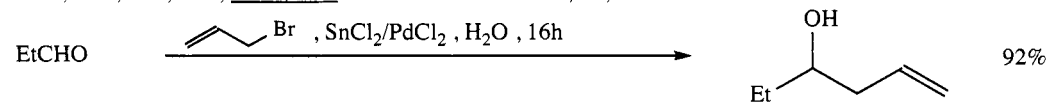
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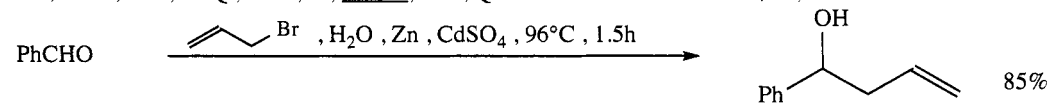
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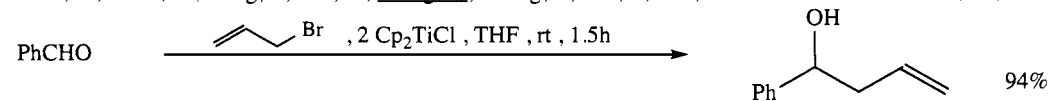
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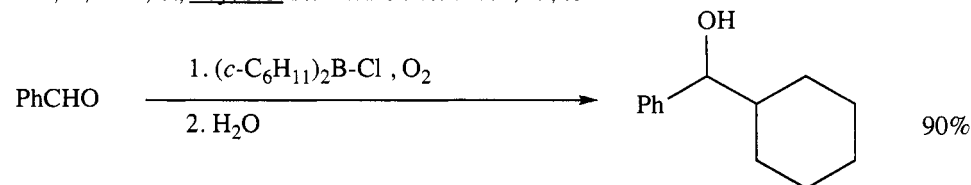
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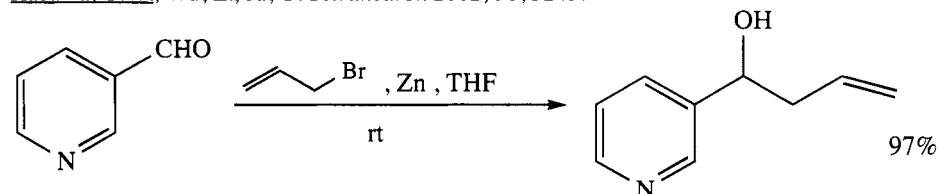
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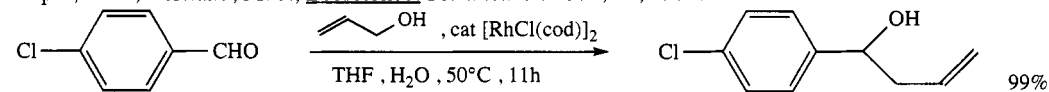
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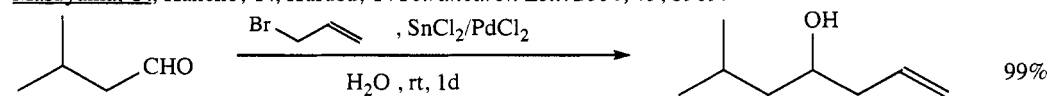
Kabalka, G.W.; Wu, Z.; Ju, Y. *Tetrahedron* **2002**, *58*, 3243.



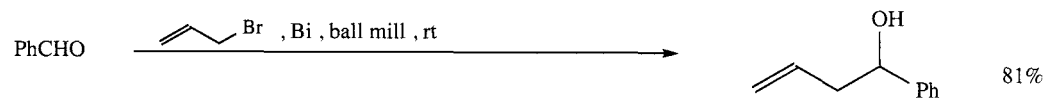
Felpin, F.-X.; Bertrand, M.-J.; Lebreton, J. *Tetrahedron* **2002**, *58*, 7381.



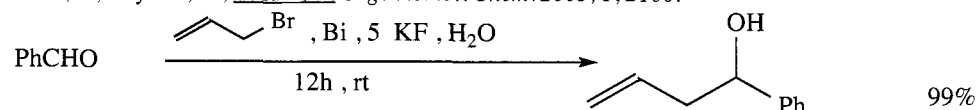
Masuyama, Y.; Kaneko, Y.; Kurusu, Y. *Tetrahedron Lett.* **2004**, *45*, 8969.



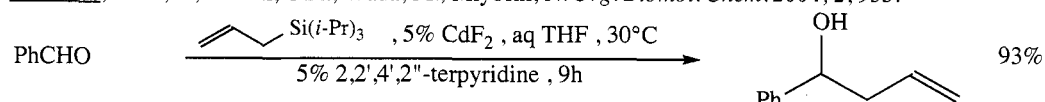
Tan, X.-H.; Hou, Y.-Q.; Huang, C.; Liu, L.; Guo, Q.-X. *Tetrahedron* **2004**, *60*, 6129.



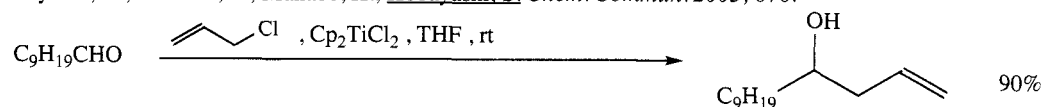
Wada, S.; Hayashi, N.; Suzuki, H. *Org. Biomol. Chem.* **2003**, *1*, 2160.



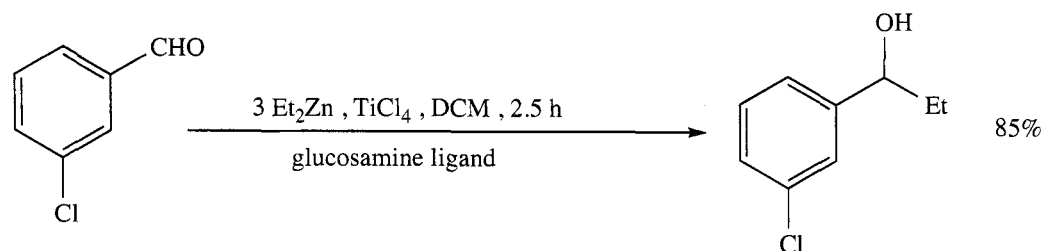
Smith, K.; Lock, S.; El-Hiti, G.A.; Wada, M.; Miyoshi, N. *Org. Biomol. Chem.* **2004**, *2*, 935.



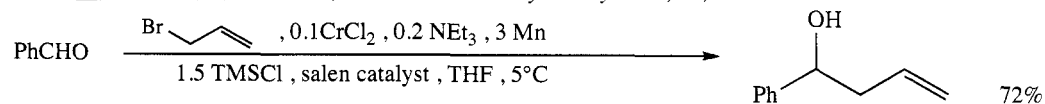
Aoyama, N.; Hamada, T.; Manabe, K.; Kobayashi, S. *Chem. Commun.* **2003**, 676.



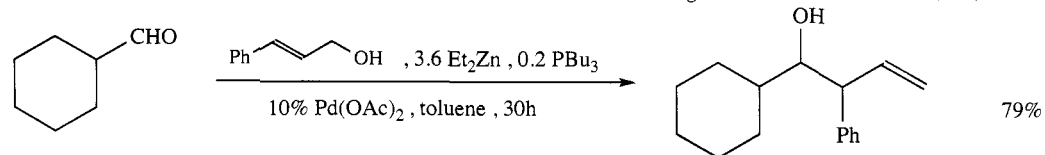
Rosales, A.; Oller-López, J.L.; Justicia, J.; Gansauer, A.; Oltra, J.E.; Cuerva, J.M. *Chem. Commun.* **2004**, 2628.



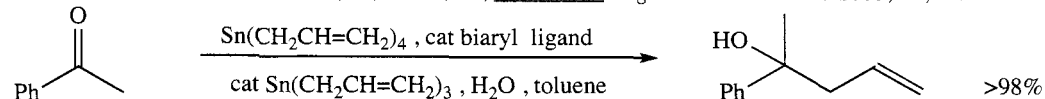
Bauer, T.; Tarasiuk, J.; Pasniczek, K. *Tetrahedron: Asymmetry* **2002**, *13*, 77.



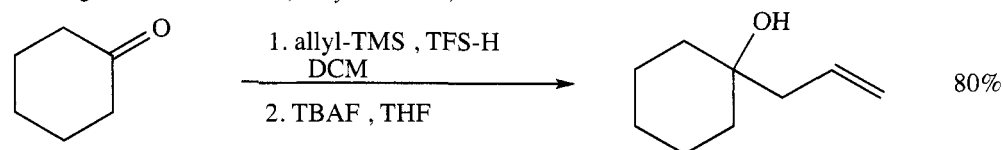
Berkessel, A.; Menche, D.; Sklorz, C.A.; Schröder, M.; Paterson, I. *Angew. Chem. Int. Ed.* **2003**, *42*, 1032.



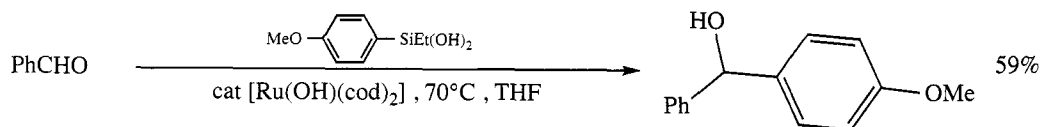
Kimura, M.; Shimizu, M.; Shibata, K.; Tazoe, M.; Tamura, Y. *Angew. Chem. Int. Ed.* **2003**, *42*, 3392.



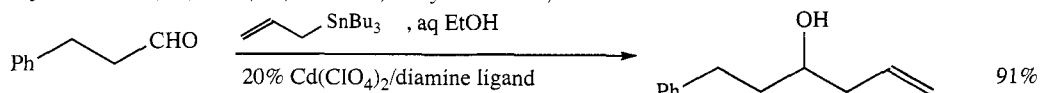
Cunningham, A.; Woodward, S. *Synlett* **2002**, 43.



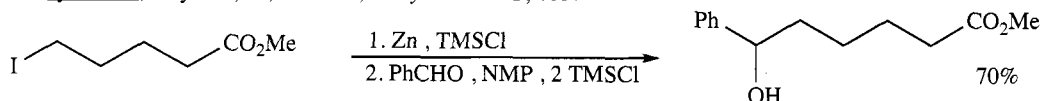
Cossy, J.; Lutz, F.; Alauze, C.; Meyer, C. *Synlett* **2002**, 45.



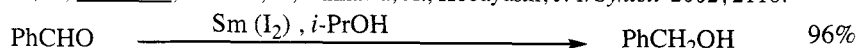
Fujii, T.; Koike, T.; Mori, A.; Osakada, K. *Synlett* **2002**, 298.



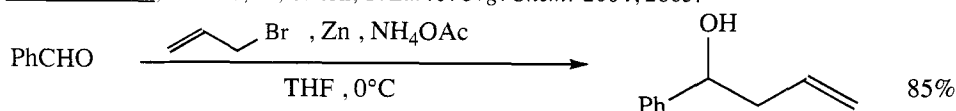
Kobayashi, S.; Aoyama, N.; Manabe, K. *Synlett* **2002**, 483.



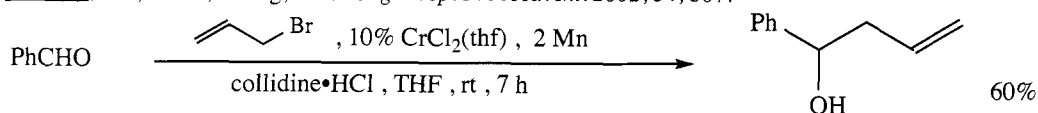
Ito, T.; Ishino, Y.; Mizuno, T.; Ishikawa, A.; Kobayashi, J.-i. *Synlett* **2002**, 2116.



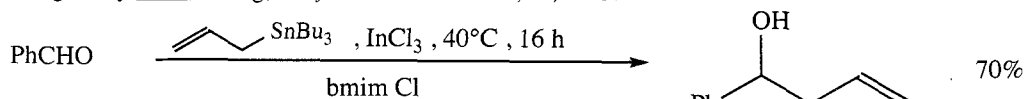
Fukuzawa, S.-i.; Nakano, N.; Saitoh, T. *Eur. J. Org. Chem.* **2004**, 2863.



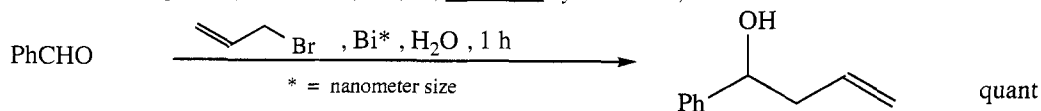
Chen, C.; Dai, W.-C.; Chang, H.-G. *Org. Prep. Proceed. Int.* **2002**, 34, 507.



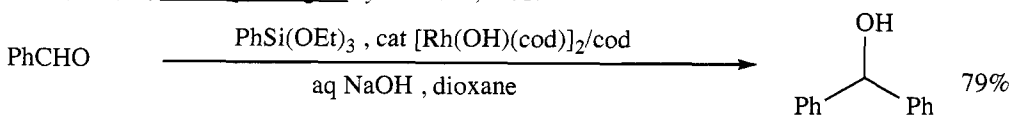
Shaughnessy, K.H.; Huang, R. *Synth. Commun.* **2002**, 32, 1923.



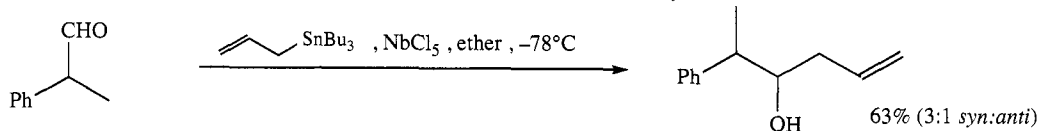
Lu, J.; Ji, S.-J.; Qian, R.; Chen, J.-P.; Liu, Y.; Loh, T.-P. *Synlett* **2004**, 534.



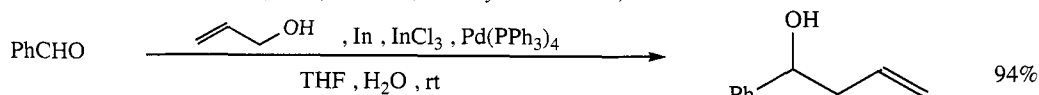
Xu, X.; Zha, Z.; Miao, Q.; Wang, Z. *Synlett* **2004**, 1171.



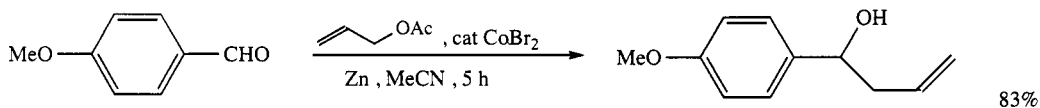
Murata, M.; Shimazaki, R.; Ishikura, M.; Watanabe, S.; Masuda, Y. *Synthesis* **2002**, 717.



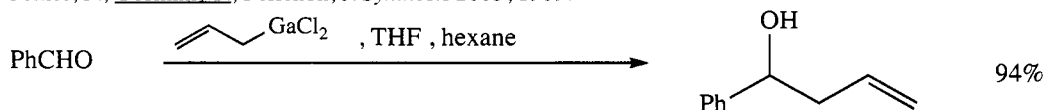
Andrade, C.K.Z.; Azevedo, N.R.; Oliveira, G.R. *Synthesis* **2002**, 928.



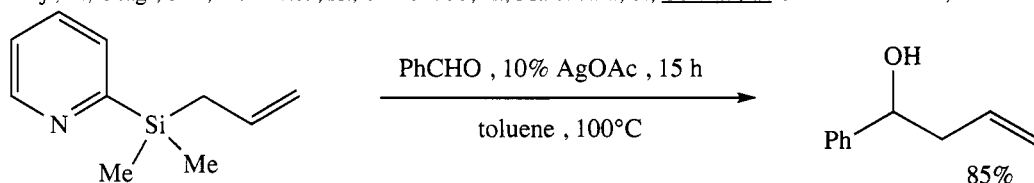
Jang, T.-S.; Keum, G.; Kang, S.B.; Chung, B.Y.; Kim, Y. *Synthesis* **2003**, 775.



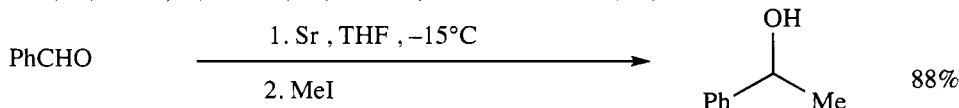
Gomes, P.; Gosmini, C.; Périchon, J. *Synthesis* **2003**, 1909.



Tsuji, T.; Usagi, S.-i.; Yorimitsu, H.; Shinokubo, H.; Matsubara, S.; Oshima, K. *Chem. Lett.* **2002**, 2.



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Miyoshi, N.; Kamiura, K.; Oka, H.; Kita, A.; Kuwata, R.; Ikehara, D.; Wada, M. *Bull. Chem. Soc. Jpn.* **2004**, 77, 341.

REVIEWS:

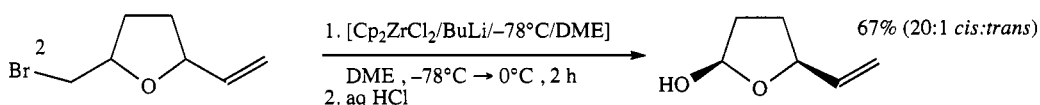
"Asymmetric Alkynylzinc Additions to Aldehydes and Ketones"
Pu, L. *Tetrahedron* **2003**, 59, 9873.

"Catalytic Enantioselective Addition of Allylic Organometallic Reagents to Aldehydes and Ketones"
Denmark, S.E.; Fu, J. *Chem. Rev.* **2003**, 103, 2763.

"Asymmetric Transition Metal Catalyzed Allylic Alkylations: Applications in Total Synthesis"
Trost, B.M.; Crawley, M.L. *Chem. Rev.* **2003**, 103, 2921.

"Titanium-Catalyzed Enantioselective Additions of Allenes with a Nucleophilic Functionality Connected to the Carbon Atom"
Walsh, P.J. *Acc. Chem. Res.* **2003**, 36, 739.

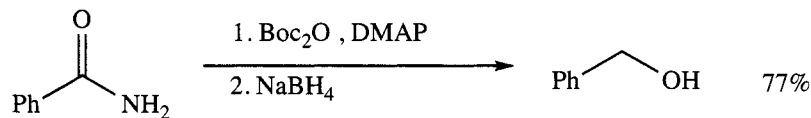
SECTION 35: ALCOHOLS AND THIOLS FROM ALKYLs, METHYLENES, AND ARYLS



Williams, D.R.; Donnell, A.F.; Kammler, D.C. *Heterocycles* **2004**, 62, 297.

For reactions of the type $\text{RH} \rightarrow \text{ROH}$ (R = alkyl or aryl), see Section 41
(Alcohols and Thiols from Hydrides).

SECTION 36: ALCOHOLS AND THIOLS FROM AMIDES

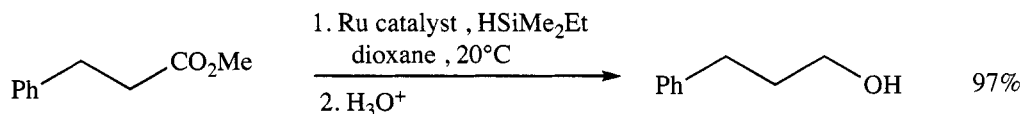


Ragnarsson, U.; Grehn, L.; Monteiro, L.S.; Maia, H.L.S. *Synlett* **2003**, 2386.

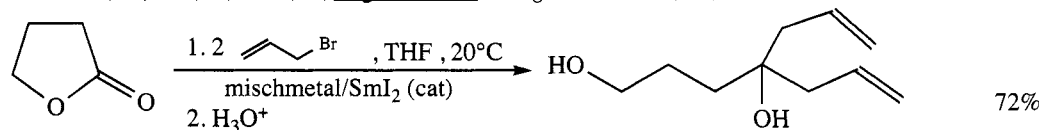
SECTION 37: ALCOHOLS AND THIOLS FROM AMINES

NO ADDITIONAL EXAMPLES

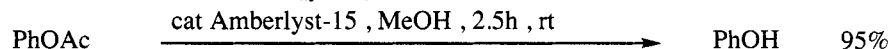
SECTION 38: ALCOHOLS AND THIOLS FROM ESTERS



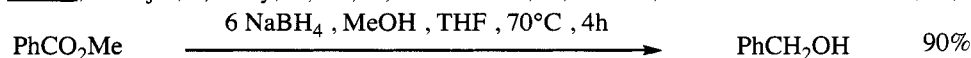
Matsubara, K.; Iura, T.; Maki, T.; Nagashima, H. *J. Org. Chem.* **2002**, 67, 4985.



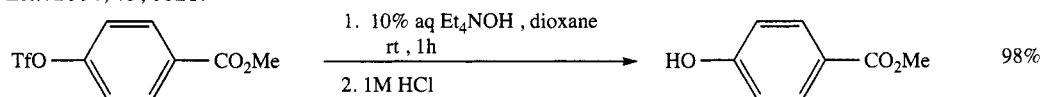
Lannou, M.-I.; Hélicon, F.; Namy, J.-L. *Tetrahedron Lett.* **2002**, 43, 8007.



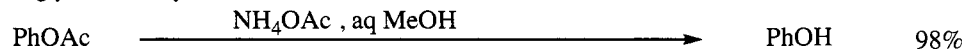
Das, B.; Banerjee, J.; Ramy, R.; Pal, R.; Ravindranath, N.; Ramesh, C. *Tetrahedron Lett.* **2003**, 44, 5465.



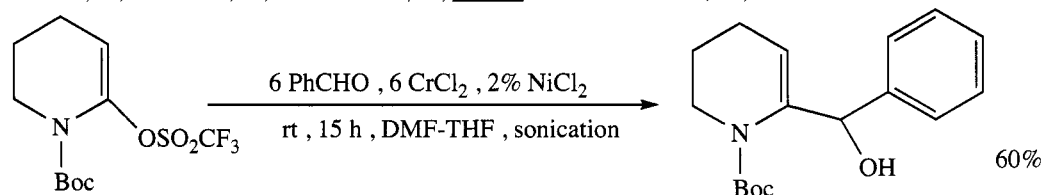
Beechat, N.; da Costa, J.C.S.; Mendonca, J. de S.; Sanos, P.; de Oliveira, M.; DeSouza, M.V.N. *Tetrahedron Lett.* **2004**, 45, 6021.



Ohgiya, T.; Nishiyama, S. *Tetrahedron Lett.* **2004**, 45, 6317.

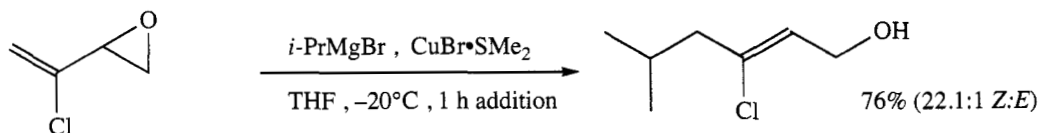


Ramesh, C.; Mahender, G.; Ravindranath, N.; Das, B. *Tetrahedron* **2003**, 59, 1049.

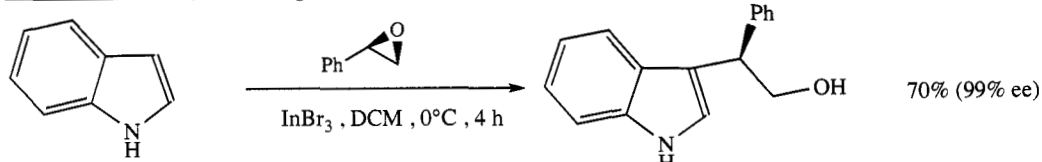


Easton, L.P.; Duke, G.R. *Can. J. Chem.* **2004**, 82, 139.

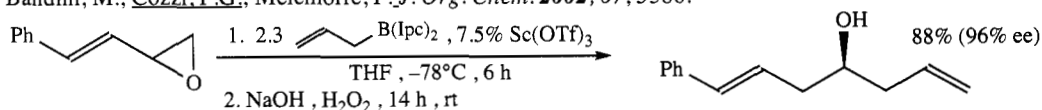
SECTION 39: ALCOHOLS AND THIOLS FROM ETHERS, EPOXIDES, AND THIOETHERS



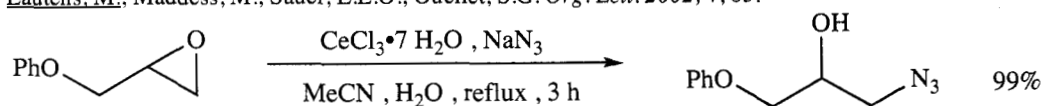
Taber, D.F.; Mitten, J.V. *J. Org. Chem.* **2002**, 67, 3847.



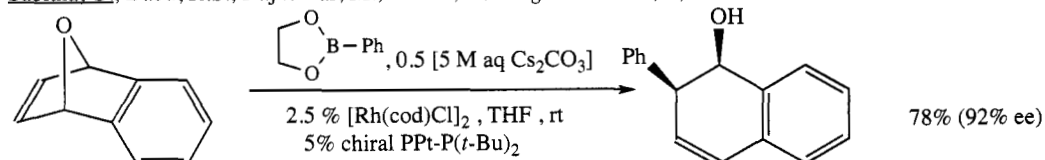
Bandini, M.; Cozzi, P.G.; Melchiorre, P. *J. Org. Chem.* **2002**, 67, 5386.

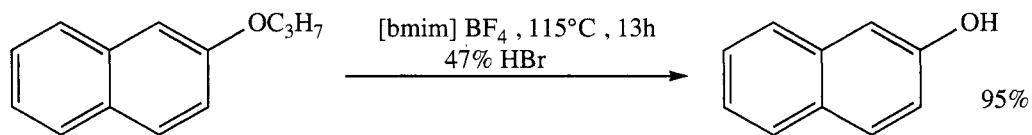


Lautens, M.; Maddess, M.; Sauer, E.L.O.; Ouellet, S.G. *Org. Lett.* **2002**, 4, 83.

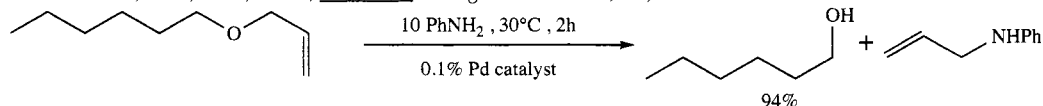


Sabitha, G.; Babu, R.S.; Rajkumar, M.; Yadav, J.S. *Org. Lett.* **2002**, 4, 343.

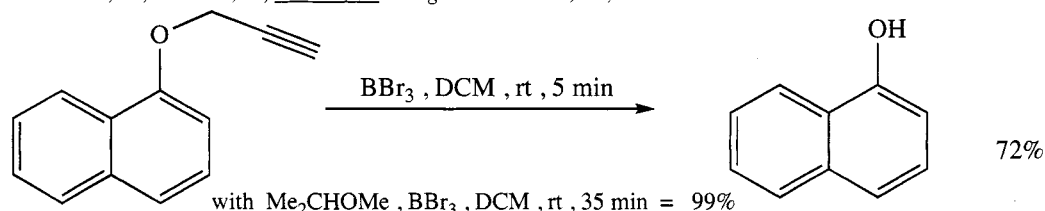




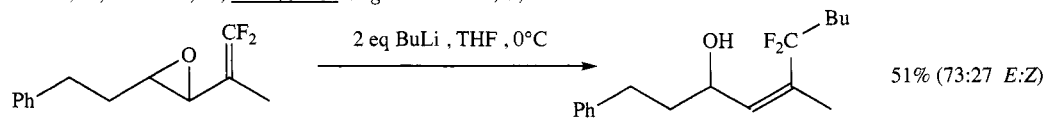
Boovanahalli, S.K.; Kim, D.W.; Chi, D.Y. *J. Org. Chem.* **2004**, *69*, 3340.



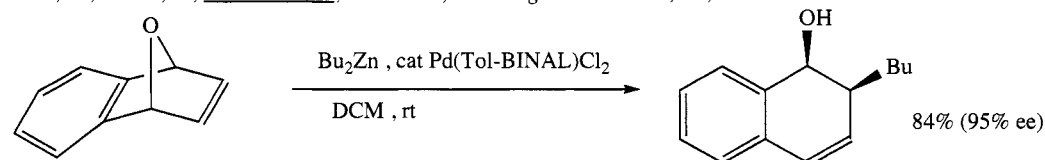
Murakami, H.; Minami, T.; Ozawa, F. *J. Org. Chem.* **2004**, *69*, 4482.



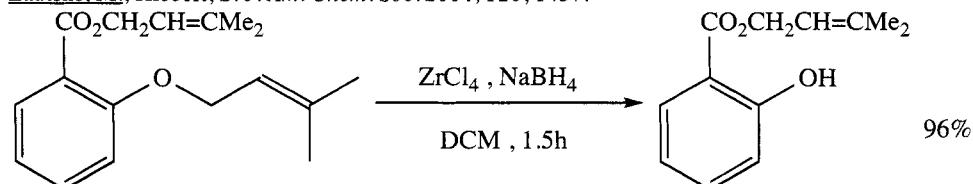
Punna, S.; Neunier, S.; Finn, M.G. *Org. Lett.* **2004**, *6*, 2777.



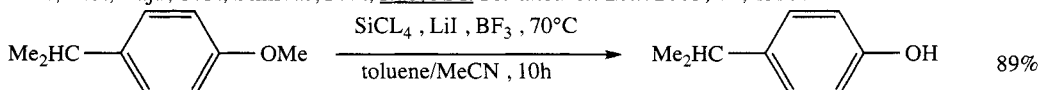
Ueki, H.; Chiba, T.; Yamazaki, T.; Kitazume, T. *J. Org. Chem.* **2004**, *69*, 7616.



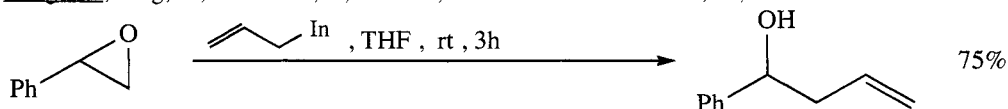
Lautens, M.; Hiebert, S. *J. Am. Chem. Soc.* **2004**, *126*, 1437.



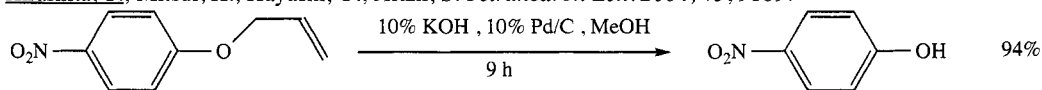
Babu, K.S.; Raju, B.C.; Srinivas, P.V.; Rao, J.M. *Tetrahedron Lett.* **2003**, *44*, 2525.



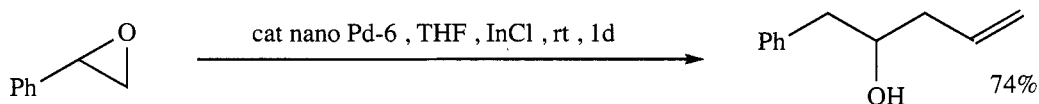
Zewge, D.; King, A.; Weissman, S.; Tschäen, D. *Tetrahedron Lett.* **2004**, *45*, 3729.



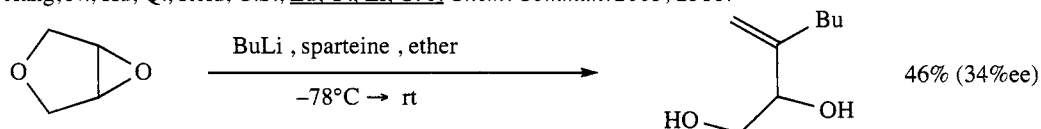
Hirashita, T.; Mitsui, K.; Hayashi, Y.; Araki, S. *Tetrahedron Lett.* **2004**, *45*, 9189.



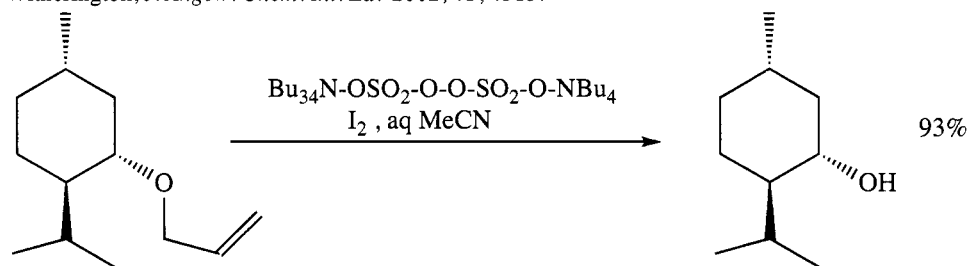
Ishizaki, M.; Yamada, M.; Watanabe, S.-i.; Hoshino, O.; Nishitani, K.; Hayashida, M.; Tanaka, A.; Hara, H. *Tetrahedron* **2004**, *60*, 7973.



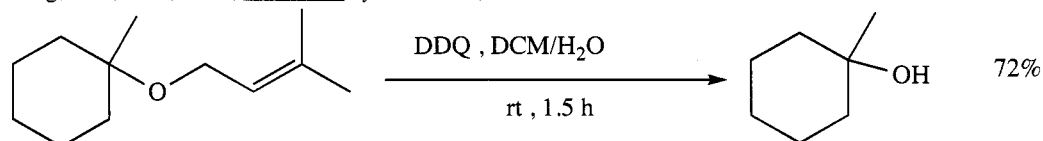
Jiang, N.; Hu, Q.; Reid, C.S.; Lu, Y.; Li, C.-J. *Chem. Commun.* **2003**, 2318.



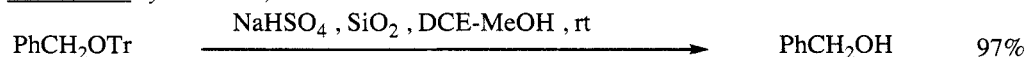
Hodgson, D.M.; Maxwell, C.R.; Miles, T.J.; Paruch, E.; Stent, M.A.H.; Malthews, I.R.; Wilson, F.X.; Witherington, J. *Angew. Chem. Int. Ed.* **2002**, 41, 4313.



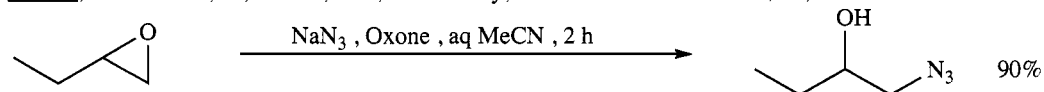
Yang, S.G.; Park, M.Y.; Kim, Y.H. *Synlett* **2002**, 492.



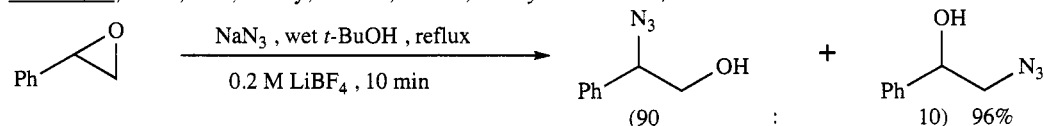
Vatèle, J.-M. *Synlett* **2002**, 507.



Das, B.; Mashendeer, G.; Kumar, V.S.; Chowdhury, N. *Tetrahedron Lett.* **2004**, 45, 6709.

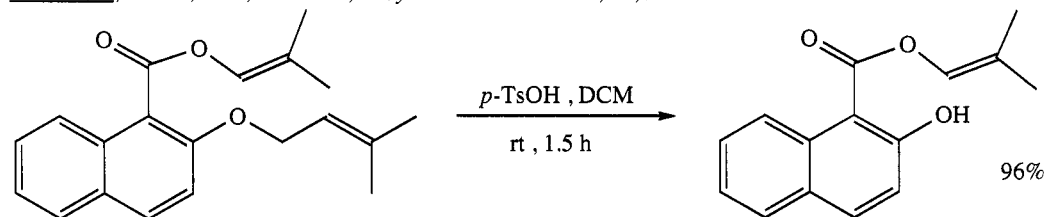


Sabitha, G.; Babu, R.S.; Reddy, M.S.K.; Yadav, J.S. *Synthesis* **2002**, 2254.

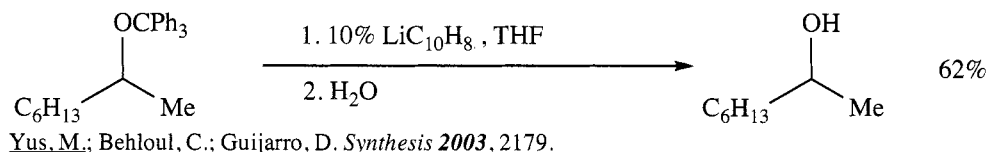


Kazemi, F.; Kiasat, A.R.; Ebrahimi, S. *Synth. Commun.* **2003**, 33, 999.

Kazemi, F.; Kiasat, A.R.; Ebrahimi, S. *Synth. Commun.* **2004**, 34, 999.

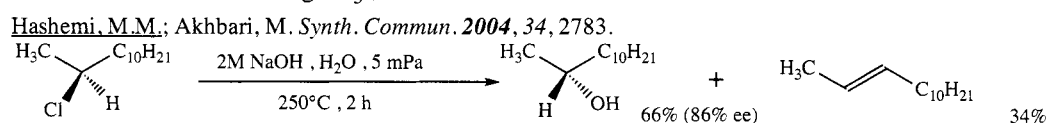
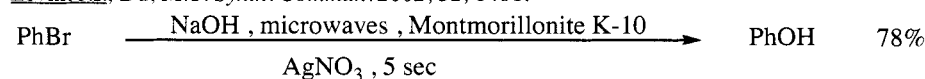
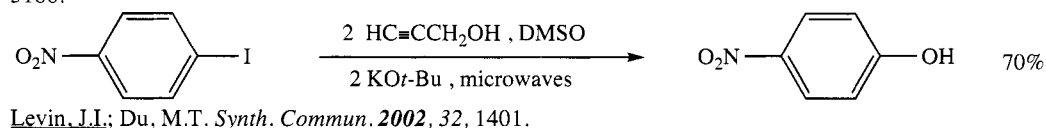
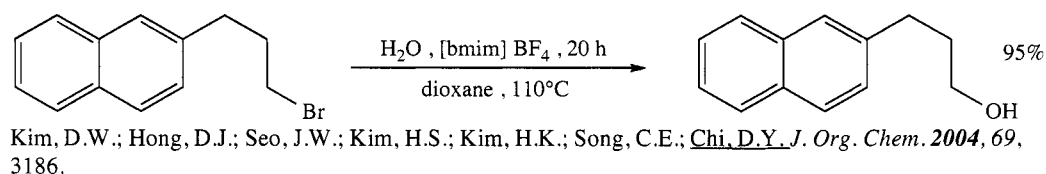


Babu, K.S.; Raju, B.C.; Rao, S.A.S.; Kumar, S.P.; Rao, J.M. *Chem. Lett.* **2003**, 32, 704.

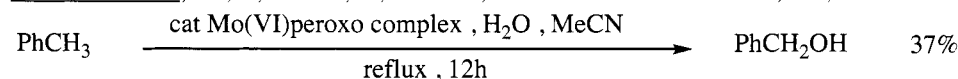
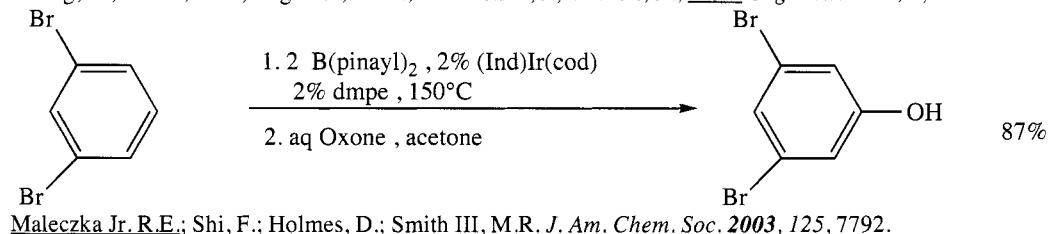
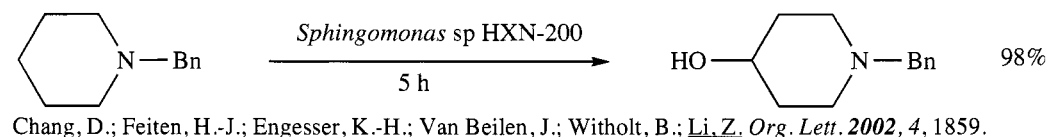


Additional examples of ether cleavages may be found in Section 45A (Protection of Alcohols and Thiols).

SECTION 40: ALCOHOLS AND THIOLS FROM HALIDES AND SULFONATES



SECTION 41: ALCOHOLS AND THIOLS FROM HYDRIDES



Das, S.; Bhowmick, T.; Punniyamurthy, T.; Dey, D.; Nath, J.; Choudhuri, M.K. *Tetrahedron Lett.* **2003**, 44, 4915.

SECTION 42: ALCOHOLS AND THIOLS FROM KETONES

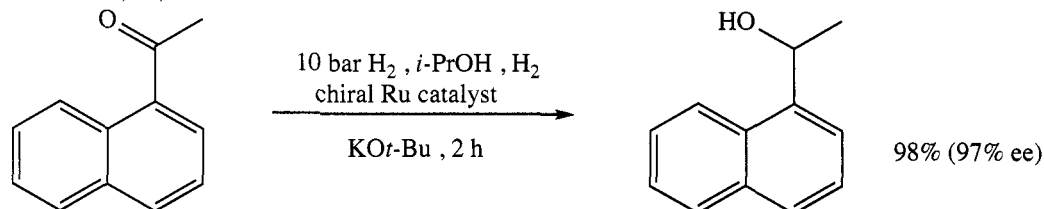
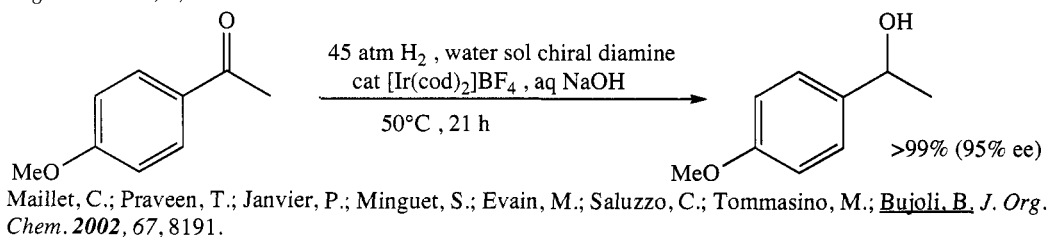
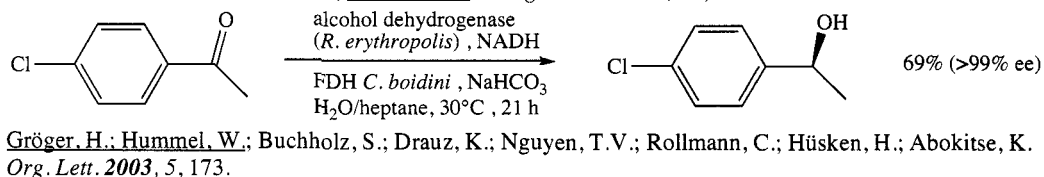
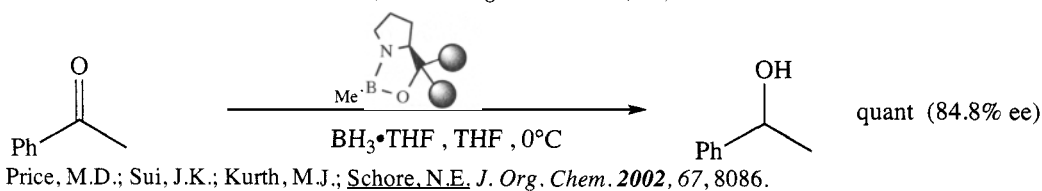
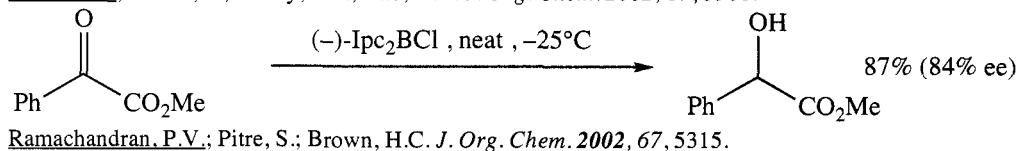
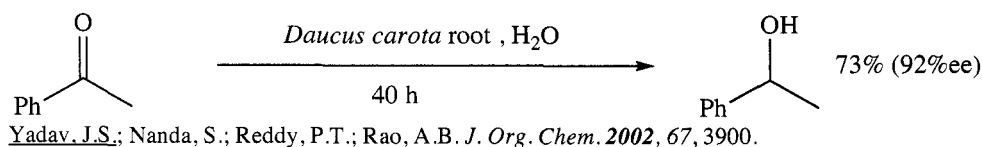
The following reaction types are included in this section:

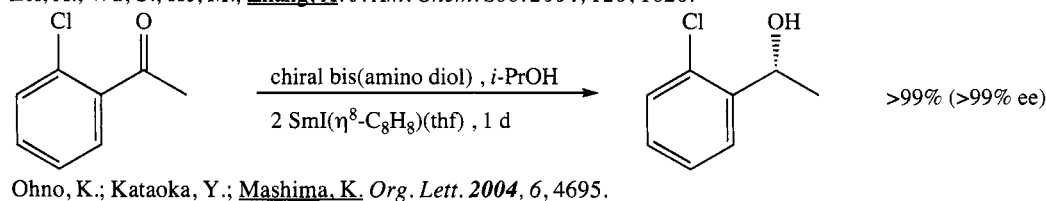
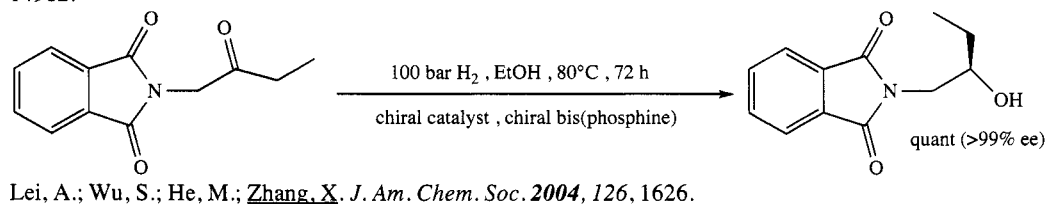
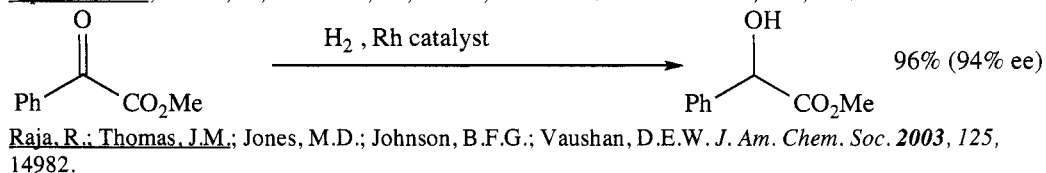
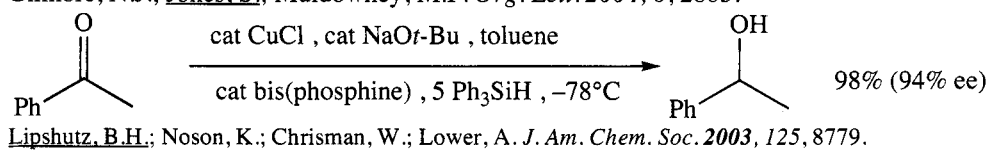
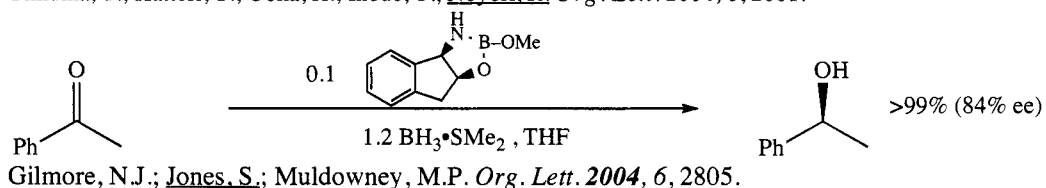
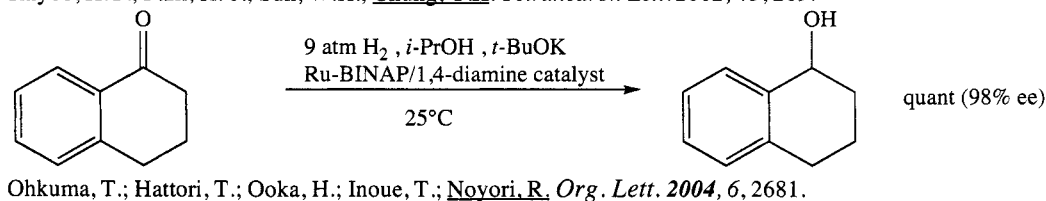
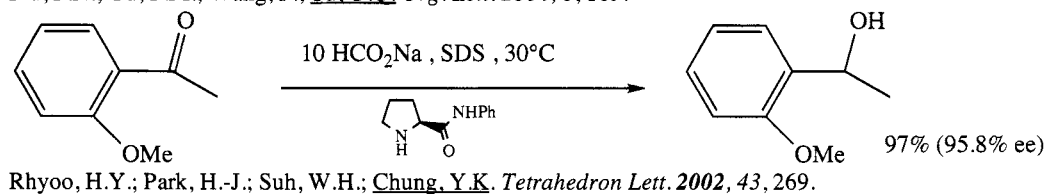
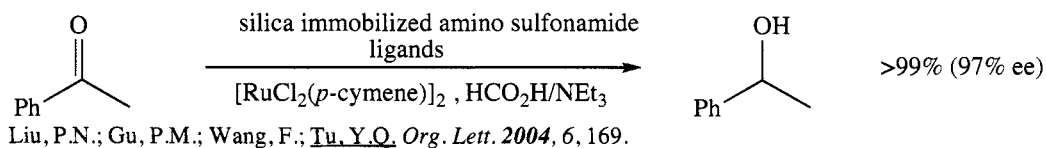
- A. Reductions of Ketones to Alcohols
- B. Alkylations of Ketones, forming Alcohols

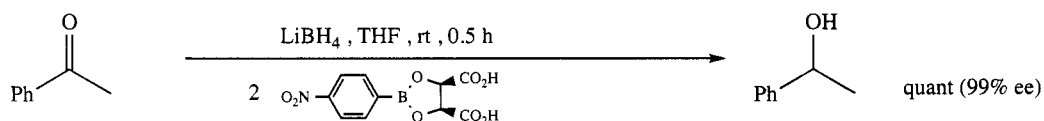
Coupling of ketones to give diols may be found in Section 323 (Alcohol \rightarrow Alcohol).

SECTION 42A: REDUCTION OF KETONES TO ALCOHOLS

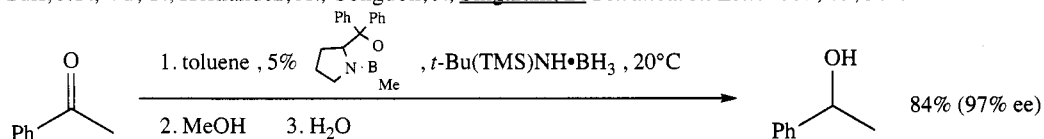
ASYMMETRIC REDUCTION



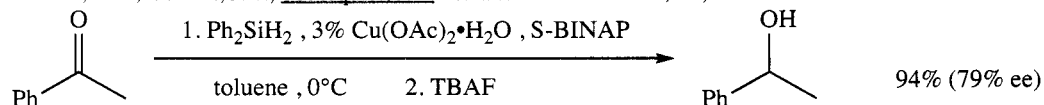




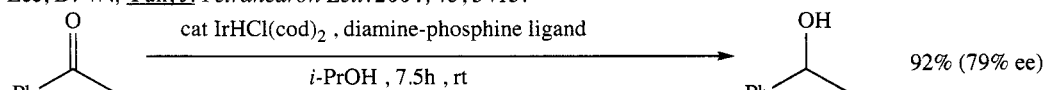
Suri, J.T.; Vu, T.; Hernandez, A.; Congdon, J.; Singaram, B. *Tetrahedron Lett.* **2002**, *43*, 3649.



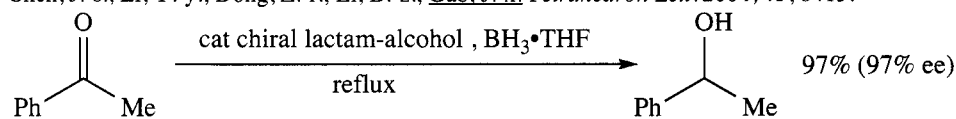
Huertas, R.E.; Corella, J.A.; Soderquist, J.A. *Tetrahedron Lett.* **2003**, *44*, 4435.



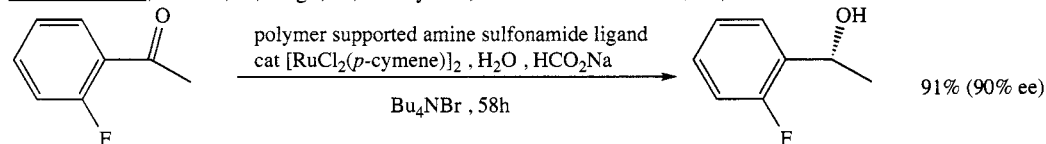
Lee, D.-W.; Yun, J. *Tetrahedron Lett.* **2004**, *45*, 5415.



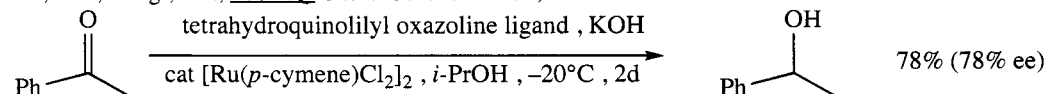
Chen, J.-s.; Li, Y.-y.; Dong, Z.-r.; Li, B.-z.; Gao, J.-x. *Tetrahedron Lett.* **2004**, *45*, 8415.



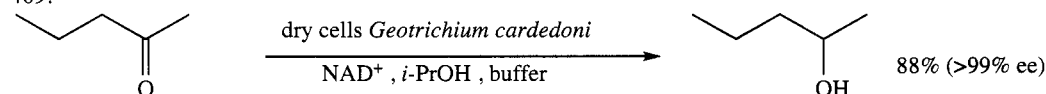
Kawanami, Y.; Murao, S.; Ohga, T.; Kobayashi, N. *Tetrahedron* **2003**, *59*, 8411.



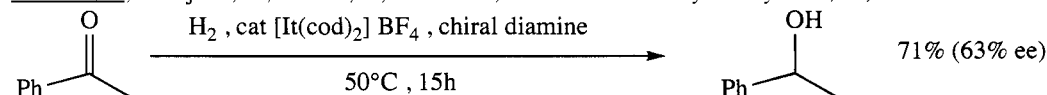
Liu, P.N.; Dengt, J.G.; Tu, Y.Q. *Chem. Commun.* **2004**, 2070.



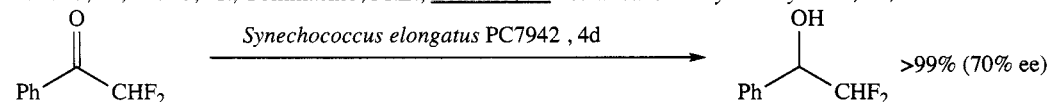
Zhou, Y.-B.; Tang, F.-Y.; Xu, H.-D.; Wu, X.-Y.; Ma, J.-A.; Zhou, Q.-L. *Tetrahedron: Asymmetry* **2002**, *13*, 469.



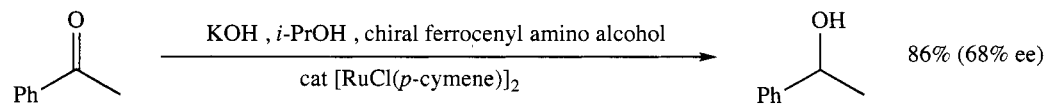
Matsuda, T.; Nakajima, Y.; Harada, T.; Nakamura, K. *Tetrahedron: Asymmetry* **2002**, *13*, 971.



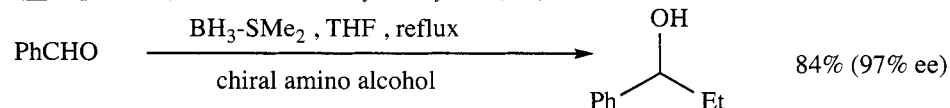
Ferrand, A.; Bruno, M.; Tommasino, M.L.; Lemaire, M. *Tetrahedron: Asymmetry* **2002**, *13*, 1379.



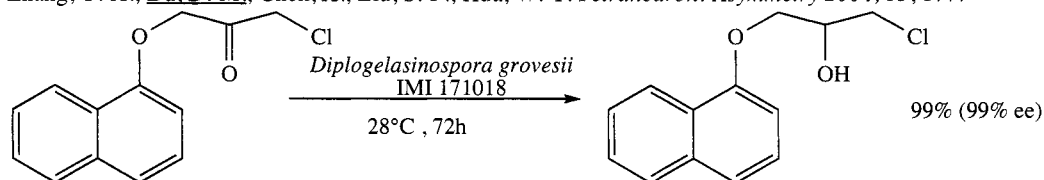
Nakamura, K.; Yamanaka, R. *Tetrahedron: Asymmetry* **2002**, *13*, 2529.



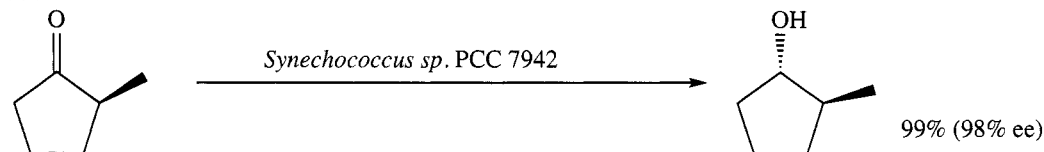
Patti, A.; Pedotti, S. *Tetrahedron: Asymmetry* **2003**, *14*, 597.



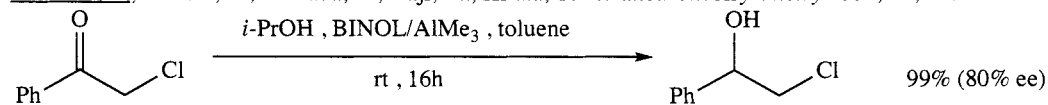
Zhang, Y.-X.; Du, D.-M.; Chen, X.; Liu, S.-F.; Hua, W.-T. *Tetrahedron: Asymmetry* **2004**, *15*, 177.



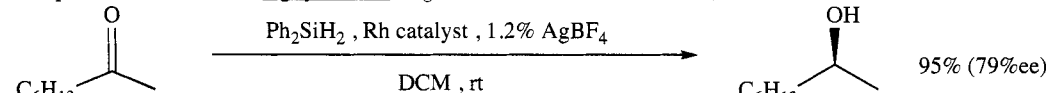
Carballeira, J.D.; Álvarez, E.; Campillo, M.; Pardo, L.; Sinisterra, J.V. *Tetrahedron: Asymmetry* **2004**, *15*, 951.



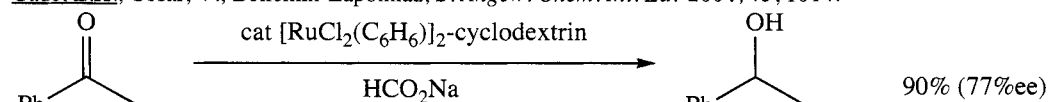
Shimoda, K.; Kubota, N.; Hamada, H.; Kaji, M.; Hirata, T. *Tetrahedron: Asymmetry* **2004**, *15*, 1677.



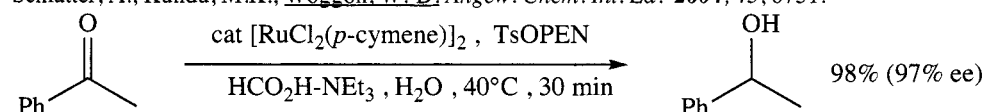
Campbell, E.J.; Zhou, H.; Nguyen, S.T. *Angew. Chem. Int. Ed.* **2002**, *41*, 1020.



Gade, L.H.; César, V.; Bellemin-Laponnaz, S. *Angew. Chem. Int. Ed.* **2004**, *43*, 1014.

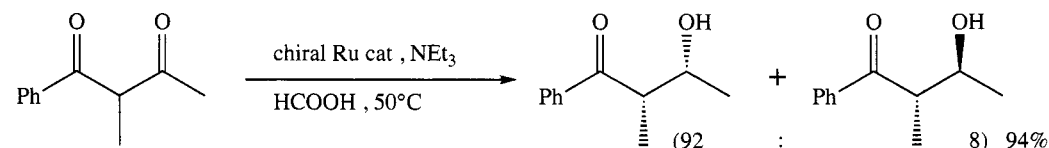


Schlatter, A.; Kundu, M.K.; Woggon, W.-D. *Angew. Chem. Int. Ed.* **2004**, *43*, 6731.

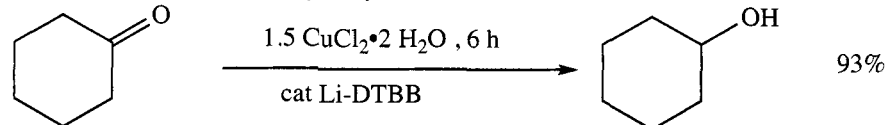
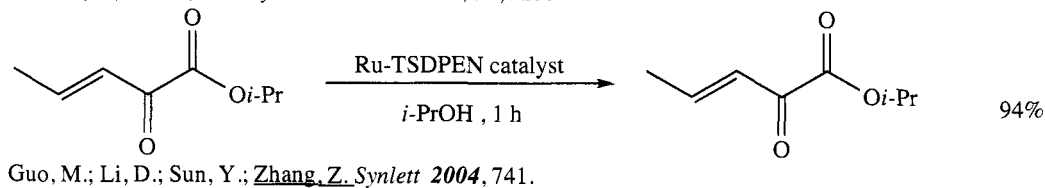
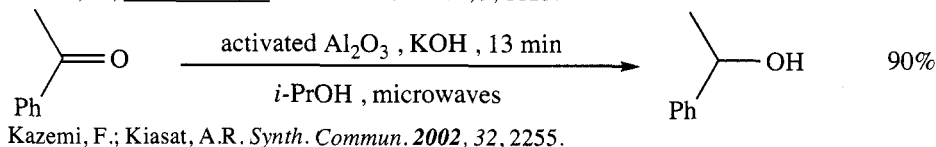
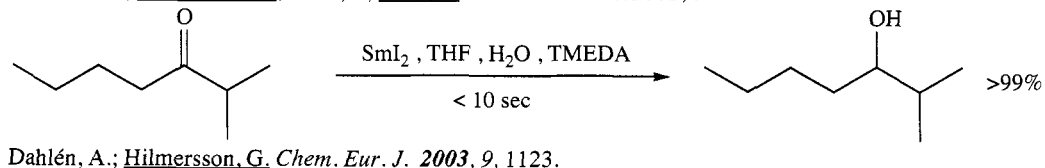
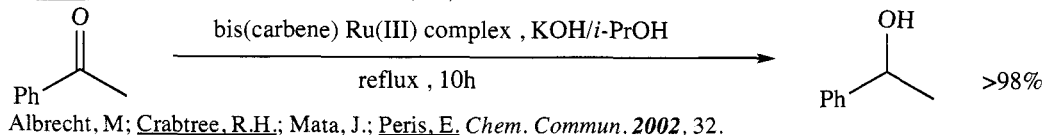
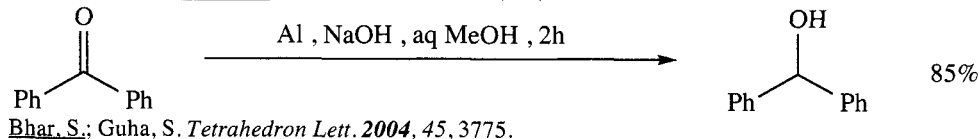
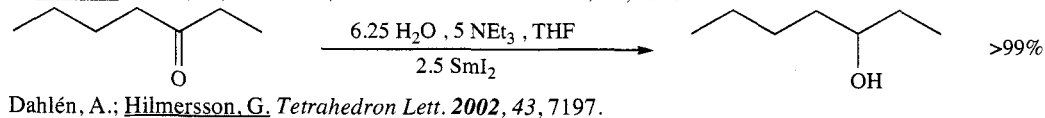
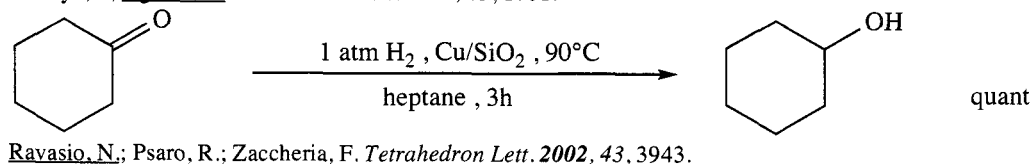
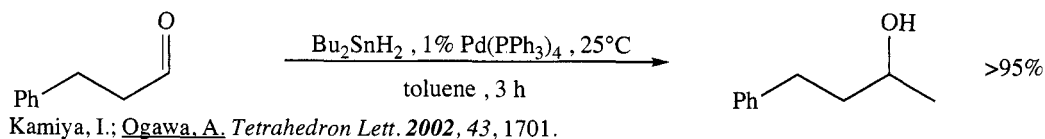


Wu, X.; Li, X.; Hems, W.; King, F.; Xiao, J. *Org. Biomol. Chem.* **2004**, *2*, 1818.

NON-ASYMMETRIC REDUCTION



Eustache, F.; Dalko, P.I.; Cossy, J. *Org. Lett.* **2002**, *4*, 1263.



Alonso, F.; Vitale, C.; Radivoy, G.; Yus, M. *Synthesis* **2003**, 443.

REVIEW:

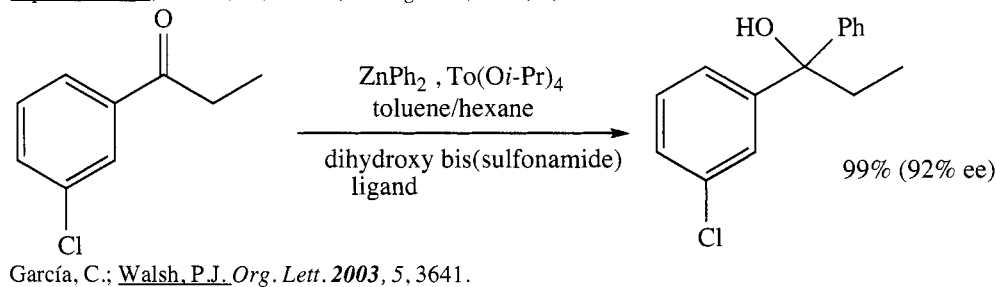
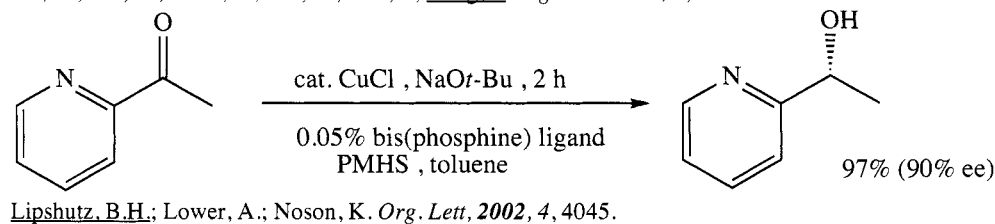
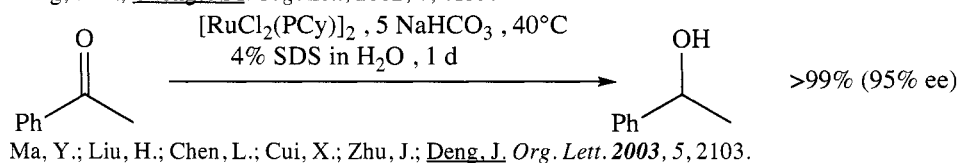
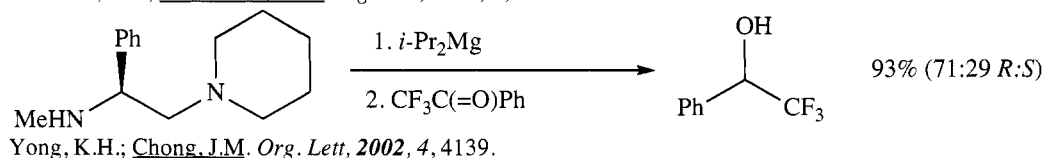
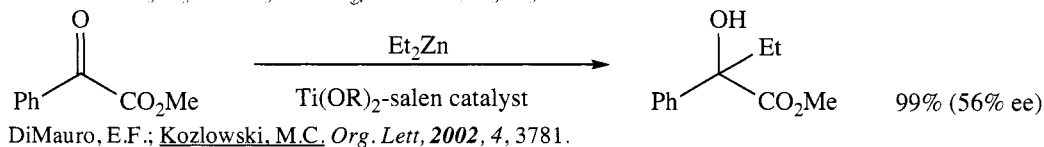
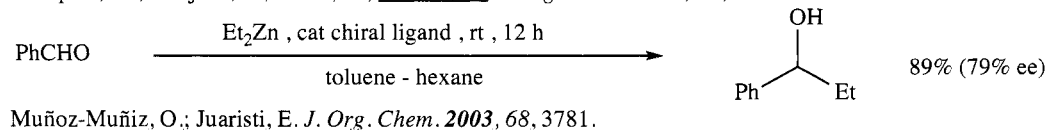
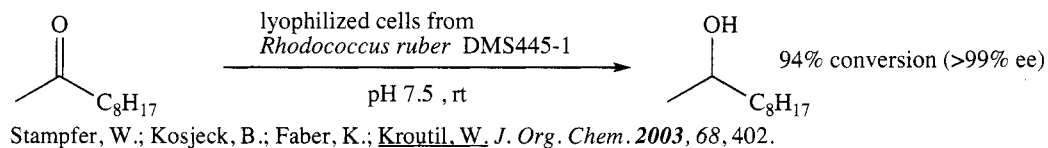
"Recent Developments in Asymmetric Reduction of Ketones with Biocatalysts"

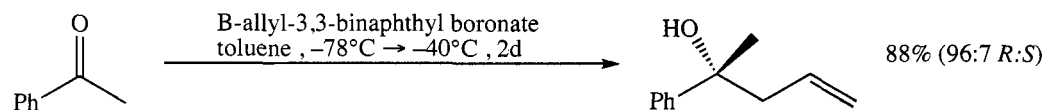
Nakamura, K.; Yamanaka, R.; Matsuda, T.; Harada, T. *Tetrahedron: Asymmetry* **2003**, 14, 2659.

SECTION 42B: ALKYLATION OF KETONES, FORMING ALCOHOLS

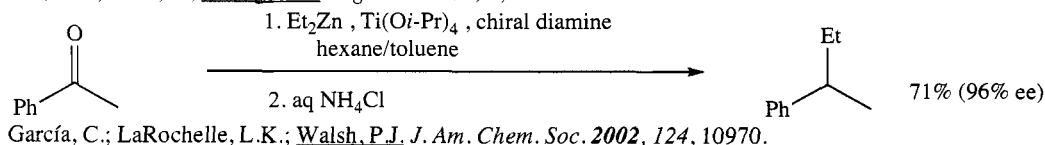
Aldol reactions are listed in Section 330 (Alcohol, Thiol-Ketone)

ASYMMETRIC ALKYLATION

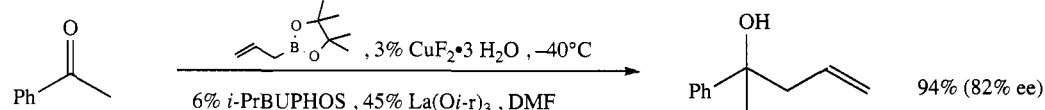




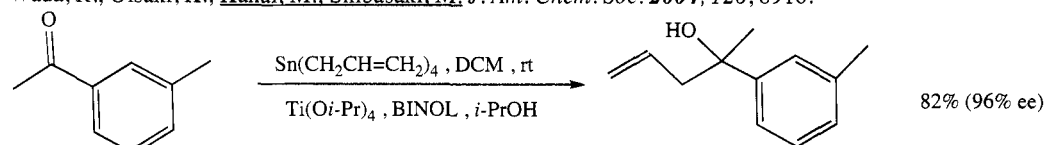
Wu, T.R.; Shen, L.; Chong, J.M. *Org. Lett.* **2004**, 6, 2701.



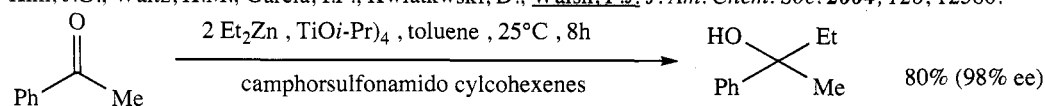
García, C.; LaRoche, L.K.; Walsh, P.J. *J. Am. Chem. Soc.* **2002**, 124, 10970.



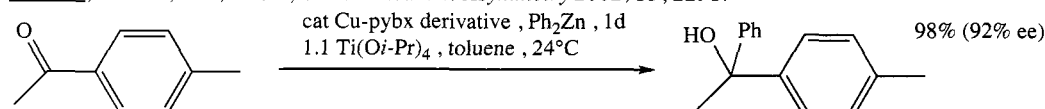
Wada, R.; Oisaki, K.; Kanai, M.; Shibasaki, M. *J. Am. Chem. Soc.* **2004**, 126, 8910.



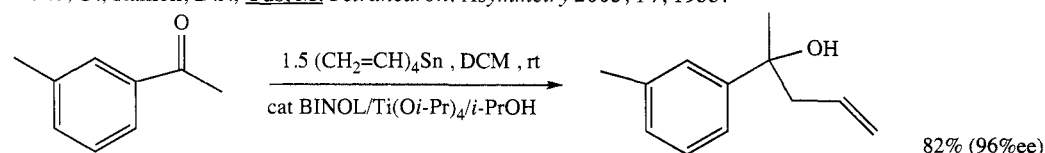
Kim, J.G.; Waltz, K.M.; Garcia, I.F.; Kwiatkowski, D.; Walsh, P.J. *J. Am. Chem. Soc.* **2004**, 126, 12580.



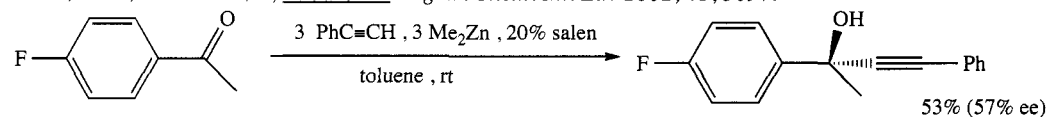
Yus, M.; Ramón, D.J.; Prieto, O. *Tetrahedron: Asymmetry* **2002**, 13, 2291.



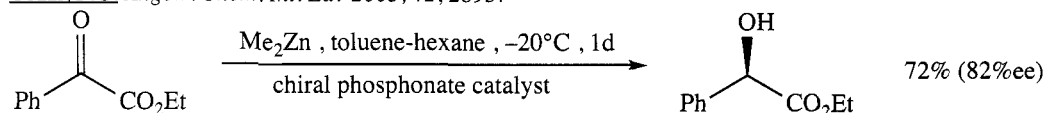
Prieto, O.; Ramón, D.J.; Yus, M. *Tetrahedron: Asymmetry* **2003**, 14, 1955.



Waltz, K.M.; Gavenonis, J.; Walsh, P.J. *Angew. Chem. Int. Ed.* **2002**, 41, 3697.

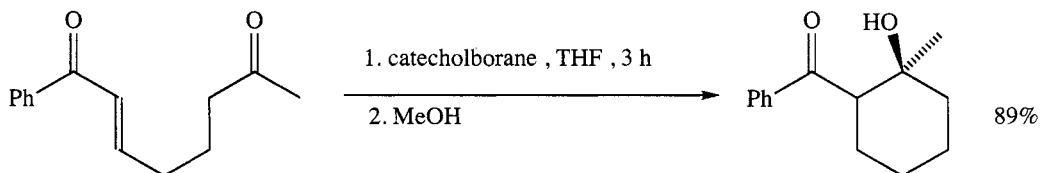


Cozzi, P.G. *Angew. Chem. Int. Ed.* **2003**, 42, 2895.

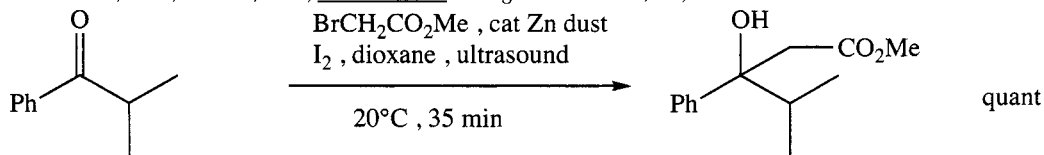


Funabashi, K.; Jachmann, M.; Kanai, M.; Shibasaki, M. *Angew. Chem. Int. Ed.* **2003**, 42, 5489.

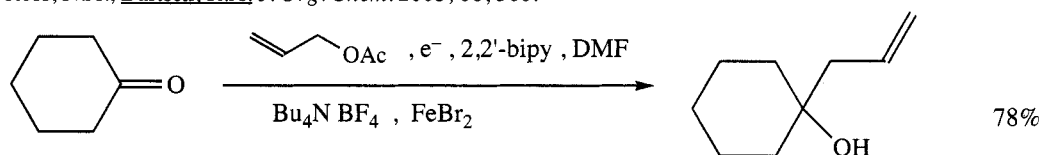
NON-ASYMMETRIC ALKYLATION



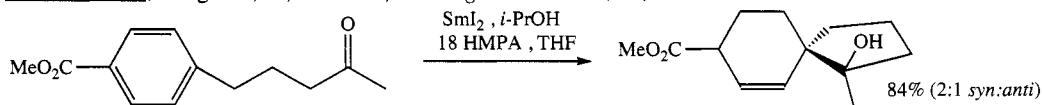
Huddleston, R.R.; Cauble, D.F.; Krische, M.J. *J. Org. Chem.* **2003**, 68, 11.



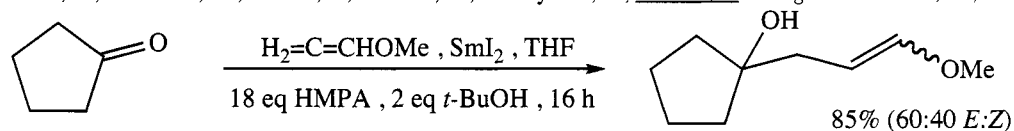
Ross, N.A.; Bartsch, R.A. *J. Org. Chem.* **2003**, 68, 360.



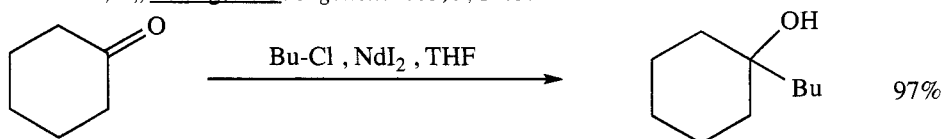
Durandetti, M.; Meignein, C.; Périchon, J. *J. Org. Chem.* **2003**, 68, 3121.



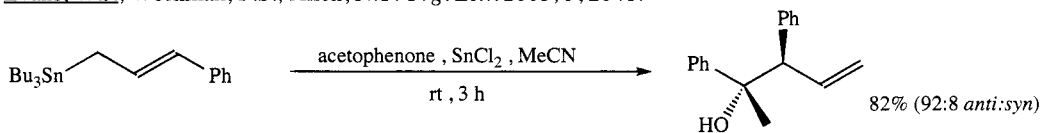
Ohno, H.; Okumura, M.; Maeda, S.; Iwasaki, H.; Wakayama, R.; Tanaka, T. *J. Org. Chem.* **2003**, 68, 7722.



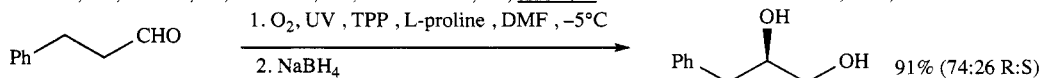
Hölemann, A.; Reissig, H.-U. *Org. Lett.* **2003**, 5, 1463.



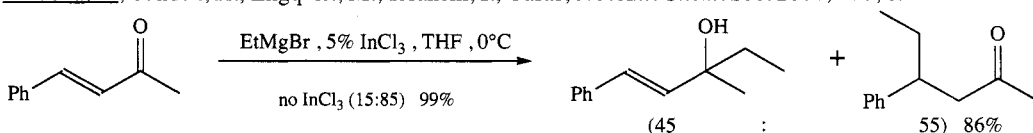
Evans, W.J.; Workman, P.S.; Allen, N.T. *Org. Lett.* **2003**, 5, 2041.



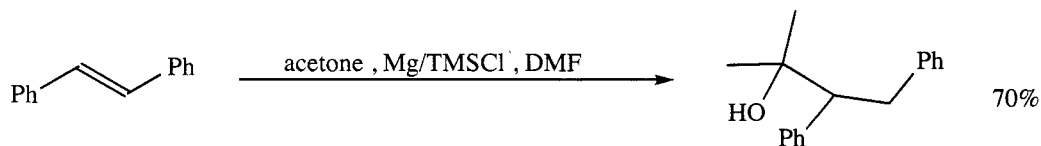
Yasuda, M.; Hirata, K.; Nishino, M.; Yamamoto, A.; Baba, A. *J. Am. Chem. Soc.* **2002**, 124, 13442.



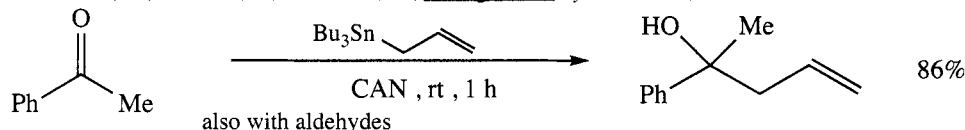
Córdova, A.; Sundén, H.; Engqvist, M.; Ibrahim, I.; Casas, J. *J. Am. Chem. Soc.* **2004**, 126, 8914.



Kelly, B.G.; Gilheany, D.G. *Tetrahedron Lett.* **2002**, 43, 887.



Yamamoto, Y.; Kawano, S.; Maekawa, H.; Nishiguchi, I. *Synlett* **2004**, 30.

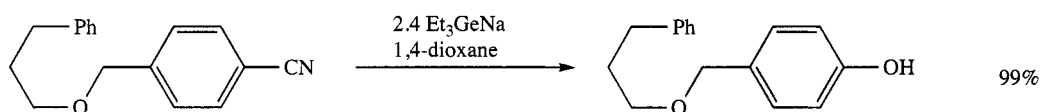


also with aldehydes
Yadav, J.S.; Reddy, B.V.S.; Krishna, A.D.; Sadasiv, K.; Chary, Ch.J. *Chem Lett.* **2003**, 32, 248.

REVIEW:

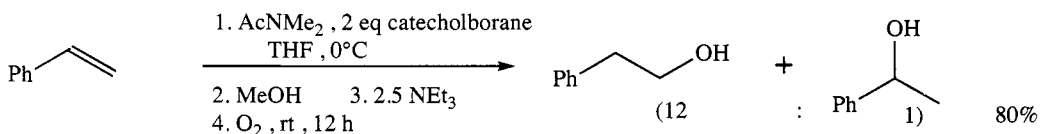
“Catalytic Enantioselective Addition of Allylic Organometallic Reagents to Aldehydes and Ketones”
Denmark, S.E.; Fu, J. *Chem. Rev.* **2003**, 103, 2763.

SECTION 43: ALCOHOLS AND THIOLS FROM NITRILES

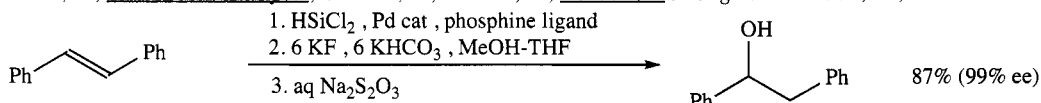


Yokoyama, Y.; Takizawa, S.; Nanjo, M.; Mochida, K. *Chem. Lett.* **2002**, 31, 1032.

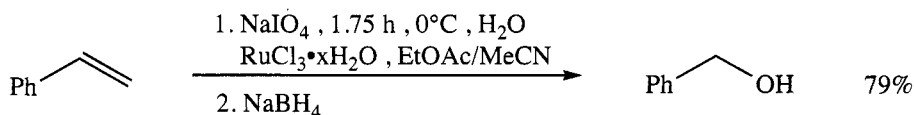
SECTION 44: ALCOHOLS AND THIOLS FROM ALKENES



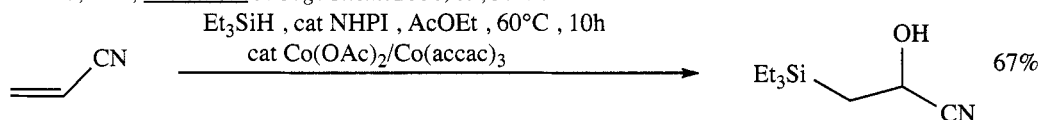
Cadot, C.; Dalko, P.I.; Cossy, J.; Ollivier, C.; Chuard, R.; Renaud, P. *J. Org. Chem.* **2002**, 67, 7193.



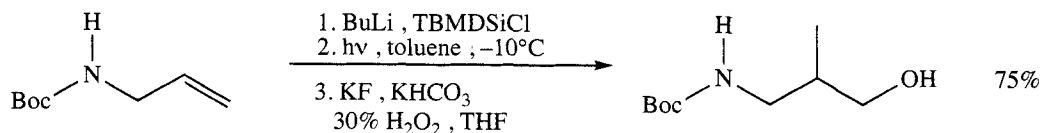
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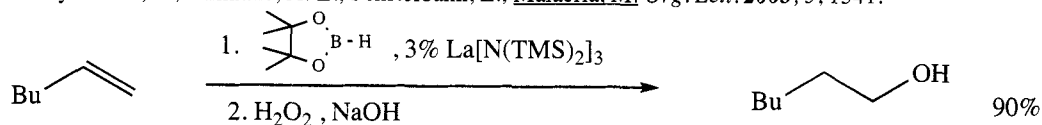
Sharma, P.K.; Nielsen, P. *J. Org. Chem.* **2004**, 69, 5742.



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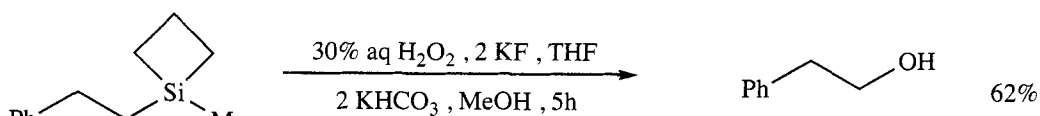


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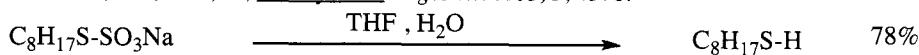


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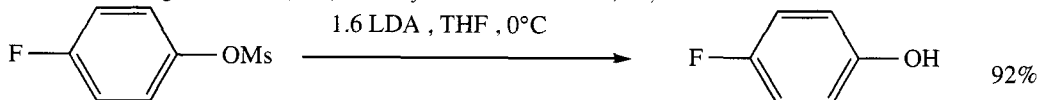
SECTION 45: ALCOHOLS AND THIOLS FROM MISCELLANEOUS COMPOUNDS



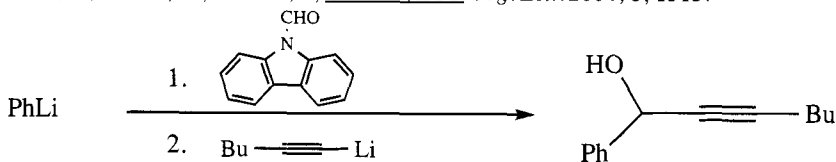
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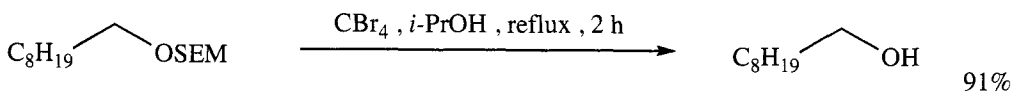


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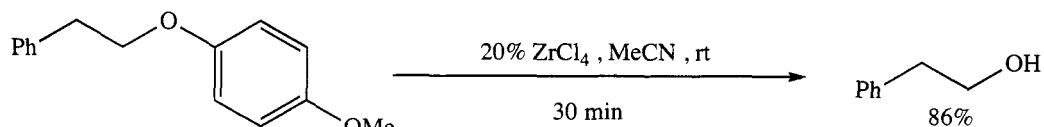


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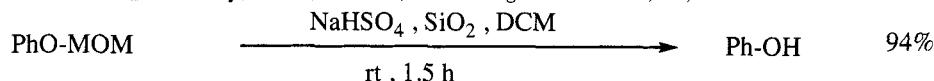
SECTION 45A: PROTECTION OF ALCOHOLS AND THIOLS



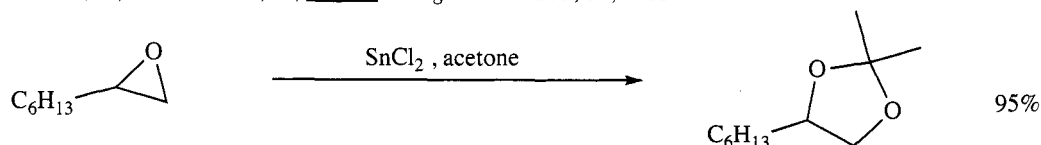
Chen, M.-Y.; Lee, A.S.-Y. *J. Org. Chem.* **2002**, *67*, 1384.



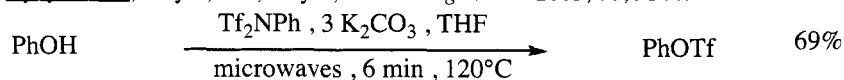
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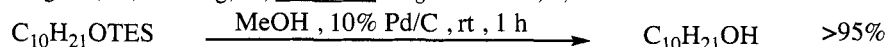
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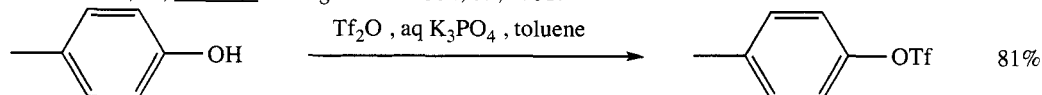
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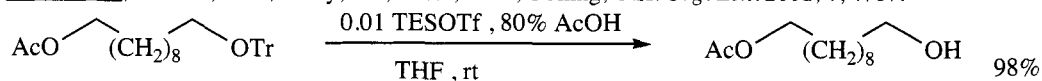
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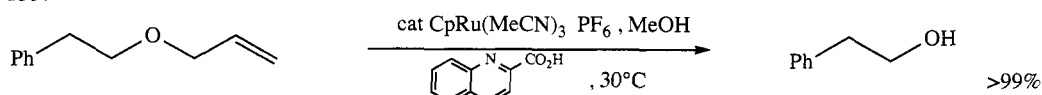
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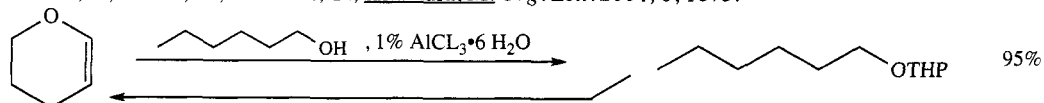
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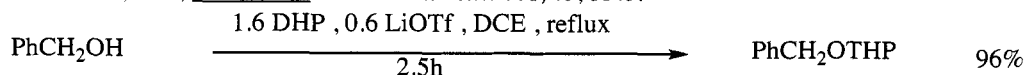
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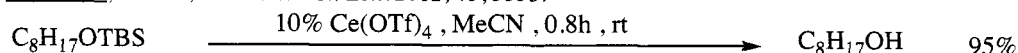
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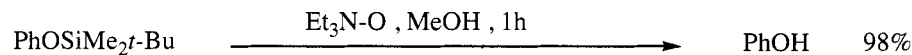
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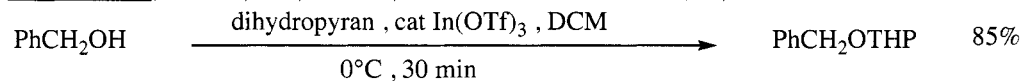
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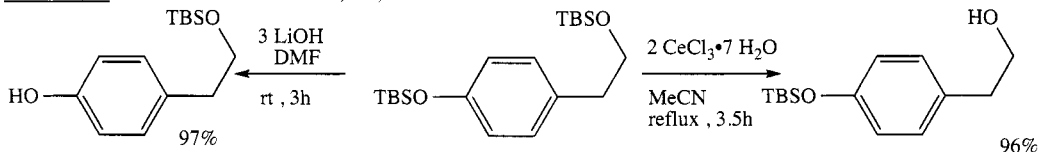
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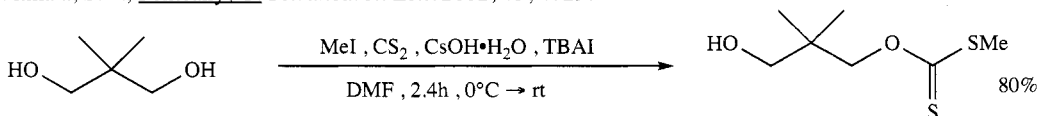
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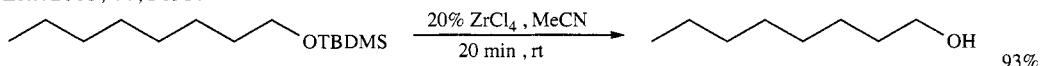
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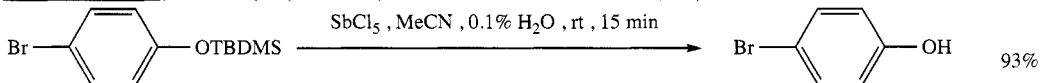
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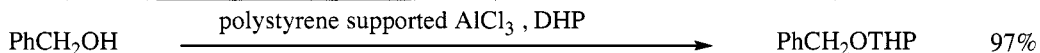
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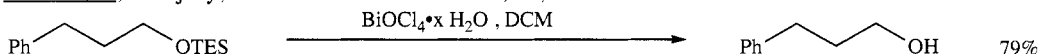
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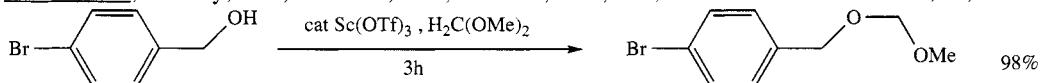
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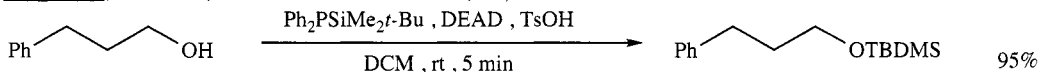
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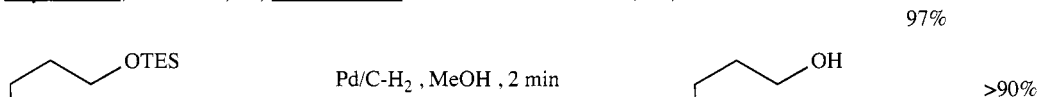
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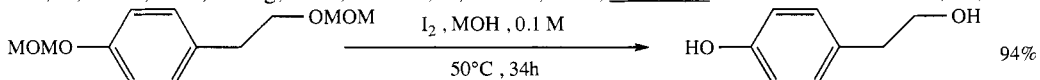
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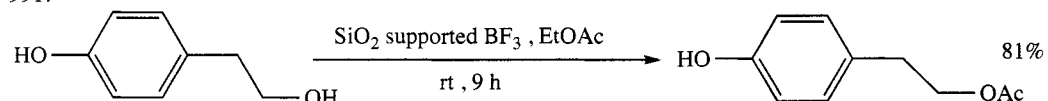
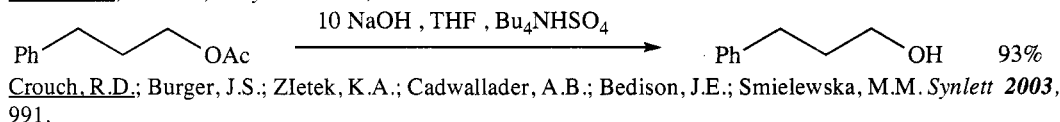
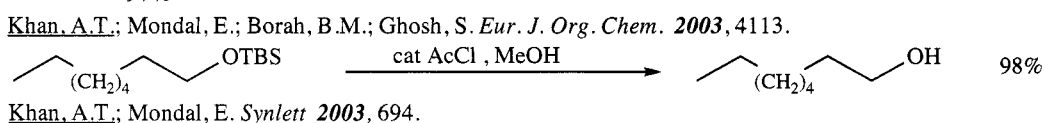
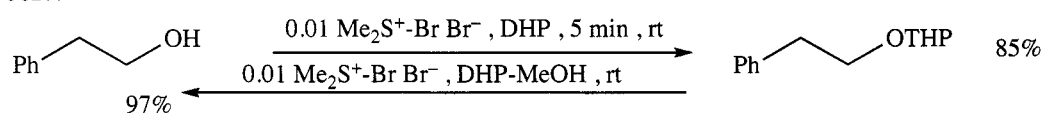
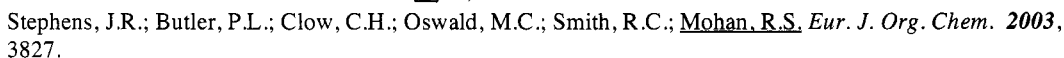
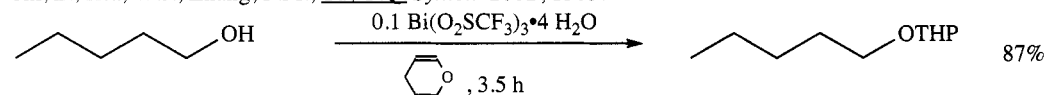
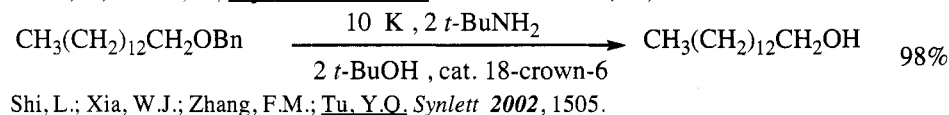
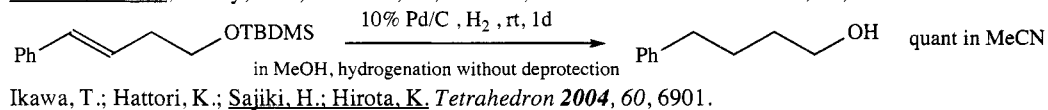
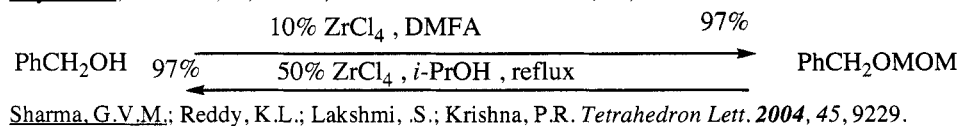
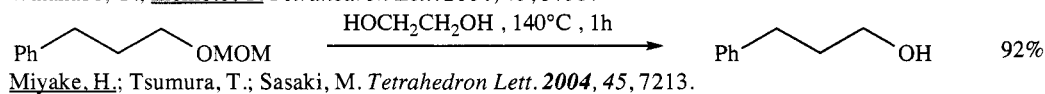
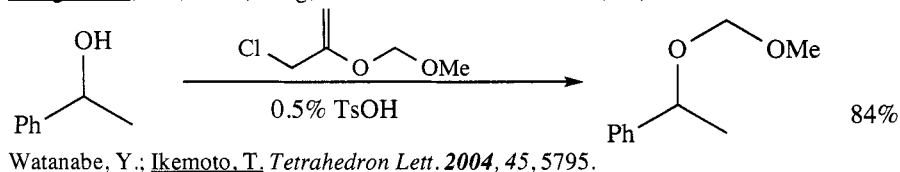
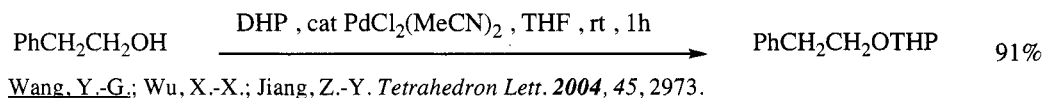
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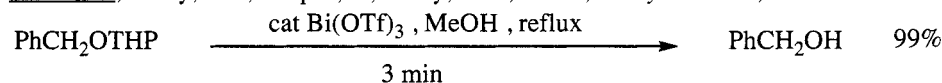
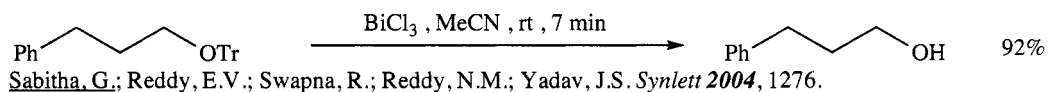


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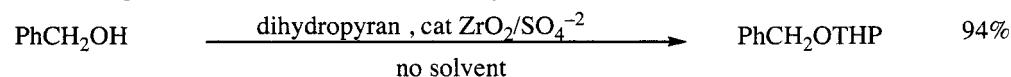


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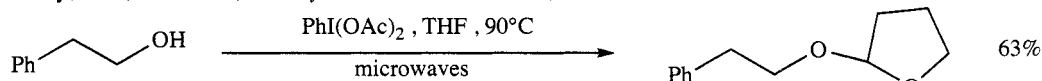




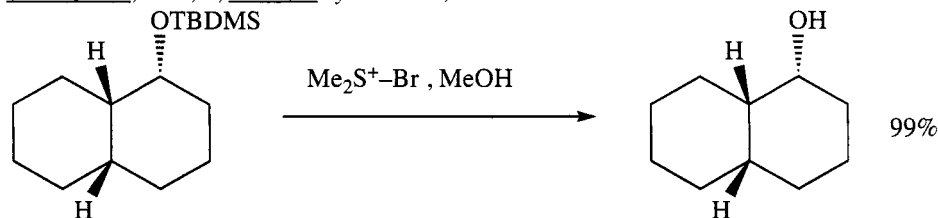
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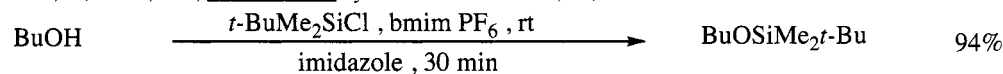
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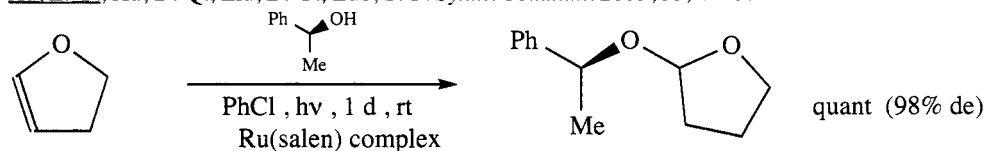
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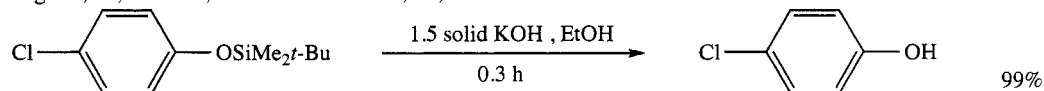
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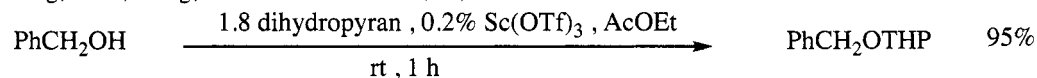
Xu, Z.-Y.; Xu, D.-Q.; Liu, B.-Y.; Luo, S.-P. *Synth. Commun.* **2003**, 33, 4143.



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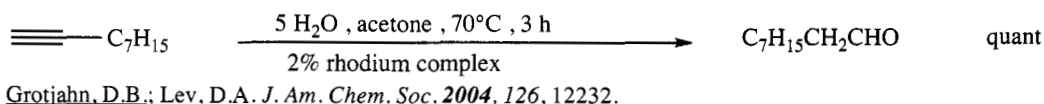


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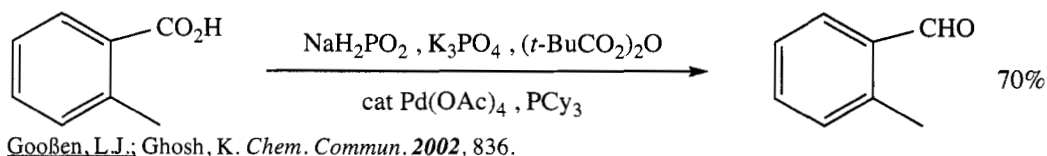
CHAPTER 4

PREPARATION OF ALDEHYDES

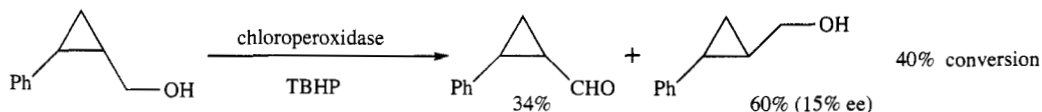
SECTION 46: ALDEHYDES FROM ALKYNES



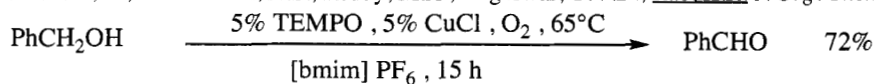
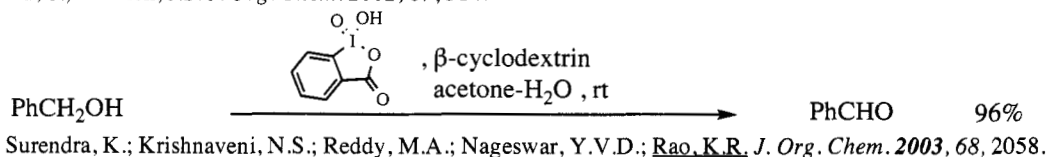
SECTION 47: ALDEHYDES FROM ACID DERIVATIVES



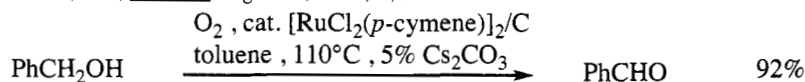
SECTION 48: ALDEHYDES FROM ALCOHOLS AND THIOLS



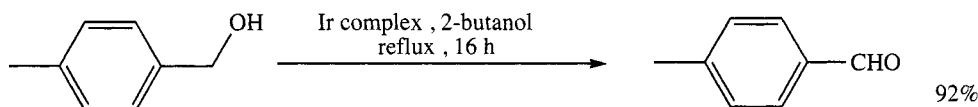
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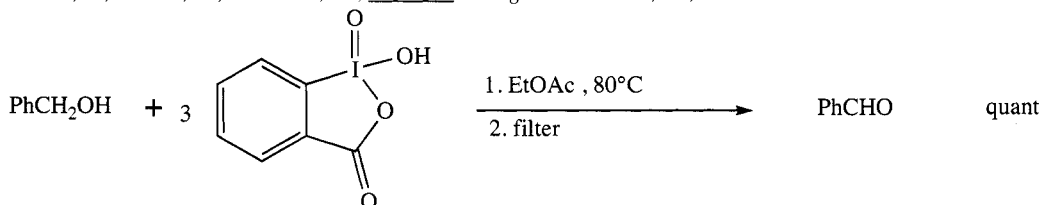
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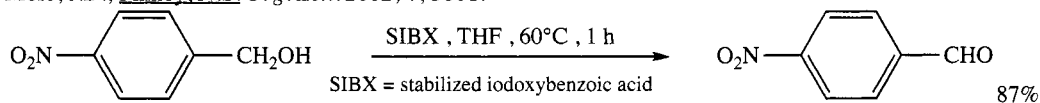
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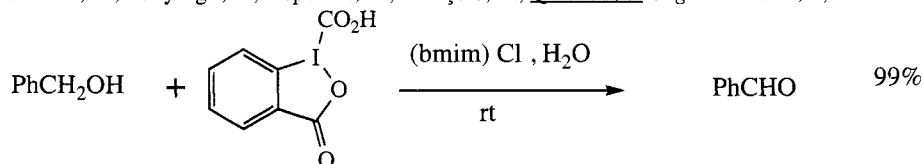
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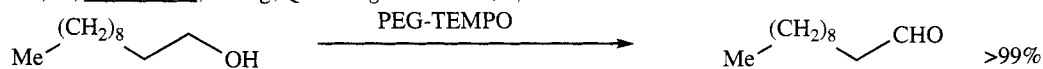
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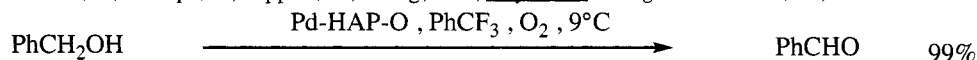
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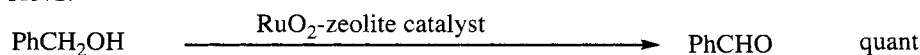
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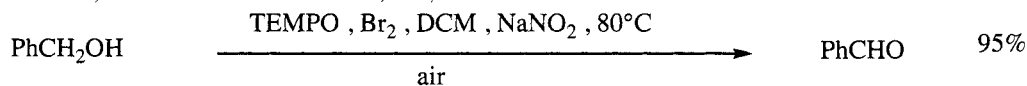
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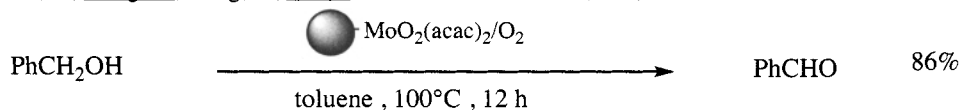
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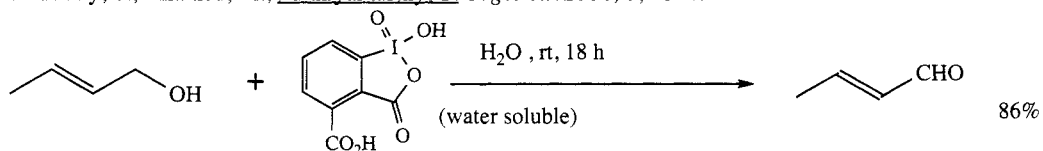
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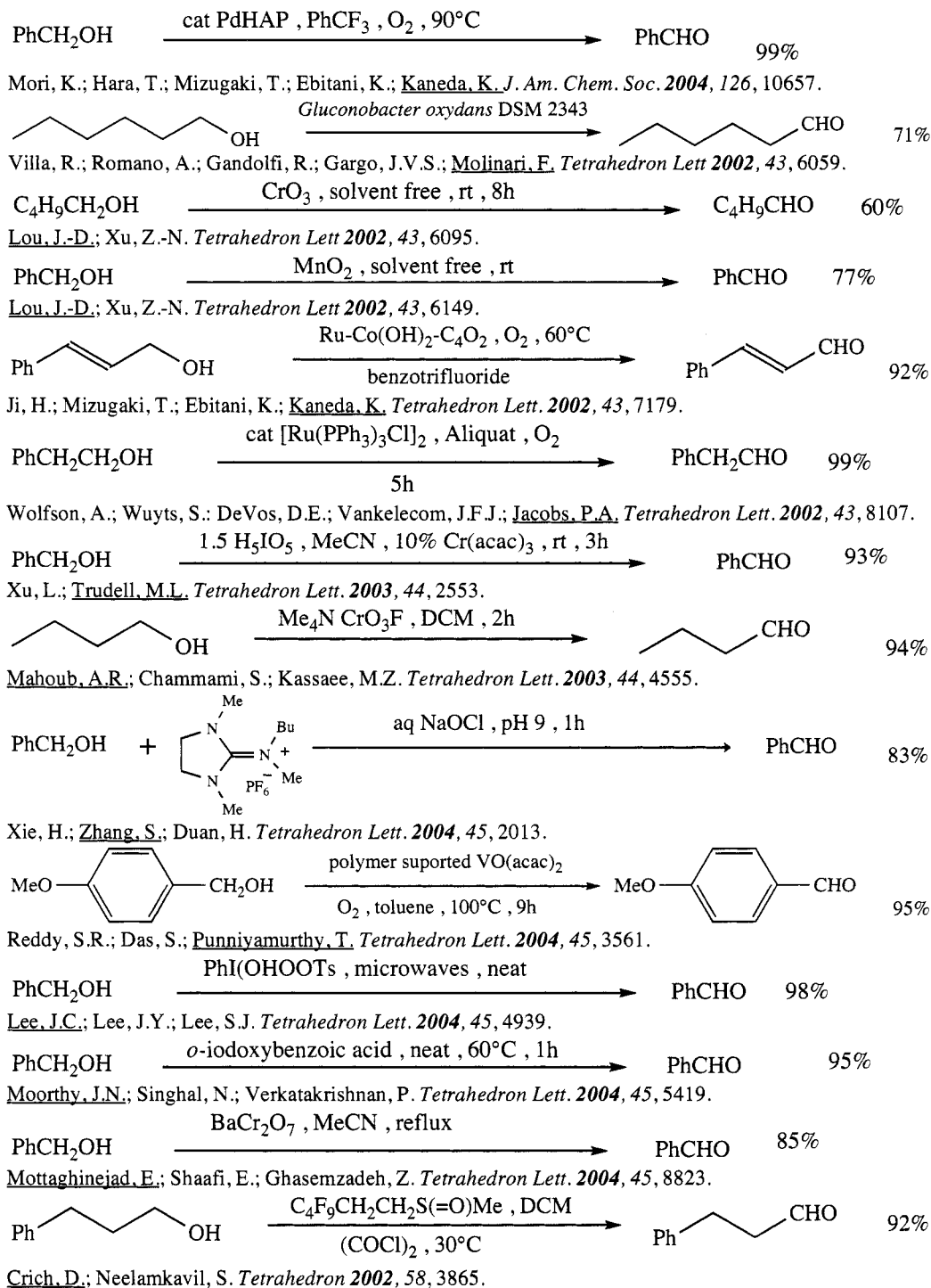
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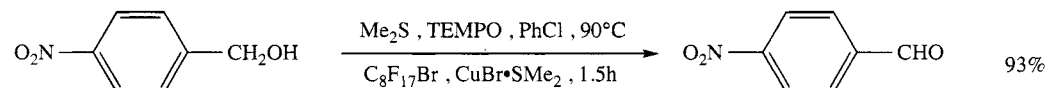


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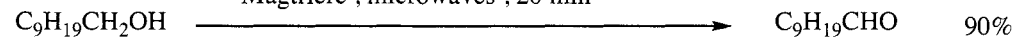
Thottumkara, A.P.; Vinod, T.K. *Tetrahedron Lett.* **2002**, 43, 569.



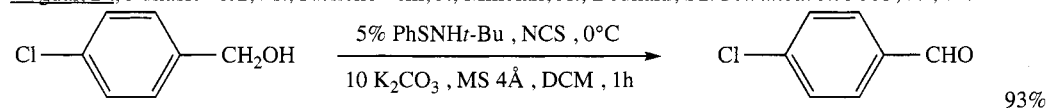


Ragagnin, G.; Betzemeier, B.; Quici, S.; Knochel, P. *Tetrahedron* **2002**, 58, 3985.

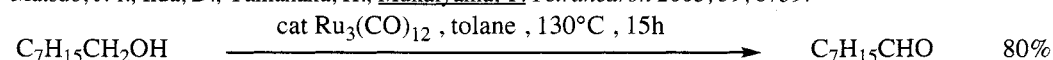
Magtierre, microwaves, 20 min



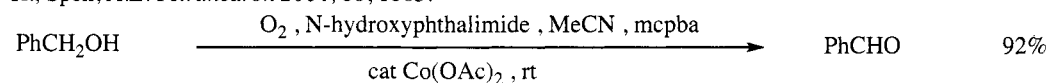
Bogdal, D.; Lukasiewicz, M.; Pielichowski, J.; Mikciak, A.; Bednarz, Sz. *Tetrahedron* **2003**, 59, 649.



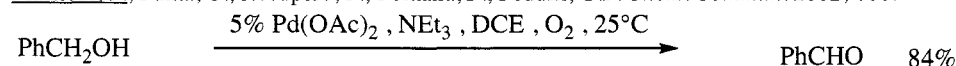
Matsuo, J.-i.; Iida, D.; Yamanaka, H.; Mukaiyama, T. *Tetrahedron* **2003**, 59, 6739.



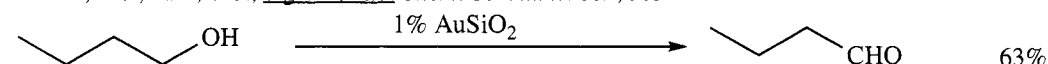
Meijer, R.H.; Lighart, G.B.W.L.; Meuldijk, J.; Vekemans, J.A.J.M.; Hulshof, L.A.; Mills, A.M.; Kooijman, H.; Spek, A.L. *Tetrahedron* **2004**, 60, 1065.



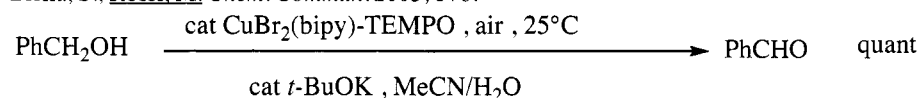
Minisci, F.; Punta, C.; Recupero, F.; Fontana, F.; Pedulli, G.F. *Chem. Commun.* **2002**, 688.



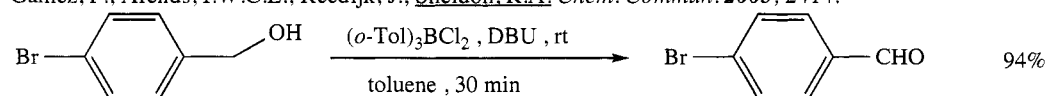
Schultz, M.J.; Park, C.C.; Sigman, M.S. *Chem. Commun.* **2002**, 3034.



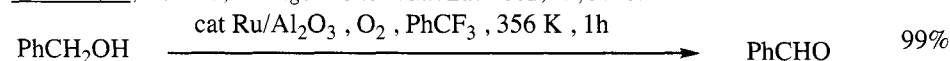
Biella, S.; Rossi, M. *Chem. Commun.* **2003**, 378.



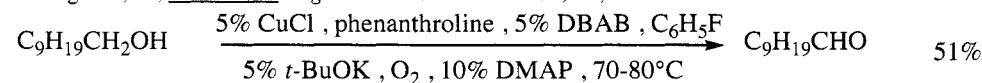
Gamez, P.; Arends, I.W.C.E.; Reedijk, J.; Sheldon, R.A. *Chem. Commun.* **2003**, 2414.



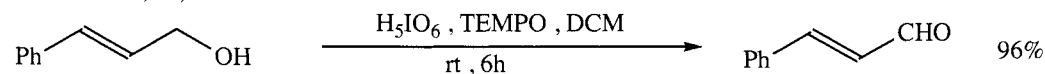
Mantano, Y.; Nomura, H. *Angew. Chem. Int. Ed.* **2002**, 41, 3028.



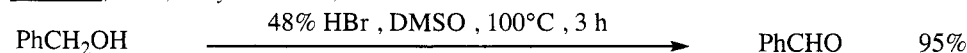
Yamaguchi, K.; Mizuno, N. *Angew. Chem. Int. Ed.* **2002**, 41, 4538.



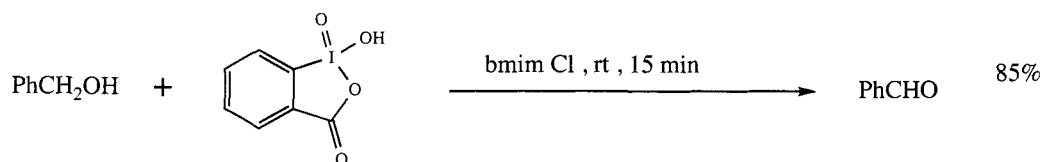
Markó, I.E.; Gautier, A.A.; Dumeunier, R.; Doda, K.; Philippart, F.; Brown, S.M.; Urch, C.J. *Angew. Chem. Int. Ed.* **2004**, 43, 1588.



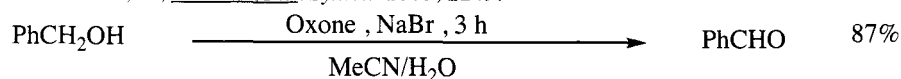
Kim, S.S.; Nhru, K. *Synlett* **2002**, 616.



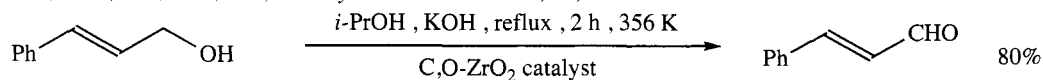
Li, C.; Xu, Y.; Lu, M.; Zhao, Z.; Liu, L.; Zhao, Z.; Cui, Y.; Zheng, P.; Ji, X.; Gao, G. *Synlett* **2002**, 2041.



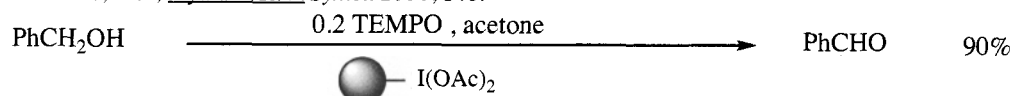
Karthikeuan, G.; Perumal, P.T. *Synlett* **2003**, 2249.



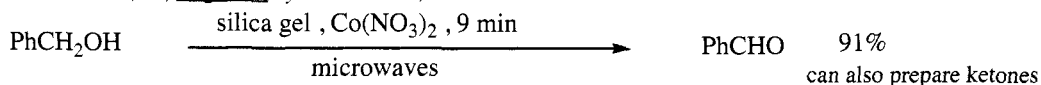
Koo, B.-S.; Lee, C.K.; Lee, K.-J. *Synth. Commun.* **2002**, 32, 2115.



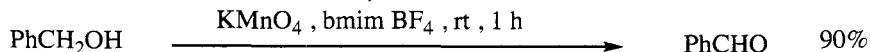
Sonovane, S.U.; Jayaram, R.V. *Synlett* **2004**, 146.



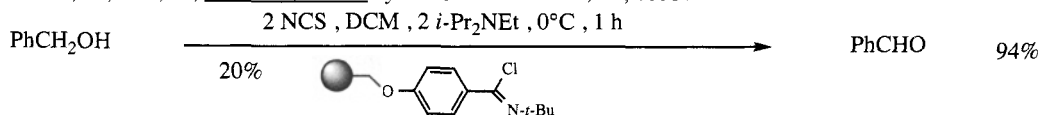
Sakuraathani, K.; Togo, H. *Synthesis* **2003**, 21.



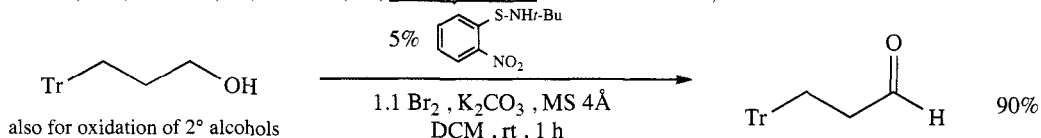
Kiasat, A.R.; Kazemi, F.; Rafati, M. *Synth. Commun.* **2003**, 33, 601.



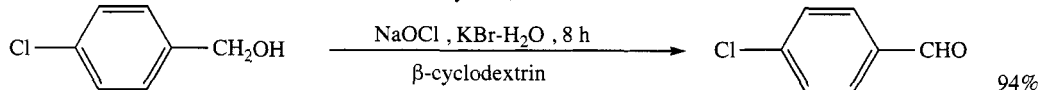
Kumar, A.; Jain, N.; Chauhan, S.M.S. *Synth. Commun.* **2004**, 34, 2835.



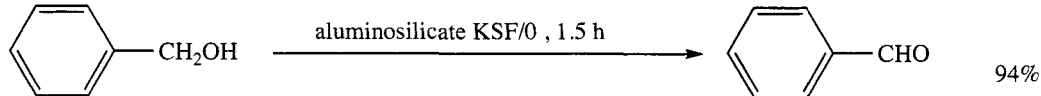
Matsuo, J.-i.; Kawana, A.; Pudhom, K.; Mukaiyama, T. *Chem. Lett.* **2002**, 250.



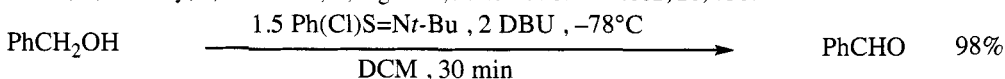
Matsuo, J.; Kawana, A.; Yamanaka, H.; Mukaiyama, T. *Chem Lett.* **2003**, 32, 182.



Surendra, K.; Krishnaveni, N.S.; Rama Rao, K. *Can. J. Chem.* **2004**, 82, 1230.



Farkas, J.; Békássy, S.; Madarász, J.; Figueras, F. *New J. Chem.* **2002**, 26, 750.



Matsuo, J.-i.; Iida, D.; Tatani, K.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.* **2002**, 75, 223.

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“Palladium Catalyzed Oxidation of Primary and Secondary Alcohols”

Murart, J., *Tetrahedron* **2003**, 59, 5789.

“Recent Developments in the Aerobic Oxidation of Alcohols”

Zhan, B.-Z.; Thompson, A. *Tetrahedron* **2004**, 60, 2917.

“Oxidation of Alcohols with Molecular Oxygen on Solid Catalysts”

Mallat, T.; Baiker, A. *Chem. Rev.* **2004**, 104, 3037.

“Green, Catalytic Oxidations of Alcohols”

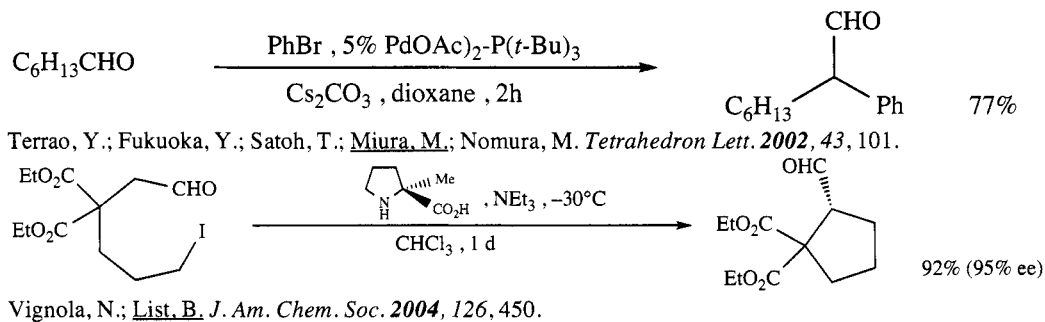
Sheldon, R.A.; Arends, I.W.C.E.; ten Brink, G.-J.; Dijkman, A. *Acc. Chem. Res.* **2002**, 35, 774.

“Preparation of Tetramethylpiperidine-1-oxammonium Salts and Their Use as Oxidants”

Merbouh, N.; Bobbitt, J.M.; Brückner, C. *Org. Prep. Proceed. Int.* **2004**, 36, 1.

SECTION 49: ALDEHYDES FROM ALDEHYDES

Conjugate reductions and Michael alkylations of conjugated aldehydes are listed in Section 74 (Alkyls, Methylenes, and Aryls from Alkenes).



Related Methods:

Aldehydes from Ketones (Section 57)

Ketones from Ketones (Section 177)

Also via: Alkene-Aldehydes (Section 341)

SECTION 50: ALDEHYDES FROM ALKYLs, METHYLENES AND ARYLs

NO ADDITIONAL EXAMPLES

SECTION 51: ALDEHYDES FROM AMIDES

NO ADDITIONAL EXAMPLES

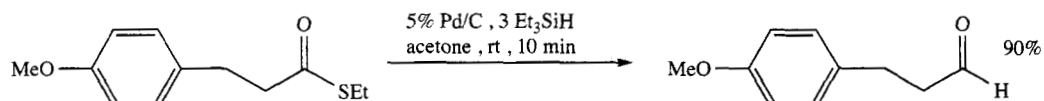
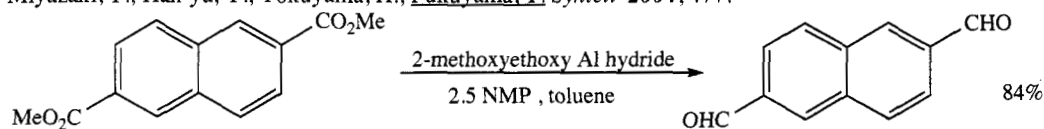
SECTION 52: ALDEHYDES FROM AMINES

NO ADDITIONAL EXAMPLES

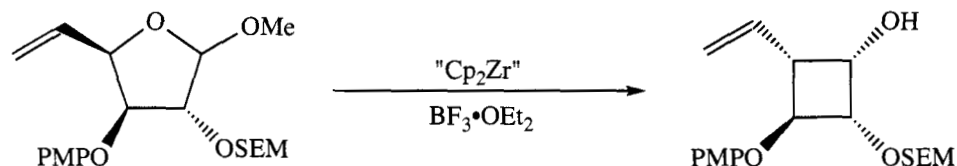
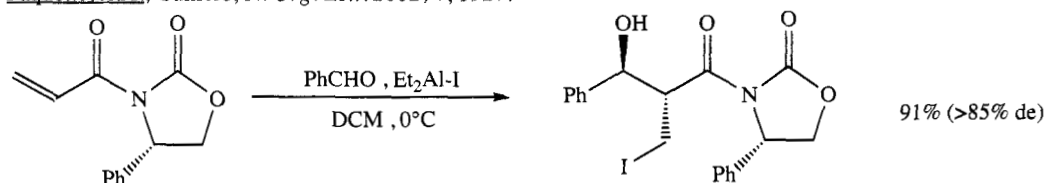
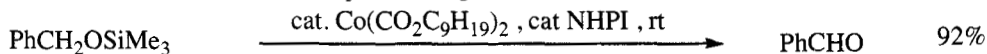
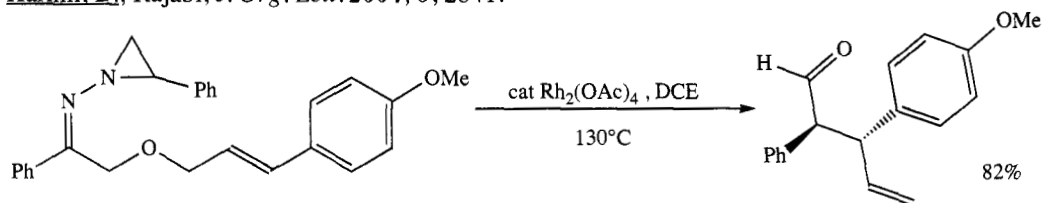
Related Method:

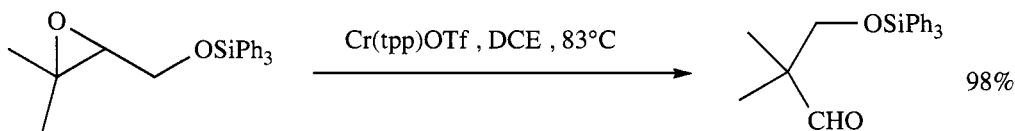
Ketones from Amines (Section 172)

SECTION 53: ALDEHYDES FROM ESTERS

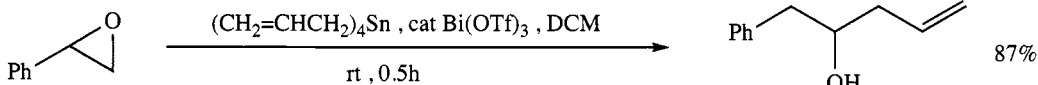
Miyazaki, T.; Han-ya, Y.; Tokuyama, H.; Fukuyama, T. *Synlett* **2004**, 477.Hagiya, K.; Mitsui, S.; Taguchi, H. *Synthesis* **2003**, 823.

SECTION 54: ALDEHYDES FROM ETHERS, EPOXIDES, AND THIOETHERS

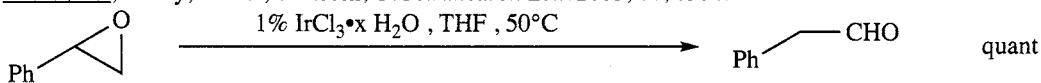
Paquette, L.A.; Cunière, N. *Org. Lett.* **2002**, 4, 1927.Pal, M.; Parasuraman, K.; Yeleswarapu, K.R. *Org. Lett.* **2003**, 5, 349.NHPI = *N*-hydroxyphthalimide1 atm O₂, MeCNKarimi, B.; Rajabi, J. *Org. Lett.* **2004**, 6, 2841.May, J.A.; Stolz, B.M. *J. Am. Chem. Soc.* **2002**, 124, 12426.



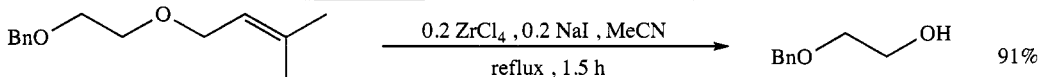
Suda, K.; Kikkawa, T.; Nakajima, S.-i.; Takanami, T. *J. Am. Chem. Soc.* **2004**, 126, 9554.



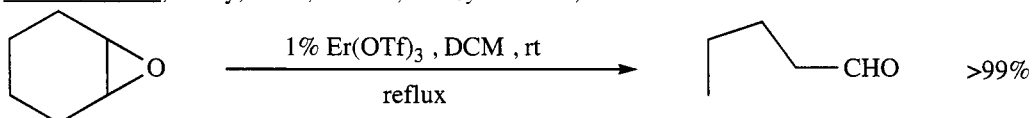
Yadav, J.S.; Reddy, B.V.S.; Sateesh, G. *Tetrahedron Lett.* **2003**, 44, 6501.



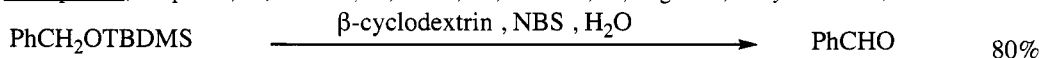
Karamé, I.; Tommasino, M.L.; Lomaire, M. *Tetrahedron Lett.* **2003**, 44, 7687.



Sharma, G.V.M.; Reddy, Ch.G.; Krishna, P.R. *Synlett* **2003**, 1728.



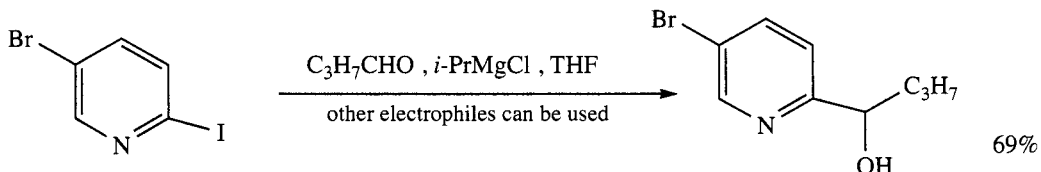
Procopio, A.; Dalpozzo, R.; DeNino, A.; Nardi, M.; Sindona, G.; Tagarelli, A. *Synlett* **2004**, 2633.



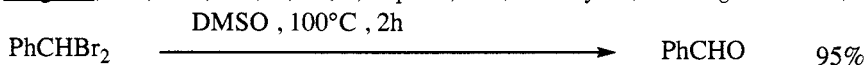
Reddy, M.S.; Narender, M.; Nageswar, Y.V.D.; Rao, K.R. *Synthesis* **2004**, 714.

Related Method: Ketones from Ethers, Epoxides, and Thioethers (Section 174)

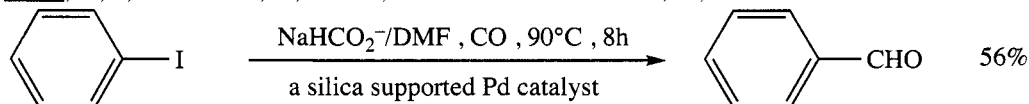
SECTION 55: ALDEHYDES FROM HALIDES AND SULFONATES



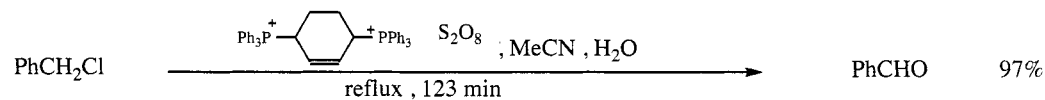
Song, J.J.; Yee, N.K.; Tan, Z.; Xu, J.; Kapadia, S.R.; Senanayake, C.H. *Org. Lett.* **2004**, 6, 4905.



Li, W.; Li, J.; DeVincentis, D.; Masour, T.S. *Tetrahedron Lett.* **2004**, 45, 1071.

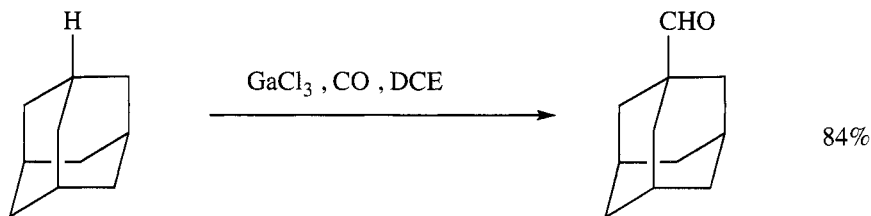


Cai, M.-Z.; Zhao, H.; Zhou, J.; Song, C.-S. *Synth. Commun.* **2002**, 32, 923.



Badri, R.; Soleymani, M. *Synth. Commun.* **2003**, 33, 1325.

SECTION 56: ALDEHYDES FROM HYDRIDES

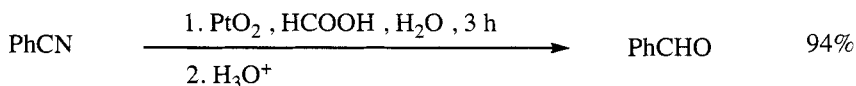


Oshita, M.; Chatani, N. *Org. Lett.* **2004**, 6, 4323.

SECTION 57: ALDEHYDES FROM KETONES

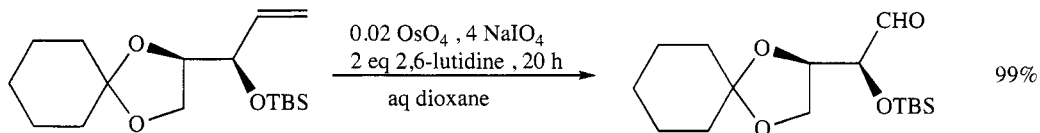
NO ADDITIONAL EXAMPLES

SECTION 58: ALDEHYDES FROM NITRILES

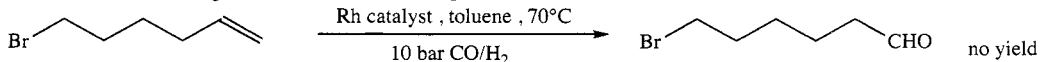


Xi, F.; Kamal, F.; Schenerman, M.A. *Tetrahedron Lett.* **2002**, 43, 1395.

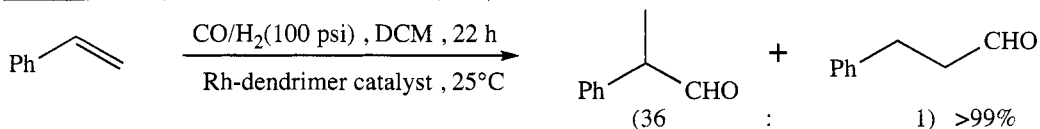
SECTION 59: ALDEHYDES FROM ALKENES



Yu, W.; Mei, Y.; Kang, Y.; Hua, Z.; Jin, Z. *Org. Lett.* **2004**, 6, 3217.



Breit, B.; Seiche, W. *J. Am. Chem. Soc.* **2003**, 125, 6608.

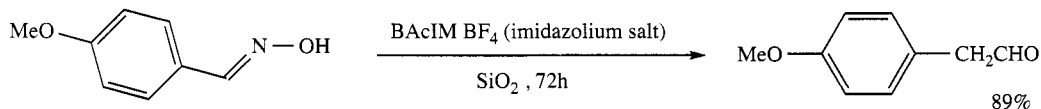


Li, S.-M.; Alper, H. *J. Am. Chem. Soc.* **2003**, 125, 13126.

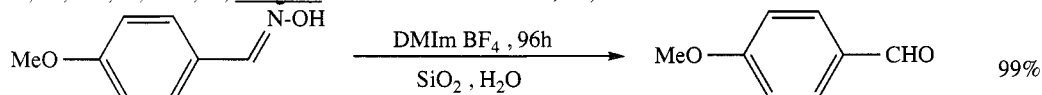
Related Method:

Ketones from Alkenes (Section 179)

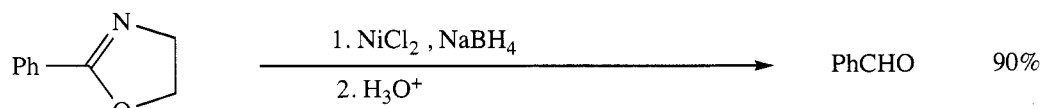
SECTION 60: ALDEHYDES FROM MISCELLANEOUS COMPOUNDS



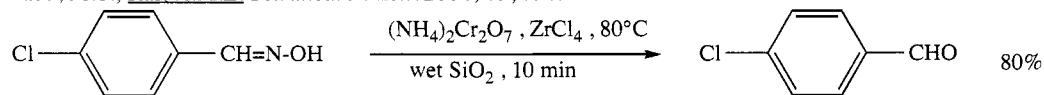
Li, D.; Shi, F.; Guo, S.; Deng, Y. *Tetrahedron Lett.* **2004**, 45, 265.



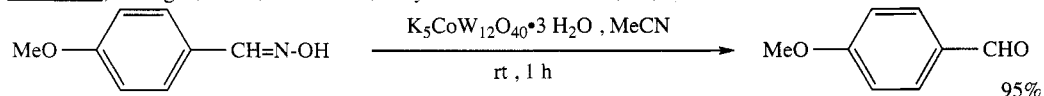
Li, D.; Shi, F.; Deng, Y. *Tetrahedron Lett.* **2004**, 45, 6791.



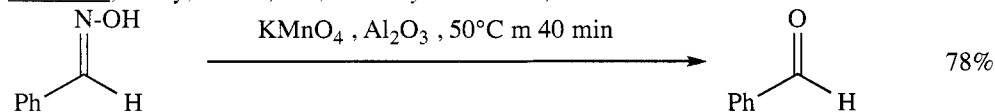
Babu, M.S.; Rai, K.M.L. *Tetrahedron Lett.* **2004**, 45, 7969.



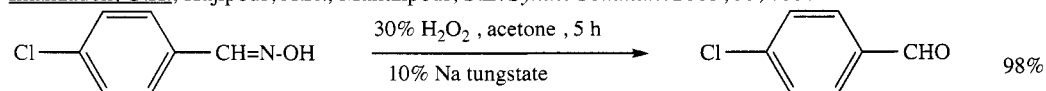
Shirini, F.; Zolfigol, M.A.; Pourhabib, A. *Synth. Commun.* **2002**, 32, 2837.



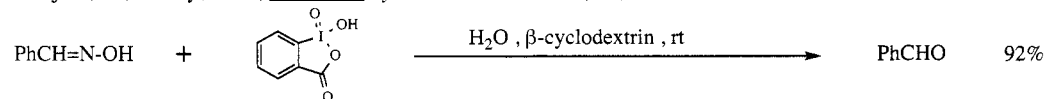
Bose, D.S.; Reddy, A.V.N.; Das, A.P.R. *Synthesis* **2003**, 1883.



Imanzadeh, G.H.; Hajipour, A.R.; Mallakpour, S.E. *Synth. Commun.* **2003**, 33, 735.



Manjula, A.; Reddy, G.N.; Rao, B.C. *Synth. Commun.* **2003**, 33, 3455.



Krishnaveni, N.S.; Surendrak, K.; Nageswar, Y.V.D.; Rao, K.R. *Synthesis* **2003**, 1968.

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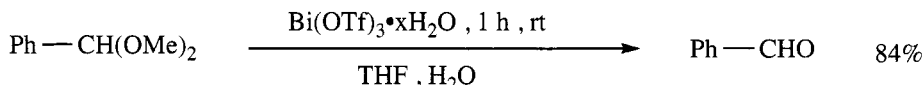
Ballini, R.; Petrini, M. *Tetrahedron* **2004**, 60, 1017.

“Recent Advances in Rhodium-Catalyzed Asymmetric Hydroformylation Using Phosphite”

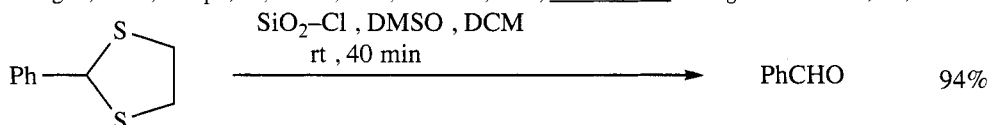
Diéguez, M.; Pàmies, O.; Claver, C. *Tetrahedron: Asymmetry* **2004**, 15, 2113.

"The Pummerer Reaction: Methodology and Strategy for the Synthesis of Heterocyclic Compounds"
Bur, S.K.; Padwa, A. *Chem. Rev.* **2004**, *104*, 2401.

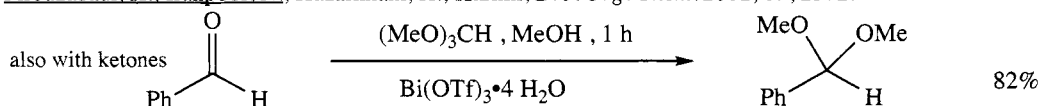
SECTION 60A: PROTECTION OF ALDEHYDES



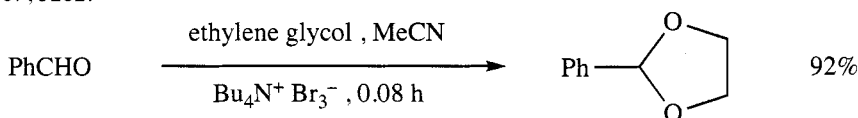
Carrigan, M.D.; Sarapa, D.; Smith, R.C.; Wieland, L.C.; Mohan, R.S. *J. Org. Chem.* **2002**, *67*, 1027.



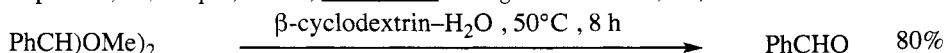
Firouzbadi, H.; Iranpoor, N.; Hazarkhani, H.; Karimi, B. *J. Org. Chem.* **2002**, *67*, 2572.



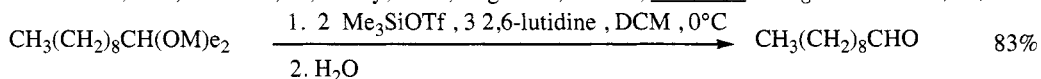
Leonard, N.M.; Oswald, M.C.; Freiberg, D.A.; Nattier, B.A.; Smith, R.C.; Mohan, R.S. *J. Org. Chem.* **2002**, *67*, 5202.



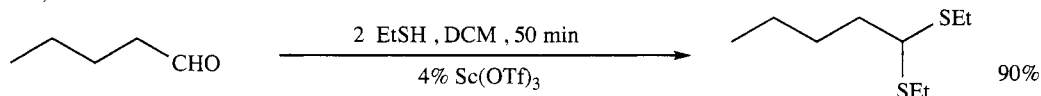
Gopinathi, R.; Haque, S.K.J.; Patel, B.K. *J. Org. Chem.* **2002**, *67*, 5842.



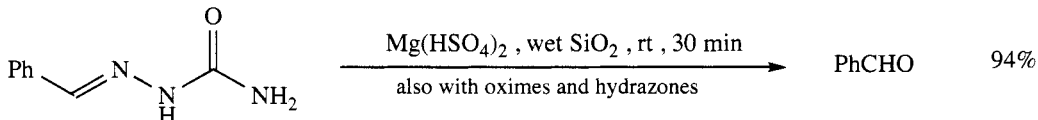
Krishnaveni, N.S.; Surendra, K.; Reddy, M.A.; Nageswar, Y.V.D.; Rao, K.R. *J. Org. Chem.* **2003**, *68*, 2018.



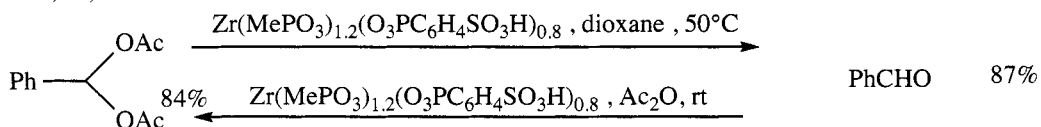
Fujioka, H.; Sawama, Y.; Murata, N.; Kitsu, T.; Kubo, O.; Matsuda, S.; Kita, Y. *J. Am. Chem. Soc.* **2004**, *126*, 11800.



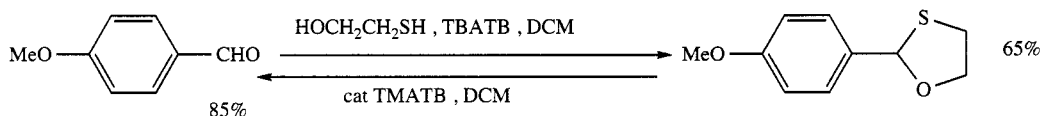
Kamal, A.; Chouhan, G. *Tetrahedron Lett.* **2002**, *43*, 1347.



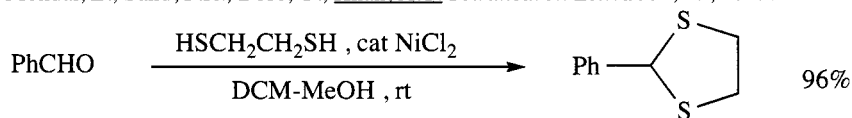
Shivini, F.; Zolfigl, M.A.; Mallapour, B.; Mallakpour, S.E.; Hajipour, A.R.; Baltork, I.M. *Tetrahedron Lett.* **2002**, *43*, 1555.



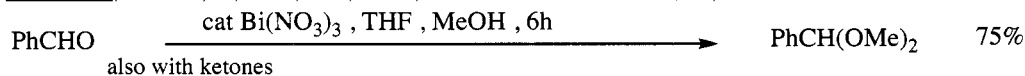
Curini, M.; Epifano, F.; Marcotullio, M.C.; Rosati, O.; Nocchetti, M. *Tetrahedron Lett.* **2002**, *43*, 2709.



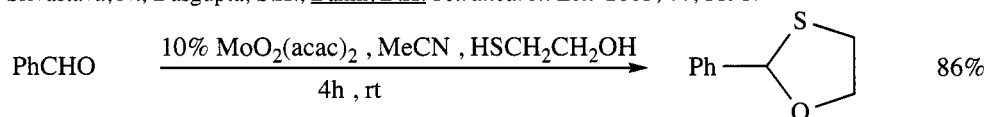
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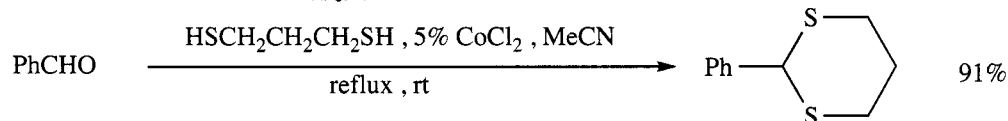
Khan, A.T.; Mondal, E.; Sahu, P.R.; Islam, S. *Tetrahedron Lett.* **2003**, *44*, 919.



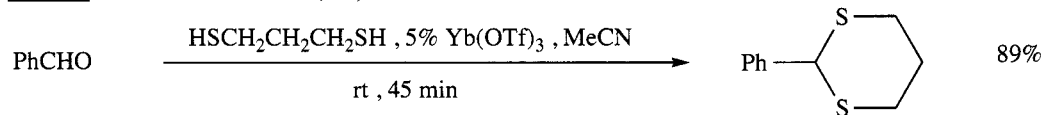
Srivastava, N.; Dasgupta, S.K.; Banik, B.K. *Tetrahedron Lett.* **2003**, *44*, 1191.



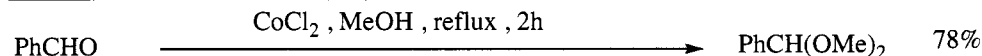
Rana, K.K.; Guin, C.; Jana, S.; Roy, S.C. *Tetrahedron Lett.* **2003**, *44*, 8597.



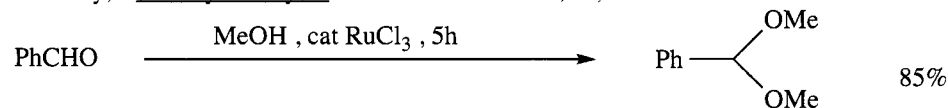
De, S.K. *Tetrahedron Lett.* **2004**, *45*, 1035.



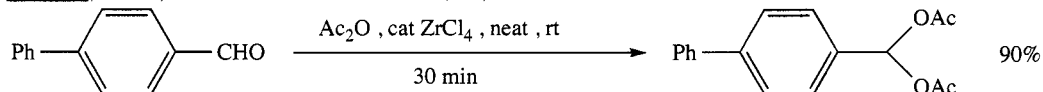
De, S.K.; *Tetrahedron Lett.* **2004**, *45*, 2339.



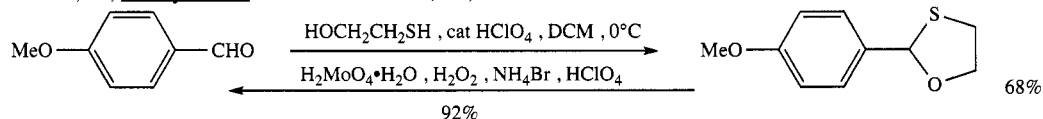
Velusamy, S.; Punniyamurthy, T. *Tetrahedron Lett.* **2004**, *45*, 4917.



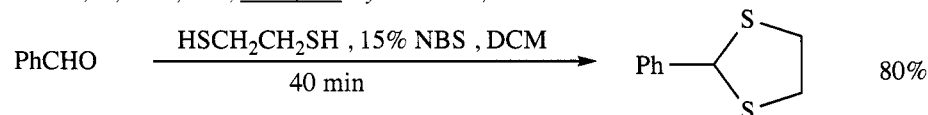
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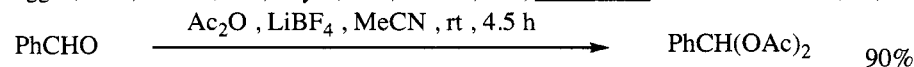
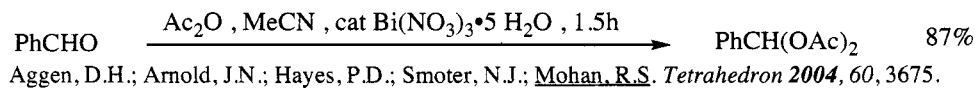
Smitha, G.; Reddy, Ch.S. *Tetrahedron* **2003**, *59*, 9571.



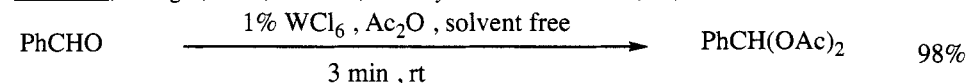
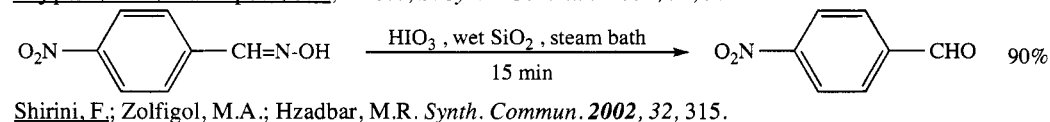
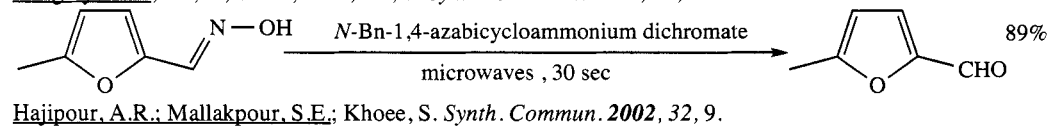
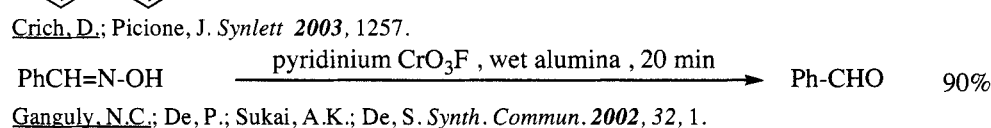
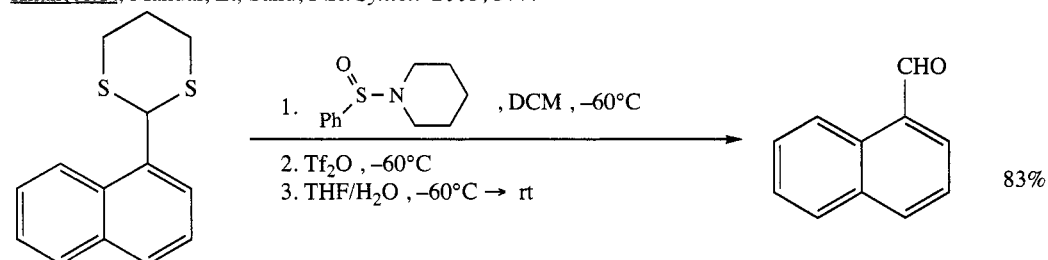
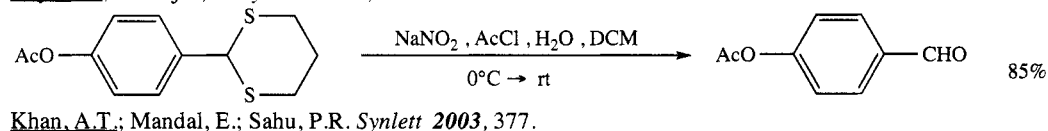
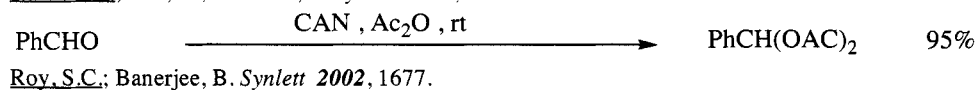
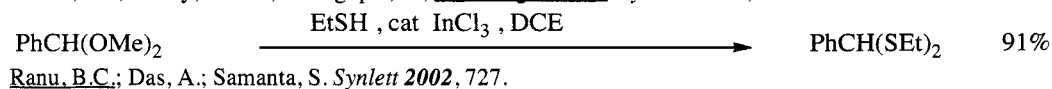
Mondal, E.; Sahu, P.R.; Khan, A.T. *Synlett* **2002**, 463.



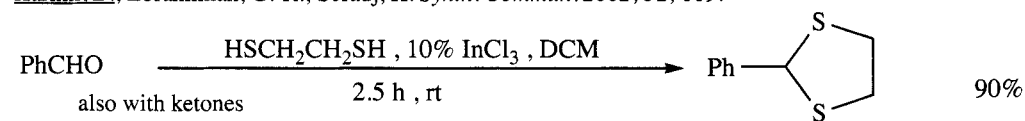
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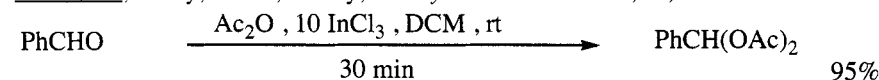
Yadav, J.S.; Reddy, B.V.S.; Venugopal, C.; Ramalingam, V.T. *Synlett* **2002**, 604.



Karimi, B.; Ebrahimian, G.-R.; Seradj, H. *Synth. Commun.* **2002**, 32, 669.

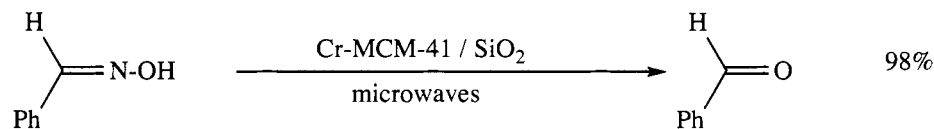


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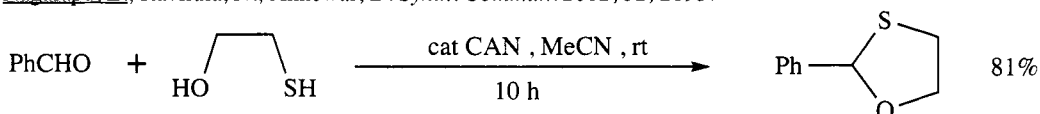


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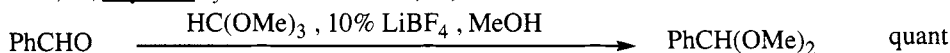
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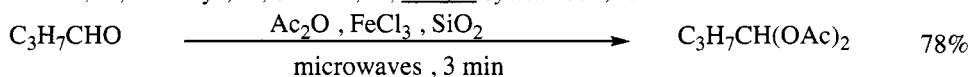
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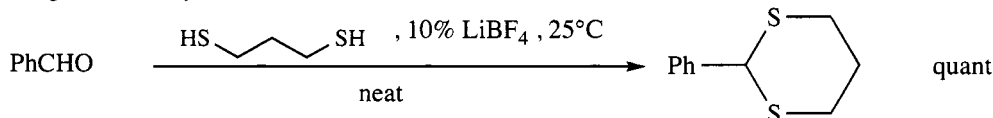
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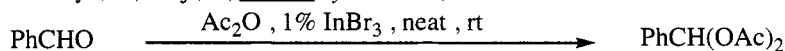
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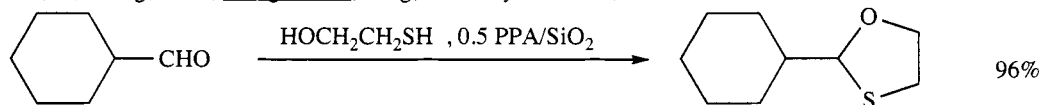
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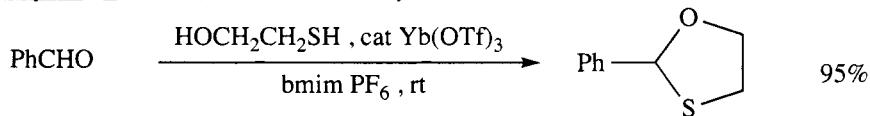
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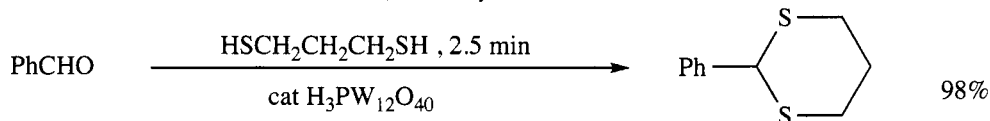
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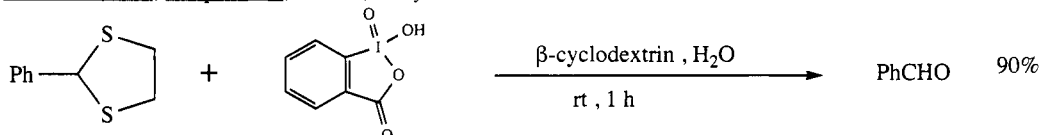
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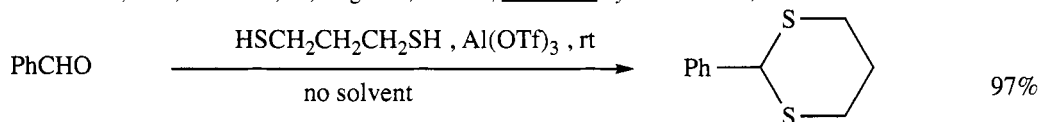
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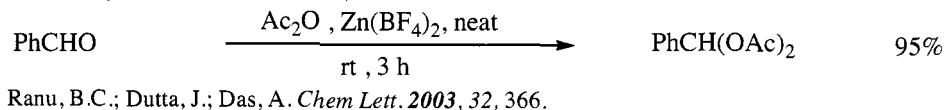
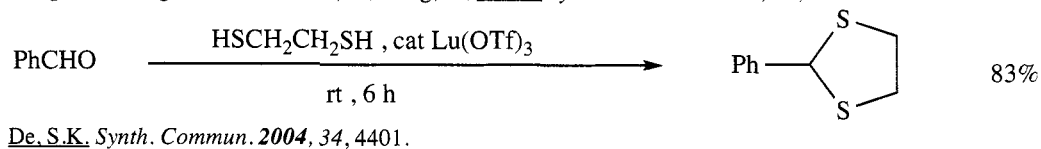
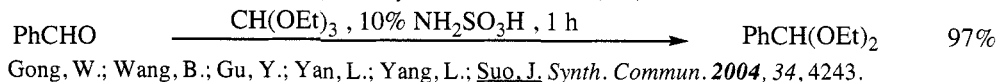
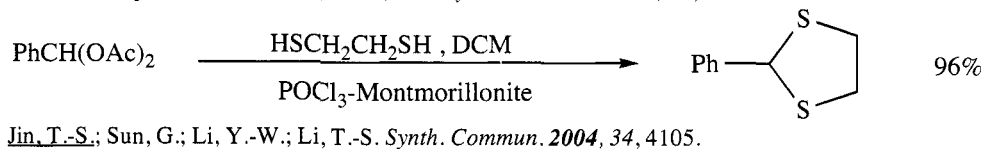
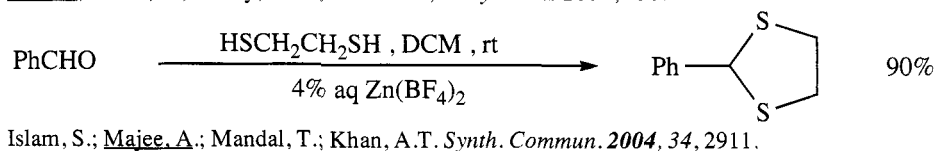
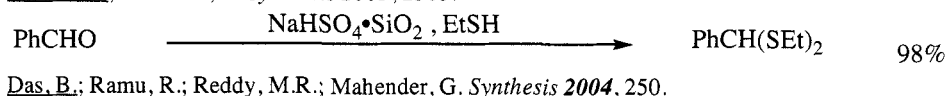
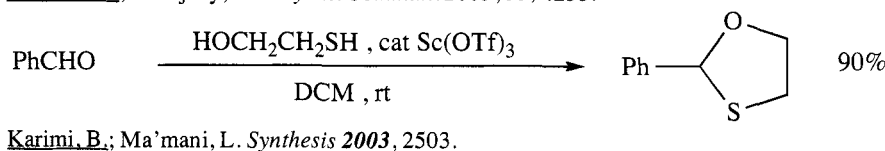
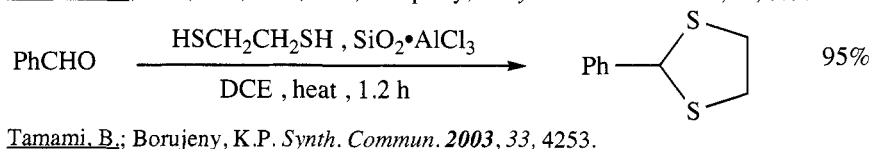
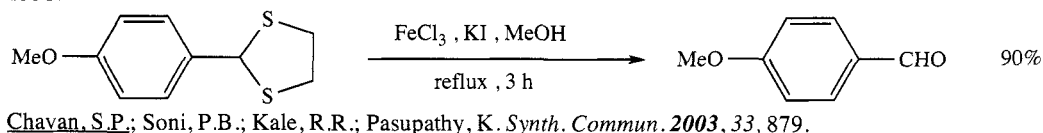
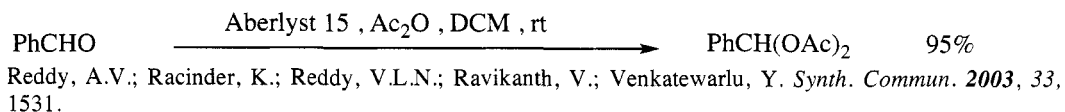
Firouzabadi, H.; Iranpoor, N.; Amani, K. *Synthesis* **2002**, 59.



Krishnaveni, N.S.; Surendra, K.; Nagswar, Y.V.D.; Rao, K.R. *Synthesis* **2003**, 2295.



Firouzabadi, H.; Iranpoor, N.; Kohmarch, G. *Synth. Commun.* **2003**, 33, 167.



REVIEW:

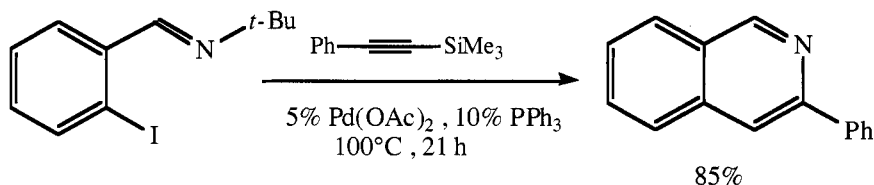
"Regeneration of Carbonyl Compounds from Oximes, Hydrazones, Semicarbazones, Acetals, 1,1-Diacetates, 1,3-Dithiolanes, 1,3-Dithianes, and 1,3-Oxathiolanes"
 Khoe, S.; Ruoho, A.E. *Org. Prep. Proceed. Int.* **2003**, 35, 527.

CHAPTER 5

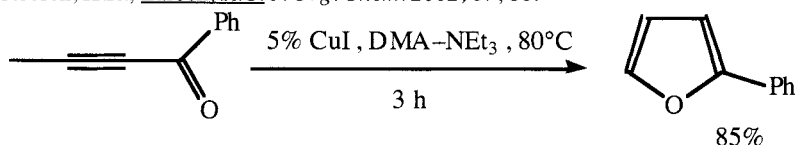
PREPARATION OF ALKYL, METHYLENE, AND ARYL

This chapter lists the conversion of functional groups into methyl, ethyl, propyl, etc. as well as methylene (CH_2), phenyl, etc.

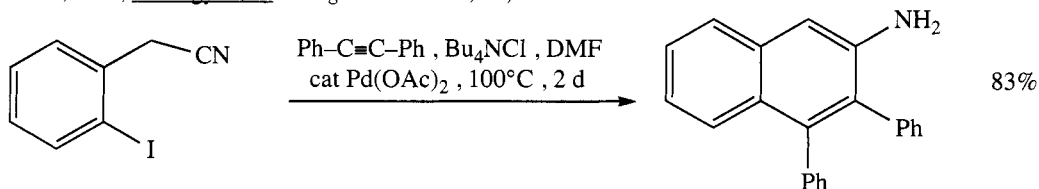
SECTION 61: ALKYL, METHYLENE, AND ARYL FROM ALKYNES



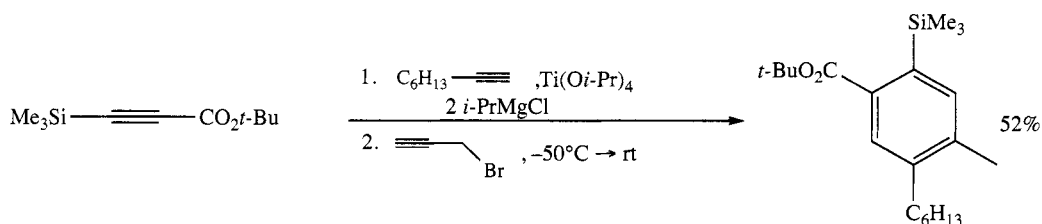
Roesch, K.R.; Larock, R.C. *J. Org. Chem.* **2002**, 67, 86.



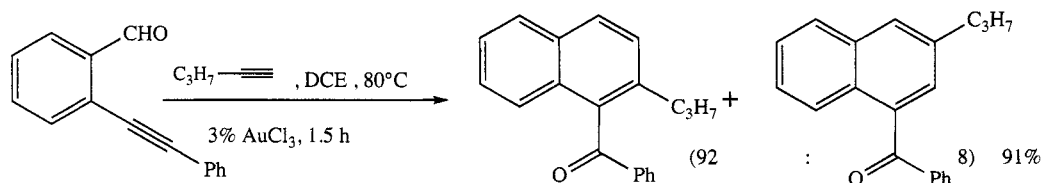
Kel'in, A.V.; Gevorgyan, V. *J. Org. Chem.* **2002**, 67, 95.



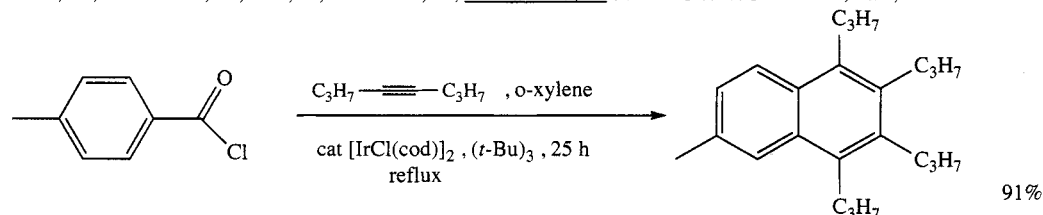
Tian, Q.; Pletnev, A.A.; Larock, R.C. *J. Org. Chem.* **2003**, 68, 339.



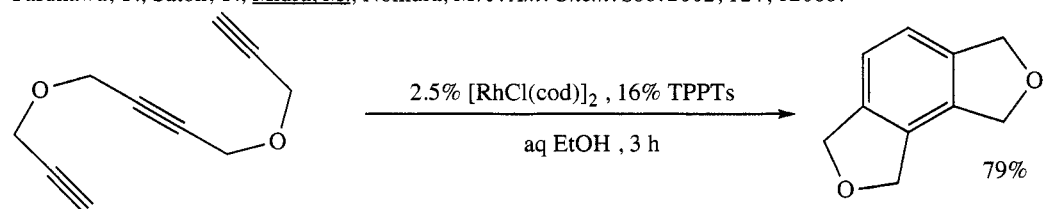
Tanaka, R.; Nakano, Y.; Suzuki, D.; Urabe, H.; Sato, F. *J. Am. Chem. Soc.* **2002**, 124, 9682.



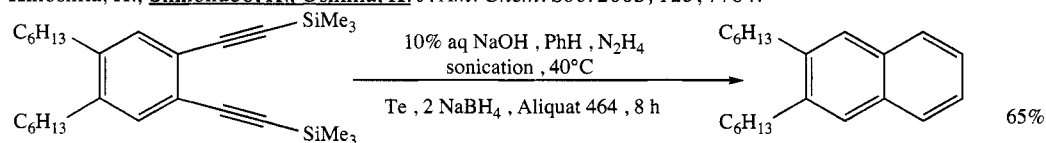
Asao, N.; Takahashi, K.; Lee, S.; Kasahara, T.; Yamamoto, Y. *J. Am. Chem. Soc.* **2002**, 124, 12650.



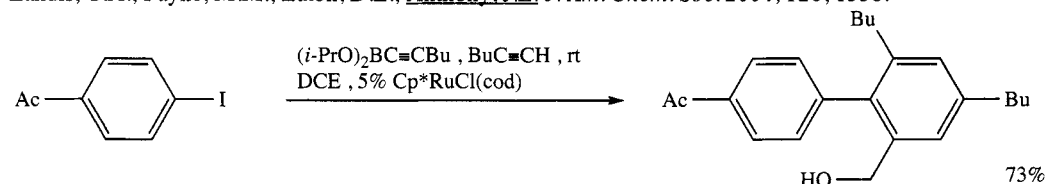
Yasukawa, T.; Satoh, T.; Miura, M.; Nomura, M. *J. Am. Chem. Soc.* **2002**, 124, 12680.



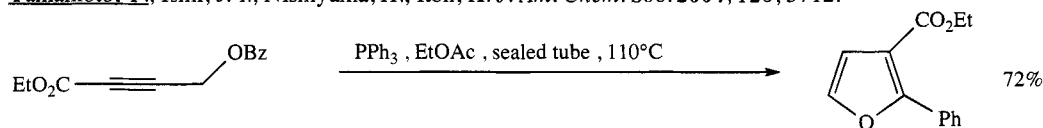
Kinoshita, H.; Shinokubo, H.; Oshima, K. *J. Am. Chem. Soc.* **2003**, 125, 7784.



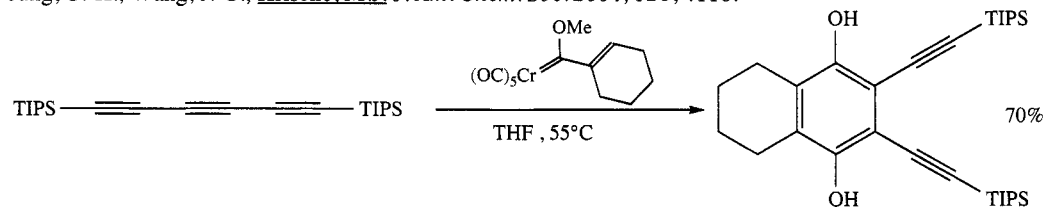
Landis, C.A.; Payne, M.M.; Eaton, D.L.; Anthony, J.E. *J. Am. Chem. Soc.* **2004**, 126, 1338.



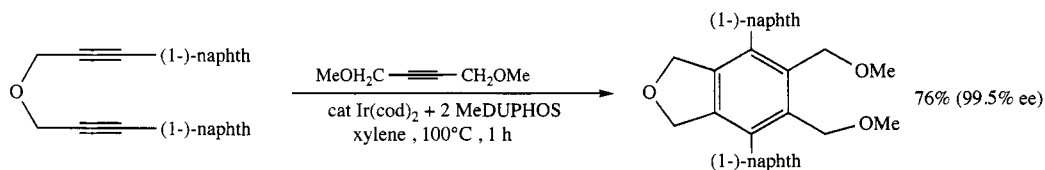
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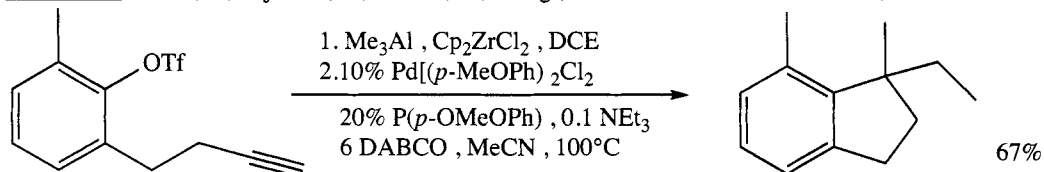
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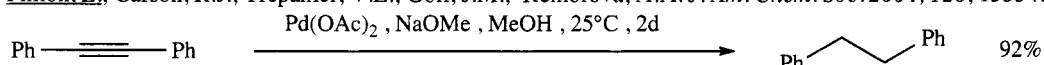
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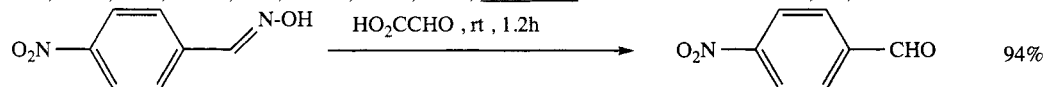
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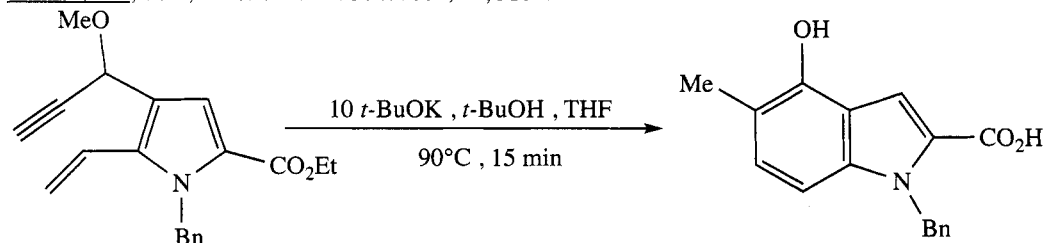
Fillion, E.; Carson, R.J.; Trépanier, V.E.; Goll, J.M.; Remorova, A.A. *J. Am. Chem. Soc.* **2004**, *126*, 15354.



Wei, L.-L.; Wei, L.-M.; Pan, W.-B.; Leou, S.-P.; Wu, M.-J. *Tetrahedron Lett.* **2003**, *44*, 1979.

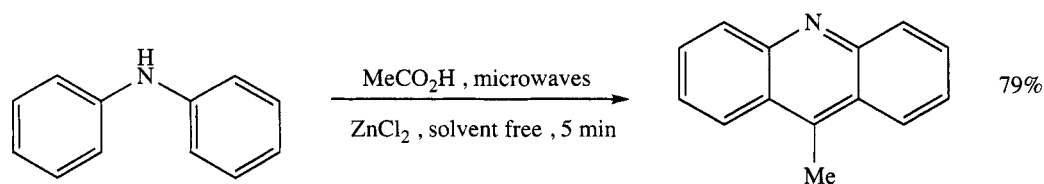


Chavan, S.P.; Soni, P. *Tetrahedron Lett.* **2004**, *45*, 3161.

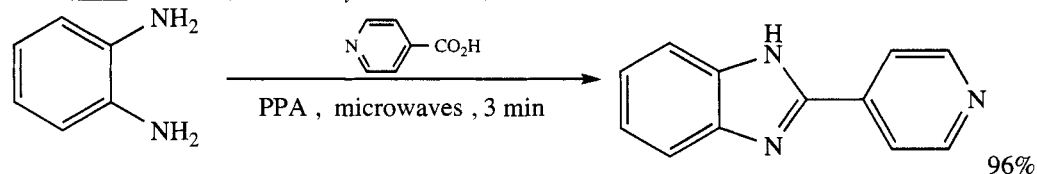


Hirayama, M.; Choshi, T.; Kumemura, T.; Tohyama, S.; Nobuhiro, J.; Hibino, S. *Heterocycles* **2004**, *63*, 1765.

SECTION 62: ALKYLs, METHYLENES, AND ARYLs FROM ACID DERIVATIVES

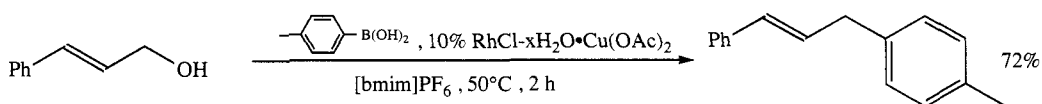


Koshima, H.; Kutsunai, K. *Heterocycles* **2002**, *57*, 1299.

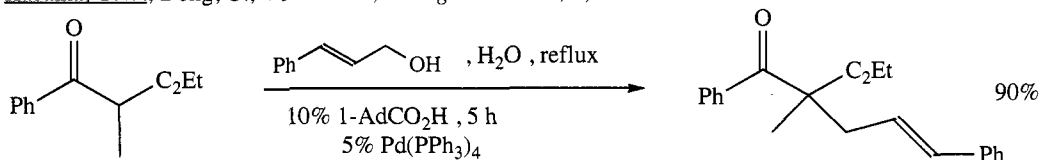


Yu, H.; Kawanishi, H.; Koshima, H. *Heterocycles* **2003**, *60*, 1457.

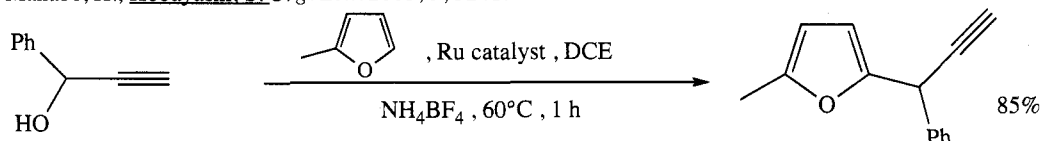
SECTION 63: ALKYL, METHYLENES, AND ARYL FROM ALCOHOLS AND THIOLS



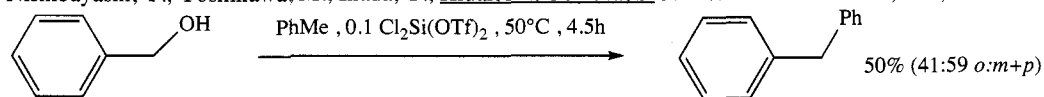
Kabalka, G.W.; Dong, G.; Venkataiah, B. *Org. Lett.* **2003**, 5, 893.



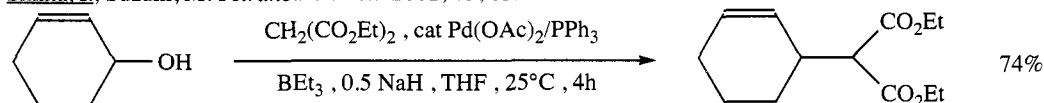
Manabe, K.; Kobayashi, S. *Org. Lett.* **2003**, 5, 3241.



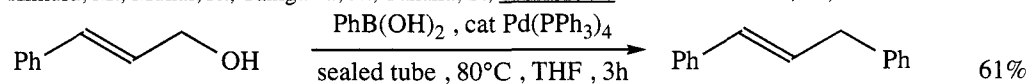
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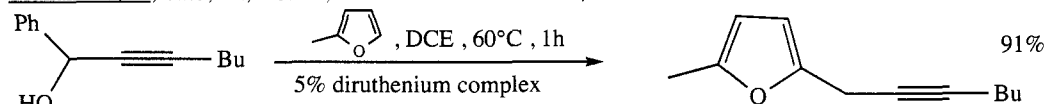
Shiina, I.; Suzuki, M. *Tetrahedron Lett.* **2002**, 43, 6391.



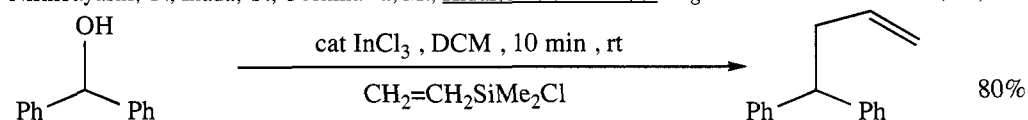
Kimura, M.; Mukai, R.; Tanigawa, N.; Tanaka, S.; Tamaru, Y. *Tetrahedron* **2003**, 59, 7767.



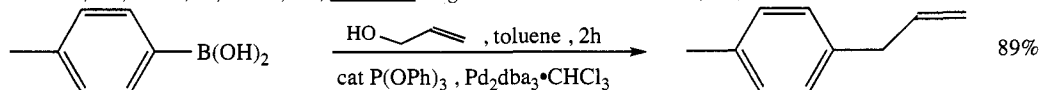
Tsukamoto, H.; Sato, M.; Kondo, Y. *Chem. Commun.* **2004**, 1200.



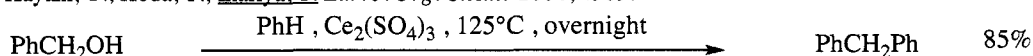
Nishibayashi, Y.; Inada, Y.; Yoshikawa, M.; Hidai, M.; Uemura, S. *Angew. Chem. Int. Ed.* **2003**, 42, 1495.



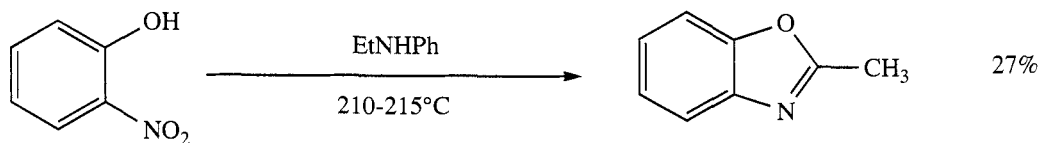
Yasuda, M.; Saito, T.; Ueba, M.; Baba, A. *Angew. Chem. Int. Ed.* **2004**, 43, 1414.



Kayaki, Y.; Koda, T.; Ikariya, T. *Eur. J. Org. Chem.* **2004**, 4989.

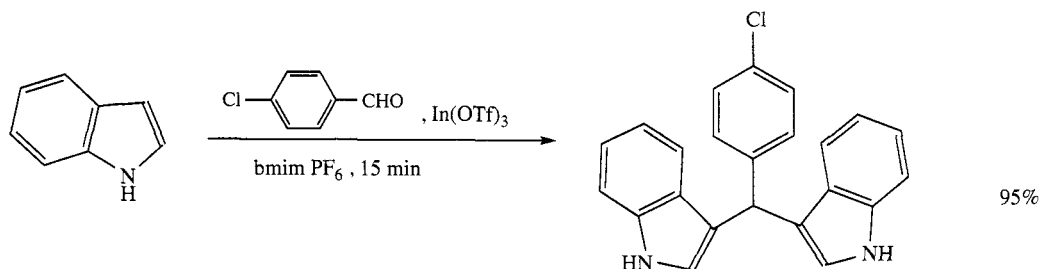


Li, J.-H.; Liu, W.-J.; Yin, D.-L. *Synth. Commun.* **2004**, 34, 3161.

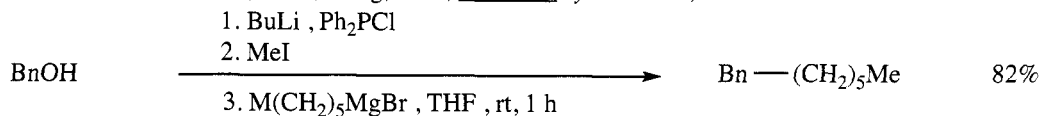


Nishioka, H.; Ohmori, Y.; Iba, Y.; Tsuda, E.; Hrayama, T. *Heterocycles* **2004**, 64, 193.

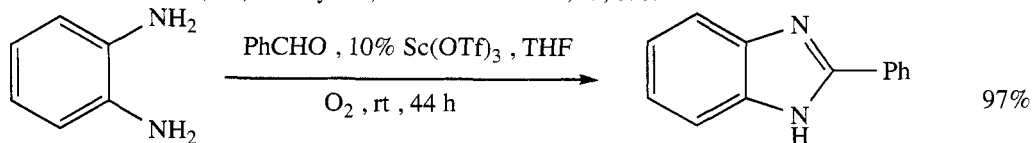
SECTION 64: ALKYLs, METHYLENES, AND ARYLs FROM ALDEHYDES



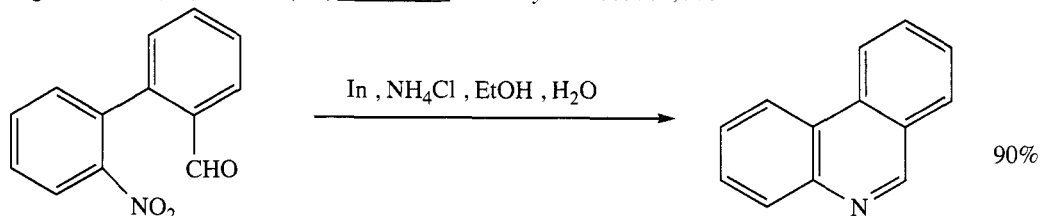
Ji, S.-J.; Zhou, M.-F.; Gu, D.-G.; Wang, S.-Y.; Loh, T.-P. *Synlett* **2003**, 2077.



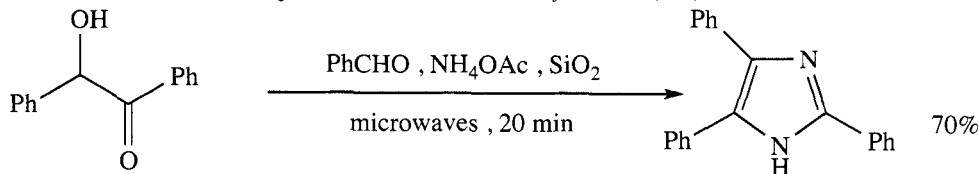
Shintou, T.; Kikuchi, W.; Mukaiyama, T. *Chem Lett.* **2003**, 32, 676.



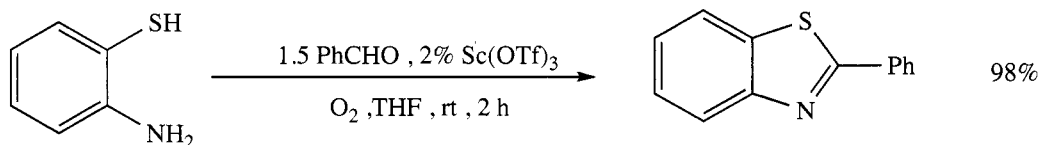
Nagata, K.; Itoh, T.; Ishikawa, H.; Ohsawa, A. *Heterocycles* **2003**, 61, 93.



Banik, B.K.; Banik, I.; Samajdar, S.; Wilson, M. *Heterocycles* **2004**, 63, 283.



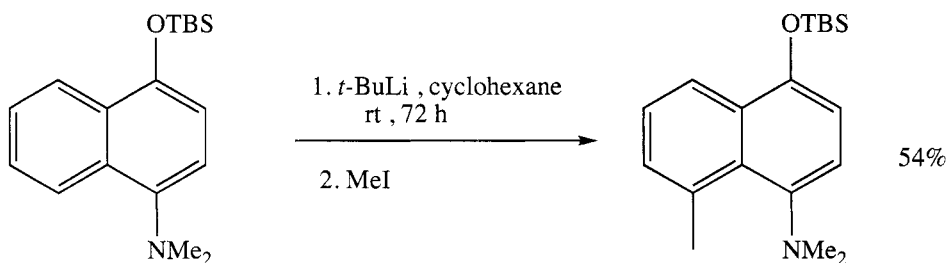
Xu, Y.; Wan, F.; Salehi, H.; Deng, W.; Guo, Q.-X. *Heterocycles* **2004**, 63, 1613.



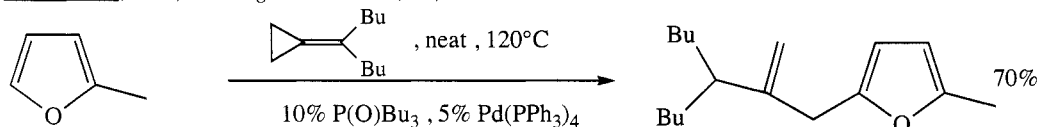
Itoh, T.; Nagata, K.; Ishikawa, H.; Ohsawa, A. *Heterocycles* **2004**, 63, 2769.

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

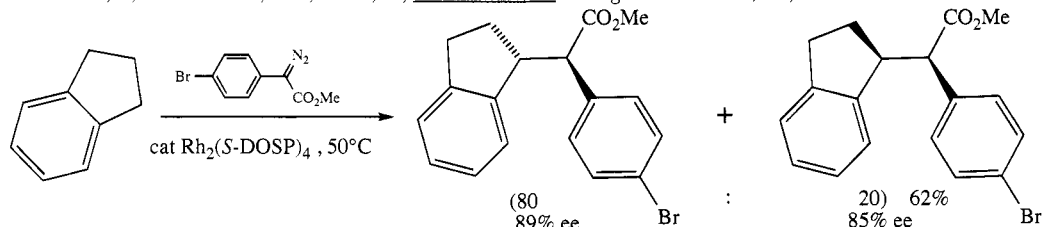
SECTION 65: ALKYLs, METHYLENES, AND ARYLs FROM ALKYLs, METHYLENES, AND ARYLs



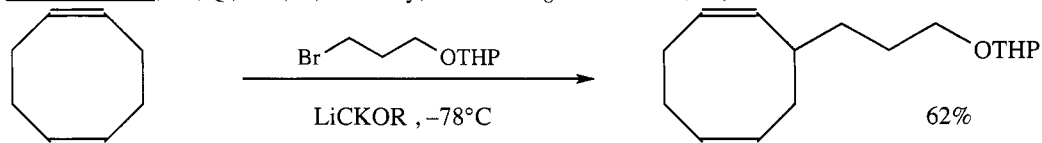
Kraus, G.A.; Kim, J. *J. Org. Chem.* **2002**, 67, 2358.



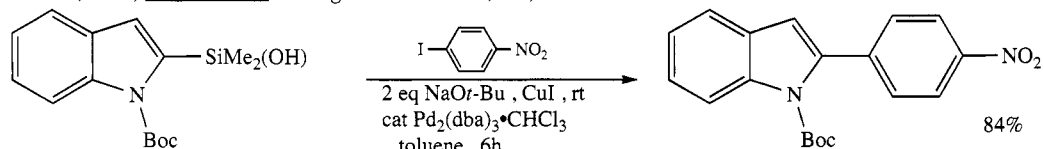
Nakamura, I.; Siriwardana, A.I.; Saito, S.; Yamamoto, Y. *J. Org. Chem.* **2002**, 67, 3445.



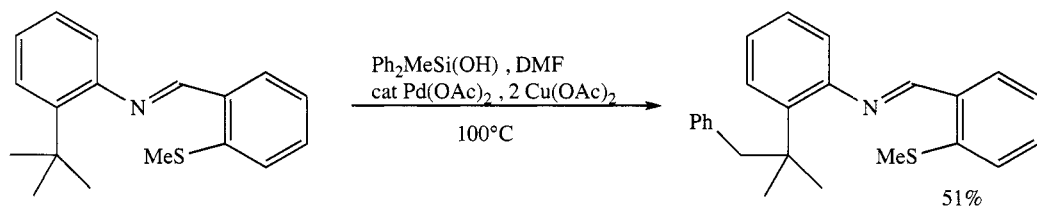
Davies, H.M.L.; Jin, Q.; Ren, P.; Kovalsky, A.Yu. *J. Org. Chem.* **2002**, 67, 4165.



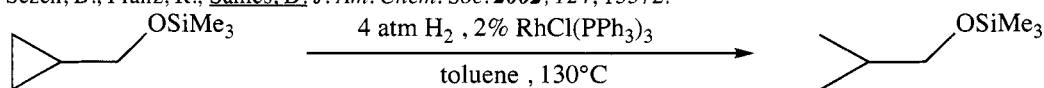
Revell, J.D.; Ganesan, A. *J. Org. Chem.* **2002**, 67, 6250.



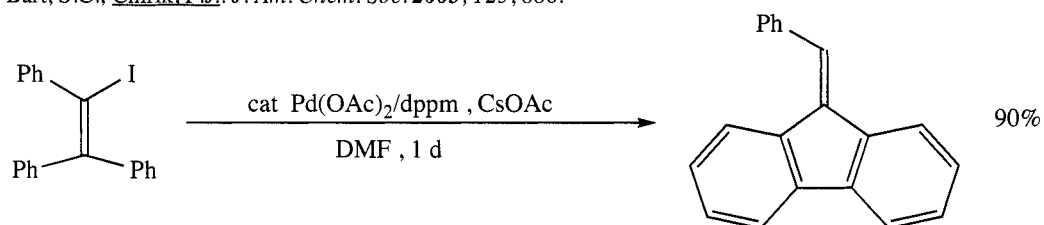
Denmark, S.E.; Baird, J.D. *Org. Lett.* **2004**, 6, 3649.



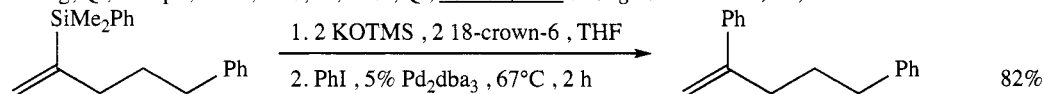
Sezen, B.; Franz, R.; Sames, D. *J. Am. Chem. Soc.* **2002**, *124*, 13372.



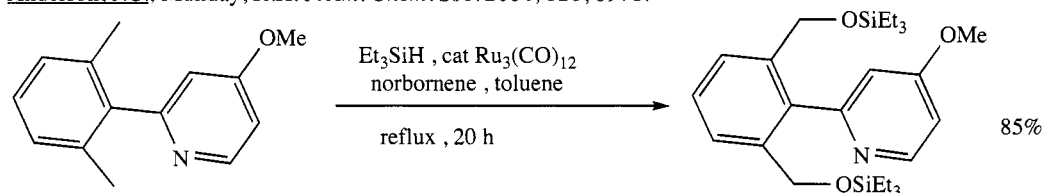
Bart, S.C.; Chirik, P.J.. *J. Am. Chem. Soc.* **2003**, *125*, 886.



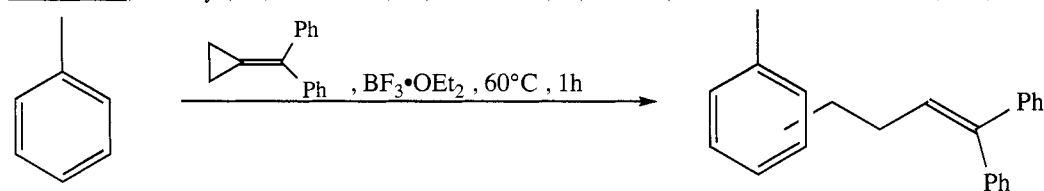
Huang, Q.; Campo, M.A.; Yao, T.; Tian, Q.; Larock, R.C. *J. Org. Chem.* **2004**, *69*, 8258.



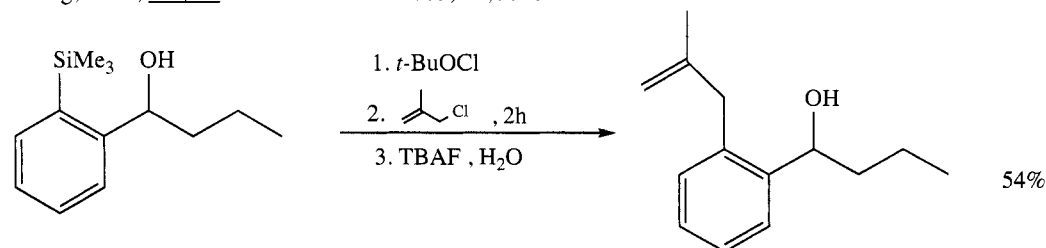
Anderson, J.C.; Munday, R.H. *J. Am. Chem. Soc.* **2004**, *126*, 8971.



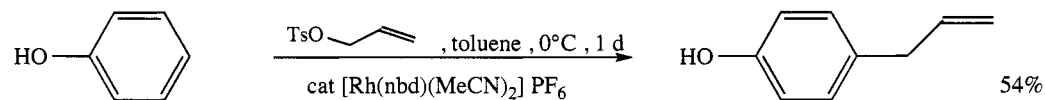
Kakiuchi, F.; Tsuchiya, K.; Matsumoto, M.; Mizushima, E.; Chatani, N. *J. Am. Chem. Soc.* **2004**, *126*, 12792.



Huang, J.-W.; Shi, M. *Tetrahedron Lett.* **2003**, *44*, 9343.



Taguchi, H.; Takami, K.; Tsubouchi, A.; Takeda, T. *Tetrahedron Lett.* **2004**, 45, 429.

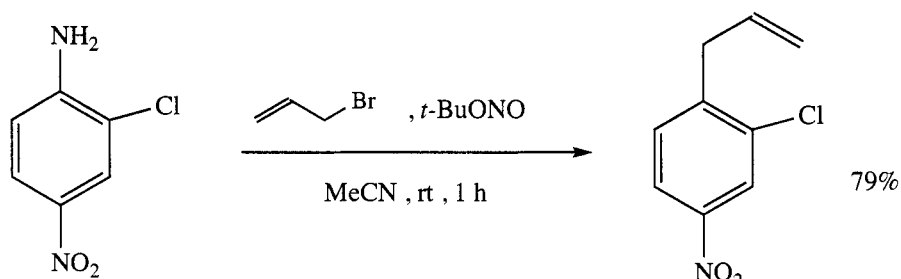


Tsukada, N.; Yagura, Y.; Sato, T.; Inoue, Y. *Synlett* 2003, 1431.

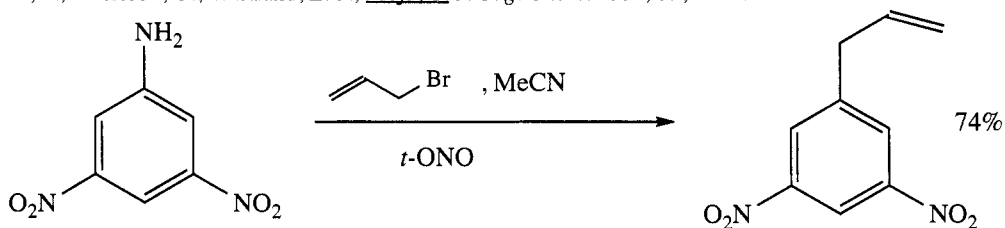
SECTION 66: ALKYL, METHYLENES, AND ARYL FROM AMIDES

NO ADDITIONAL EXAMPLES

SECTION 67: ALKYL, METHYLENES, AND ARYL FROM AMINES



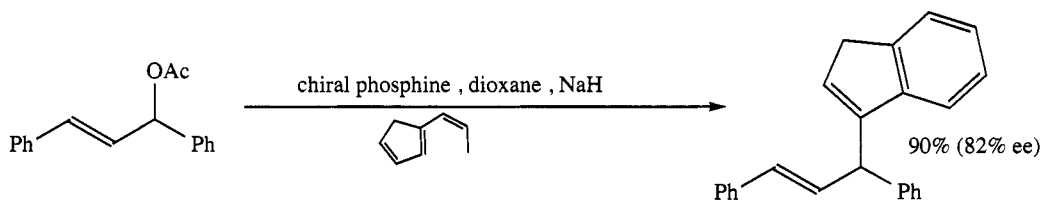
Ek, F.; Axelsson, O.; Wistrand, L.G.; Frejd, T. *J. Org. Chem.* 2002, 67, 6376.



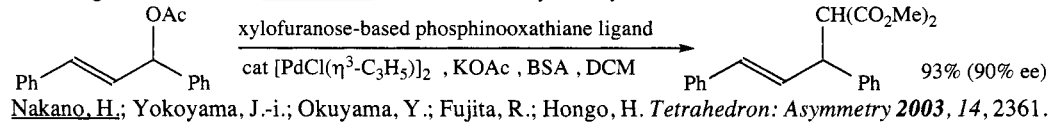
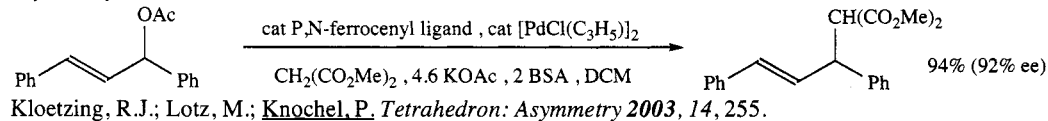
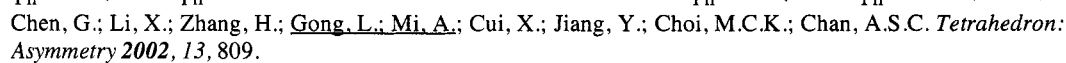
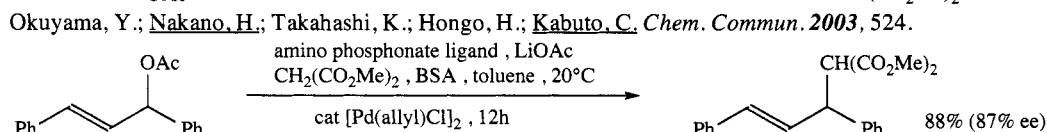
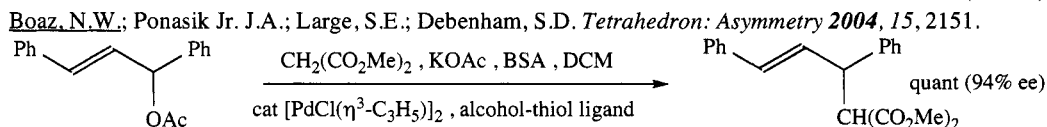
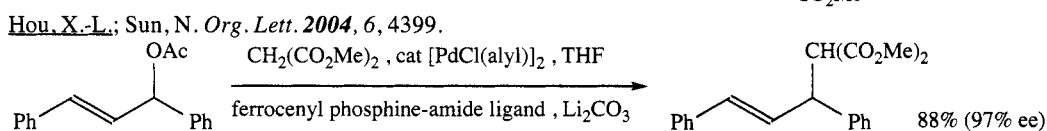
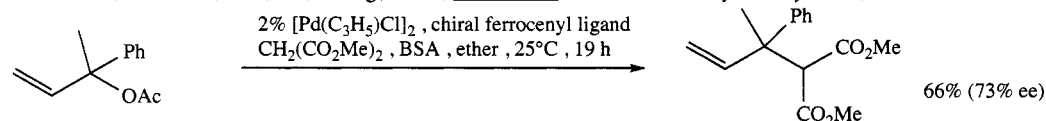
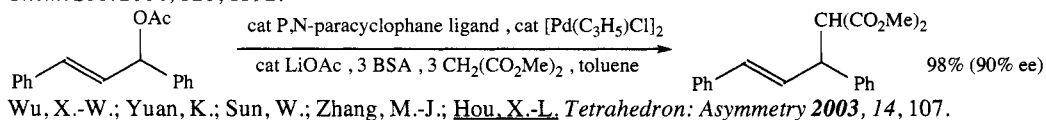
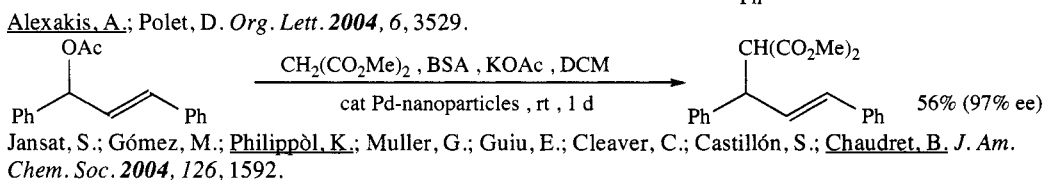
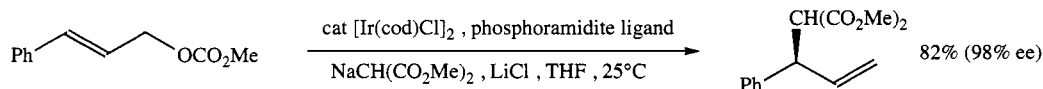
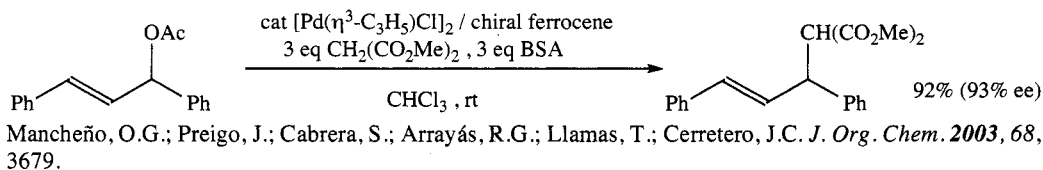
Ek, F.; Wistrand, L.G.; Frejd, T. *J. Org. Chem.* 2003, 68, 1911.

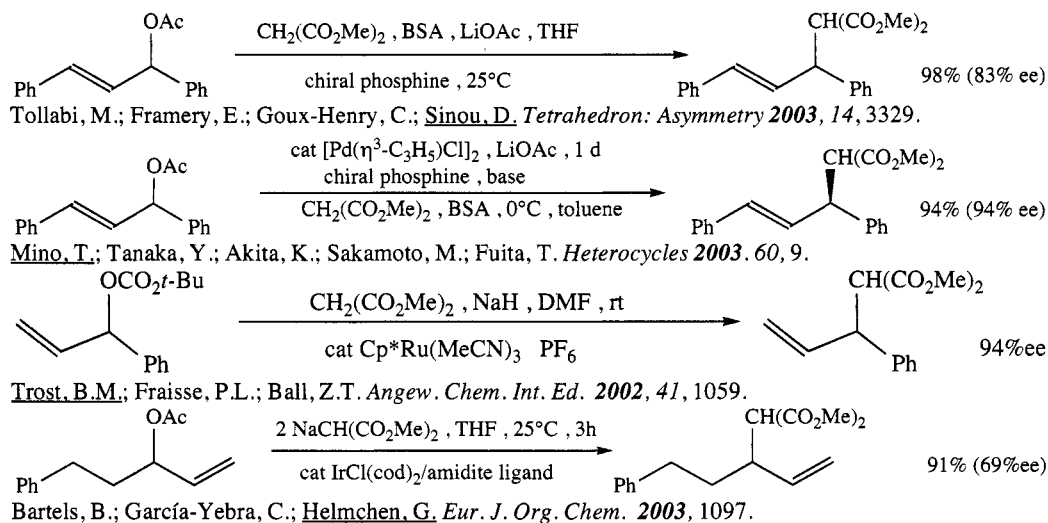
SECTION 68: ALKYL, METHYLENES, AND ARYL FROM ESTERS

ASYMMETRIC CONVERSIONS

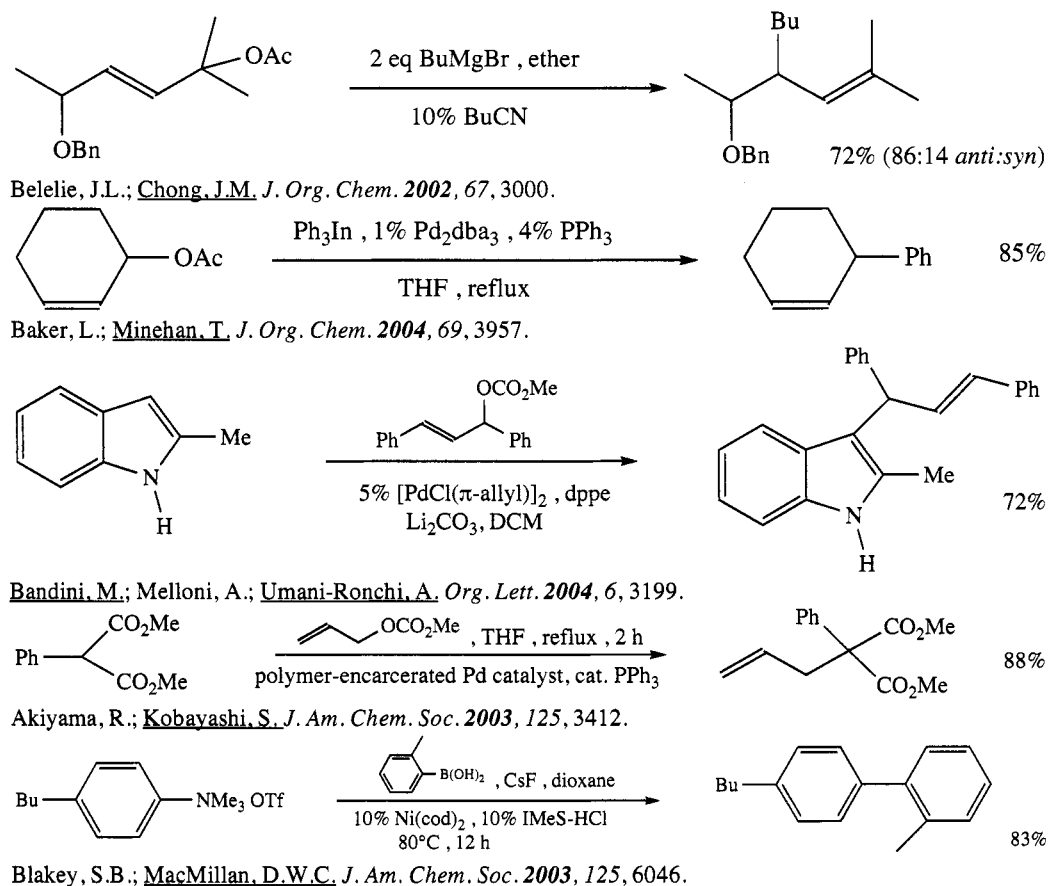


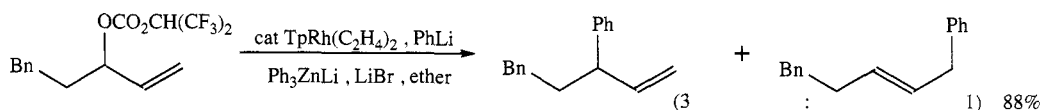
Hayashi, T.; Suzuka, T.; Okada, A.; Kawatsura, M. *Tetrahedron: Asymmetry* 2004, 15, 545.



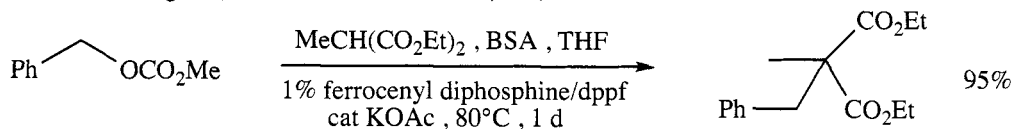


NONASYMMETRIC CONVERSIONS

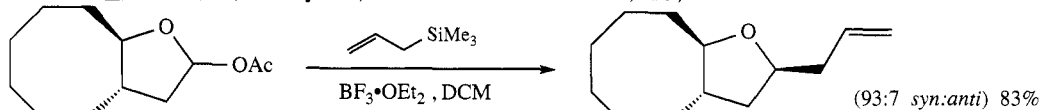




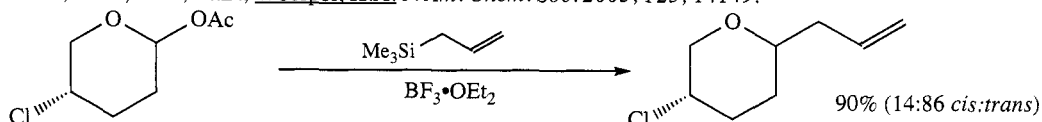
Evans, P.A.; Uraguchi, D. *J. Am. Chem. Soc.* **2003**, *125*, 7158.



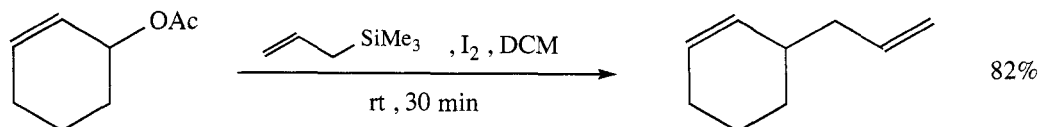
Kuwano, R.; Kondo, Y.; Matsuyama, Y. *J. Am. Chem. Soc.* **2003**, *125*, 12104.



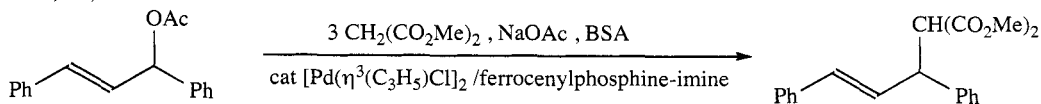
Smith, D.M.; Tran, M.B.; Woerpel, K.A. *J. Am. Chem. Soc.* **2003**, *125*, 14149.



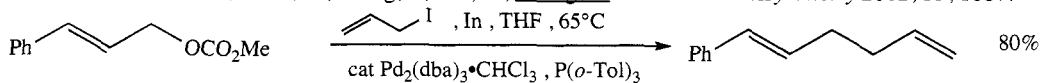
Ayala, L.; Lucero, C.G.; Romero, J.A.C.; Tabacco, S.A.; Woerpel, K.A. *J. Am. Chem. Soc.* **2003**, *125*, 15521.



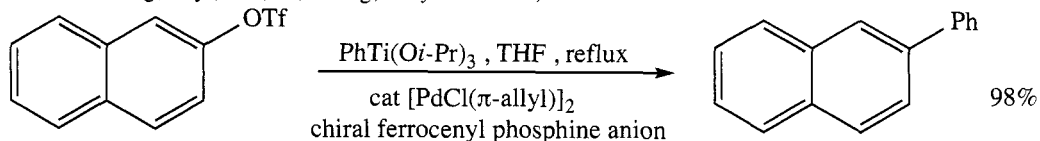
Yadav, J.S.; Reddy, B.V.S.; Rao, K.V.; Raj, K.S.; Rao, P.P.; Prasad, A.R.; Gunasekar, D. *Tetrahedron Lett.* **2004**, *45*, 6505.



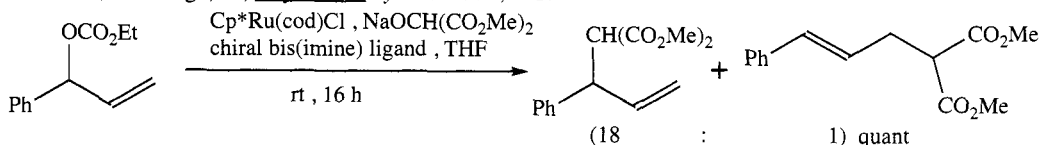
Hu, X.; Dai, H.; Hu, X.; Chen, H.; Wang, J.; Bai, C.; Zheng, Z. *Tetrahedron: Asymmetry* **2002**, *13*, 1687.



Lee, P.H.; Sung, S.-y.; Lee, K.; Chang, S. *Synlett* **2002**, 146.



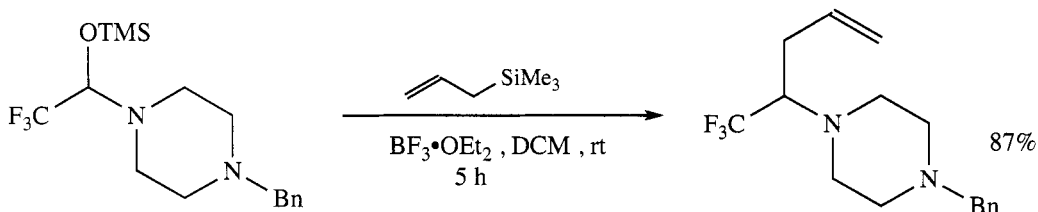
Han, J.W.; Tokunaga, N.; Hayashi, T. *Synlett* **2002**, 871.



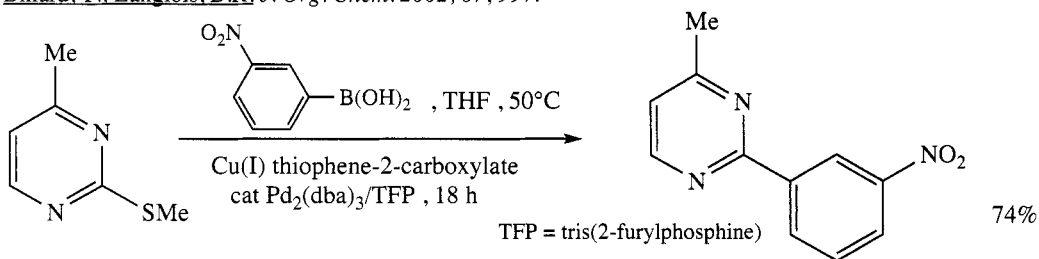
Renaud, J.-L.; Bruneau, C.; Demersean, B. *Synlett* **2003**, 408.

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

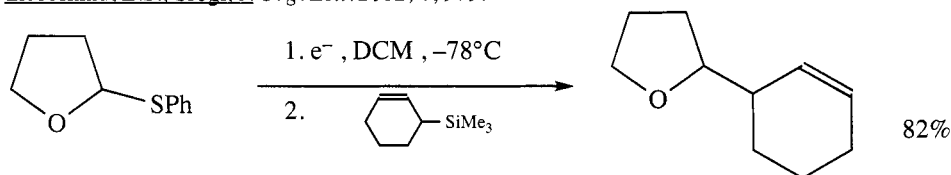
The conversion $ROR \rightarrow RR'$ ($R' = \text{alkyl, aryl}$) is included in this section.



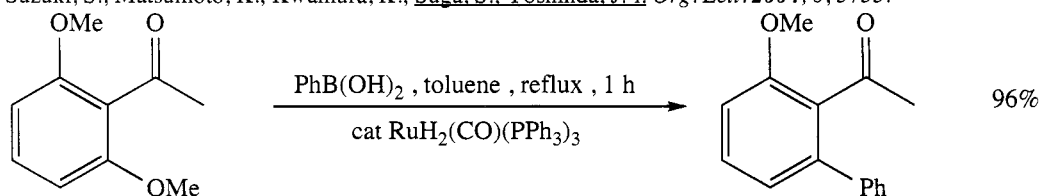
Billard, T.; Langlois, B.R. *J. Org. Chem.* **2002**, 67, 997.



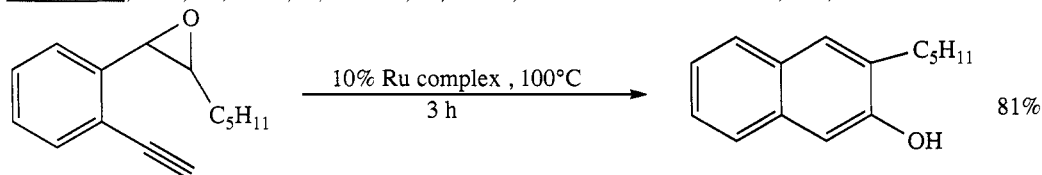
Liebeskind, L.S.; Srogl, J. *Org. Lett.* **2002**, 4, 979.



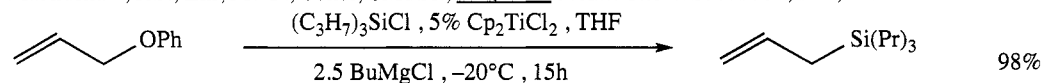
Suzuki, S.; Matsumoto, K.; Kwamura, K.; Suga, S.; Yoshinda, J.-i. *Org. Lett.* **2004**, 6, 3755.



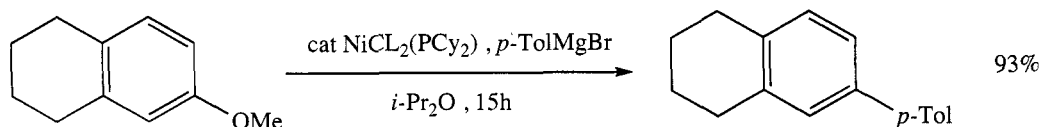
Kakiuchi, F.; Usai, M.; Ueno, S.; Chatani, N.; Murai, S. *J. Am. Chem. Soc.* **2004**, 126, 2706.



Madhushaw, R.J.; Lin, M.-Y.; Sohel, S.Md.A.; Liu, R.-S. *J. Am. Chem. Soc.* **2004**, 126, 6895.



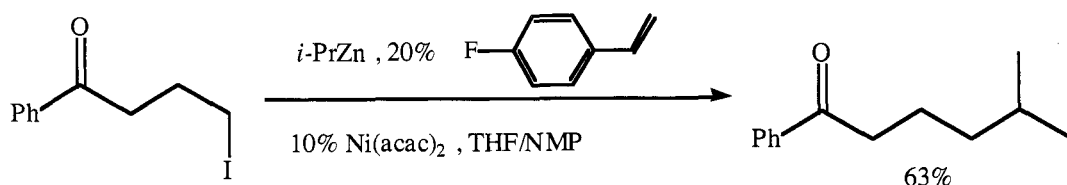
Nii, S.; Terao, J.; Kambe, N. *Tetrahedron Lett.* **2004**, 45, 1699.



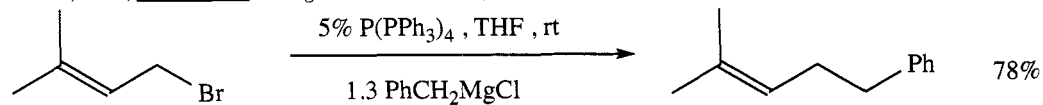
Dankwardt, J.W. *Angew. Chem. Int. Ed.* **2004**, 43, 2428.

SECTION 70: ALKYLs, METHYLENES, AND ARYLs FROM HALIDES AND SULFONATES

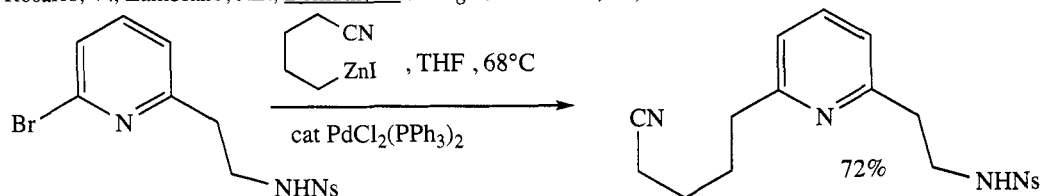
The replacement of halogen by alkyl or aryl groups is included in this section. For the conversion of $\text{RX} \rightarrow \text{RH}$ ($\text{X} = \text{halogen}$), see Section 160 (Hydrides from Halides and Sulfonates).



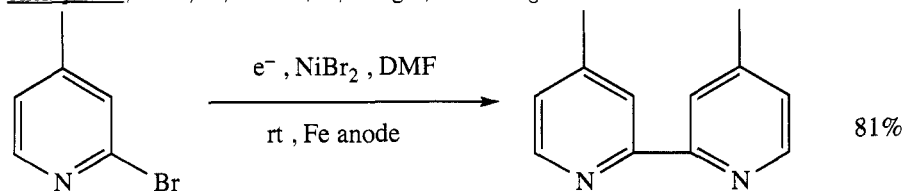
Jensen, A.E.; Knochel, P. *J. Org. Chem.* **2002**, 67, 79.



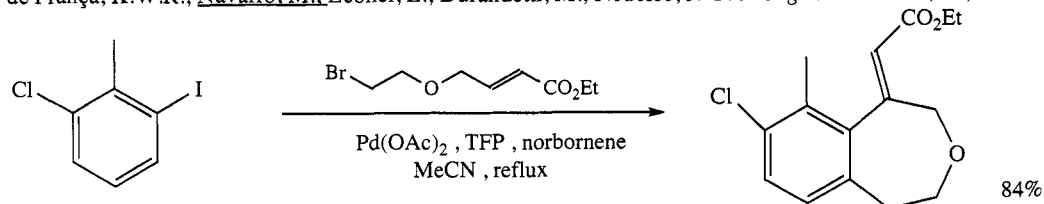
Rosales, V.; Zambrano, J.L.; Demuth, M. *J. Org. Chem.* **2002**, 67, 1167.



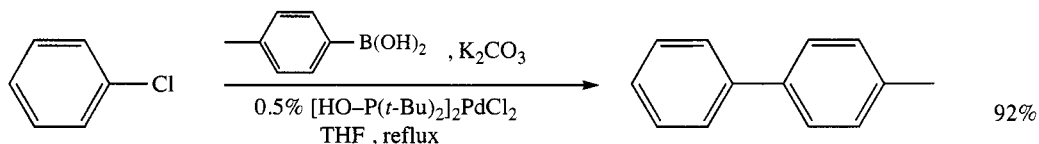
Skerlj, R.T.; Zhou, Y.; Wilson, T.; Bridger, G.J. *J. Org. Chem.* **2002**, 67, 1407.



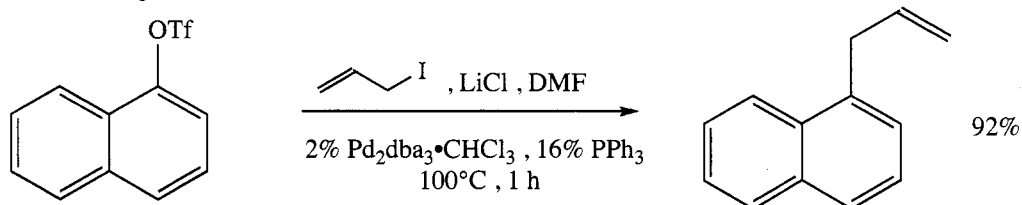
de França, K.W.R.; Navarro, M.; Léonel, É.; Durandetti, M.; Nédélec, J.-Y. *J. Org. Chem.* **2002**, 67, 1838.



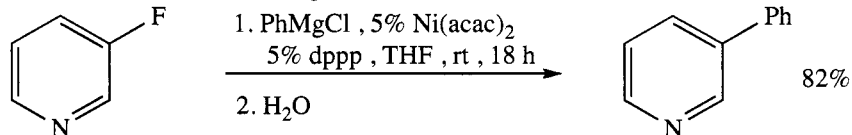
Zhang, J.; Li, C.-J. *J. Org. Chem.* **2002**, 67, 3972.



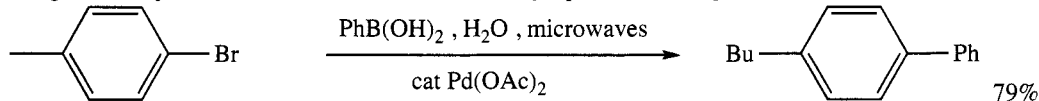
Li, G.Y. *J. Org. Chem.* **2002**, 67, 3643.



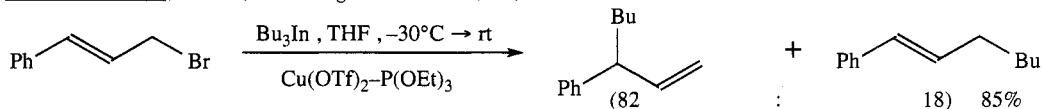
Lee, K.; Lee, J.; Lee, P.H. *J. Org. Chem.* **2002**, 67, 8265.



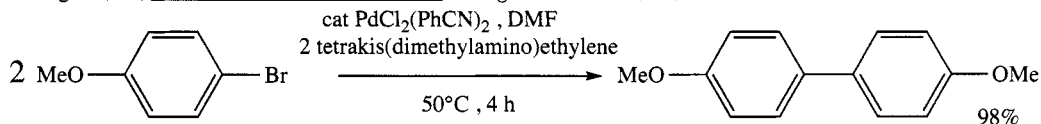
Mongin, F.; Mojovic, L.; Guillaumet, B.; Trécourt, F.; Quéquiner, G. *J. Org. Chem.* **2002**, 67, 8991.



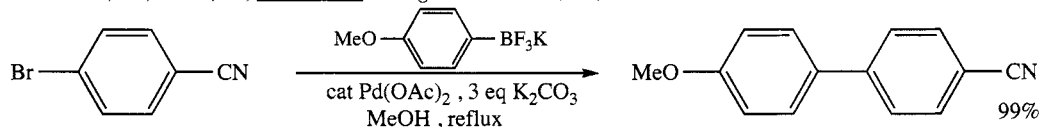
Leadbeater, N.E.; Marco, M. *J. Org. Chem.* **2003**, 68, 888.



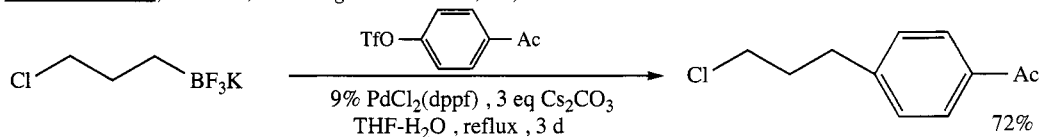
Rodríguez, D.; Sestelo, J.P.; Sarandeses, L.A. *J. Org. Chem.* **2003**, 68, 2518.



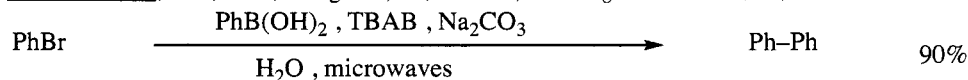
Kuroboshi, M.; Waki, Y.; Tanaka, H. *J. Org. Chem.* **2003**, 68, 3938.



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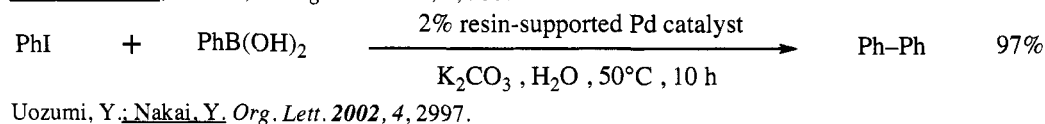
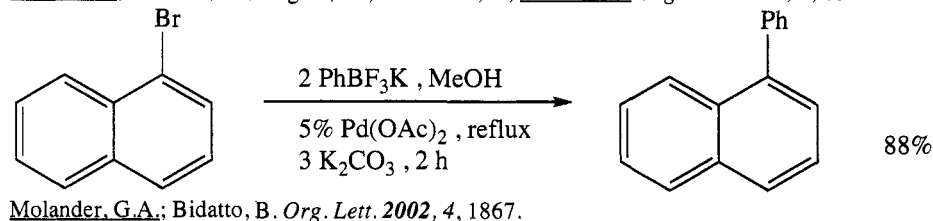
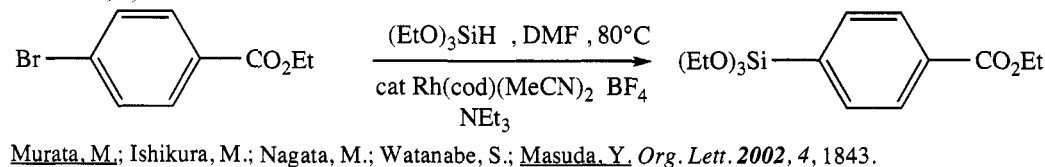
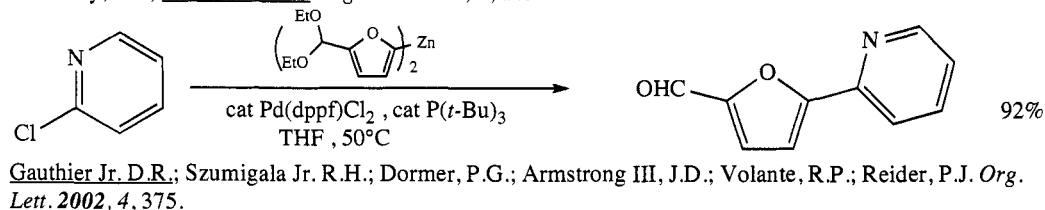
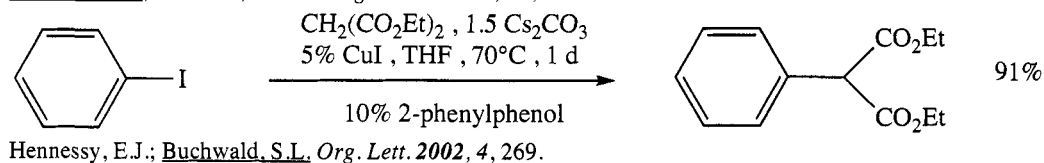
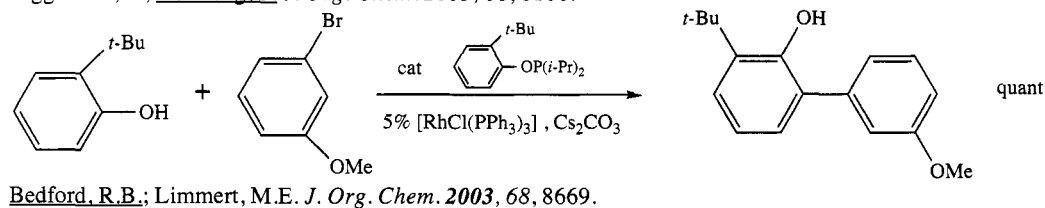
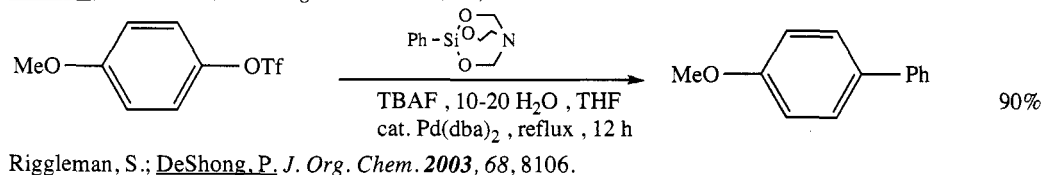
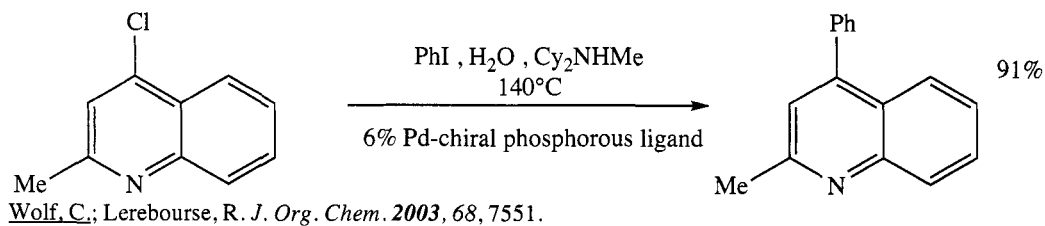


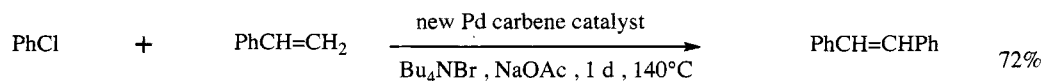
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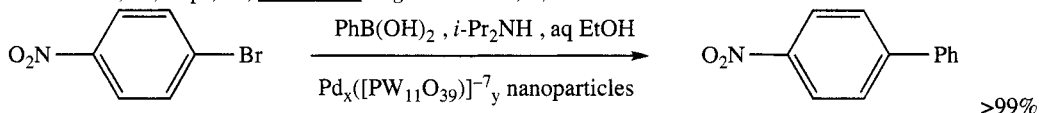
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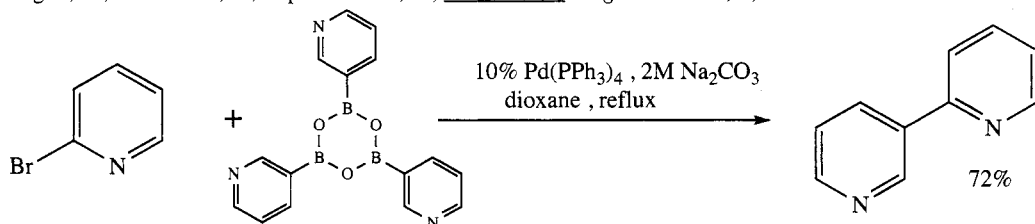




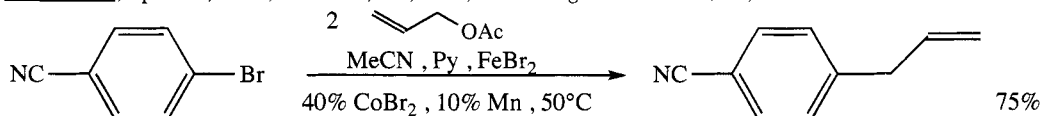
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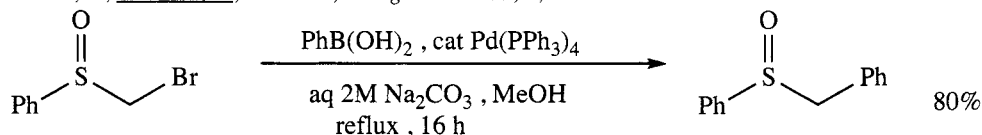
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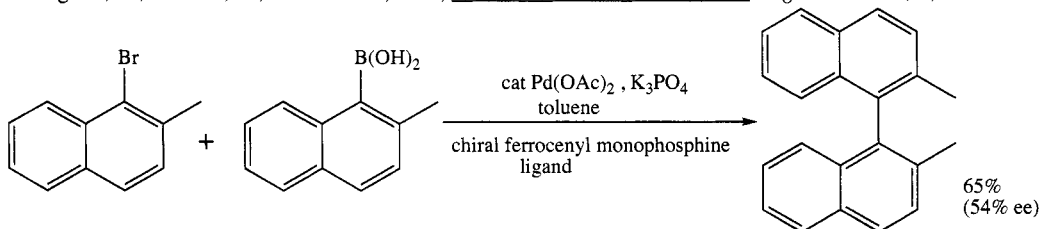
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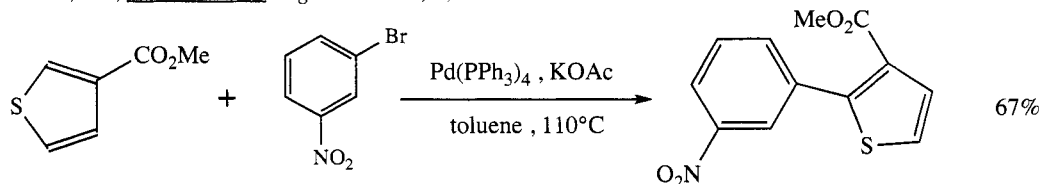
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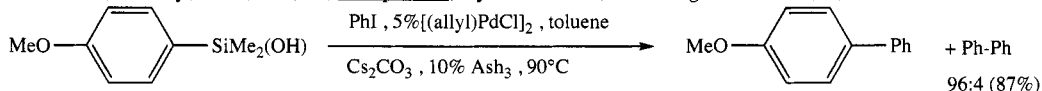
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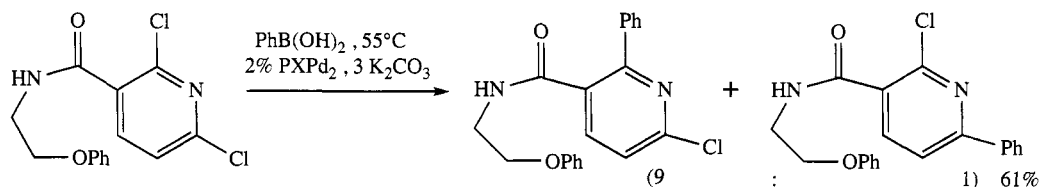
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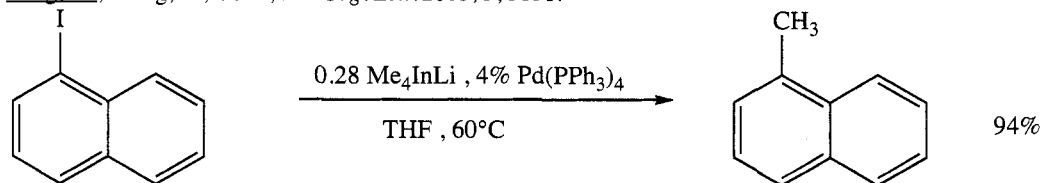
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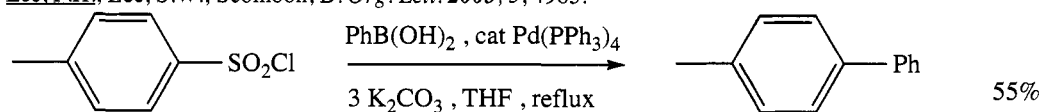
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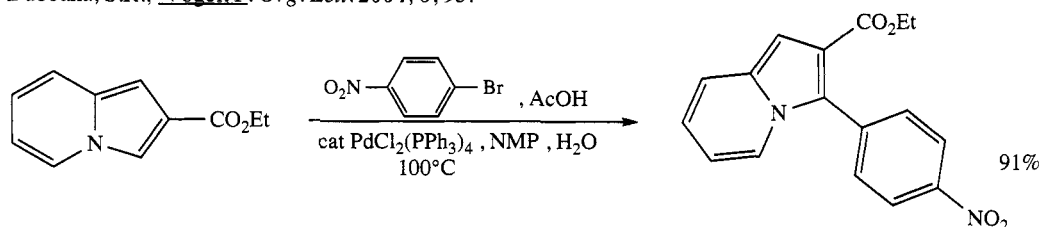
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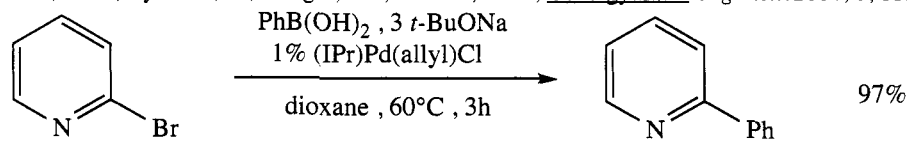
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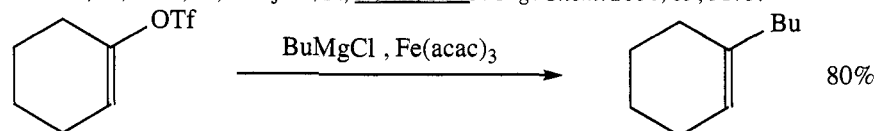
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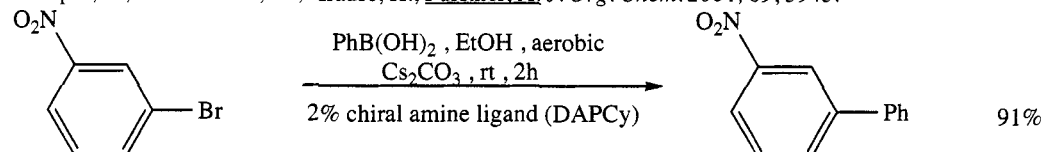
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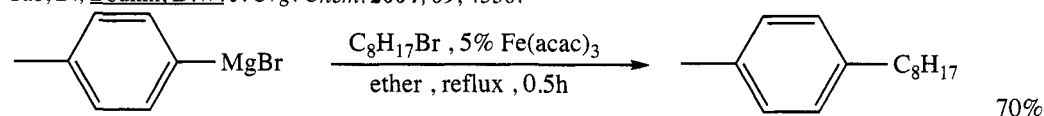
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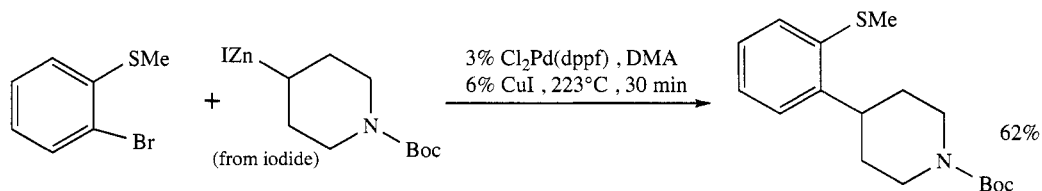
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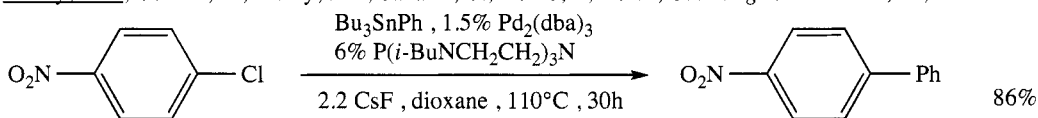
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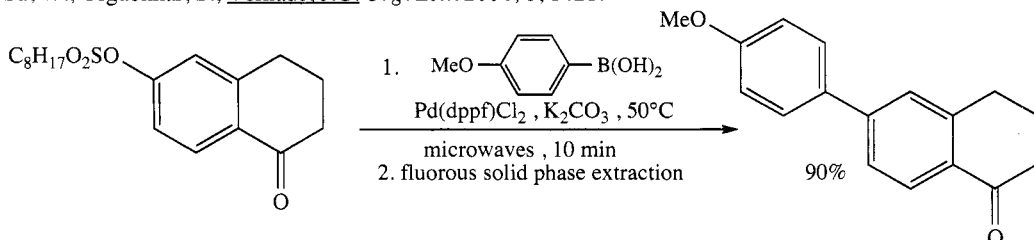
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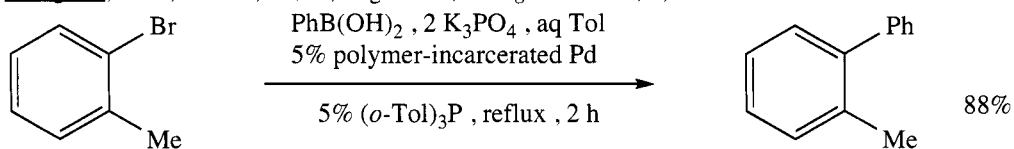
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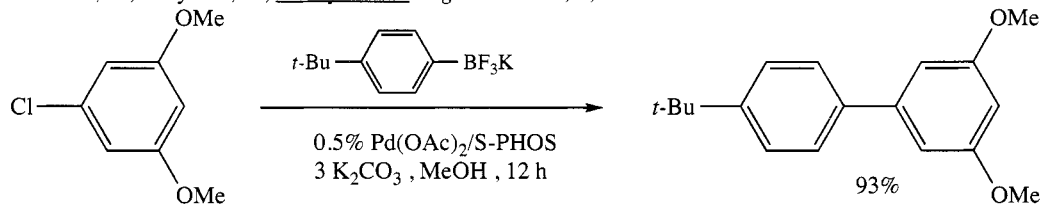
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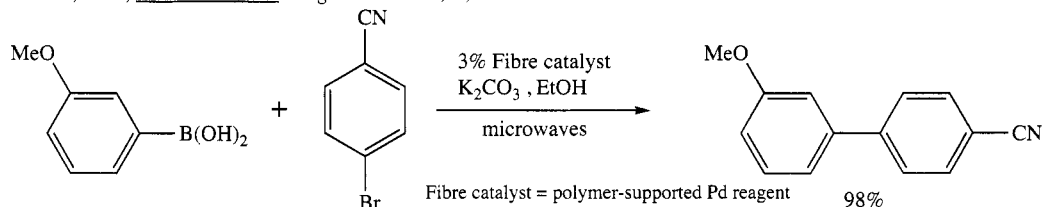
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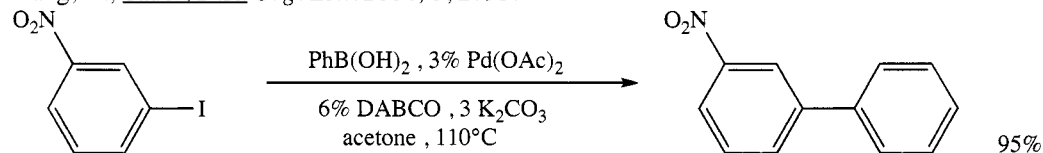
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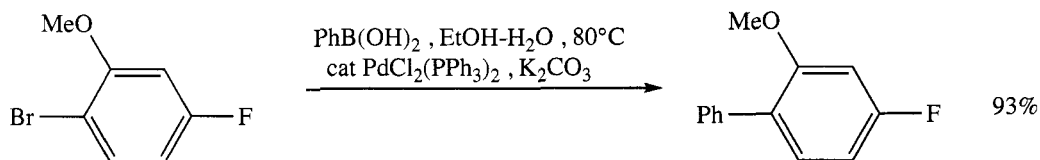
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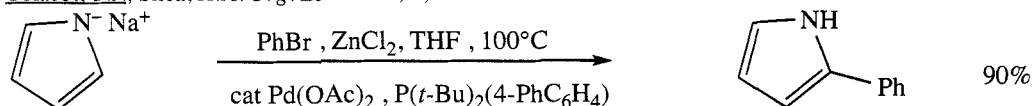
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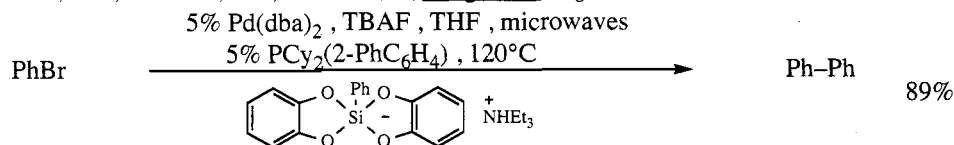
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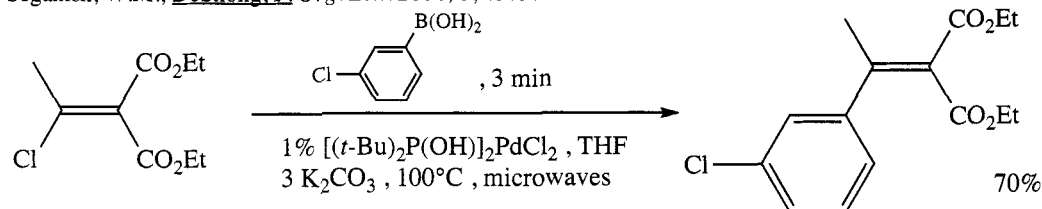
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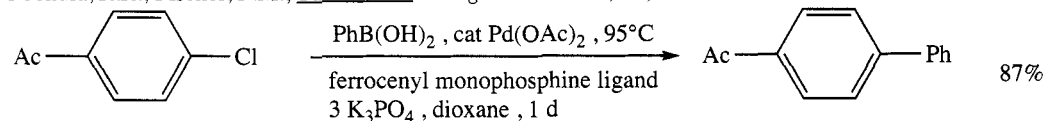
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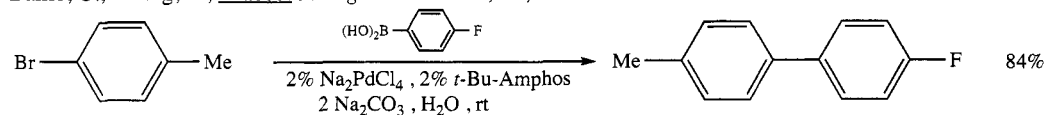
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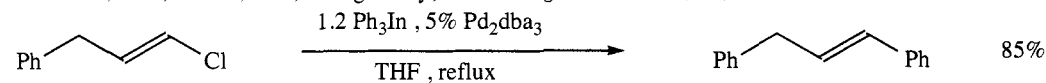
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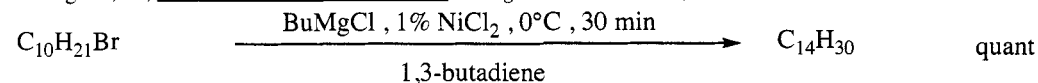
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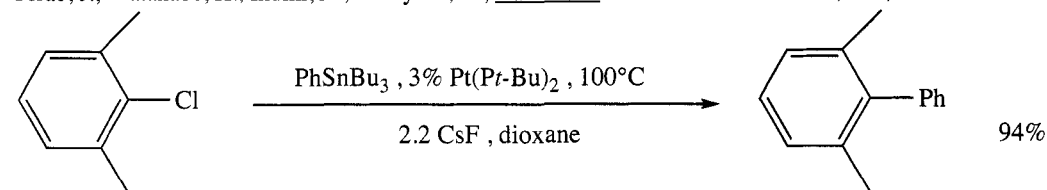
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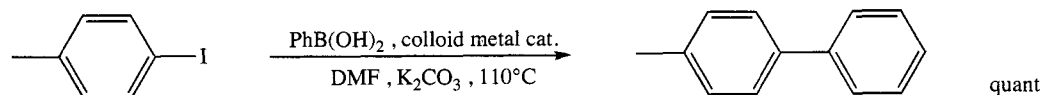
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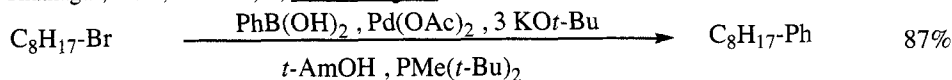
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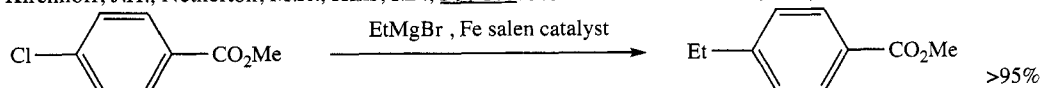
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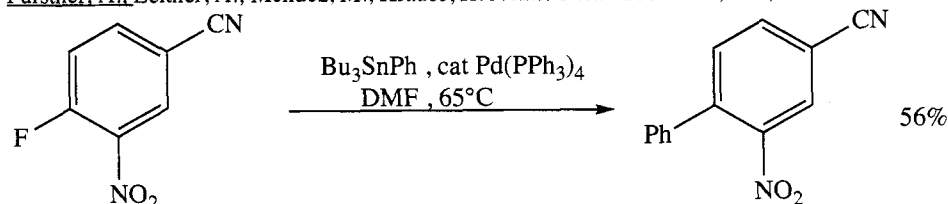
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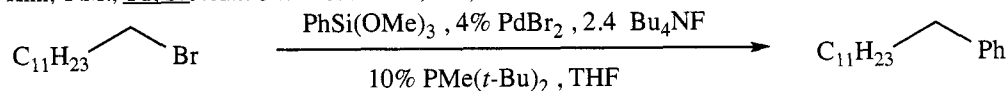
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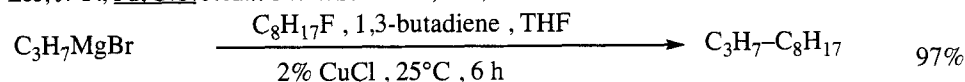
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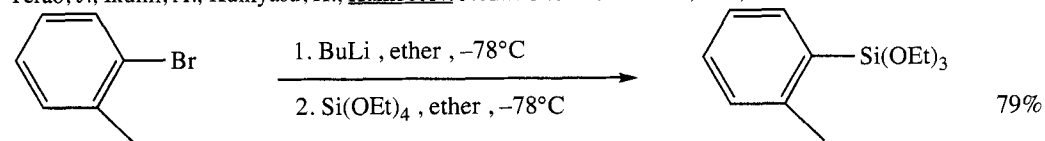
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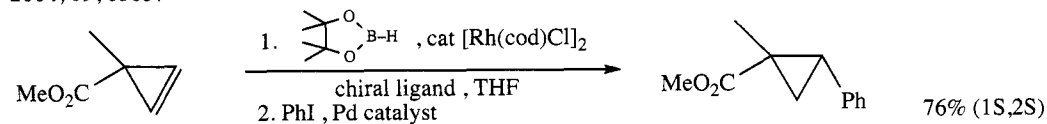
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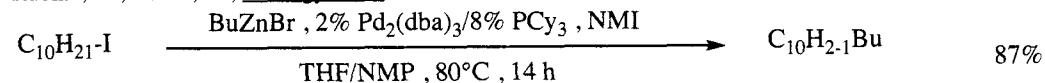
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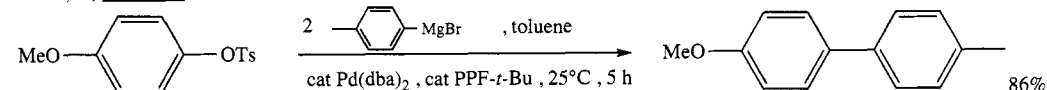
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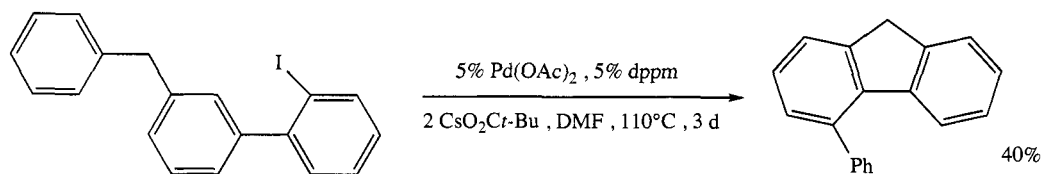
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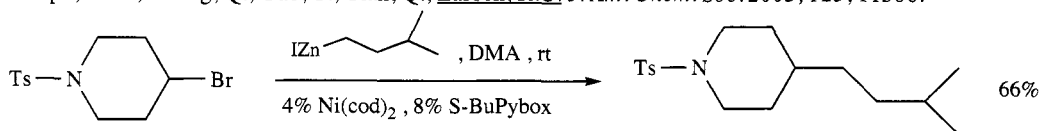
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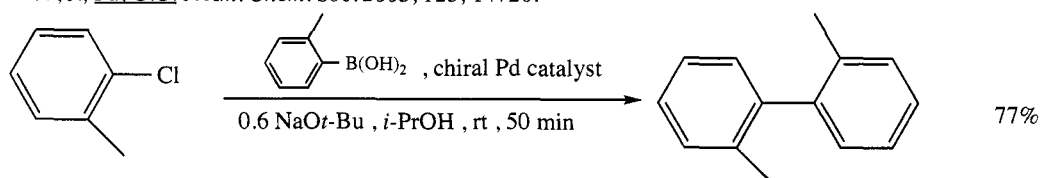
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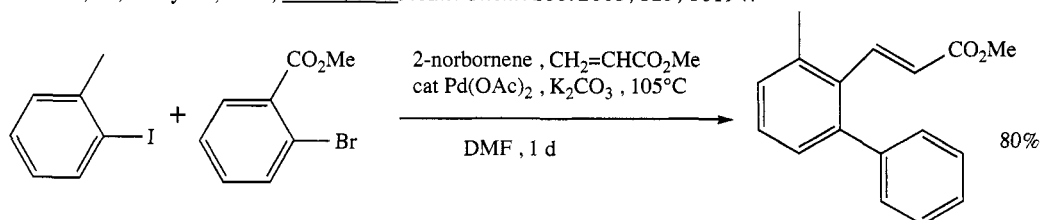
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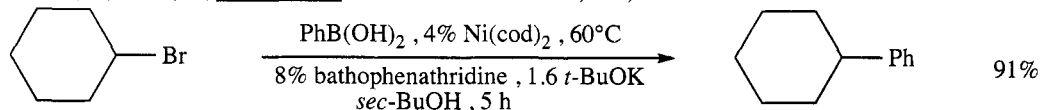
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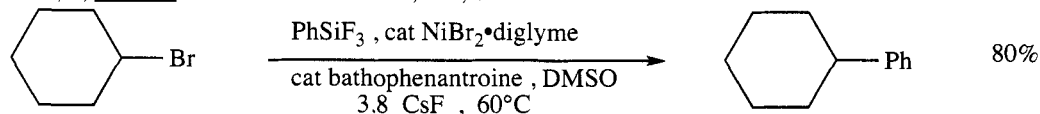
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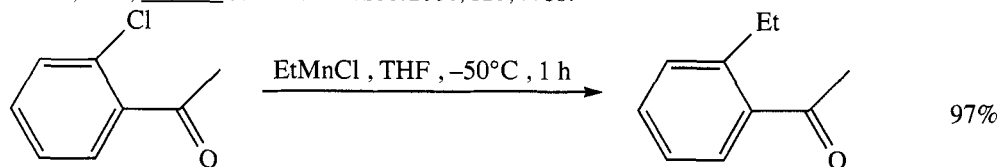
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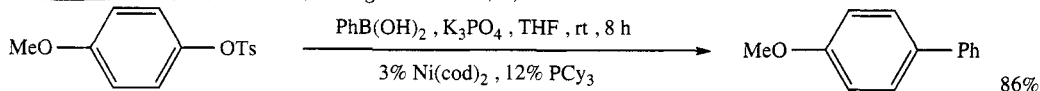
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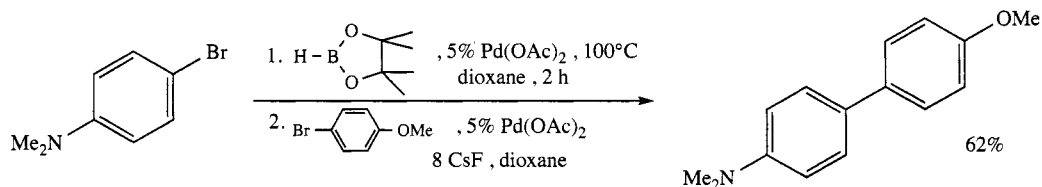
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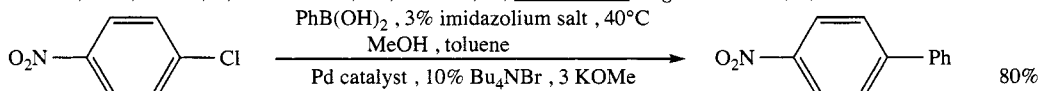
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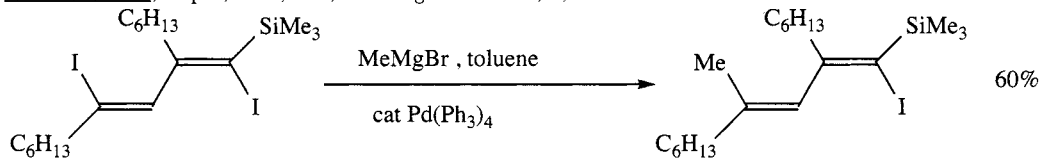
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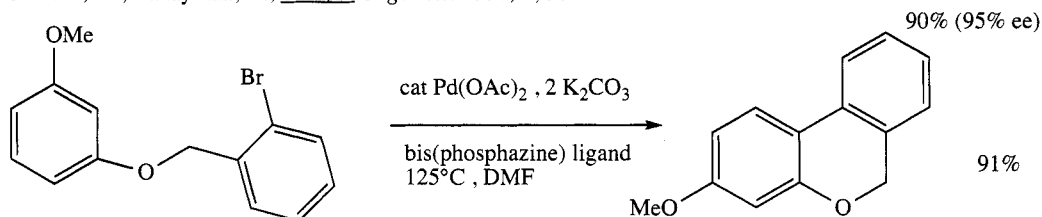
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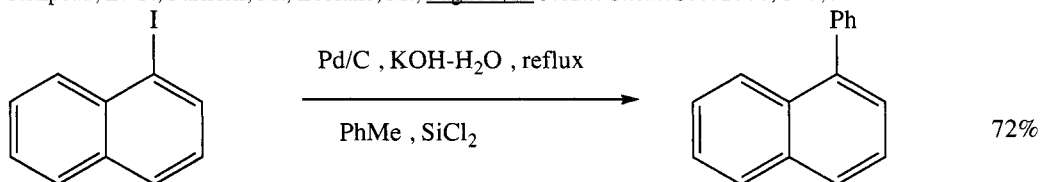
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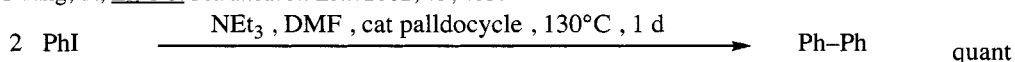
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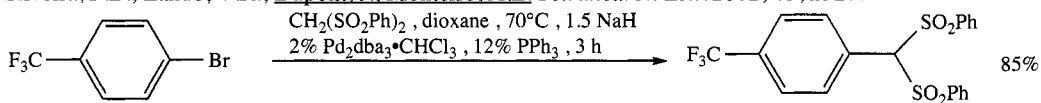
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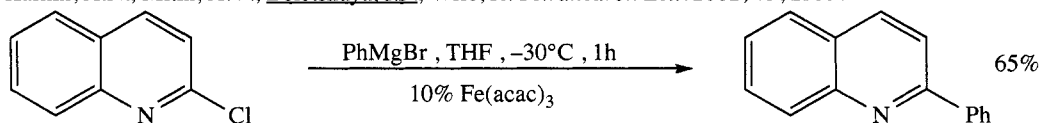
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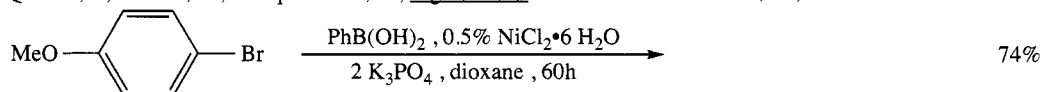
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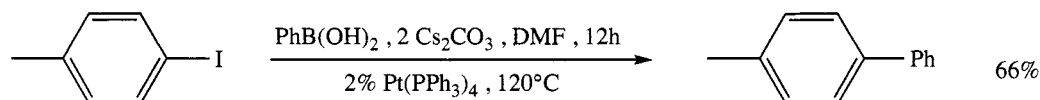
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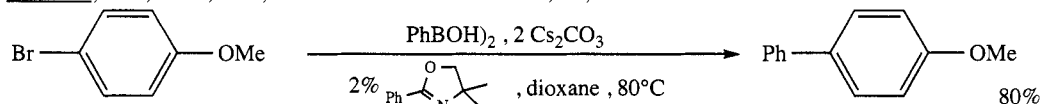
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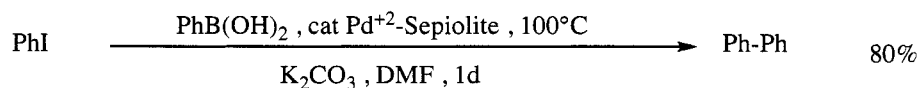
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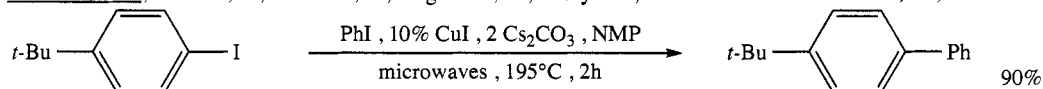
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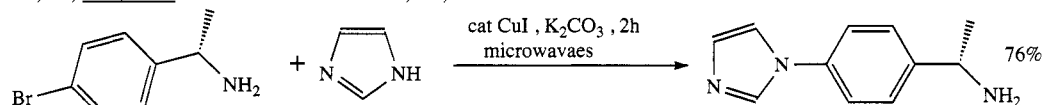
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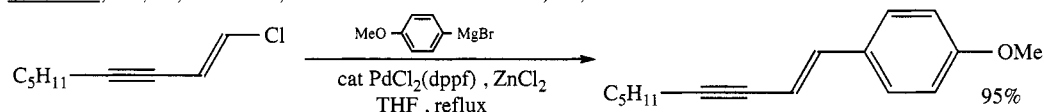
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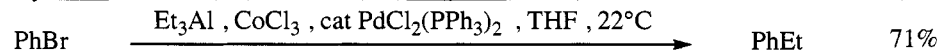
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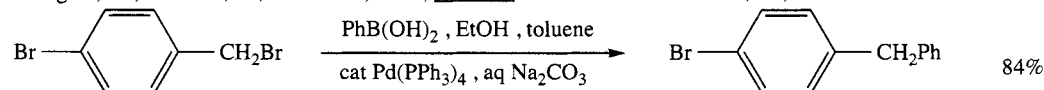
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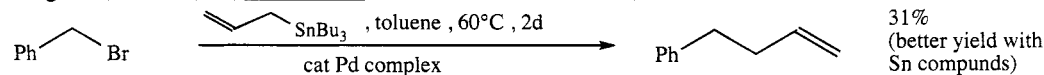
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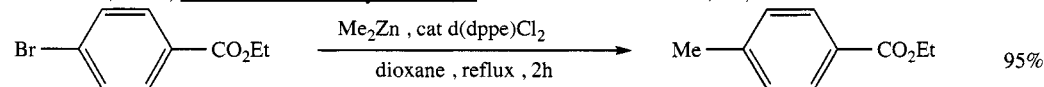
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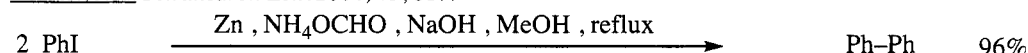
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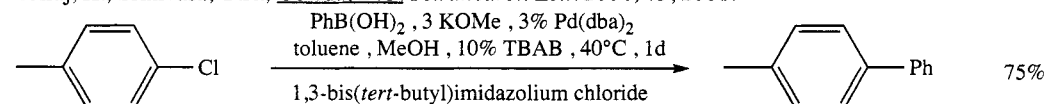
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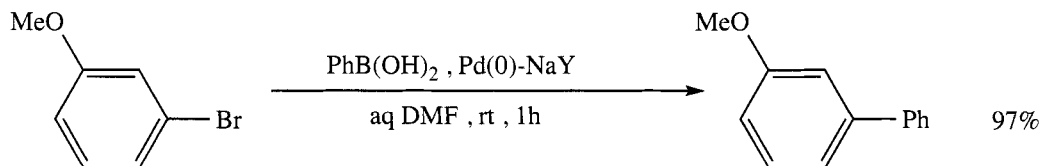
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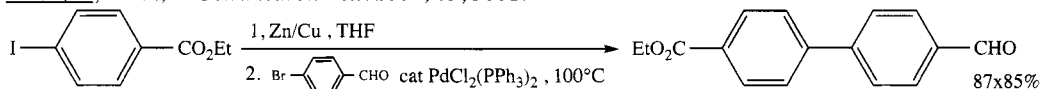
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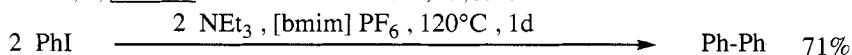
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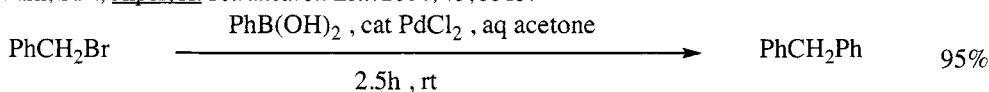
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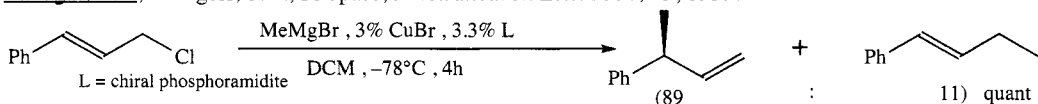
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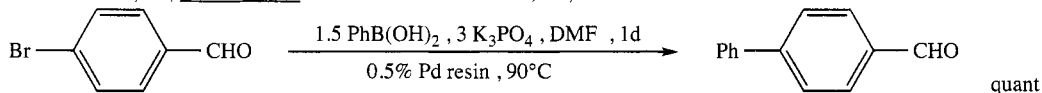
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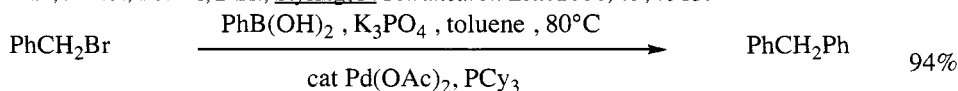
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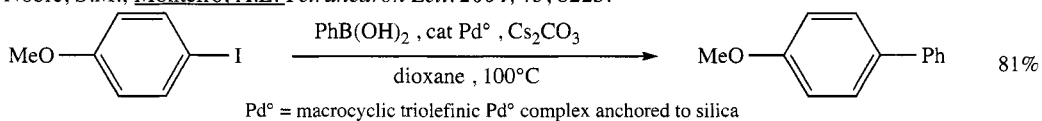
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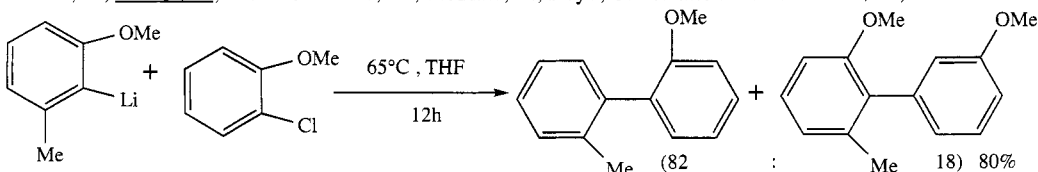


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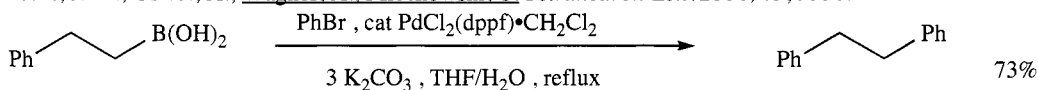


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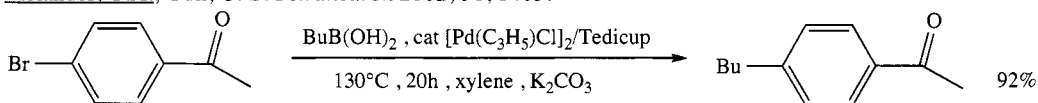
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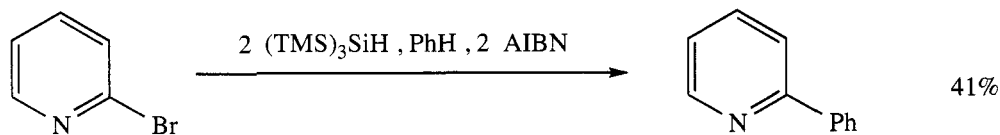
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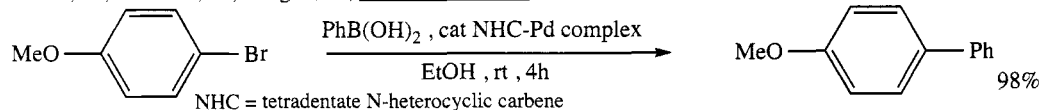
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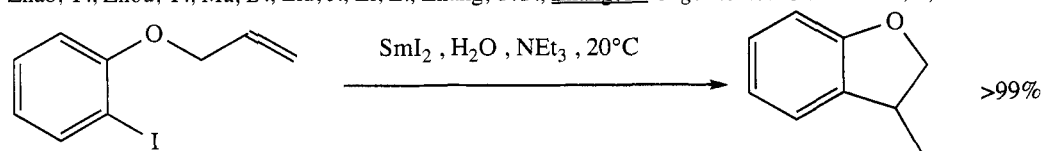
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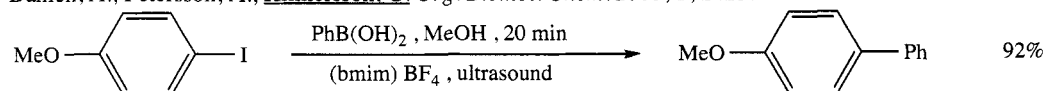
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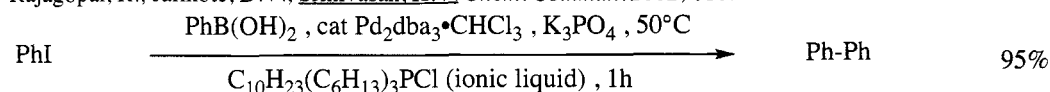
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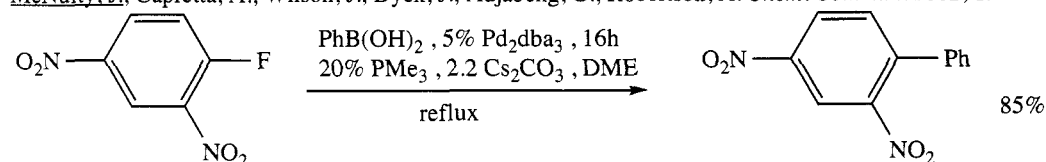
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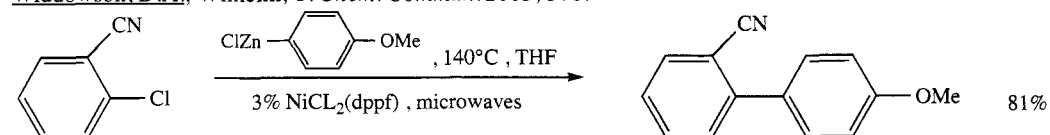
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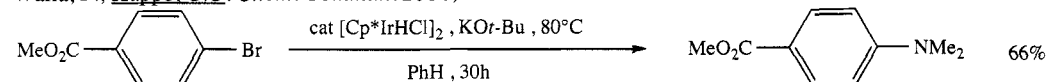
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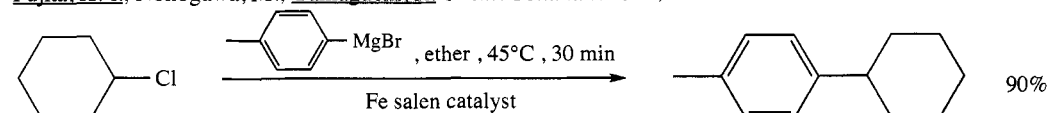
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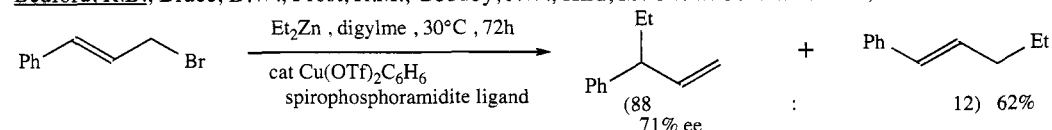
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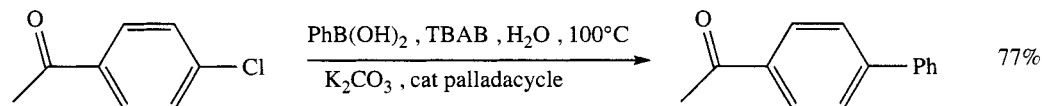
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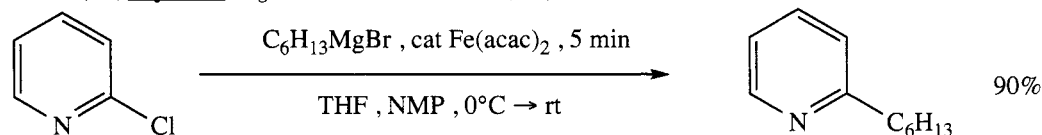
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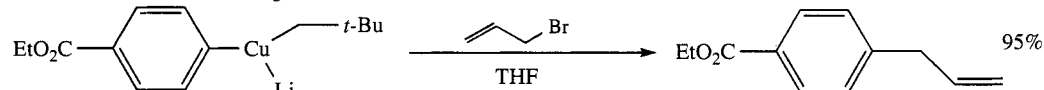
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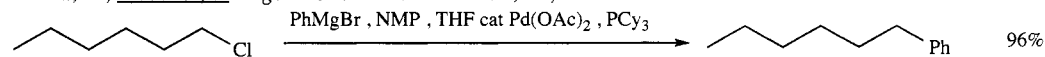
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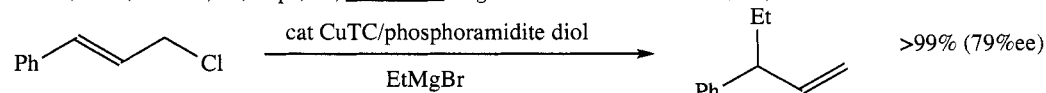
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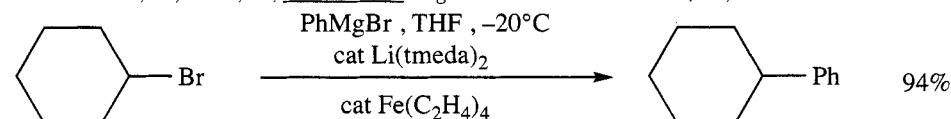
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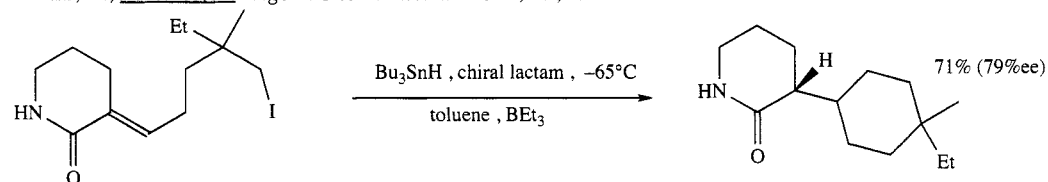
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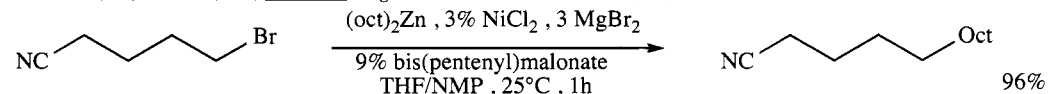
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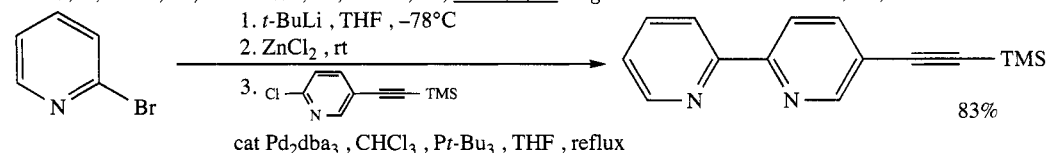
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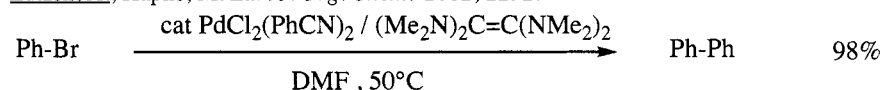
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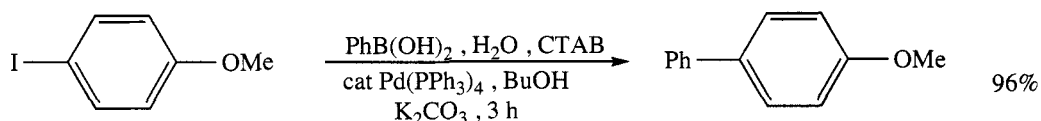
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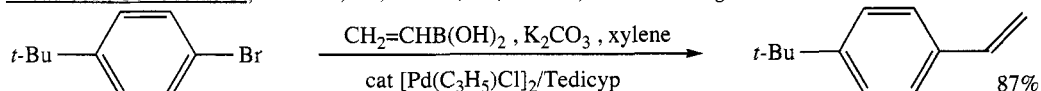
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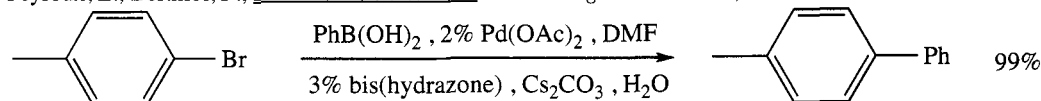
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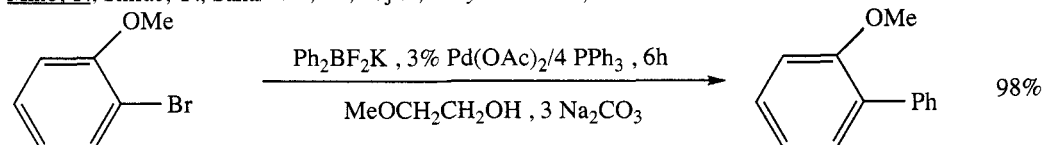
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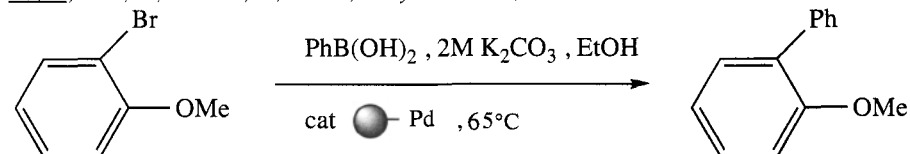
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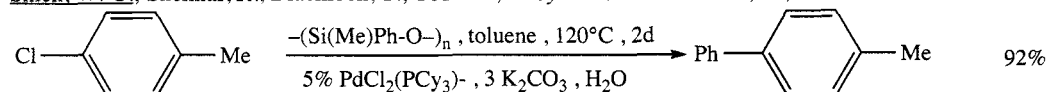
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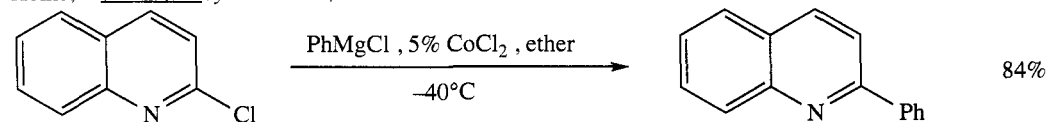
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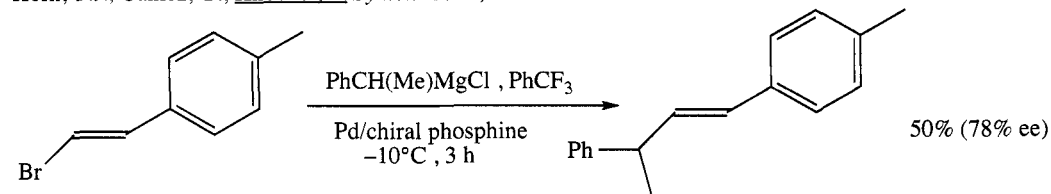
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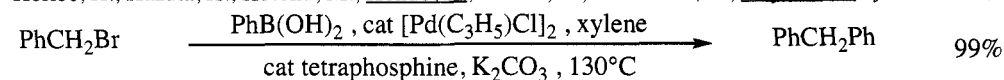
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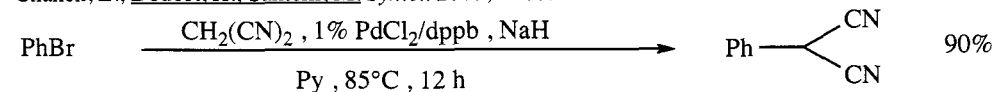
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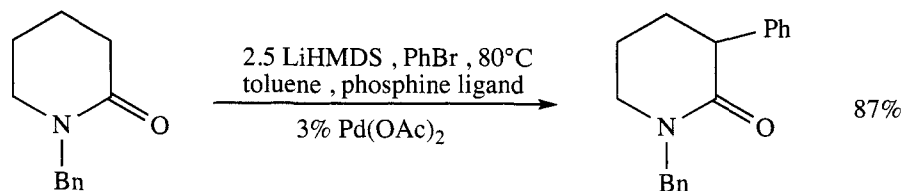
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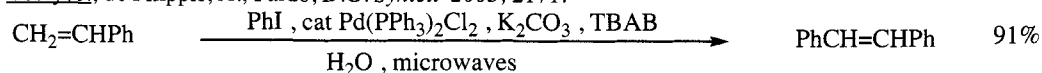
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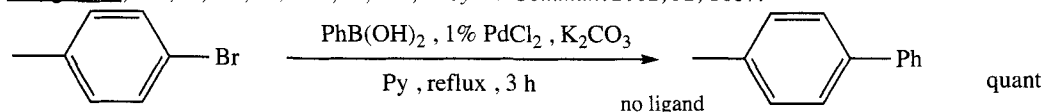
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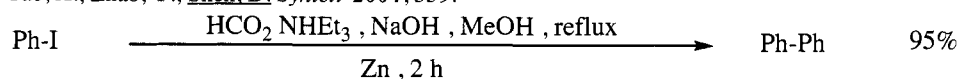
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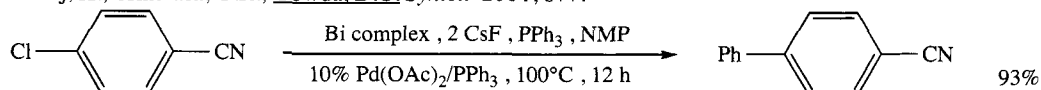
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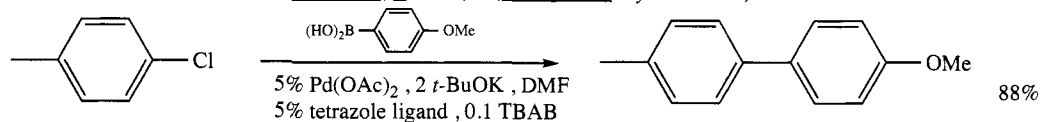
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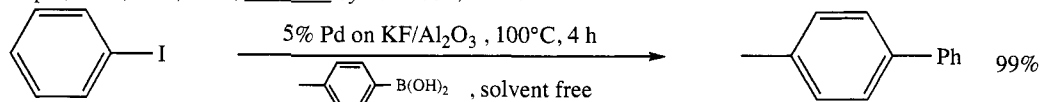
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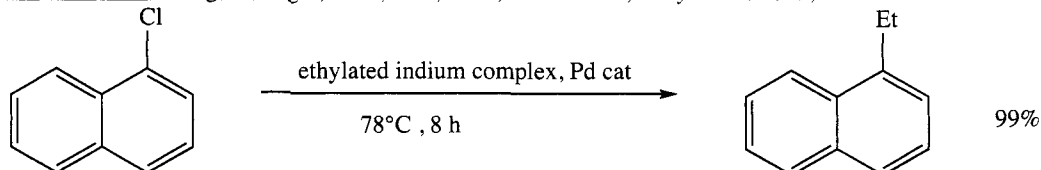
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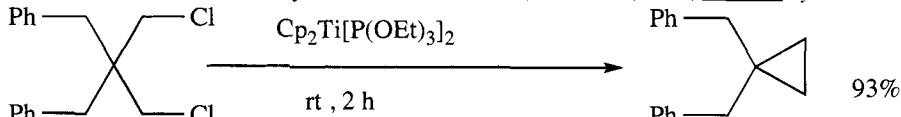
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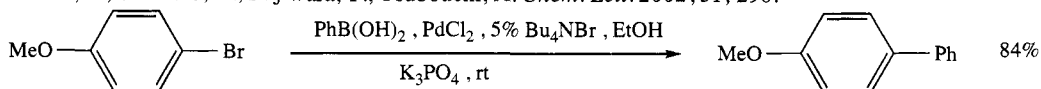
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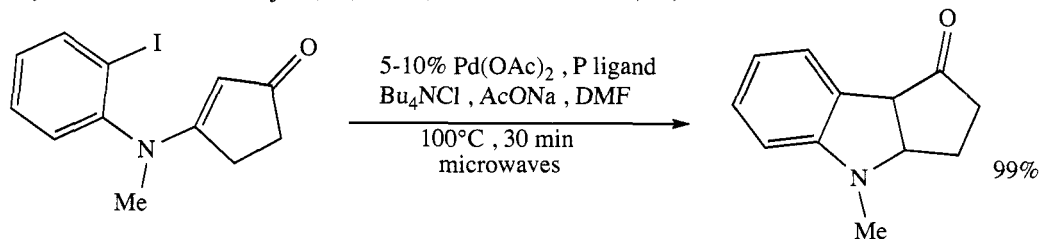
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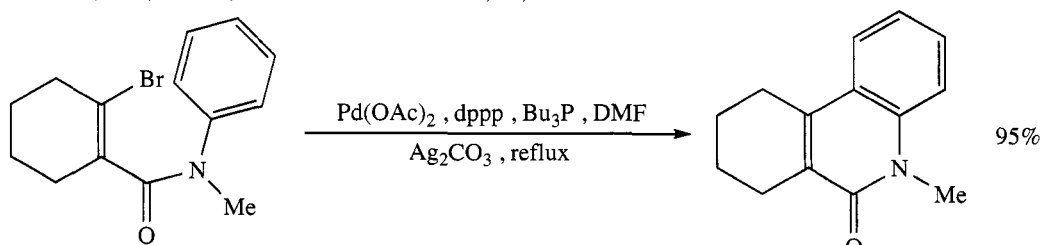
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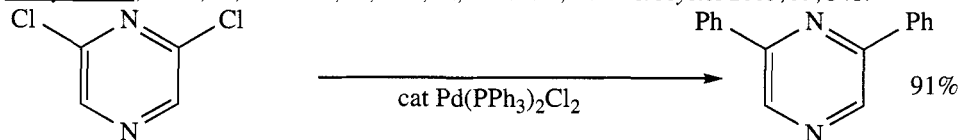
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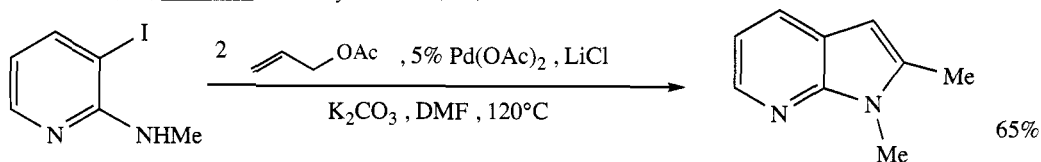
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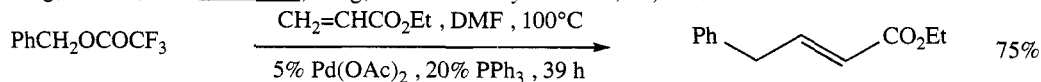
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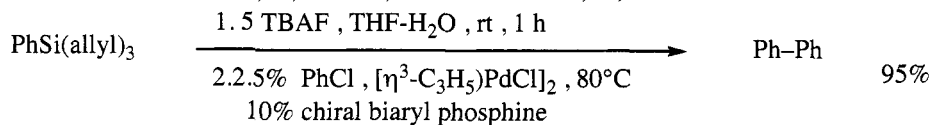
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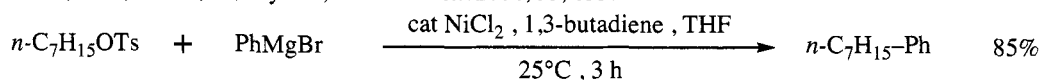
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Prim, D.; Campagne, J.-M.; Joseph, D.; Andrioleth, B. *Tetrahedron* **2002**, 58, 2041.

"Palladium-Catalyzed Coupling Reactions of Aryl Chlorides"
 Littke, A.F.; Fu, G.C. *Angew. Chem. Int. Ed.* **2002**, 41, 4176.

"New Catalytic Approaches in the Stereoselective Friedel-Crafts Alkylation Reaction"
 Bandini, M.; Melloni, A.; Umani-Ronchi, A. *Angew. Chem. Int. Ed.* **2004**, 43, 550.

"Ruthenium, Rhodium, and Palladium-Catalyzed Carbon-Carbon Bond Formation Involving C-H Activation and Addition on Unsaturated Substrates: Reactions and Mechanistic Aspects"
 Fokin, A.A.; Schreiner, P.R. *Chem. Rev.* **2002**, 102, 1731.

"Nucleophilic Substitution Reactions by Electron Transfer"
 Rossi, R.A.; Pierini, A.B.; Peñeñory, A.B. *Chem. Rev.* **2003**, 103, 71.

"The Asymmetric Intramolecular Heck Reaction in Natural Product Total Synthesis"
 Dounay, A.B.; Overman, L.E. *Chem. Rev.* **2003**, 103, 2945.

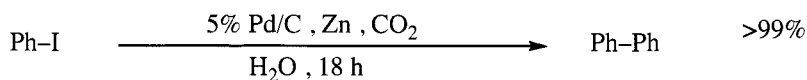
" π -Nucleophilicity in Carbon-Carbon Bond-Forming Reactions"
Mayr, H.; Kempf, B.; Ofial, A.R. *Acc. Chem. Res.* **2003**, 36, 66.

"Palladium-Catalyzed Arylation of Carbonyl Compounds and Nitriles"
 Kulkin, D.A.; Hartwig, J.F. *Acc. Chem. Res.* **2003**, 36, 234.

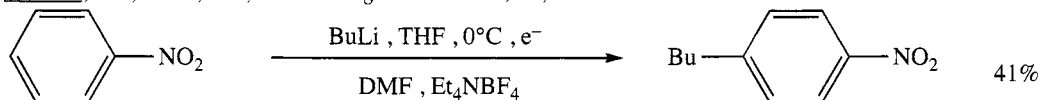
"Palladium Catalysts for Suzuki Cross-Coupling"
 Bellina, F.; Carpita, A.; Rossi, R. *Synthesis* **2004**, 2419.

SECTION 71: ALKYL, METHYLENES, AND ARYL FROM HYDRIDES

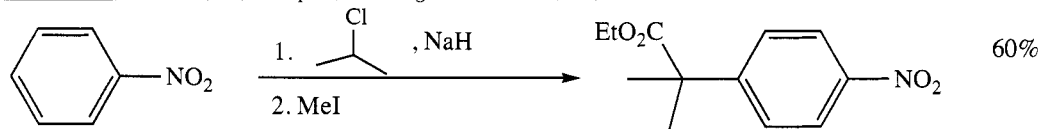
This section lists examples of the reaction of $RH \rightarrow RR'$ ($R, R' = \text{alkyl or aryl}$). For the reaction $C=CH \rightarrow C=C-R$ ($R = \text{alkyl or aryl}$), see Section 209 (Alkenes from Alkenes). For alkylations of ketones and esters, see Section 177 (Ketones from Ketones) and Section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



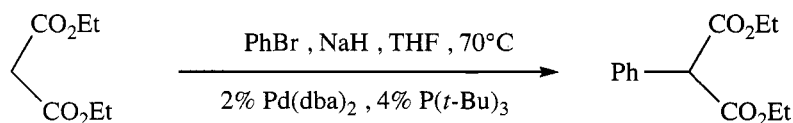
Li, J.-H.; Xie, Y.-X.; Yin, D.-L. *J. Org. Chem.* **2003**, 68, 9867.



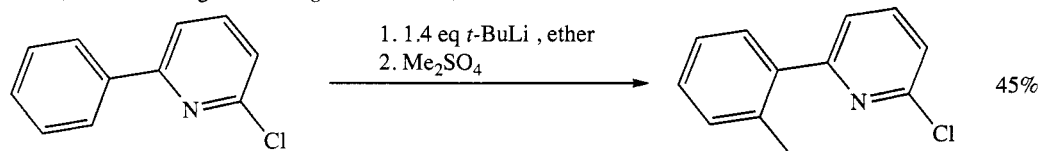
Gallardo, I.; Guirado, G.; Marquet, J. *J. Org. Chem.* **2003**, 68, 631.



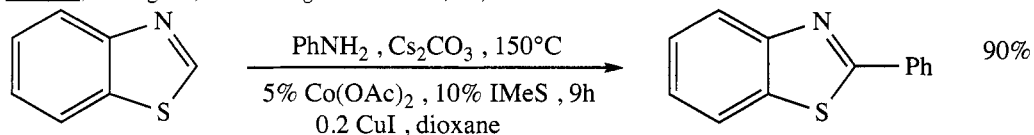
Lawrence, N.J.; Liddle, J.; Bushell, S.M. *J. Org. Chem.* **2002**, 67, 457.



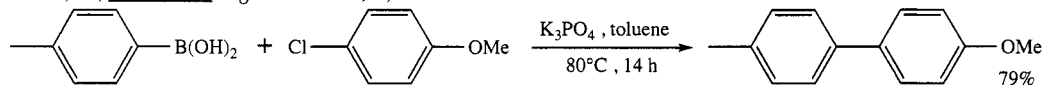
Beare, N.A.; Hartwig, J.F. *J. Org. Chem.* **2002**, 67, 541.



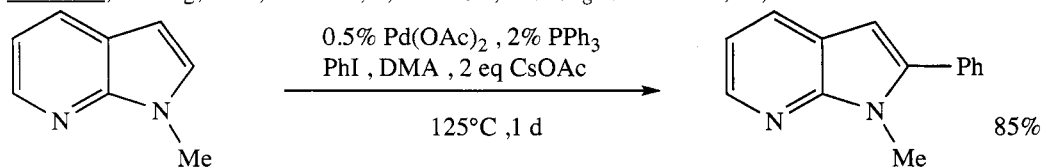
Fort, Y.; Rodriguez, A.L. *J. Org. Chem.* **2003**, 68, 4918.



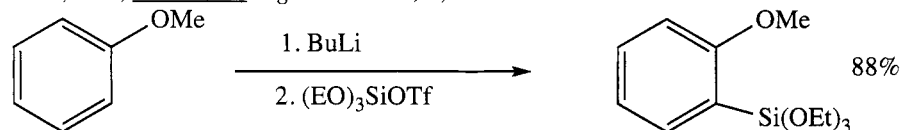
Sezen, B.; Sames, D. *Org. Lett.* **2003**, 5, 3607.



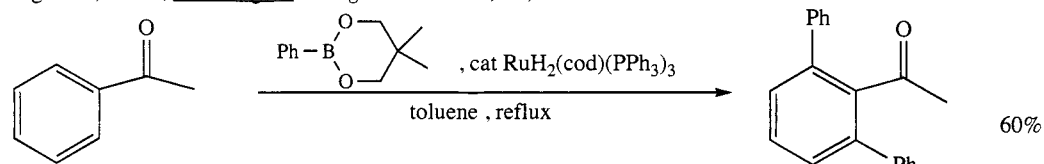
Percec, V.; Golding, G.M.; Smidrkal, J.; Weichold, O. *J. Org. Chem.* **2004**, 69, 3447.



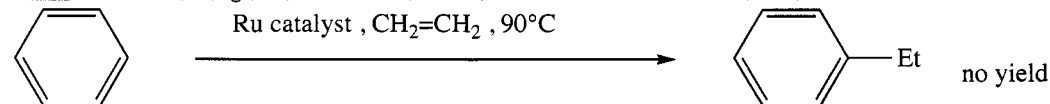
Lane, B.S.; Sames, D. *Org. Lett.* **2004**, 6, 2897.



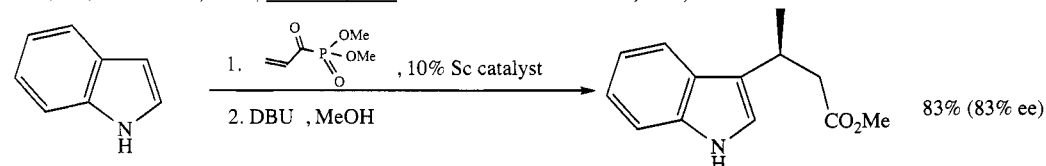
Seganish, W.M.; DeShong, P. *J. Org. Chem.* **2004**, 69, 6790.



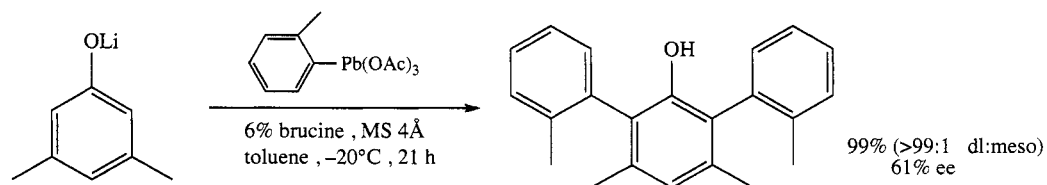
Kakiuchi, F.; Kan, S.; Igi, K.; Chatani, N.; Murai, S. *J. Am. Chem. Soc.* **2003**, 125, 1698.



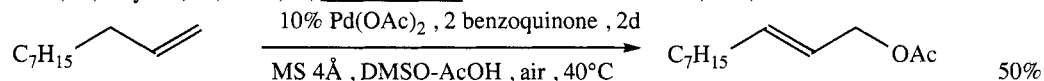
Lail, M.; Arrowood, B.N.; Gunnoe, T.B. *J. Am. Chem. Soc.* **2003**, 125, 7506.



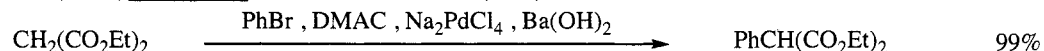
Evans, D.A.; Scheidt, K.A.; Fandrick, K.R.; Lam, H.W.; Wu, J. *J. Am. Chem. Soc.* **2003**, 125, 10780.



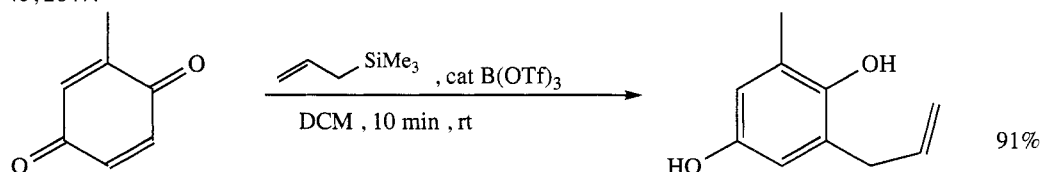
Kano, T.; Ohyaabu, Y.; Saito, S.; Yamamoto, H. *J. Am. Chem. Soc.* **2002**, *124*, 5365.



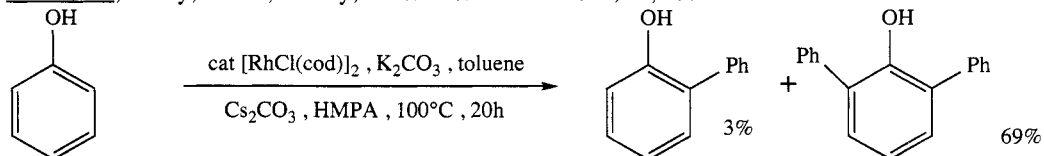
Chen, M.S.; White, M.C. *J. Am. Chem. Soc.* **2004**, *126*, 1346.



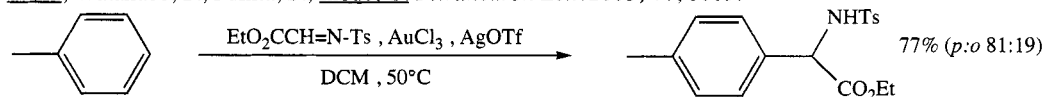
Aramendía, M.A.; Borau, V.; Jimenez, C.; Marinas, J.M.; Ruiz, J.B.; Urbano, F.J. *Tetrahedron Lett.* **2002**, *43*, 2847.



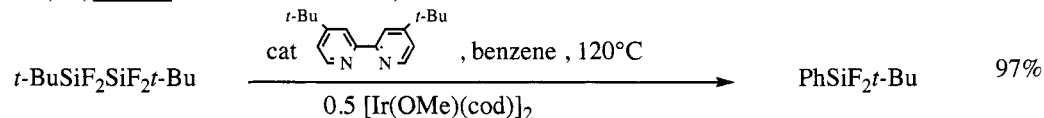
Yadav, J.S.; Reddy, B.V.S.; Swamy, T. *Tetrahedron Lett.* **2003**, *44*, 4861.



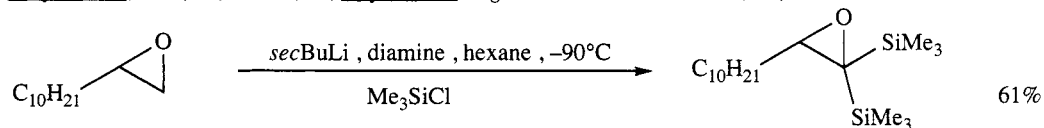
Oi, S.; Watanabe, S.; Fukita, S.; Inoue, Y. *Tetrahedron Lett.* **2003**, *44*, 8665.



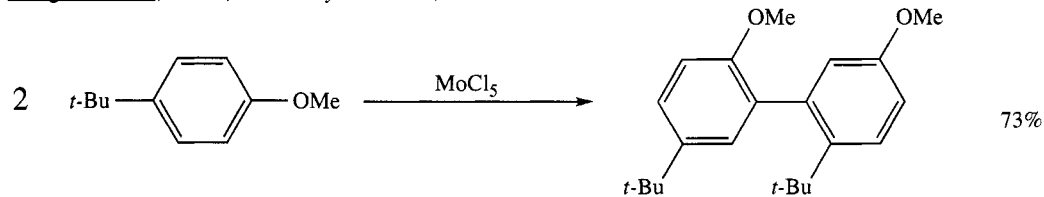
Luo, Y.; Li, C.-J. *Chem. Commun.* **2004**, 1930.



Ishiyama, T.; Sato, K.; Nishio, Y.; Miyaura, N. *Angew. Chem. Int. Ed.* **2003**, *42*, 5346.



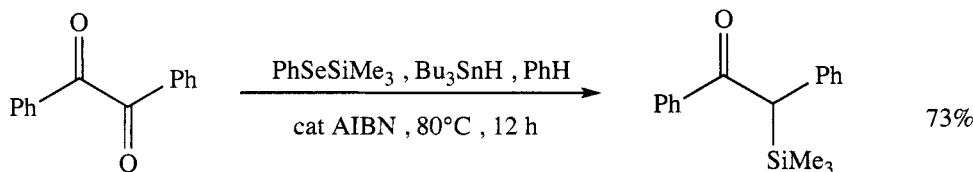
Hodgson, D.M.; Krton, E.H.M. *Synlett* **2004**, 1610.



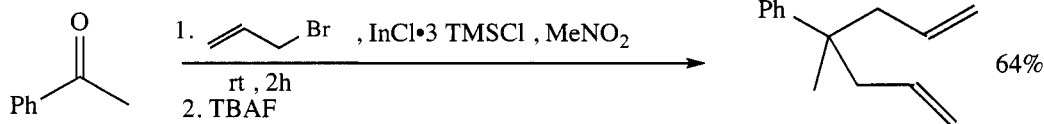
Mirk, D.; Wibbeling, B.; Fröhlich, R.; Waldvogel, S.R. *Synlett* **2004**, 1970.

SECTION 72: ALKYLs, METHYLENES, AND ARYLs FROM KETONES

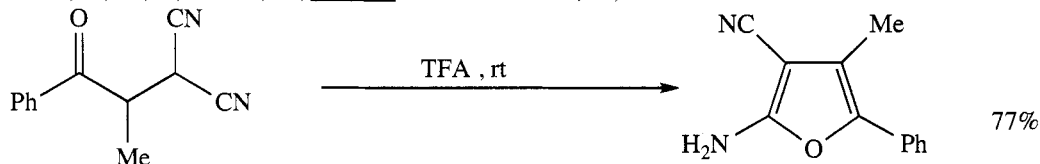
The conversions $R_2C=O \rightarrow R-R, R_2CH_2, R_2CHR'$, etc. are listed in this section.



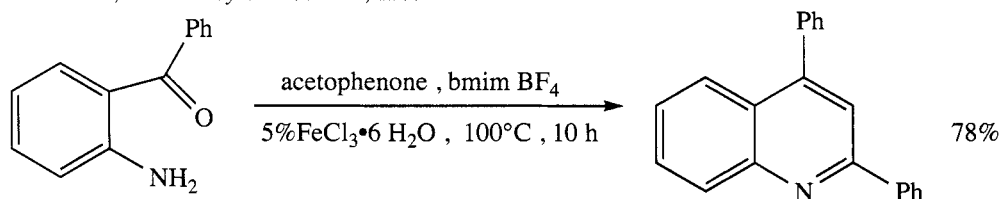
Nishiyama, Y.; Kajimoto, H.; Kotani, K.; Nishida, T.; Sonoda, N. *J. Org. Chem.* **2002**, 67, 5696.



Onishi, Y.; Ito, T.; Yasuda, M.; Baba, A. *Tetrahedron* **2002**, 58, 8227.

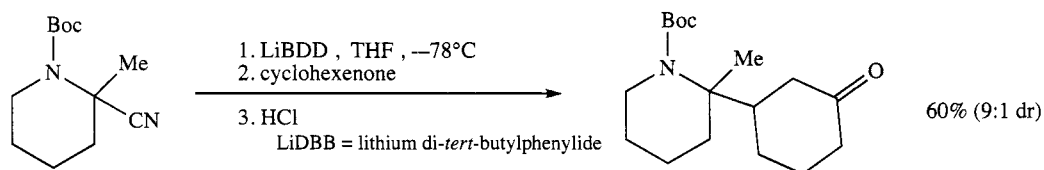


Watanuki, S.; Sakamoto, S.; Harada, H.; Kikuchi, K.; Kuramochi, T.; Kawaguchi, K.; Okazaki, T.; Tsukamoto, S. *Heterocycles* **2004**, 62, 127.

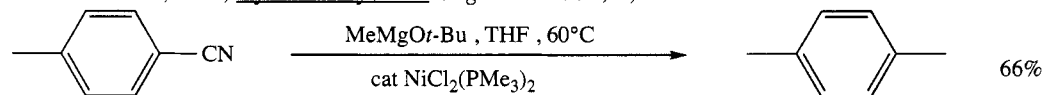


Wang, J.; Fan, X.; Zhang, X.; Han, L. *Can. J. Chem.* **2004**, 82, 1192.

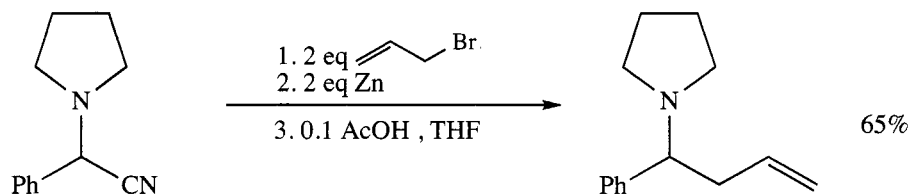
SECTION 73 ALKYLs, METHYLENES, AND ARYLs FROM NITRILES



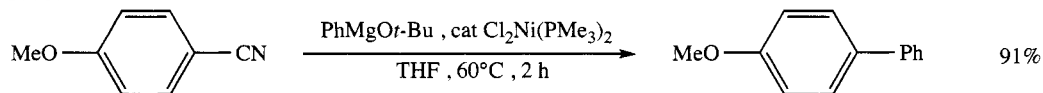
Wolckenhauer, S.A.; Rychnovsky, S.D. *Org. Lett.* **2004**, 6, 2745.



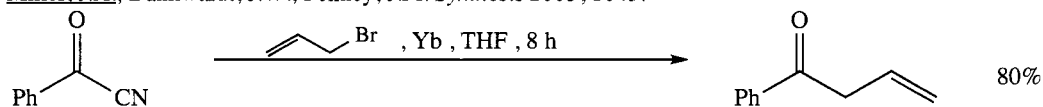
Miller, J.A.; Dankwardt, J.W. *Tetrahedron Lett.* **2003**, 44, 1907.



Bernardi, L.; Bonini, B.F.; Capito, E.; Dessole, G.; Fochi, M.; Comes-Franchini, M.; Ricci, A. *Synlett* **2003**, 1778.



Miller, J.A.; Dankwardt, J.W.; Penney, J.M. *Synthesis* **2003**, 1643.

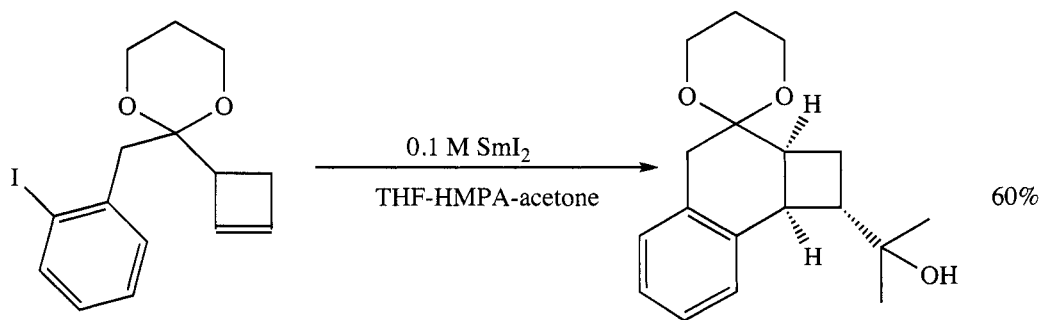


Baikuntha, M.G.; Gogoi, J.; Prajapati, D.; Sandhu, J.S. *New J. Chem.* **2003**, 27, 1038.

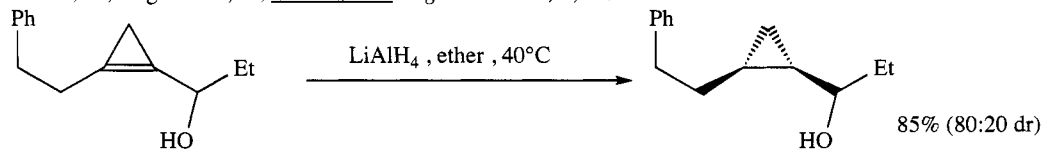
SECTION 74: ALKYL, METHYLENE AND ARYL FROM ALKENES

The following reaction types are included in this section:

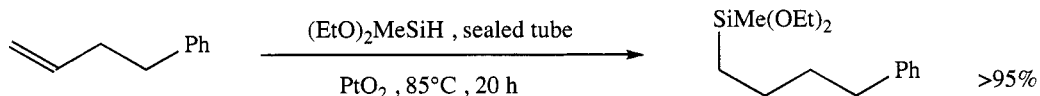
- Hydrogenation of Alkenes (and Aryls)
- Formation of Aryls and Heteroaryls
- Alkylations and Arylations of Alkenes
- Conjugate Reduction of α,β -Unsaturated Carbonyl Compounds and Nitriles
- Conjugate Alkylations
- Cyclopropanations, including Halocyclopropanations
- Cyclobutanations, including Halocyclobutanations



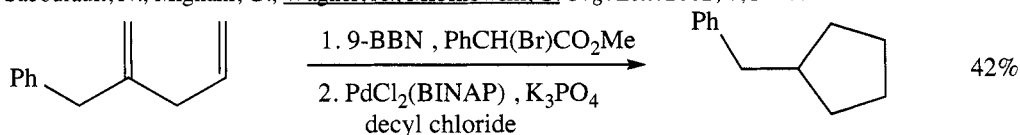
Rivkin, A.; Nagashima, T.; Curran, D.P. *Org. Lett.* **2003**, 5, 419.



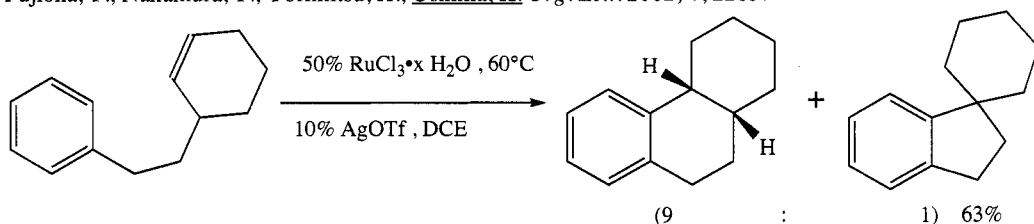
Zohar, E.; Marek, I. *Org. Lett.* **2004**, 6, 341.



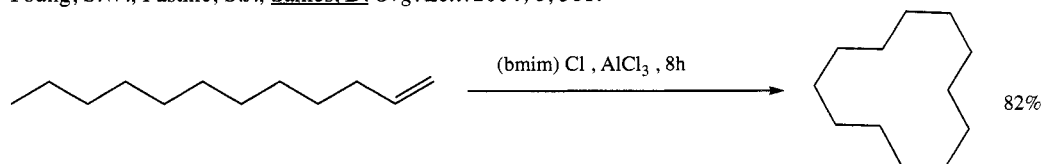
Sabourault, N.; Mignani, G.; Wagner, A.; Mioskowski, C. *Org. Lett.* **2002**, *4*, 2117.



Fujioka, T.; Nakamura, T.; Yorimitsu, H.; Oshima, K. *Org. Lett.* **2002**, *4*, 2285.



Young, S.W.; Pastine, S.J.; Sames, D. *Org. Lett.* **2004**, *6*, 581.

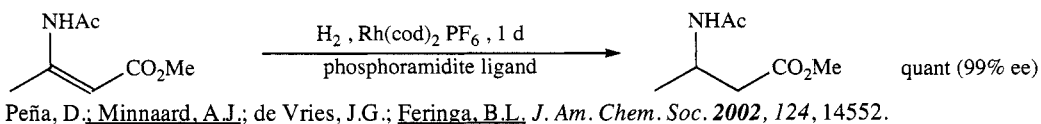


Qiao, K.; Deng, Y. *Tetrahedron Lett.* **2003**, *44*, 2191.

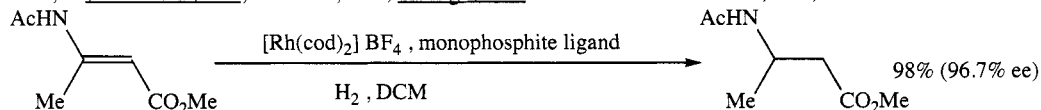
SECTION 74A: HYDROGENATION OF ALKENES (AND ARYLS)

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

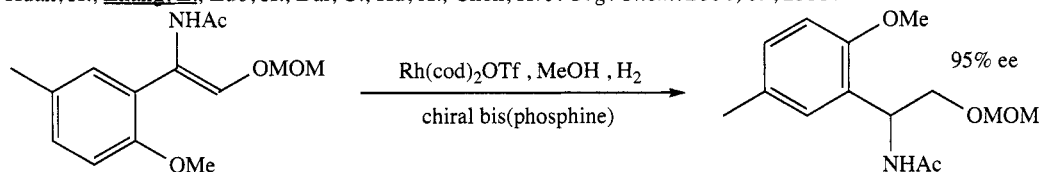
ASYMMETRIC HYDROGENATIONS



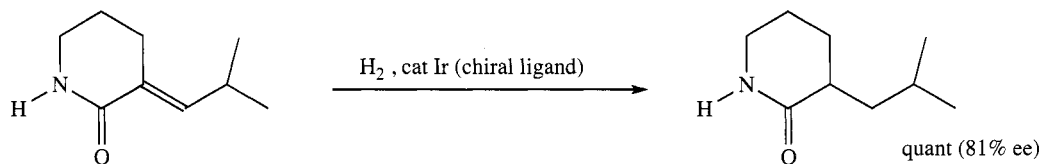
Peña, D.; Minnaard, A.J.; de Vries, J.G.; Feringa, B.L. *J. Am. Chem. Soc.* **2002**, *124*, 14552.



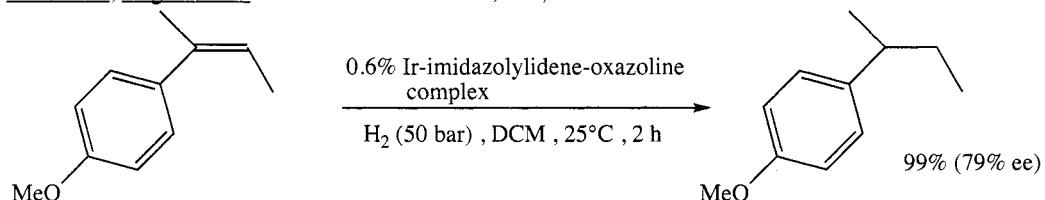
Huan, H.; Zhang, Z.; Luo, H.; Bai, C.; Hu, X.; Chen, H. *J. Org. Chem.* **2004**, *69*, 2355.



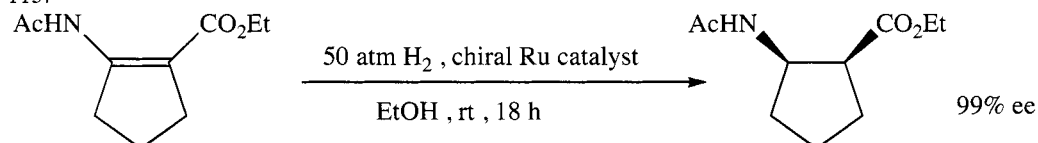
Le, J.C.-D.; Pagenkopf, B.L. *J. Org. Chem.* **2004**, *69*, 4175.



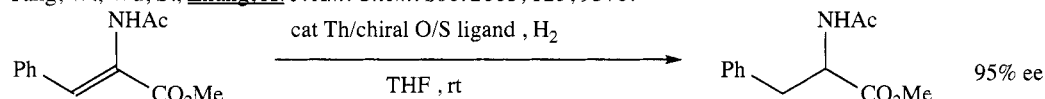
Yue, T.-Y.; Nugent, W.A. *J. Am. Chem. Soc.* **2002**, 124, 13692.



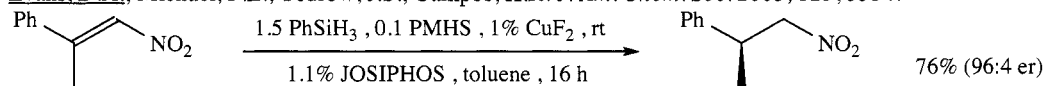
Perry, M.C.; Cu, X.; Powell, M.T.; Hou, D.-R.; Reibenspies, J.H.; Burgess, K. *J. Am. Chem. Soc.* **2003**, 125, 113.



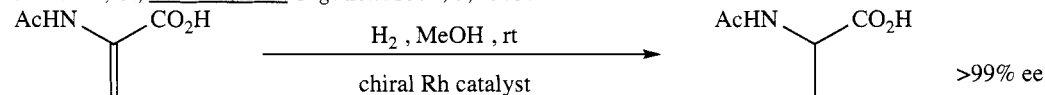
Tang, W.; Wu, S.; Zhang, X. *J. Am. Chem. Soc.* **2003**, 125, 9570.



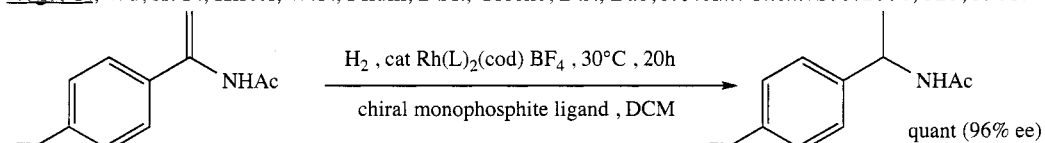
Evans, D.A.; Michael, F.E.; Tedrow, J.S.; Campos, K.R. *J. Am. Chem. Soc.* **2003**, 125, 3534.



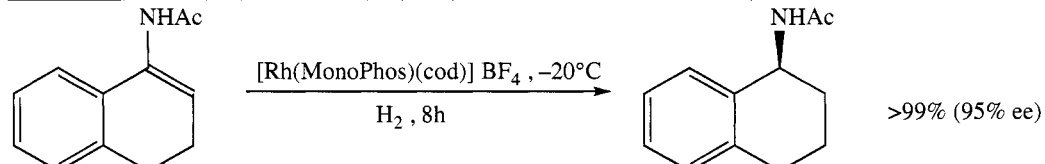
Czekelius, C.; Carreira, E.M. *Org. Lett.* **2004**, 6, 4575.



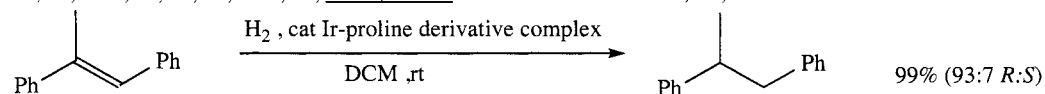
Hoge, G.; Wu, H.-P.; Kissel, W.S.; Pflum, D.A.; Greene, D.J.; Bao, J. *J. Am. Chem. Soc.* **2004**, 126, 5966.



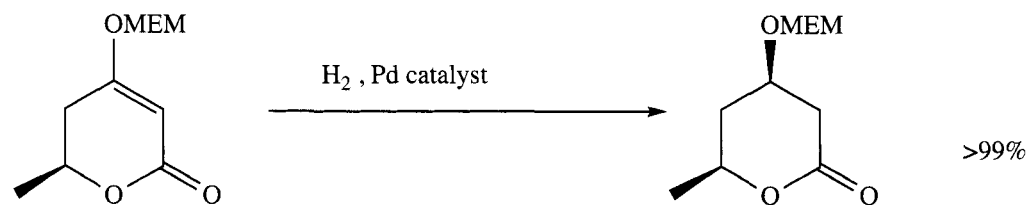
Reetz, M.T.; Mehler, G.; Meiswinkel, A.; Sell, T. *Tetrahedron Lett.* **2002**, 43, 7941.



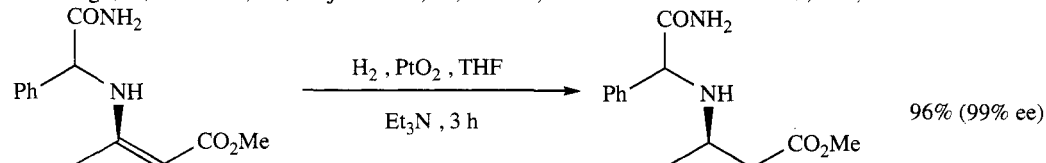
Jia, X.; Guo, R.; Li, X.; Yao, X.; Chan, A.S.C. *Tetrahedron Lett.* **2002**, 43, 5541.



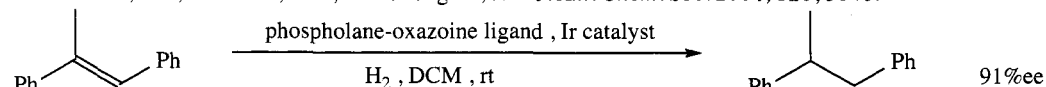
Xu, G.; Gilbertson, S.R. *Tetrahedron Lett.* **2003**, 44, 953.



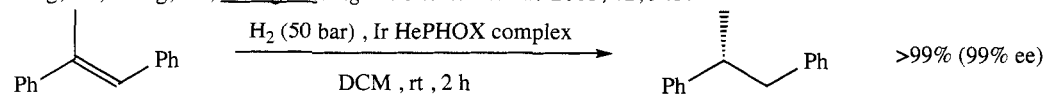
Brandänge, S.; Färnäck, M.; Leijonmarck, H.; Sundin, A. *J. Am. Chem. Soc.* **2003**, *125*, 11942.



Ikemoto, N.; Tellers, D.M.; Dreher, S.D.; Liu, J.; Huang, A.; Rivera, N.R.; Njolito, E.; Hsiao, Y.; McWilliams, J.C.; Williams, J.M.; Armstrong III, J.D. *J. Am. Chem. Soc.* **2004**, *126*, 3048.

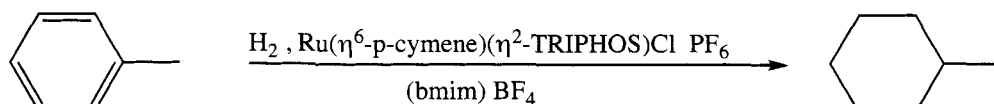


Tang, W.; Wang, W.; Zhang, X. *Angew. Chem. Int. Ed.* **2003**, *42*, 943.

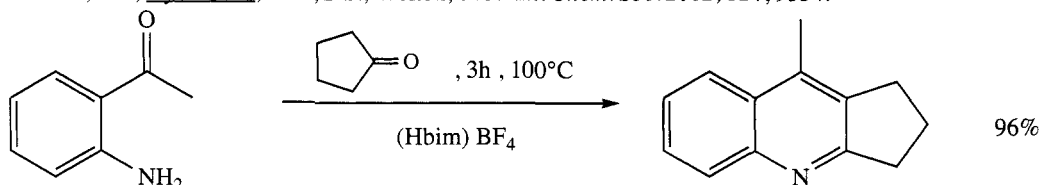


Cozzi, P.G.; Menges, F.; Kaiser, S. *Synlett* **2003**, 833.

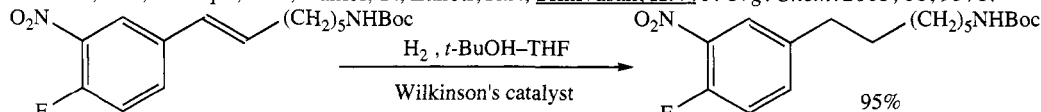
NONASYMMETRIC HYDROGENATIONS



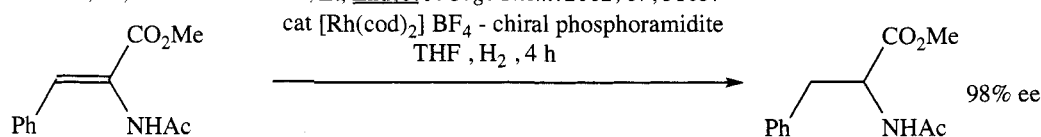
Boxwell, C.J.; Dyson, P.J.; Ellis, D.J.; Welton, T. *J. Am. Chem. Soc.* **2002**, *124*, 9334.



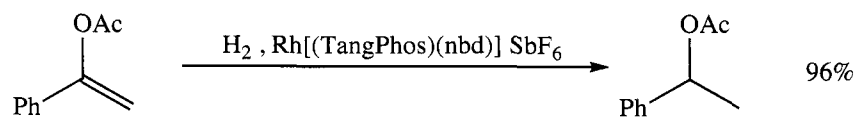
Palimkar, S.S.; Siddiqui, S.A.; Daniel, T.; Lahoti, R.J.; Srinivasan, K.V. *J. Org. Chem.* **2003**, *68*, 9371.



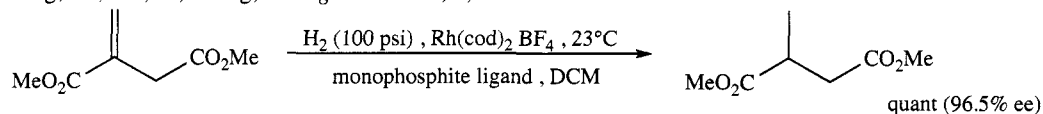
Jourdant, A.; González-Zamora, E.; Zhu, J. *J. Org. Chem.* **2002**, *67*, 3163.



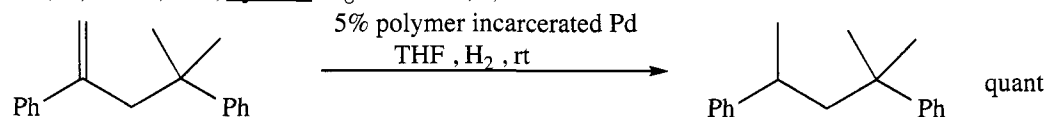
Jia, X.; Li, X.; Xu, L.; Shi, Q.; Yao, X.; Chan, A.S.C. *J. Org. Chem.* **2003**, *68*, 4539.



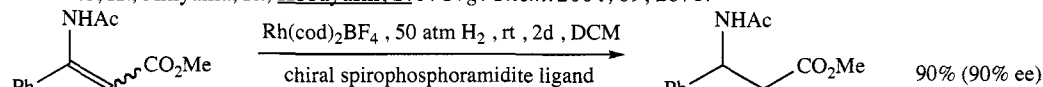
Tang, W.; Liu, D.; Zhang, X. *Org. Lett.* **2003**, 5, 205.



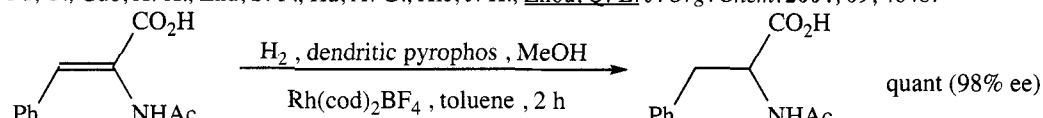
Hua, Z.; Vassar, V.C.; Ojima, I. *Org. Lett.* **2003**, 5, 3831.



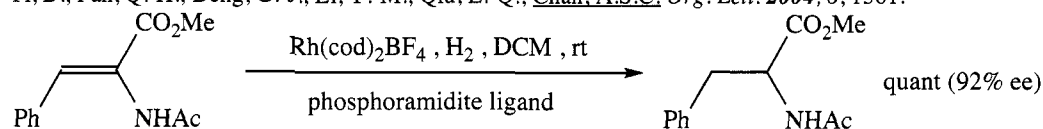
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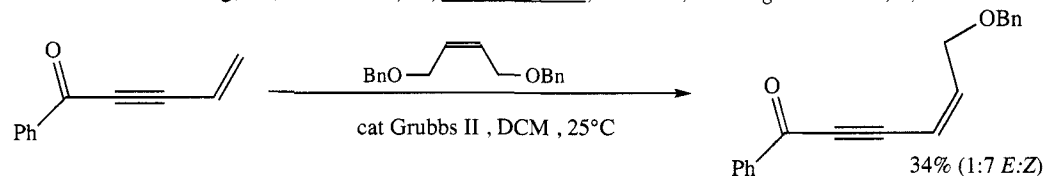
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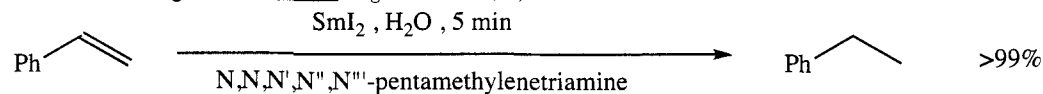
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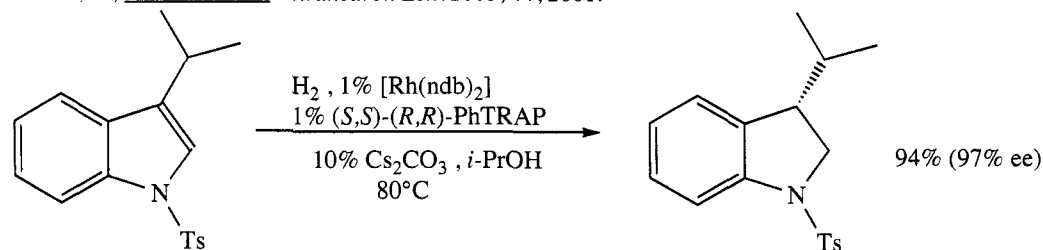
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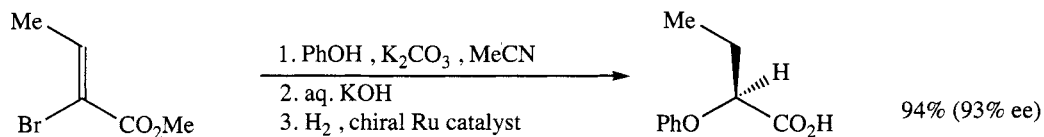
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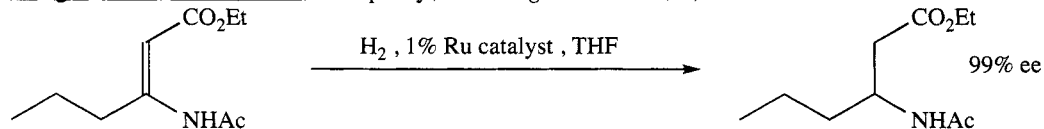
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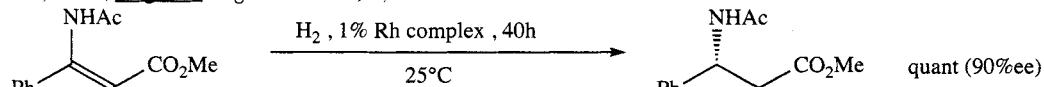
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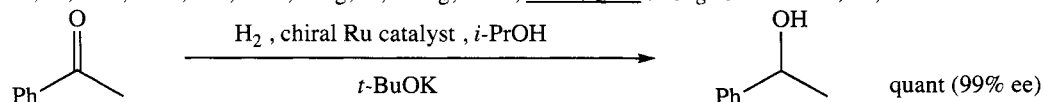
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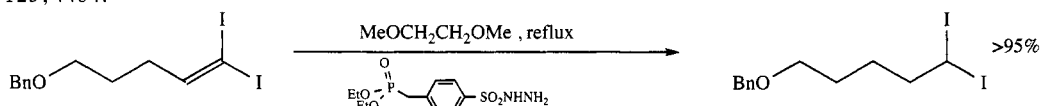
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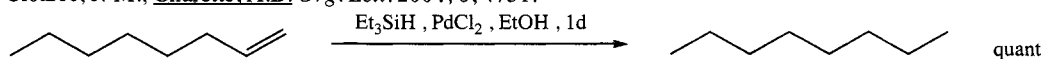
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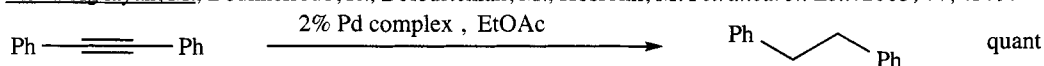
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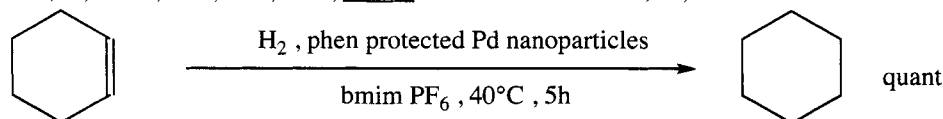
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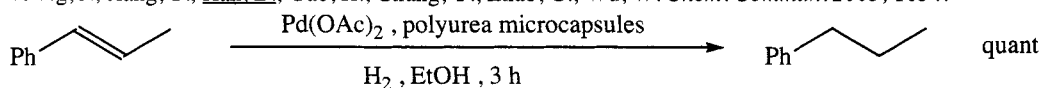
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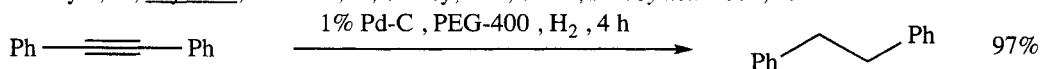
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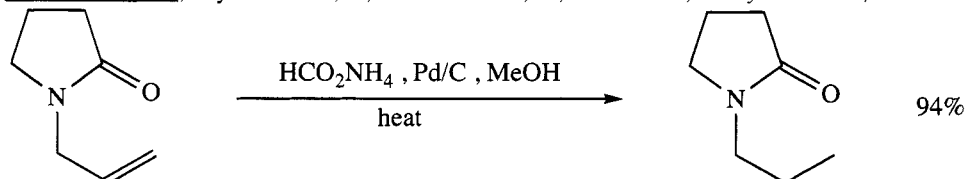
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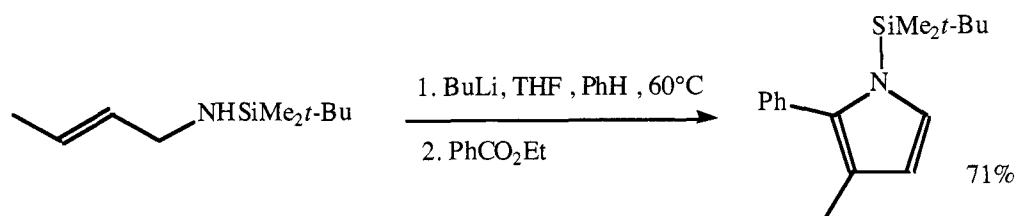
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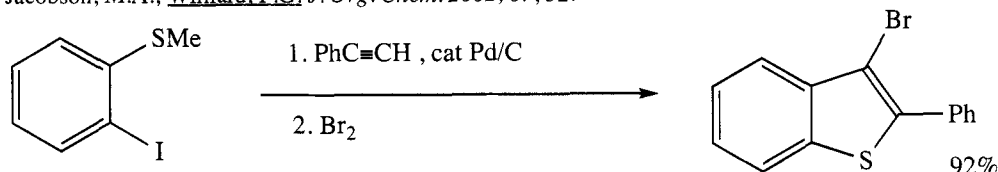
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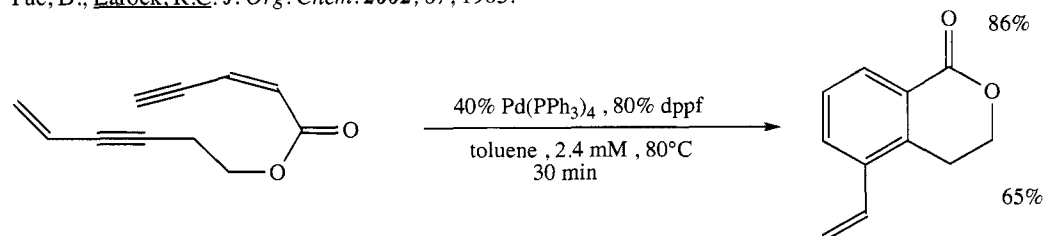
SECTION 74B: FORMATION OF ARYLS AND HETEROARYLS



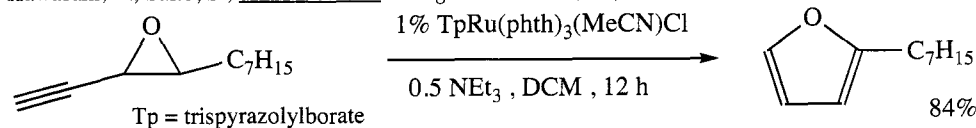
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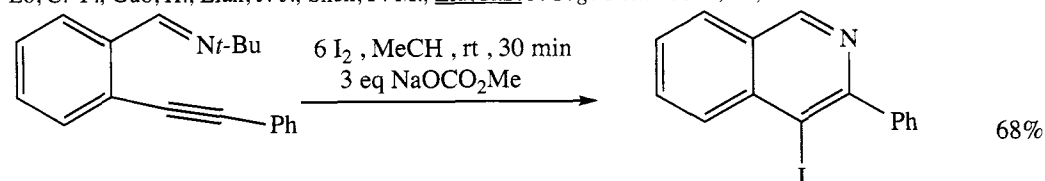
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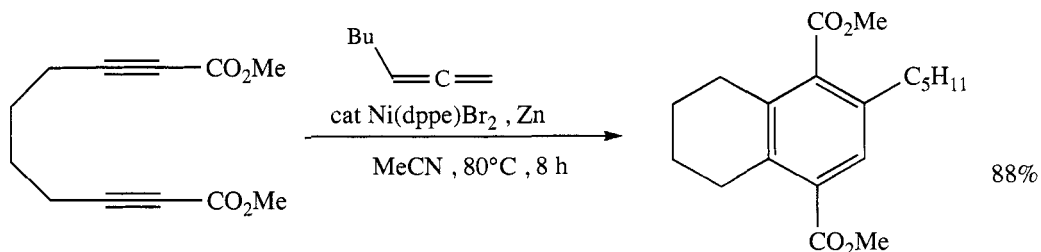
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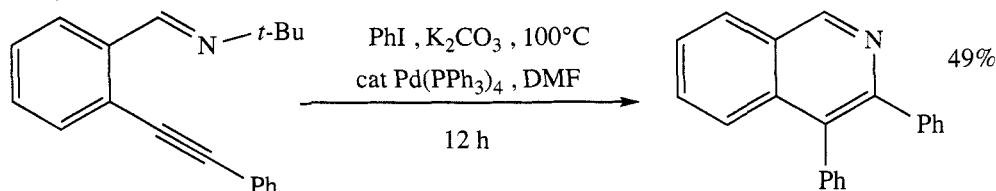
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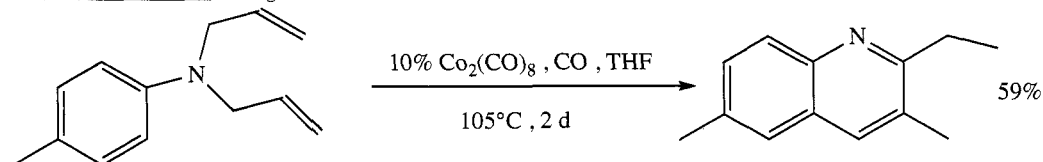
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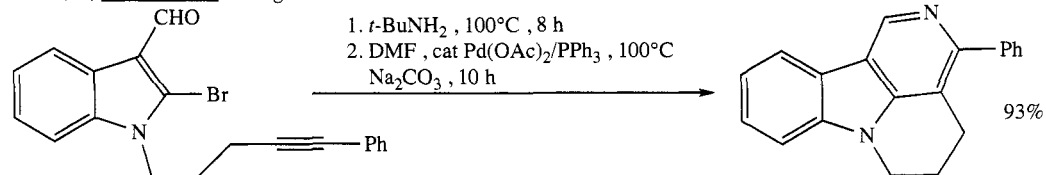
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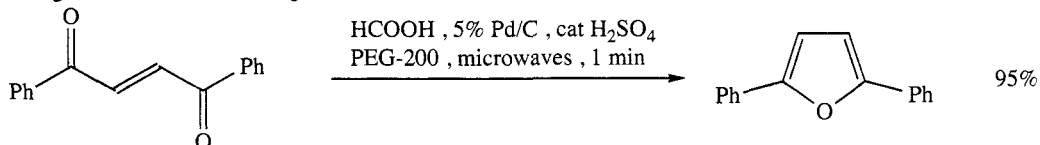
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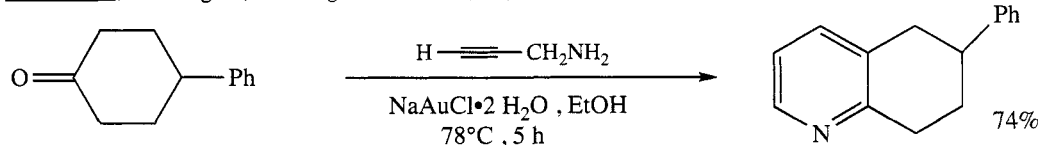
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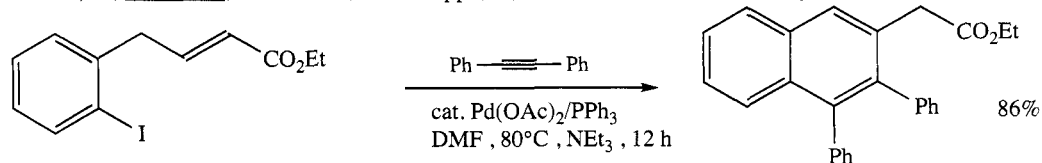
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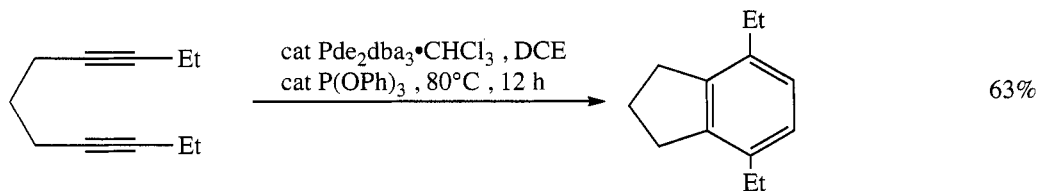
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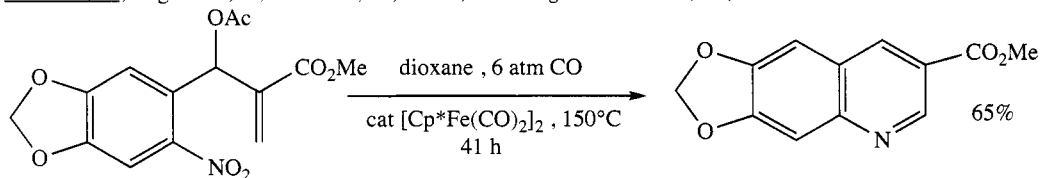
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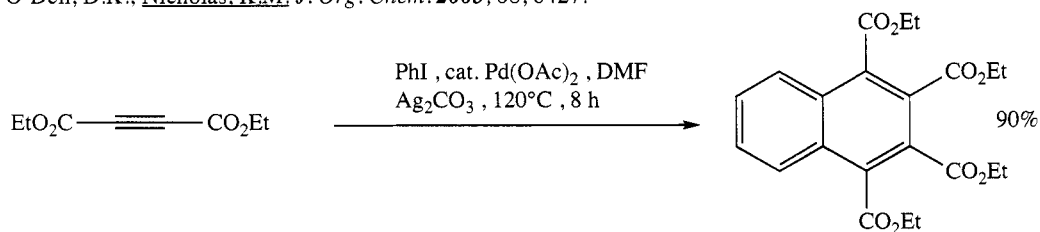
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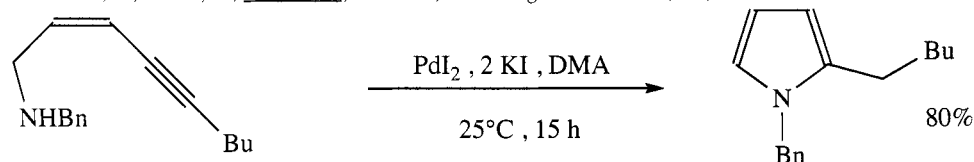
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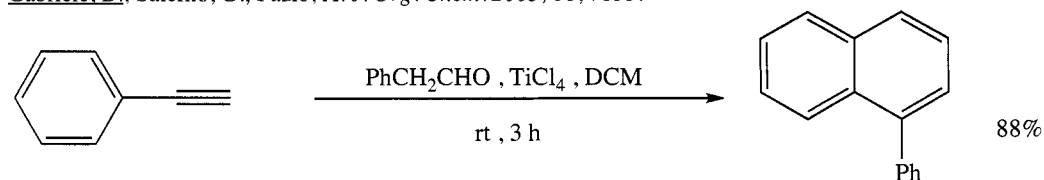
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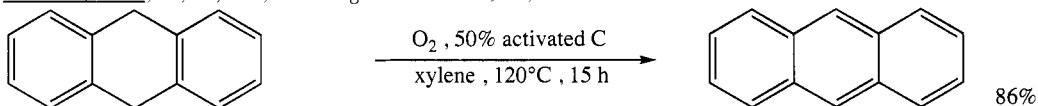
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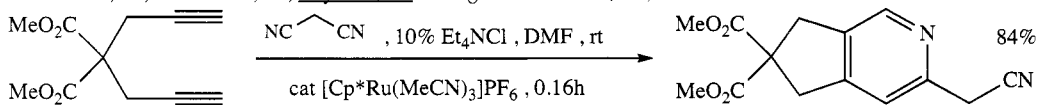
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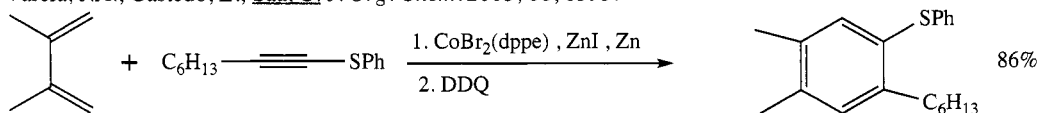
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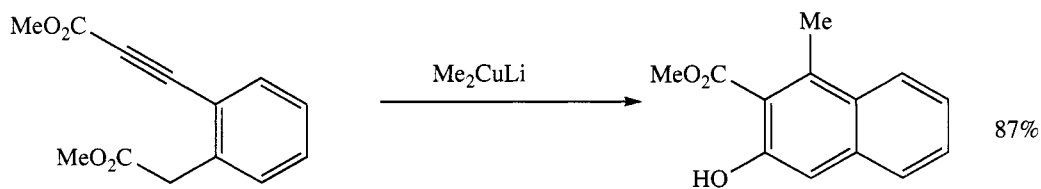
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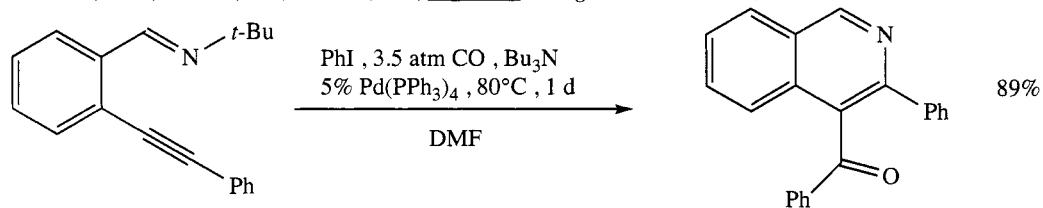
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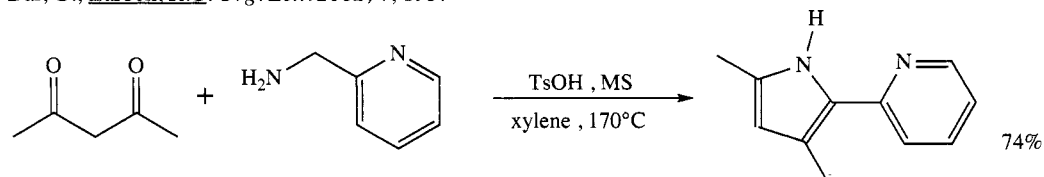
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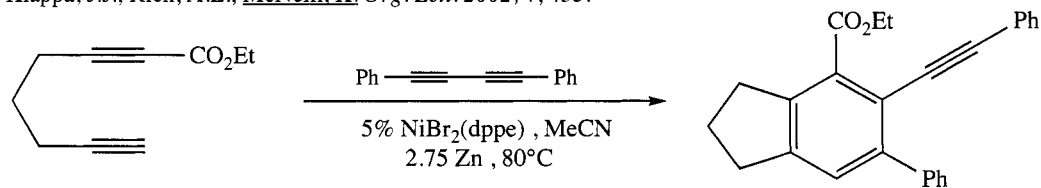
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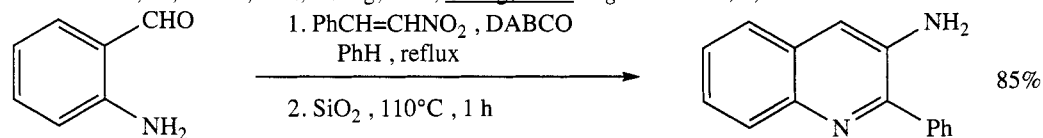
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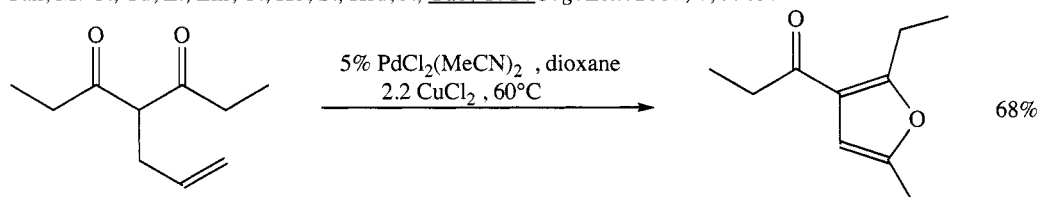
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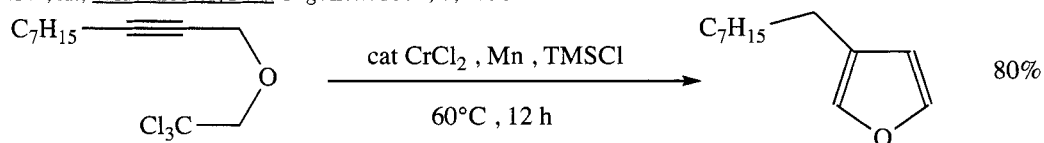
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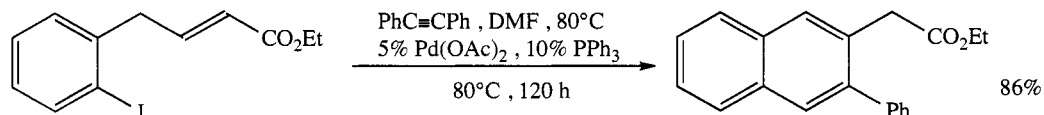
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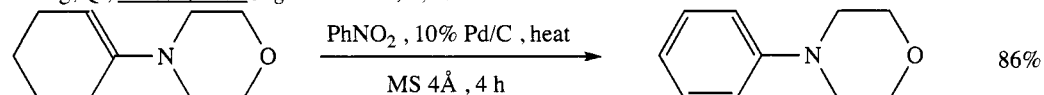
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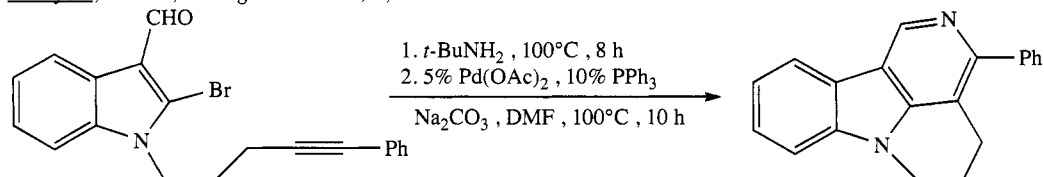
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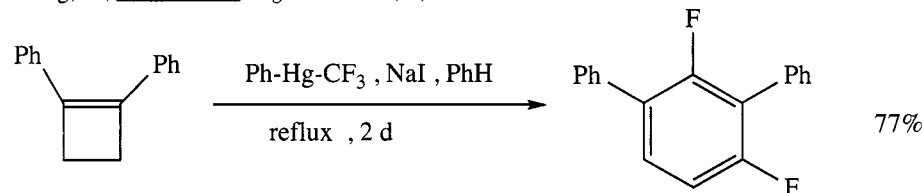
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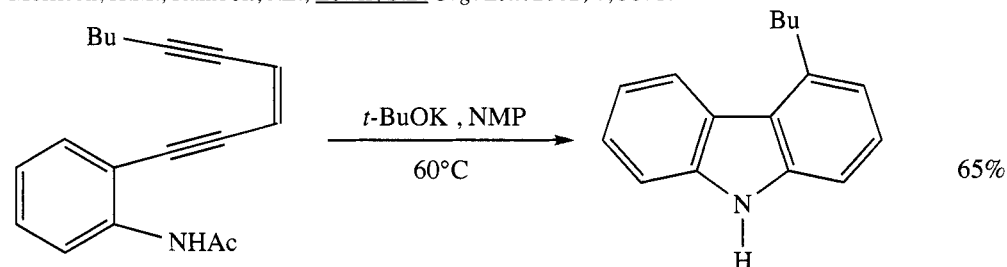
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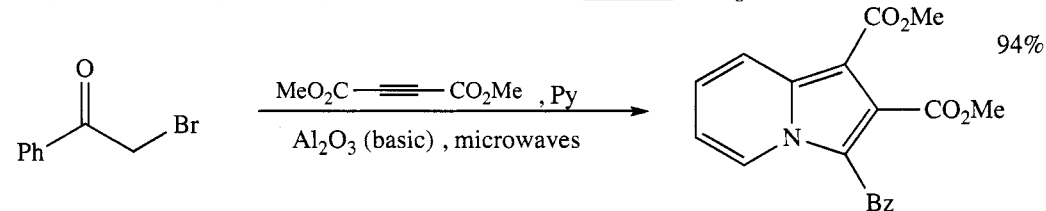
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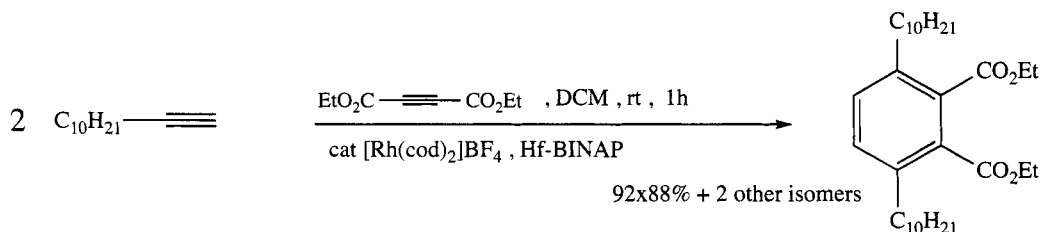
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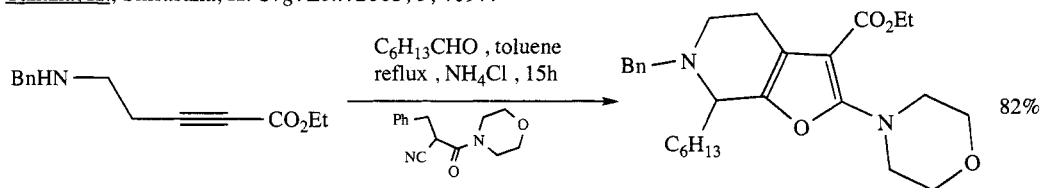
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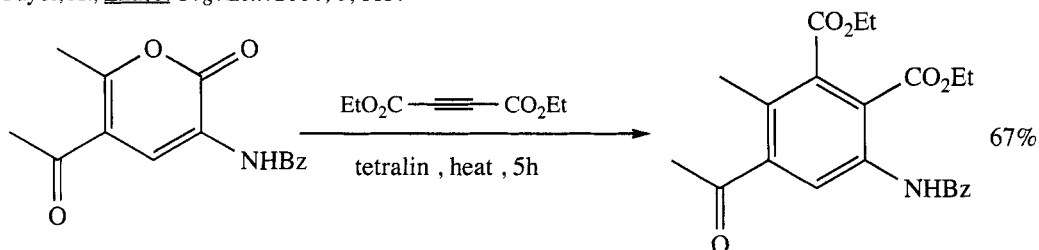
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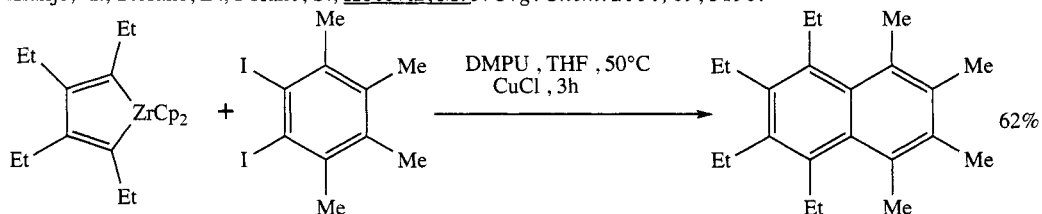
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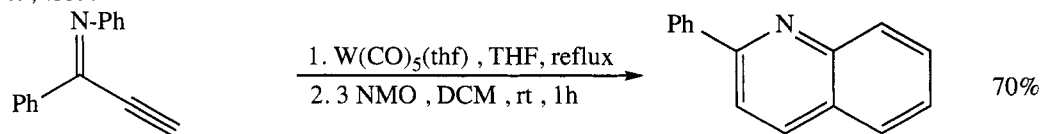
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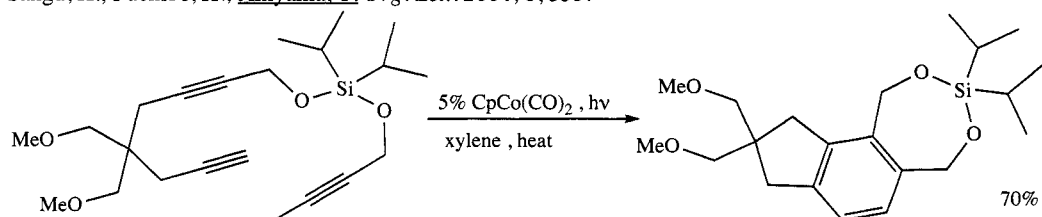
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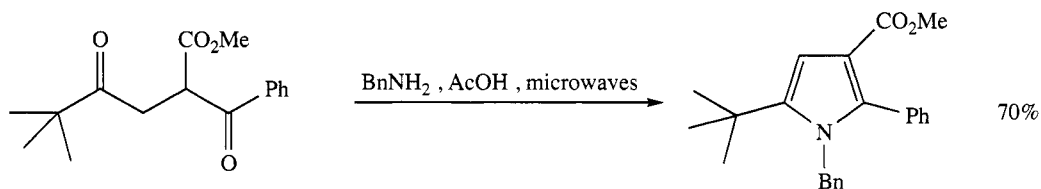
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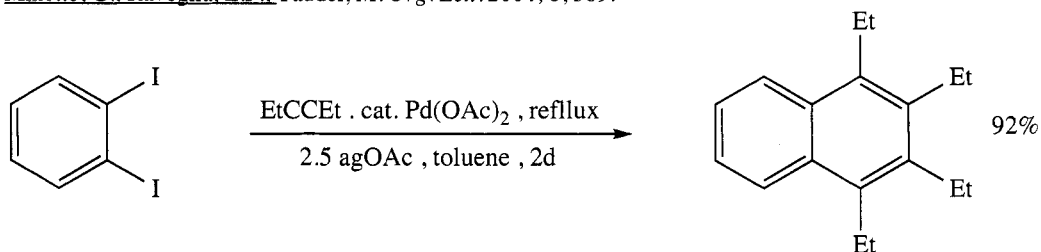
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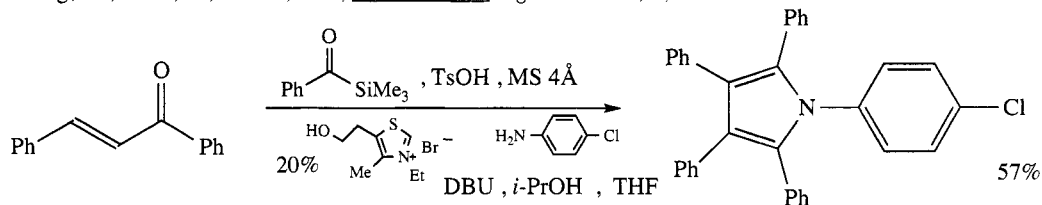
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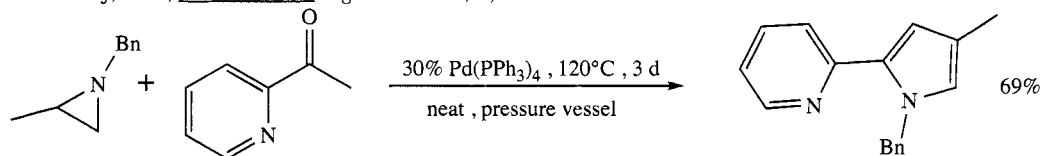
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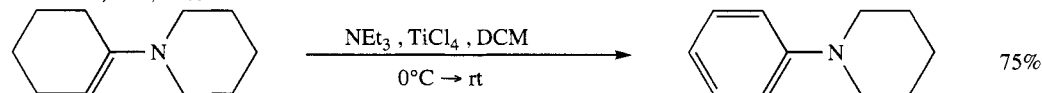
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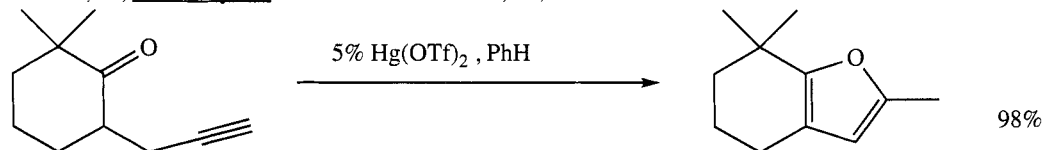
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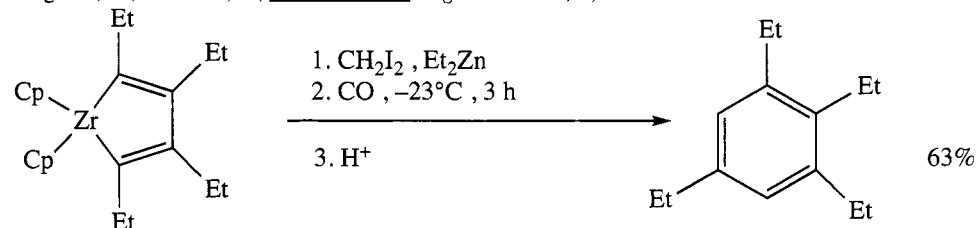
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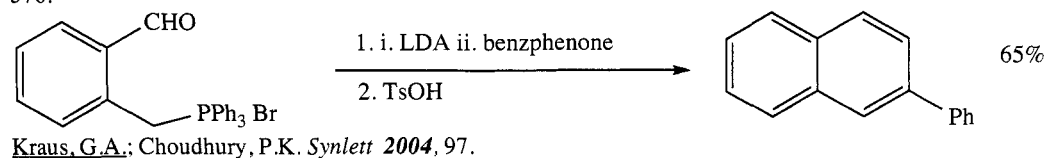
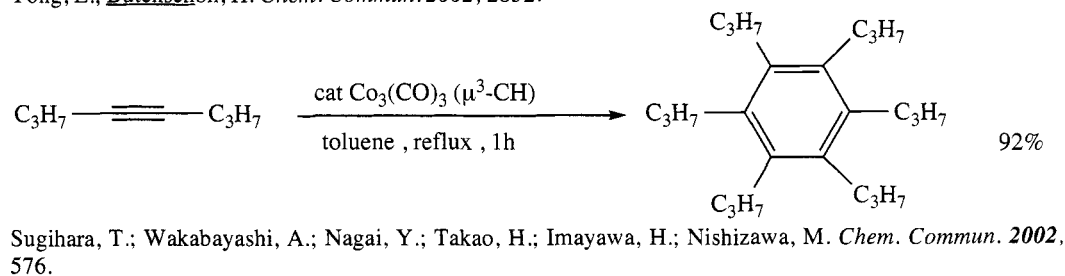
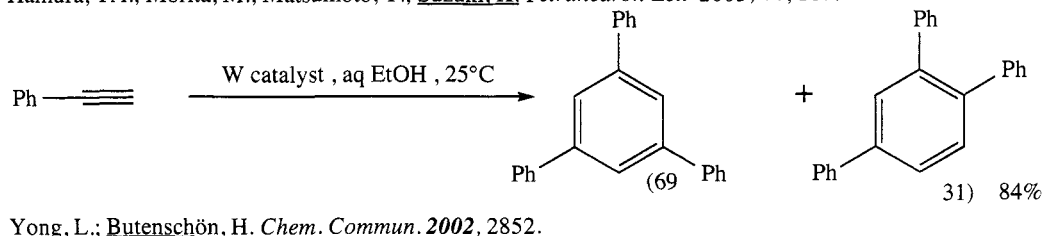
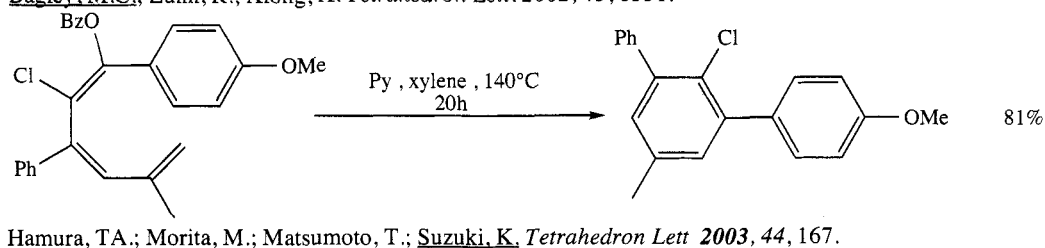
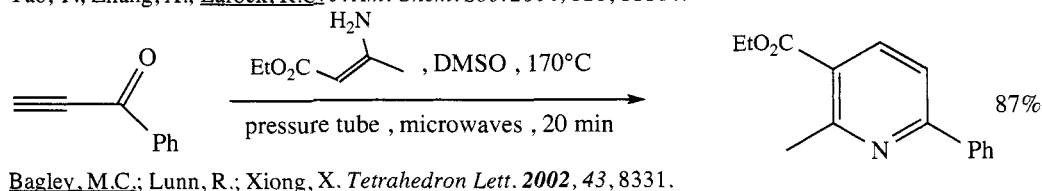
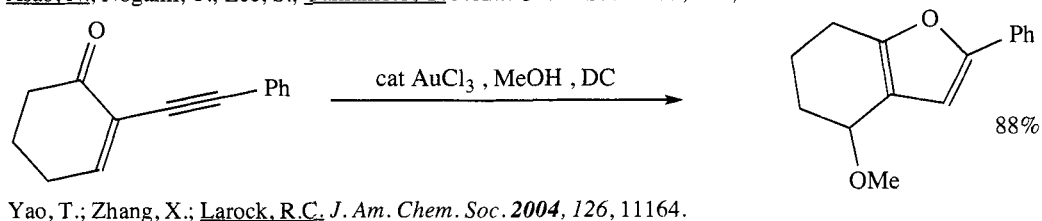
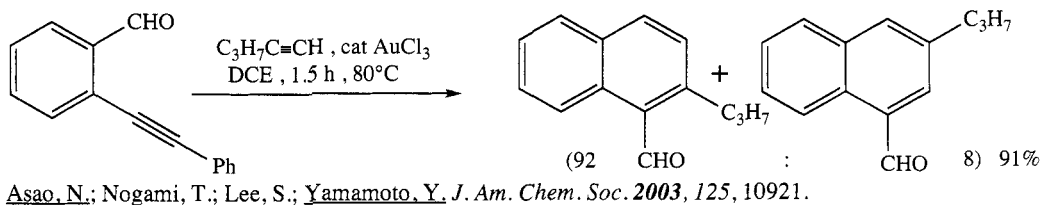
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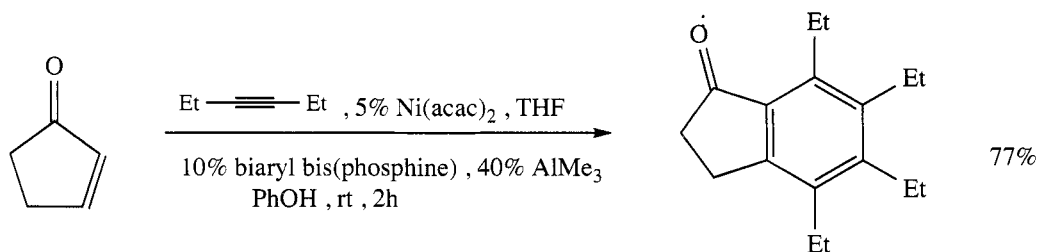


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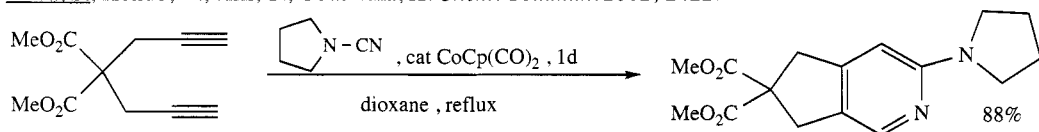


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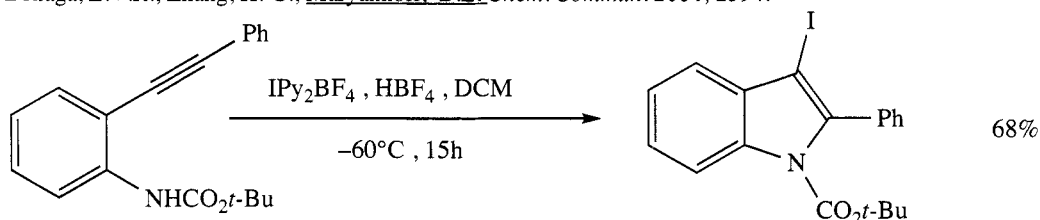




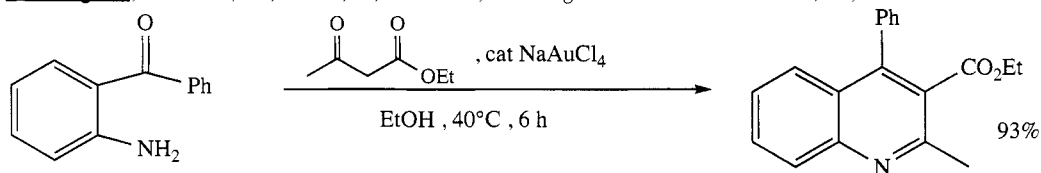
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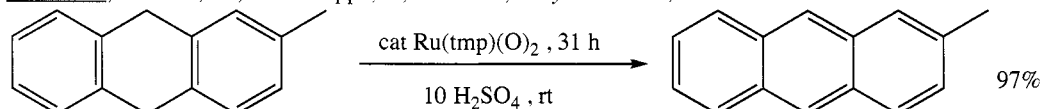
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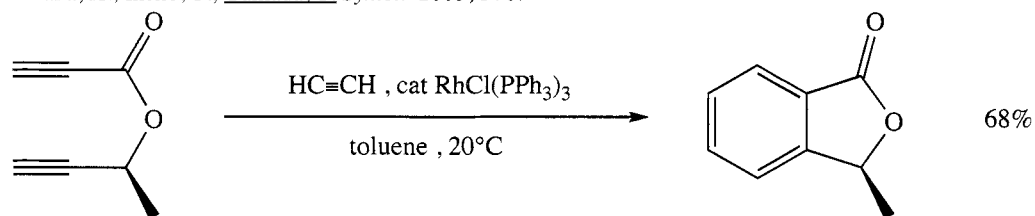
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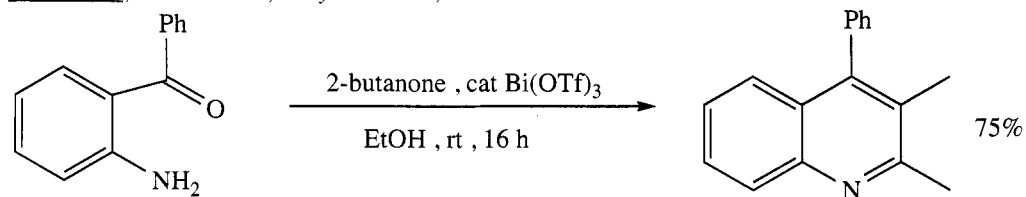
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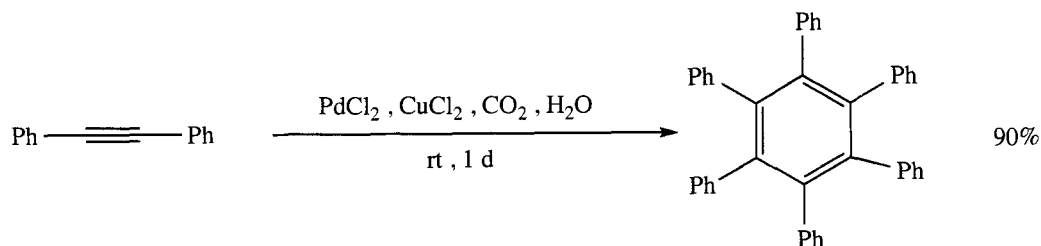
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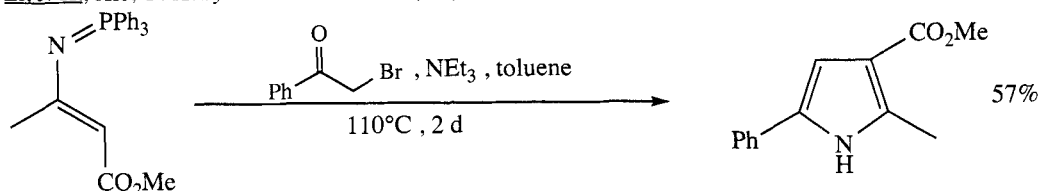
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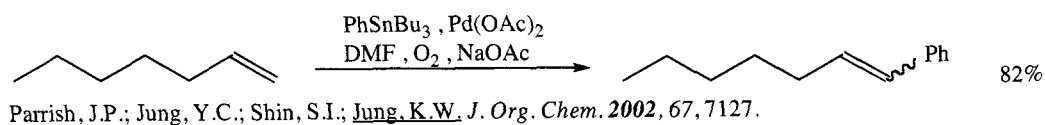
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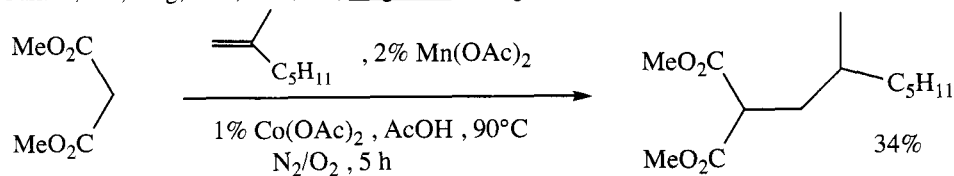
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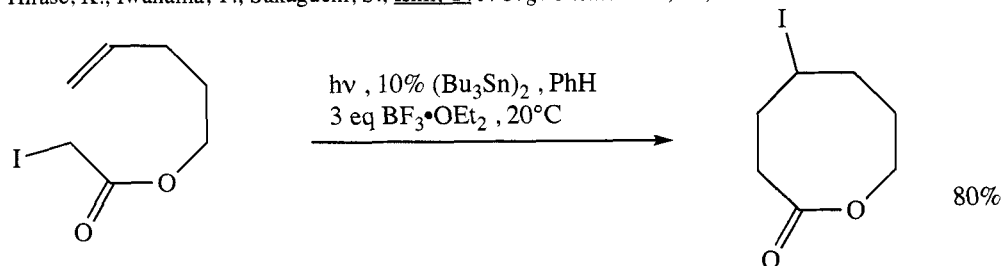
SECTION 74C: ALKYLATIONS AND ARYLATIONS OF ALKENES



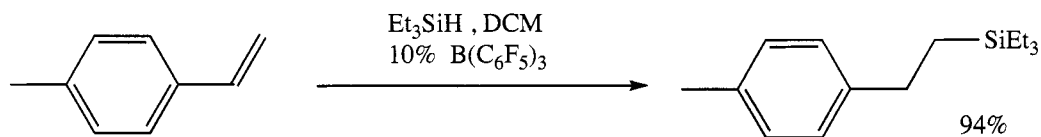
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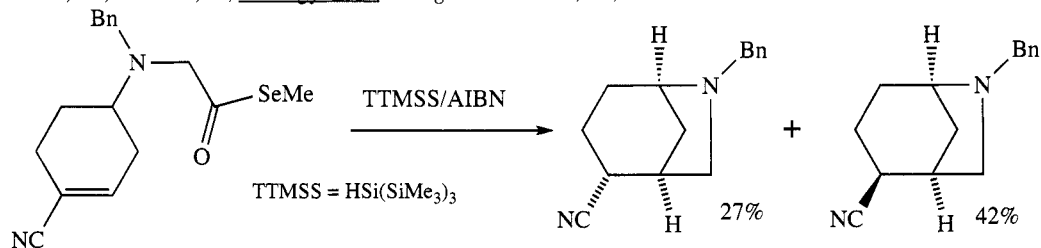
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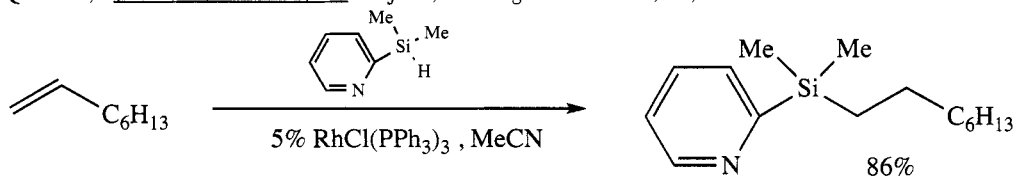
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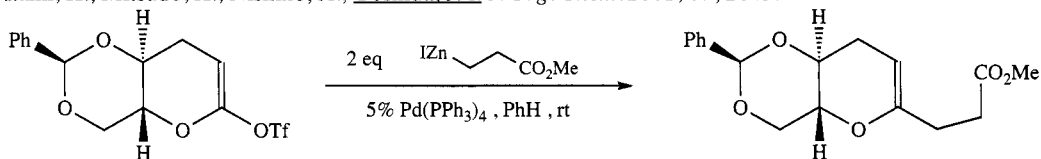
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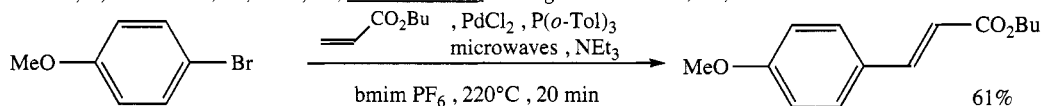
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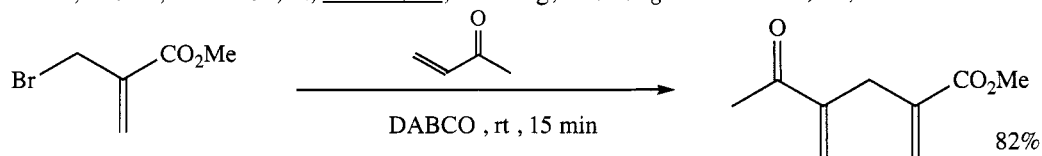
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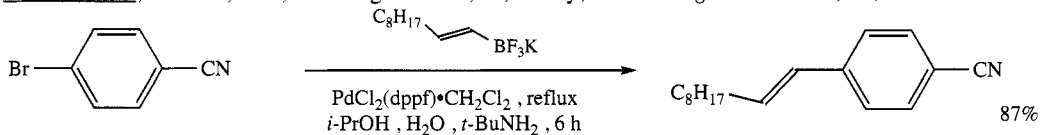
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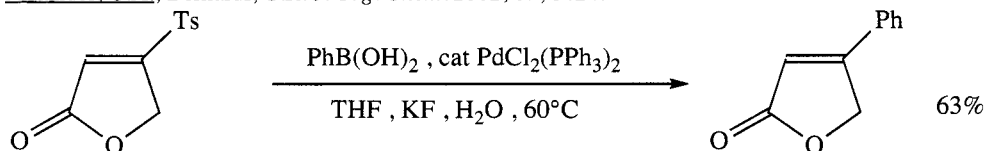
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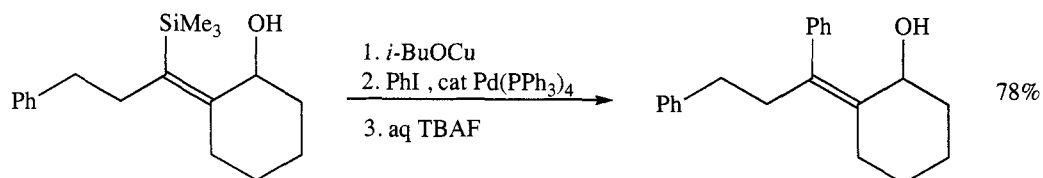
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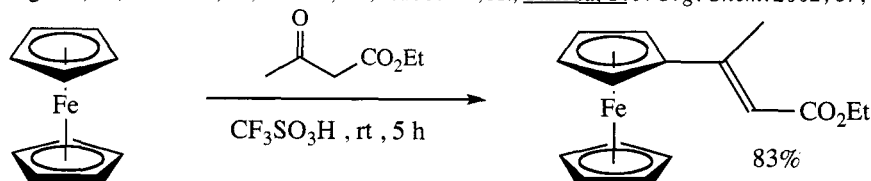
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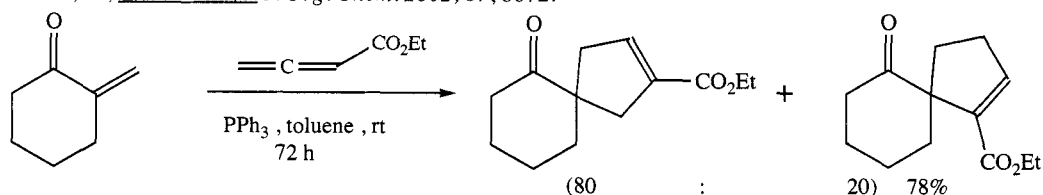
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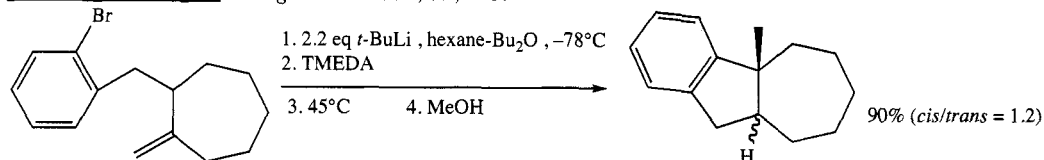
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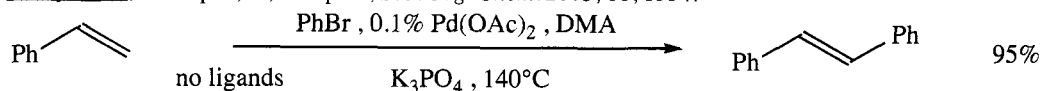
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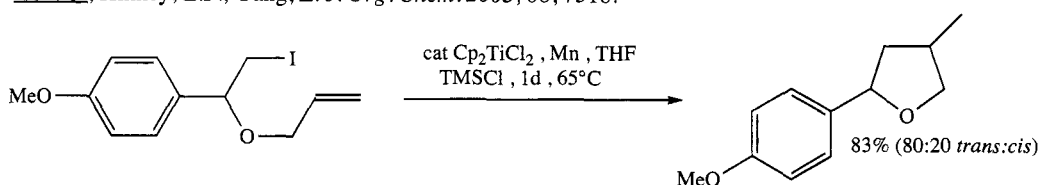
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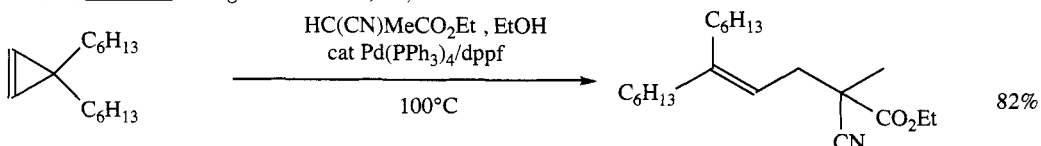
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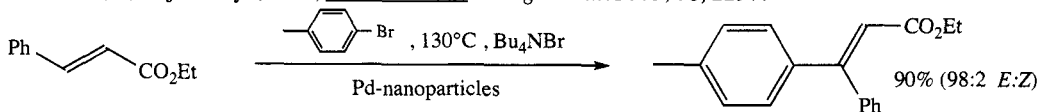
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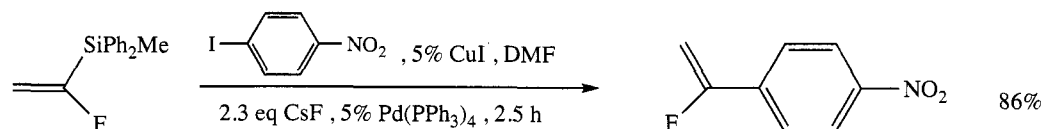
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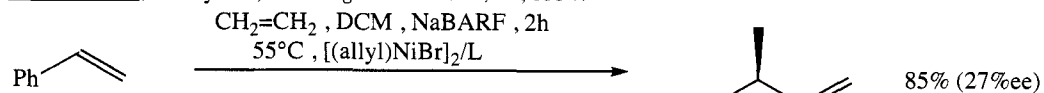
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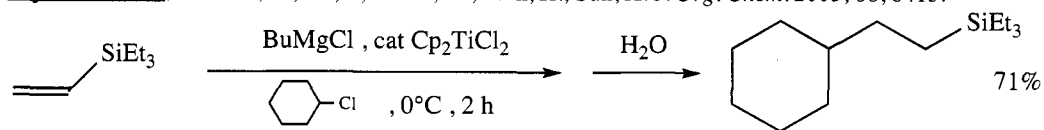
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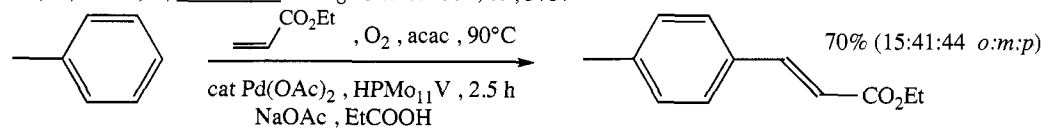
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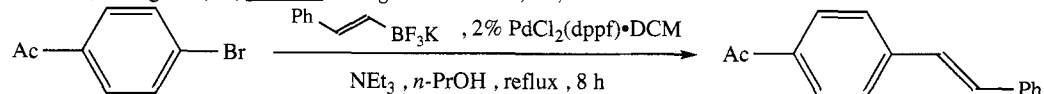
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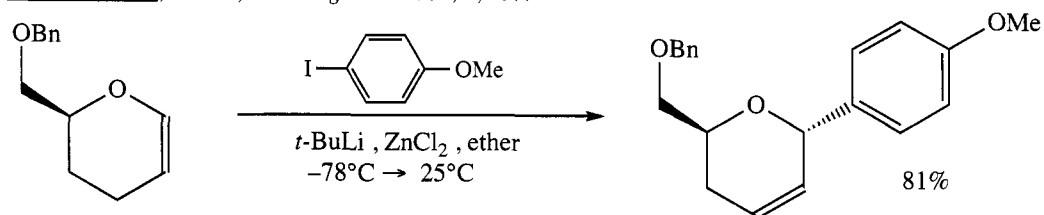
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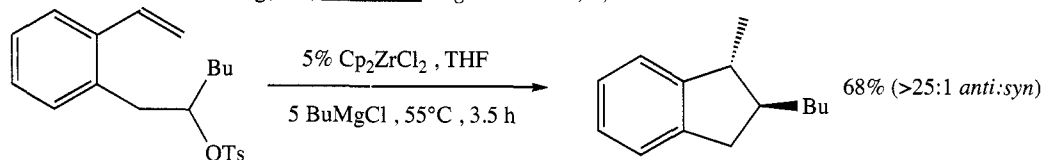
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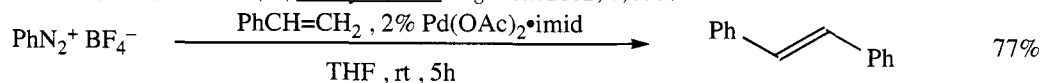
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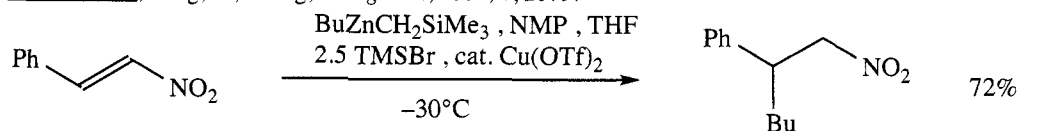
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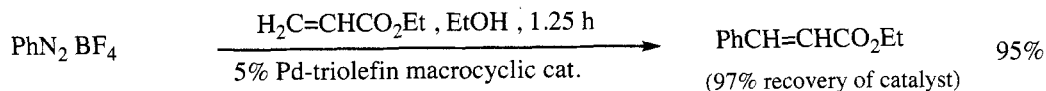
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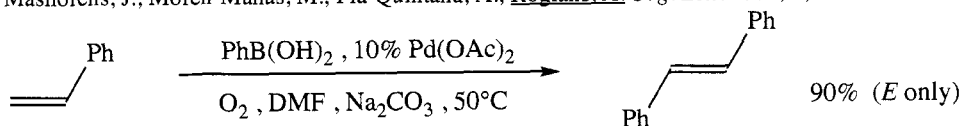
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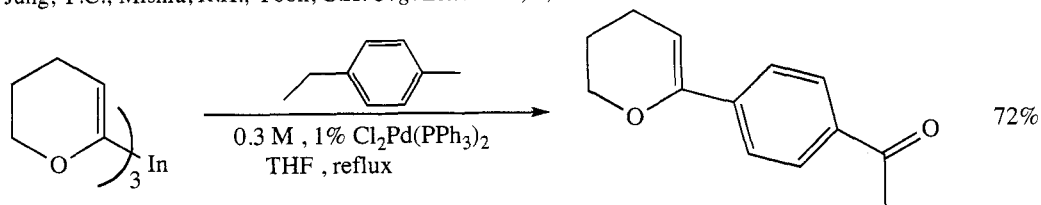
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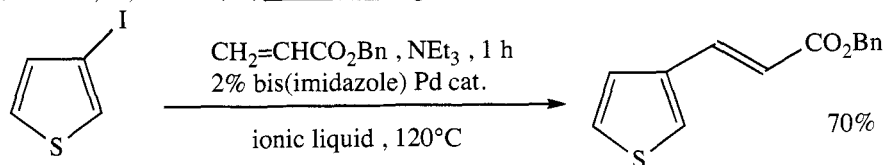
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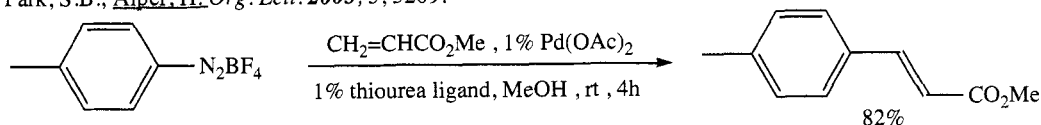
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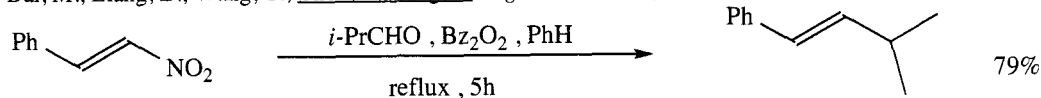
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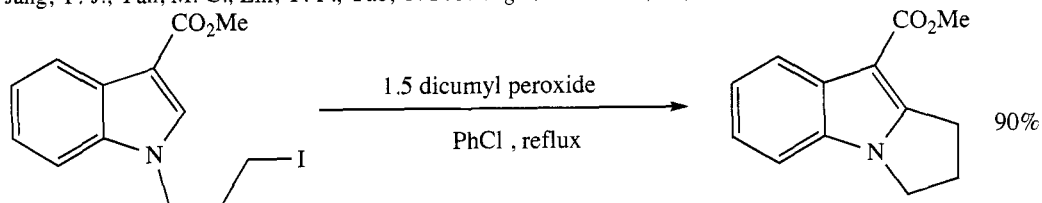
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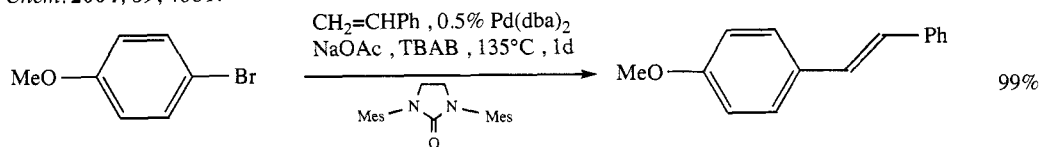
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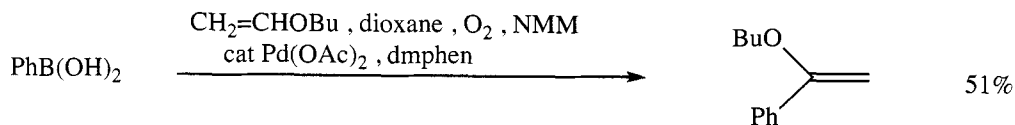
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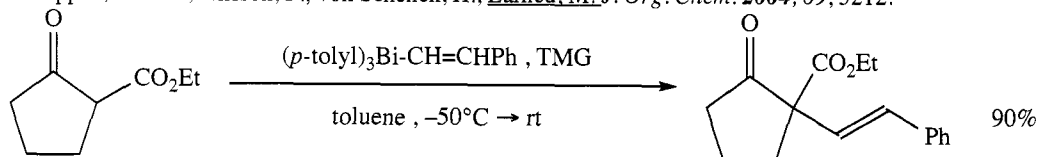
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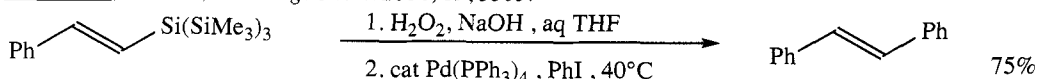
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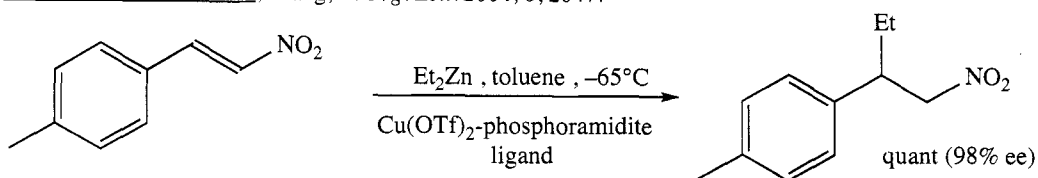
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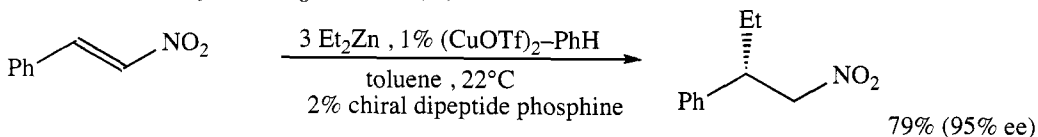
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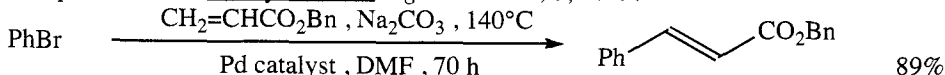
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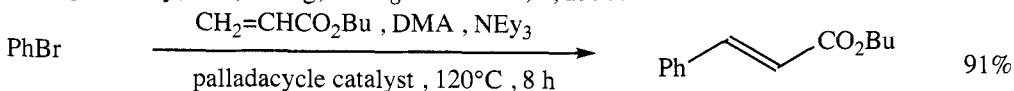
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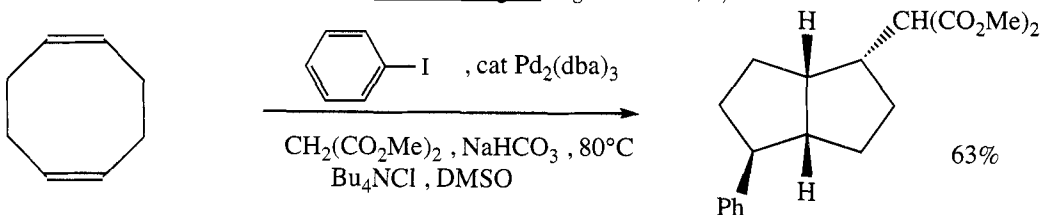
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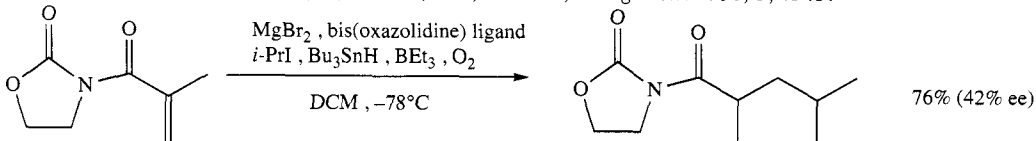
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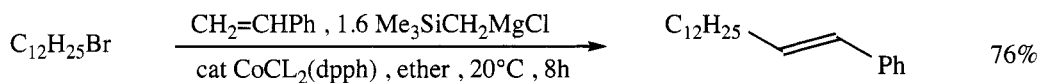
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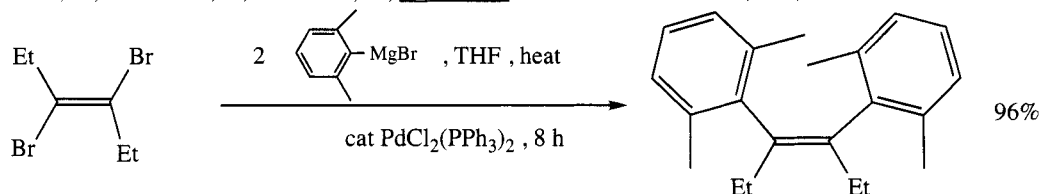
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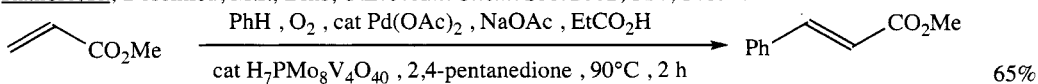
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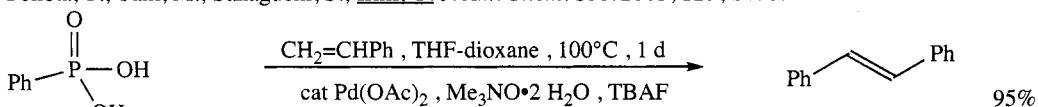
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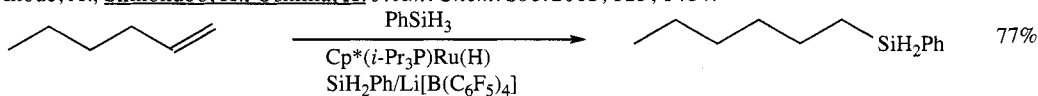
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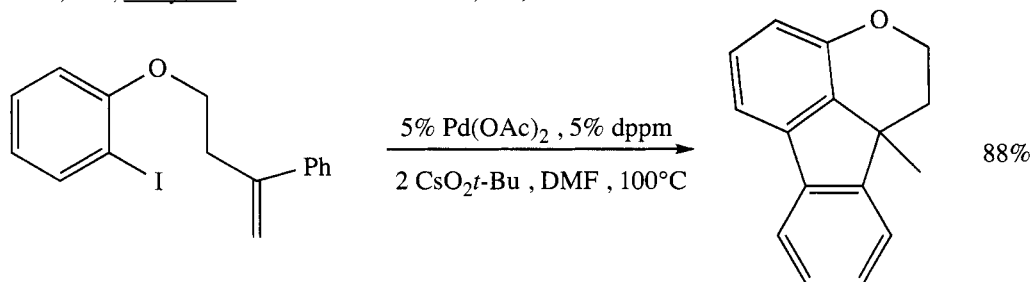
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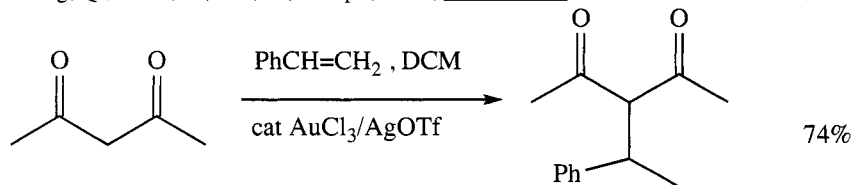
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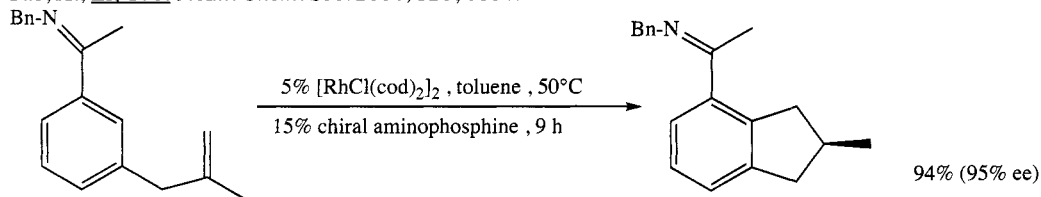
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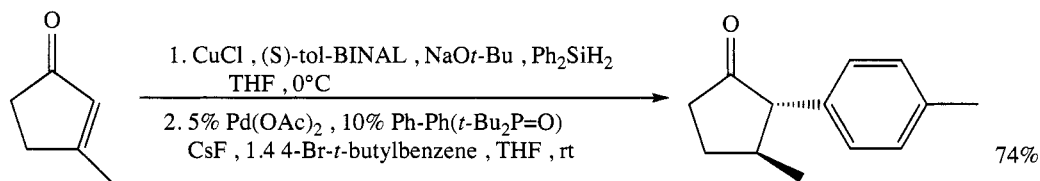
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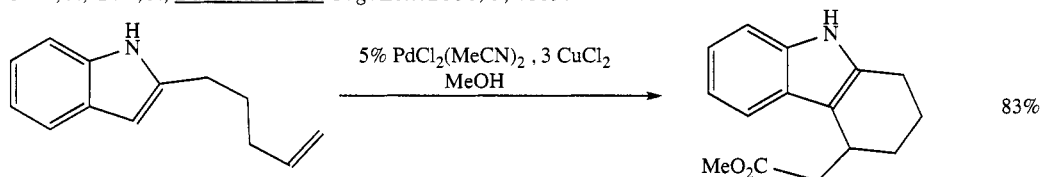
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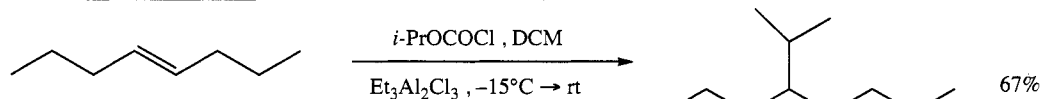
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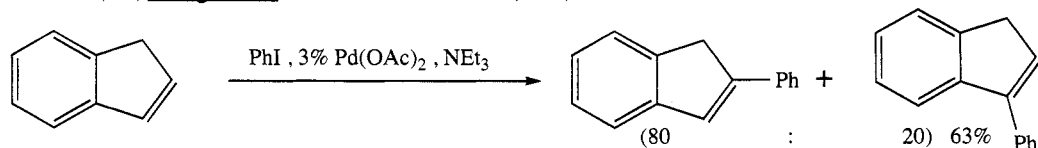
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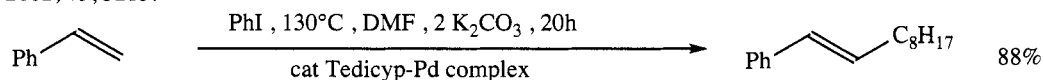
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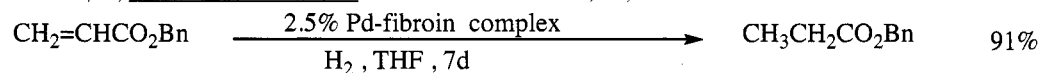
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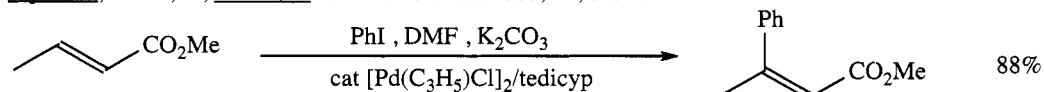
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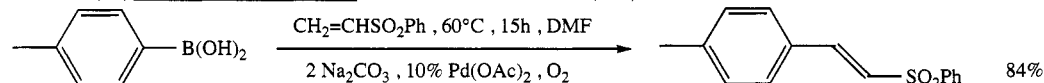
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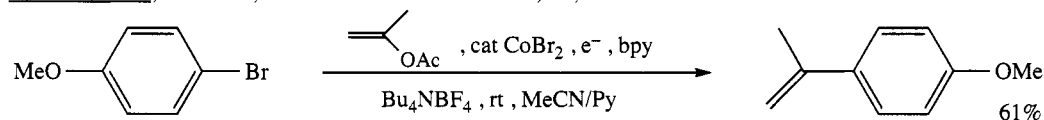
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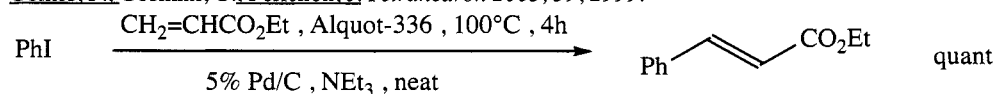
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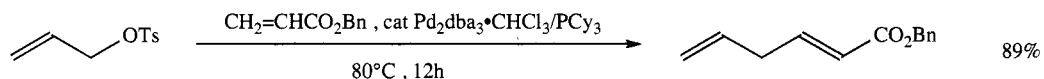
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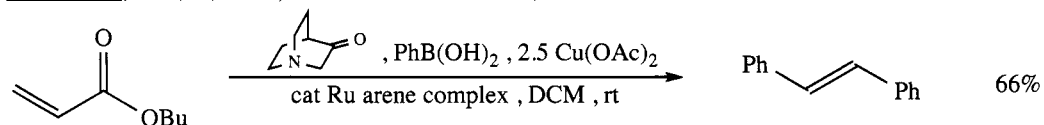
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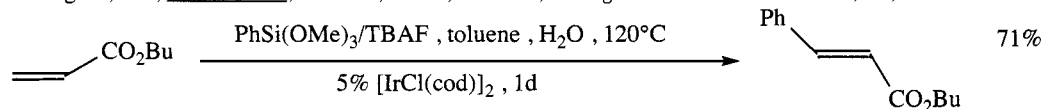
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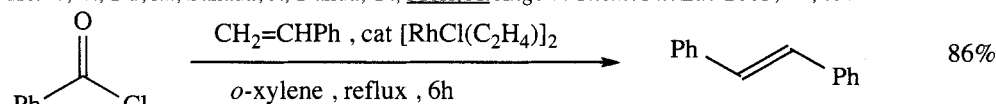
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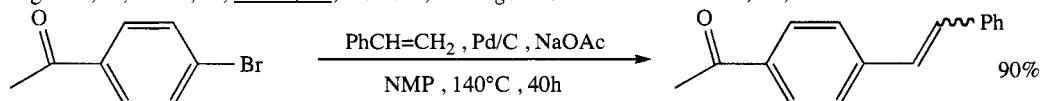
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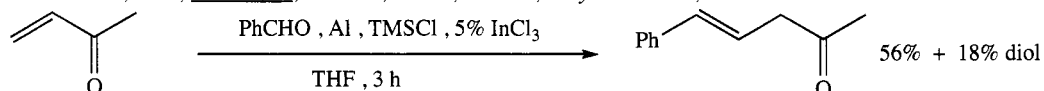
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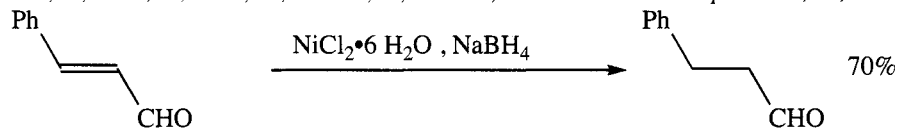
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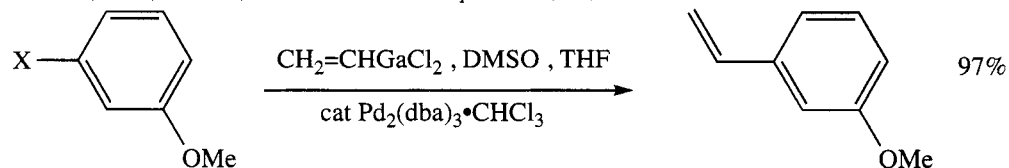
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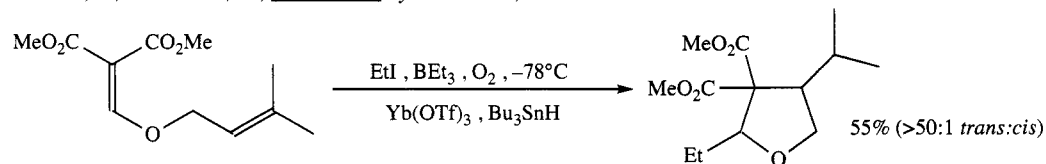
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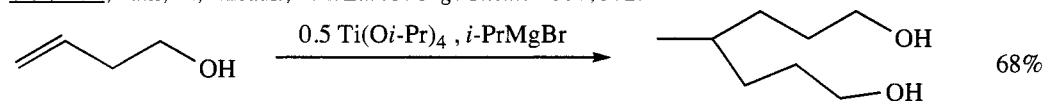
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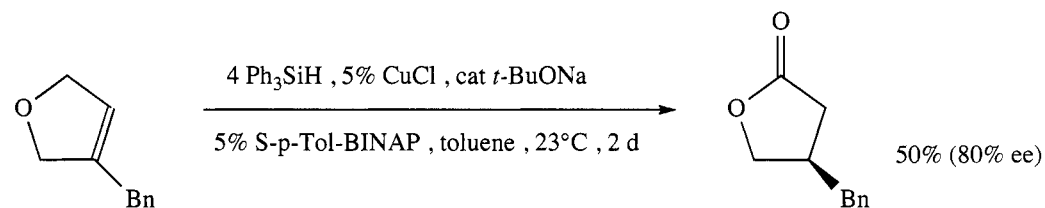
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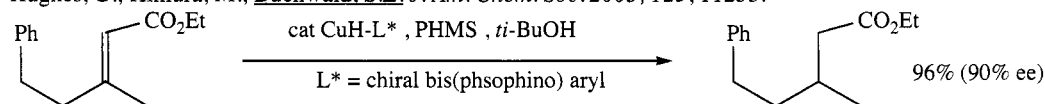
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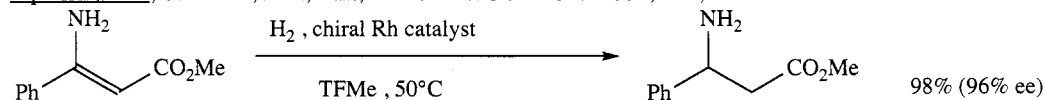
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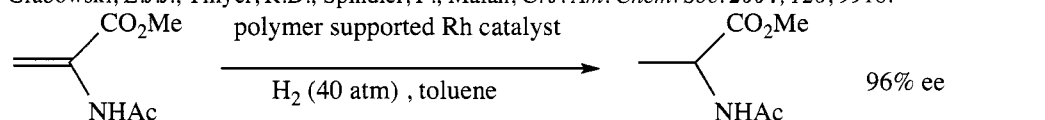
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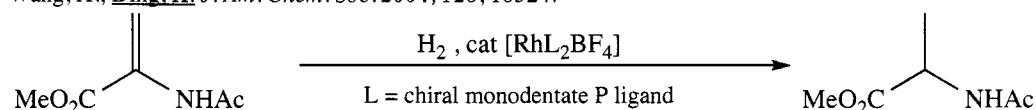
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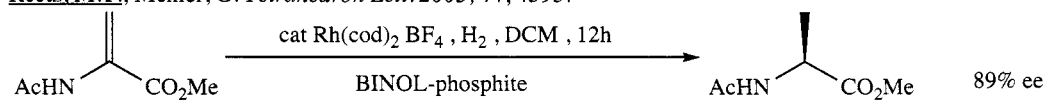
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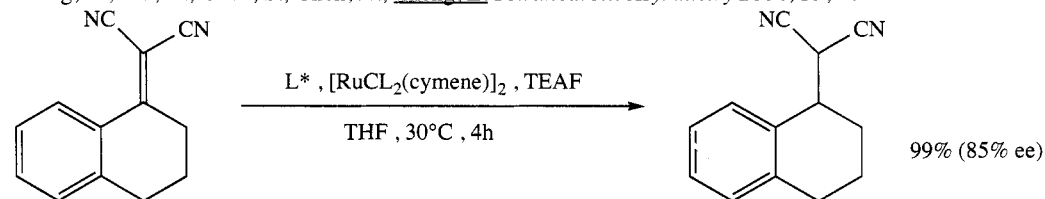
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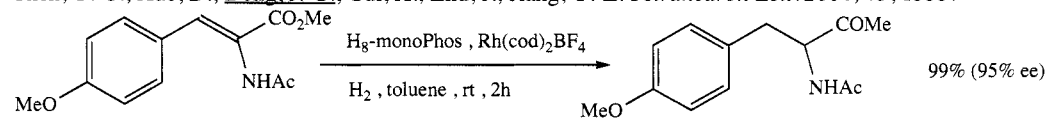
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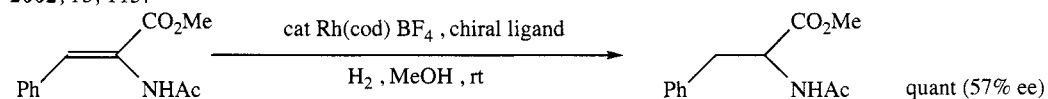
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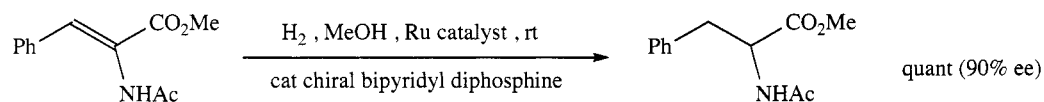
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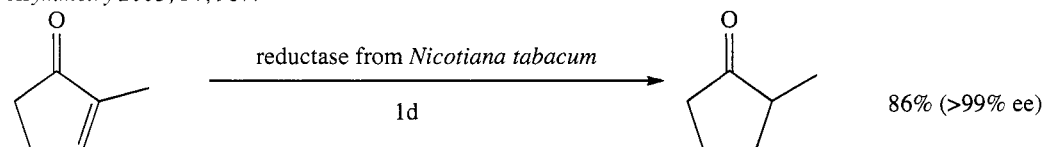
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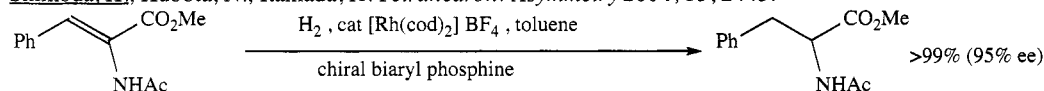
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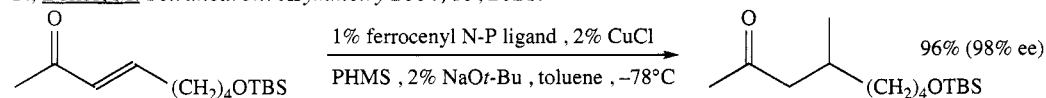
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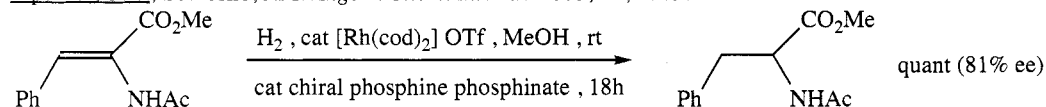
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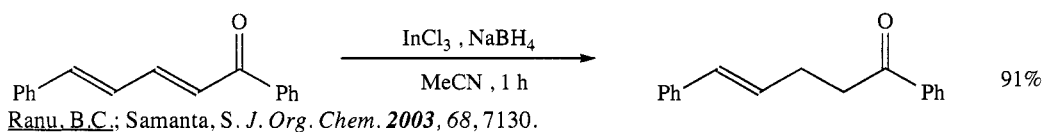


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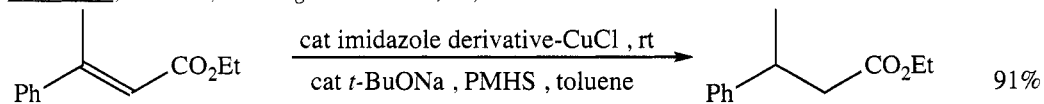


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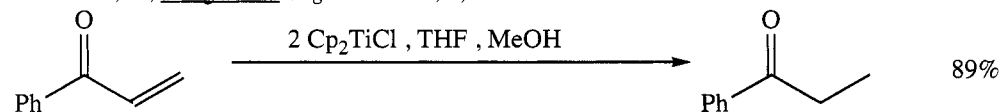
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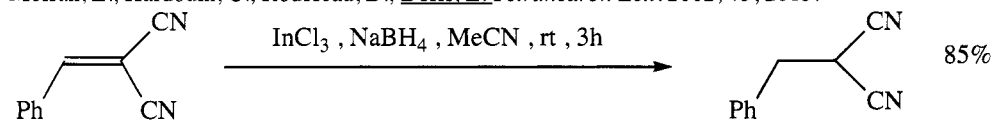
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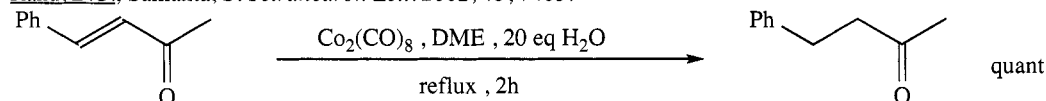
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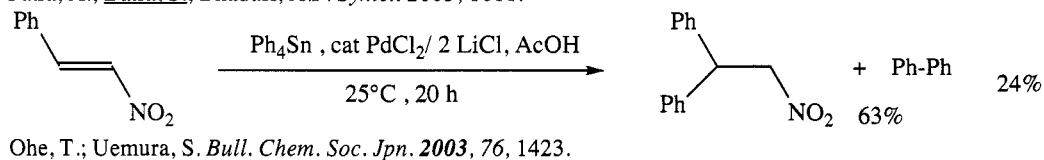
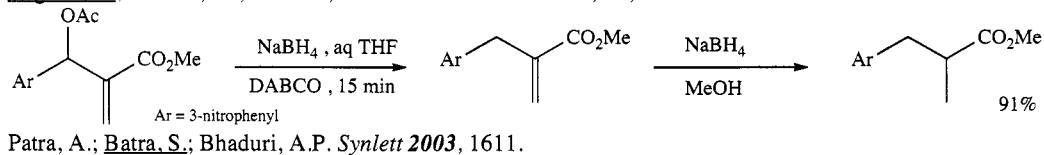
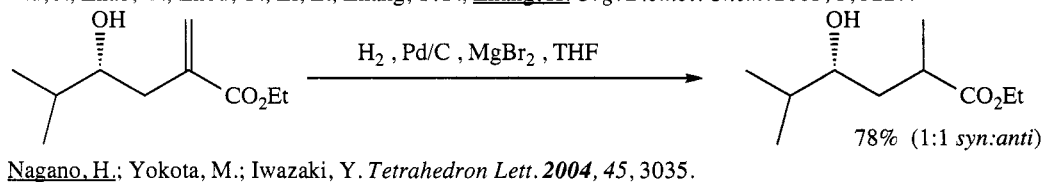
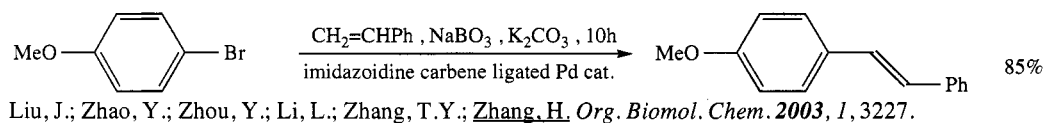
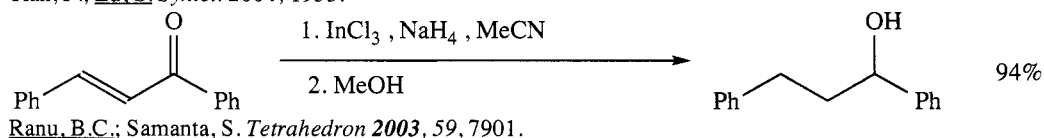
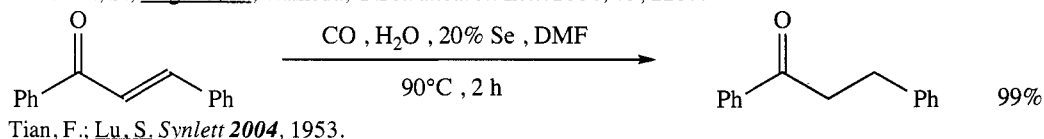
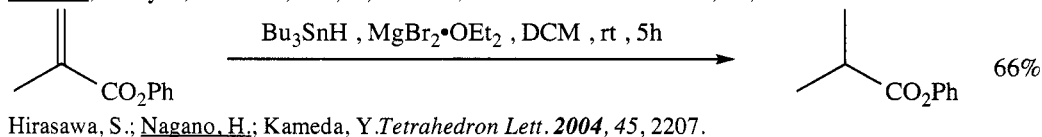
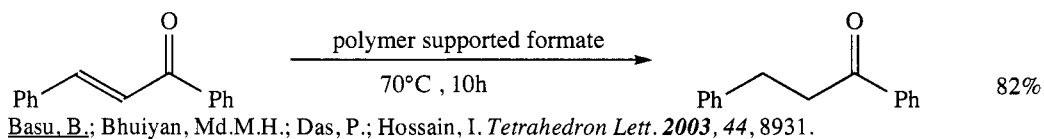
Moisan, L.; Hardouin, C.; Rousseau, B.; Doris, E. *Tetrahedron Lett.* **2002**, *43*, 2013.



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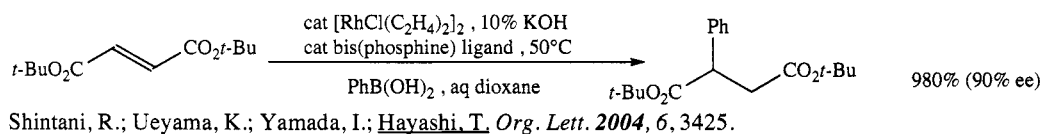


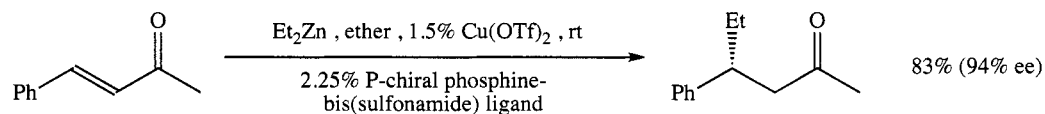
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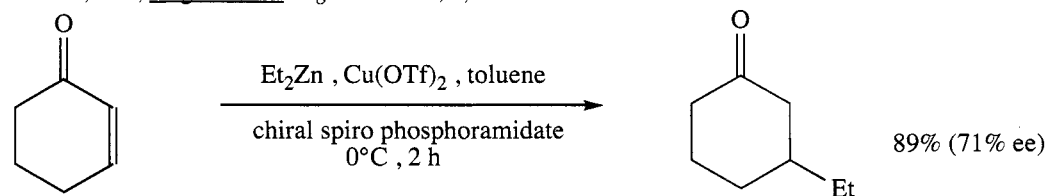
SECTION 74E: CONJUGATE ALKYLATIONS

ASYMMETRIC ALKYLATIONS

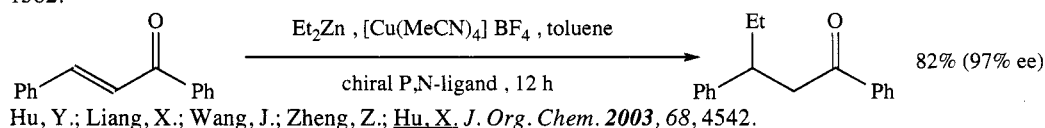




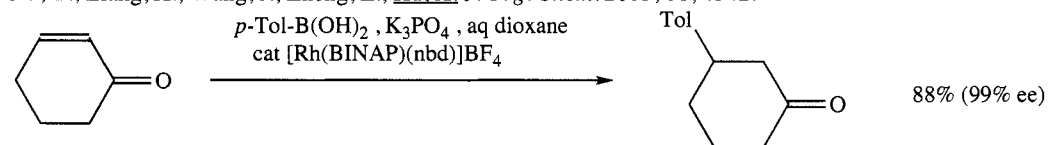
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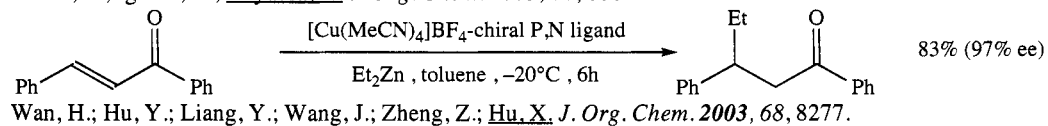
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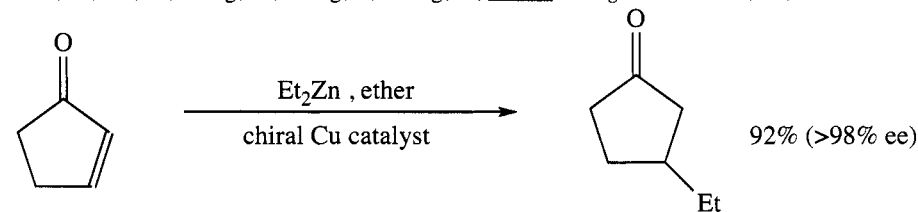
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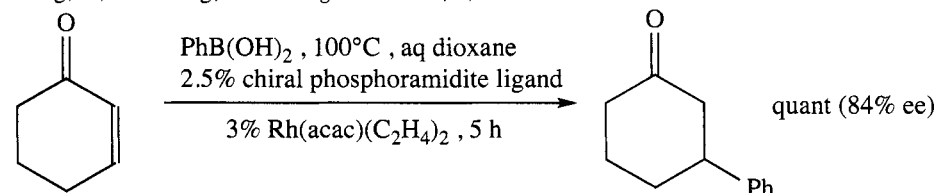
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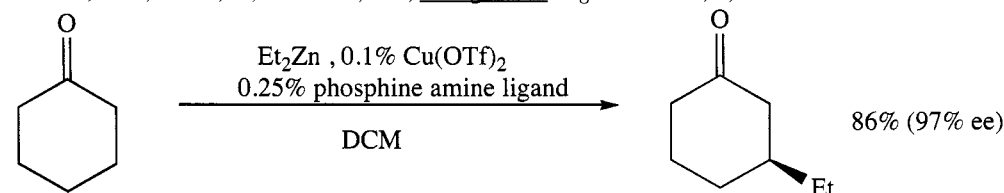
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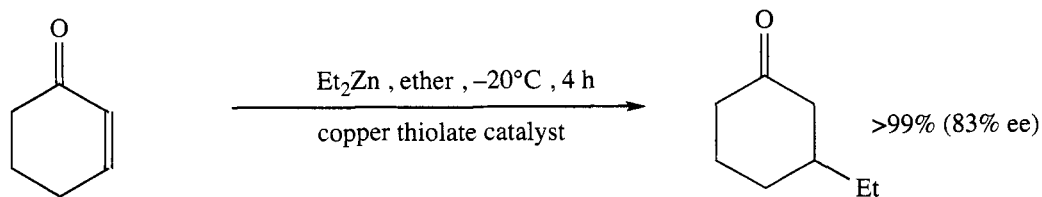
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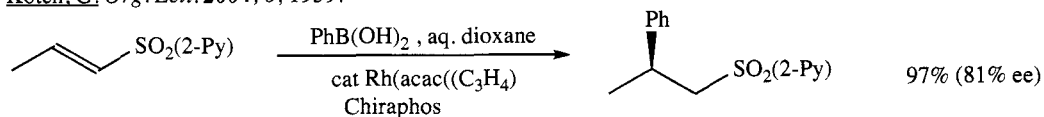
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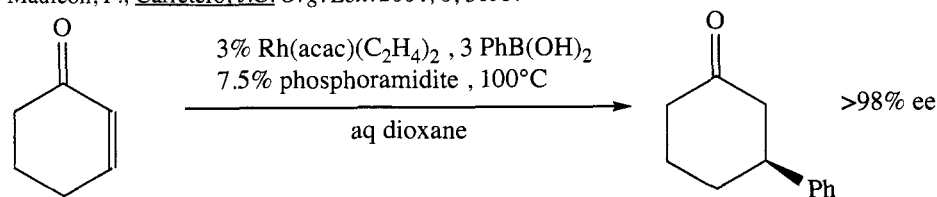
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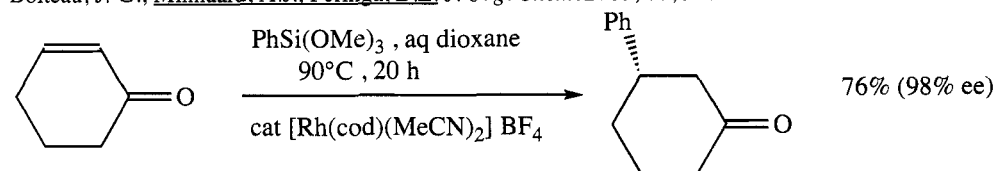
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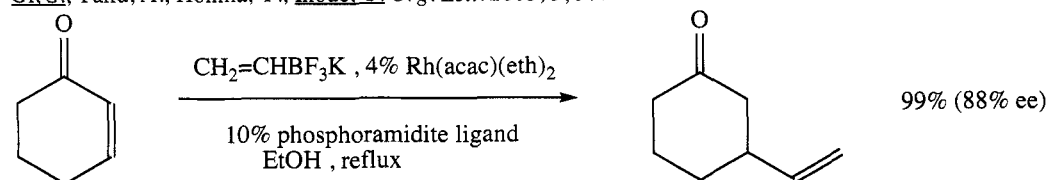
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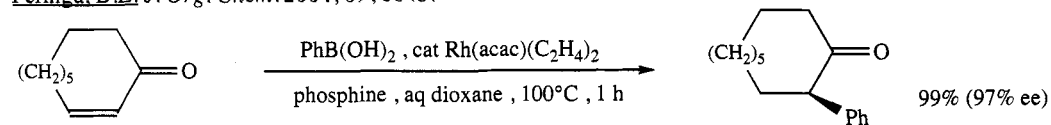
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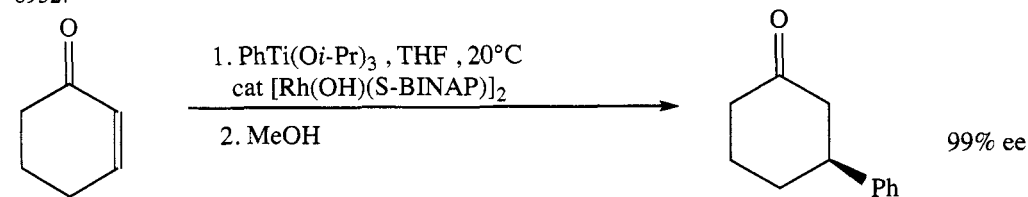
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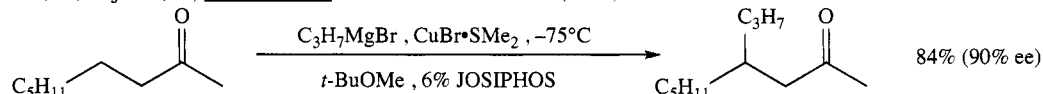
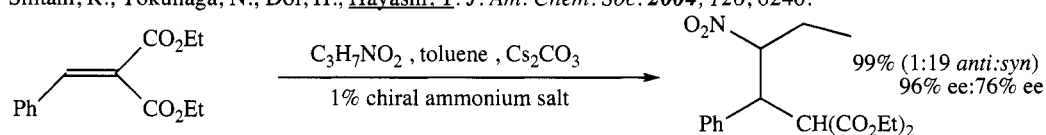
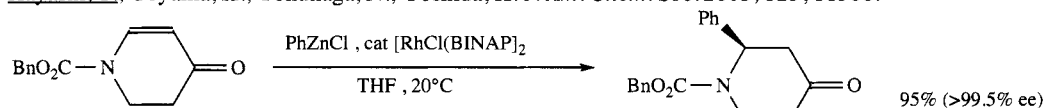
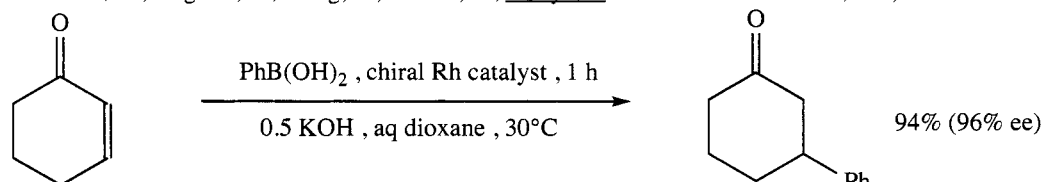
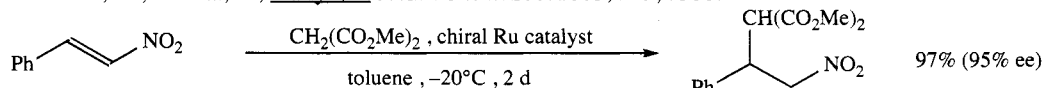
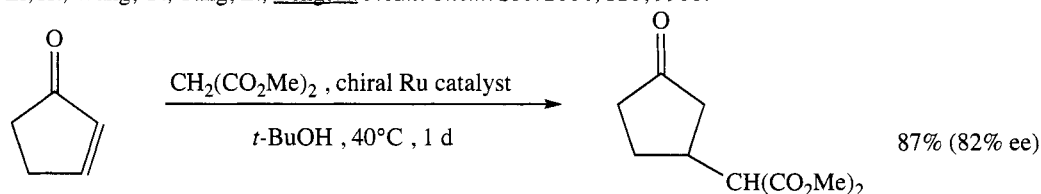
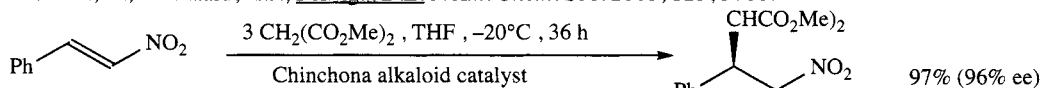
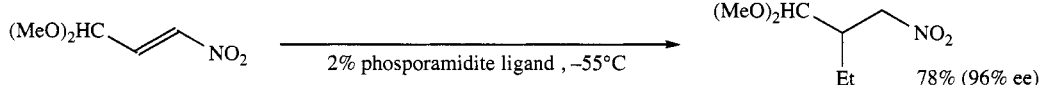
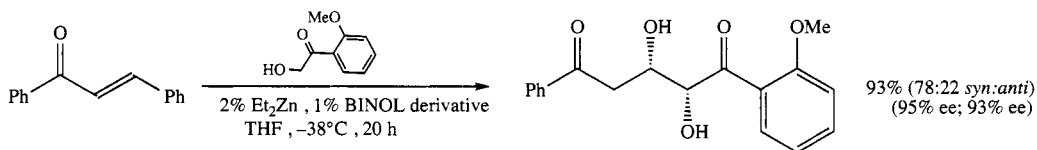
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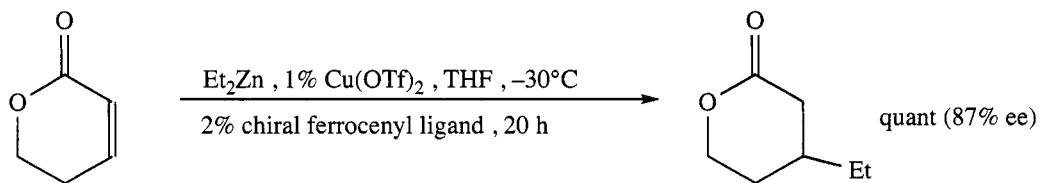


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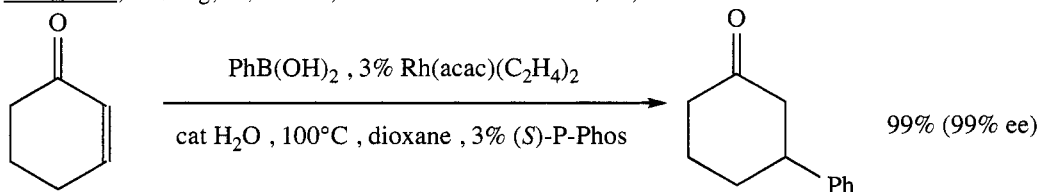


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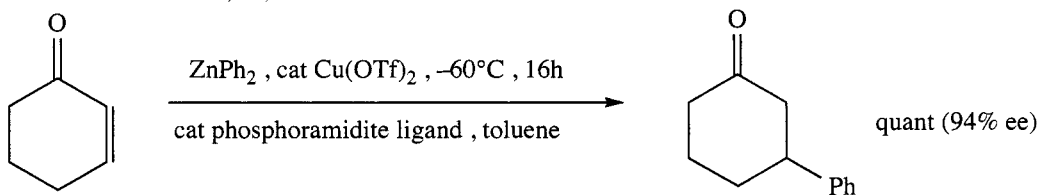




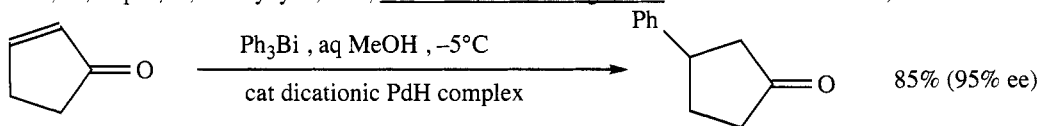
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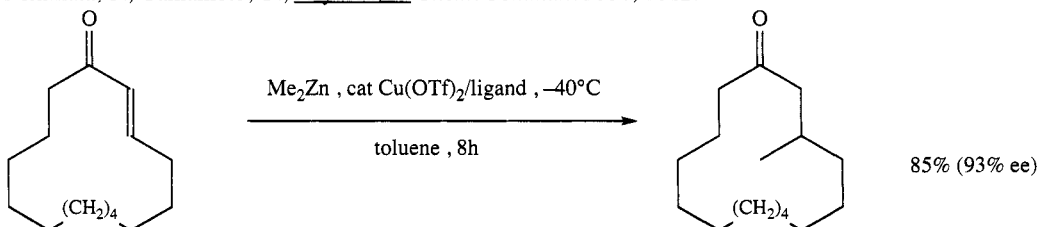
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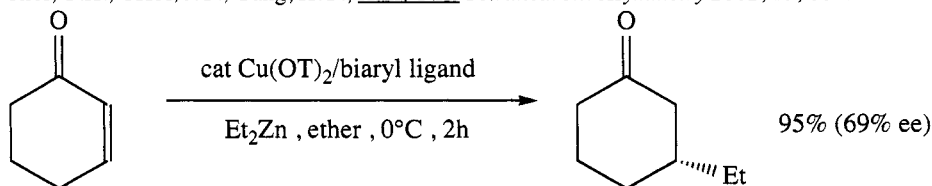
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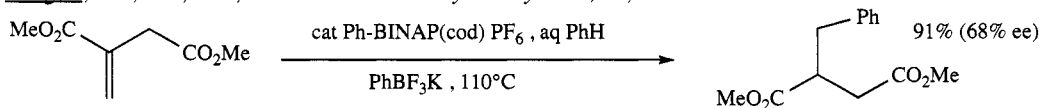
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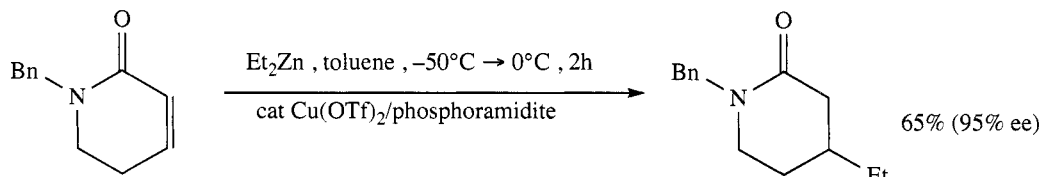
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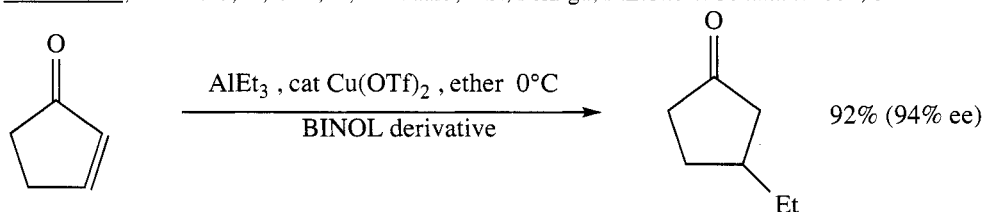
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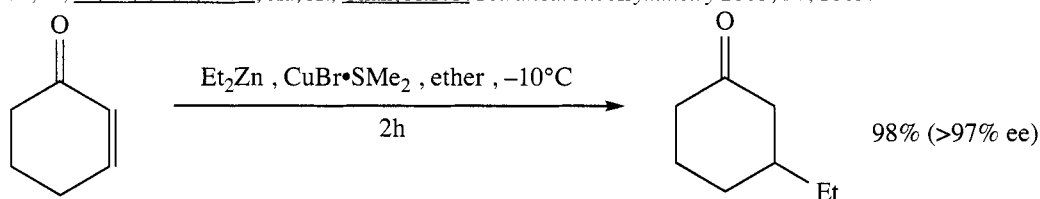
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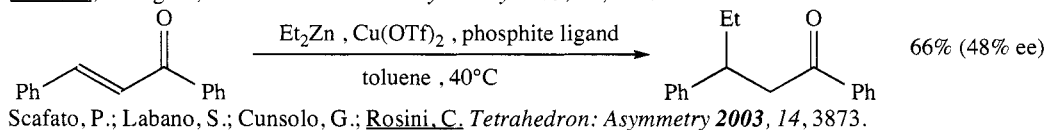
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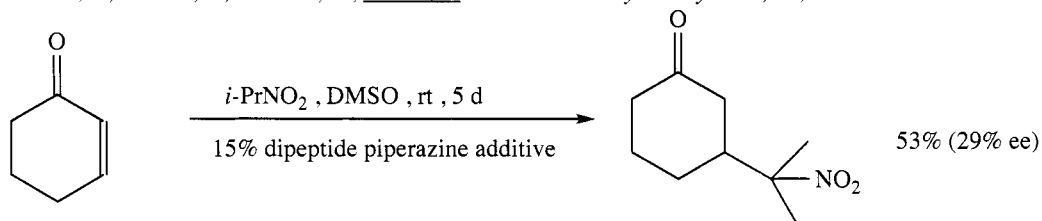
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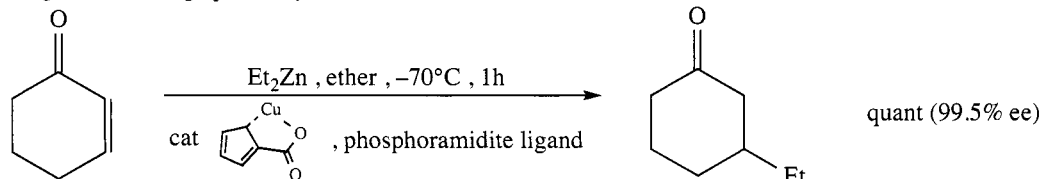
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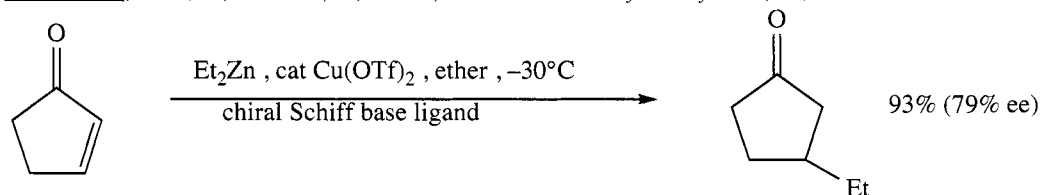
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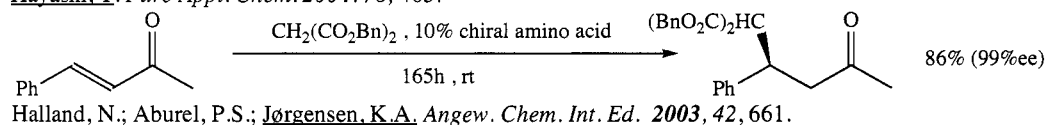
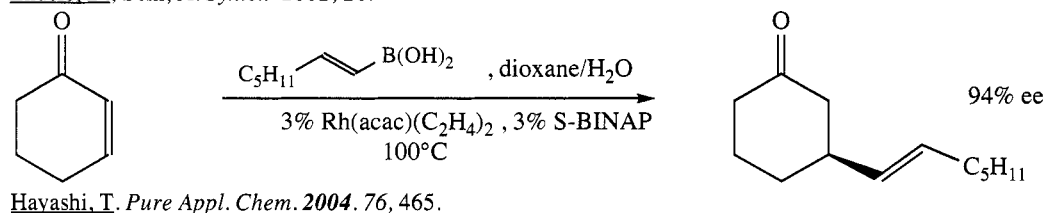
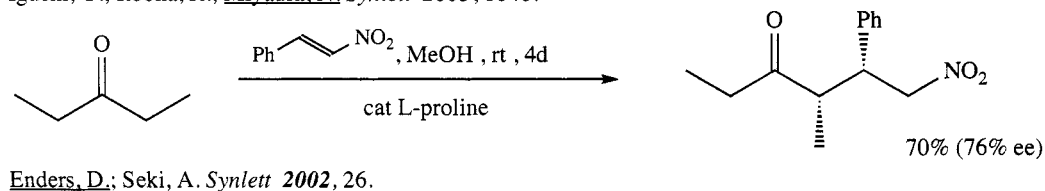
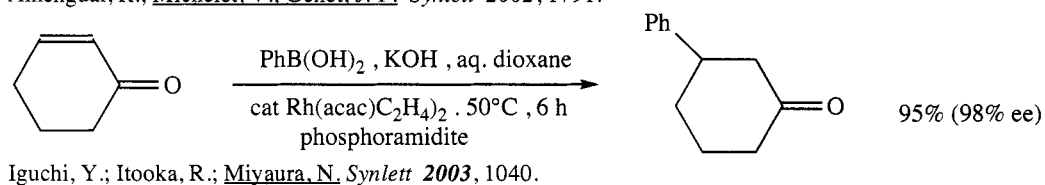
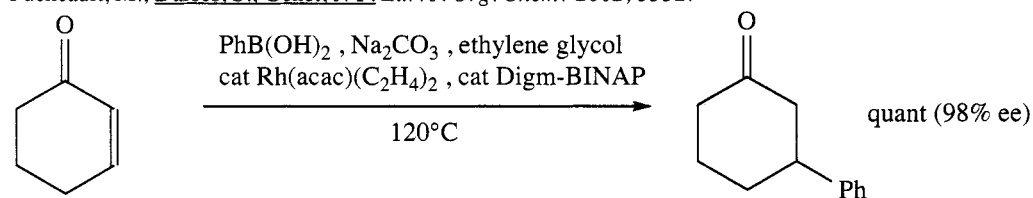
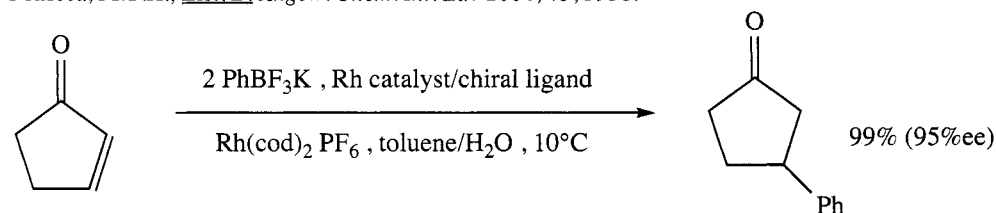
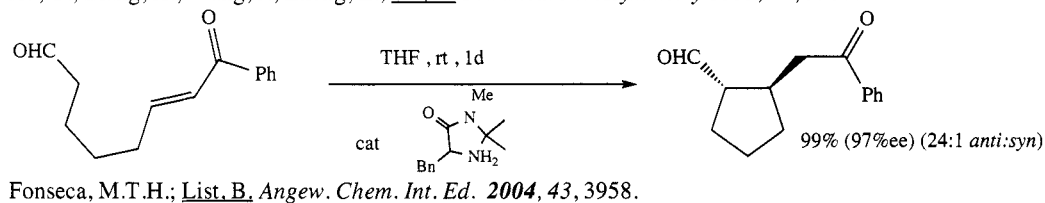
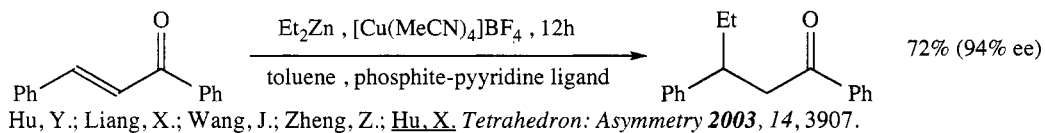
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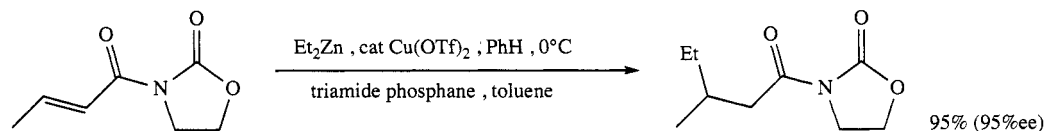


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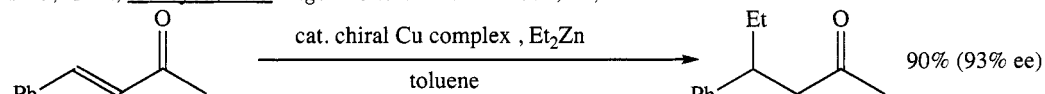


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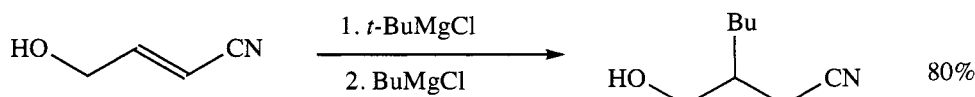


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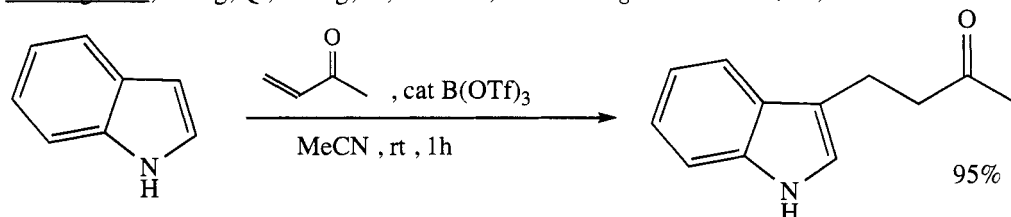


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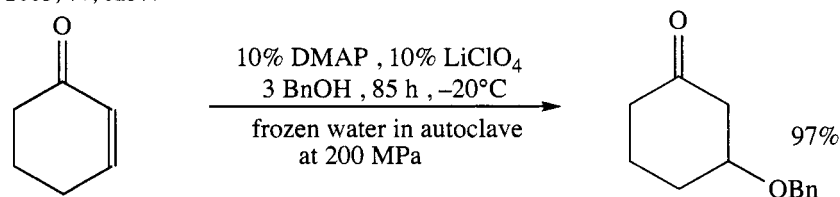
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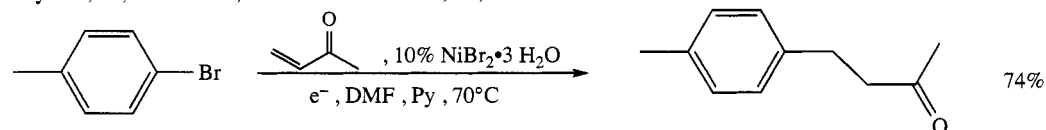
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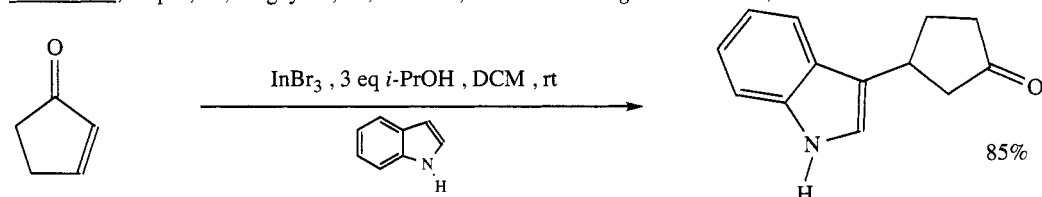
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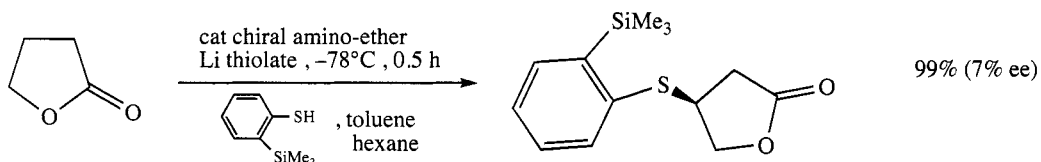
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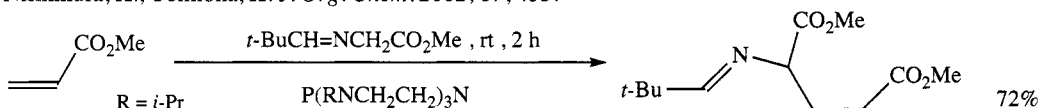
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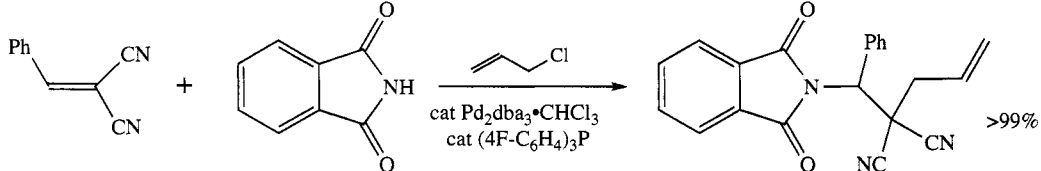
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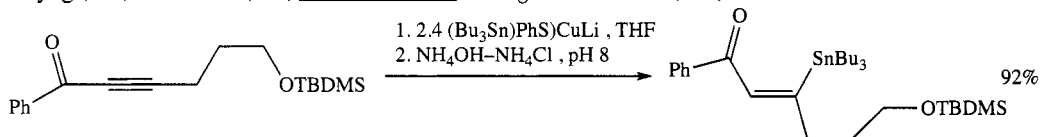
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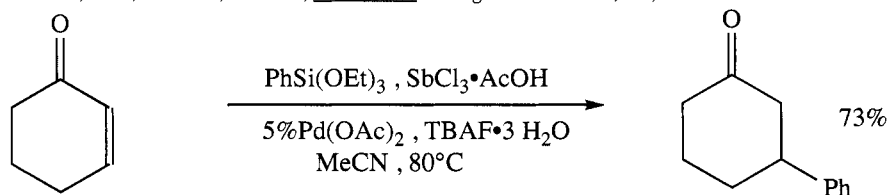
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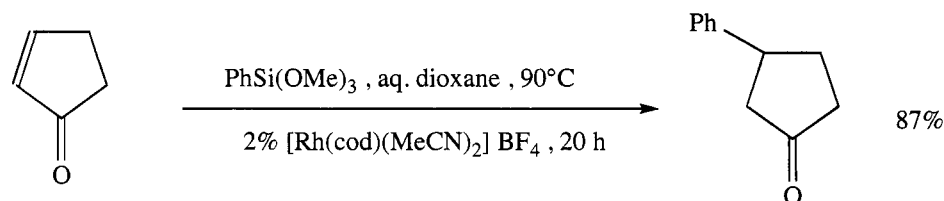
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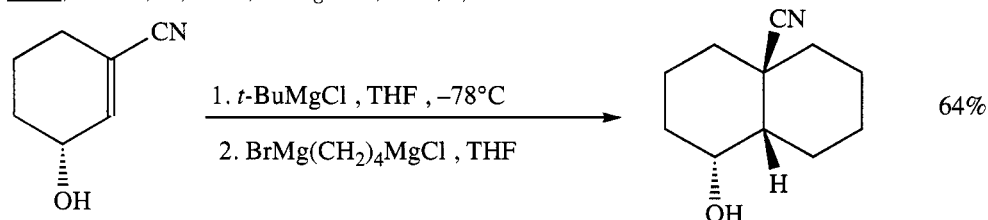
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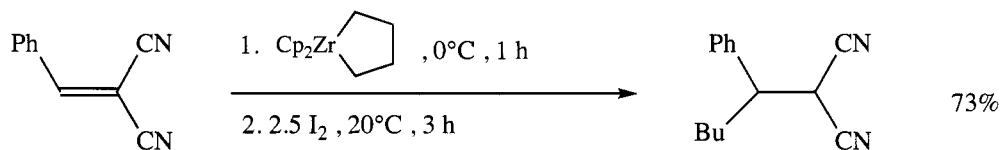
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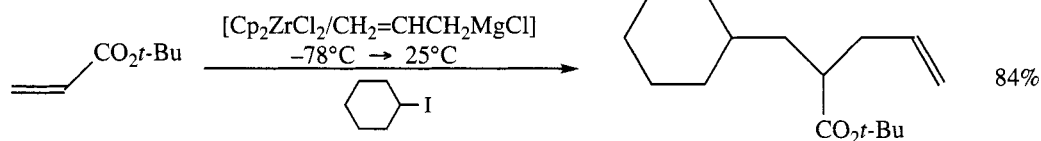
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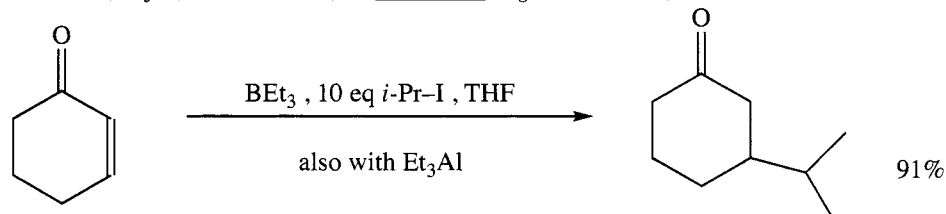
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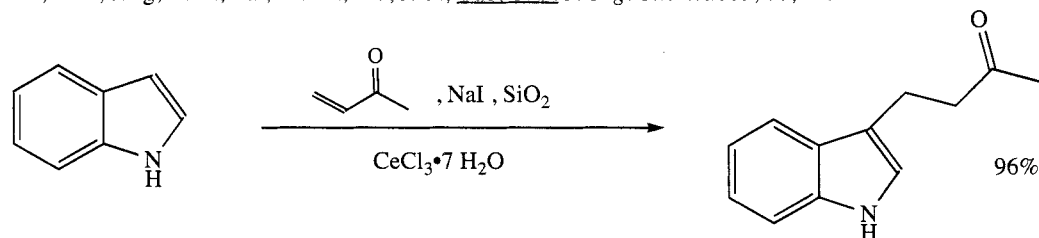
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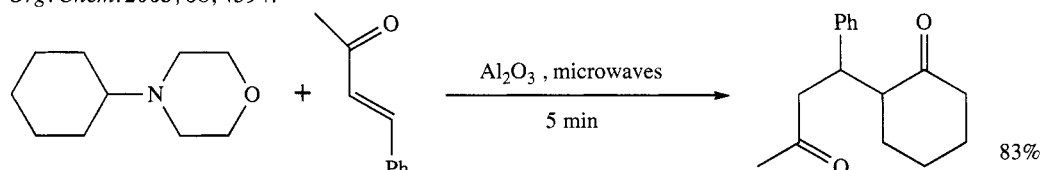
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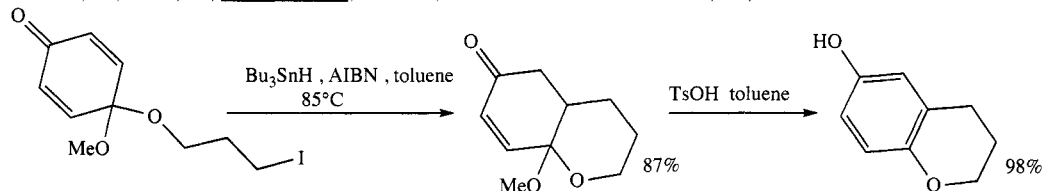
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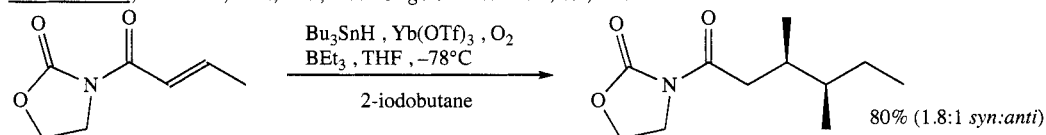
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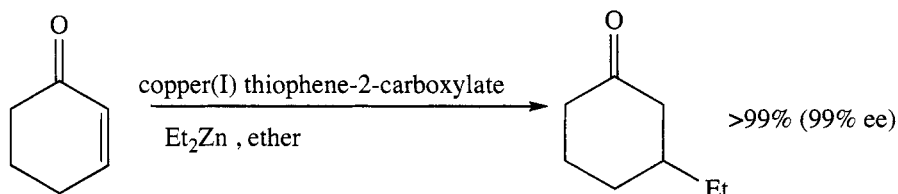
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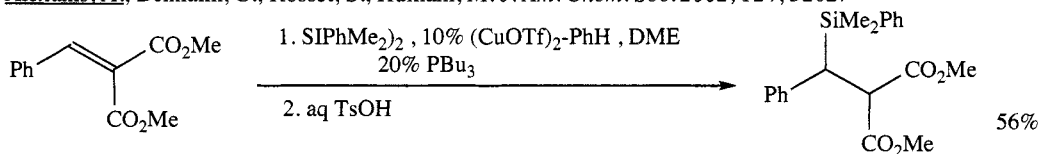
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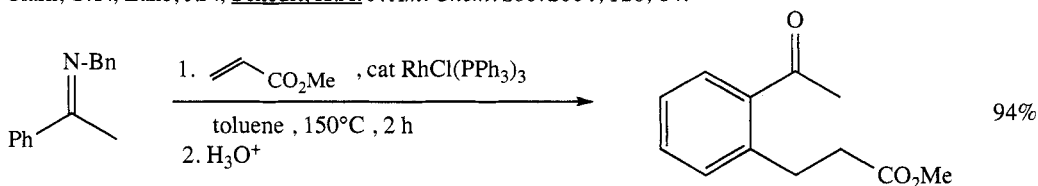
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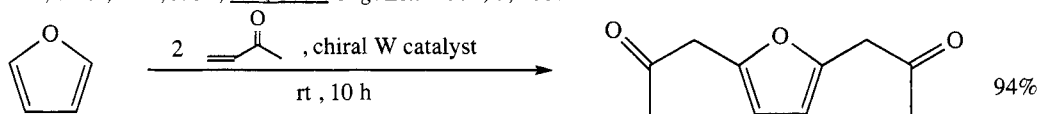
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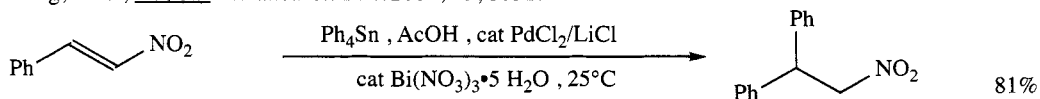
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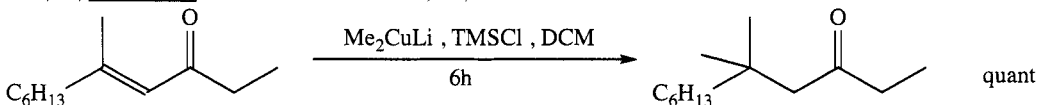
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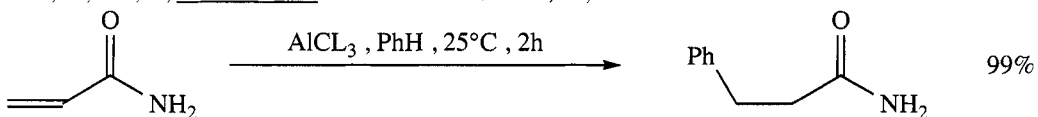
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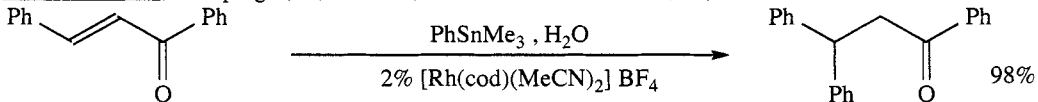
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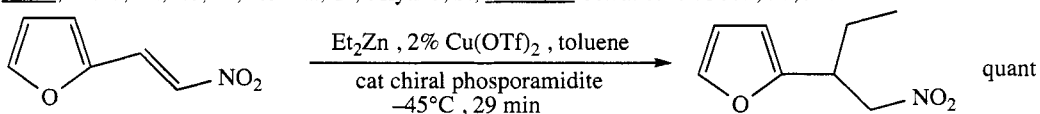
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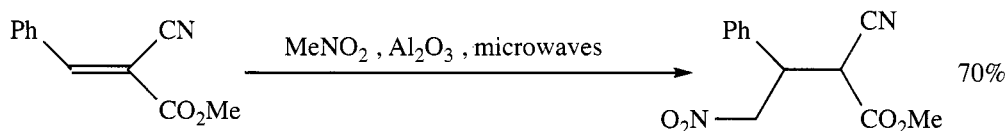
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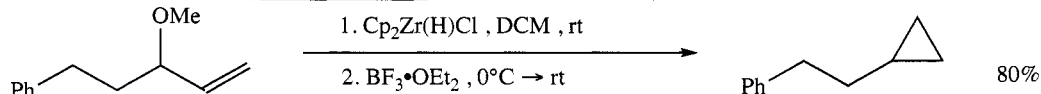
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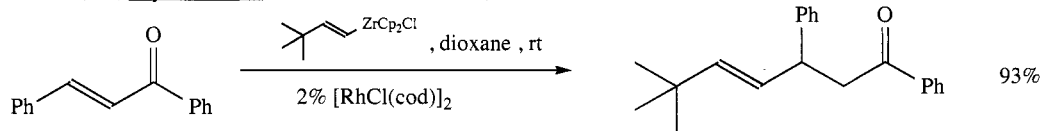
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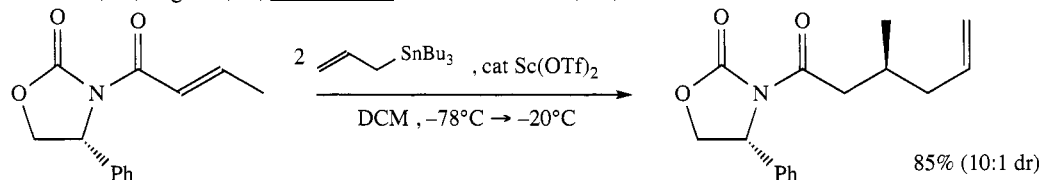
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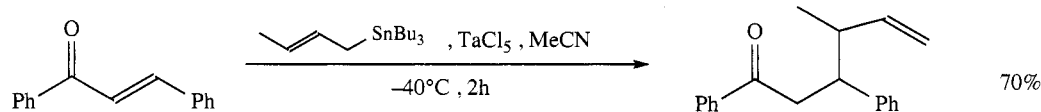
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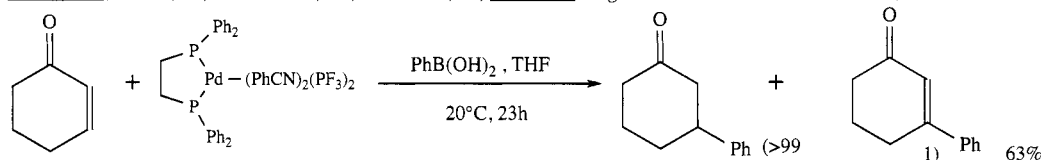
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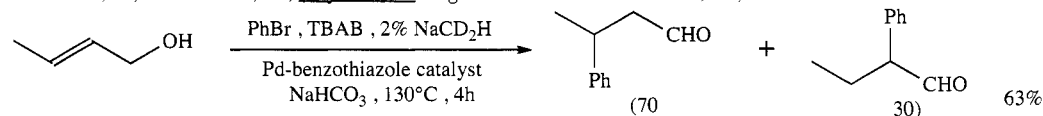
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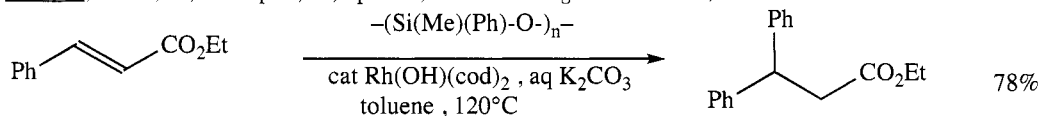
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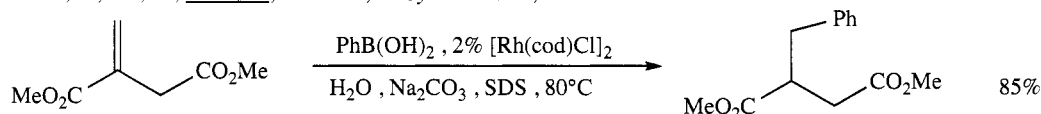
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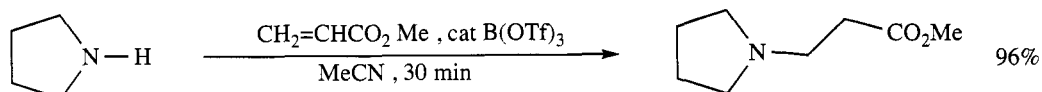
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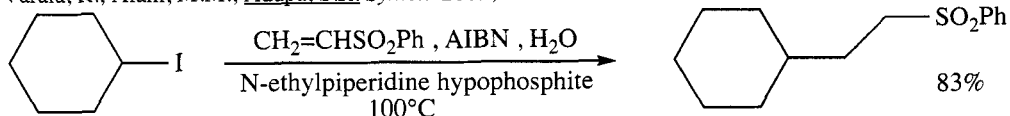
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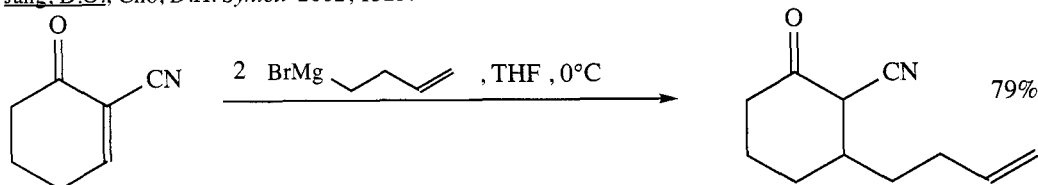
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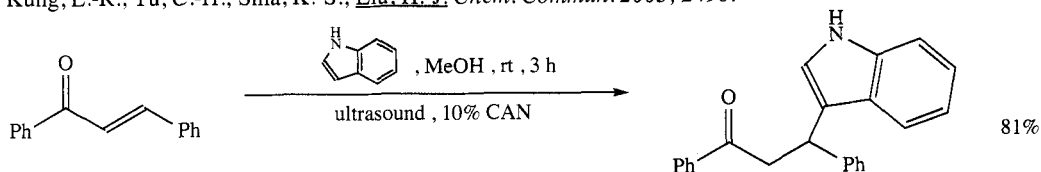
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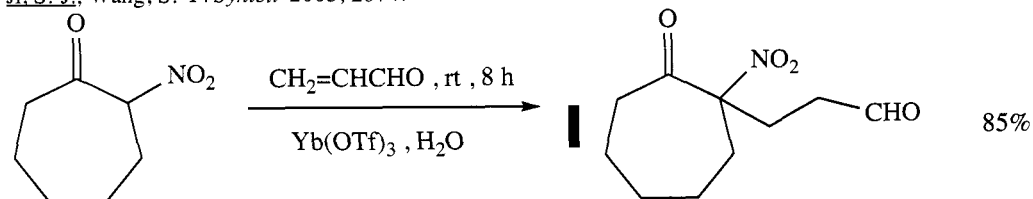
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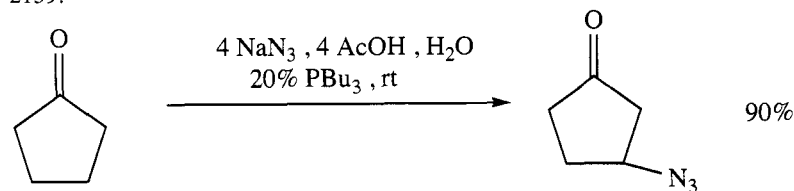
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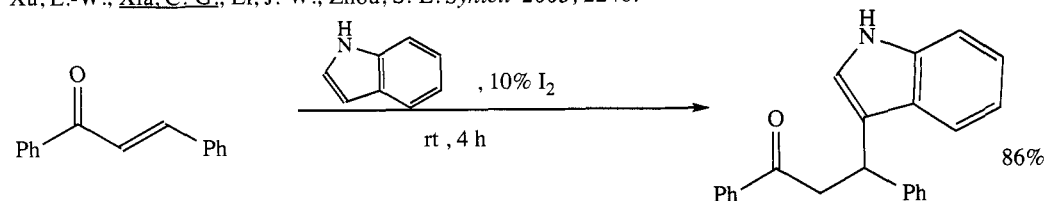
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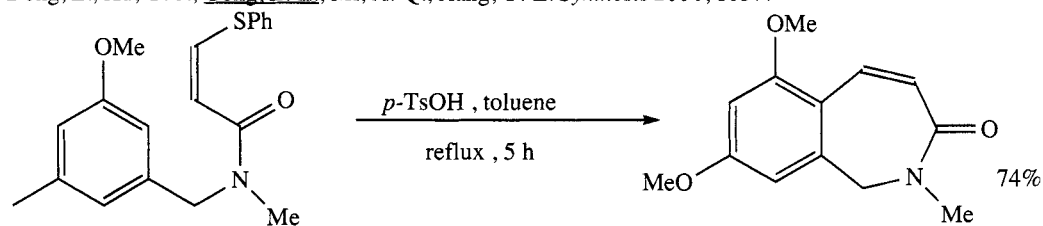
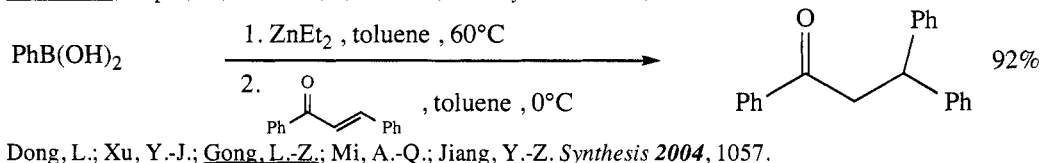
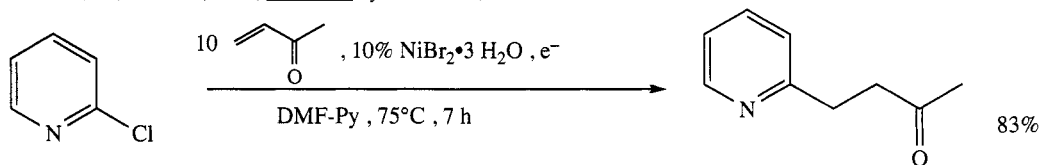
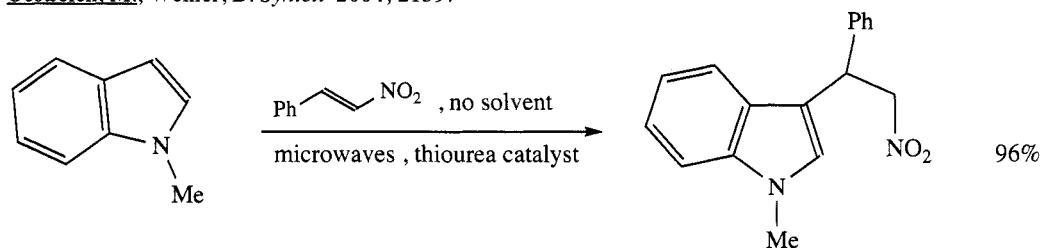
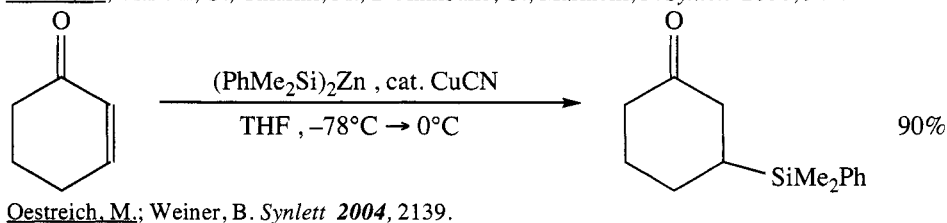
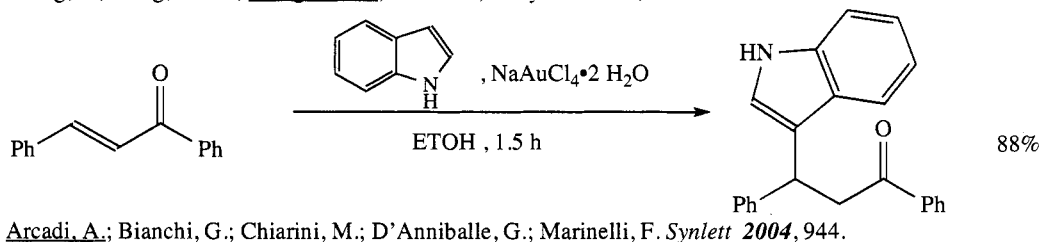
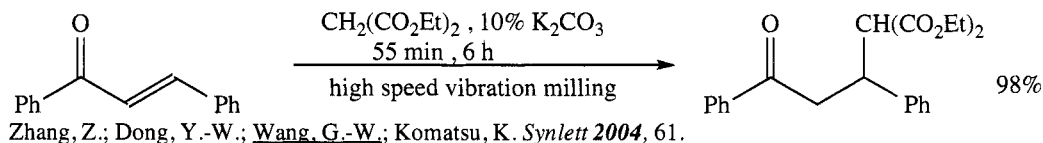
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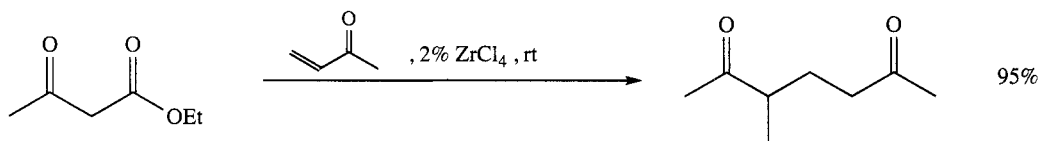


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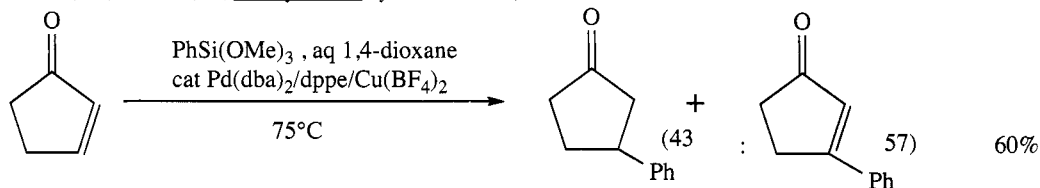


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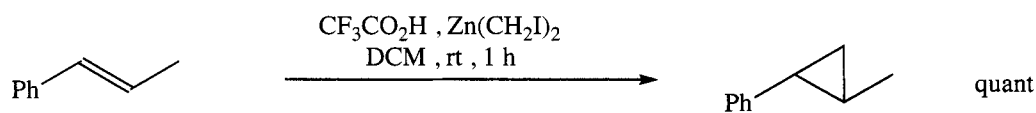
Nishikata, T.; Yamamoto, Y.; Miyaura, N. *Chem Lett.* **2003**, 32, 752.

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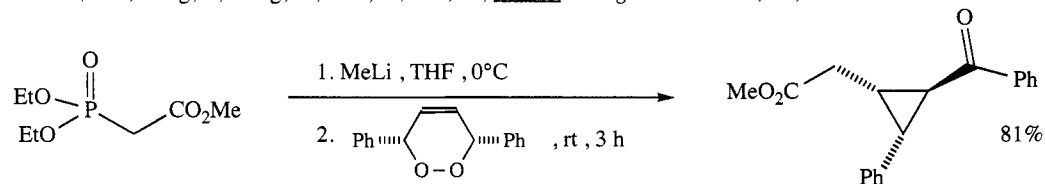
“Unsaturated Nitriles: Conjugate Additions of Carbon Nucleophiles to a Recalcitrant Class of Acceptors”
Fleming, F.F.; Qang, Q. *Chem. Rev.* **2003**, 103, 2035.

“Rhodium-Catalyzed Asymmetric 1,4-Addition and Its Related Asymmetric Reactions”
Hayashi, T.; Yamasaki, K. *Chem. Rev.* **2003**, 103, 2829.

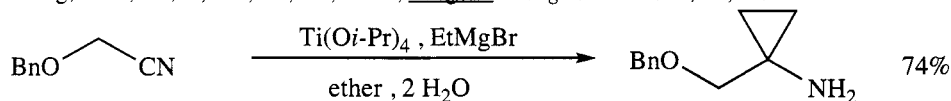
SECTION 74F: CYCLOPROPANATIONS, INCLUDING HALOCYCLOPROPANATIONS



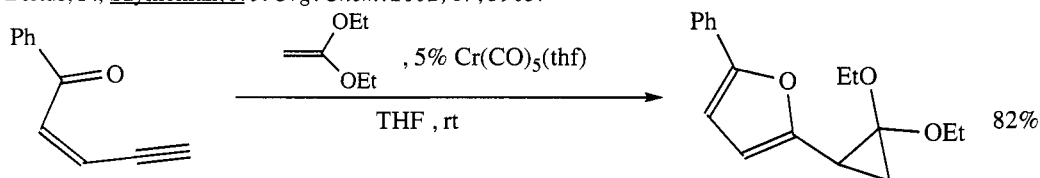
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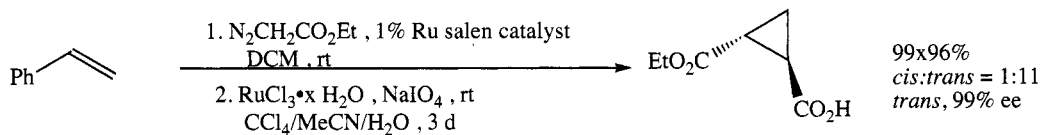
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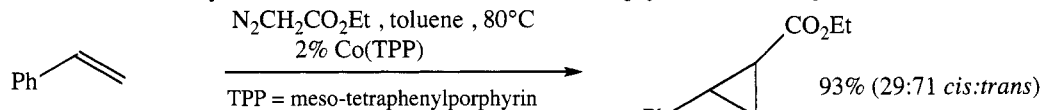
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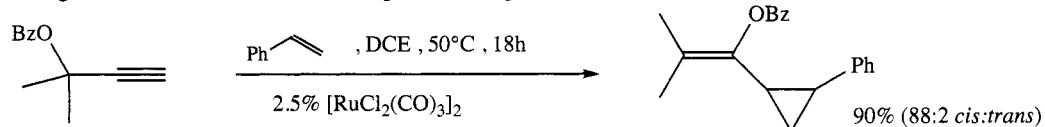
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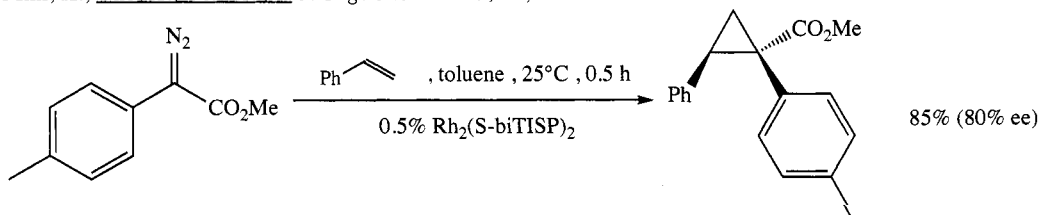
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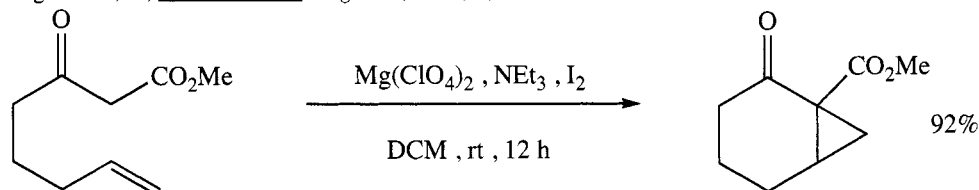
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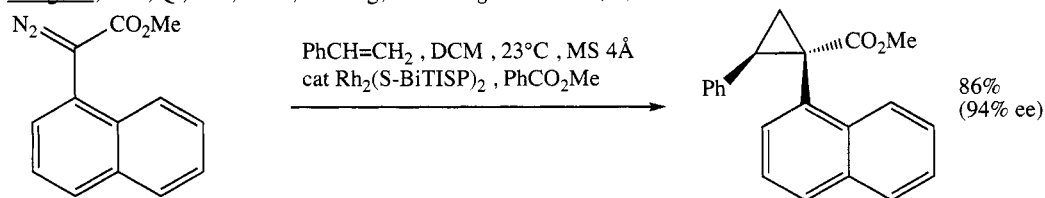
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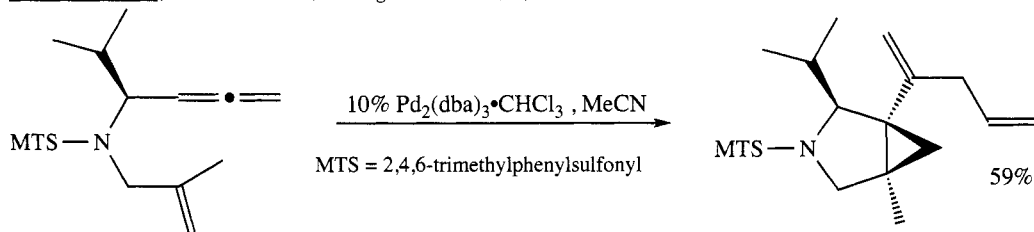
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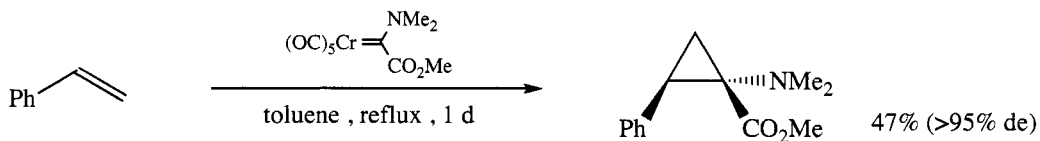
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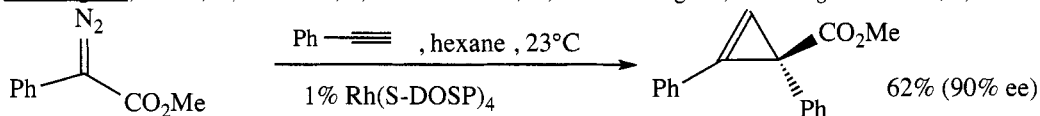
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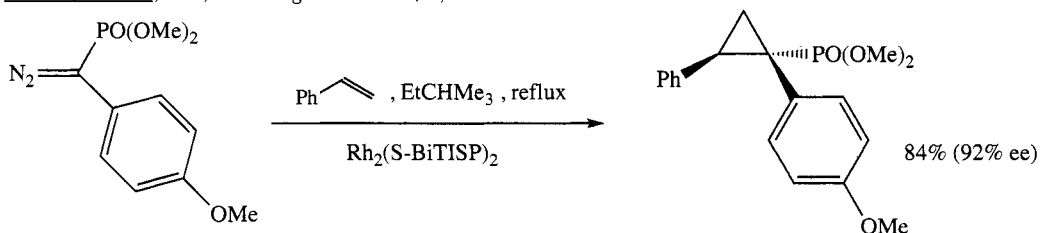
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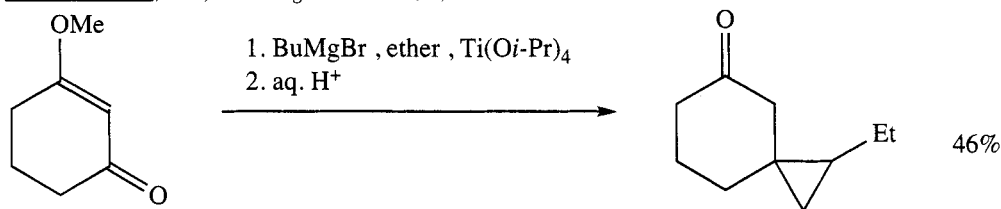
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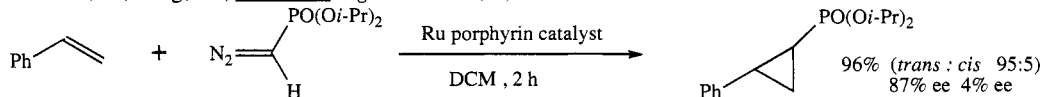
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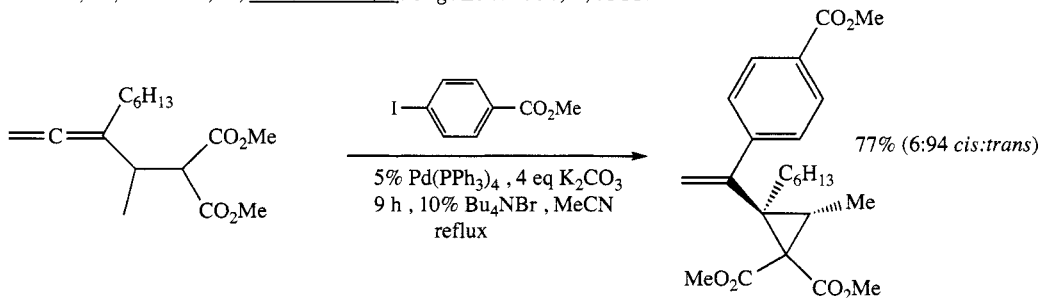
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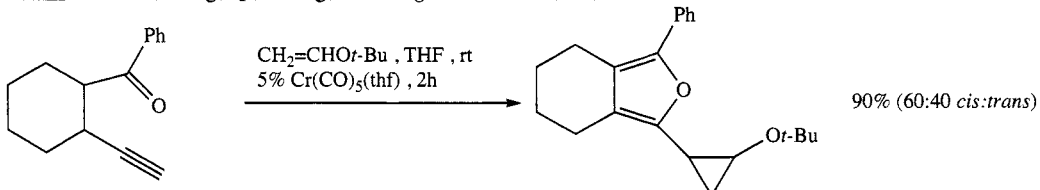
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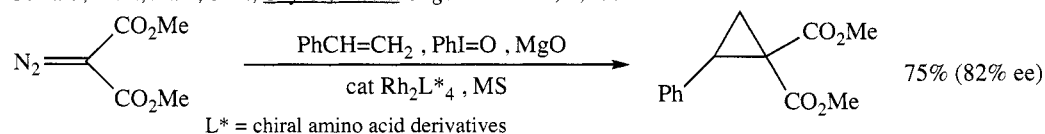
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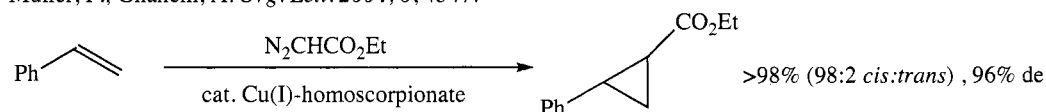
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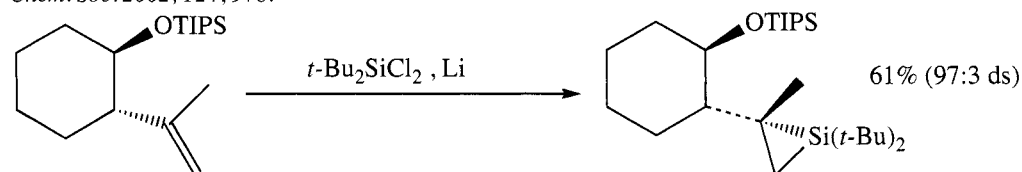
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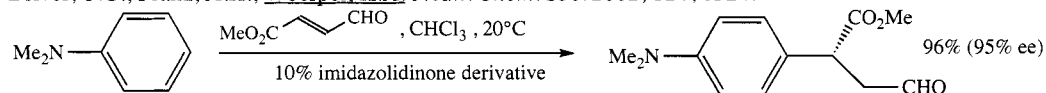
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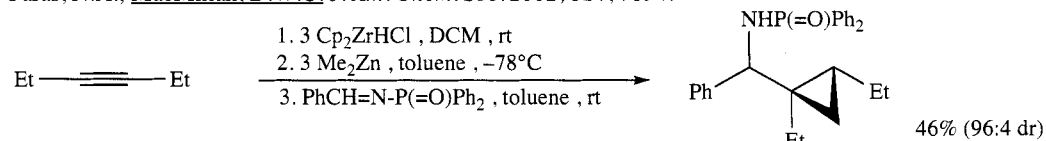
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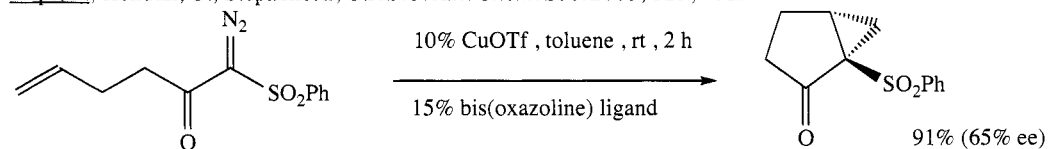
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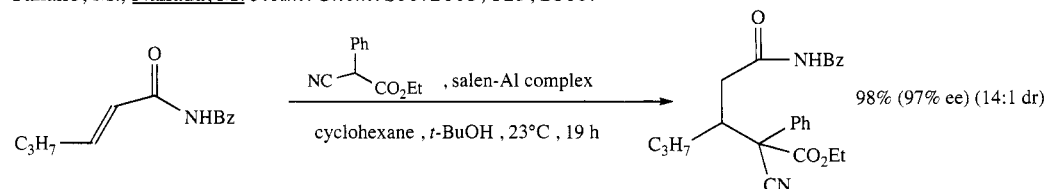
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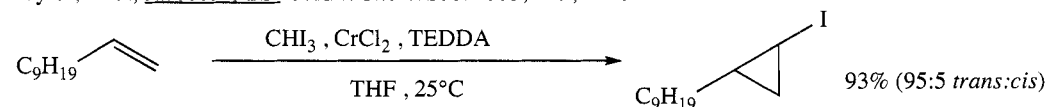
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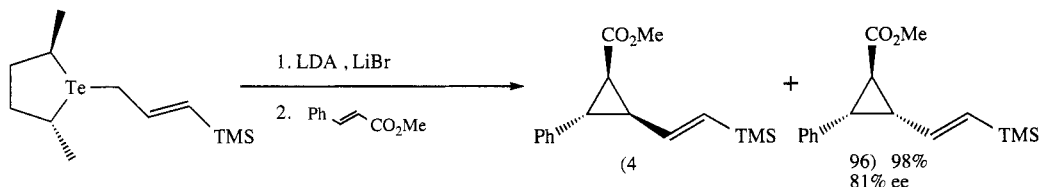
Honma, M.; Sawada, T.; Fujisawa, Y.; Utsugi, M.; Watanabe, H.; Umino, A.; Matsumura, T.; Hagihara, T.; Takano, M.; Nakada, M. *J. Am. Chem. Soc.* **2003**, 125, 2860.



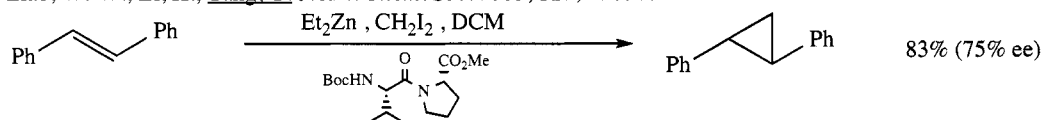
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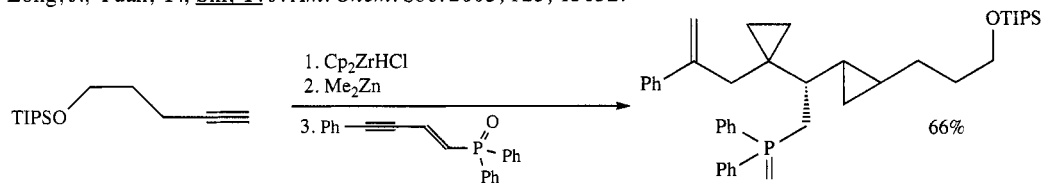
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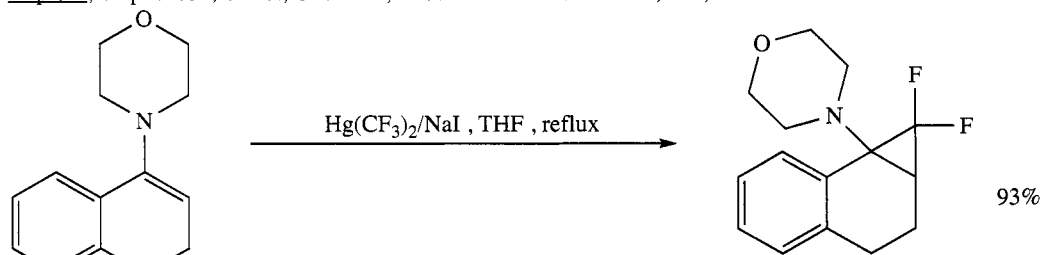
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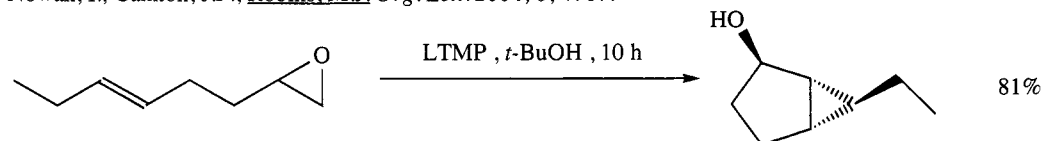
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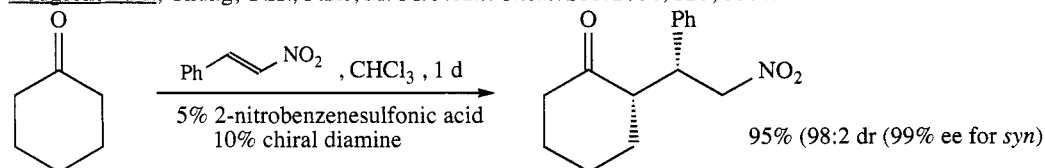
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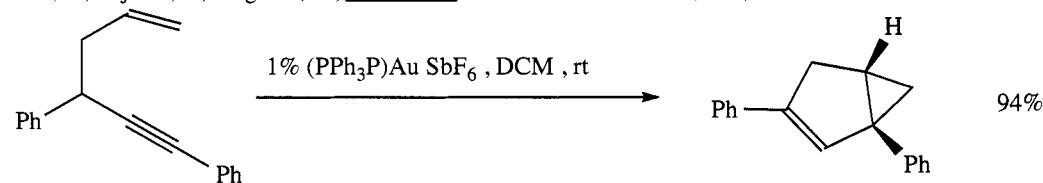
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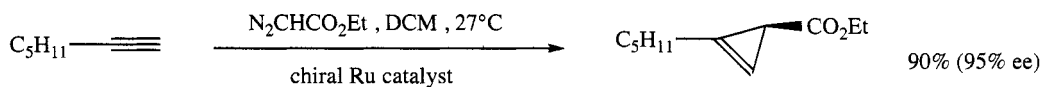
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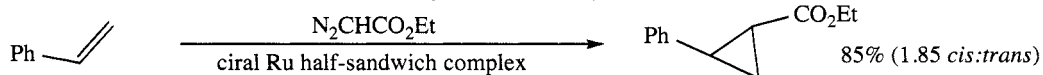
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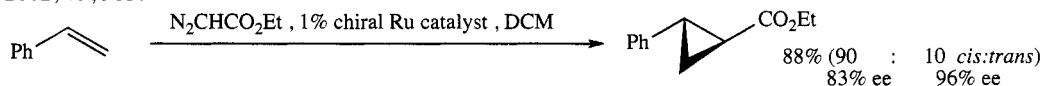
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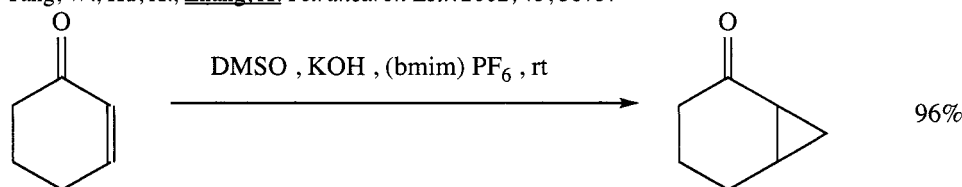
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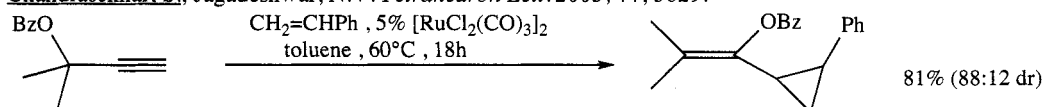
Tatusaus, O.; Delfosse, S.; Demonceau, A.; Noels, A.F.; Núñez, R.; Viñas, C.; Teixidor, F. *Tetrahedron Lett.* **2002**, *43*, 983.



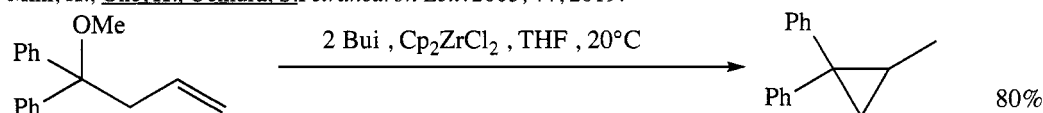
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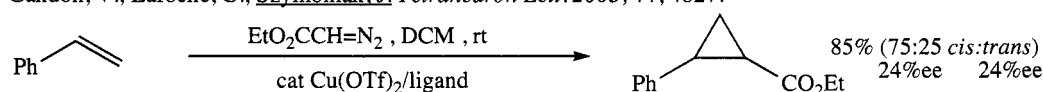
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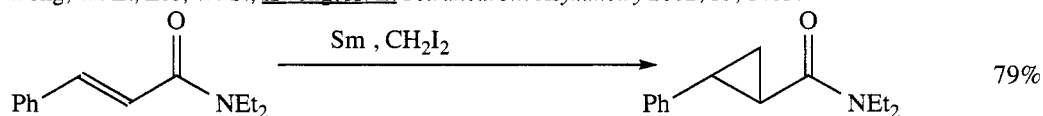
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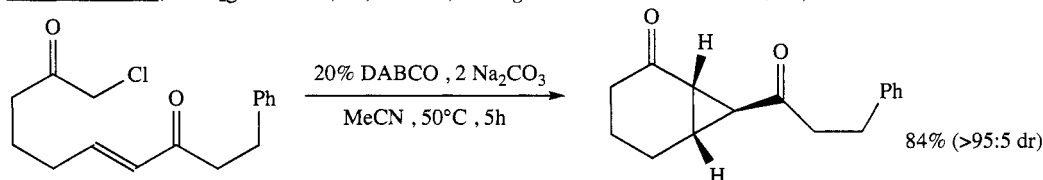
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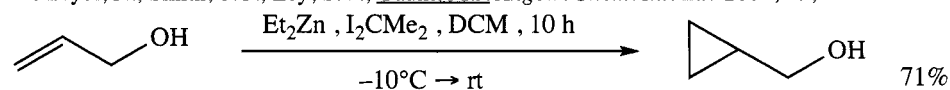
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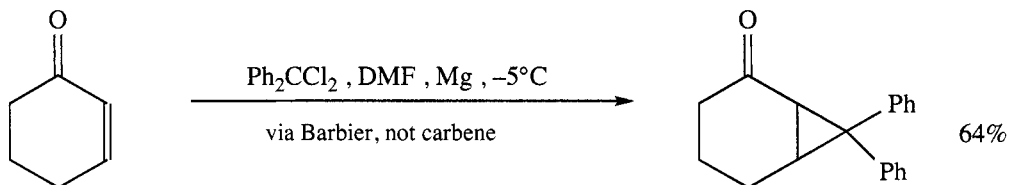
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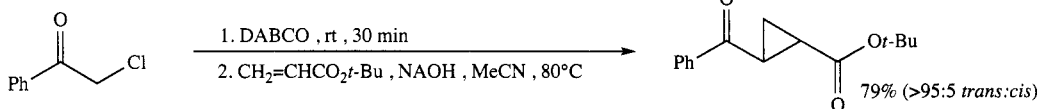
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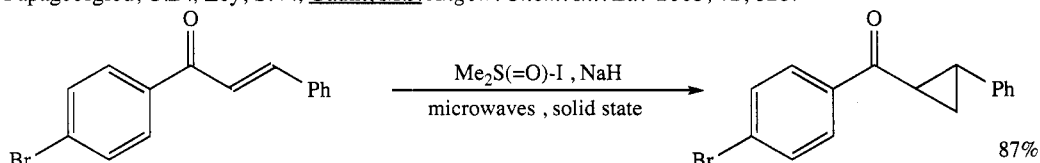
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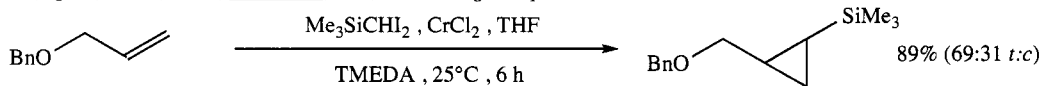
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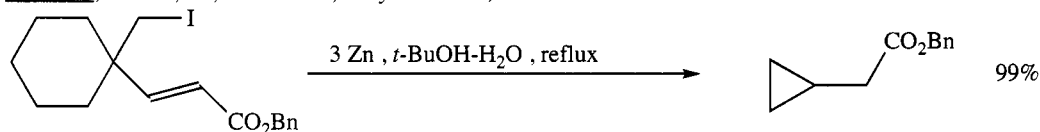
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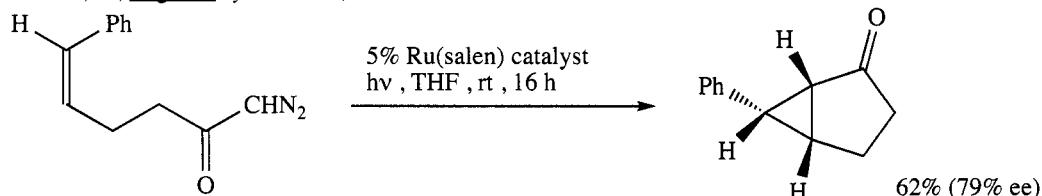
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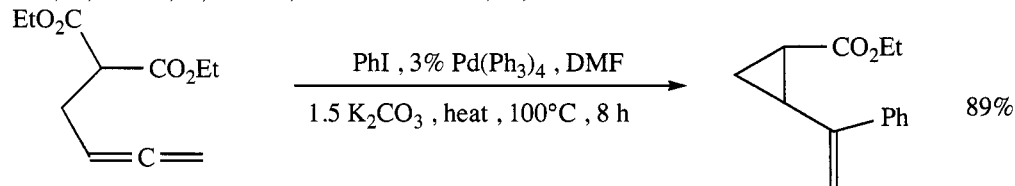
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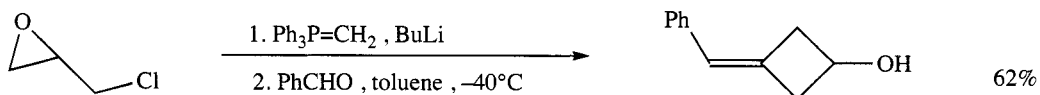
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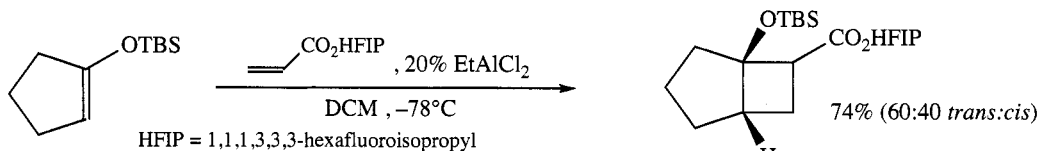
"Stereoselective Cyclopropanation Reactions"

Lebel, H.; Marcoux, J.-F.; Molinaro, C.; Charette, A.B. *Chem. Rev.* **2003**, 103, 977.

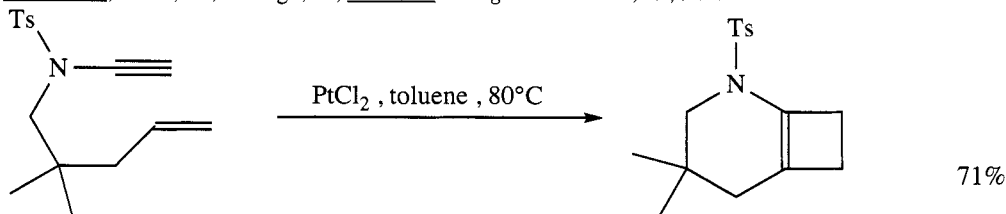
SECTION 74G: CYCLOBUTANATIONS, INCLUDING HALOCYCLOBUTANATIONS



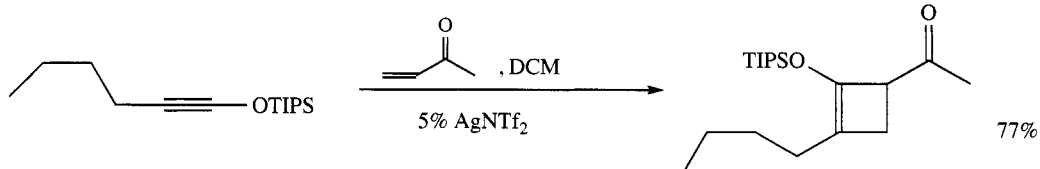
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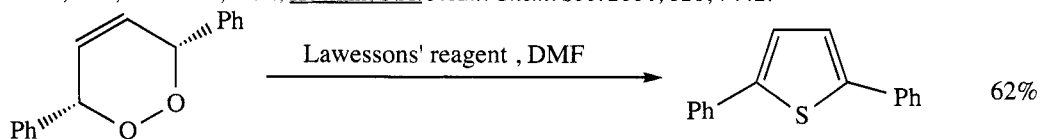
Takasu, K.; Ueno, M.; Inanaga, K.; Ihara, M. *J. Org. Chem.* **2004**, 69, 517.



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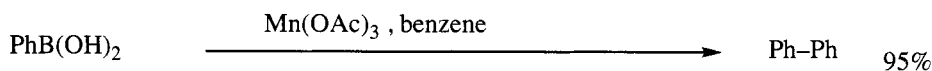
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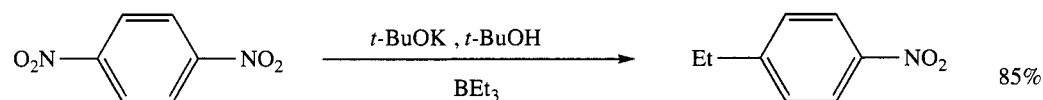
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Lee-Ruff, E.; Mladenova, G. *Chem. Rev.* **2003**, 103, 1449.

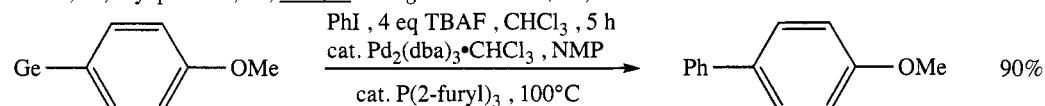
SECTION 75: ALKYL, METHYLENE, AND ARYL FROM MISCELLANEOUS COMPOUNDS



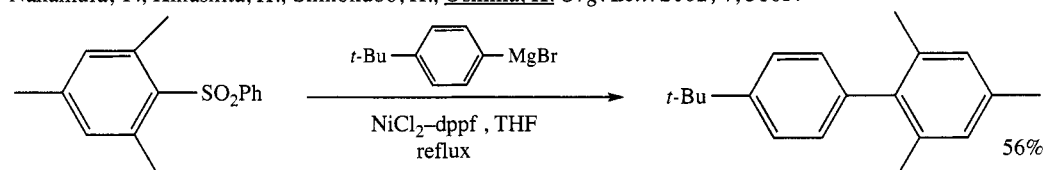
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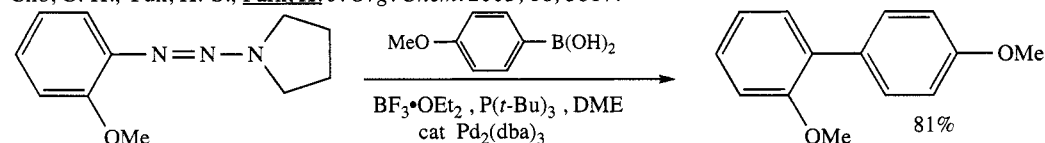
Palani, N.; Jayaprakash, K.; Hoz, S. *J. Org. Chem.* **2003**, 68, 4388.



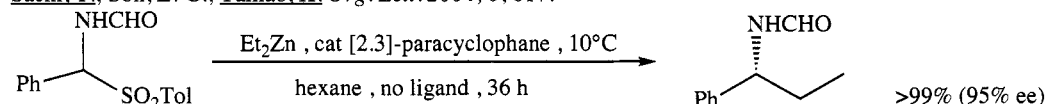
Nakamura, T.; Kinashita, H.; Shinokubo, H.; Oshima, K. *Org. Lett.* **2002**, 4, 3165.



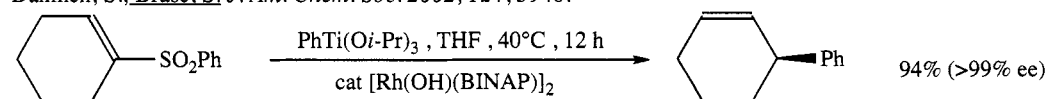
Cho, C.-H.; Yun, H.-S.; Park, K. *J. Org. Chem.* **2003**, 68, 3017.



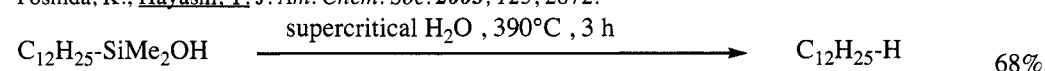
Saeki, T.; Son, E.-C.; Tamao, K. *Org. Lett.* **2004**, 6, 617.



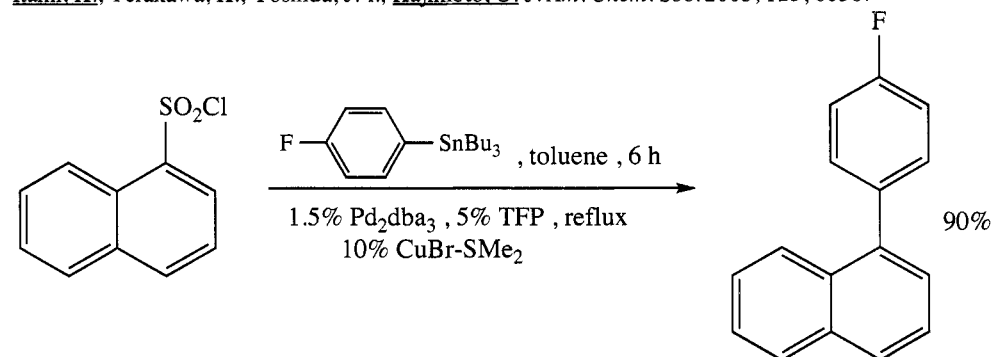
Dahmen, S.; Bräse, S. *J. Am. Chem. Soc.* **2002**, 124, 5940.



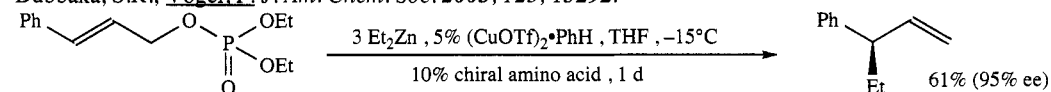
Yoshida, K.; Hayashi, T. *J. Am. Chem. Soc.* **2003**, 125, 2872.



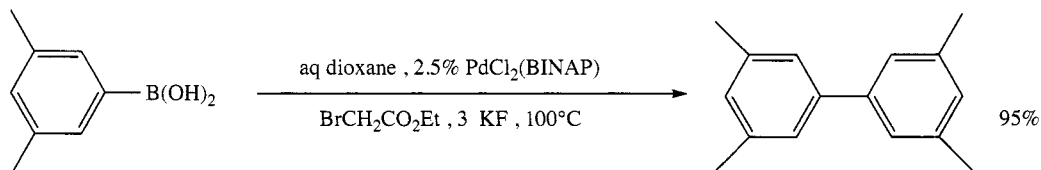
Itami, K.; Terakawa, K.; Yoshida, J.-i.; Kajimoto, O. *J. Am. Chem. Soc.* **2003**, 125, 6058.



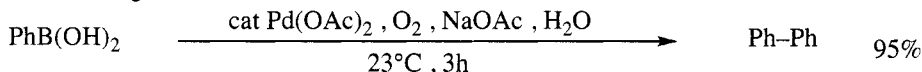
Dubbaka, S.R.; Vogel, P. *J. Am. Chem. Soc.* **2003**, 125, 15292.



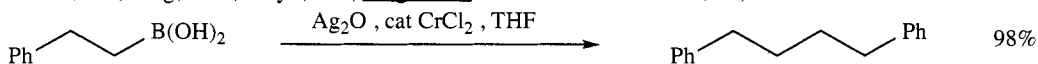
Kacprzynski, M.A.; Hoveyda, A.H. *J. Am. Chem. Soc.* **2004**, 126, 10676.



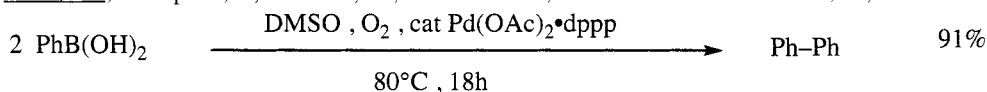
Lei, A.; Zhang, X. *Tetrahedron Lett.* **2002**, 43, 2525.



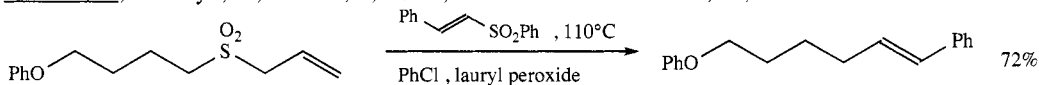
Parrish, J.P.; Jung, Y.C.; Floyd, R.J.; Jung, K.W. *Tetrahedron Lett.* **2002**, 43, 7899.



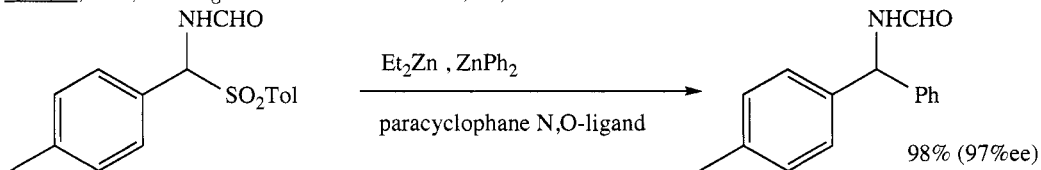
Falck, J.R.; Mohapatra, S.; Bondlela, M.; Venkataraman, S.K. *Tetrahedron Lett.* **2002**, 43, 8149.



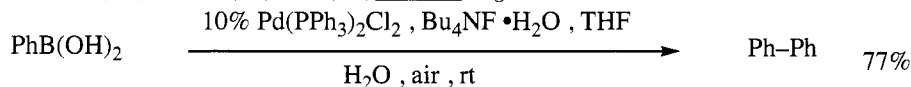
Yoshida, H.; Yamaryo, Y.; Ohshita, J.; Kunai, A. *Tetrahedron Lett.* **2003**, 44, 1541.



Kim, S.; Lim, C.J. *Angew. Chem. Int. Ed.* **2002**, 41, 3265.



Hermanns, N.; Dahmen, S.; Bolm, C.; Bräse, S. *Angew. Chem. Int. Ed.* **2002**, 41, 3692.

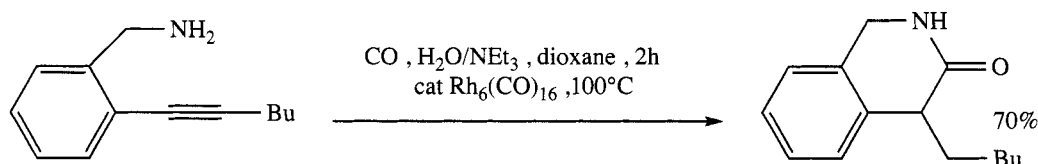


Punna, S.; Díaz, D.D.; Finn, M.G. *Synlett* **2004**, 2351.

CHAPTER 6

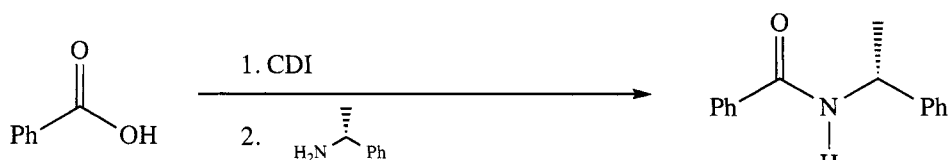
PREPARATION OF AMIDES

SECTION 76: AMIDES FROM ALKYNES

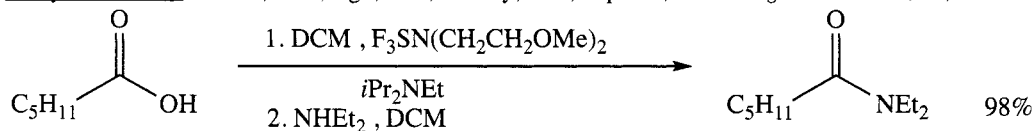


Shibata, T.; Zhou, D.-Y.; Onitsuka, K.; Takahashi, S., *Tetrahedron Lett.* **2004**, 45, 3211.

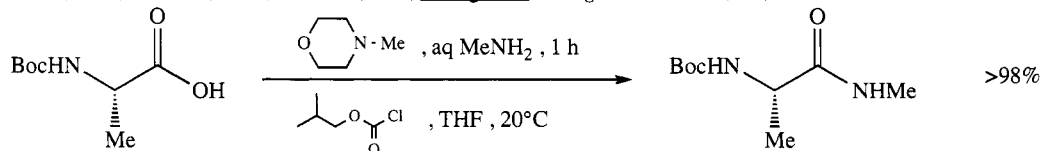
SECTION 77: AMIDES FROM ACID DERIVATIVES



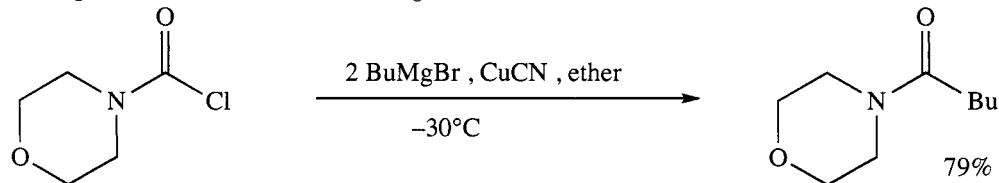
Vaidyanathan, R.; Kalthod, V.G.; Ngo, D.P.; Manley, J.M.; Lapekas, S.P. *J. Org. Chem.* **2004**, 69, 2565.



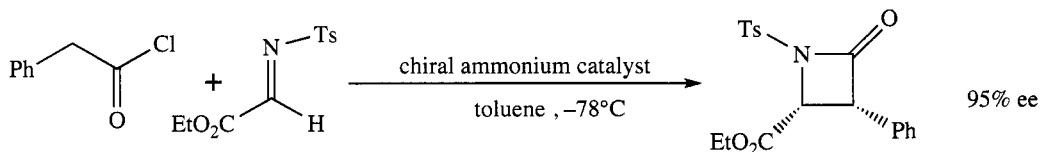
White, J.M.; Tunoori, A.R.; Turunen, B.J.; Georg, G.I. *J. Org. Chem.* **2004**, 69, 2573.



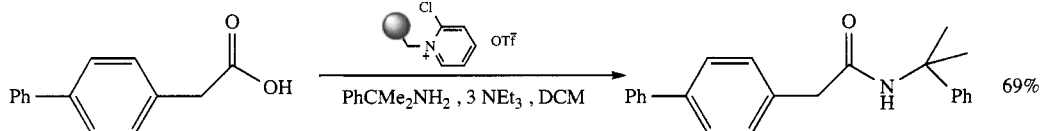
Shendage, D.M.; Frölich, R.; Haufe, G. *Org. Lett.* **2004**, 6, 3675.



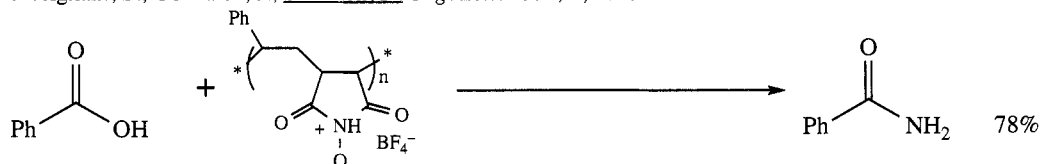
Lemoucheux, L.; Seitz, T.; Rouden, J.; Lasne, M.-C. *Org. Lett.* **2004**, 6, 3703.



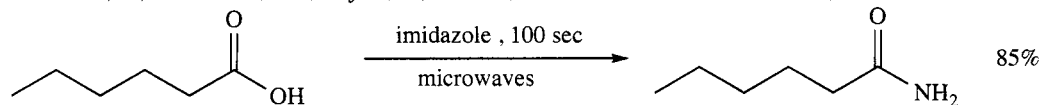
Taggi, A.E.; Hafez, A.M.; Wack, H.; Young, B.; Perraris, D.; Lectka, T. *J. Am. Chem. Soc.* **2002**, *124*, 6626.



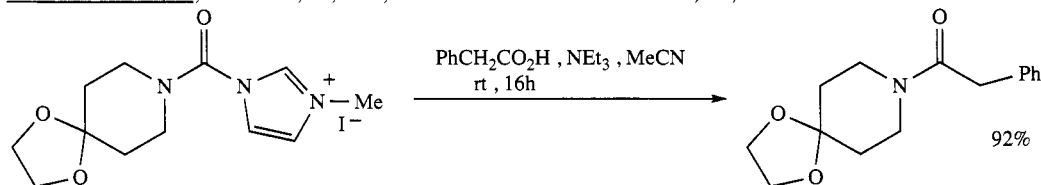
Crosignani, S.; Gonzalez, J.; Swinnen, D. *Org. Lett.* **2004**, *6*, 4579.



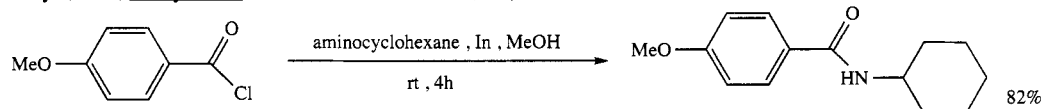
Chinchilla, R.; Dodsworth, D.J.; Nájera, C.; Soriano, J.M. *Tetrahedron Lett.* **2003**, *44*, 463.



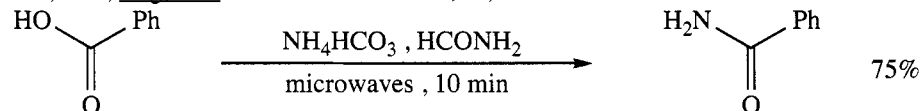
Khalafi-Nezhad, A.; Mokhtari, B.; Rad, M.N.S. *Tetrahedron Lett.* **2003**, *44*, 7325.



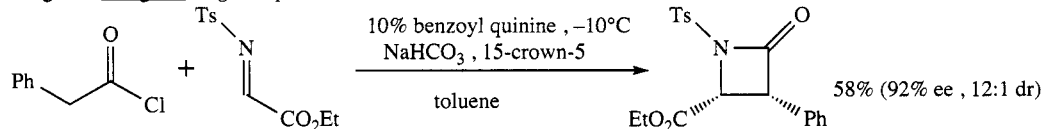
Grzyb, J.A.; Batey, R.A. *Tetrahedron Lett.* **2003**, *44*, 7485.



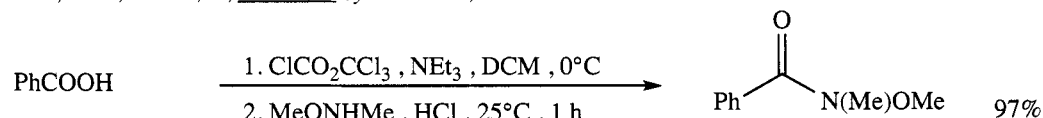
Cho, D.H.; Jang, D.O. *Tetrahedron Lett.* **2004**, *45*, 2285.



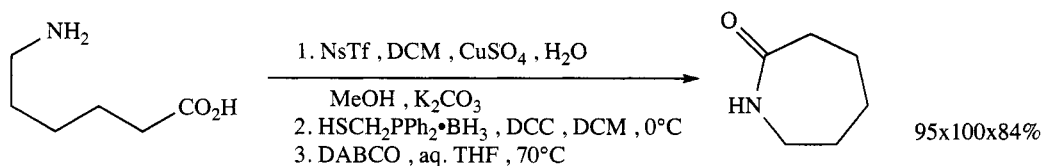
Peng, Y.; Song, G. *Org. Prep. Proceed. Int.* **2002**, *34*, 95.



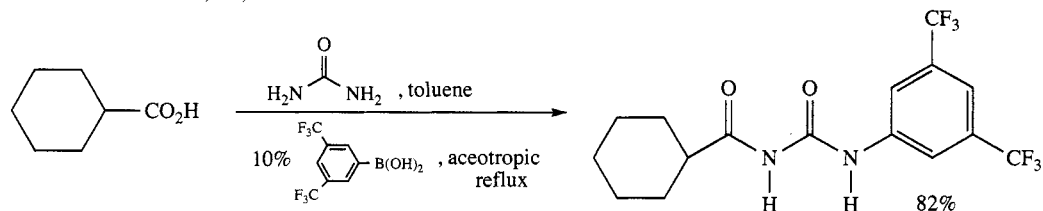
Shah, M.H.; France, S.; Lectka, T. *Synlett* **2003**, 1937.



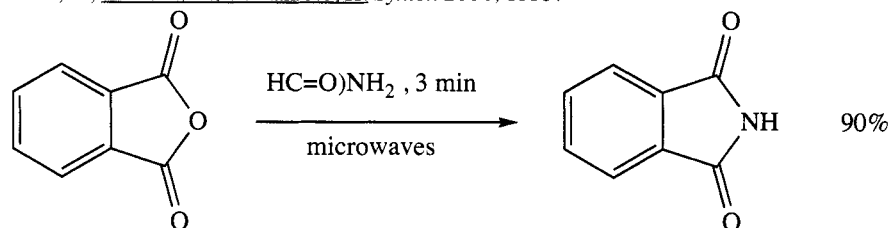
Kim, M.; Lee, H.; Han, K.-J.; Kay, K.-Y. *Synth. Commun.* **2003**, *33*, 4013.



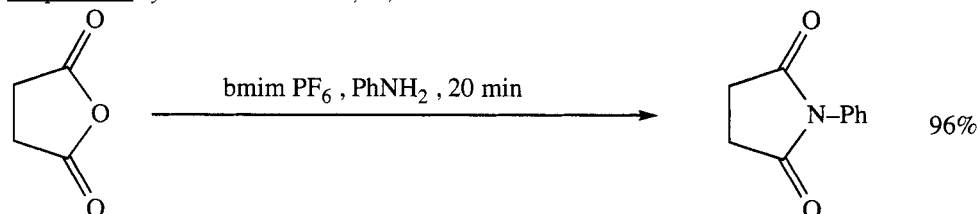
David, O.; Meester, W.J.N.; Bieräugel, H.; Schoemaker, H.E.; Hiemstra, H.; van Maarsevoen, J.H. *Angew. Chem. Int. Ed.* **2003**, 42, 4373.



Maki, T.; Ishihara, K.; Yamamoto, H. *Synlett* **2004**, 1355.

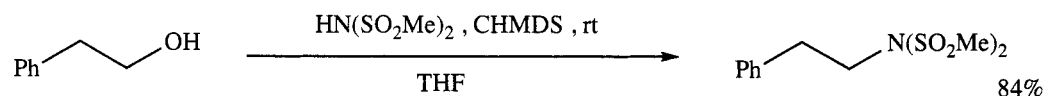


Kacprzak, K. *Synth. Commun.* **2003**, 33, 1499.

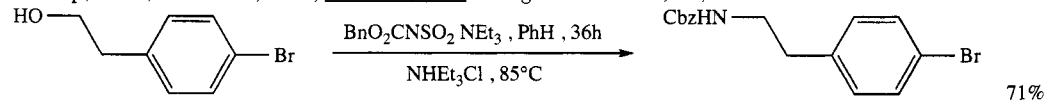


Le, Z.-G.; Chen, Z.-C.; Hu, Y.; Zheng, Q.-G. *Synthesis* **2004**, 995.

SECTION 78: AMIDES FROM ALCOHOLS AND THIOLS

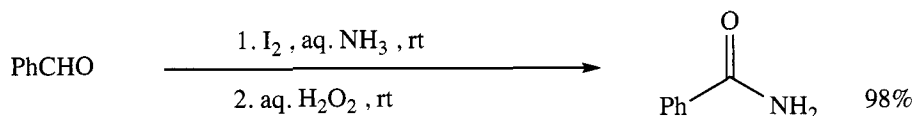


Dastrup, D.M.; van Brunt, M.P.; Weinreb, S.M. *J. Org. Chem.* **2003**, 68, 4112.

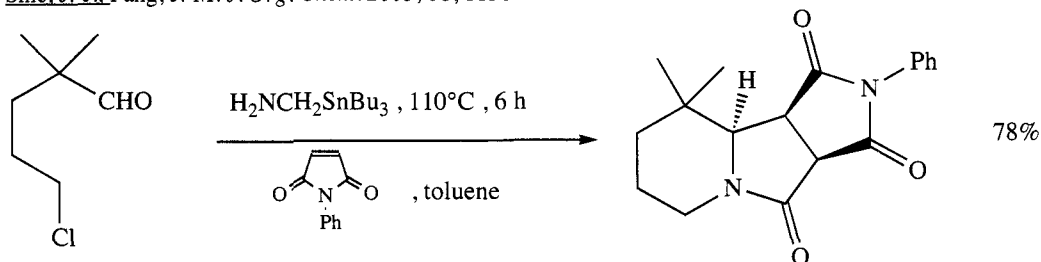


Wood, M.R.; Kim, J.Y.; Books, K.M. *Tetrahedron Lett.* **2002**, 43, 3887.

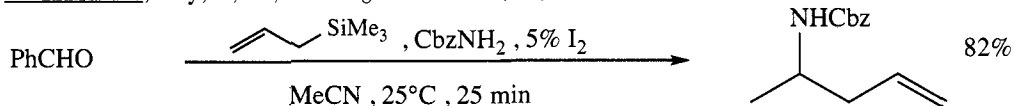
SECTION 79: AMIDES FROM ALDEHYDES



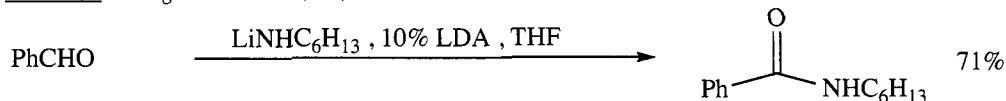
Shie, J.-J.; Fang, J.-M. *J. Org. Chem.* **2003**, 68, 1158.



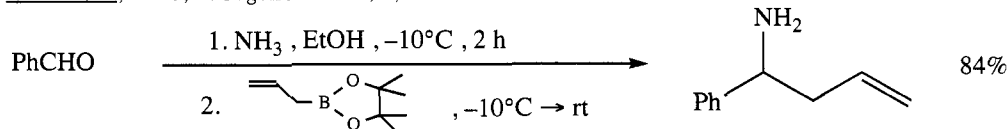
Pearson, W.H.; Stoy, P.; Mi, Y. *J. Org. Chem.* **2004**, 69, 1919.



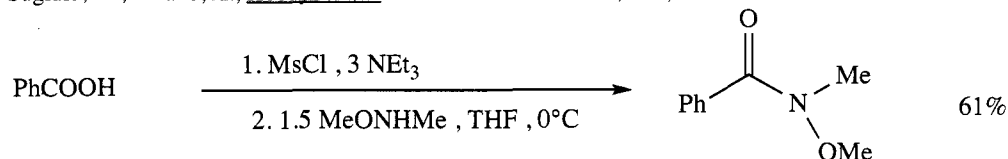
Phukan, P. *J. Org. Chem.* **2004**, 69, 4005.



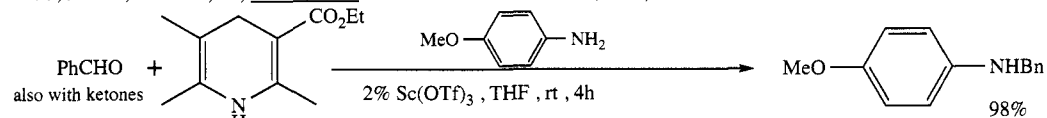
Ishihara, K.; Yano, T. *Org. Lett.* **2004**, 6, 1983.



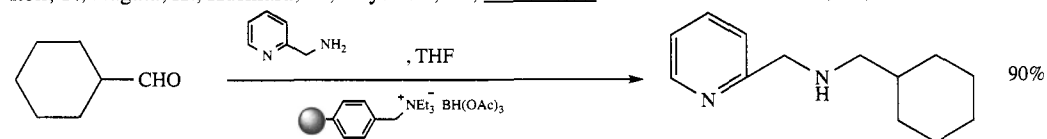
Sugiura, M.; Hirano, K.; Kobayashi, S. *J. Am. Chem. Soc.* **2004**, 126, 7182.



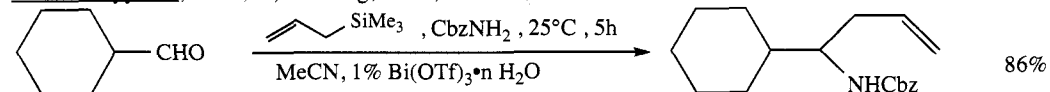
Woo, J.C.S.; Fenster, E.; Dake, G.R. *J. Am. Chem. Soc.* **2004**, 126, 8984.



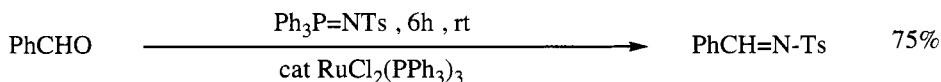
Itoh, T.; Nagata, K.; Kurihara, A.; Miyazaki, M.; Ohsawa, A. *Tetrahedron Lett.* **2002**, 43, 3105.



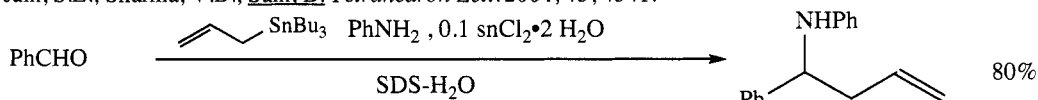
Bhattacharyya, S.; Rana, S.; Gooding, O.W.; Labadie, J. *Tetrahedron Lett.* **2003**, 44, 4957.



Ollevier, T.; Ba, T. *Tetrahedron Lett.* **2003**, 44, 9003.

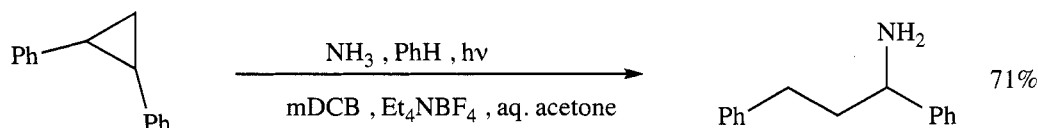


Jain, S.L.; Sharma, V.B.; Sain, B. *Tetrahedron Lett.* **2004**, 45, 4341.



Akiyama, T.; Onuma, Y. *J. Chem. Soc. Perkin Trans. 1* **2002**, 1157.

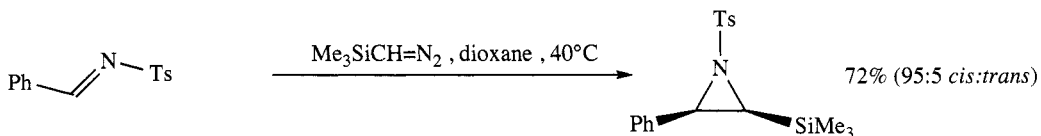
SECTION 80: AMIDES FROM ALKYL, METHYLENES, AND ARYL



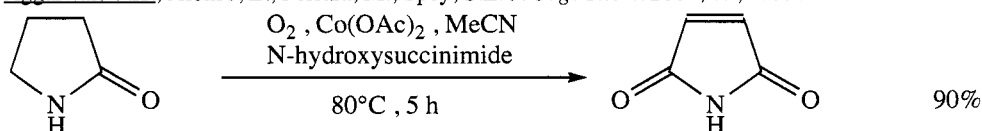
Yasuda, M.; Kojima, R.; Tsutsui, H.; Utsunomiya, D.; Ishii, K.; Jinnouchi, K.; Shiragami, T.; Yamashita, T. *J. Org. Chem.* **2003**, 68, 7618.

SECTION 81: AMIDES FROM AMIDES

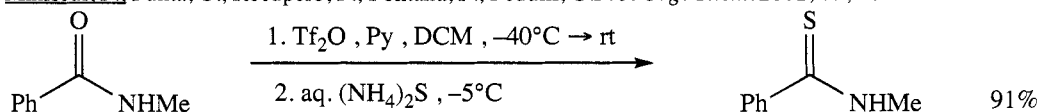
Conjugate reductions of unsaturated amides are listed in Section 74D
(Conjugate Reduction of α,β -Unsaturated Carbonyl Compounds and Nitriles).



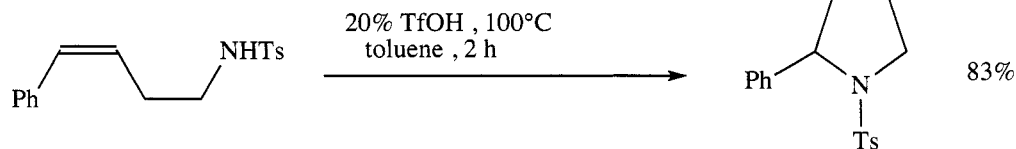
Aggarwal, V.K.; Alonso, E.; Ferrara, M.; Spey, S.E. *J. Org. Chem.* **2002**, 67, 2335.



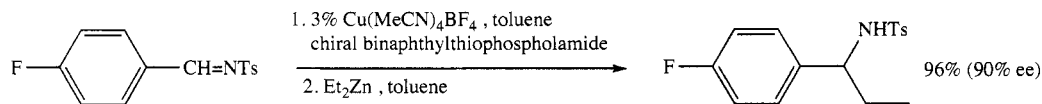
Minisci, F.; Punta, C.; Recupero, F.; Fontana, F.; Pedulli, G.F. *J. Org. Chem.* **2002**, 67, 2671.



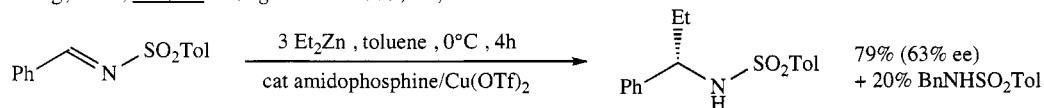
Charette, A.B.; Grenon, M. *J. Org. Chem.* **2003**, 68, 5792.



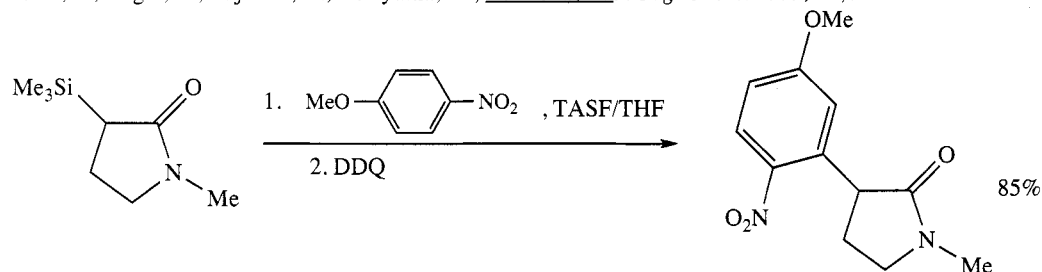
Schlummer, B.; Hartwig, J.F. *Org. Lett.* **2002**, 4, 1471.



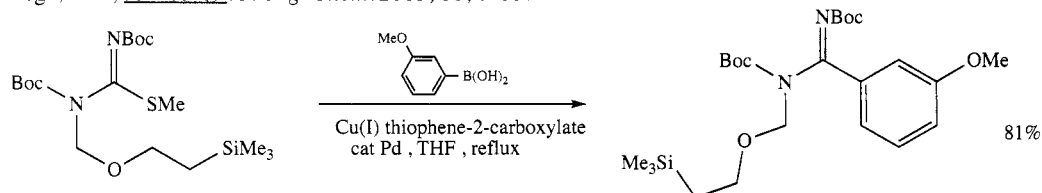
Wang, C.-J.; Shi, M. *J. Org. Chem.* **2003**, *68*, 6229.



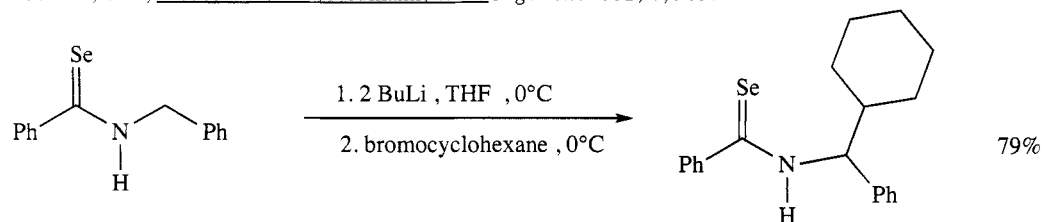
Soeta, T.; Nagai, K.; Fujihara, H.; Kuriyama, M.; Tomioka, K. *J. Org. Chem.* **2003**, *68*, 9723.



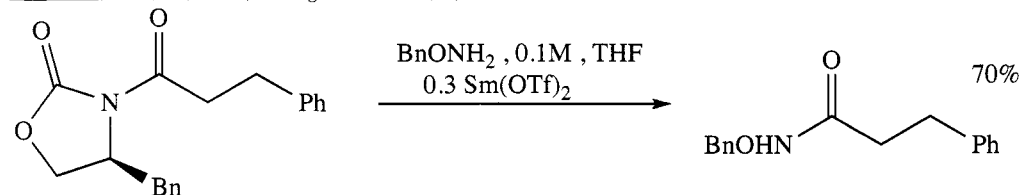
Rege, P.D.; Johnson, E. *J. Org. Chem.* **2003**, *68*, 6133.



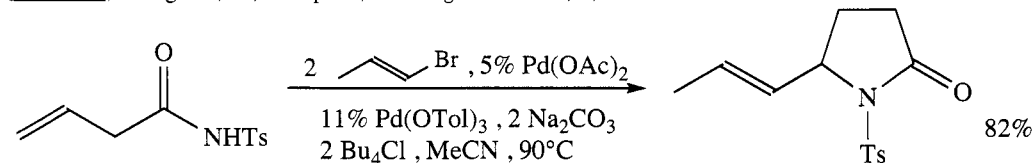
Kusturin, C.L.; Liebeskind, L.S.; Neumann, W.L. *Org. Lett.* **2002**, *4*, 983.



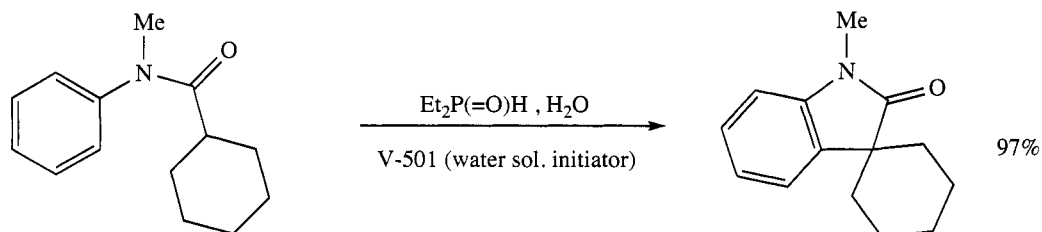
Murai, T.; Aso, H.; Kato, S. *Org. Lett.* **2002**, *4*, 1407.



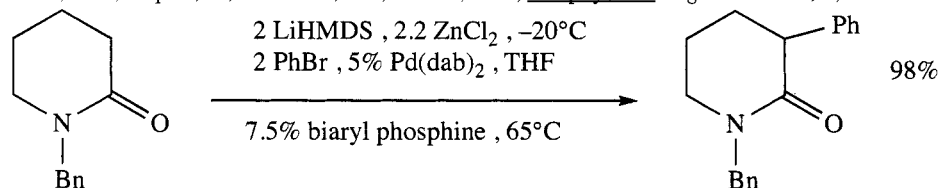
Sibi, M.P.; Hasegawa, H.; Ghorpade, S.R. *Org. Lett.* **2002**, *4*, 3343.



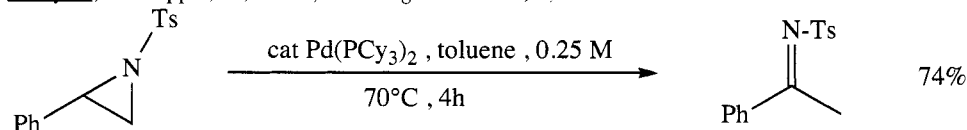
Pinho, P.; Minnaard, A.J.; Feringa, B.L. *Org. Lett.* **2003**, *5*, 259.



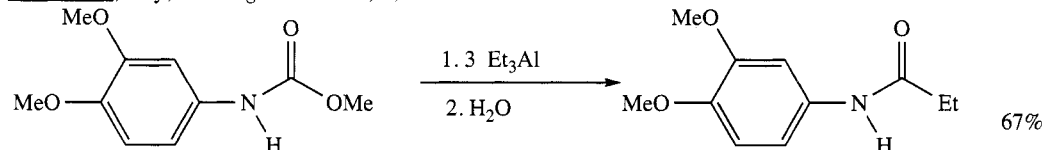
Khan, T.A.; Tripoli, R.; Crawford, J.T.; Martin, C.G.; Murphy, J.A. *Org. Lett.* **2003**, 5, 2971.



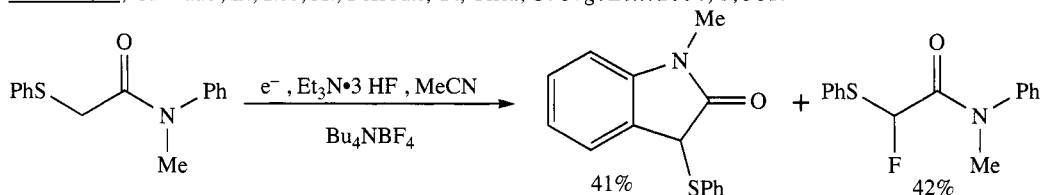
Cossy, J.; de Filippis, A.; Pardo, D.G. *Org. Lett.* **2003**, 5, 3037.



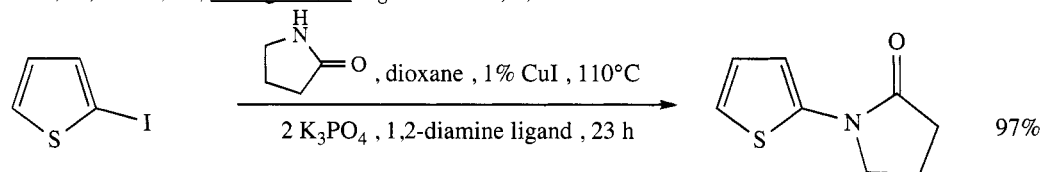
Wolfe, J.P.; Ney, J.E. *Org. Lett.* **2003**, 5, 4607.



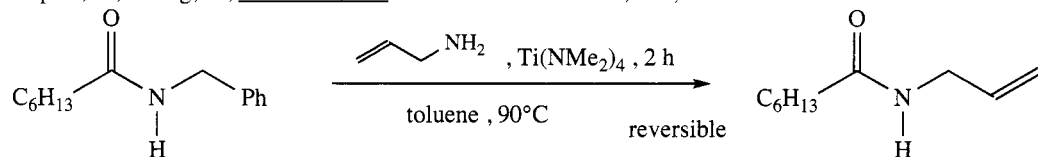
El Kaim, L.; Grimaud, L.; Lee, A.; Perroux, Y.; Tiria, C. *Org. Lett.* **2004**, 6, 381.



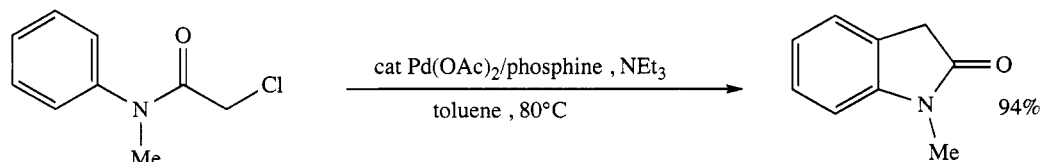
Shen, Y.; Atobe, M.; Fuchigami, T. *Org. Lett.* **2004**, 6, 2441.



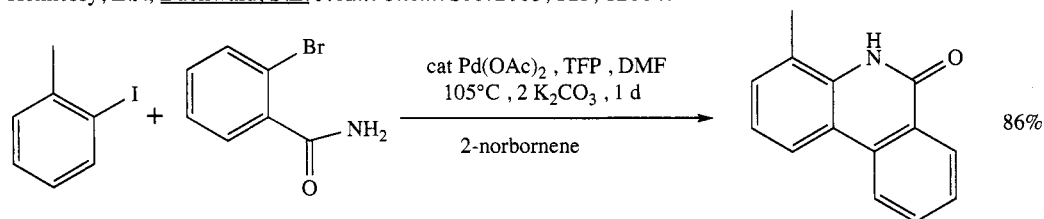
Klapars, A.; Huang, X.; Buchwald, S.L. *J. Am. Chem. Soc.* **2002**, 124, 7421.



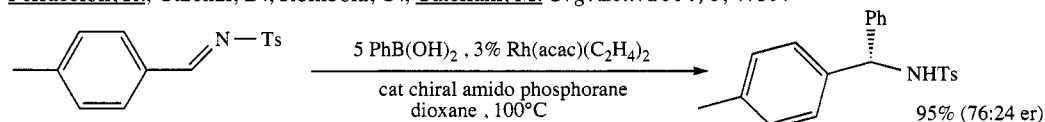
Eldred, S.E.; Stone, D.A.; Gellman, S.H.; Stahl, S.S. *J. Am. Chem. Soc.* **2003**, 125, 3422.



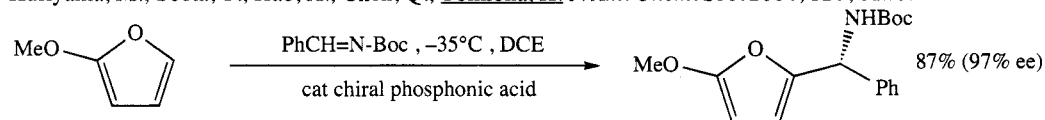
Hennessy, E.J.; Buchwald, S.L. *J. Am. Chem. Soc.* **2003**, *125*, 12084.



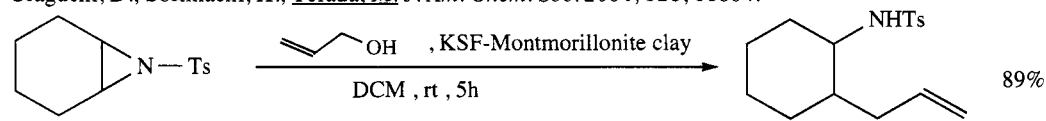
Ferraccioli, R.; Carenzi, D.; Rombolà, O.; Catellani, M. *Org. Lett.* **2004**, *6*, 4759.



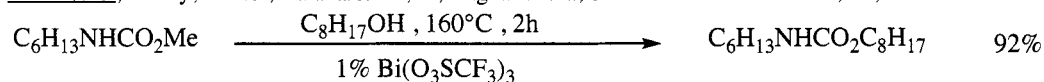
Kuriyama, M.; Soeta, T.; Hao, X.; Chen, Q.; Tomioka, K. *J. Am. Chem. Soc.* **2004**, *126*, 8128.



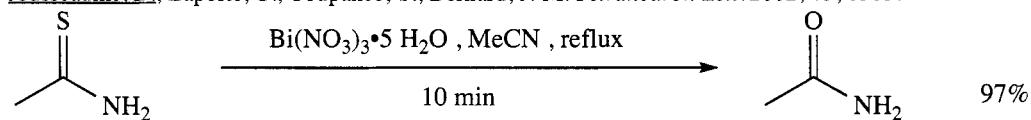
Uraguchi, D.; Sorimachi, K.; Terada, M. *J. Am. Chem. Soc.* **2004**, *126*, 11804.



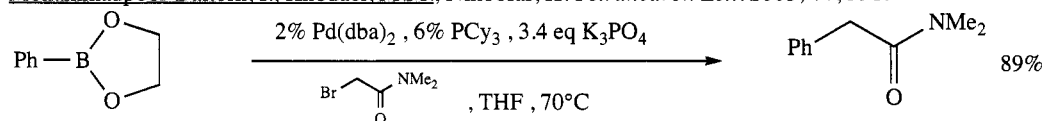
Yadav, J.S.; Reddy, B.V.S.; Balanarsaiah, E.; Raghavendra, S. *Tetrahedron Lett.* **2002**, *43*, 5105.



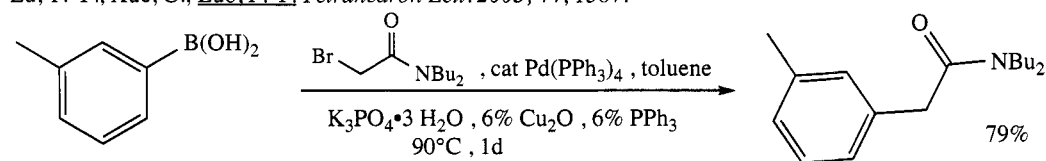
Jousseau, B.; Laporte, C.; Toupance, T.; Bernard, J.-M. *Tetrahedron Lett.* **2002**, *43*, 6305.



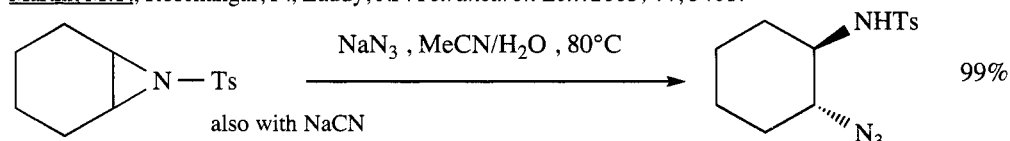
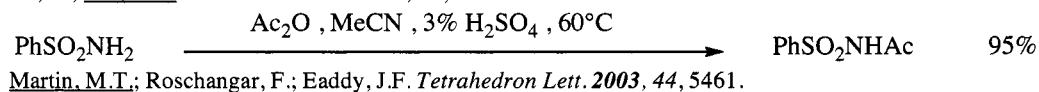
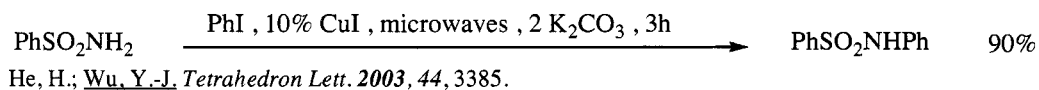
Mohammadpoor-Baltork, I.; Khodaci, M.M.; Nikoofar, K. *Tetrahedron Lett.* **2003**, *44*, 591.



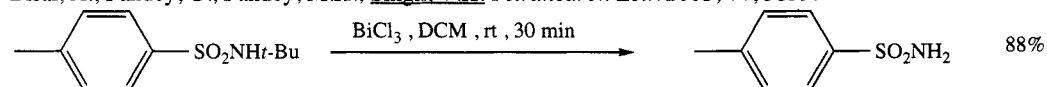
Lu, T.-Y.; Xue, C.; Luo, F.-T. *Tetrahedron Lett.* **2003**, *44*, 1587.



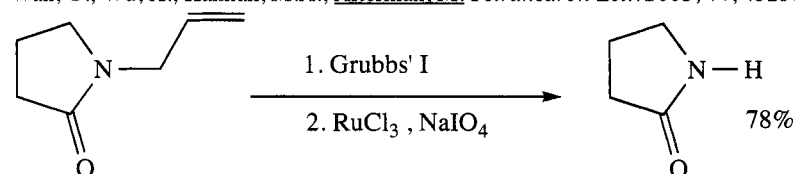
Duan, Y.-Z.; Deng, M.-Z. *Tetrahedron Lett.* **2003**, *44*, 3423.



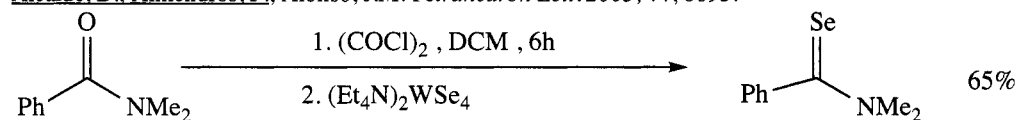
Bisai, A.; Pandey, G.; Pandey, M.K.; Singh, V.K. *Tetrahedron Lett.* **2003**, 44, 5839.



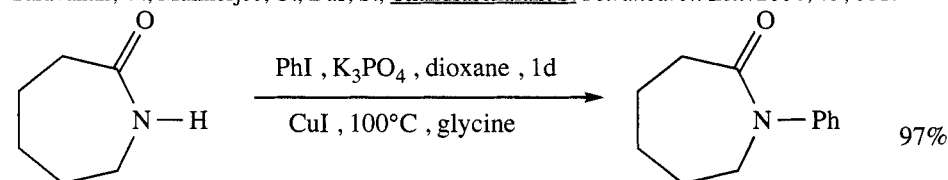
Wan, Y.; Wu, X.; Kannan, M.A.; Alterman, M. *Tetrahedron Lett.* **2003**, 44, 4523.



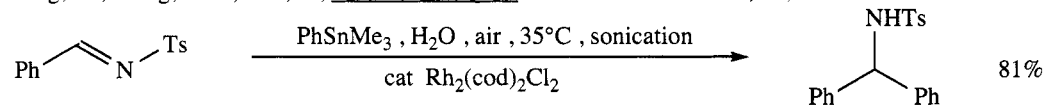
Alcaide, B.; Almendros, P.; Alonso, J.M. *Tetrahedron Lett.* **2003**, 44, 8693.



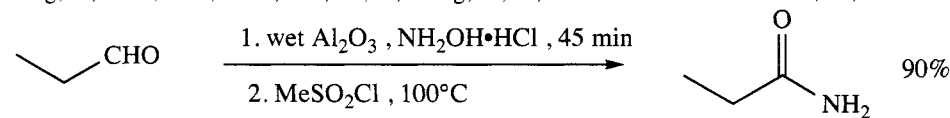
Saravanan, V.; Mukherjee, C.; Das, S.; Chandrasekaran, S. *Tetrahedron Lett.* **2004**, 45, 681.



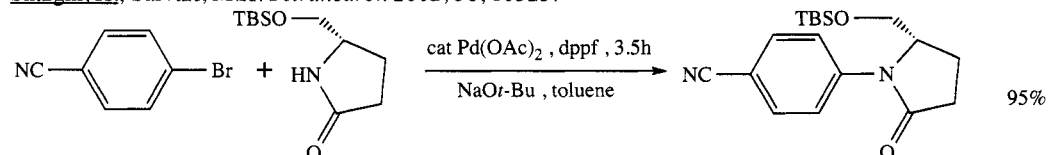
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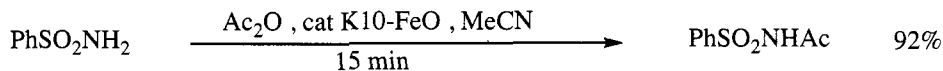
Ding, R.; Zhao, C.H.; Chen, Y.J.; Lu, L.; Wang, D.; Li, C.J. *Tetrahedron Lett.* **2004**, 45, 2995.



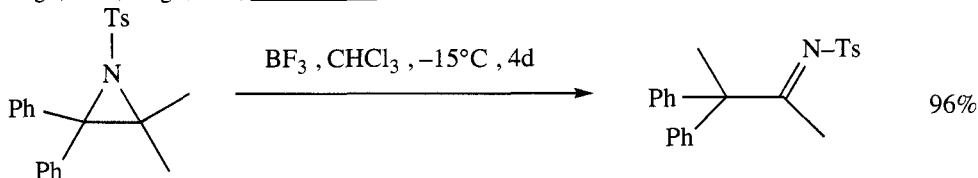
Sharghi, H.; Sarvari, M.H. *Tetrahedron* **2002**, 58, 10323.



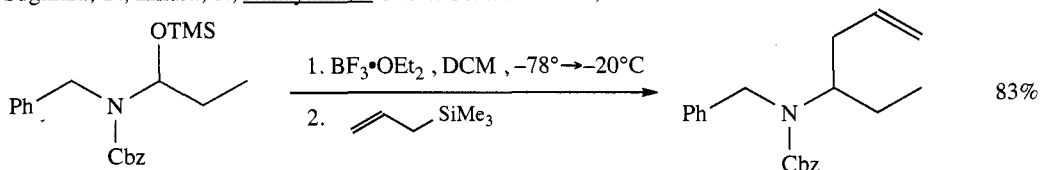
Browning, R.G.; Badarinarayana, V.; Mahmud, H.; Lovely, C.J. *Tetrahedron* **2004**, 60, 359.



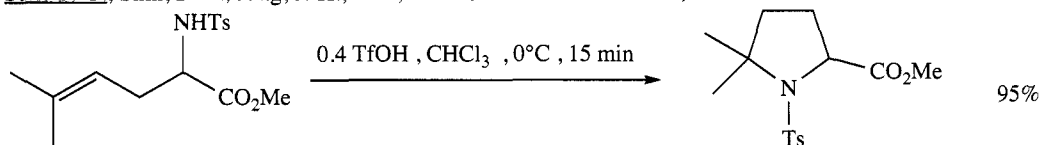
Singh, D.U.; Singh, P.R.; Samant, S.D. *Tetrahedron Lett.* **2004**, 45, 4805.



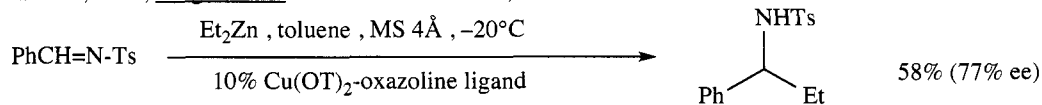
Sugihara, Y.; Iimura, S.; Nakayama, J. *Chem. Commun.* **2002**, 134.



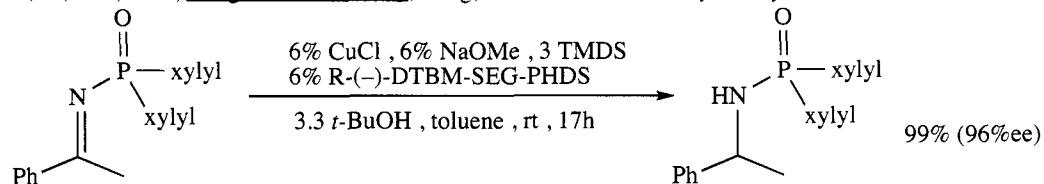
Suh, Y.-G.; Shin, D.-Y.; Jung, J.-K.; Kim, S.-H. *Chem. Commun.* **2002**, 1064.



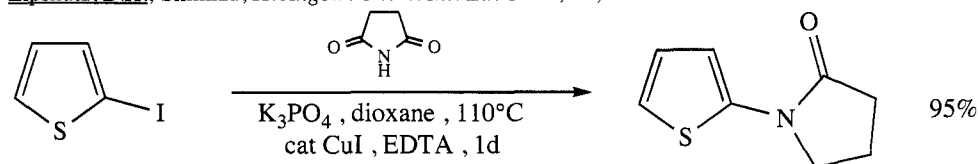
Haskins, C.M.; Knight, D.W. *Chem. Commun.* **2002**, 2724.



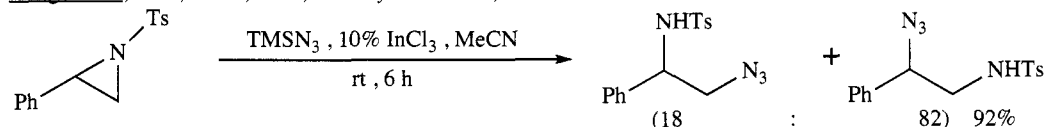
Li, X.; Cun, L.-F.; Gong, L.-Z.; Mi, A.-Q.; Jiang, Y.-Z. *Tetrahedron: Asymmetry* **2003**, 14, 3819.



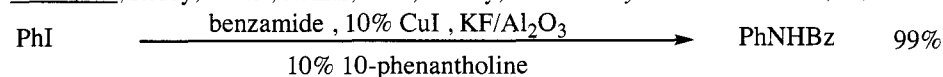
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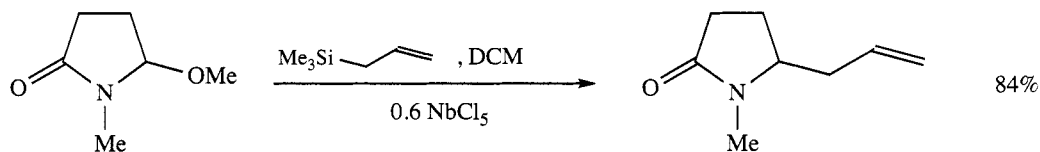
Kang, S.-K.; Kim, D.-H.; Park, J.-N. *Synlett* **2002**, 427.



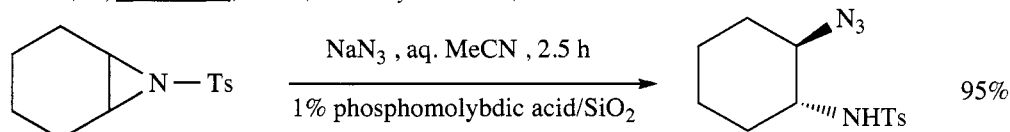
Yadav, J.S.; Reddy, B.V.S.; Kumar, G.M.; Murthy, Ch.V.S.R. *Synth. Commun.* **2002**, 32, 1797.



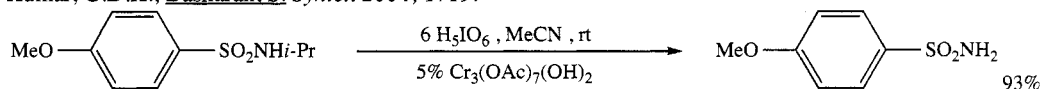
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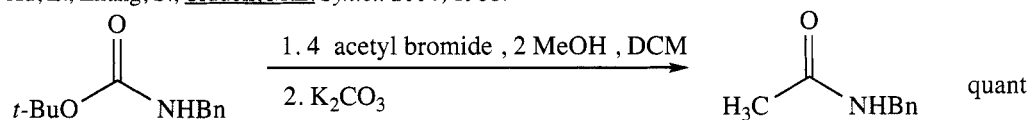
Kleber, C.; Andrade, Z.; Matos, R.A.F. *Synlett* **2003**, 1189.



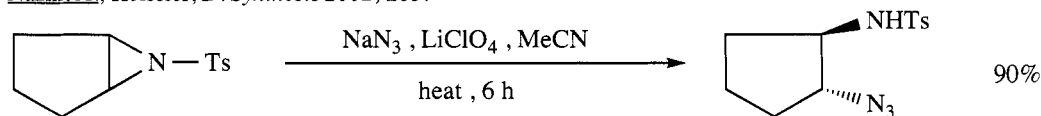
Kumar, G.D.K.; Baskaran, S. *Synlett* **2004**, 1719.



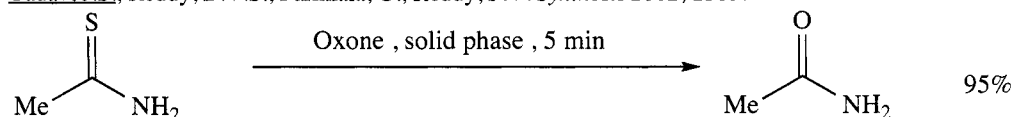
Xu, L.; Zhang, S.; Trudell, M.L. *Synlett* **2004**, 1901.



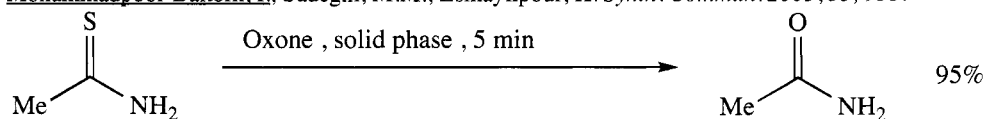
Nazih, A.; Heissler, D. *Synthesis* **2002**, 203.



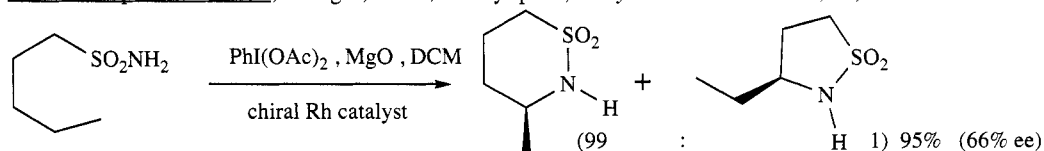
Yadav, J.S.; Reddy, B.V.S.; Parimala, G.; Reddy, P.V. *Synthesis* **2002**, 2383.



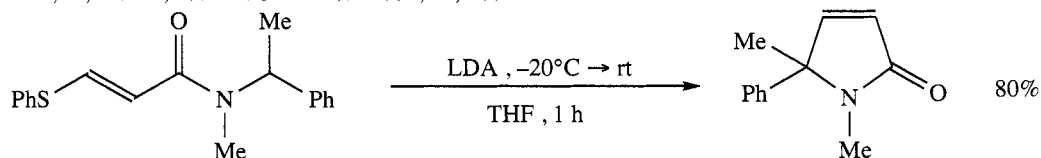
Mohammadpoor-Baltork, I.; Sadeghi, M.M.; Esmayilpour, K. *Synth. Commun.* **2003**, 33, 953.



Mohammadpoor-Baltork, I.; Sadeghi, M.M.; Esmayilpour, K. *Synth. Commun.* **2004**, 34, 953.



Fruit, C.; Müller, P. *Helv. Chim. Acta* **2004**, 87, 1607.



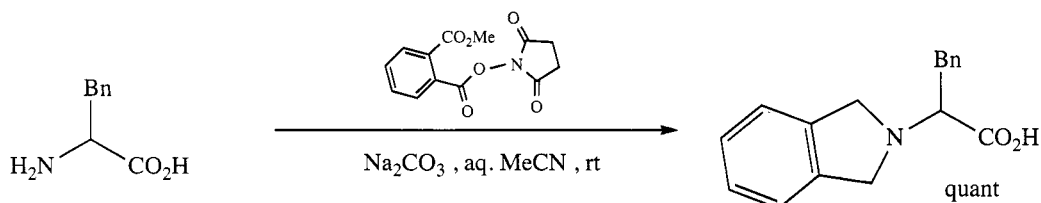
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REVIEW:

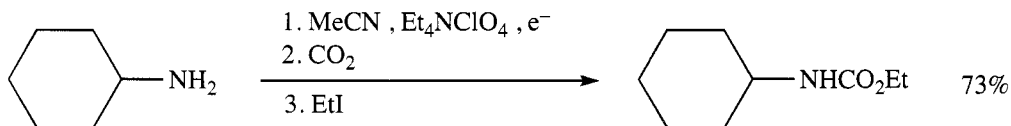
"Metalated Sulfonamides and Their Synthetic Applications"

Familoni, O.B. *Synlett* **2002**, 1181.

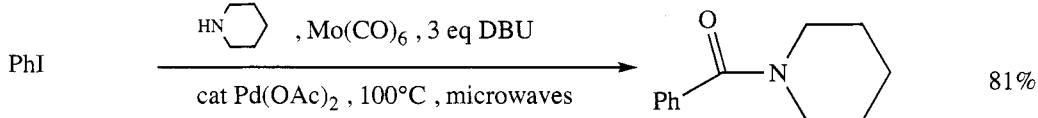
SECTION 82: AMIDES FROM AMINES



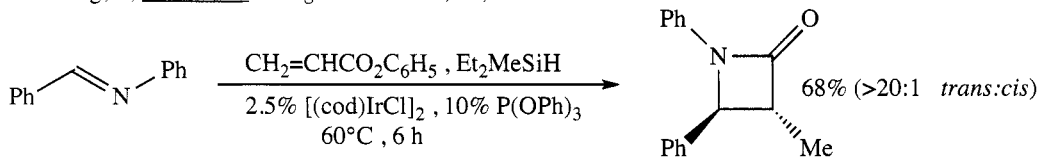
Casimir, J.R.; Guichard, G.; Briand, J.-P. *J. Org. Chem.* **2002**, 67, 3764.



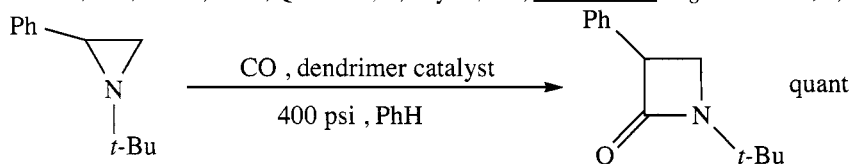
Feroci, M.; Casadei, M.A.; Orsini, M.; Palombi, L.; Inesi, A. *J. Org. Chem.* **2003**, 68, 1548.



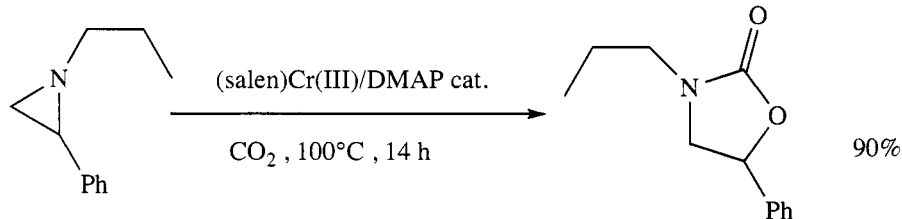
Wannberg, J.; Larhed, M. *J. Org. Chem.* **2003**, 68, 5750.



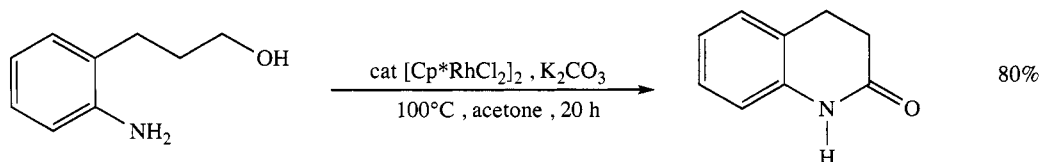
Townes, J.A.; Evans, M.A.; Queffelec, J.; Taylor, S.J.; Morken, J.P. *Org. Lett.* **2002**, 4, 2537.



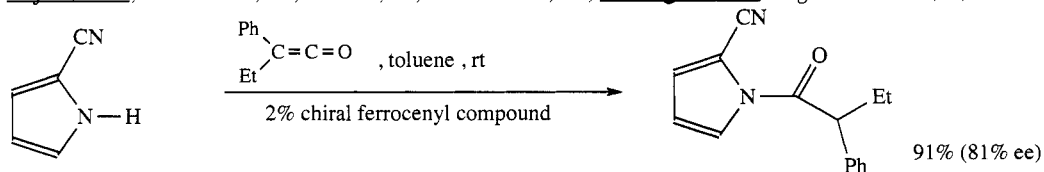
Lu, S.-M.; Alper, H. *J. Org. Chem.* **2004**, 69, 3558.



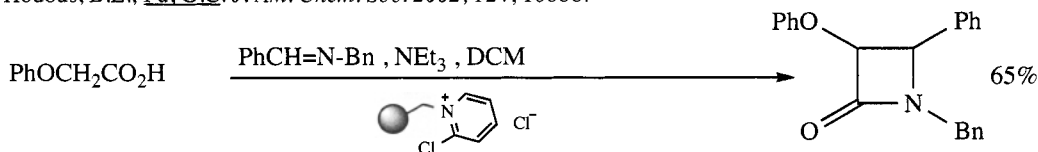
Miller, A.W.; Nguyen, S.T. *Org. Lett.* **2004**, 6, 2301.



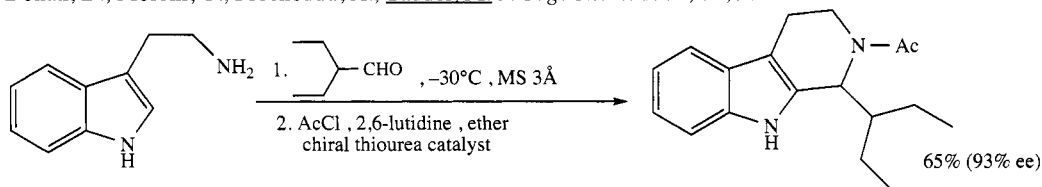
Fujita, K.-i.; Takahashi, Y.; Owaki, M.; Yamamoto, K.; Yamaguchi, R. *Org. Lett.* **2004**, 6, 2785.



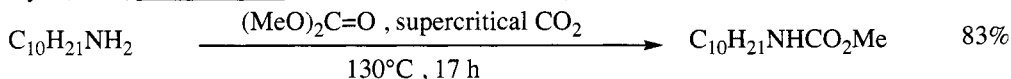
Hodous, B.L.; Fu, G.C. *J. Am. Chem. Soc.* **2002**, 124, 10006.



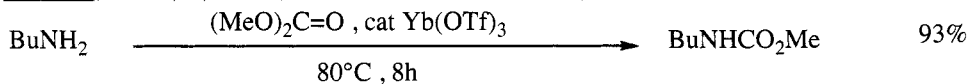
Donati, D.; Morelli, C.; Procheddu, A.; Taddei, M. *J. Org. Chem.* **2004**, 69, 9317.



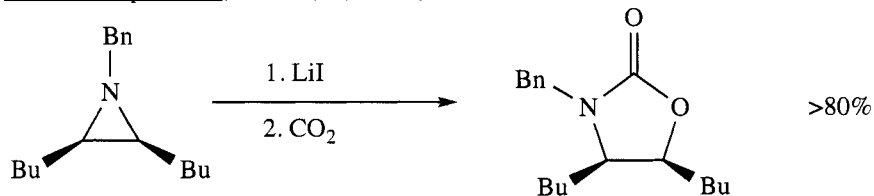
Taylor, M.S.; Jacobsen, E.N. *J. Am. Chem. Soc.* **2004**, 126, 10558.



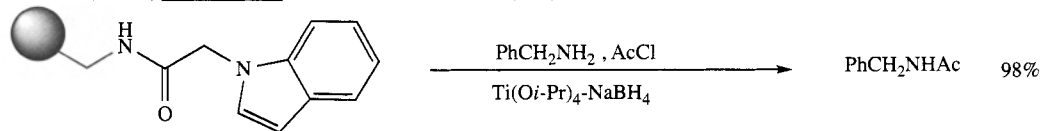
Selva, M.; Tundo, P.; Perosa, A. *Tetrahedron Lett.* **2002**, 43, 1217.



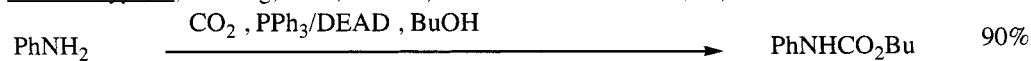
Curini, M.; Epifano, F.; Maltese, F.; Rosati, O. *Tetrahedron Lett.* **2002**, 43, 4895.



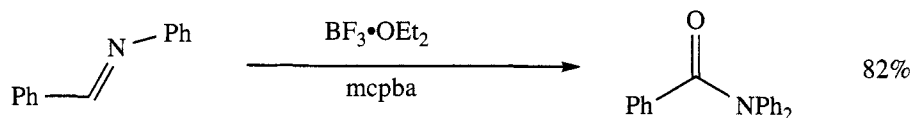
Hancock, M.T.; Pinhas, A.R. *Tetrahedron Lett.* **2003**, 44, 5457.



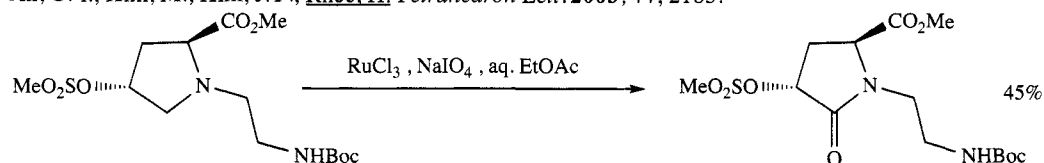
Bhattacharyya, S.; Gooding, O.W.; Labadie, J. *Tetrahedron Lett.* **2003**, 44, 6099.



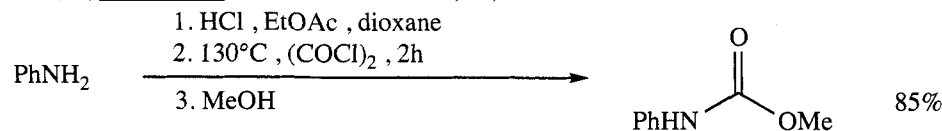
Chaturvedi, D.; Kumar, A.; Ray, S. *Tetrahedron Lett.* **2003**, 44, 7637.



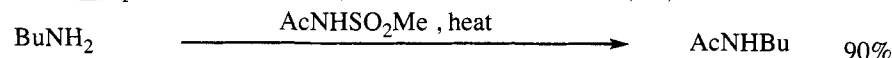
An, G.-i.; Kim, M.; Kim, J.Y.; Rhee, H. *Tetrahedron Lett.* **2003**, *44*, 2183.



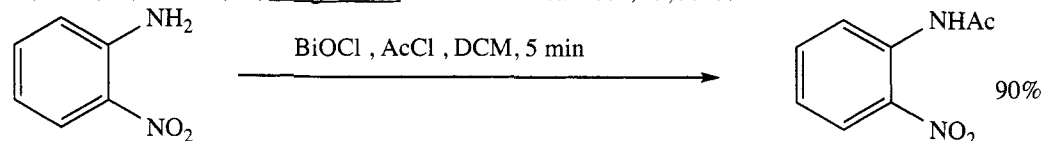
Patel, S.; Mishra, B.K. *Tetrahedron Lett.* **2004**, *45*, 1371.



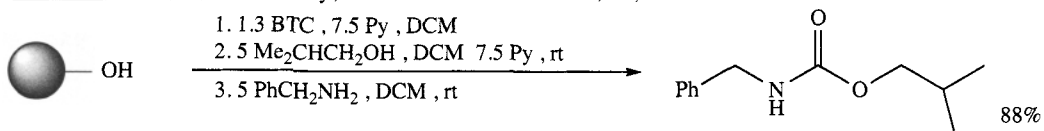
Oh, L.M.; Spoors, P.G.; Goodman, R.M. *Tetrahedron Lett.* **2004**, *45*, 4769.



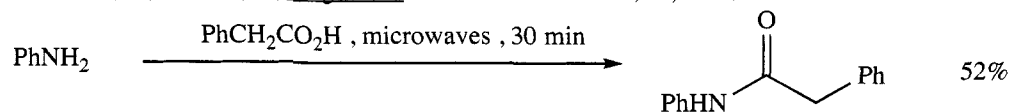
Coniglio, S.; Aramini, A.; Cesta, M.C.; Colagioia, S.; Curti, R.; D'Alessandro, F.; D'Annibale, G.; D'Elia, V.; Nano, G.; Orlando, V.; Allegretti, M. *Tetrahedron Lett.* **2004**, *45*, 5375.



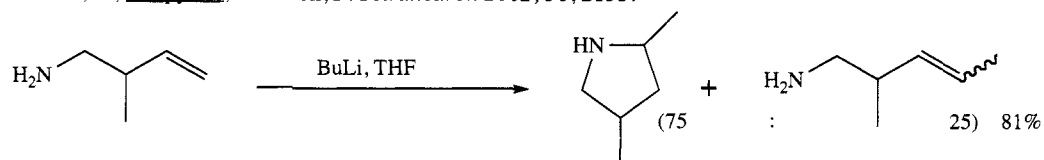
Ghosh, R.; Maiti, S.; Chakraborty, A. *Tetrahedron Lett.* **2004**, *45*, 6775.



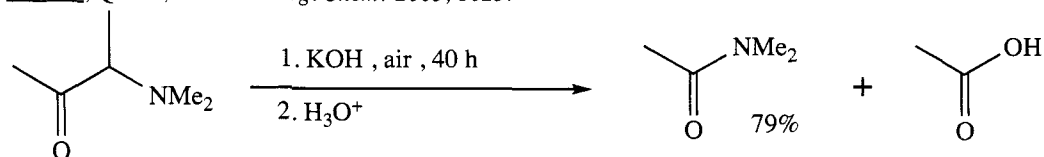
Mormeneo, D.; Llebaria, A.; Delgado, A. *Tetrahedron Lett.* **2004**, *45*, 6831.



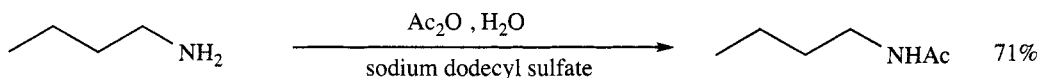
Perreux, L.; Loupy, A.; Volatron, F. *Tetrahedron* **2002**, *58*, 2155.



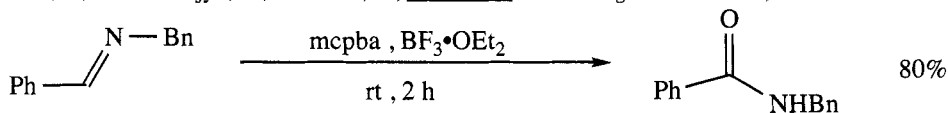
Ates, A.; Quinet, C. *Eur. J. Org. Chem.* **2003**, 1623.



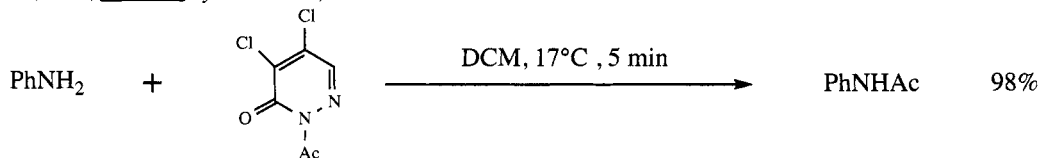
García-Valverde, M.; Pedrosa, R.; Vicente, M. *Synlett* **2002**, 2092.



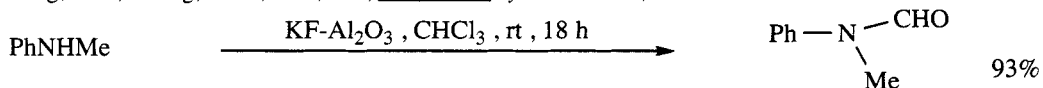
Naik, S.; Bhattacharjya, G.; Talukdar, B.; Patel, B.K., *Eur. J. Org. Chem.* **2004**, 1254.



An, G.-i.; Rhee, H., *Synlett* **2003**, 876.

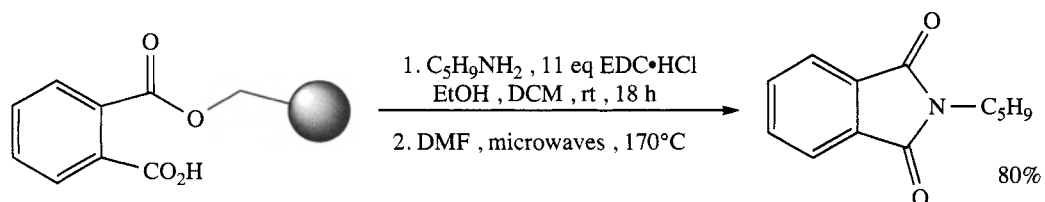


Kang, Y.-J.; Chung, H.-A.; Kim, J.-J.; Yoon, Y.-J., *Synthesis* **2002**, 733.

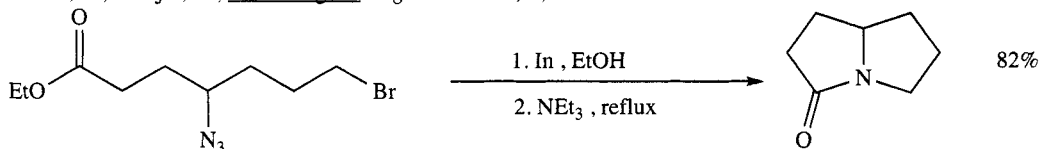


Mihara, M.; Ishino, Y.; Minakata, S.; Komatsu, M., *Synthesis* **2003**, 2317.

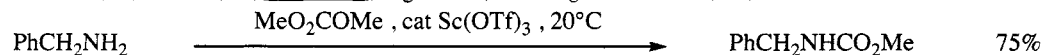
SECTION 83: AMIDES FROM ESTERS



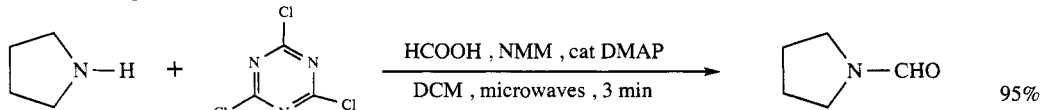
Martin, B.; Sekljic, H.; Chassaing, C., *Org. Lett.* **2003**, 5, 1857.



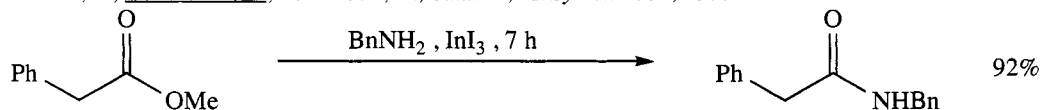
Panchaud, P.; Ollivier, C.; Renaud, P.; Zigmantas, S. *J. Org. Chem.* **2004**, 69, 2755.



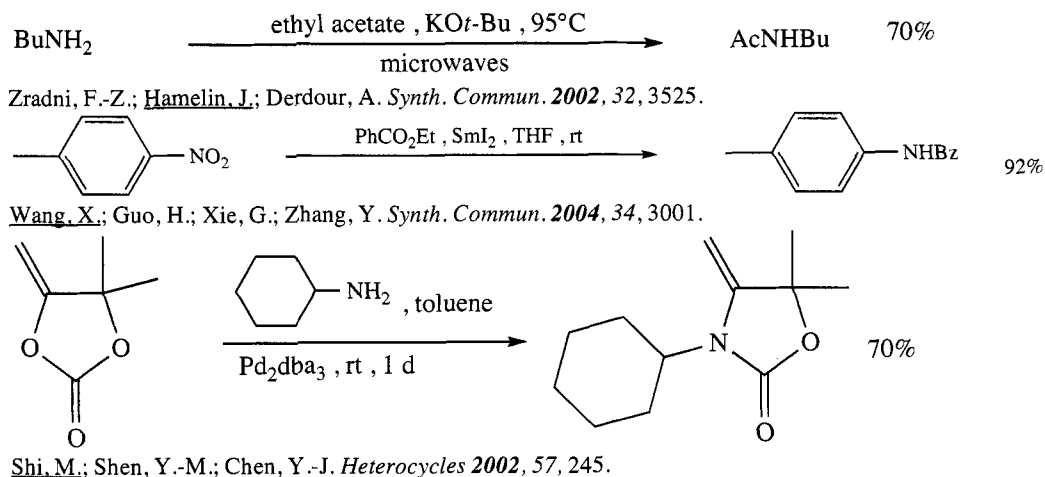
Distaso, M.; Quaranta, E., *Tetrahedron* **2004**, 60, 1531.



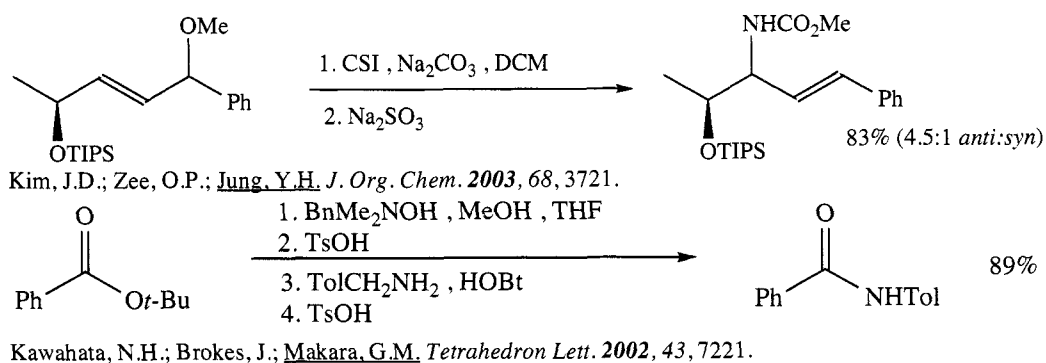
DeLuca, L.; Giacomelli, G.; Porcheddu, A.; Salaries, M. *Synlett* **2004**, 2570.



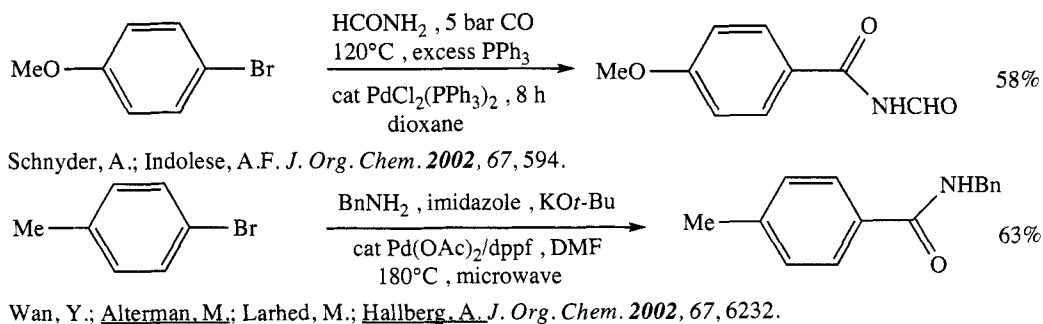
Ranu, B.C.; Dutta, P. *Synth. Commun.* **2003**, 33, 297.

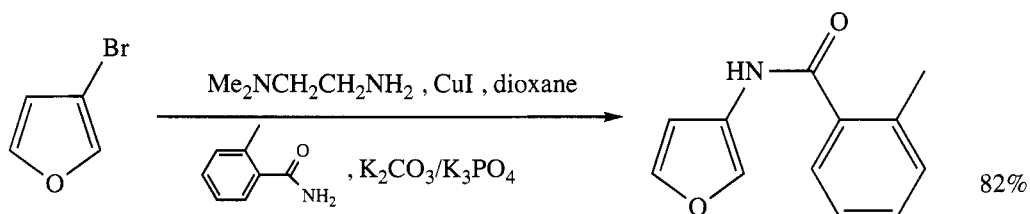


SECTION 84: AMIDES FROM ETHERS, EPOXIDES, AND THIOETHERS

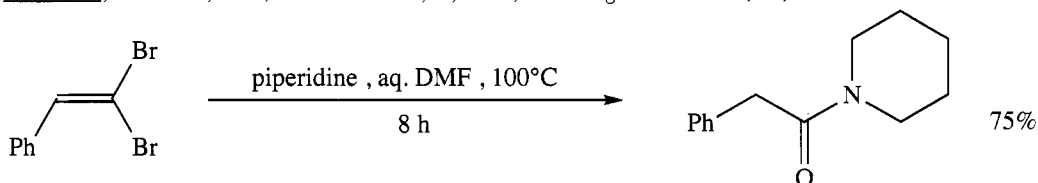


SECTION 85: AMIDES FROM HALIDES AND SULFONATES

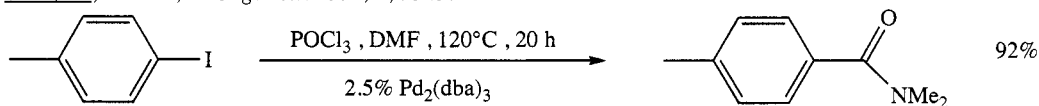




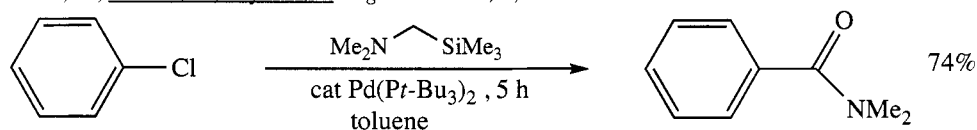
Padwa, A.; Crawford, K.R.; Rashatasakhon, P.; Rose, M. *J. Org. Chem.* **2003**, 68, 2609.



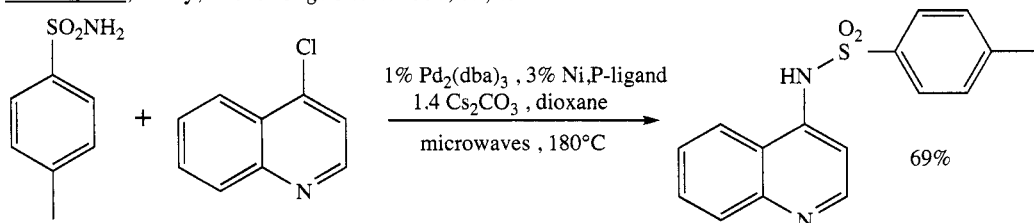
Shen, W.; Kunzer, A. *Org. Lett.* **2002**, 4, 1315.



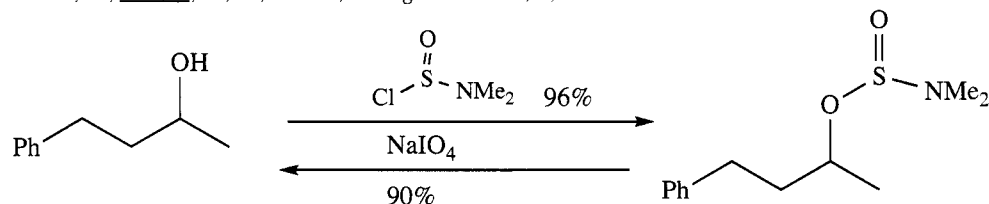
Hosoi, K.; Nozaki, K.; Hiyama, T. *Org. Lett.* **2002**, 4, 2849.



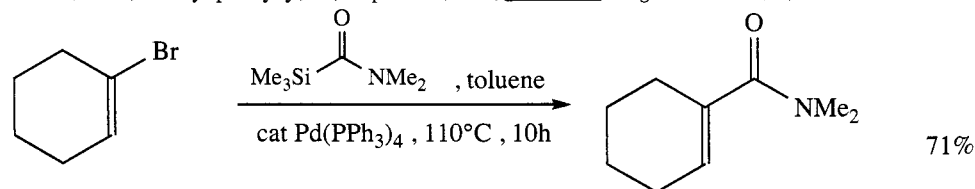
Cunico, R.F.; Maity, B.C. *J. Org. Chem.* **2002**, 67, 4357.



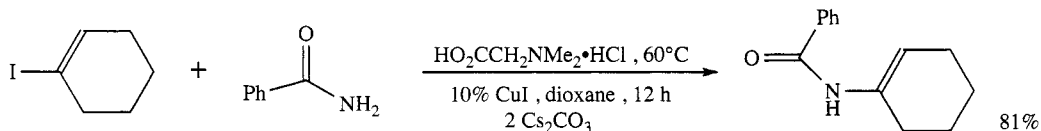
Burton, G.; Cao, P.; Li, G.; Rivero, R. *Org. Lett.* **2003**, 5, 4373.



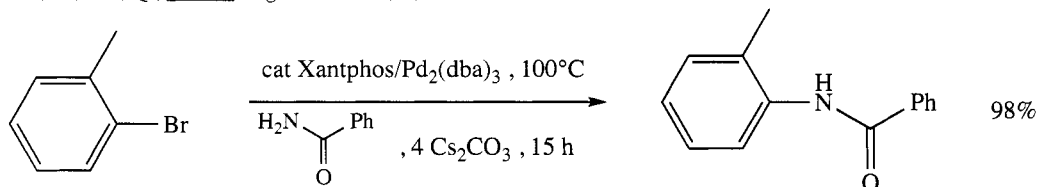
Barma, D.K.; Bandyopadhyay, A.; Capdevila, J.H.; Falck, J.R. *Org. Lett.* **2003**, 5, 4755.



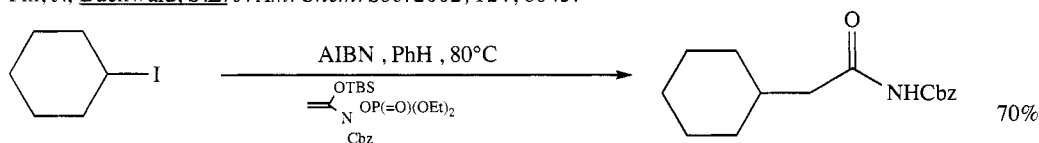
Cunico, R.F.; Maity, B.C. *Org. Lett.* **2003**, 5, 4947.



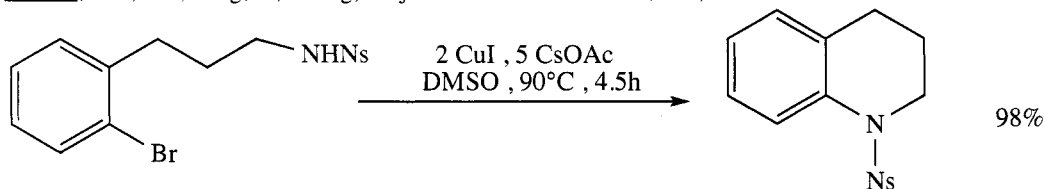
Pan, X.; Cai, Q.; Ma, D. *Org. Lett.* **2004**, 6, 1809.



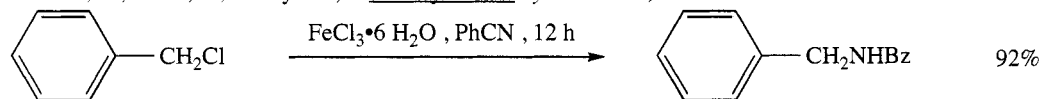
Yin, J.; Buchwald, S.L. *J. Am. Chem. Soc.* **2002**, 124, 6043.



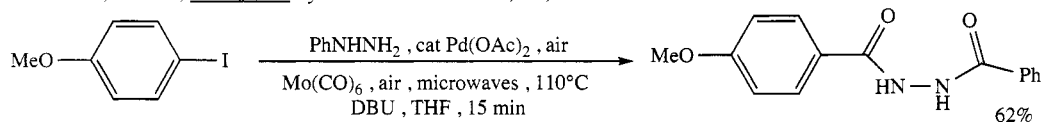
Kim, S.; Lim, C.J.; Song, C.; Chung, W.-j. *J. Am. Chem. Soc.* **2002**, 124, 14306.



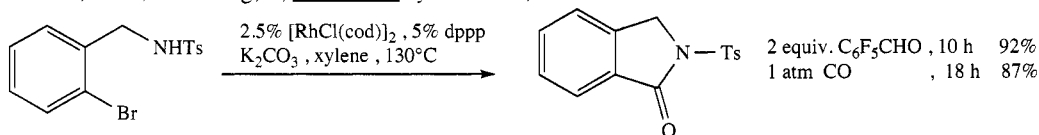
Yamada, K.; Kubo, T.; Tokuyama, H.; Fukuyama, T. *Synlett* **2002**, 231.



Karabulut, H.R.F.; Kacan, M. *Synth. Commun.* **2002**, 32, 2345.

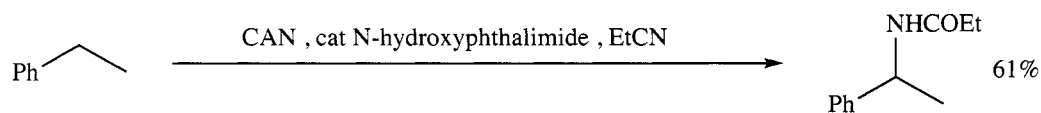


Herrero, M.A.; Wannberg, J.; Larhed, M. *Synlett* **2004**, 2335.

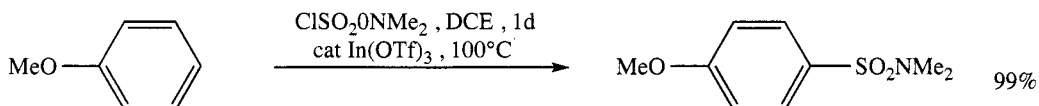


Morimoto, T.; Fujioka, M.; Fuji, K.; Tsutsumi, K.; Kakiuchi, K. *Chem. Lett.* **2003**, 32, 154

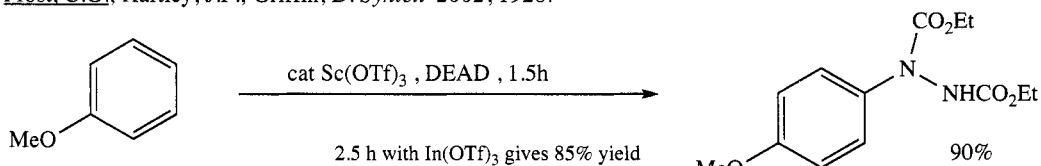
SECTION 86: AMIDES FROM HYDRIDES



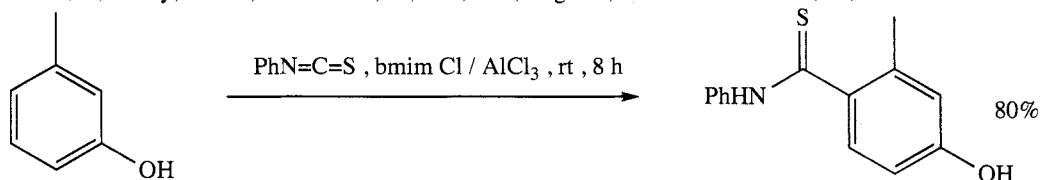
Sakaguchi, S.; Hirabayashi, T.; Ishii, Y. *Chem. Commun.* **2002**, 516.



Frost, C.G.; Hartley, J.P.; Griffin, D. *Synlett* **2002**, 1928.

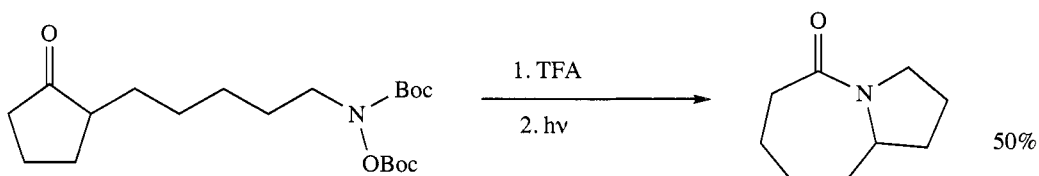


Yadav, S.; Reddy, B.V.S.; Veerendhar, G.; Rao, R.S.; Nagaiah, K. *Chem. Lett.* **2002**, 31, 318.

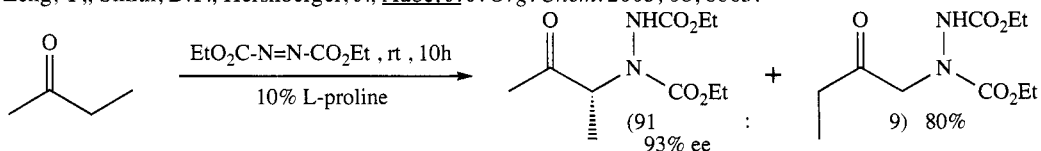


Naik, P.U.; Nara, S.J.; Harjani, K.R.; Salunkhe, M.M. *Can. J. Chem.* **2003**, 81, 1057.

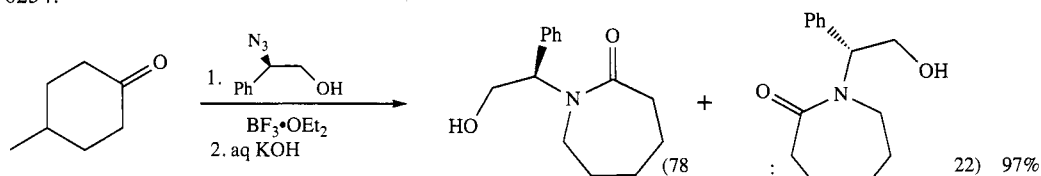
SECTION 87: AMIDES FROM KETONES



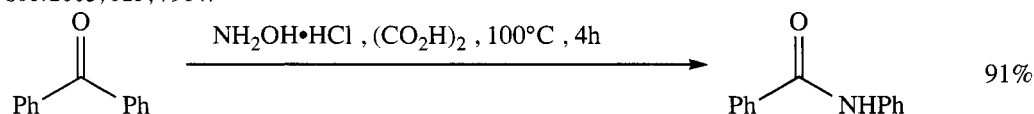
Zeng, Y.; Smith, B.T.; Hershberger, J.; Aubé, J. *J. Org. Chem.* **2003**, 68, 8065.



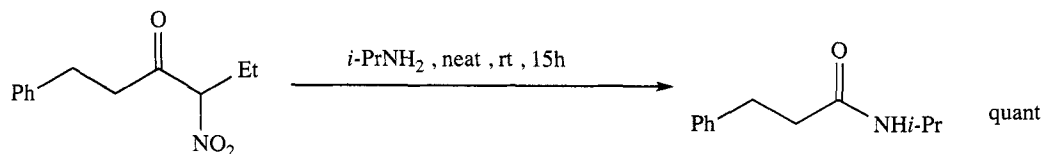
Kumaragurubaran, N.; Juhl, K.; Zhuang, W.; Bøgevig, Z.; Jørgensen, K.A. *J. Am. Chem. Soc.* **2002**, 124, 6254.



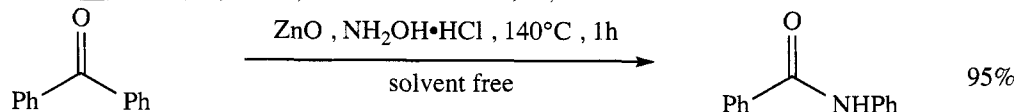
Sahasrabudhe, K.; Gracias, V.; Rurness, K.; Smith, B.T.; Katz, C.E.; Reddy, D.S.; Aubé, J. *J. Am. Chem. Soc.* **2003**, 125, 7914.



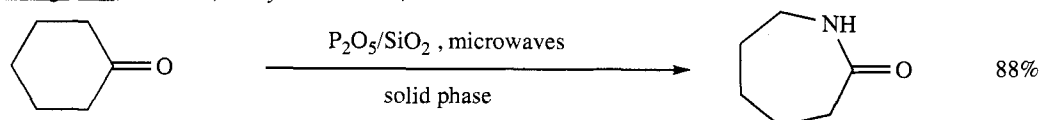
Chandrasekhar, S.; Gopalaiah, K. *Tetrahedron Lett.* **2003**, 44, 7437.



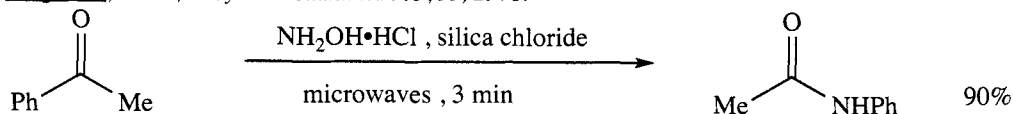
Ballini, R.; Bosica, G.; Fiorini, D. *Tetrahedron* **2003**, 59, 1143.



Sharghi, H.; Hosseini, M. *Synthesis* **2002**, 1057.

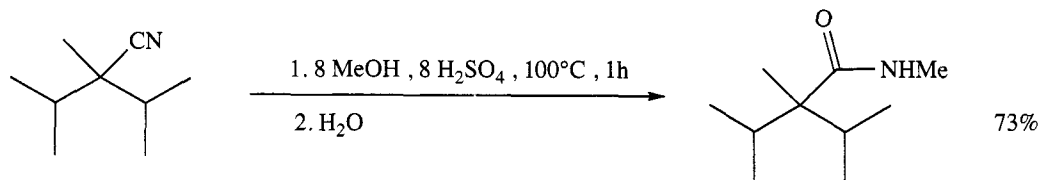


Eshghi, H.; Gordi, Z. *Synth. Commun.* **2003**, 33, 2971.

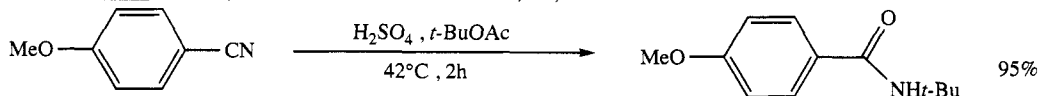


Srinivas, K.V.N.S.; Mahender, I.; Das, B. *Chem. Lett.* **2003**, 32, 738.

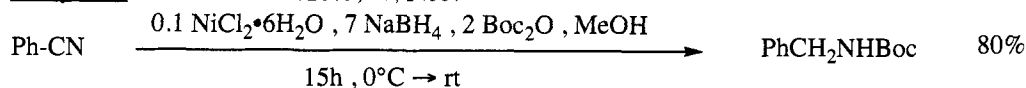
SECTION 88: AMIDES FROM NITRILES



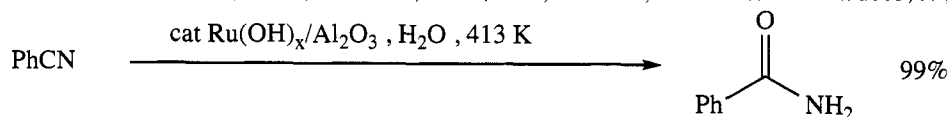
Lebedev, M.Y.; Erman, M.B. *Tetrahedron Lett.* **2002**, 43, 1397.



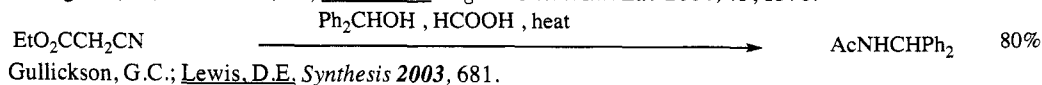
Reddy, K.L. *Tetrahedron Lett.* **2003**, 44, 1453.



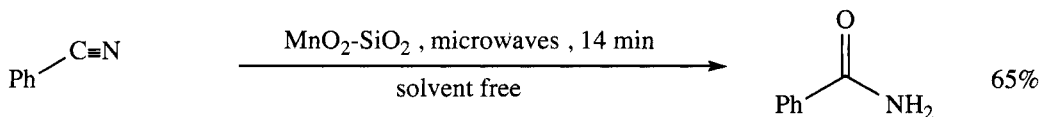
Caddick, S.; Judd, D.B.; Lewis, A.K.de K.; Reich, M.T.; Williams, M.R.V. *Tetrahedron* **2003**, 59, 5417.



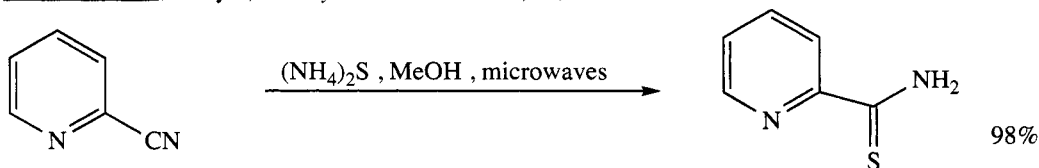
Yamaguchi, K.; Matsushita, M.; Mizuno, N. *Angew. Chem. Int. Ed.* **2004**, 43, 1576.



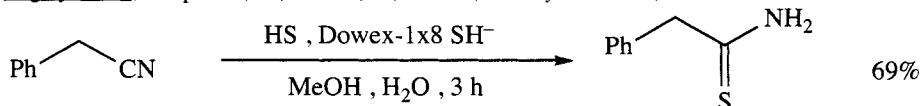
Gullickson, G.C.; Lewis, D.E. *Synthesis* **2003**, 681.



Khadilkar, B.M.; Madyar, V.R. *Synth. Commun.* **2002**, 32, 1731.

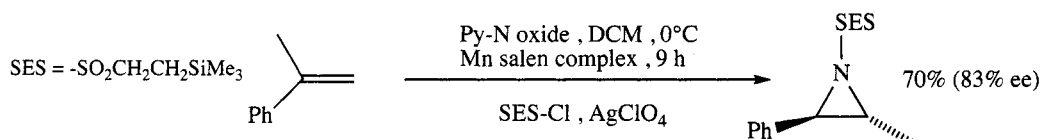


Bagley, M.C.; Chapaneri, K.; Glover, C.; Merritt, E.A. *Synlett* **2004**, 2615.

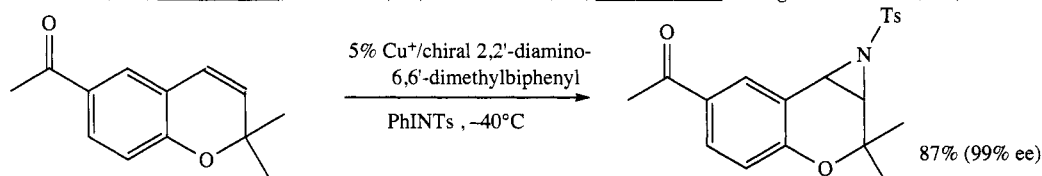


Liboska, R.; Zyka, D.; Bobek, M. *Synthesis* **2002**, 1649.

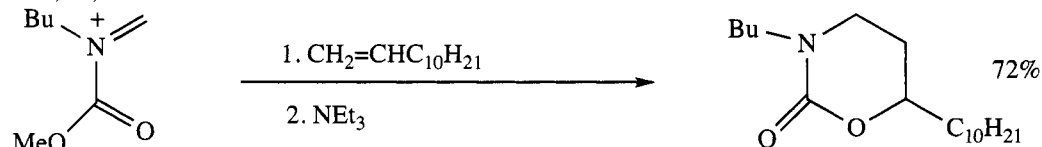
SECTION 89: AMIDES FROM ALKENES



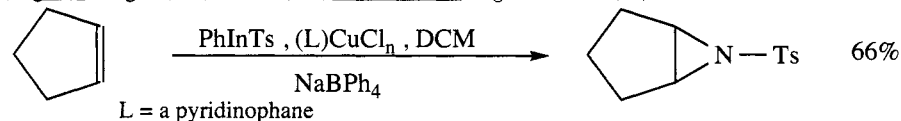
Nishimura, M.; Minakata, S.; Talahashi, T.; Oderaotoshi, Y.; Komatsu, M. *J. Org. Chem.* **2002**, 67, 2107.



Gillesie, K.M.; Sander, C.J.; O'Shaughnessy, P.; Wetmoreland, I.; Thickett, C.P.; Scott, P. *J. Org. Chem.* **2002**, 67, 3450.

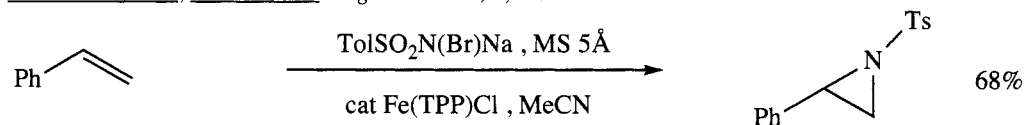


Suga, S.; Nagaki, A.; Tsutsui, Y.; Yoshida, J.-i. *Org. Lett.* **2003**, 5, 945.

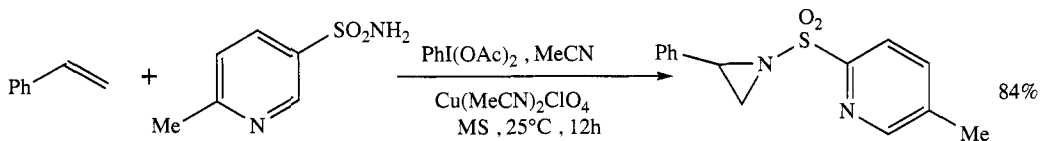


L = a pyridinophane

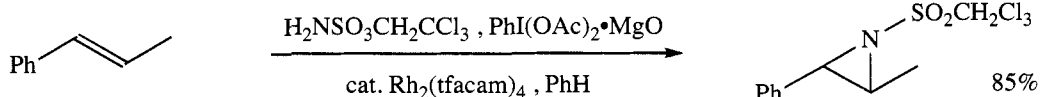
Vedernikov, A.N.; Caluton, K.G. *Org. Lett.* **2003**, 5, 2591.



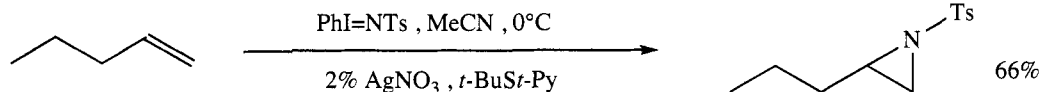
Vyas, R.; Gao, G.-Y.; Hardin, J.D.; Zhang, X.P. *Org. Lett.* **2004**, 6, 1907.



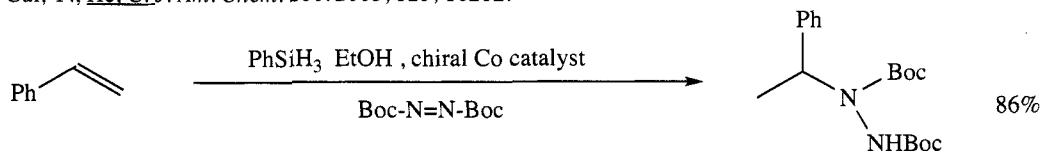
Han, H.; Bae, I.; Yoo, E.J.; Lee, J.; Do, Y.; Chang, S. *Org. Lett.* **2004**, 6, 4109.



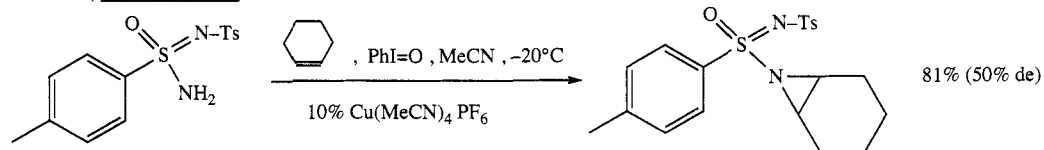
Guthikonda, K.; DuBois, J. *J. Am. Chem. Soc.* **2002**, 124, 13672.



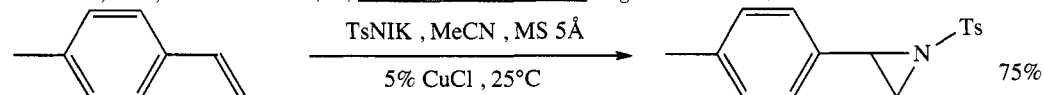
Cui, Y.; He, C. *J. Am. Chem. Soc.* **2003**, 125, 16202.



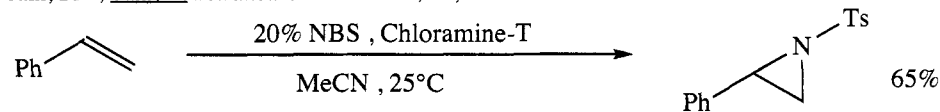
Waser J.; Carreira, E.M. *J. Am. Chem. Soc.* **2004**, 126, 5676.



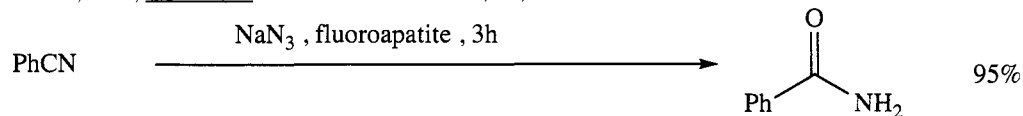
Dichenna, P.H.; Robert-Peillard, F.; Dauban, P.; Dodd, R.H. *Org. Lett.* **2004**, 6, 4503.



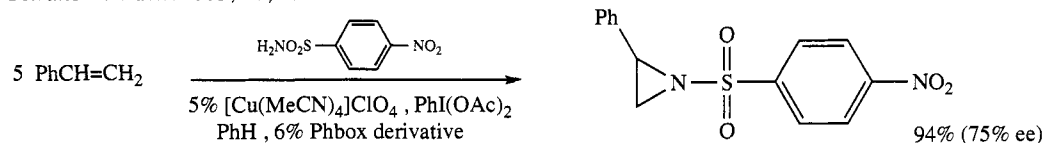
Jain, S.L.; Sain, B. *Tetrahedron Lett.* **2003**, 44, 575.



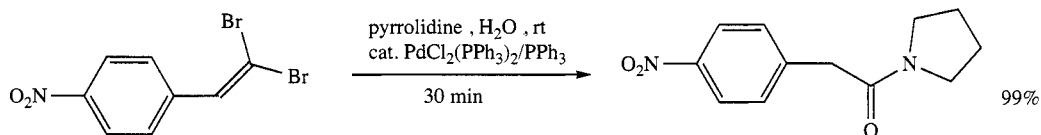
Thakur, V.V.; Sudalai, A. *Tetrahedron Lett.* **2003**, 44, 989.



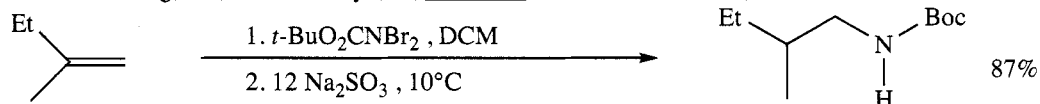
Solhy, A.; Smahi, A.; El Badaour, H.; Elaabar, B.; Amoukal, A.; Tikad, A.; Sebti, S.; Macquarrie, D.J. *Tetrahedron Lett.* **2003**, 44, 4031.



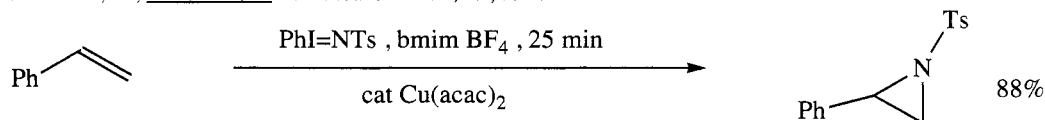
Kwong, H.-L.; Liu, D.; Chan, K.-Y.; Lee, C.-S.; Huang, K.-H.; Che, C.-M. *Tetrahedron Lett.* **2004**, 45, 3965.



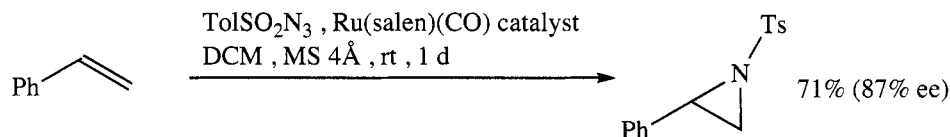
Huh, D.H.; Jeong, J.S.; Lee, H.B.; Ryu, H.; Kim, Y.G. *Tetrahedron* **2002**, *58*, 9925.



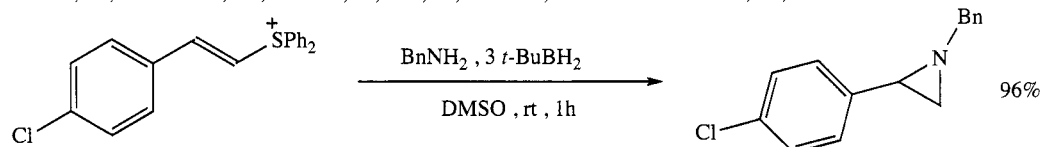
Sliwinska, A.; Zwierzak, A. *Tetrahedron* **2003**, *59*, 5927.



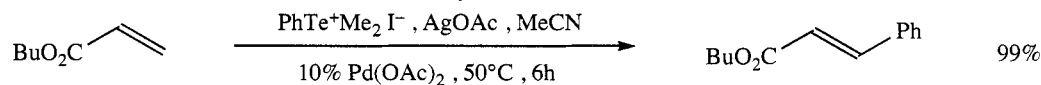
Kantam, M.L.; Neeraja, V.; Kavita, B.; Haritha, Y. *Synlett* **2004**, 525.



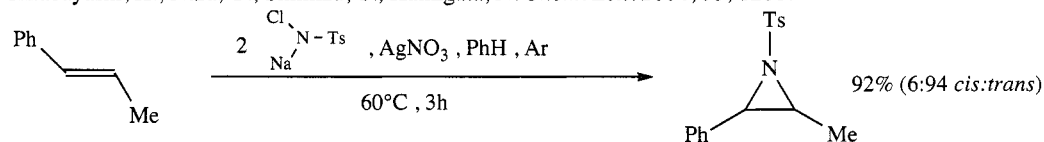
Omura, K.; Murakami, M.; Uchida, T.; Irie, R.; Katsuki, T. *Chem. Lett.* **2003**, 32, 354.



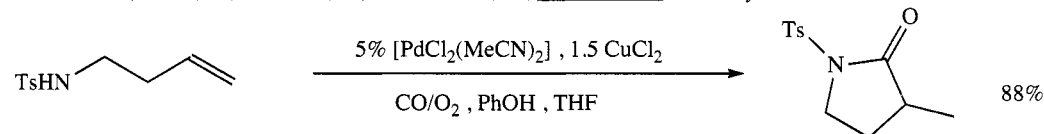
Matsuo, J.; Yamanaka, H.; Kawana, A.; Mukaiyama, T. *Chem. Lett.* **2003**, 32, 392.



Hirabayashi, K.; Nara, Y.; Shimizu, T.; Kamigata, N. *Chem. Lett.* **2004**, 33, 1280.

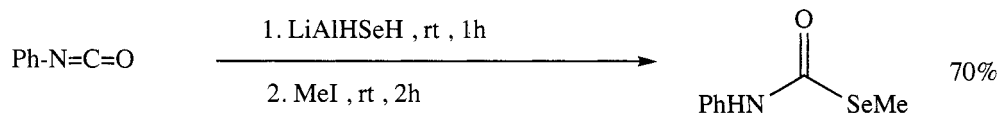


Minakata, S.; Kano, D.; Fukuoka, R.; Oderaotoshi, Y.; Komatsu, M. *Heterocycles* **2003**, *60*, 289.

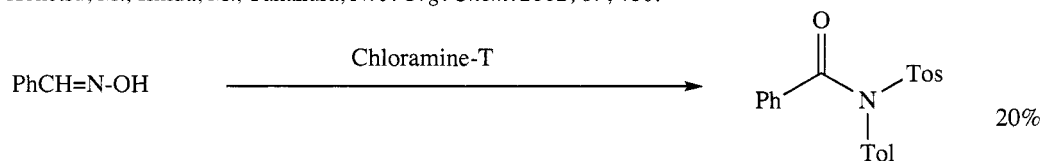


Mizutani, T.; Ukaji, Y.; Inomata, K. *Bull. Chem. Soc. Jpn.* **2003**, 76, 1251.

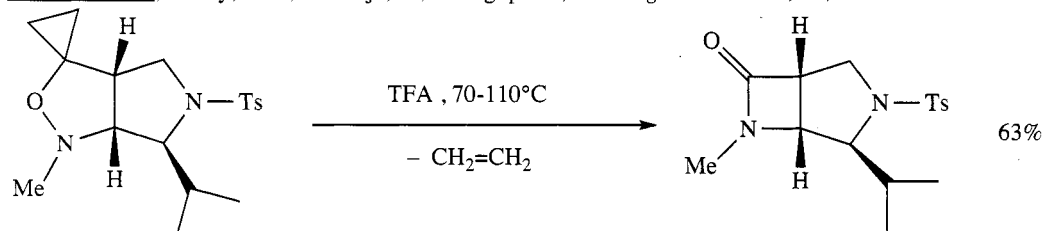
SECTION 90: AMIDES FROM MISCELLANEOUS COMPOUNDS



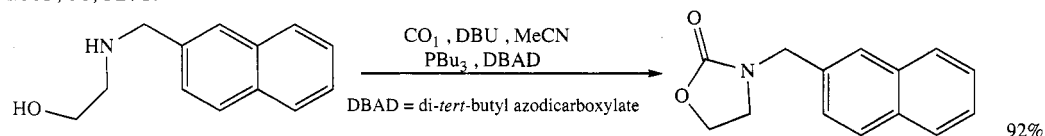
Koketsu, M.; Ishida, M.; Takakura, N. *J. Org. Chem.* **2002**, 67, 486.



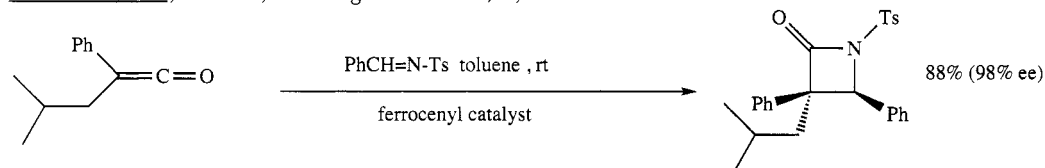
Padmavathi, V.; Reddy, K.V.; Padmaja, A.; Venugopalan, P. *J. Org. Chem.* **2003**, 68, 1567.



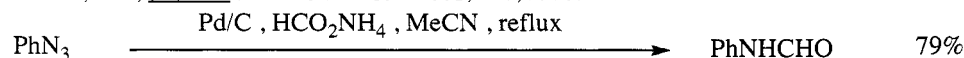
Cordero, F.M.; Pisaneschi, F.; Salvati, M.; Paschetta, V.; Ollivier, J.; Salaün, J.; Brandi, A. *J. Org. Chem.* **2003**, 68, 3271.



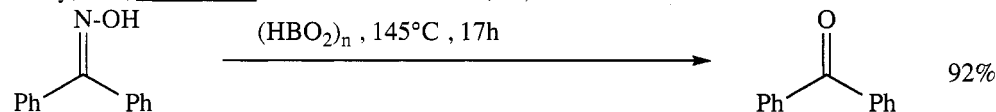
Dinsmore, C.J.; Mercer, S.P. *Org. Lett.* **2004**, 6, 2885.



Hodous, B.L.; Fu, G.C. *J. Am. Chem. Soc.* **2002**, 124, 1578.



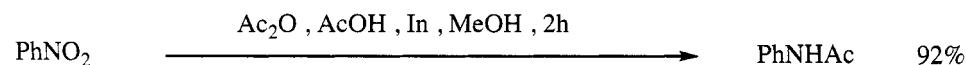
Reddy, P.G.; Baskaran, S. *Tetrahedron Lett.* **2002**, 43, 1919.



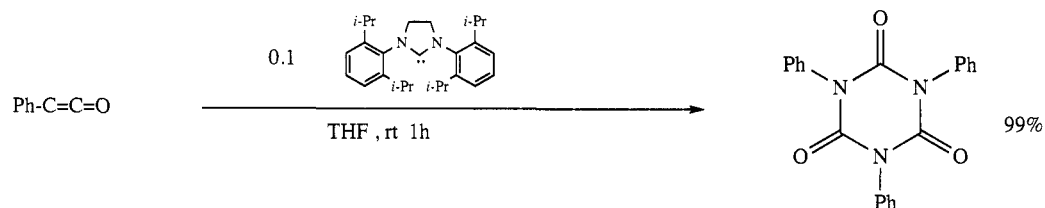
Chandrasekhar, S.; Gopalaiah, K. *Tetrahedron Lett.* **2002**, 43, 2455.



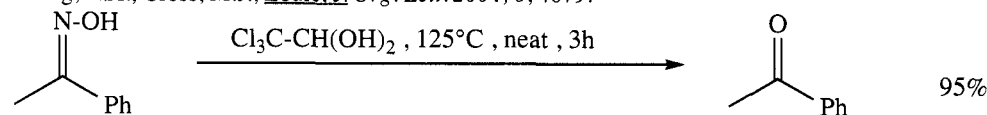
Park, S.-D.; Oh, J.-H.; Lim, D. *Tetrahedron Lett.* **2002**, 43, 6309.



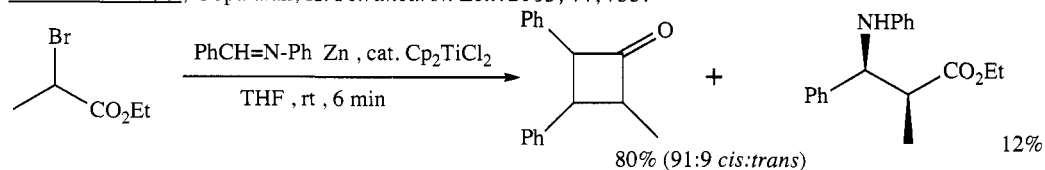
Kim, B.H.; Han, R.; Piao, F.; Jun, Y.M.; Baik, W.; Lee, B.M. *Tetrahedron Lett.* **2003**, 44, 77.



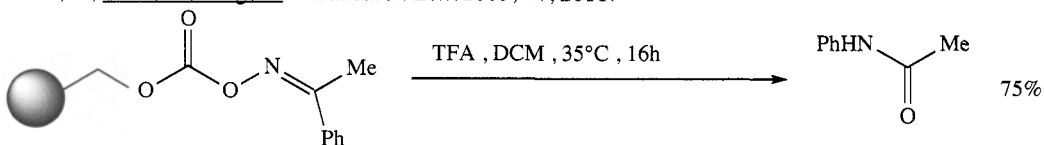
Duong, H.A.; Cross, M.J.; Louie, J. *Org. Lett.* **2004**, 6, 4679.



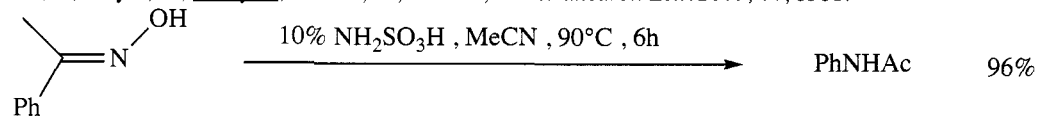
Chandrasekhar, S.; Gopalaiah, K. *Tetrahedron Lett.* **2003**, 44, 755.



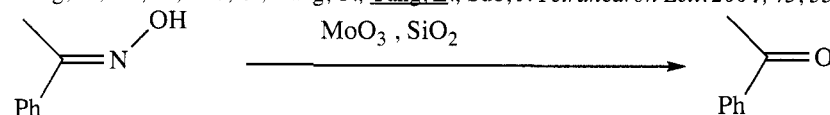
Chen, L.; Zhao, G.; Ding, Y. *Tetrahedron Lett.* **2003**, 44, 2611.



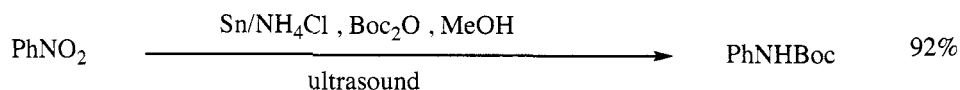
His, S.; Meyer, C.; Cossy, J.; Emeric, G.; Greiner, A. *Tetrahedron Lett.* **2003**, 44, 8581.



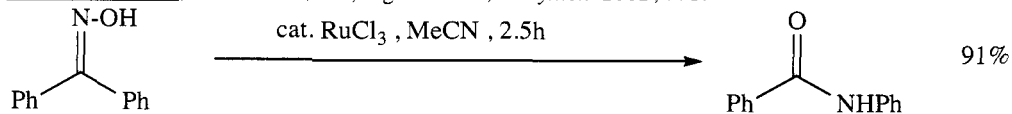
Wang, B.; Gu, Y.; Luo, C.; Yang, T.; Yang, L.; Suo, J. *Tetrahedron Lett.* **2004**, 45, 3369.



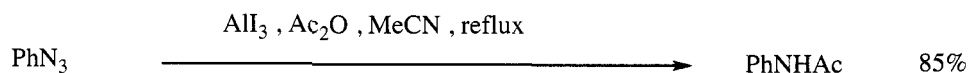
Dongare, M.K.; Bhagwat, V.V.; Ramana, C.V.; Gurgar, M.K. *Tetrahedron Lett.* **2004**, 45, 4759.



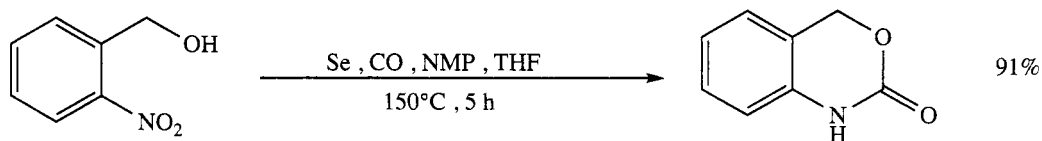
Chandrasekhar, S.; Barishmulu, Ch.; Jagadeshwar, V. *Synlett* **2002**, 771.



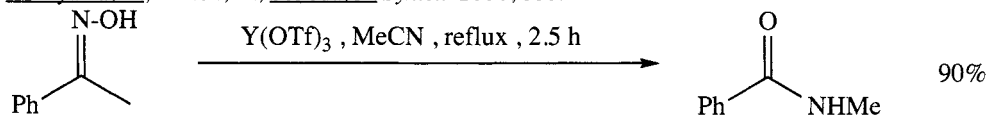
De, S.K. *Synth. Commun.* **2004**, 34, 3431.



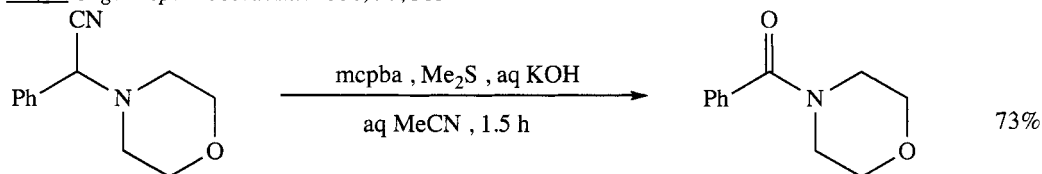
Bez, G. *Synth. Commun.* **2002**, 32, 3625.



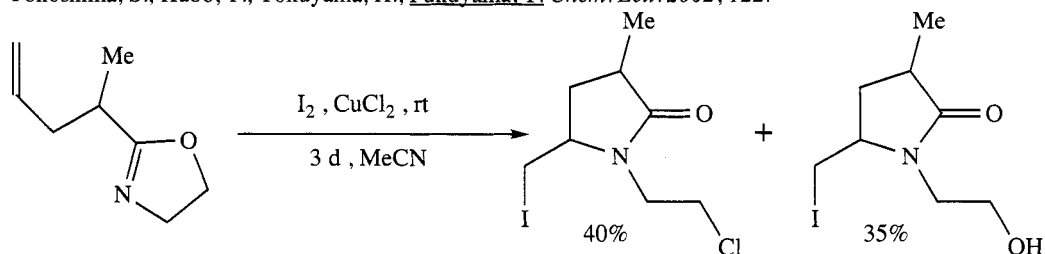
Nishiyama, Y.; Naitoh, Y.; Sonoda, N. *Synlett* **2004**, 886.



De, K. *Org. Prep. Proceed. Int.* **2004**, 36, 383

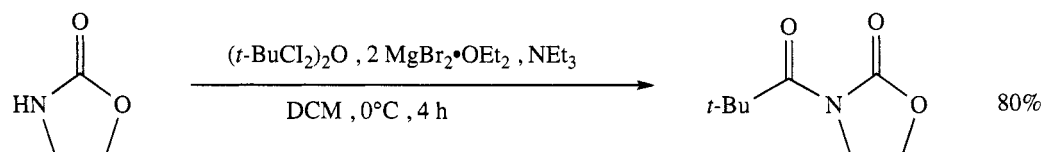


Yokoshima, S.; Kubo, T.; Tokuyama, H.; Fukuyama, T. *Chem. Lett.* **2002**, 122.

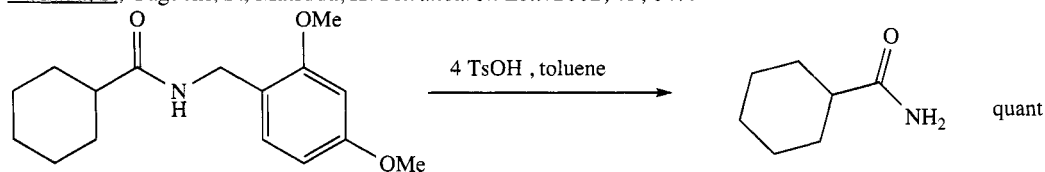


Terao, K.; Takechi, Y.; Kunishima, M.; Tani, S.; Ito, A.; Yamasaki, C.; Fukuzawa, S. *Chem. Lett.* **2002**, 31, 522.

SECTION 90A: PROTECTION OF AMIDES



Yamada, S.; Yaguchi, S.; Matsuda, K. *Tetrahedron Lett.* **2002**, 43, 647.

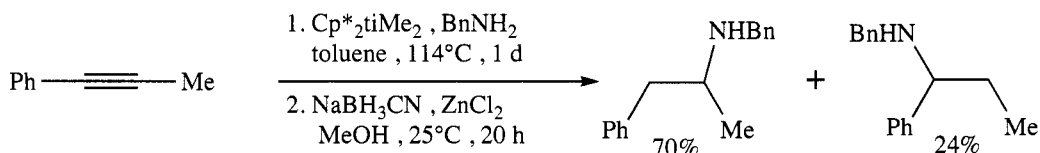


Chern, C.-Y.; Huang, Y.-P.; Kan, W.M. *Tetrahedron Lett* **2003**, 44, 1039.

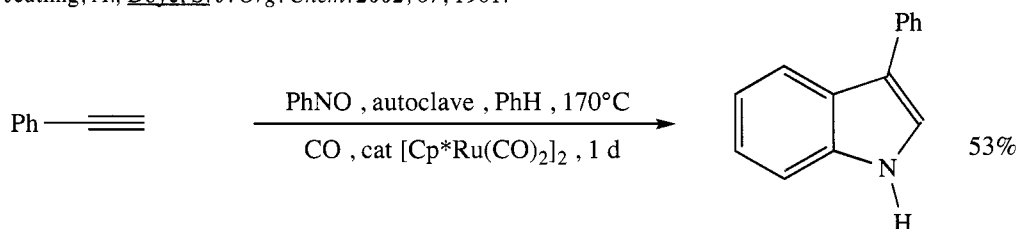
CHAPTER 7

PREPARATION OF AMINES

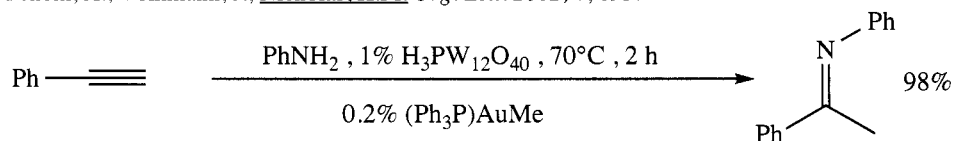
SECTION 91: AMINES FROM ALKYNES



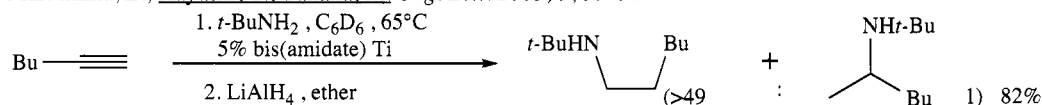
Jeutling, A.; Doye, S. *J. Org. Chem.* **2002**, 67, 1961.



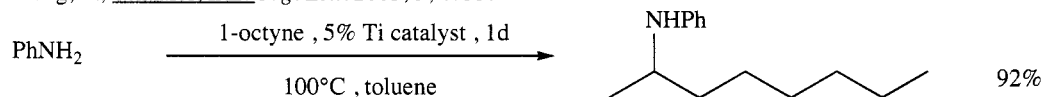
Penoni, A.; Volkmann, J.; Nicholas, K.M. *Org. Lett.* **2002**, 4, 695.



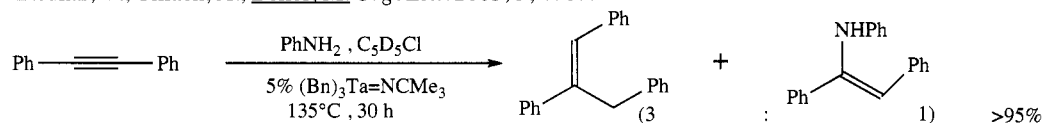
Mizushima, E.; Hayashi, T.; Tanaka, M. *Org. Lett.* **2003**, 5, 3349.



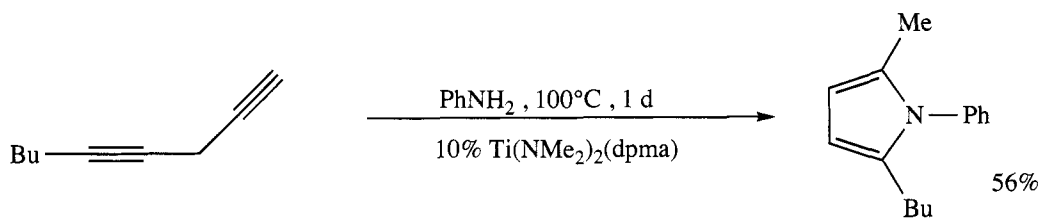
Zhang, Z.; Schaefer, L.L. *Org. Lett.* **2003**, 5, 4733.



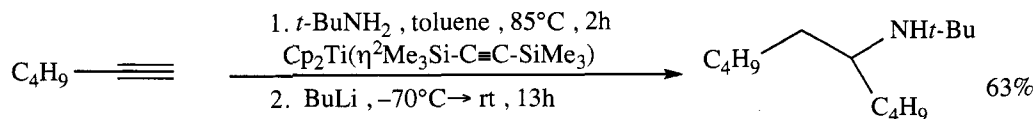
Khedkar, V.; Tillack, A.; Beller, M. *Org. Lett.* **2003**, 5, 4767.



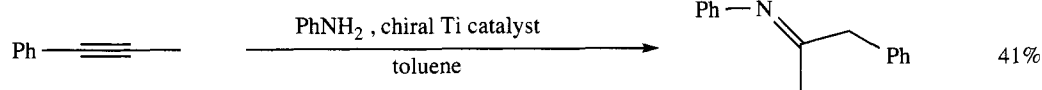
Anderson, L.L.; Arnold, J.; Bergman, R.G. *Org. Lett.* **2004**, 6, 2519.



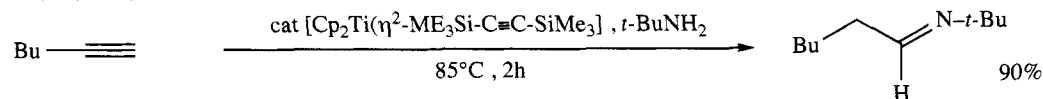
Ramanathan, B.; Keith, A.J.; Armstrong, D.; Odom, A.L. *Org. Lett.* **2004**, *6*, 2957.



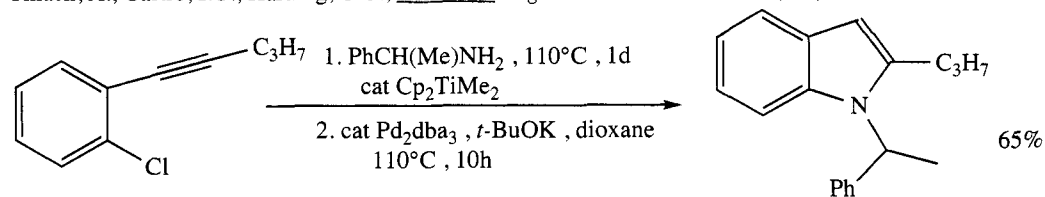
Castro, I.G.; Tillack, A.; Hartung, C.G.; Beller, M. *Tetrahedron Lett.* **2003**, *44*, 3217.



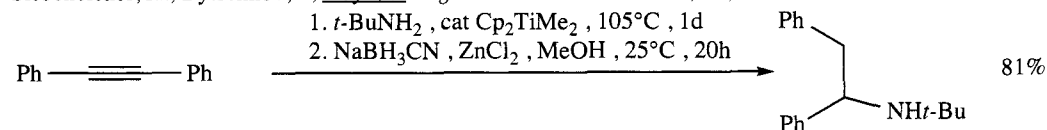
Shi, Y.; Hall, C.; Ciszewski, J.T.; Cao, C.; Odom, A.L. *Chem. Commun.* **2003**, 586.



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Siebeneicher, H.; Bytschkov, I.; Doye, S. *Angew. Chem. Int. Ed.* **2003**, *42*, 3042.



Pohlki, F.; Heutling, A.; Bytschkov, I.; Hotopp, T.; Doye, S. *Synlett* **2002**, 799.

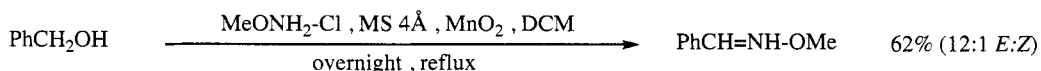
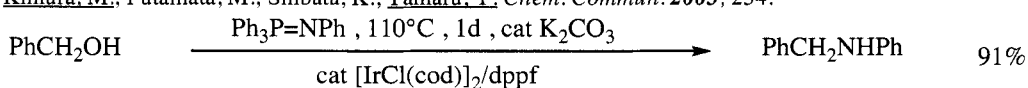
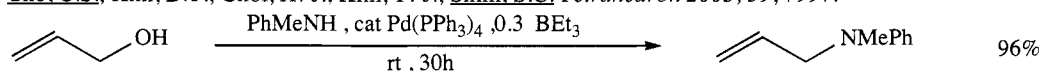
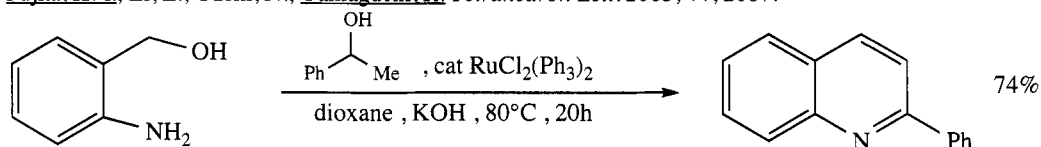
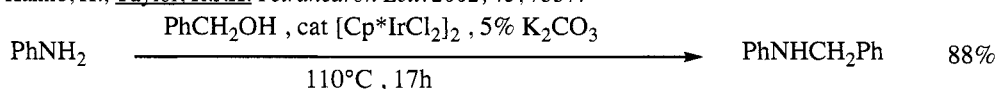
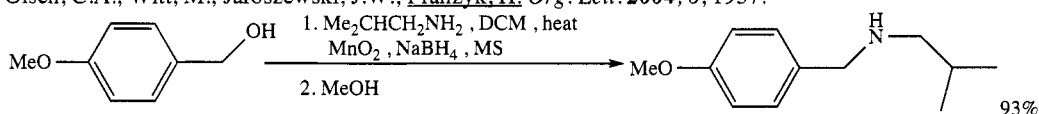
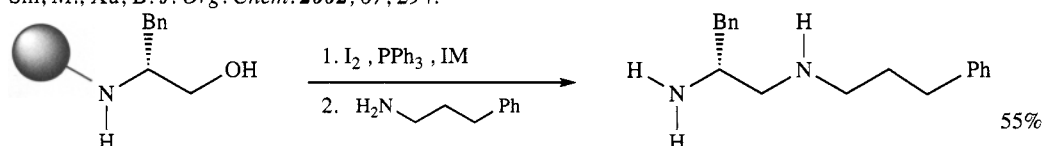
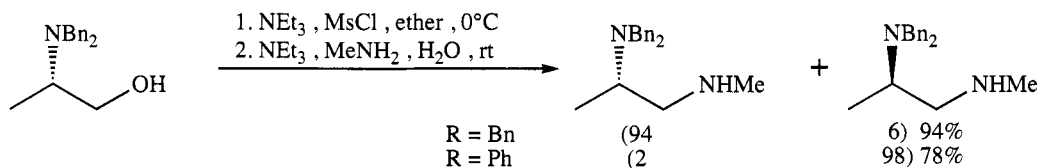
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 Doye, S. *Synlett* **2004**, 1653.

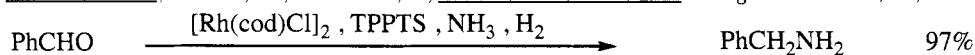
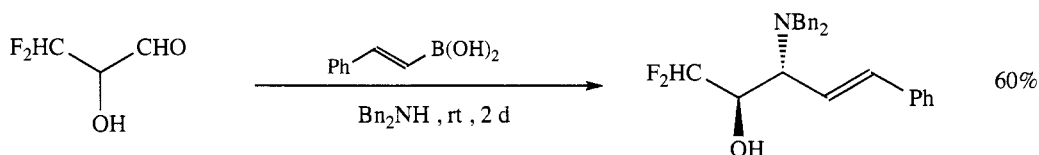
SECTION 92: AMINES FROM ACID DERIVATIVES

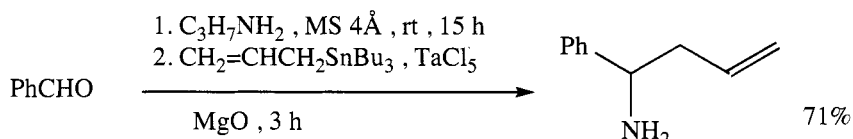
NO ADDITIONAL EXAMPLES

SECTION 93: AMINES FROM ALCOHOLS AND THIOLS

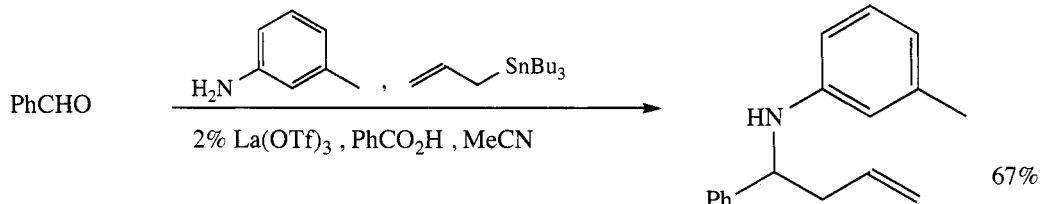


SECTION 94: AMINES FROM ALDEHYDES

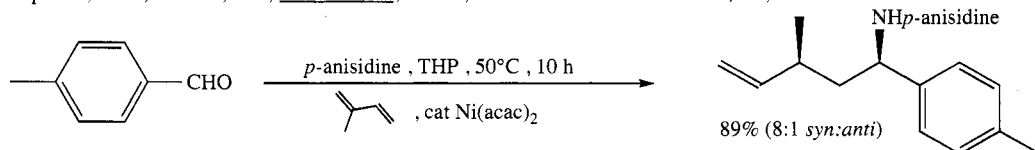




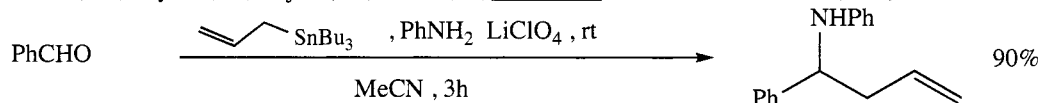
Shibata, I.; Nose, K.; Sakamoto, K.; Yasuda, M.; Baba, A. *J. Org. Chem.* **2004**, 69, 2185.



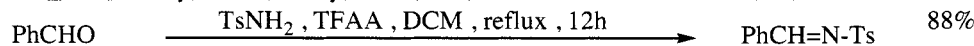
Aspinall, H.C.; Bissett, J.S.; Greeves, N.; Levin, D. *Tetrahedron Lett.* **2002**, 43, 323.



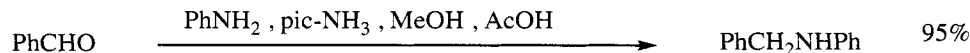
Kimura, M.; Miyachi, A.; Kojima, K.; Tanaka, S.; Tamaru, Y. *J. Am. Chem. Soc.* **2004**, 126, 14360.



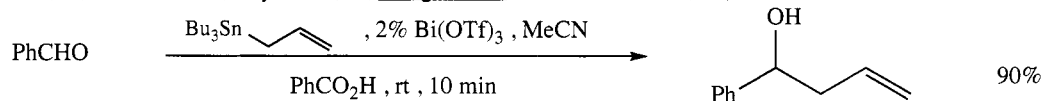
Yadav, J.S.; Reddy, B.V.S.; Reddy, P.S.R.; Rao, M.S. *Tetrahedron Lett.* **2002**, 43, 6245.



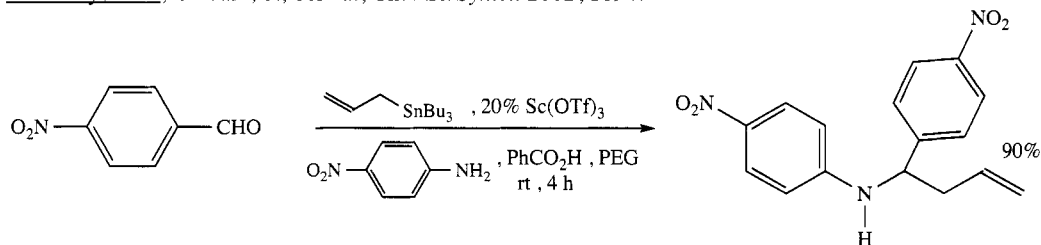
Lee, K.Y.; Lee, C.G.; Kim, J.N. *Tetrahedron Lett.* **2003**, 44, 1231.



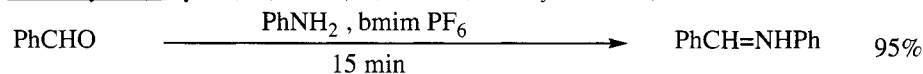
Sato, S.; Sakamoto, T.; Miyazawa, E.; Kitugawa, Y. *Tetrahedron* **2004**, 60, 7899.



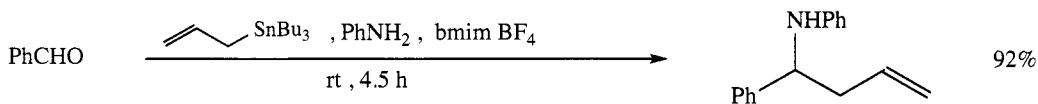
Choudary, B.M.; Chidara, S.; Sekhar, Ch.V.R. *Synlett* **2002**, 1694.



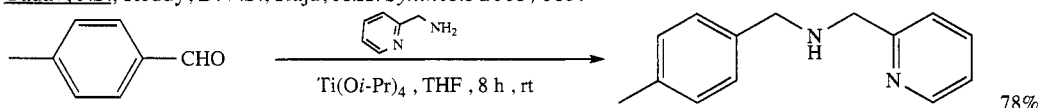
Choudary, B.M.; Jyothi, K.; Madhi, S.; Kantam, M.L. *Synlett* **2004**, 231.



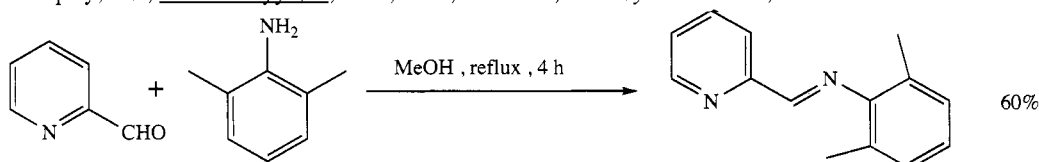
Andrade, C.K.Z.; Takada, S.C.S.; Alves, L.M.; Rodrigues, J.P.; Suarez, P.A.Z.; Brandão, R.F.; Soares V.C.D. *Synlett* **2004**, 2135.



Yadav, J.S.; Reddy, B.V.S.; Raju, A.K. *Synthesis* **2003**, 883.



Kumpaty, H.J.; Bhattacharyya, S.; Rehr, E.W.; Gonzalez, A.M. *Synthesis* **2003**, 2206.



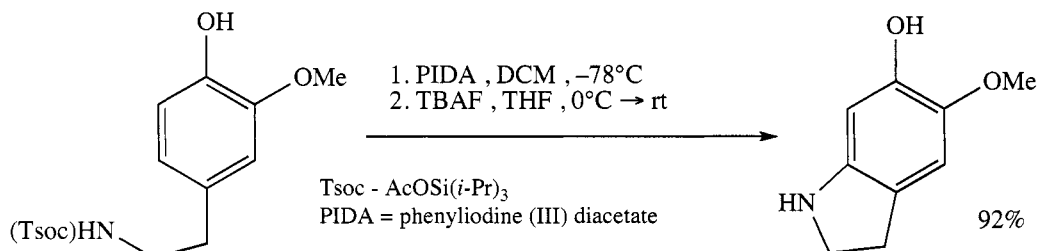
Bianchini, C.; Lee, H.M.; Mantovani, G.; Meli, A.; Oberhauser, W. *New J. Chem.* **2002**, 26, 387.

Related Method: Section 102 (Amines from Ketones)

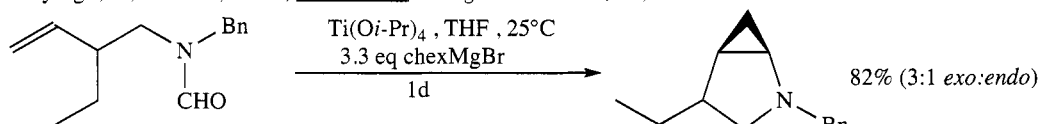
SECTION 95: AMINES FROM ALKYL, METHYLENES, AND ARYL

NO ADDITIONAL EXAMPLES

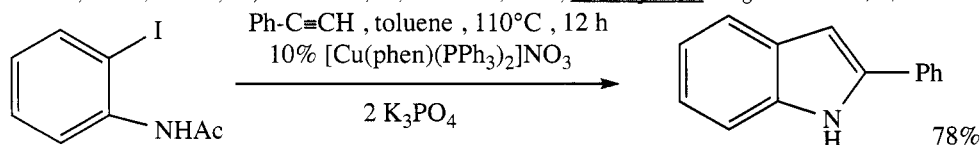
SECTION 96: AMINES FROM AMIDES



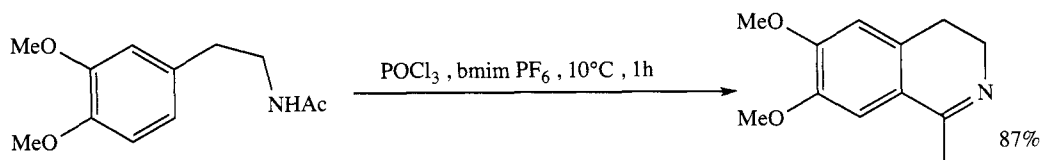
Pouységu, L.; Avellan, A.-V.; Ouideau, S. *J. Org. Chem.* **2002**, 67, 3425.



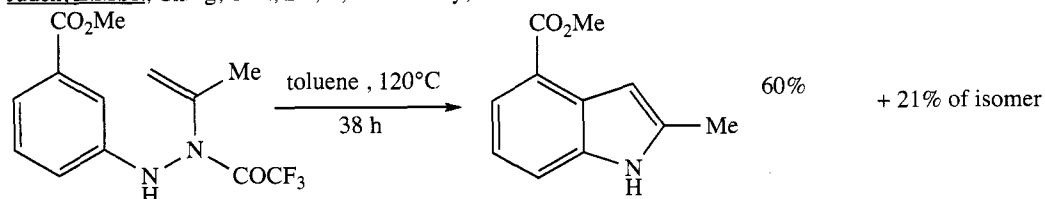
Tebben, G.-D.; Rauch, K.; Stratmann, C.; Williams, C.M.; de Meijere, A. *Org. Lett.* **2003**, 5, 483.



Cacchi, S.; Fabrizi, G.; Parisi, L.M. *Org. Lett.* **2003**, 5, 3843.



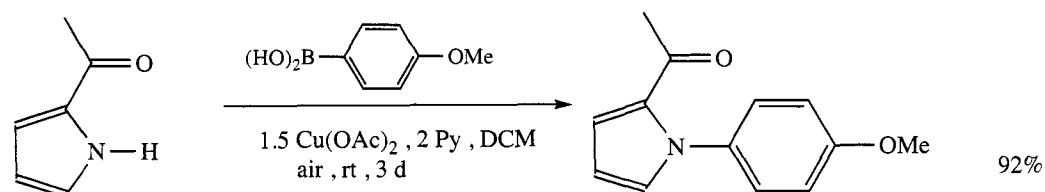
Judeh, Z.M.A.; Ching, C.B.; Bu, J.; McCluskey, A. *Tetrahedron Lett.* **2002**, 43, 5089.



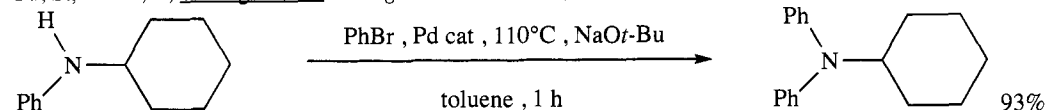
Miyata, O.; Takeda, N.; Naito, T. *Heterocycles* **2002**, 57, 1101.

Related Method: Section 105A (Protection of Amines)

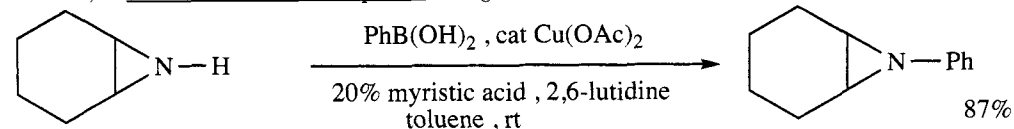
SECTION 97: AMINES FROM AMINES



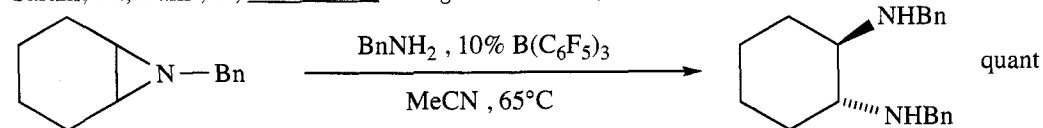
Yu, S.; Saenz, J.; Srirangam, J.K. *J. Org. Chem.* **2002**, 67, 1699.



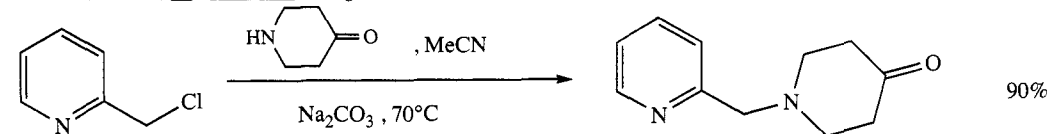
Prashad, M.; Mak, X.Y.; Liu, Y.; Repic, O. *J. Org. Chem.* **2003**, 68, 1163.



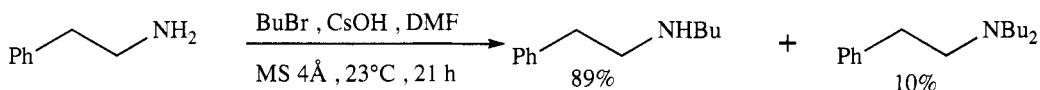
Sasaki, M.; Dalili, S.; Yudin, A.K. *J. Org. Chem.* **2003**, 68, 2045.



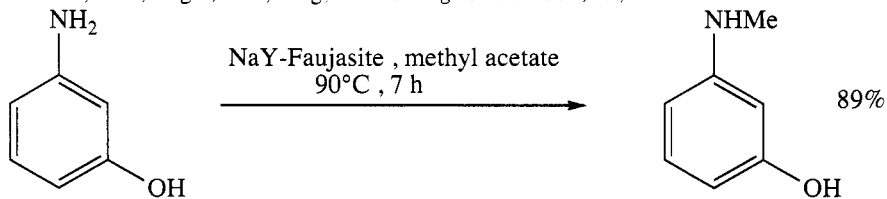
Watson, I.D.G.; Yudin, A.K. *J. Org. Chem.* **2003**, 68, 5160.



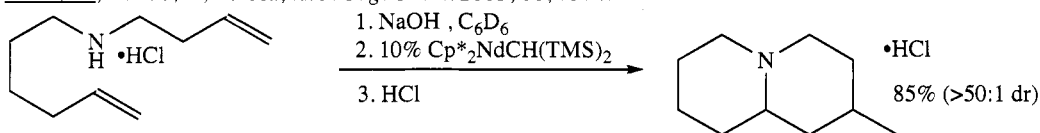
Faul, M.M.; Kobierski, M.E.; Kopach, M.E. *J. Org. Chem.* **2003**, 68, 5739.



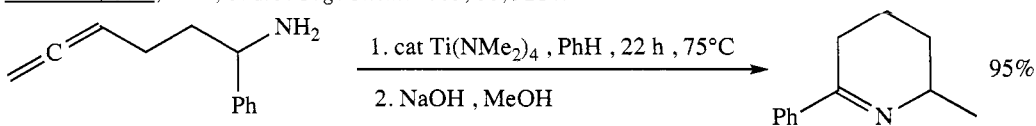
Salvatore, R.N.; Nagle, A.S.; Jung, K.W. *J. Org. Chem.* **2002**, 67, 674.



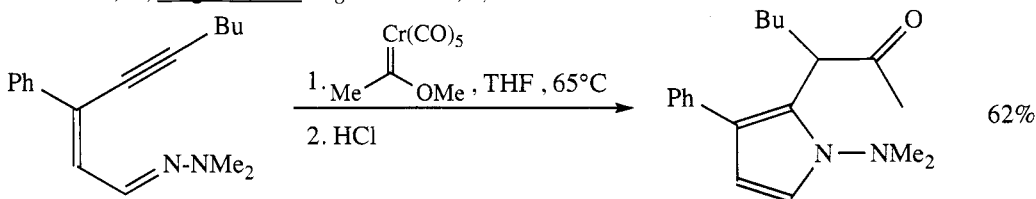
Selva, M.; Tundo, P.; Perosa, A. *J. Org. Chem.* **2003**, 68, 7374.



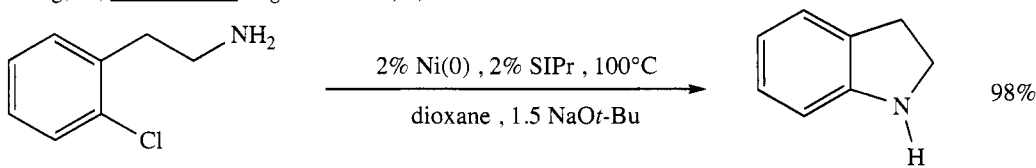
Molander, G.A.; Pack, S.K. *J. Org. Chem.* **2003**, 68, 9214.



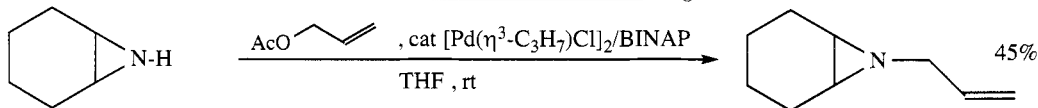
Ackermann, L.; Bergman, R.G. *Org. Lett.* **2002**, 4, 1475.



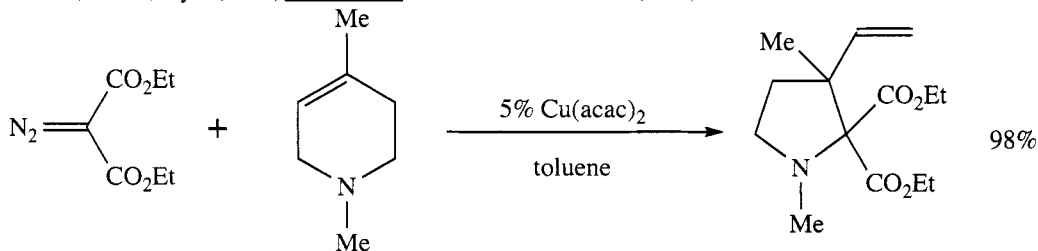
Zhang, Y.; Herdon, J.W. *Org. Lett.* **2003**, 5, 2043.



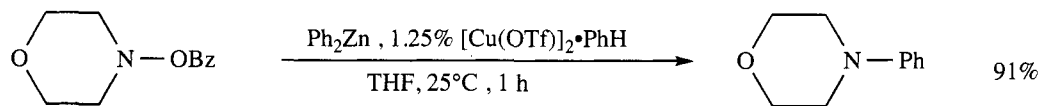
Omar-Amrani, R.; Thomas, A.; Brenner, E.; Schneider, R.; Fort, Y. *Org. Lett.* **2003**, 5, 2311.



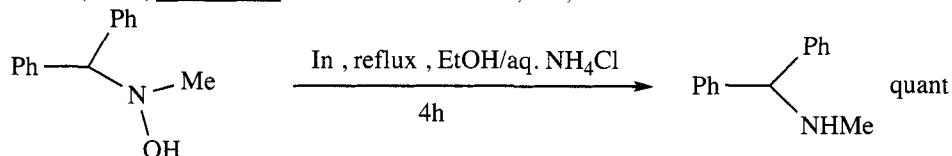
Watson, I.D.G.; Styler, S.A.; Yudin, A.K. *J. Am. Chem. Soc.* **2004**, 126, 5086.



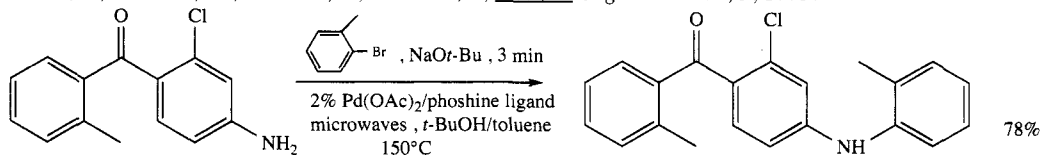
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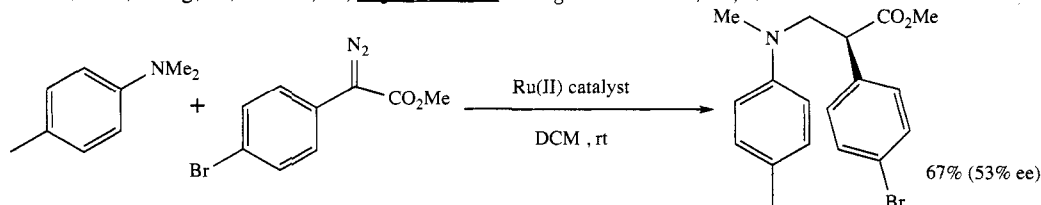
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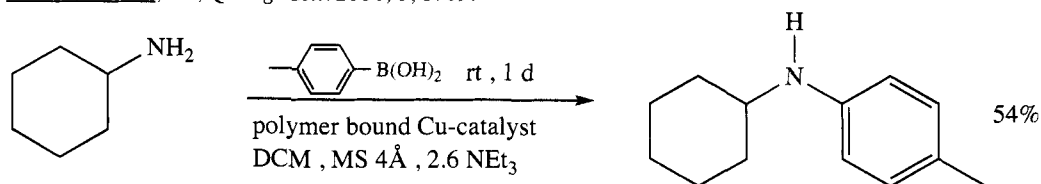
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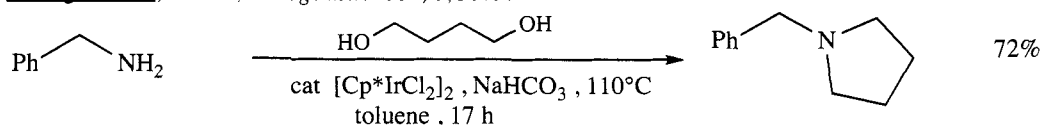
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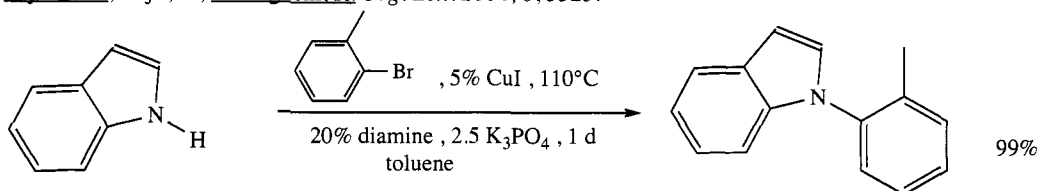
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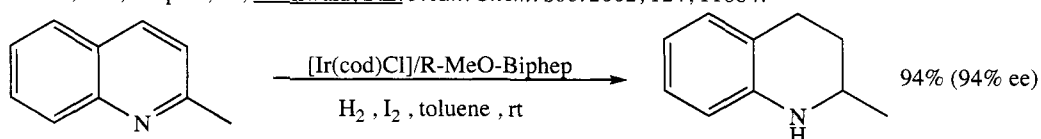
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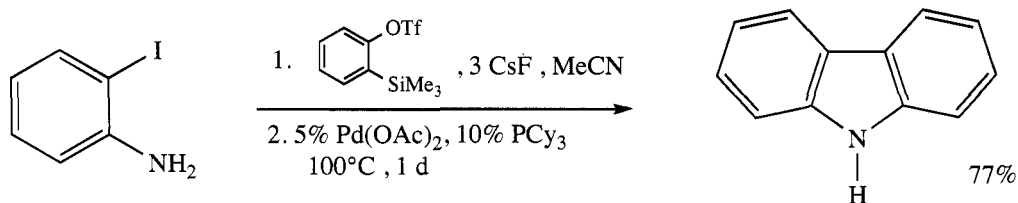
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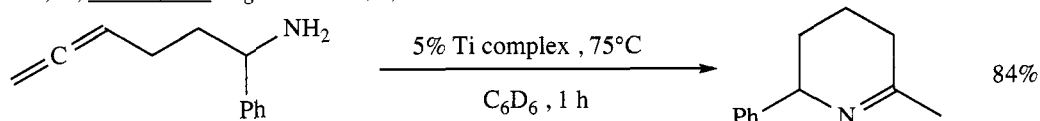
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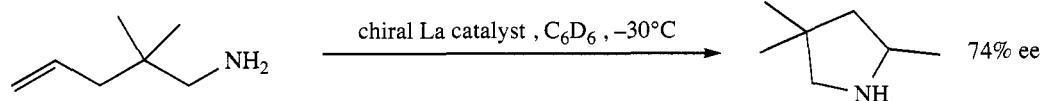
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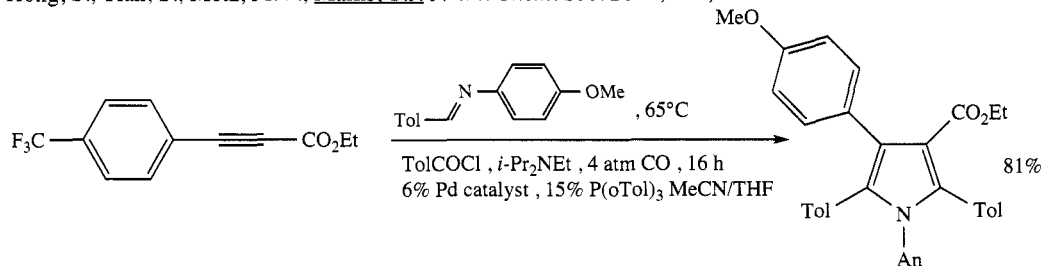
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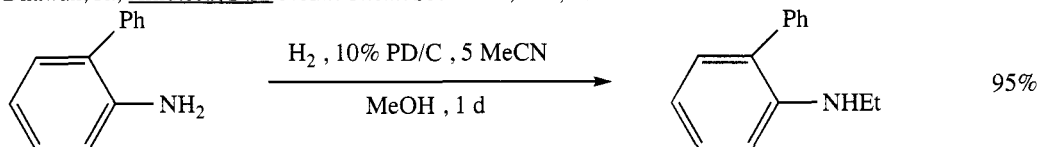
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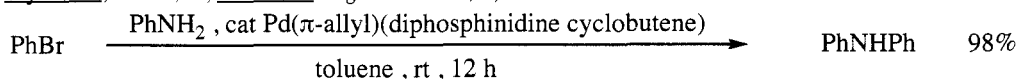
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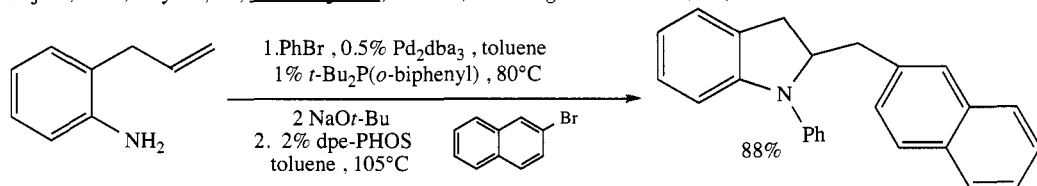
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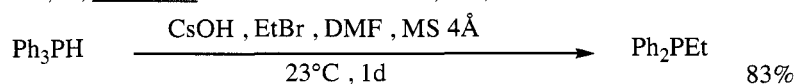
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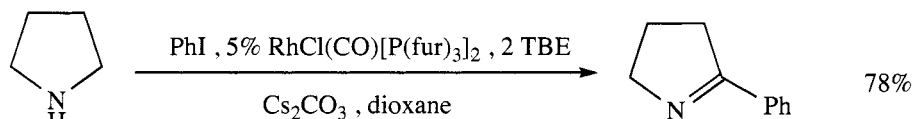
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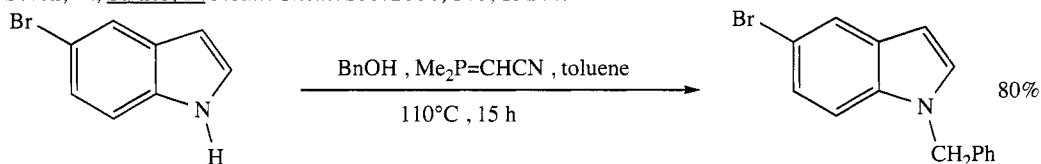
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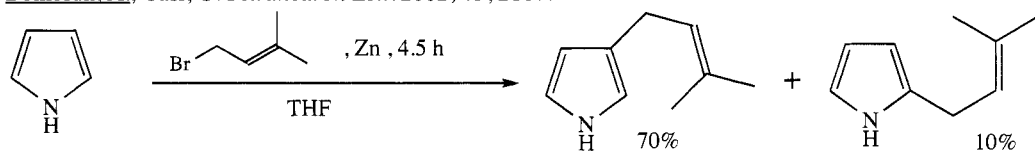
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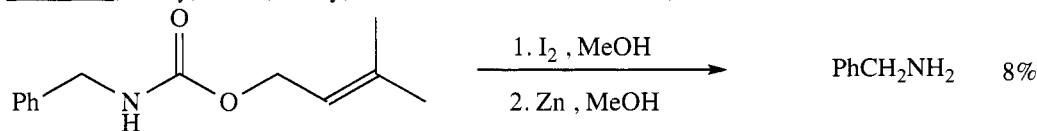
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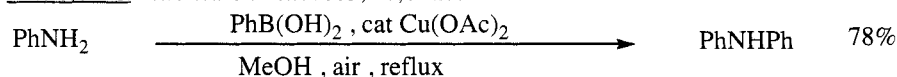
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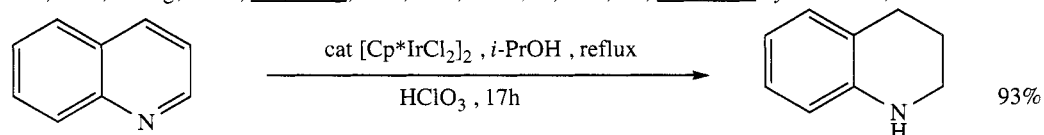
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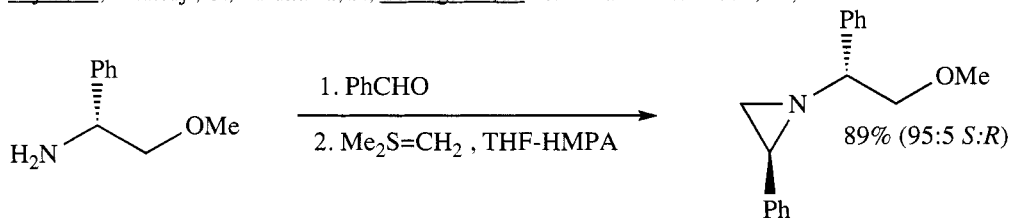
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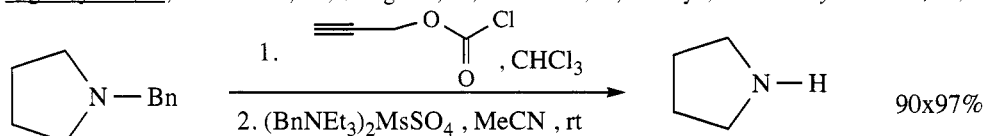
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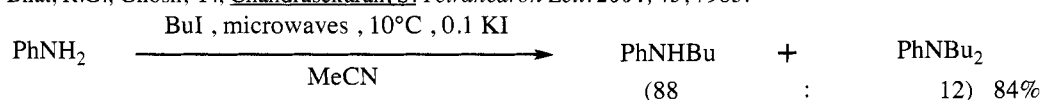
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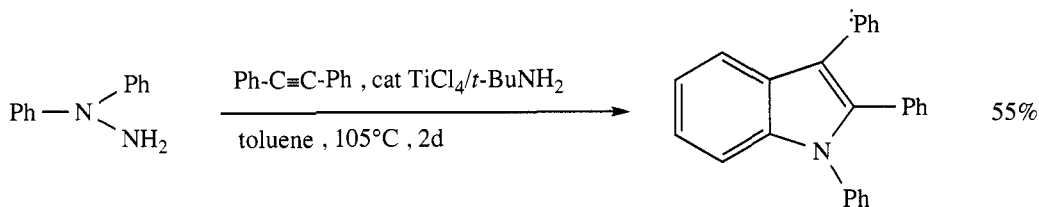
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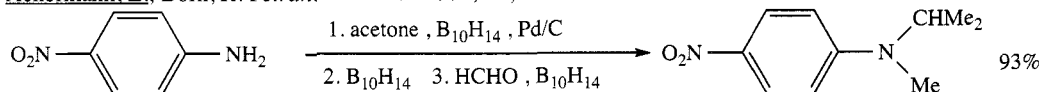
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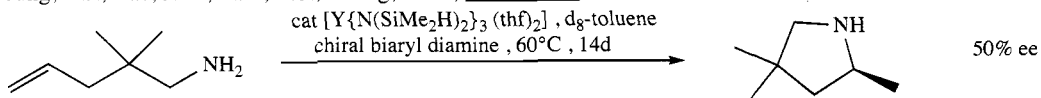
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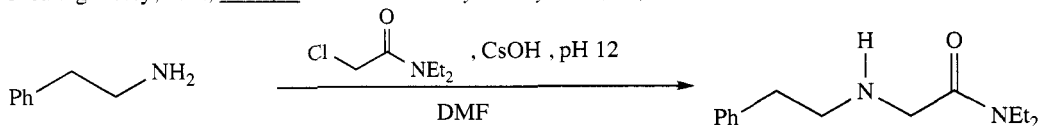
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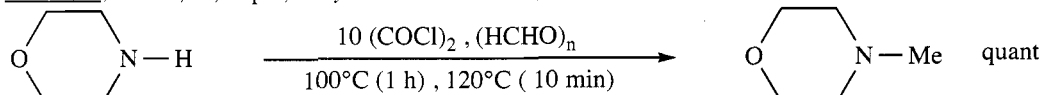
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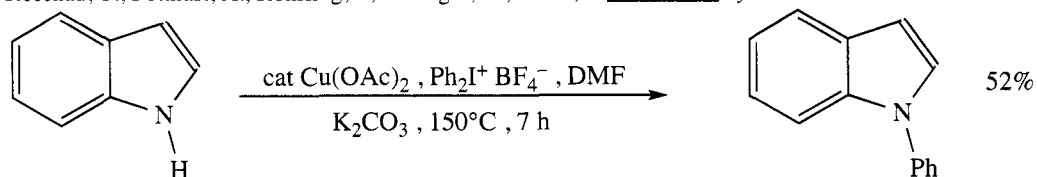
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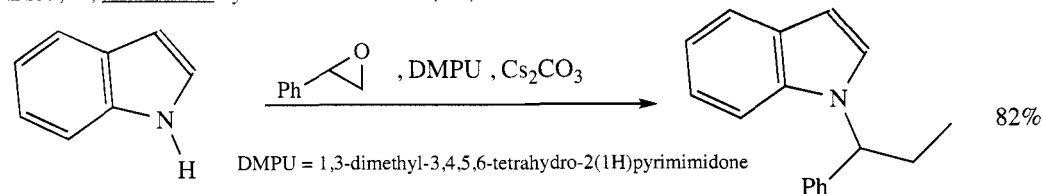
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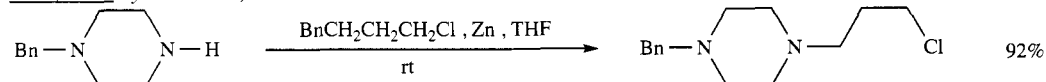
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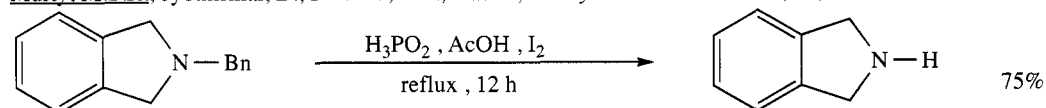
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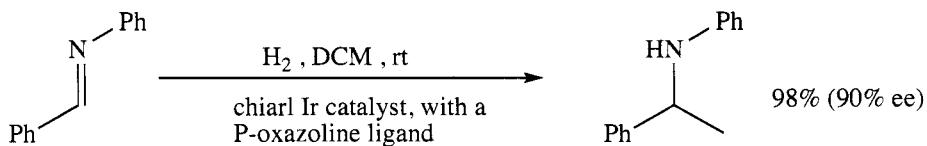
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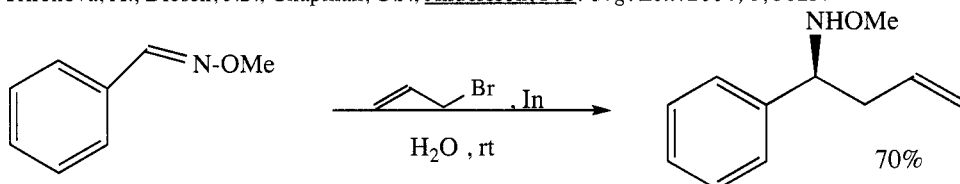
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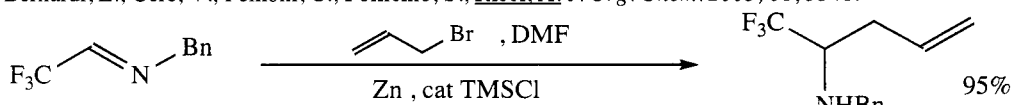
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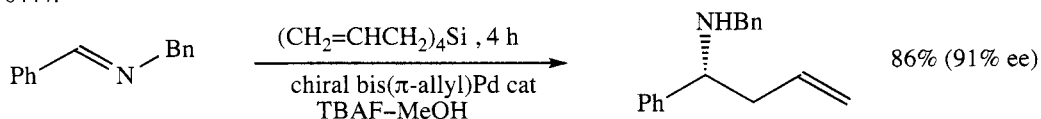
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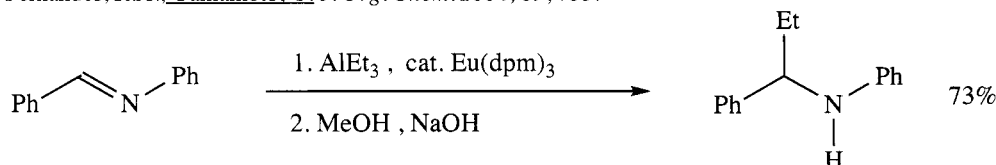
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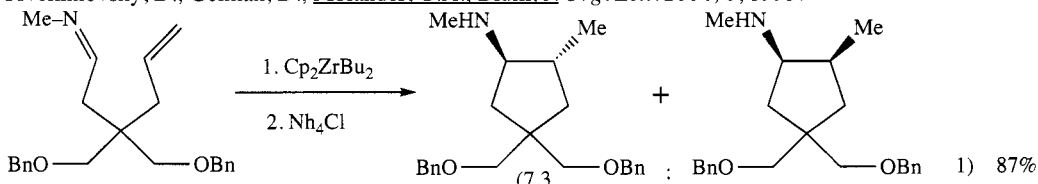
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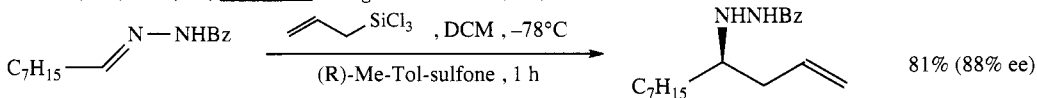
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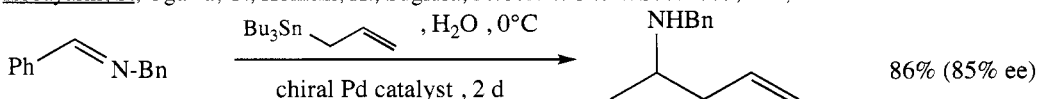
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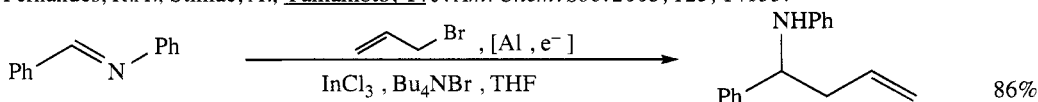
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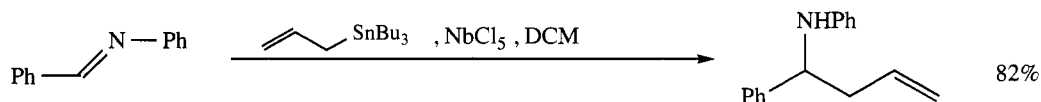
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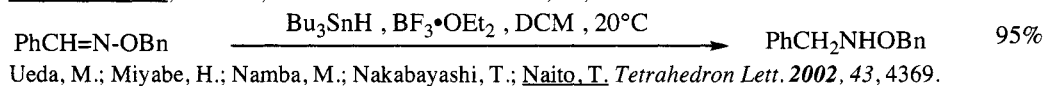
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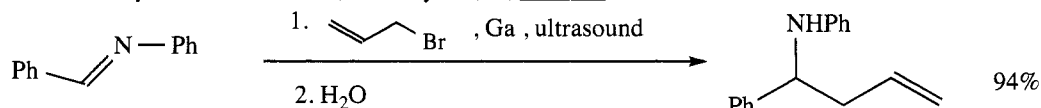
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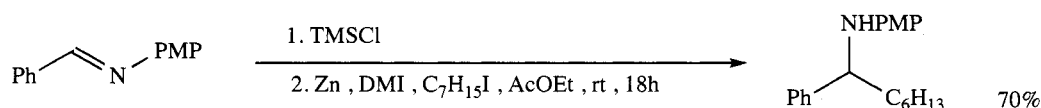
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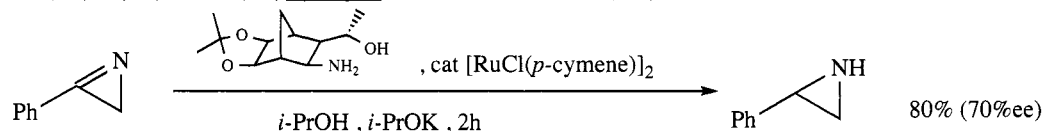
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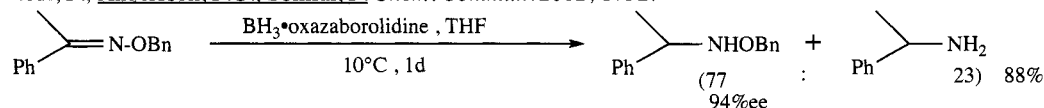
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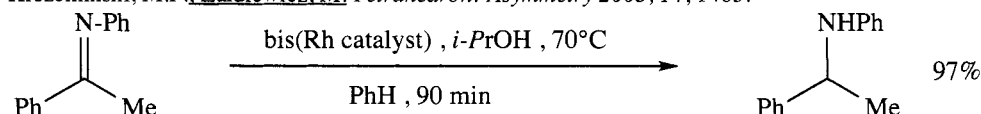
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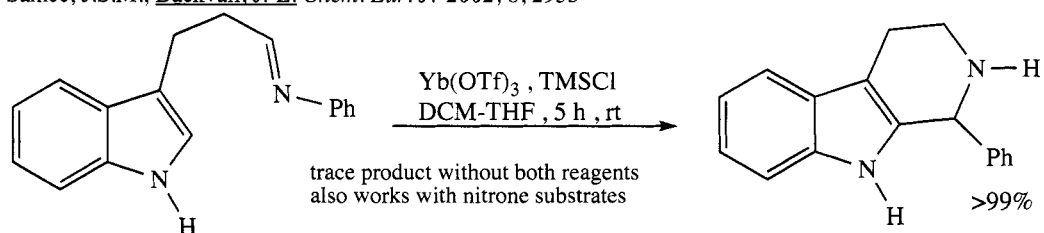
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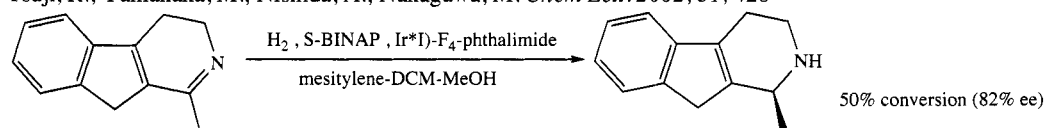
Krezeminshi, M.P.; Zaidlewicz, M. *Tetrahedron: Asymmetry* **2003**, 14, 1463.



Samec, J.S.M.; Bäckvall, J.-E. *Chem. Eur. J.* **2002**, 8, 2955



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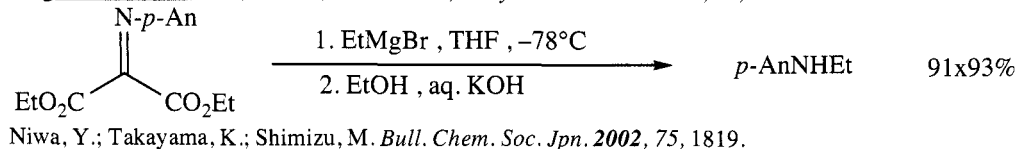
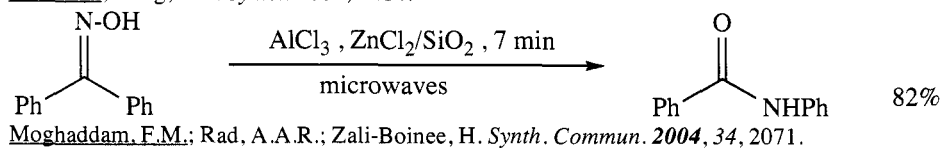
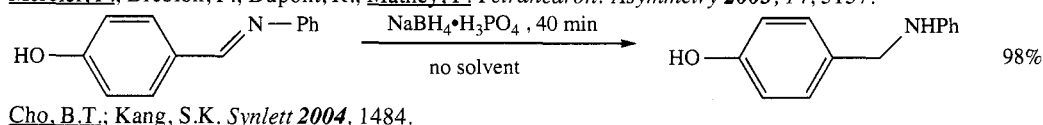
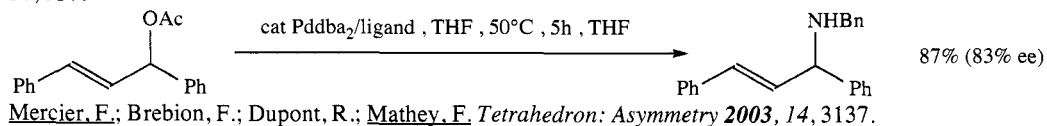
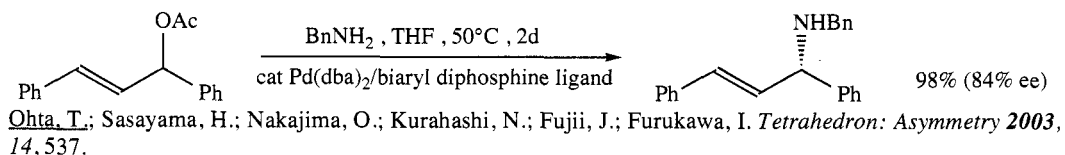
"Nucleophilic Ring Opening of Aziridines"

Hu, X.E. *Tetrahedron* **2004**, 60, 2701.

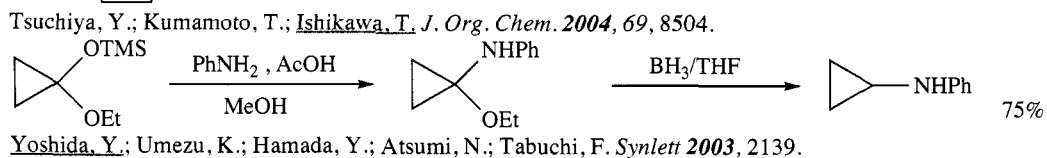
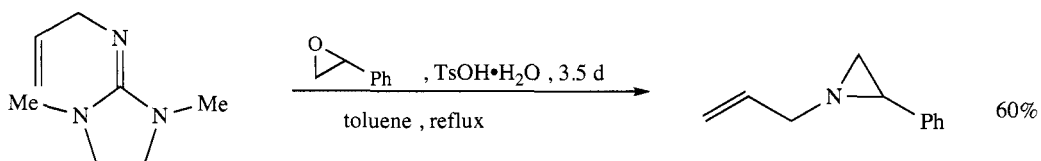
"Chiral Heterocycles by Iminium Ion Cyclization"

Royer, J.; Bonin, M.; Mocouin, L. *Chem. Rev.* **2004**, 104, 2311.

SECTION 98: AMINES FROM ESTERS



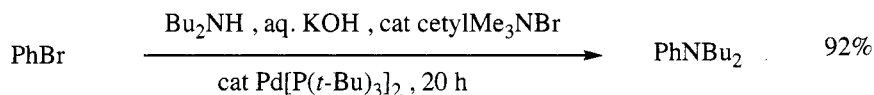
SECTION 99: AMINES FROM ETHERS, EPOXIDES, AND THIOETHERS



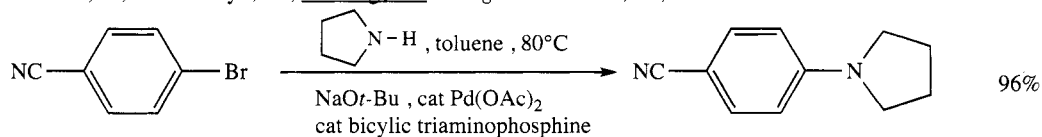


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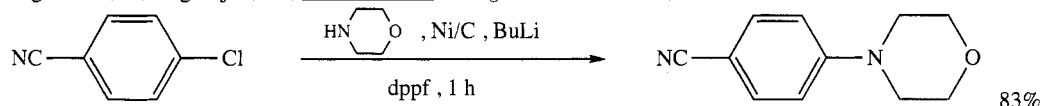
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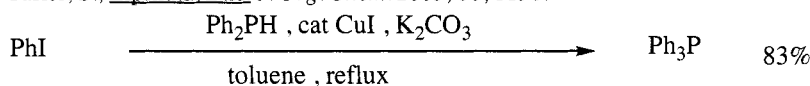
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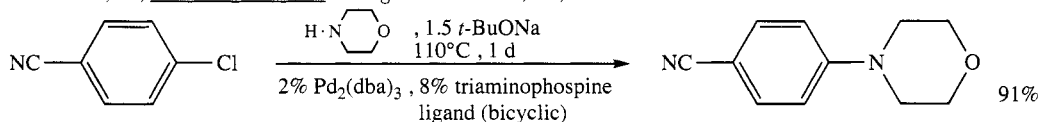
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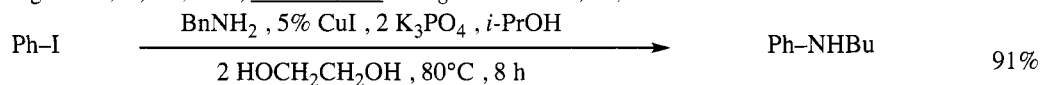
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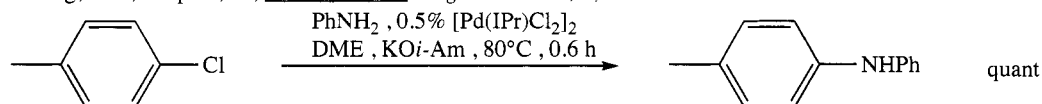
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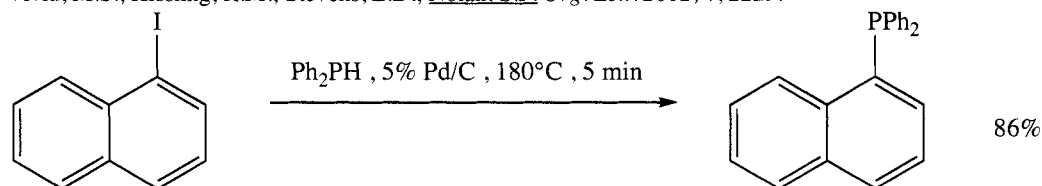
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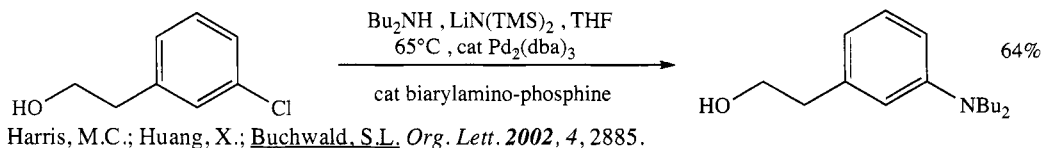
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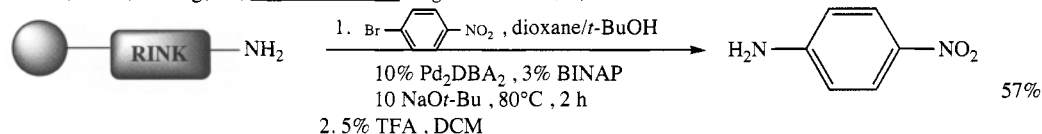
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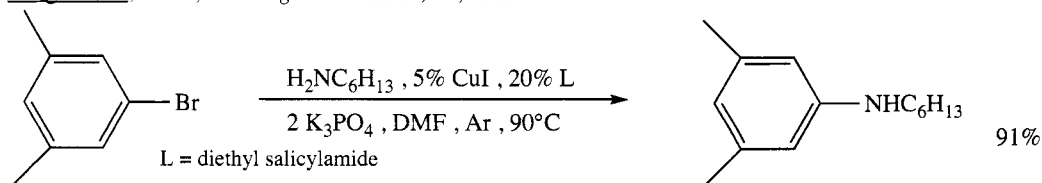
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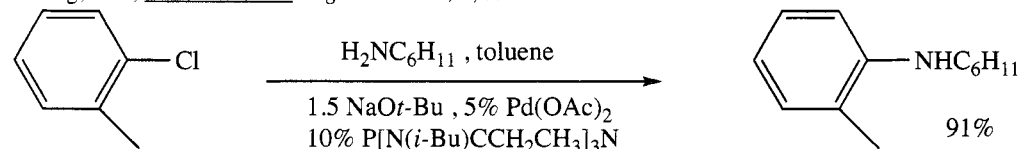
Harris, M.C.; Huang, X.; Buchwald, S.L. *Org. Lett.* **2002**, 4, 2885.



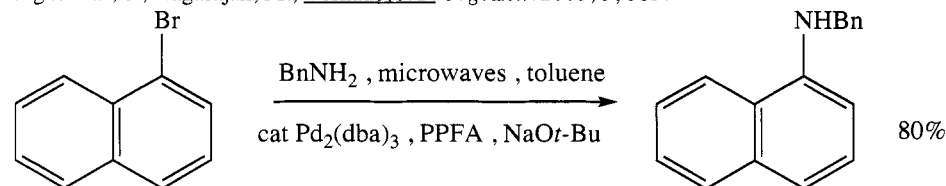
Weigand, K.; Pelka, S. *J. Org. Chem.* **2002**, 67, 4689.



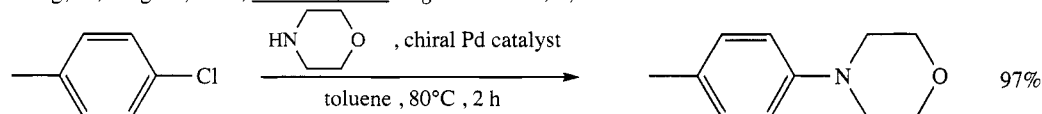
Kwong, F.Y.; Buchwald, S.L. *Org. Lett.* **2003**, 5, 793.



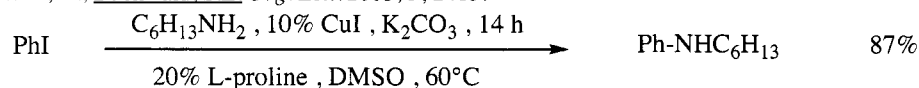
Urgaonkar, S.; Nagarajan, M.; Verkade, J.G. *Org. Lett.* **2003**, 5, 815.



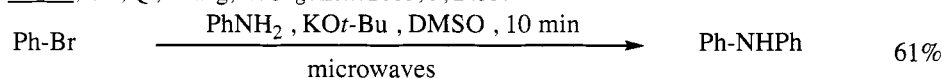
Wang, T.; Magnin, D.R.; Hamann, L.G. *Org. Lett.* **2003**, 5, 897.



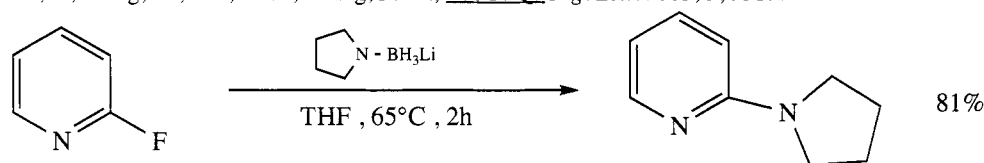
Zim, D.; Buchwald, S.L. *Org. Lett.* **2003**, 5, 2413.



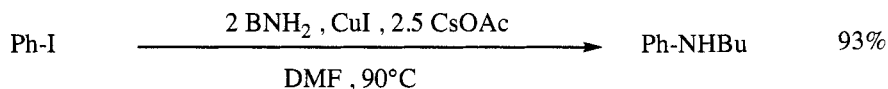
Ma, D.; Cai, Q.; Zhang, H. *Org. Lett.* **2003**, 5, 2453.



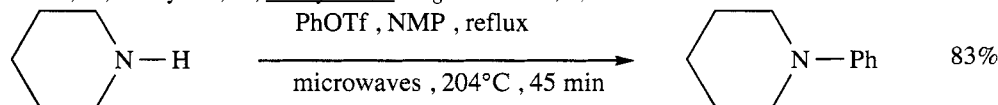
Shi, L.; Wang, M.; Fan, C.-A.; Zhang, F.-M.; Tu, Y.-Q. *Org. Lett.* **2003**, 5, 3515.



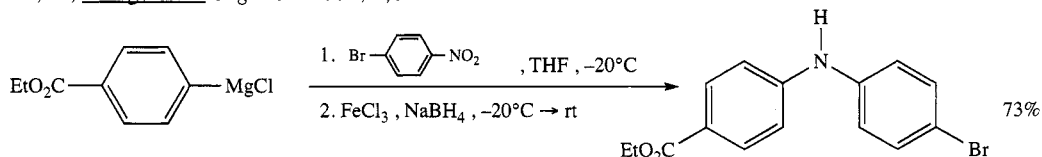
Thomas, S.; Roberts, S.; Pasumaansky, L.; Gamsey, S.; Singaram, B. *Org. Lett.* **2003**, 5, 3867.



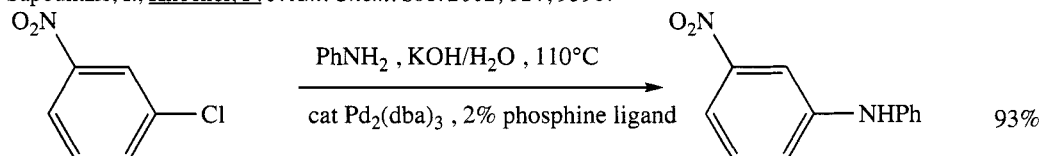
Okano, K.; Tokuyama, H.; Fukuyama, T. *Org. Lett.* **2003**, 5, 4987.



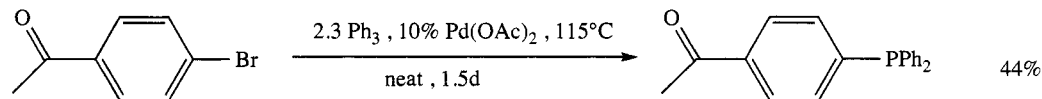
Xu, G.; Wang, Y.-G. *Org. Lett.* **2004**, 6, 985.



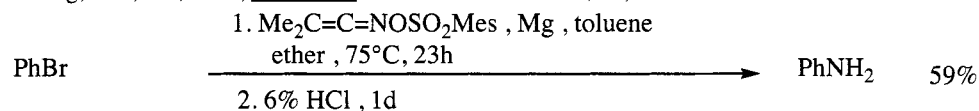
Sapountzis, I.; Knochel, P. *J. Am. Chem. Soc.* **2002**, 124, 9390.



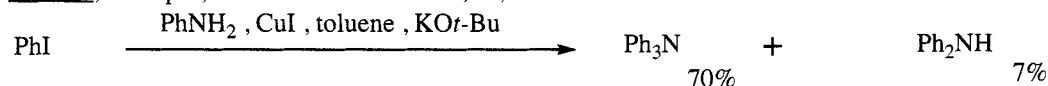
Huang, X.; Anderson, K.W.; Zim, D.; Jiang, L.; Klepars, A.; Buchwald, S.L. *J. Am. Chem. Soc.* **2003**, 125, 6653.



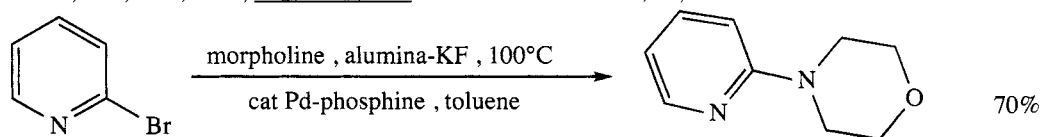
Kwong, F.Y.; Lai, C.W.; Chan, K.S. *Tetrahedron Lett.* **2002**, 43, 3537.



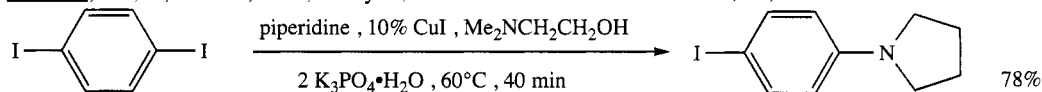
Erdik, E.; Daskapan, T. *Tetrahedron Lett.* **2002**, 43, 6237.



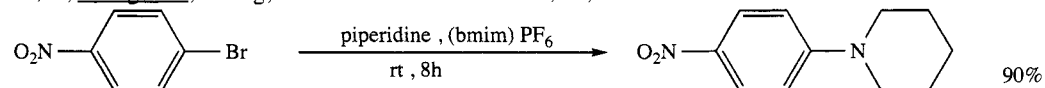
Kelkar, A.A.; Patil, N.M.; Chaudhari, R.V. *Tetrahedron Lett.* **2002**, 43, 7143.



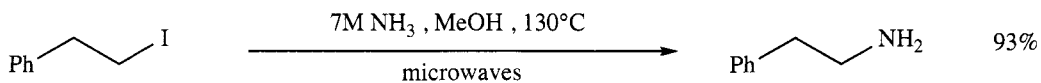
Basu, B.; Jha, S.; Mridha, N.K.; Bhuiyan, Md.M.H. *Tetrahedron Lett.* **2002**, 43, 7967.



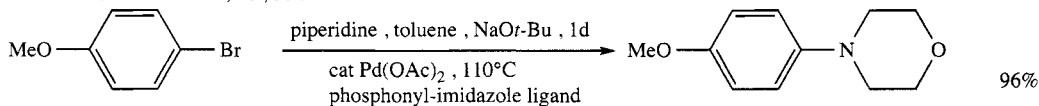
Lu, Z.; Twieg, R.J.; Huang, S.D. *Tetrahedron Lett.* **2003**, 44, 6289.



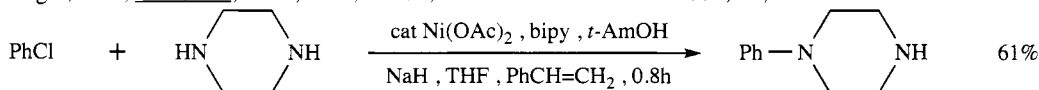
Yadav, J.S.; Reddy, B.V.S.; Basak, A.K.; Narsaiah, A.V. *Tetrahedron Lett.* **2003**, 44, 2217.



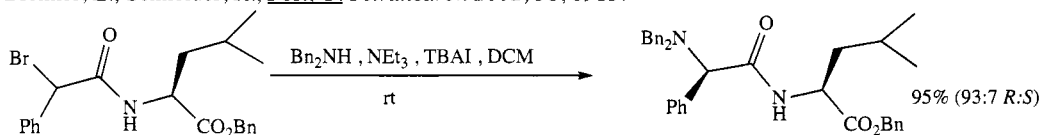
Saulnier, M.G.; Zimmermann, K.; Struzynski, C.P.; Sang, X.; Velaparthi, U.; Wittman, M.; Frennesson, D.B. *Tetrahedron Lett.* **2004**, *45*, 397.



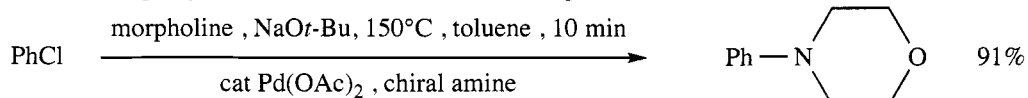
Singer, R.A.; Tom, N.J.; Frost, H.N.; Simon, W.M. *Tetrahedron Lett.* **2004**, *45*, 4715.



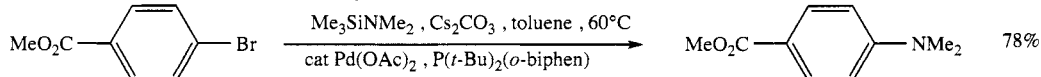
Brenner, E.; Schneider, R.; Fort, Y. *Tetrahedron* **2002**, *58*, 6913.



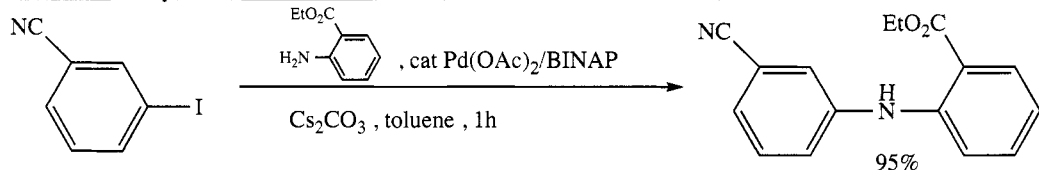
Nam, J.; Chang, J.-y.; Shin, E.-k.; Kim, H.J.; Kim, Y.; Jang, S.; Park, Y.S. *Tetrahedron* **2004**, *60*, 6311.



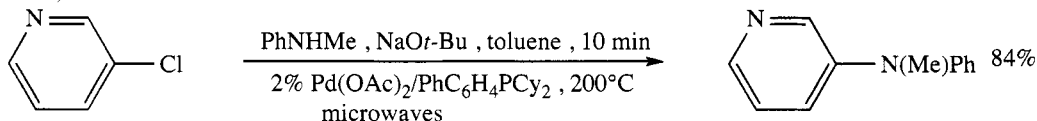
Maes, B.U.W.; Loones, K.T.J.; Hustyn, S.; Diels, G.; Rombouts, G. *Tetrahedron* **2004**, *60*, 11559.



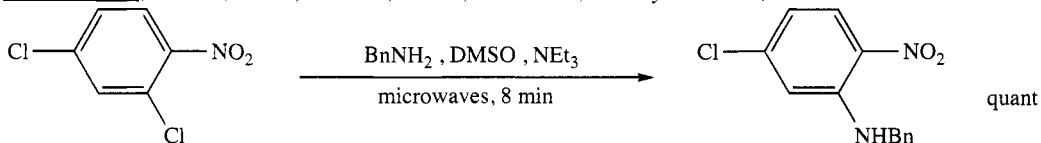
Smith, C.J.; Farly, T.R.; Holmes, A.B.; Shute, R.E. *Chem. Commun.* **2004**, 1976.



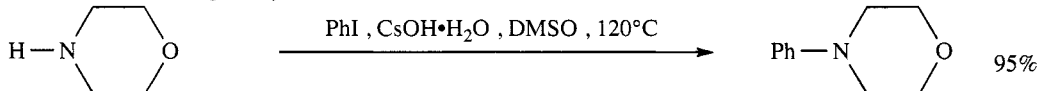
Maes, B.U.W.; Loones, K.T.J.; Jonckers, T.H.M.; Lemièrre, G.L.F.; Dommissie, R.A.; Haemers, A. *Synlett* **2002**, 1995.



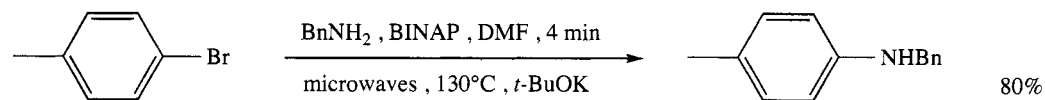
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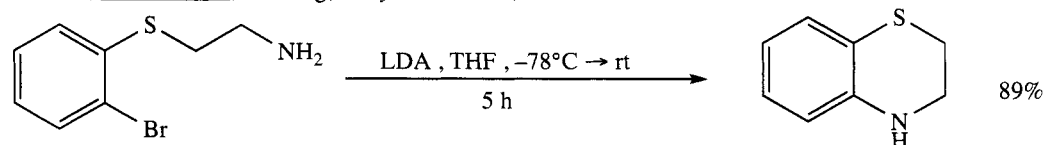
Li, W.; Yun, L.; Wang, H. *Synth. Commun.* **2002**, *32*, 2657.



Varala, R.; Ramu, E.; Alam, M.M.; Adapa, S.R. *Synlett* **2004**, 1747.

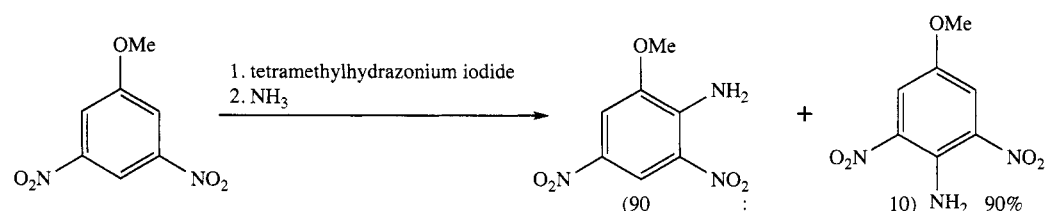


Wan, Y.; Alterman, M.; Hallberg, A. *Synthesis* **2002**, 1597.

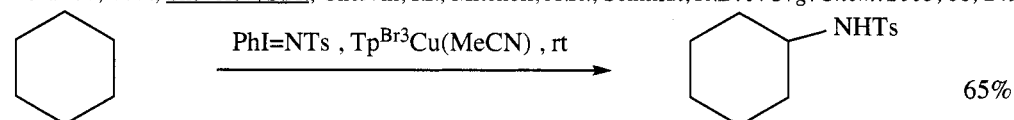


Mukherjee, C.; Biehl, E. *Heterocycles* **2004**, 63, 2309.

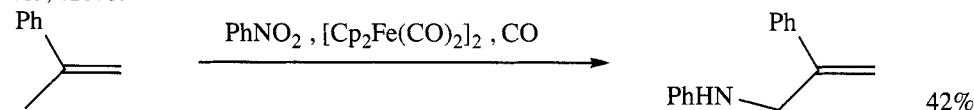
SECTION 101: AMINES FROM HYDRIDES



Rozhkov, V.V.; Shevelev, S.A.; Chervin, I.I.; Mitchell, A.R.; Schmidt, R.D. *J. Org. Chem.* **2003**, 68, 2498.

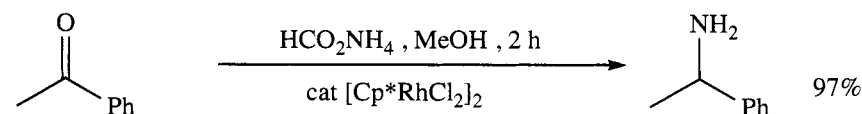


Díaz-Requejo, M.M.; Belderráin, T.R.; Nicasio, M.C.; Trofimenko, S.; Pérez, P.J. *J. Am. Chem. Soc.* **2003**, 125, 12078.

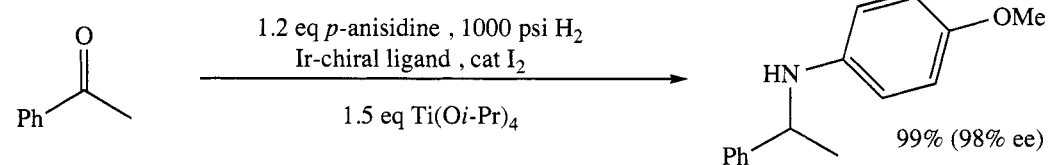


Srivastava, R.S.; Kolel-Veetil, M.; Nicholas, K.M. *Tetrahedron Lett.* **2002**, 43, 931.

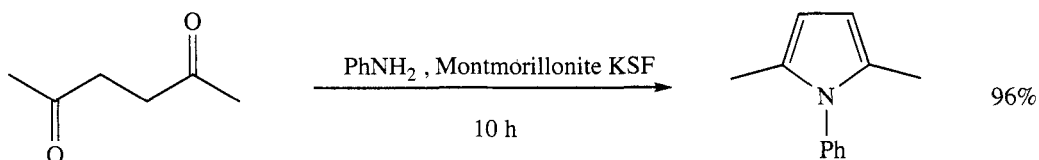
SECTION 102: AMINES FROM KETONES



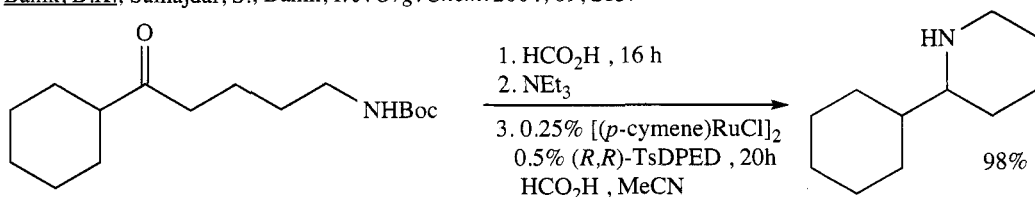
Kitamura, M.; Lee, D.; Hayashi, S.; Tanaka, S.; Yoshimura, M. *J. Org. Chem.* **2002**, 67, 8685.



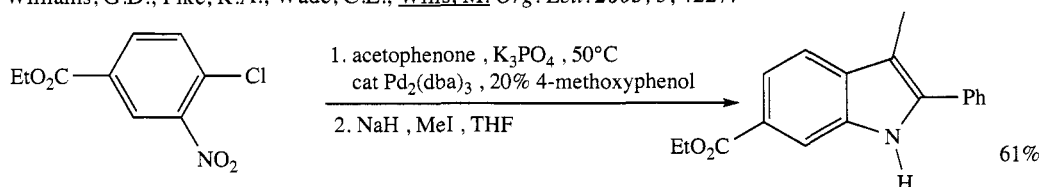
Chi, Y.; Zhou, Y.-G.; Zhang, X. *J. Org. Chem.* **2003**, 68, 4120.



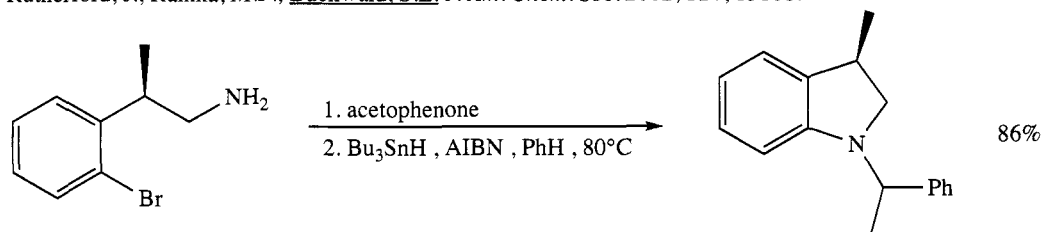
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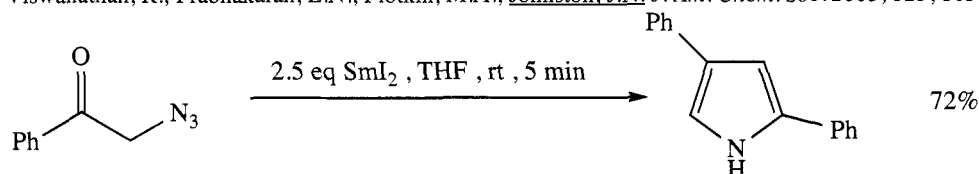
Williams, G.D.; Pike, R.A.; Wade, C.E.; Wills, M. *Org. Lett.* **2003**, 5, 4227.



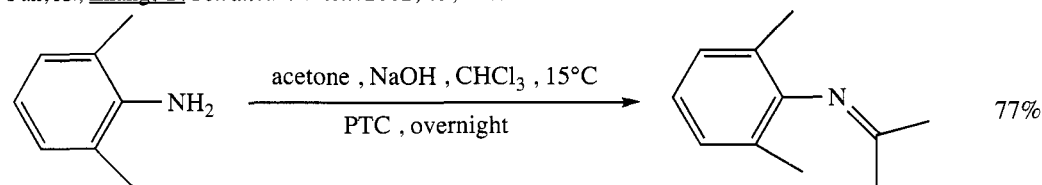
Rutherford, J.; Rainka, M.P.; Buchwald, S.L. *J. Am. Chem. Soc.* **2002**, 124, 15168.



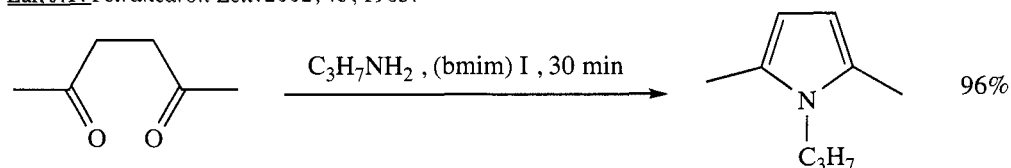
Viswanathan, R.; Prabhakaran, E.N.; Plotkin, M.A.; Johnston, J.N. *J. Am. Chem. Soc.* **2003**, 125, 163.



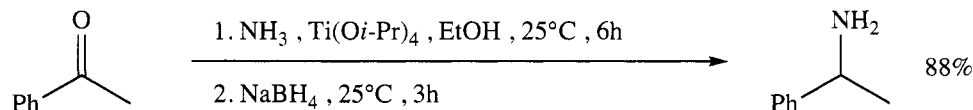
Fan, X.; Zhang, Y. *Tetrahedron Lett.* **2002**, 43, 1863.



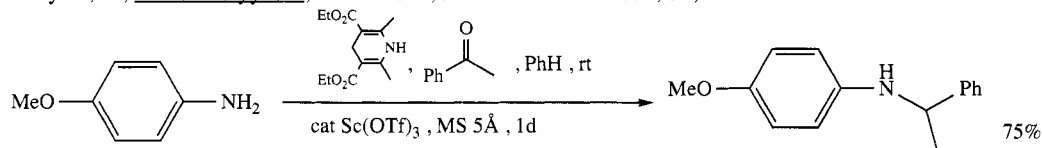
Lai, J.T. *Tetrahedron Lett.* **2002**, 43, 1965.



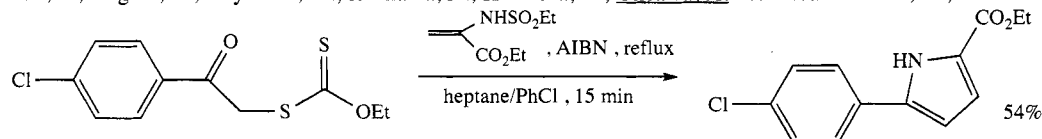
Wang, B.; Gu, Y.; Luo, C.; Yang, T.; Yang, L.; Suo, J. *Tetrahedron Lett.* **2004**, 45, 3417.



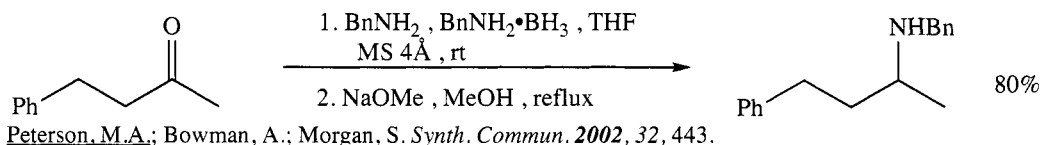
Miriyala, B.; Bhattacharyya, S.; Williamson, J.S. *Tetrahedron* **2004**, 60, 1463.



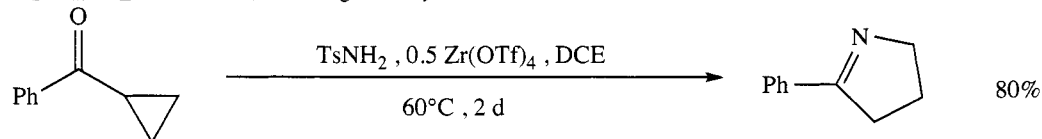
Itoh, T.; Nagata, K.; Miyazaki, M.; Ishikawa, H.; Kurihara, A.; Ohsawa, A. *Tetrahedron* **2004**, 60, 6649.



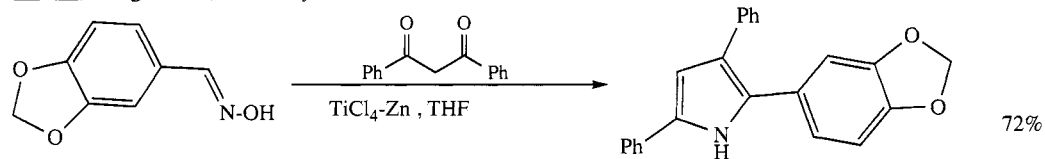
Quiclet-Sire, B.; Wendeborn, F.; Zard, S.Z. *Chem. Commun.* **2002**, 2214.



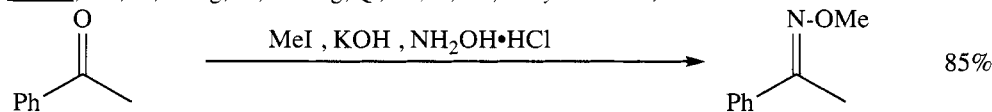
Peterson, M.A.; Bowman, A.; Morgan, S. *Synth. Commun.* **2002**, 32, 443.



Shi, M.; Yang, Y.-H.; Xu, B. *Synlett* **2004**, 1622.



Shi, D.; Shi, C.; Wang, X.; Zhuang, Q.; Tu, S.; Hu, H. *Synlett* **2004**, 2239.



Li, C.; Zhang, H.; Cui, Y.; Zhang, S.; Zhao, Z.; Choi, M.C.K.; Chan, A.S.C. *Synth. Commun.* **2003**, 33, 543.

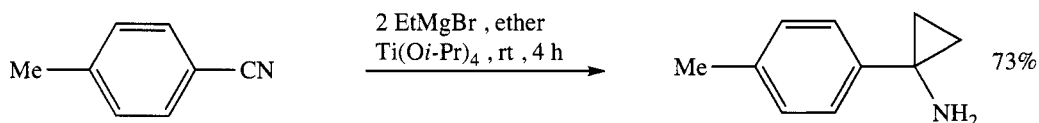
REVIEW:

“Homogeneous Rhodium(I)-Catalyzed Reductive Aminations”

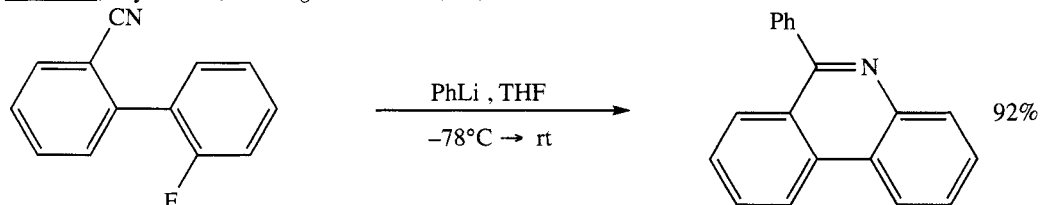
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Related Method: Section 94 (Amines from Aldehydes)

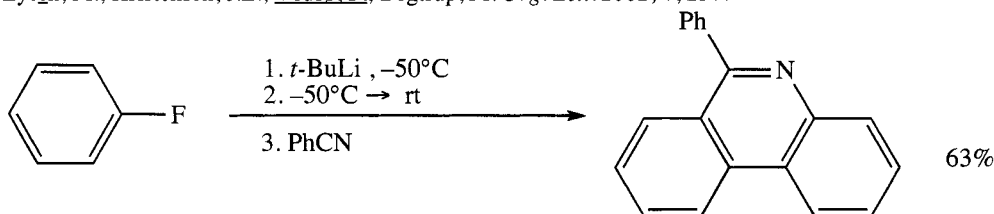
SECTION 103: AMINES FROM NITRILES



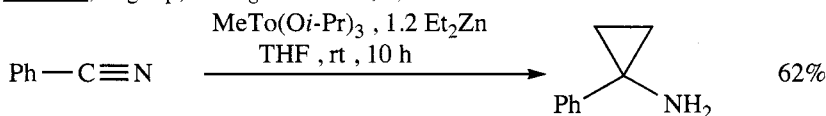
Bertus, P.; Szymoniak, J. *J. Org. Chem.* **2003**, 68, 7133.



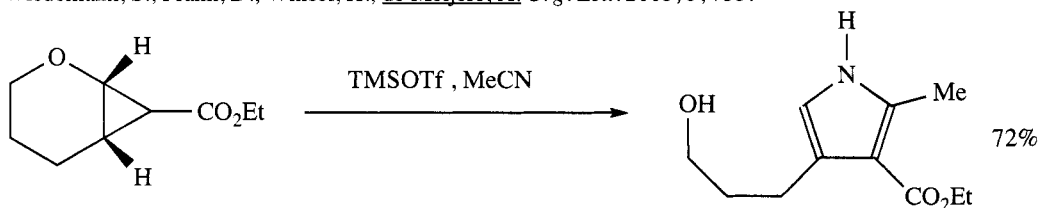
Lysén, M.; Kristensen, J.L.; Vedsø, P.; Begtrup, M. *Org. Lett.* **2002**, 4, 257.



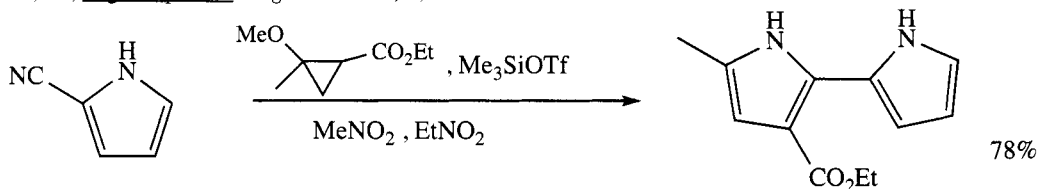
Pawla, J.; Begtrup, M. *Org. Lett.* **2002**, 4, 2687.



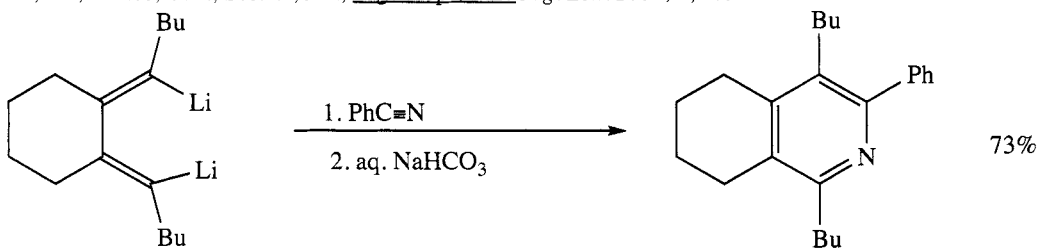
Wiedemann, S.; Frank, D.; Winsel, H.; de Meijere, A. *Org. Lett.* **2003**, 5, 753.



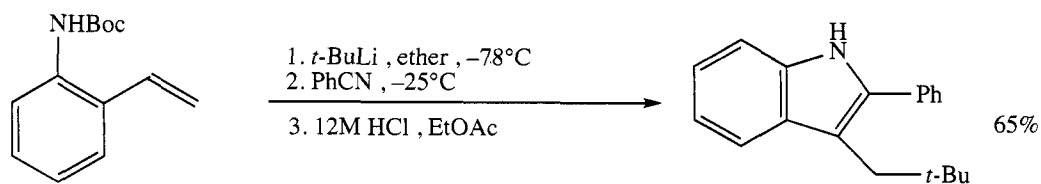
Yu, M.; Pagenkopf, B.L. *Org. Lett.* **2003**, 5, 5099.



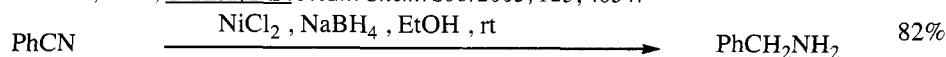
Yu, M.; Pantos, G.D.; Sessler, J.L.; Pagenkopf, B.L. *Org. Lett.* **2004**, 6, 1057.



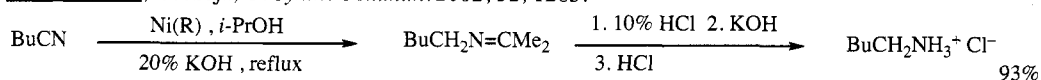
Chen, J.; Song, Q.; Wang, C.; Xi, Z. *J. Am. Chem. Soc.* **2002**, 124, 6228.



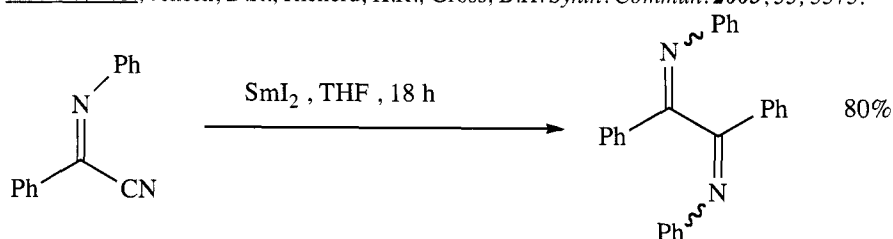
Coleman, C.M.; O'Shea, D.F. *J. Am. Chem. Soc.* **2003**, *125*, 4054.



Khurana, J.M.; Kukreja, G. *Synth. Commun.* **2002**, *32*, 1265.

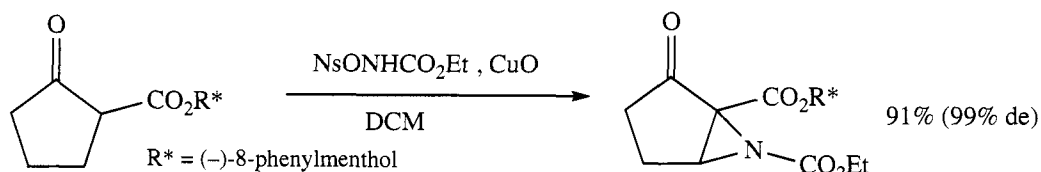


Mebane, R.C.; Jensen, D.R.; Rickerd, K.R.; Gross, B.H. *Synth. Commun.* **2003**, *33*, 3373.

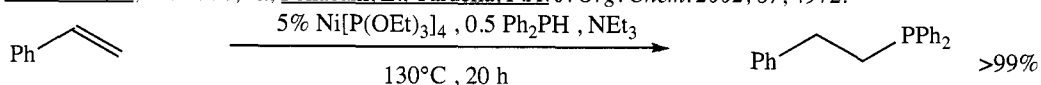


Thakur, A.J.; Prajapati, D.; Sandhu, J.S. *Chem. Lett.* **2004**, *33*, 102.

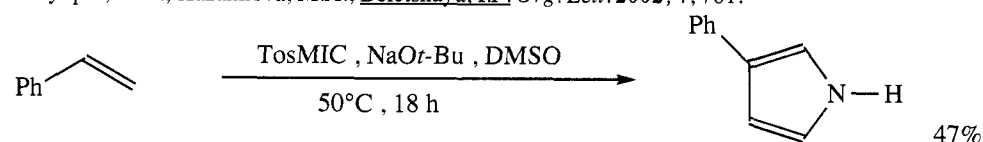
SECTION 104: AMINES FROM ALKENES



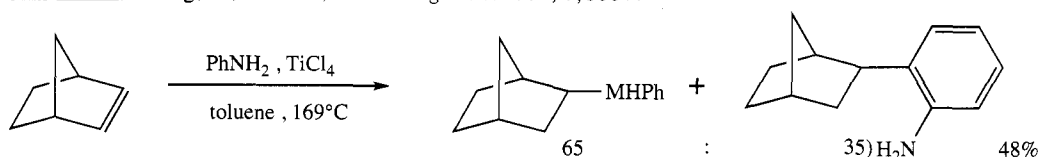
Fioravanti, S.; Morreale, A.; Pellacani, L.; Tardella, P.A. *J. Org. Chem.* **2002**, *67*, 4972.



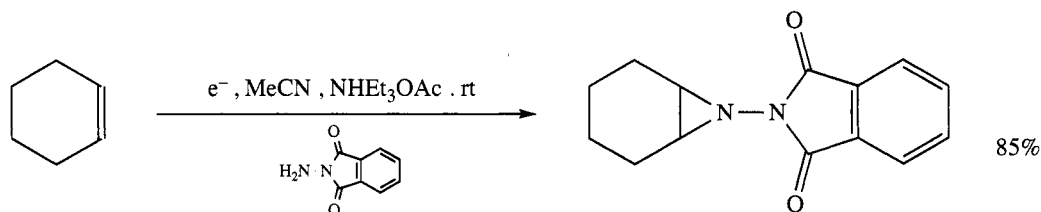
Shulyupin, M.O.; Kazankova, M.A.; Beletskaya, I.P. *Org. Lett.* **2002**, *4*, 761.



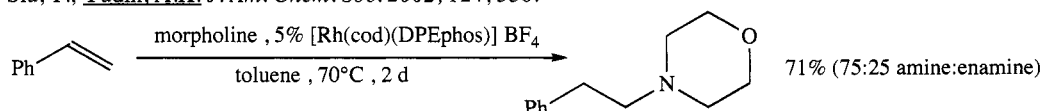
Smith, N.D.; Huang, D.; Cosford, B.D.P. *Org. Lett.* **2002**, *4*, 3537.



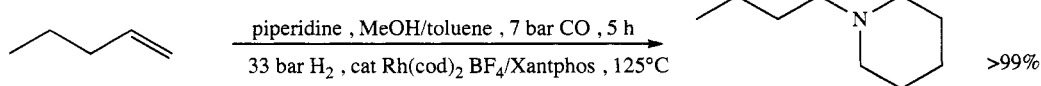
Ackermann, L.; Kaspar, L.T.; Gschrei, C.J. *Org. Lett.* **2004**, *6*, 2575.



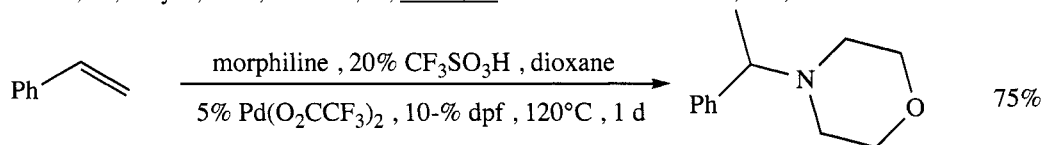
Siu, T.; Yudin, A.K. *J. Am. Chem. Soc.* **2002**, *124*, 530.



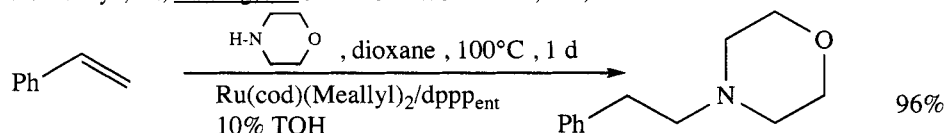
Utsunomiya, M.; Kuwano, R.; Kawatsura, M.; Hartwig, J.F. *J. Am. Chem. Soc.* **2003**, *125*, 5608.



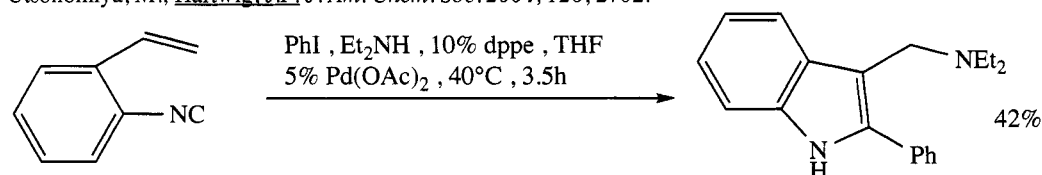
Ahmed, M.; Seayad, A.M.; Jackstell, R.; Beller, M. *J. Am. Chem. Soc.* **2003**, *125*, 10311.



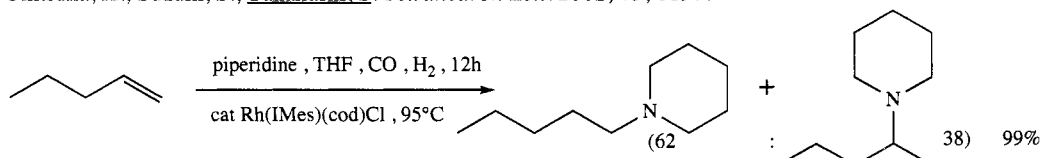
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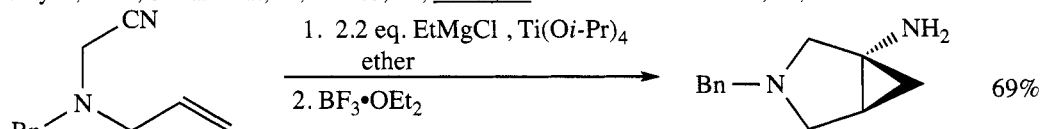
Utsunomiya, M.; Hartwig, J.F. *J. Am. Chem. Soc.* **2004**, *126*, 2702.



Onitsuka, K.; Suzuki, S.; Takahashi, S. *Tetrahedron Lett.* **2002**, *43*, 6197.

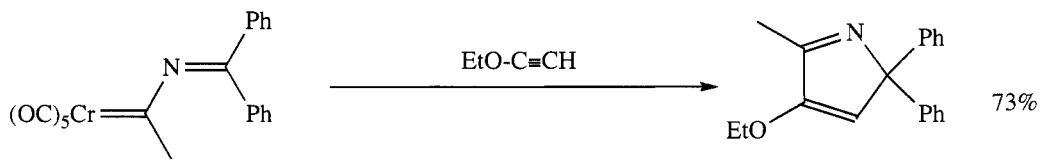


Seayad, A.M.; Selvakumar, K.; Ahmed, M.; Beller, M. *Tetrahedron Lett.* **2003**, *44*, 1679.

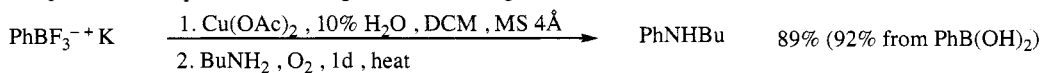


Laroche, C.; Bertus, P.; Szymoniak, J. *Tetrahedron Lett.* **2003**, *44*, 2485.

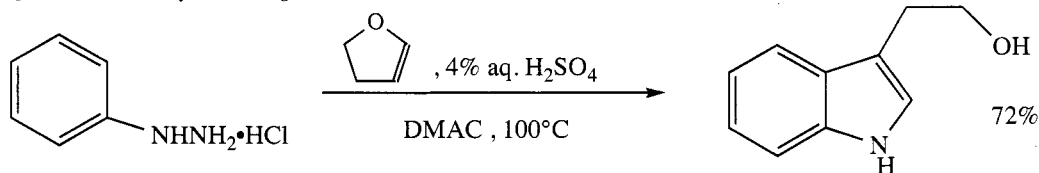
SECTION 105: AMINES FROM MISCELLANEOUS COMPOUNDS



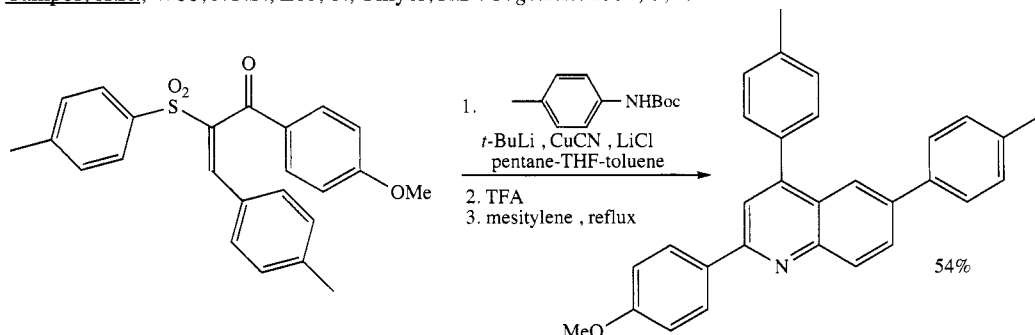
Campos, P.J.; Sampedro, D.; Rodríguez, M.A. *J. Org. Chem.* **2003**, 68, 4674.



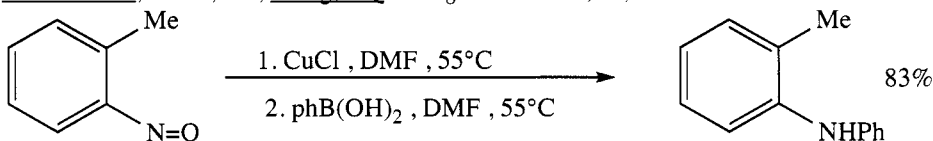
Quach, T.D.; Batey, R.A. *Org. Lett.* **2003**, 5, 4397.



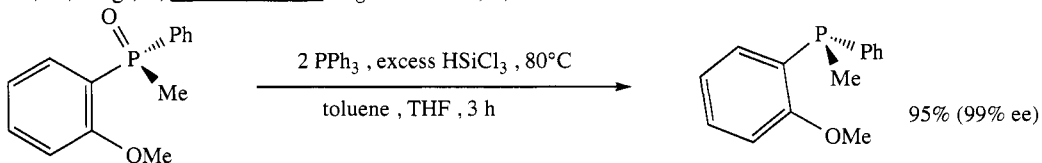
Campos, K.R.; Woo, J.C.S.; Lee, S.; Tillyer, R.D. *Org. Lett.* **2004**, 6, 79.



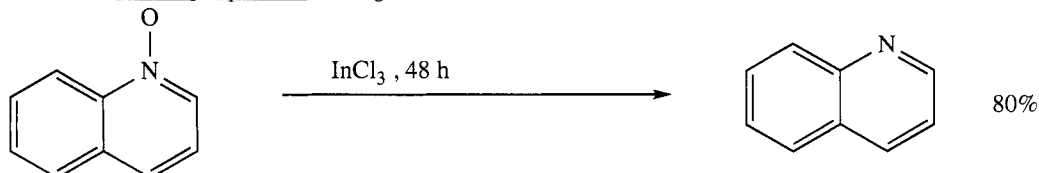
Swenson R.E.; Sowin, T.J.; Zhang, H.Q. *J. Org. Chem.* **2002**, 67, 9182.



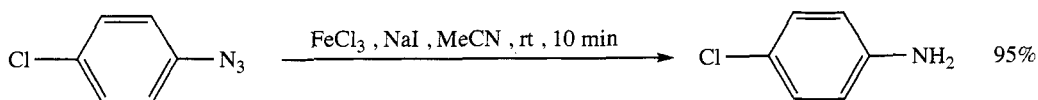
Yu, Y.; Srogl, J.; Liebeskind, L.S. *Org. Lett.* **2004**, 6, 2631.



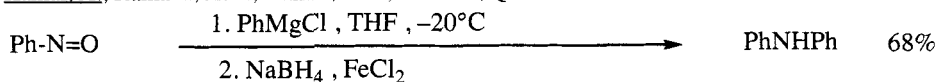
Wu, H.-C.; Yu, J.-Q.; Spencer, J.B. *Org. Lett.* **2004**, 6, 4675.



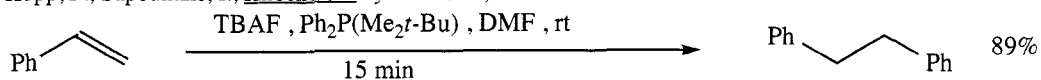
Ilias, Md.; Barman, D.C.; Prajapati, D.; Sandhu, J.S. *Tetrahedron Lett.* **2002**, 43, 1877.



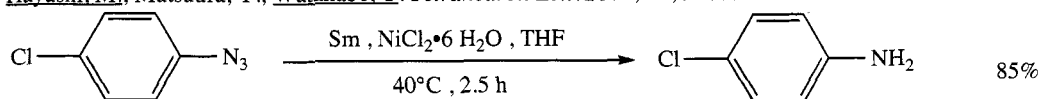
Kamal, A.; Ramana, K.V.; Ankati, H.B.; Ramana, Q.V. *Tetrahedron Lett.* **2002**, 43, 6861.



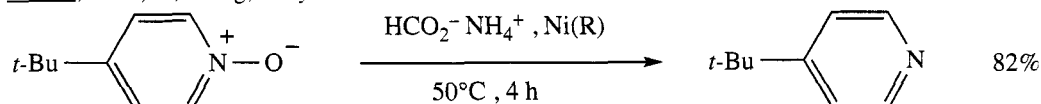
Kopp, F.; Sapountzis, I.; Knochel, P. *Synlett* **2003**, 885.



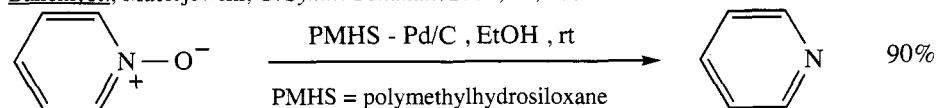
Hayashi, M.; Matsuura, Y.; Watanabe, Y. *Tetrahedron Lett.* **2004**, 45, 9167.



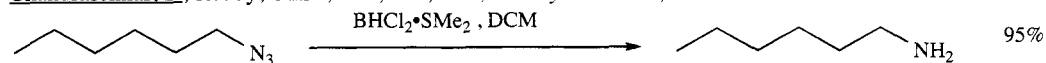
Wu, H.; Chen, R.; Zhang, Y. *Synth. Commun.* **2002**, 32, 189.



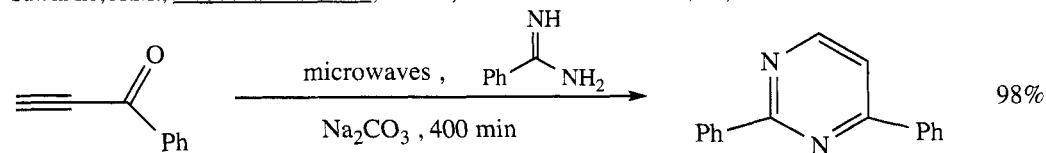
Balicki, R.; Maciejewski, G. *Synth. Commun.* **2002**, 32, 1681.



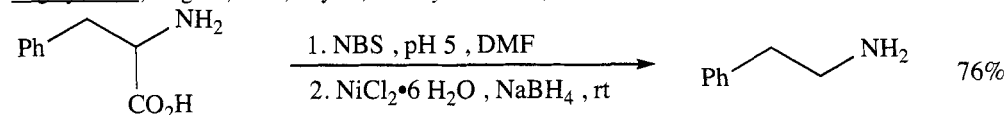
Chandrasekhar, S.; Reddy, Ch.R.; Rao, R.J.; Rao, J.M. *Synlett* **2002**, 349.



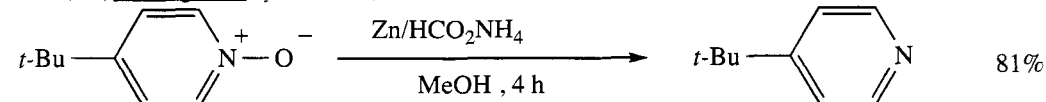
Salunkhe, A.M.; Ramachandran, P.V.; Brown, H.C. *Tetrahedron* **2002**, 58, 10059.



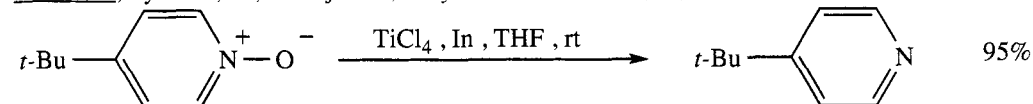
Bagley, M.C.; Hughes, D.D.; Taylor, P.H. *Synlett* **2003**, 259.



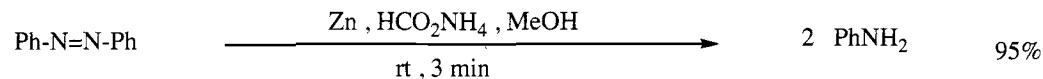
Laval, G.; Golding, B.T. *Synlett* **2003**, 542.



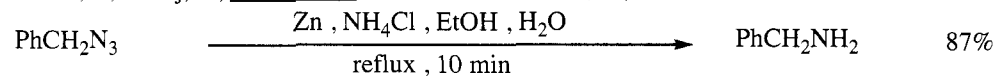
Balicki, R.; Cybulski, M.; Maciejewski, G. *Synth. Commun.* **2003**, 33, 4137.



Yoo, B.W.; Choi, K.H.; Choi, K.I.; Kim, J.H. *Synth. Commun.* **2003**, 33, 4105.



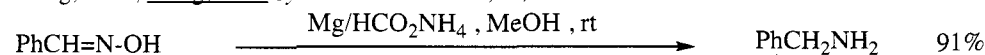
Gowda, S.; Abiraj, K.; Gowda, D.C. *Tetrahedron Lett.* **2002**, 43, 1329.



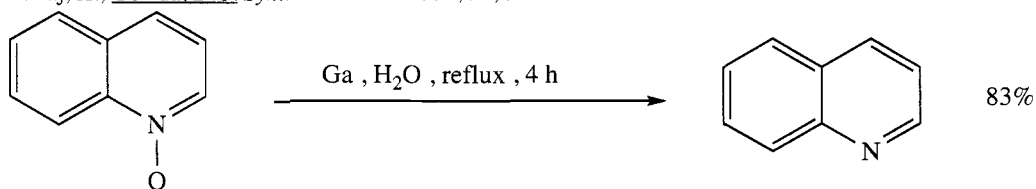
Lin, W.; Zhang, X.; He, Z.; Jin, Y.; Gong, L.; Mi, A. *Synth. Commun.* **2002**, 32, 3279.



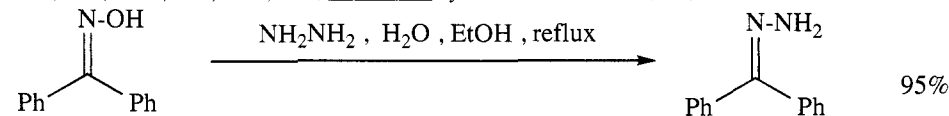
Zhang, C.-R.; Wang, Y.-L. *Synth. Commun.* **2003**, 33, 4205.



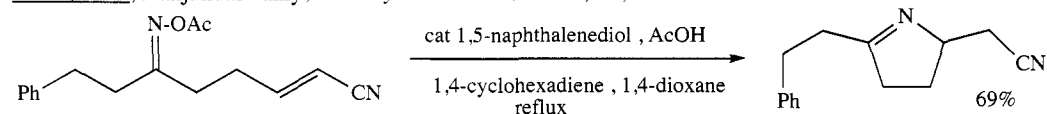
Abiraj, K.; Gowda, D.C. *Synth. Commun.* **2004**, 34, 599.



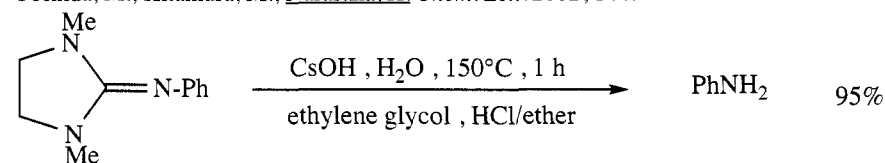
Han, J.H.; Choi, K.I.; Kim, J.H.; Yoo, B.W. *Synth. Commun.* **2004**, 34, 3197.



Pasha, M.A.; Nanjundaswamy, H.M. *Synth. Commun.* **2004**, 34, 3827.

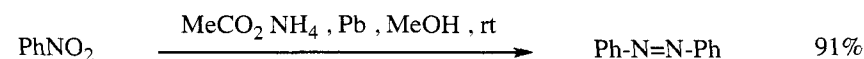


Yoshida, M.; Kitamura, M.; Narasaka, K. *Chem. Lett.* **2002**, 144.

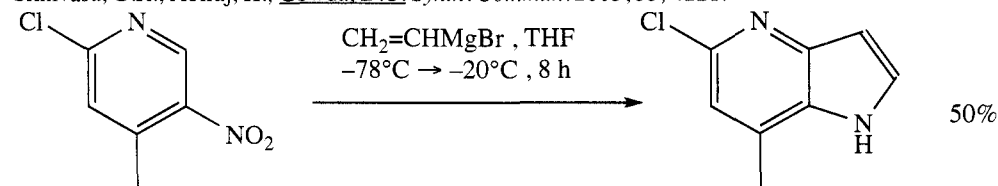


Kitamura, M.; Chiba, S.; Narasaka, K. *Bull. Chem. Soc. Jpn.* **2003**, 76, 1063.

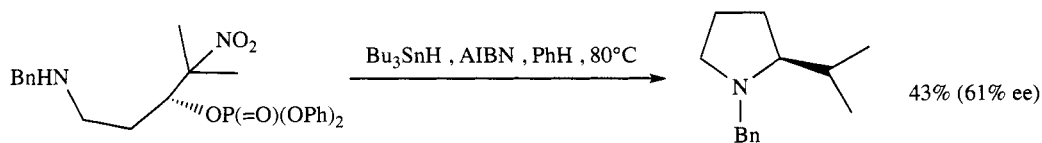
AMINES FROM NITRO COMPOUNDS



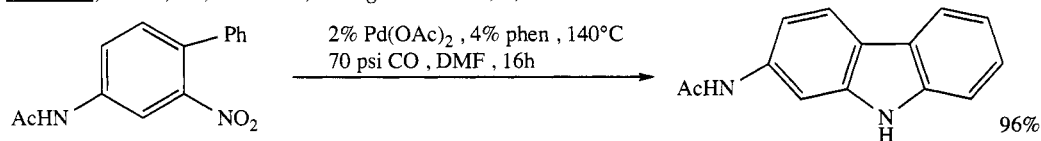
Srinivasa, G.R.; Abiraj, K.; Gowda, D.C. *Synth. Commun.* **2003**, 33, 4221.



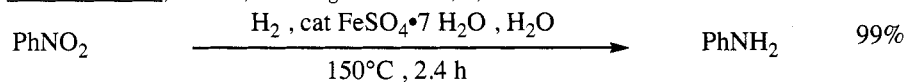
Zhang, Z.; Yang, Z.; Meanwell, N.A.; Kadow, J.F.; Wang, T. *J. Org. Chem.* **2002**, 67, 2345.



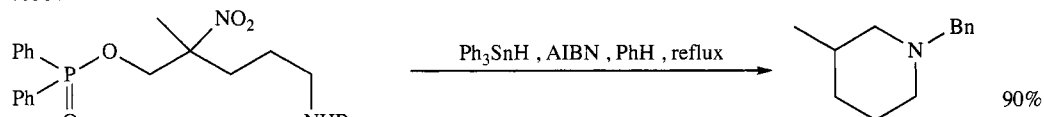
Crich, D.; Shirai, M.; Rumthao, S. *Org. Lett.* **2003**, *5*, 3767.



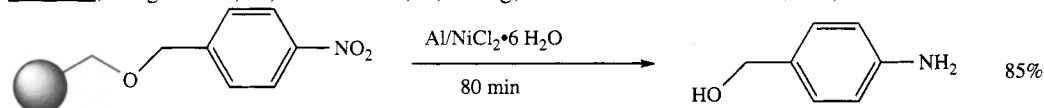
Smitrovich, J.H.; Davies, I.W. *Org. Lett.* **2004**, 6, 533.



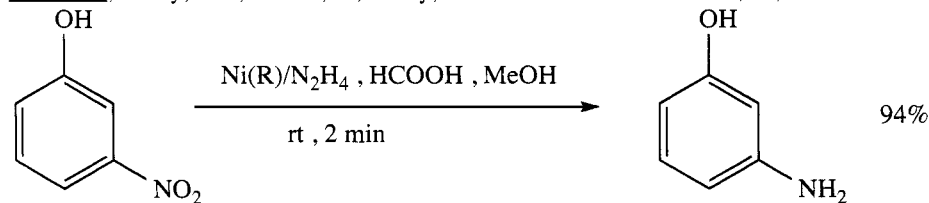
Deshpande, R.M.; Mahajan, A.N.; Diwakaar, M.M.; Ozarde, S.; Chaudhari, R.V. *J. Org. Chem.* **2004**, *69*, 4835.



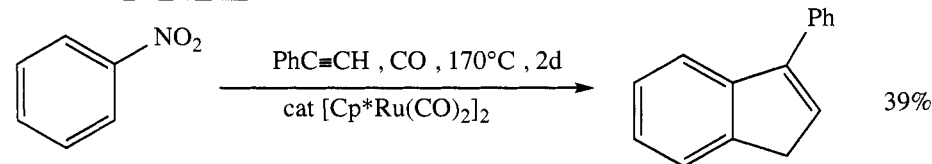
Crich, D.; Ranganathan, K.; Neelamkavil, S.; Huang, X. *J. Am. Chem. Soc.* **2003**, *125*, 7942.



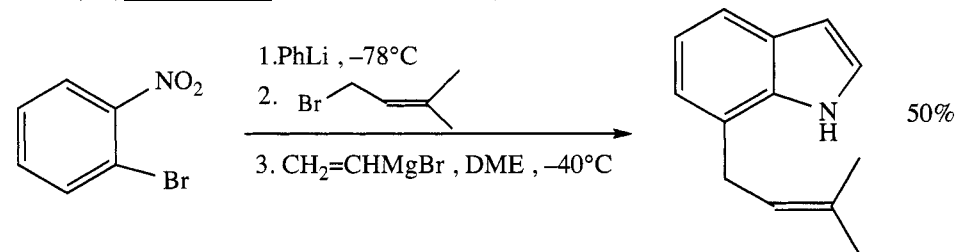
Kamal, A.; Reddy, K.L.; Deviah, V.; Reddy, G.S.K. *Tetrahedron Lett.* **2003**, *44*, 4741.



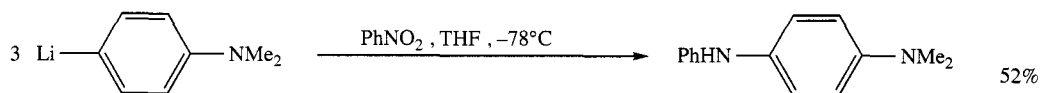
Gowda, S.; Gowda, D.C. *Tetrahedron* **2002**, 58, 2211.



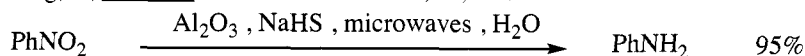
Penoni, A.; Nicholas, K.M. *Chem. Commun.* **2002**, 484.



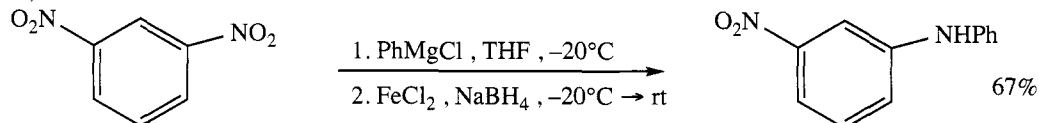
Pirrung, M.C.; Wedel, M.; Zhao, Y. *Synlett* **2002**, 143.



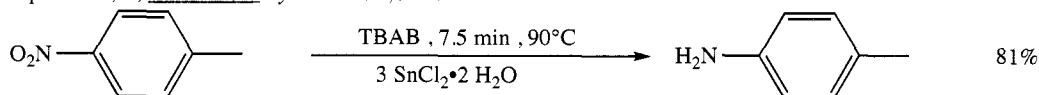
Yang, T.; Cho, B.P. *Tetrahedron Lett.* **2003**, *44*, 7549.



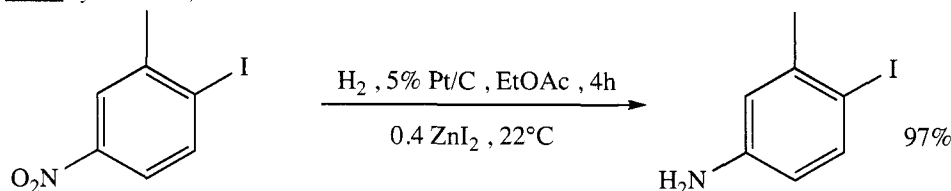
Kanth, S.R.; Reddy, G.V.; Rao, V.V.V.N.S.R.; Maitraie, P.; Narsaiah, B.; Rao, P.S. *Synth. Commun.* **2002**, *32*, 2849.



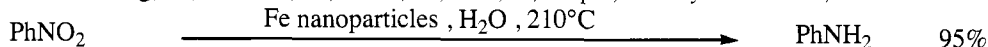
Sapountzis, I.; Knochel, P. *Synlett* **2004**, 955.



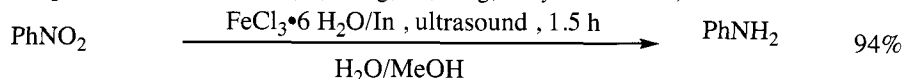
De, P. *Synlett* **2004**, 1835.



Wu, G.; Huang, M.; Richards, M.; Poirer, M.; Wen, X.; Draper, R.W. *Synthesis* **2003**, 1657.



Wang, L.; Li, P.; Wu, Z.; Yan, J.; Wang, M.; Ding, Y. *Synthesis* **2003**, 2001.



Yoo, B.W.; Choi, J.W.; Hwang, S.K.; Kim, D.Y.; Baek, H.; Choi, K.I.; Kim, J.H. *Synth. Commun.* **2003**, *33*, 2985.

REVIEWS:

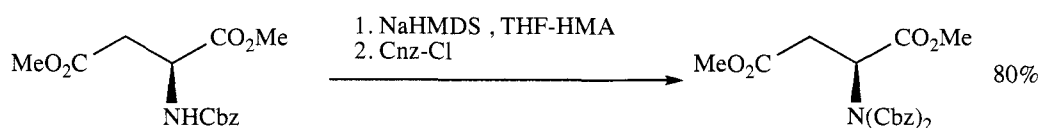
"*N-tert*-Butanesulfinyl Imines: Versatile Intermediates for the Asymmetric Synthesis of Amines"

Ellman, J.A.; Owens, T.D.; Tang, T.P. *Acc. Chem. Res.* **2002**, *35*, 984.

"Preparation, Properties and Synthetic Applications of 2H-Azirines"

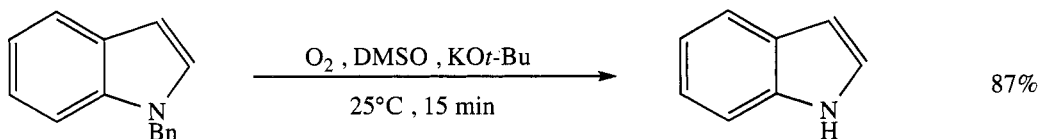
de Retana, A.M.O.; de Marigorta, E.M.; de los Santos, J.M. *Org. Prep. Proceed. Int.* **2002**, *34*, 219.

SECTION 105A: PROTECTION OF AMINES

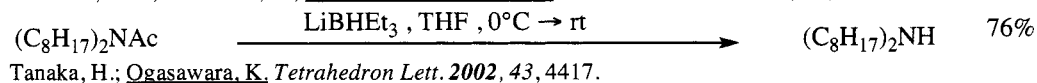


Hernández, J.N.; Martín, V.S. *J. Org. Chem.* **2004**, *69*, 3590.

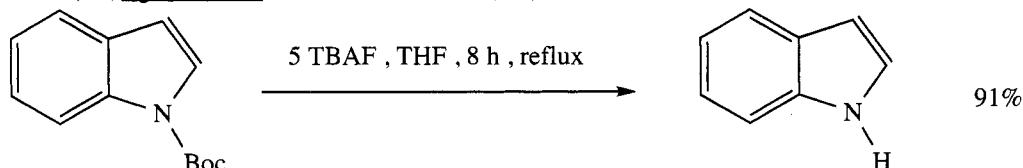
Hernández, J.N.; Ramírez, M.A.; Martín, V.S. *J. Org. Chem.* **2003**, *68*, 743.



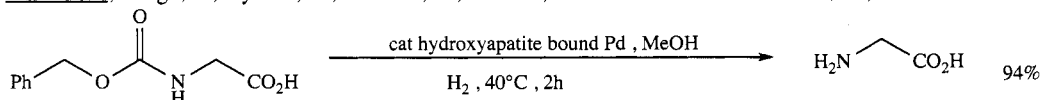
Haddach, A.A.; Kelleman, A.; Deaton-Rewoliwski, M.V. *Tetrahedron Lett.* **2002**, *43*, 399.



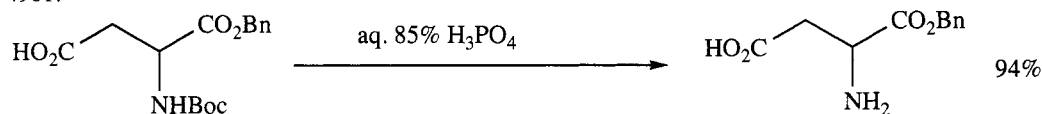
Tanaka, H.; Ogasawara, K. *Tetrahedron Lett.* **2002**, *43*, 4417.



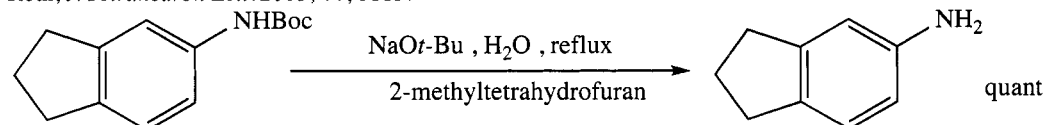
Routier, S.; Saugé, L.; Ayerbe, N.; Coudert, G.; Méroux, J.-Y. *Tetrahedron Lett.* **2002**, *43*, 589.



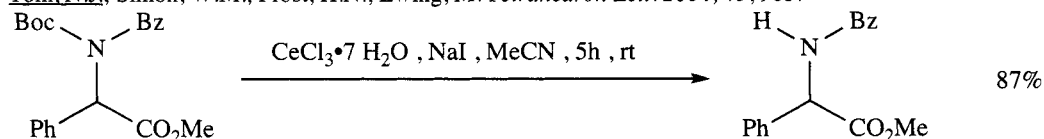
Murata, M.; Hara, T.; Mori, K.; Ooe, M.; Mizugaki, T.; Ebitani, K.; Kaneda, K. *Tetrahedron Lett.* **2003**, *44*, 4981.



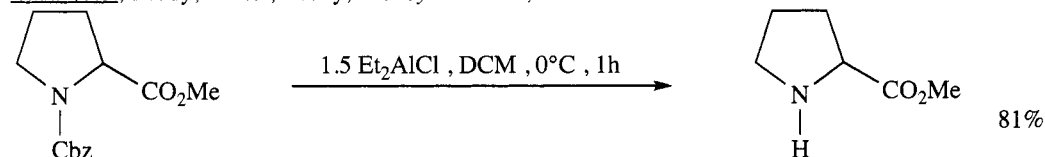
Li, B.; Bemish, R.; Buzon, R.A.; Chiu, C.K.-F.; Colgan, S.T.; Kissel, W.; Le, T.; Leeman, K.R.; Newell, L.; Roth, J. *Tetrahedron Lett.* **2003**, *44*, 8113.



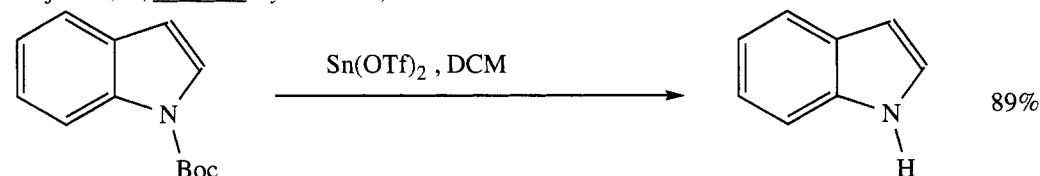
Tom, N.J.; Simon, W.M.; Frost, H.N.; Ewing, M. *Tetrahedron Lett.* **2004**, *45*, 905.



Yadav, J.S.; Reddy, B.V.S.; Reddy, K.S. *Synlett* **2002**, 468.



Tsujimoto, T.; Murai, A. *Synlett* **2002**, 1283.

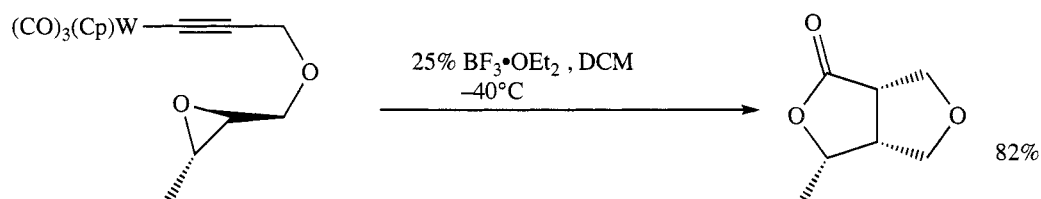


Bose, D.S.; Kumar, K.C.; Reddy, A.V.N. *Synth. Commun.* **2003**, *33*, 445.

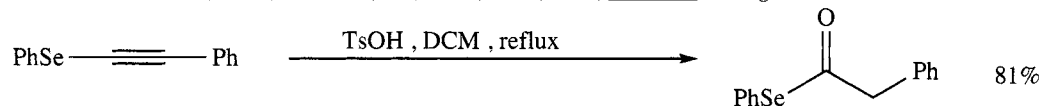
CHAPTER 8

PREPARATION OF ESTERS

SECTION 106: ESTERS FROM ALKYNES



Madhushaw, R.J.; Li, C.-L.; Su, H.-L.; Hu, C.-C.; Lush, S.-F.; Liu, R.-S. *J. Org. Chem.* **2003**, 68, 1872.

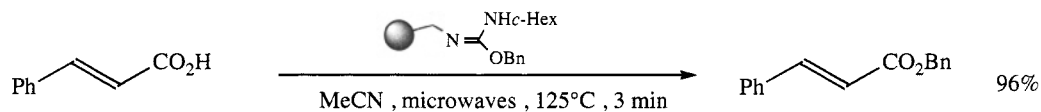


Sheng, S.; Liu, X. *Org. Prep. Proceed. Int.* **2002**, 34, 499.

SECTION 107: ESTERS FROM ACID DERIVATIVES

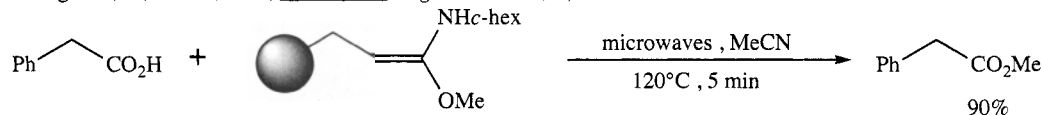
The following types of reactions are found in this section:

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

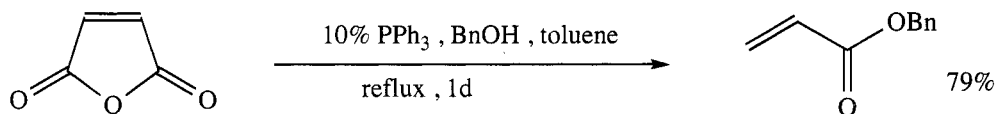


Crosignani, S.; White, P.D.; Steinauer, R.; Linclau, B. *Org. Lett.* **2003**, 5, 853.

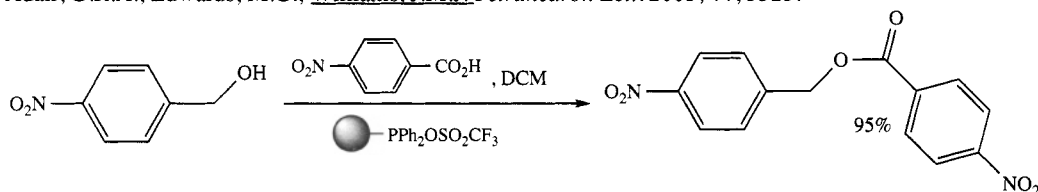
Crosignani, S.; White, P.D.; Linclau, B. *Org. Lett.* **2002**, 4, 2961.



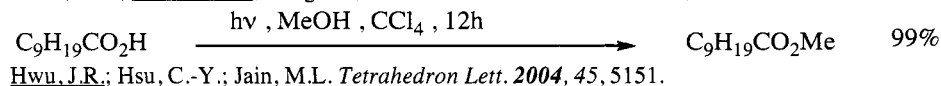
Crosignani, S.; White, P.D.; Linclau, B. *J. Org. Chem.* **2004**, 69, 5897.



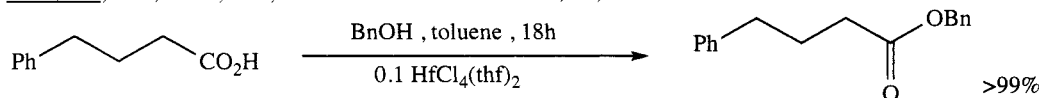
Adair, G.R.A.; Edwards, M.G.; Williams, J.M.J. *Tetrahedron Lett.* **2003**, 44, 5523.



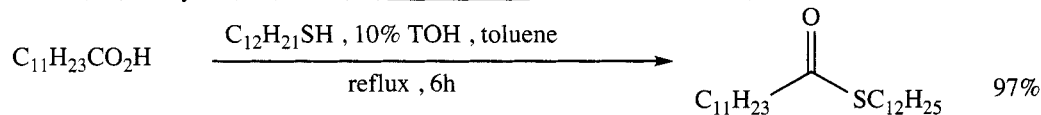
Elson, K.E.; Jenkins, I.D.; Loughlin, W.A. *Tetrahedron Lett.* **2004**, 45, 2491.



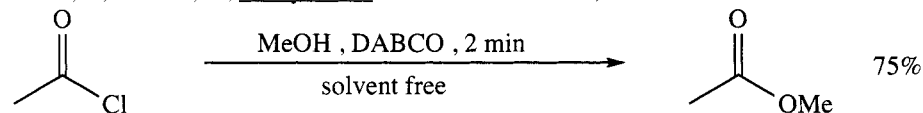
Hwu, J.R.; Hsu, C.-Y.; Jain, M.L. *Tetrahedron Lett.* **2004**, 45, 5151.



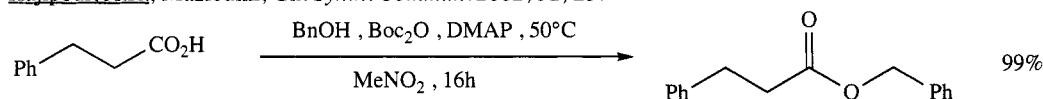
Ishihara, K.; Nakayama, M.; Ohara, S.; Yamamoto, H. *Tetrahedron* **2002**, 58, 8179.



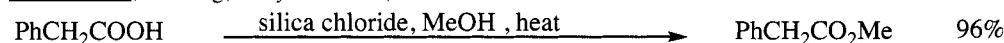
Iimura, S.; Manabe, K.; Kobayashi, S. *Chem. Commun.* **2002**, 94.



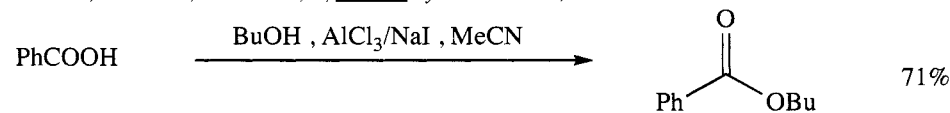
Hajipour, A.R.; Mazloumi, Gh. *Synth. Commun.* **2002**, 32, 23.



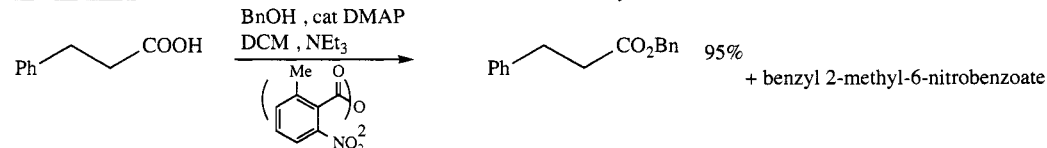
Gooßen, L.J.; Döhring, A. *Synlett* **2004**, 263.



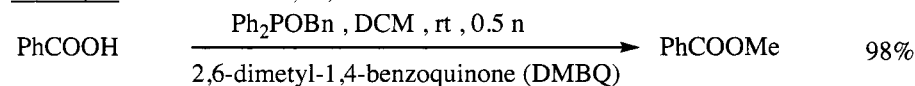
Srinivas, K.V.N.S.; Mahender, I.; Das, B. *Synthesis* **2003**, 2479.



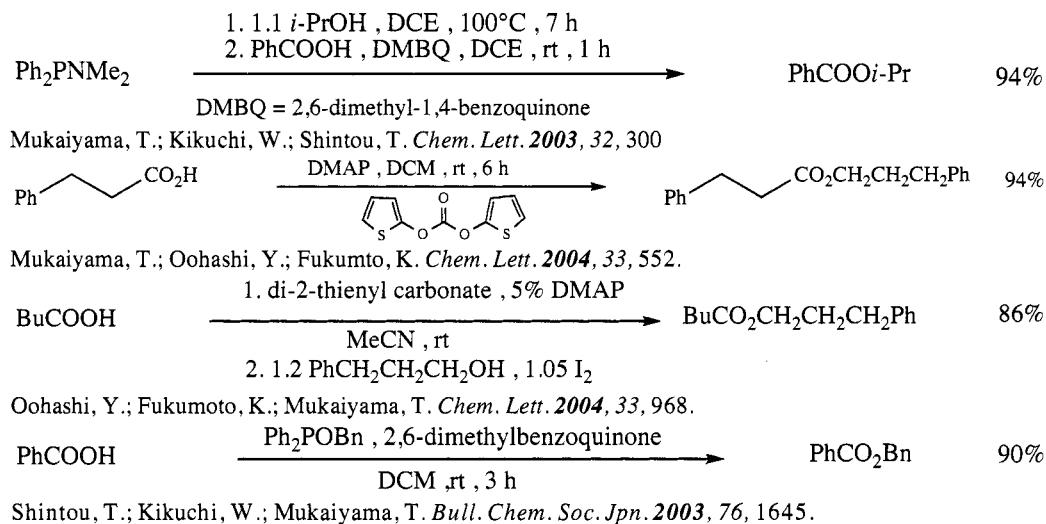
Karade, N.N.; Shirodkaar, S.G.; Potrekar, R.A.; Karade, H.N. *Synth. Commun.* **2004**, 34, 391.



Kubota, M. *Chem. Lett.* **2002**, 31, 286.

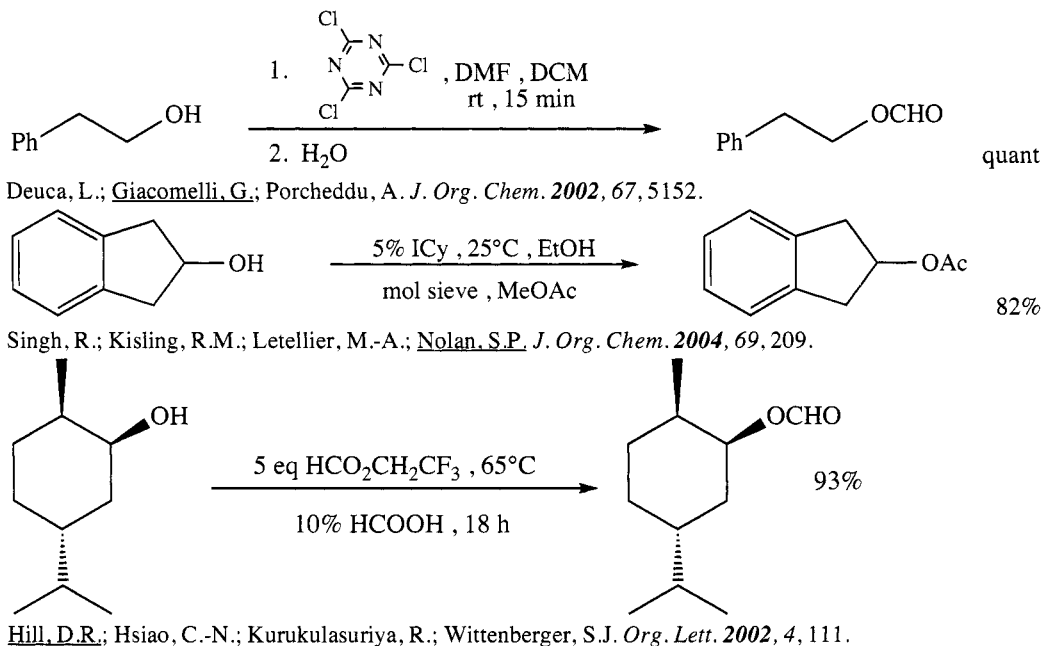


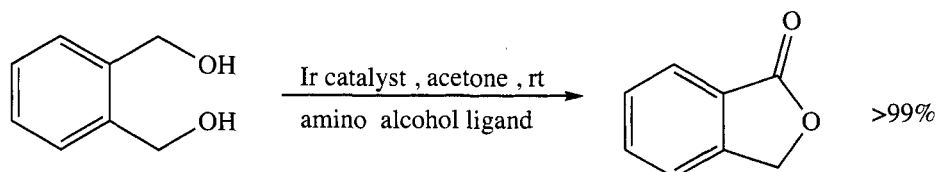
Mukaiyama, T.; Shintou, T.; Kikuchi, W. *Chem. Lett.* **2002**, 31, 1126.



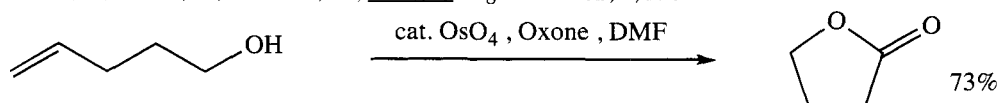
Further examples of the reaction $\text{RCO}_2\text{H} + \text{R}'\text{OH} \rightarrow \text{RCO}_2\text{R}'$ are included in Section 108 (Esters from Alcohols and Thiols) and in Section 30A (Protection of Carboxylic Acid Derivatives).

SECTION 108: ESTERS FROM ALCOHOLS AND THIOLS

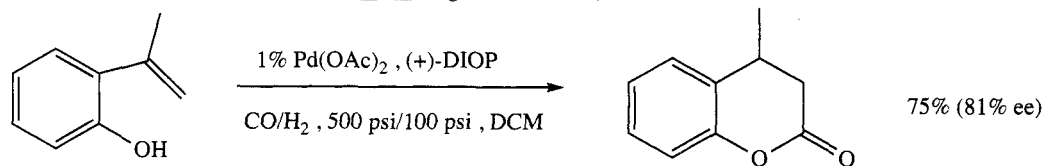




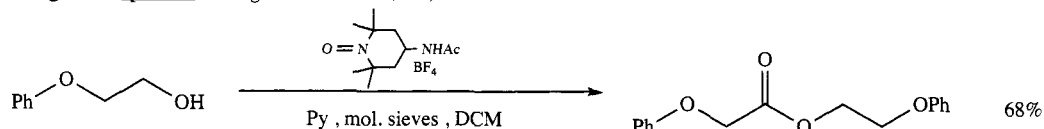
Suzuki, T.; Morita, K.; Tsuchida, M.; Hiroi, K. *Org. Lett.* **2002**, *4*, 2361.



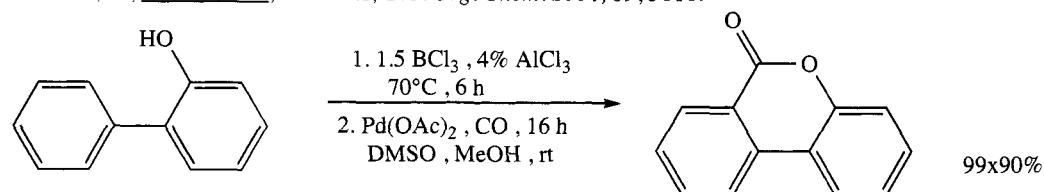
Schomaker, J.M.; Travis, B.R.; Borhan, B. *Org. Lett.* **2003**, *5*, 3089.



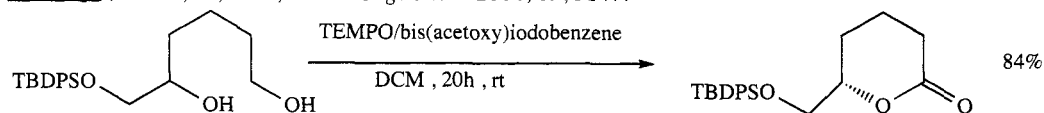
Dong, C.; Alper, H. *J. Org. Chem.* **2004**, *69*, 5011.



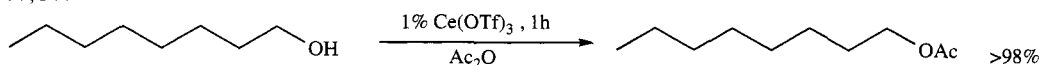
Merbouh, N.; Bobbitt, J.M.; Brückner, C. *J. Org. Chem.* **2004**, *69*, 5116.



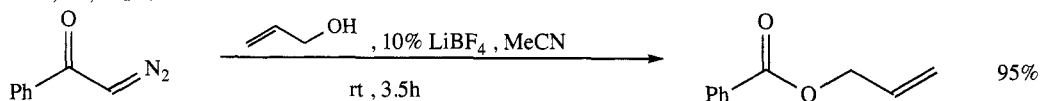
Zhou, Q.J.; Worm, K.; Dole, R.E. *J. Org. Chem.* **2004**, *69*, 5147.



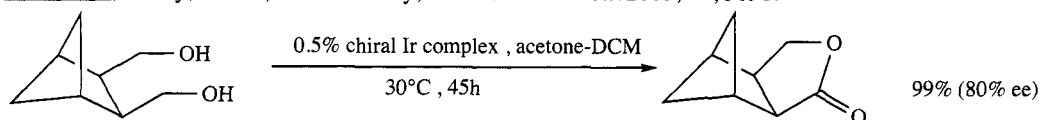
Hansen, T.M.; Florence, G.J.; Lugo-Mas, P.; Chen, J.; Abrams, J.N.; Forsyth, C.J. *Tetrahedron Lett.* **2003**, *44*, 57.



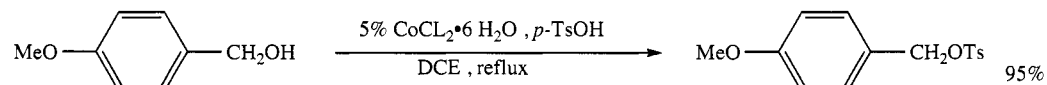
Dalpozzo, R.; DeNino, A.; Maiuolo, L.; Procopio, A.; Nardi, M.; Bartoi, G.; Romeo, R. *Tetrahedron Lett.* **2003**, *44*, 5621.



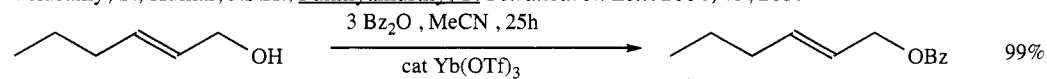
Yadav, J.S.; Reddy, B.V.S.; Vishnumurthy, P. *Tetrahedron Lett.* **2003**, *44*, 5691.



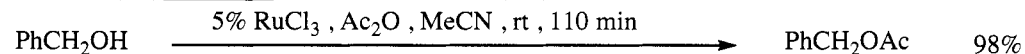
Suzuki, T.; Morita, K.; Matsuo, Y.; Hiroi, K. *Tetrahedron Lett.* **2003**, *44*, 2003.



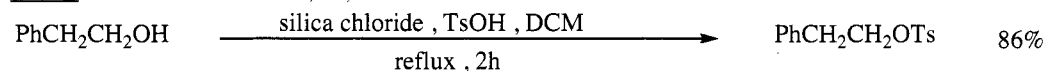
Velusamy, S.; Kumar, J.S.K.; Punniyamurthy, T. *Tetrahedron Lett.* **2004**, 45, 203.



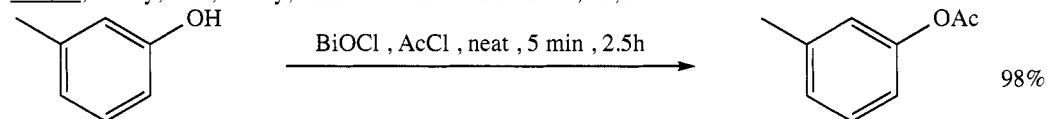
Dumeunier, R.; Markó, I.E. *Tetrahedron Lett.* **2004**, 45, 825.



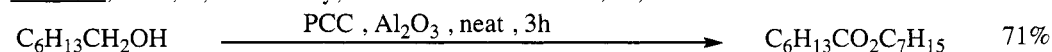
De, K. *Tetrahedron Lett.* **2004**, 45, 2919.



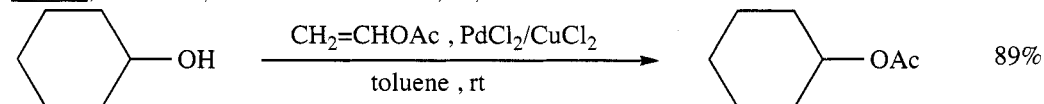
Das, B.; Reddy, V.S.; Reddy, M.R. *Tetrahedron Lett.* **2004**, 45, 6717.



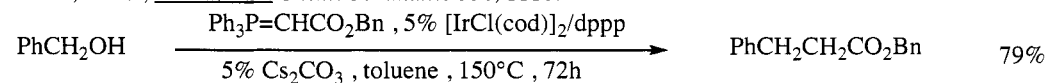
Ghosh, R.; Maiti, S.; Chakraborty, A. *Tetrahedron Lett.* **2004**, 45, 6775.



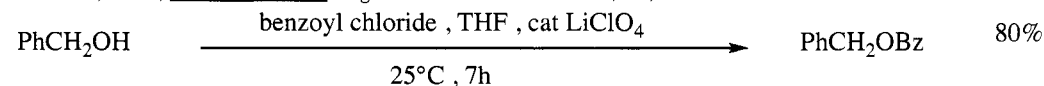
Bhar, S.; Chaudhuri, S.K. *Tetrahedron* **2003**, 59, 3493.



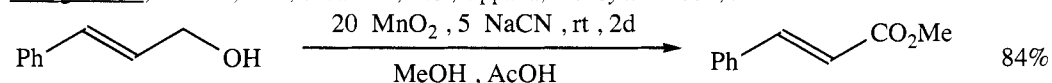
Bosco, J.W.J.; Saikia, A.K. *Chem. Commun.* **2004**, 1116.



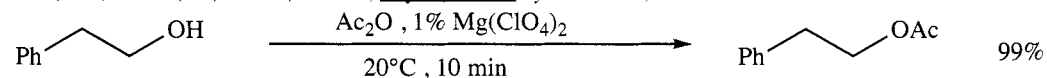
Edwards, M.G.; Williams, J.M.J. *Angew. Chem. Int. Ed.* **2002**, 41, 4740.



Bandgar, B.P.; Kamble, V.T.; Sadavarte, V.S.; Uppalla, L.S. *Synlett* **2002**, 735.

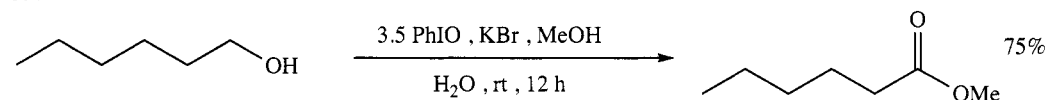


Foot, J.S.; Kanno, H.; Giblin, G.M.P.; Taylor, R.J.K. *Synlett* **2002**, 1293.

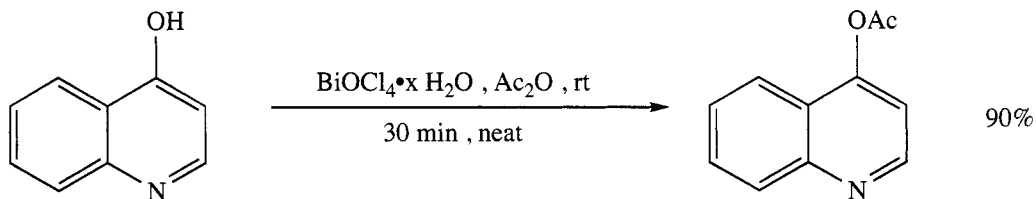


Bartoli, G.; Bosco, M.; Dalpozzo, R.; Marcantoni, E.; Massaccesi, M.; Sambri, L. *Eur. J. Org. Chem.* **2003**, 4611.

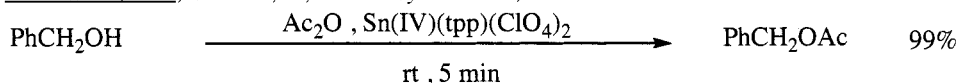
Bartoli, G.; Bosco, M.; Dalpozzo, R.; Marcantoni, E.; Massaccesi, M.; Rinaldi, S.; Sambri, L. *Synlett* **2003**, 39.



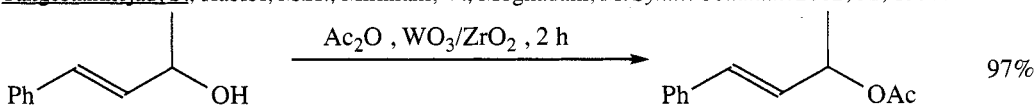
Tohma, H.; Maegawa, T.; Kita, Y. *Synlett* **2003**, 723.



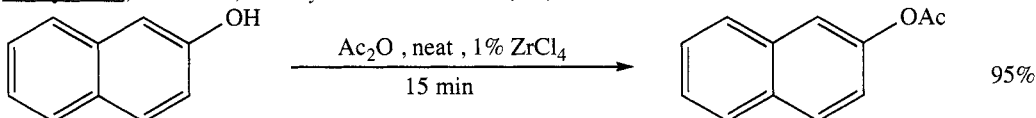
Chakraborti, A.K.; Gulhane, R.; Shivani *Synlett* **2003**, 1805.



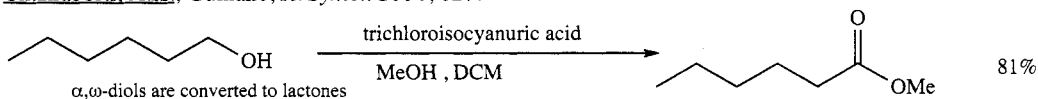
Tangestaninejad, S.; Habibi, M.H.; Mirkhani, V.; Moghadam, M. *Synth. Commun.* **2002**, 32, 1337.



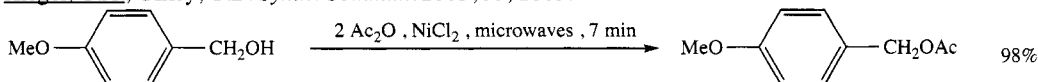
Reddy, B.M.; Sreekanth, P.M. *Synth. Commun.* **2002**, 32, 2815.



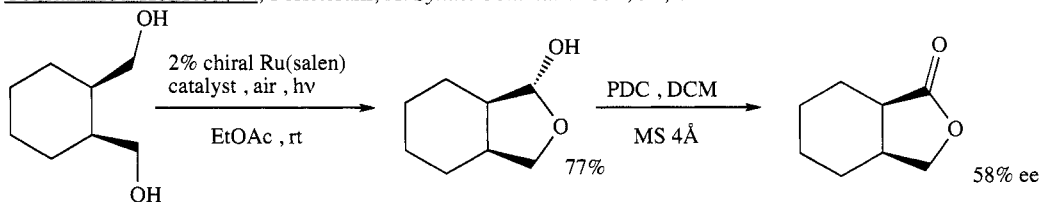
Chakraborti, A.K.; Gulhane, R. *Synlett* **2004**, 627.



Hiegel, G.A.; Gilley, C.B. *Synth. Commun.* **2003**, 33, 2003.

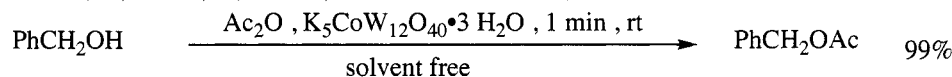


Constantinou-Kokotou, V.; Peristeraki, A. *Synth. Commun.* **2004**, 34, 4227.



Shimizu, H.; Nakata, K.; Katsuki, K. *Chem. Lett.* **2002**, 31, 1080

Shimizu, H.; Nakata, K.; Katsuki, K. *Chem. Lett.* **2003**, 32, 480.



Habibi, M.H.; Tangestaninejad, S.; Mirkhani, V.; Yadollahi, B. *Synth. Commun.* **2002**, 32, 863.



Das, B.; Reddy, V.S. *Chem. Lett.* **2004**, 33, 1428.

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"Lewis Acid Catalyzed Arylation Reactions: Scope and Limitations"

Chandra, K.L.; Saravanan, P.; Singh, R.K.; Singh, V.K. *Tetrahedron* **2002**, 58, 1369.

"Fluorous Mitsunobu Reagents and Reactions"

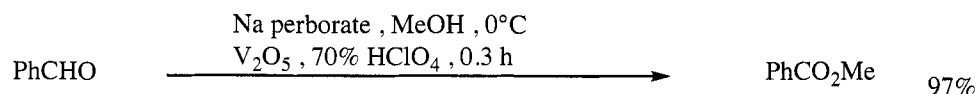
Dandapani, S.; Curran, D.P. *Tetrahedron* **2002**, 58, 3855.

"Recent Advances in the Mitsunobu Reaction: Modified Reagents and the Quest for Chromatography-Free Separation"

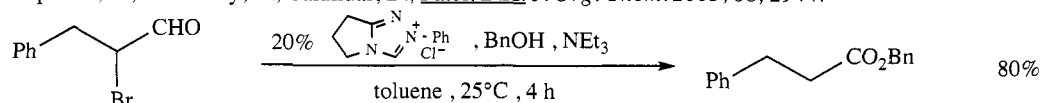
Dembinski, R. *Eur. J. Org. Chem.* **2004**, 2163.

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 Thiols).

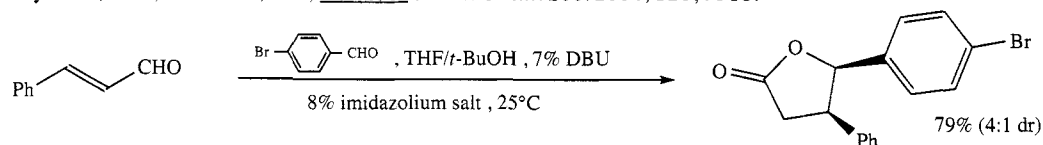
SECTION 109: ESTERS FROM ALDEHYDES



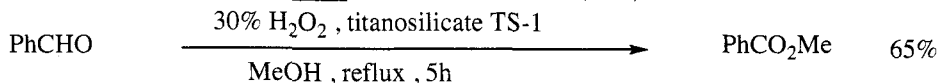
Gopinath, R.; Barkakaty, B.; Talukdar, B.; Patel, B.K. *J. Org. Chem.* **2003**, 68, 2944.



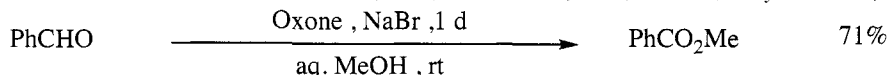
Reynolds, N.T.; de Alaniz, J.R.; Rovis, T. *J. Am. Chem. Soc.* **2004**, 126, 9518.



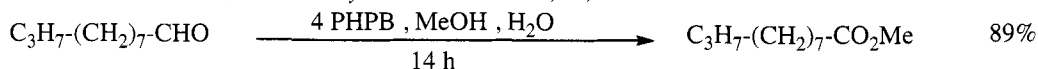
Sohn, S.S.; Rosen, E.L.; Bode, J.W. *J. Am. Chem. Soc.* **2004**, 126, 14370.



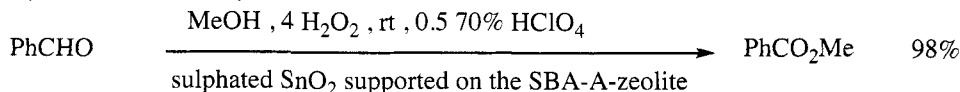
Chavan, S.P.; Dantale, S.W.; Gouande, C.A.; Venkataman, M.S.; Praveen, C. *Synlett* **2002**, 267.



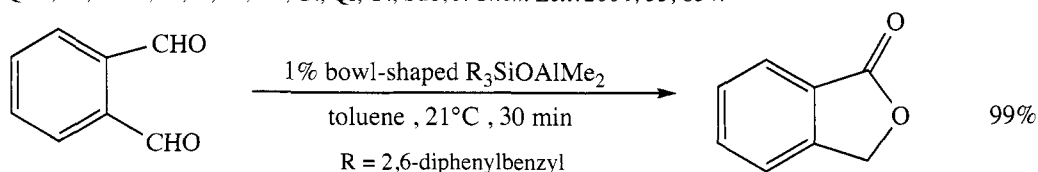
Koo, B.-S.; Kim, E.-H.; Lee, K.-J. *Synth. Commun.* **2002**, 32, 2275.



Sayama, S.; Onami, T. *Synlett* **2004**, 2739.



Qian, G.; Zhao, R.; Ji, D.; Lu, G.; Qi, Y.; Suo, J. *Chem Lett.* **2004**, 33, 834.

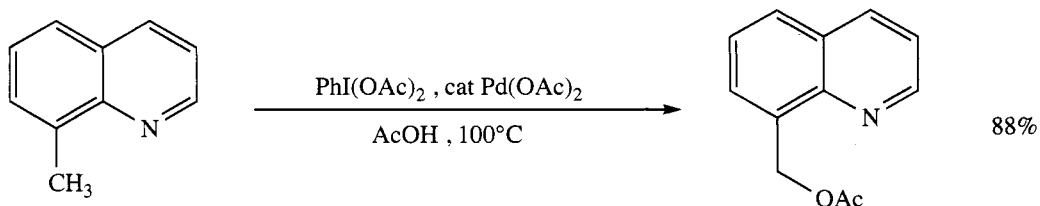


Shirakawa, S.; Takai, J.; Sasaki, K.; Miura, T.; Maruoka, K. *Heterocycles* **2003**, 59, 57.

Related Method: Section 117 (Esters from Ketones)

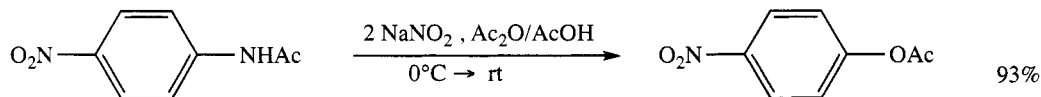
SECTION 110: ESTERS FROM ALKYLs, METHYLENES AND ARYLs

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).

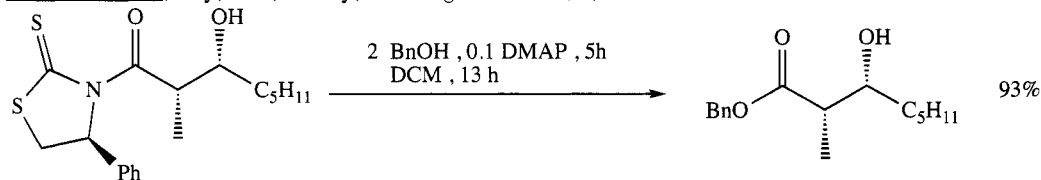


Dick, A.R.; Hull, K.L.; Sanford, M.S. *J. Am. Chem. Soc.* **2004**, 126, 2300.

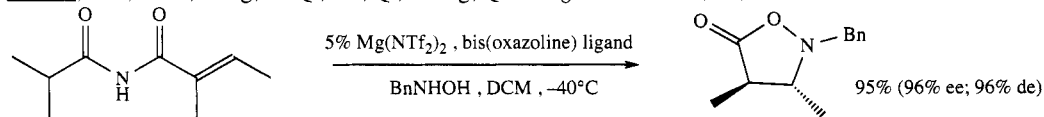
SECTION 111: ESTERS FROM AMIDES



Glatzhofer, D.T.; Roy, R.R.; Cossey, K.N. *Org. Lett.* **2002**, 4, 2349.



Wu, Y.; Sun, Y.-P.; Yang, Y.-Q.; Hu, Q.; Zhang, Q. *J. Org. Chem.* **2004**, 69, 6141.



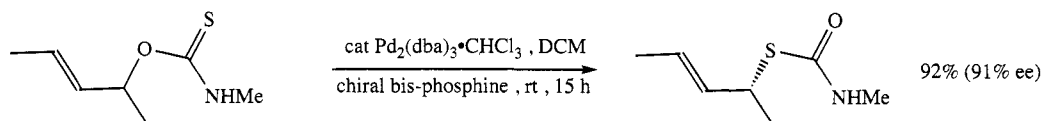
Sibi, M.P.; Prabakaran, N.; Ghorpade, S.G.; Jasperse, C.P. *J. Am. Chem. Soc.* **2003**, 125, 11796.

SECTION 112: ESTERS FROM AMINES

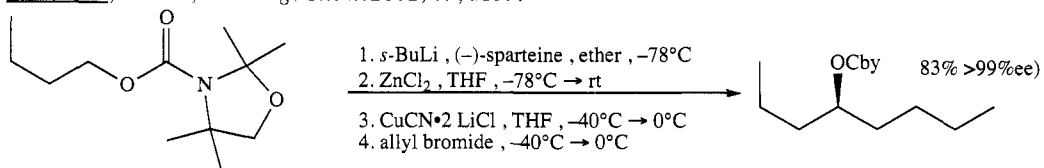
NO ADDITIONAL EXAMPLES

SECTION 113: ESTERS FROM ESTERS

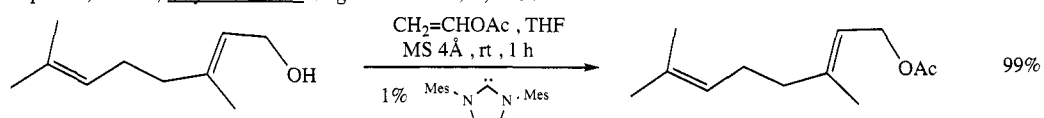
Conjugate reductions and conjugate alkylations of unsaturated esters are given in Section 74 (Alkyls, Methylene, and Aryls from Alkenes).



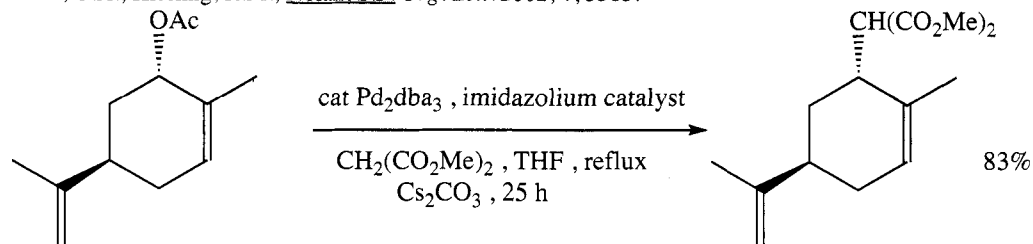
Gais, H.-J.; Böhme, A. *J. Org. Chem.* **2002**, *67*, 1153.



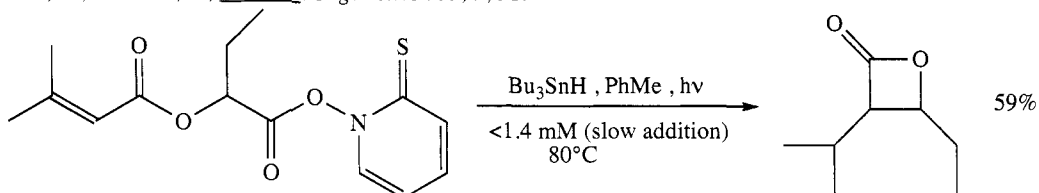
Papillon, J.P.N.; Taylor, R.J.K. *Org. Lett.* **2002**, *4*, 119.



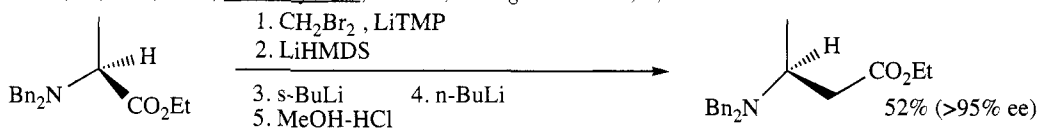
Grasa, G.A.; Kissling, R.M.; Nolan, S.P. *Org. Lett.* **2002**, *4*, 3583.



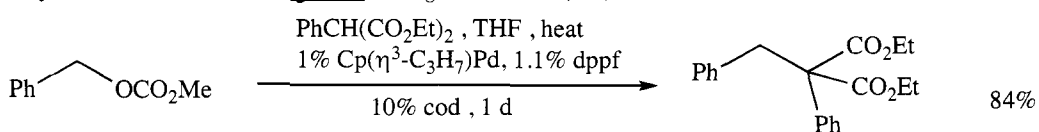
Sato, Y.; Yoshino, T.; Mori, M. *Org. Lett.* **2003**, *5*, 31.



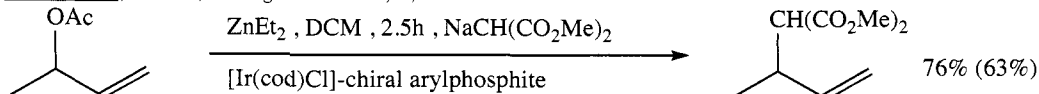
Castle, K.; Hau, C.-S.; Sweeney, J.B.; Tindall, C. *Org. Lett.* **2003**, *5*, 757.



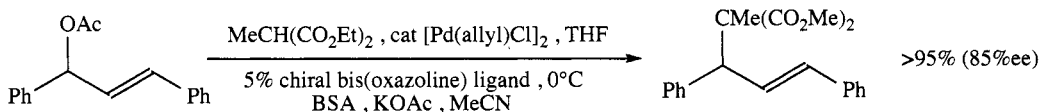
Gray, D.; Concellón, C.; Gallagher, T. *J. Org. Chem.* **2004**, *69*, 4849.



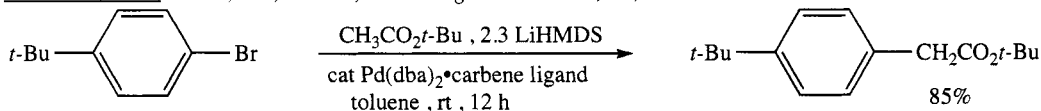
Kuwano, R.; Kondo, Y. *Org. Lett.* **2004**, *6*, 3545.



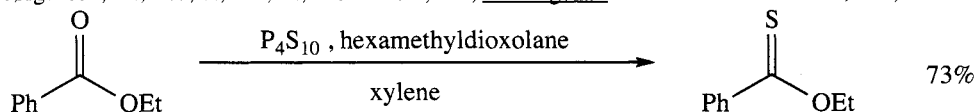
Kinoshita, N.; Marx, K.H.; Tanaka, K.; Tsubaki, K.; Kawabata, T.; Yoshikai, N.; Nakamura, E.; Fuji, K. *J. Org. Chem.* **2004**, *69*, 7960.



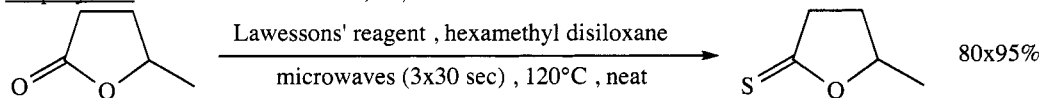
Molander, G.A.; Burke, J.P.; Carroll, P.J. *J. Org. Chem.* **2004**, 69, 8062.



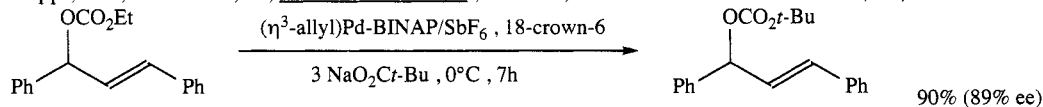
Jørgensen, M.; Lee, S.; Liu, X.; Wolkowski, J.P.; Hartwig, J.F. *J. Am. Chem. Soc.* **2002**, 124, 12557.



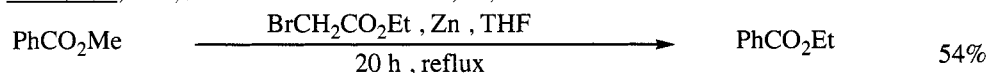
Curphey, T.J. *Tetrahedron Lett.* **2002**, 43, 371.



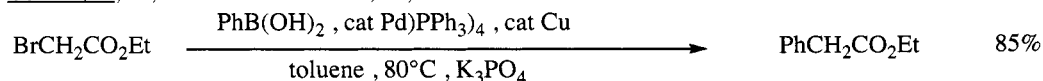
Filippi, J.-J.; Fernandez, X.; Lizzani-Cavelier, L.; Loiseau, A.-M. *Tetrahedron Lett.* **2003**, 44, 6647.



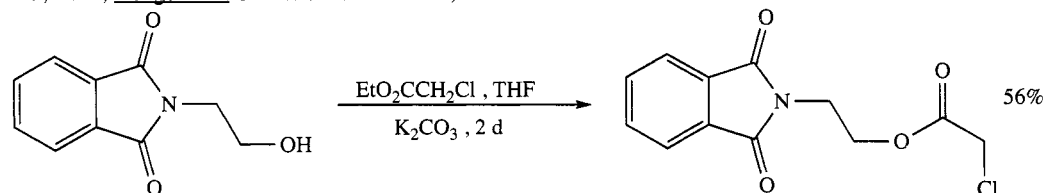
Faller, J.W.; Wilt, J.C. *Tetrahedron Lett.* **2004**, 45, 7613.



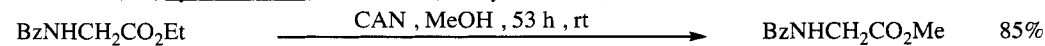
Coskun, N.; Er, M. *Tetrahedron* **2003**, 59, 3481.



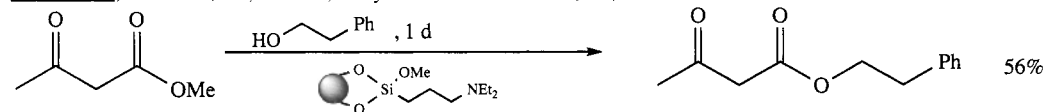
Liu, X.-x.; Deng, M.-z. *Chem. Commun.* **2002**, 622.



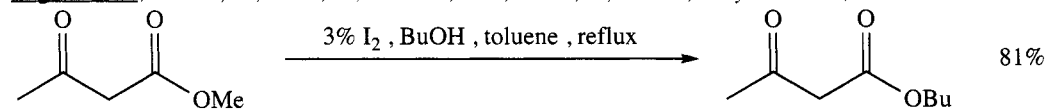
Janczewski, D.; Synoradzki, L.; Wlostowski, M. *Synlett* **2003**, 420.



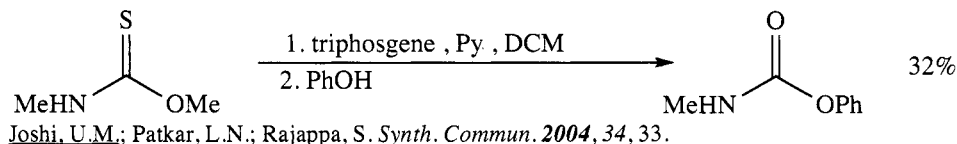
Stefane, B.; Koccar, M.; Polanc, S. *Synth. Commun.* **2002**, 32, 1703.



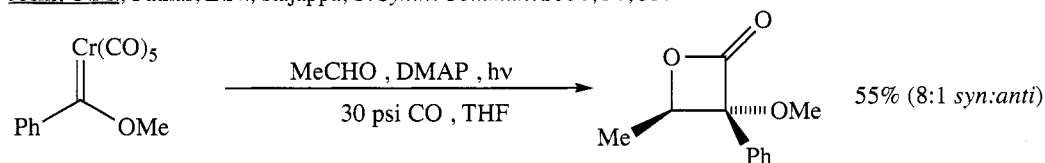
Hagiwara, H.; Koseki, A.; Isobe, K.; Shimizu, K.-i.; Hoshi, T.; Suzuki, T. *Synlett* **2004**, 2188.



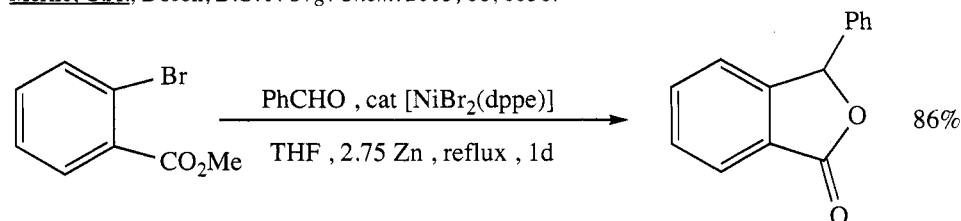
Chavan, S.P.; Kale, R.R.; Shivasankar, K.; Chandake, S.I.; Benjamin, S.B. *Synthesis* **2003**, 2695.



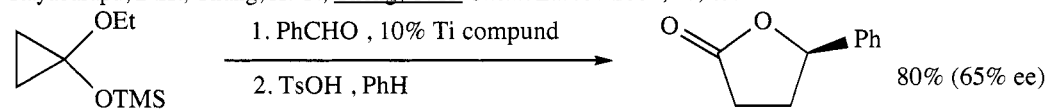
Joshi, U.M.; Patkar, L.N.; Rajappa, S. *Synth. Commun.* **2004**, 34, 33.



Merlic, C.A.; Doroh, B.C. *J. Org. Chem.* **2003**, 68, 6056.



Rayabarapu, D.K.; Chang, H.-T.; Cheng, C.-H. *Chem. Eur. J.* **2004**, 10, 2991.



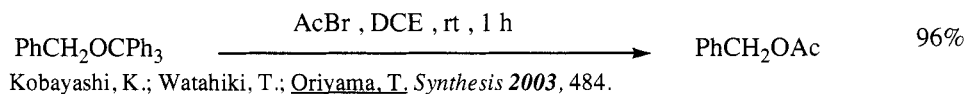
Burke, E.D.; Lim, N.K.; Gleason, J.L. *Synlett* **2003**, 390.

REVIEW:

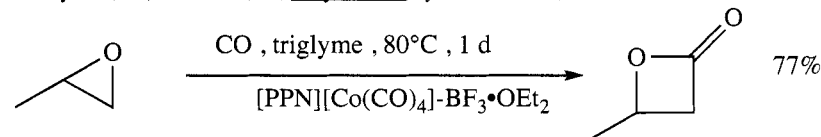
"Transesterification/Arylation Reactions Catalyzed by Molecular Catalysts"

Grasa, G.A.; Singh, R.; Nolan, S.P. *Synthesis* **2004**, 971.

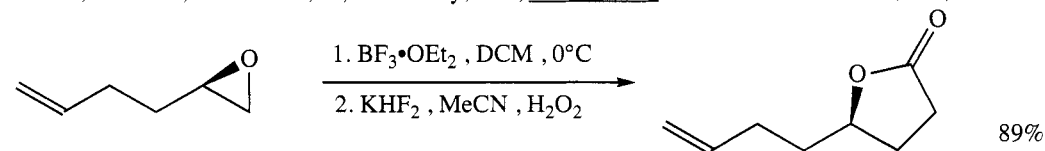
SECTION 114: ESTERS FROM ETHERS, EPOXIDES, AND THIOETHERS



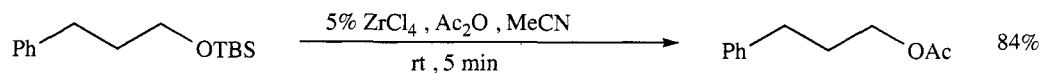
Kobayashi, K.; Watahiki, T.; Oriyama, T. *Synthesis* **2003**, 484.



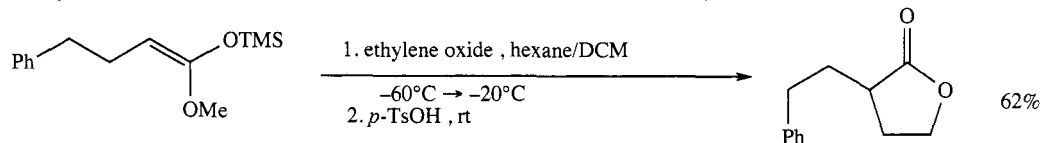
Getzler, Y.D.Y.L.; Mahadevan, V.; Lobkovsky, E.B.; Coates, G.W. *J. Am. Chem. Soc.* **2002**, 124, 1174.



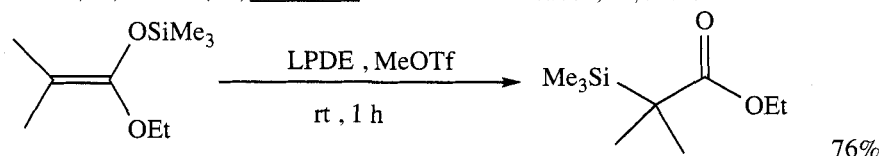
Movassaghi, M.; Jacobsen, E.N. *J. Am. Chem. Soc.* **2002**, 124, 2456.



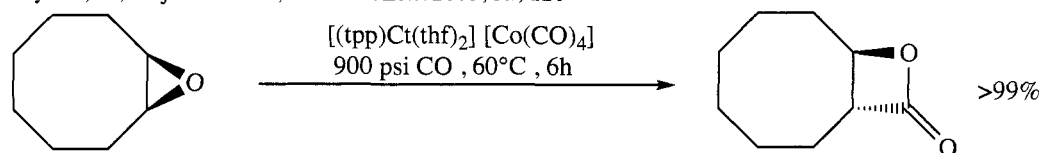
Reddy, Ch.S.; Smitha, G.; Chandrasekhar, S. *Tetrahedron Lett.* **2003**, *44*, 4693.



Maslak, V.; Matovic, R.; Saicic, R.N. *Tetrahedron Lett.* **2002**, *43*, 5411.

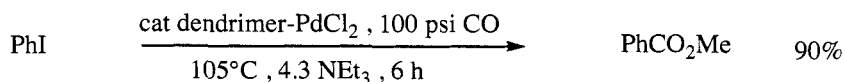


Heydari, A.; Alijanianzadeh, R. *Chem. Lett.* **2003**, *32*, 226

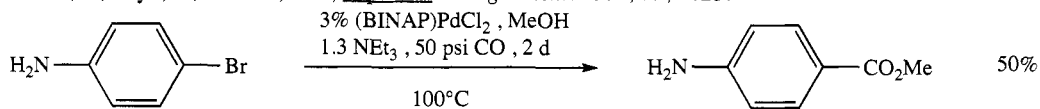


Schmidt, J.A.R.; Mahadevan, V.; Getzler, Y.D.Y.L.; Coates, G.W. *Org. Lett.* **2004**, *6*, 373.

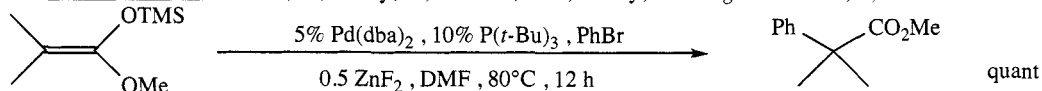
SECTION 115: ESTERS FROM HALIDES AND SULFONATES



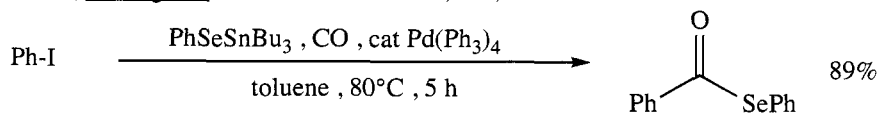
Antebi, S.; Arya, P.; Manzer, L.E.; Alper, H. *J. Org. Chem.* **2002**, *67*, 6623.



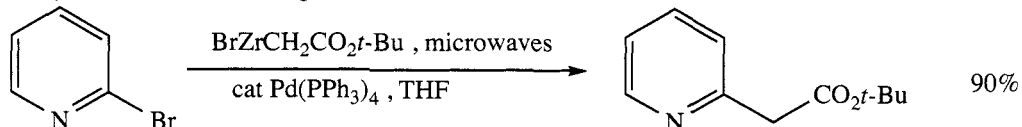
Albaneze-Walker, J.; Bazaral, C.; Lavey, T.; Dormer, P.G.; Murry, J.A. *Org. Lett.* **2004**, *6*, 2097.



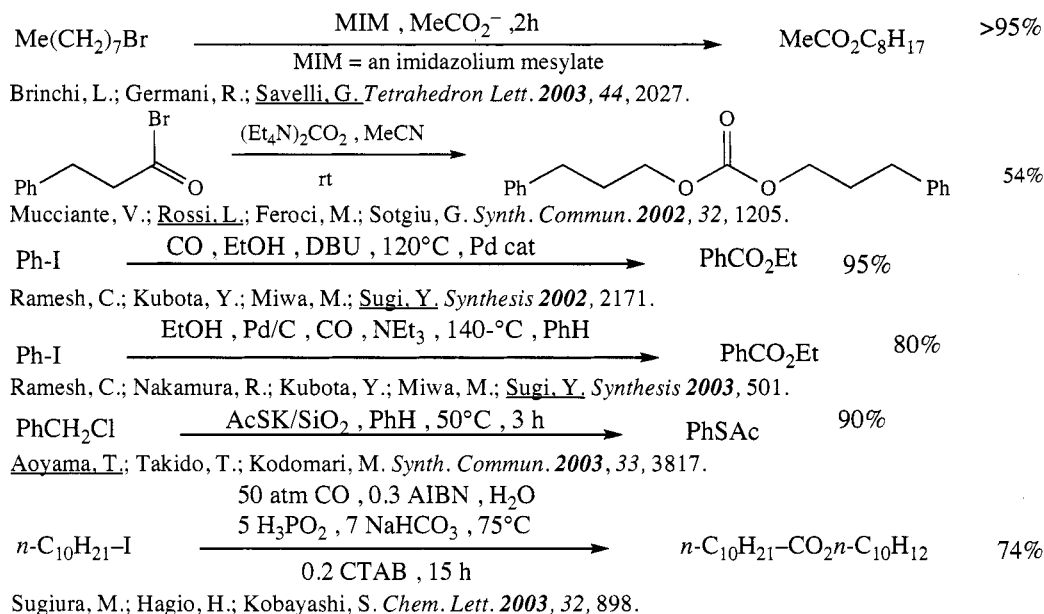
Liu, X.; Hartwig, J.F. *J. Am. Chem. Soc.* **2004**, *126*, 5182.



Hasegawa, M.; Ishii, H.; Fuchigami, T. *Tetrahedron Lett.* **2002**, *43*, 1503.



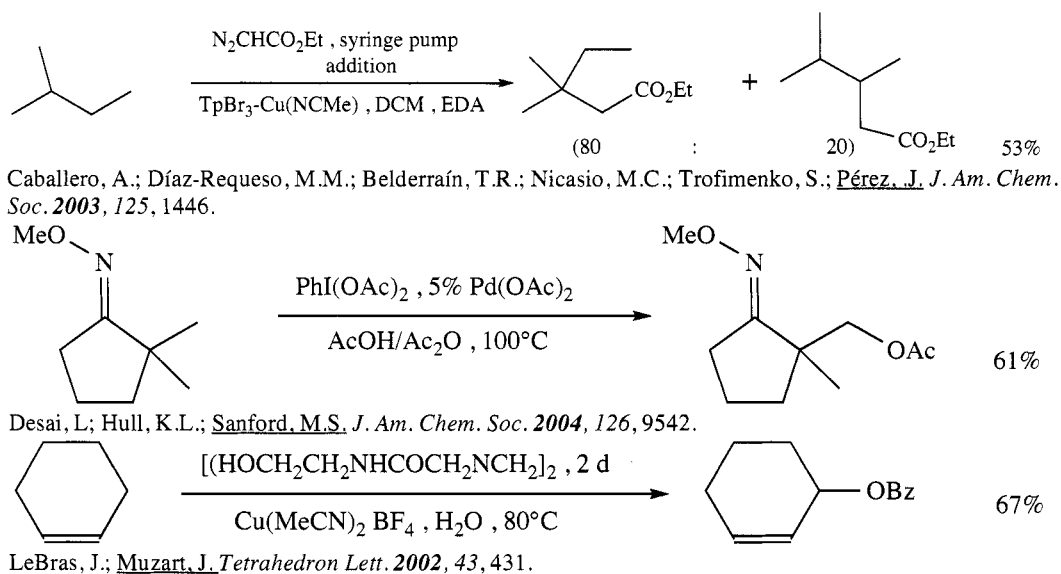
Bentz, E.; Moloney, M.G.; Westaway, S.M. *Tetrahedron Lett.* **2004**, *45*, 7395.

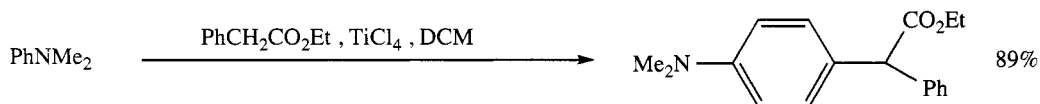


Related Method: Section 25 (Acid Derivatives from Halides and Sulfonates).

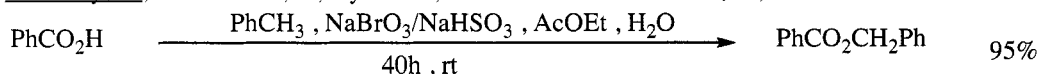
SECTION 116: ESTERS FROM HYDRIDES

This section contains examples of the reaction $\text{R-H} \rightarrow \text{RCO}_2\text{R}'$ or $\text{R}'\text{CO}_2\text{R}$ (R = alkyl, aryl, etc.).

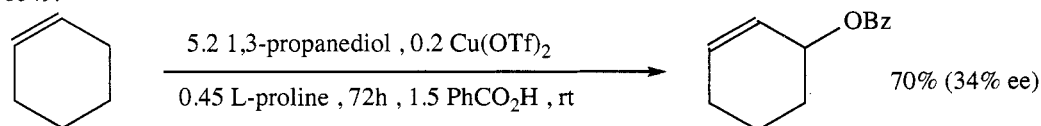




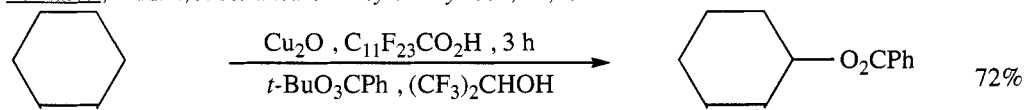
Periasamy, M.; KishoreBabu, N.; Jayakumar, K.N. *Tetrahedron Lett.* **2003**, 44, 8939.



Khan, K.M.; Maharvi, G.M.; Hayat, S.; Zia-Ullah; Choudhary, M.I.; Atta-ur-Rahman *Tetrahedron* **2003**, 59, 5549.



LeBras, J.; Muzart, J. *Tetrahedron: Asymmetry* **2003**, 14, 1911.



Fache, F.; Piva, O. *Synlett* **2002**, 2035.

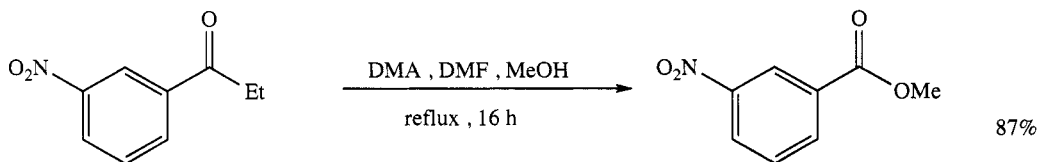
REVIEW:

“Copper Catalyzed Allylic Oxidation with Peresters”

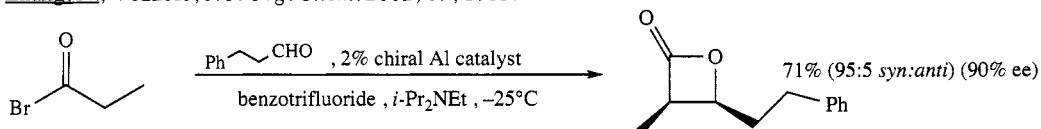
Andrus, M.B.; Lashley, J.C. *Tetrahedron* **2002**, 58, 845.

Also via: Section 26 (Acid Derivatives from Hydrides) and Section 41 (Alcohols and Thiols from Hydrides).

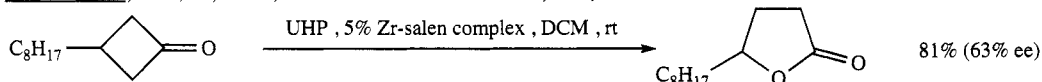
SECTION 117: ESTERS FROM KETONES



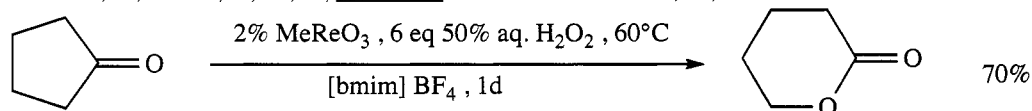
Zhang, N.; Vozzolo, J. *J. Org. Chem.* **2002**, 67, 1703.



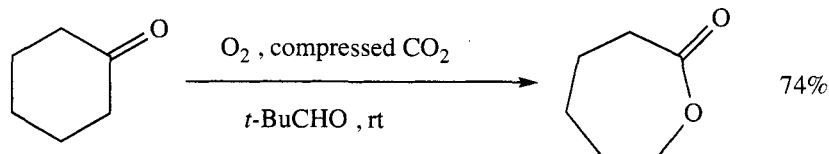
Nelson, S.G.; Zhu, C.; Shen, X. *J. Am. Chem. Soc.* **2004**, 126, 14.



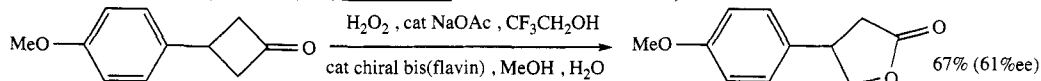
Watanabe, A.; Uchida, T.; Ito, K.; Katsuki, T. *Tetrahedron Lett.* **2002**, 43, 4481.



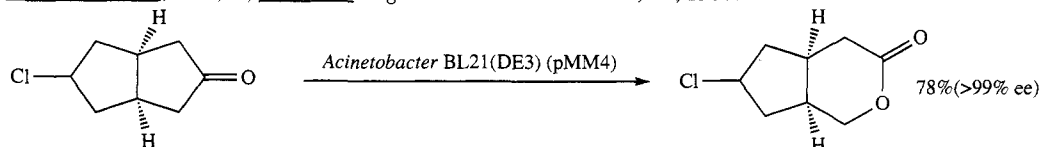
Bernini, R.; Coratti, A.; Fabrizi, G.; Goggiamani, A. *Tetrahedron Lett.* **2003**, 44, 8991.



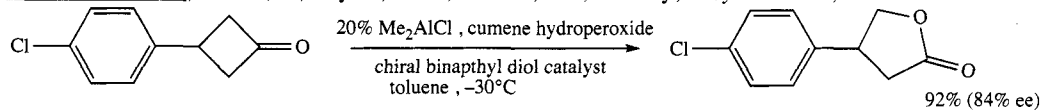
Bolm, C.; Palazzi, C.; Francio, G.; Leitner, W. *Chem. Commun.* **2002**, 1588.



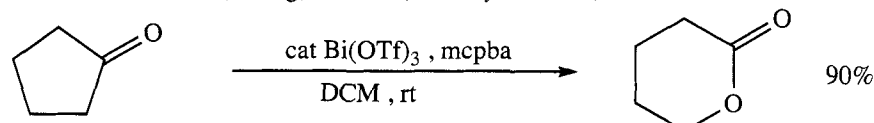
Murahashi, S.-I.; Ono, S.; Imada, Y. *Angew. Chem. Int. Ed.* **2002**, 41, 2366.



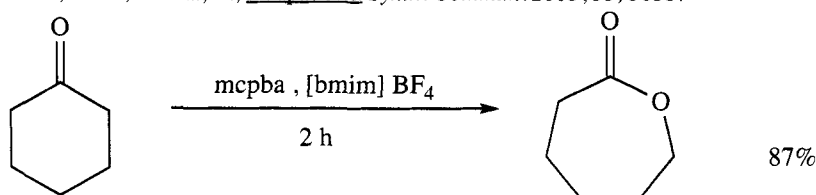
Mihovilovic, M.D.; Müller, B.; Kayser, M.M.; Stewart, J.D.; Stanetty, P. *Synlett* **2002**, 703.



Bolm, C.; Frison, J.-C.; Zhang, Y.; Wulff, W.D. *Synlett* **2004**, 1619.



Alam, M.M.; Varala, R.; Adapa, S.R. *Synth. Commun.* **2003**, 33, 3035.



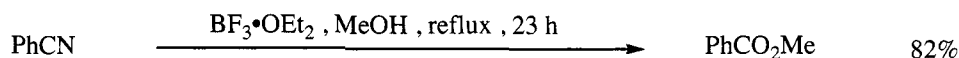
Yadav, J.S.; Reddy, B.V.S.; Basak, A.K.; Narsaiah, A.V. *Chem. Lett.* **2004**, 33, 248.

REVIEW:

"The Baeyer-Villiger Reaction: New Developments Toward Greener Procedures"
 ten Brink, G.-J.; Arends, I.W.C.E.; Shedon, R.A. *Chem. Rev.* **2004**, 104, 4105.

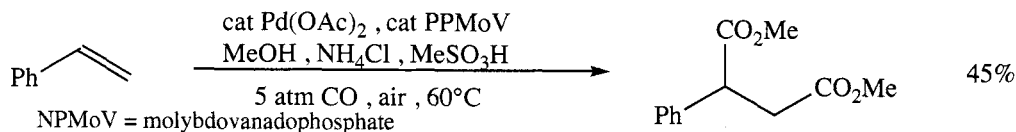
Also via: Section 27 (Acid Derivatives from Ketones).

SECTION 118: ESTERS FROM NITRILES

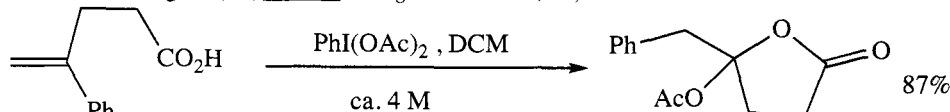


Jyachitra, G.; Yasmoen, N.; Rao, K.S.; Ralte, S.L.; Srinivasan, R.; Singh, A.K. *Synth. Commun.* **2003**, 33, 3461.

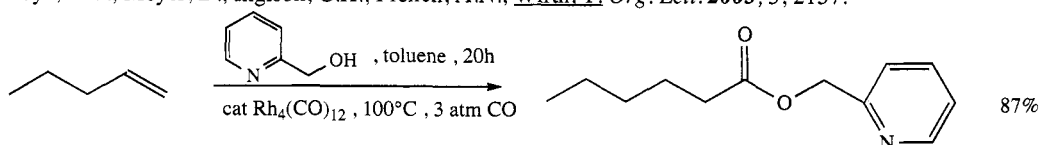
SECTION 119: ESTERS FROM ALKENES



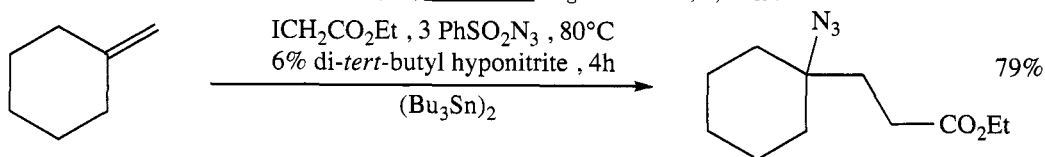
Yokota, T.; Sakaguchi, S.; Ishii, Y. *J. Org. Chem.* **2002**, 67, 5005.



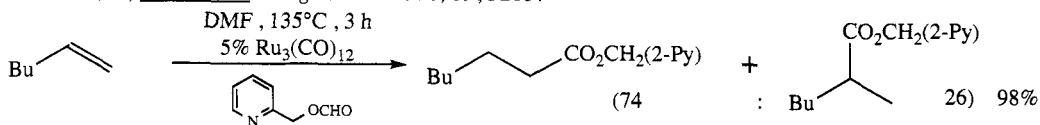
Boye, A.C.; Meyer, D.; Ingison, C.K.; French, A.N.; Wirth, T. *Org. Lett.* **2003**, 5, 2157.



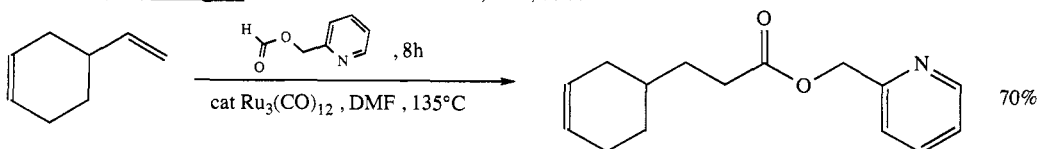
Yokota, K.; Tatamidani, H.; Fukumoto, Y.; Chatani, N. *Org. Lett.* **2003**, 5, 4329.



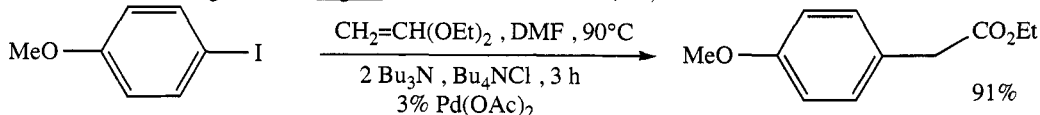
Panchaud, P.; Renaud, P. *J. Org. Chem.* **2004**, 69, 3205.



Ko, S.; Na, Y.; Chang, S. *J. Am. Chem. Soc.* **2002**, 124, 750.



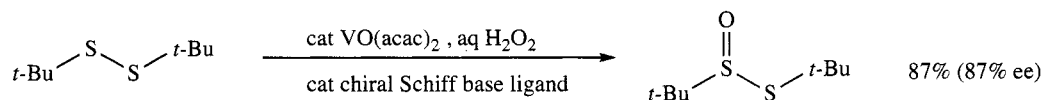
Na, Y.; Ko, S.; Hwang, L.K.; Chang, S. *Tetrahedron Lett.* **2003**, 44, 4475.



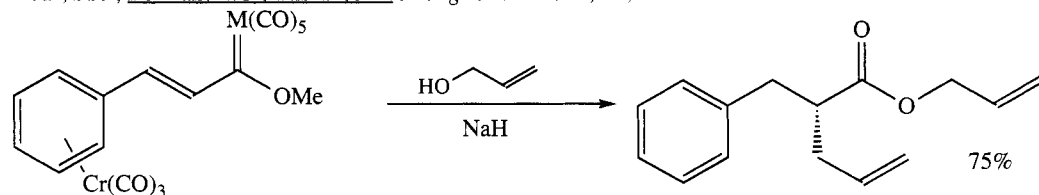
Battistuzzi, G.; Cacchi, S.; Fabrizi, G.; Bernini, R. *Synlett* **2003**, 1133.

Also via: Section 44 (Alcohols and Thiols from Alkenes).

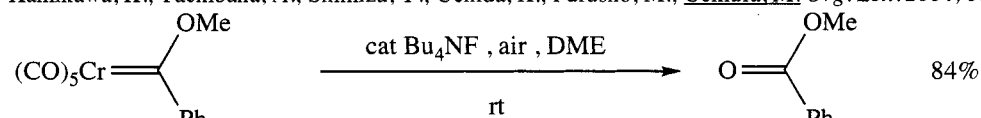
SECTION 120: ESTERS FROM MISCELLANEOUS COMPOUNDS



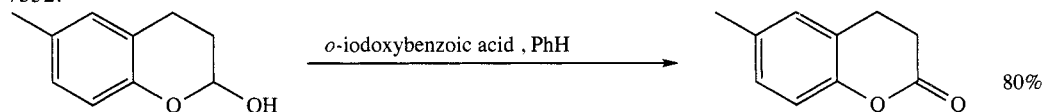
Blum, S.A.; Berman, R.G.; Ellman, J.A. *J. Org. Chem.* **2003**, 68, 150.



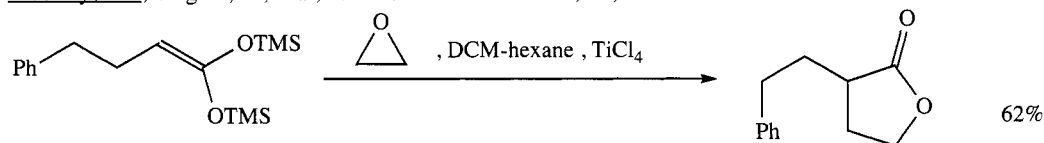
Kamikawa, K.; Tachibana, A.; Shimizu, Y.; Uchida, K.; Furusho, M.; Uemura, M. *Org. Lett.* **2004**, 6, 4307.



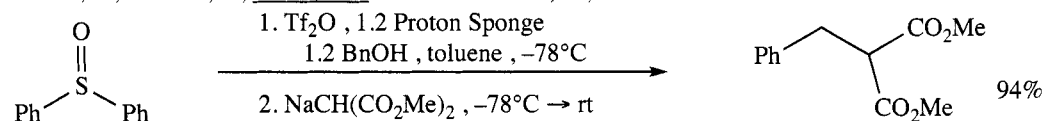
Barluenga, J.; Andina, F.; Fernández-Rodríguez, M.A.; García-García, P.; Merino, I. *J. Org. Chem.* **2004**, 69, 7352.



Moorthy, J.N.; Singhal, N.; Mal, P. *Tetrahedron Lett.* **2004**, 45, 309.



Maslak, V.; Matovic, R.; Saicic, R.N. *Tetrahedron* **2004**, 60, 8957.

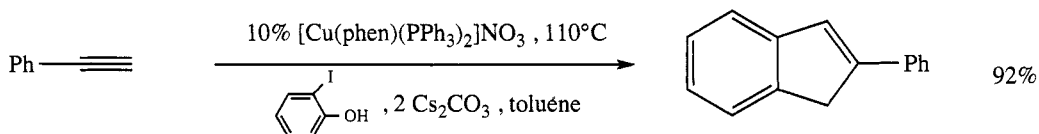


Takuwa, T.; Yoshitaka, J.; Onishi, Y.; Matsuo, J.; Mukaiyama, T. *Chem. Lett.* **2004**, 33, 8.

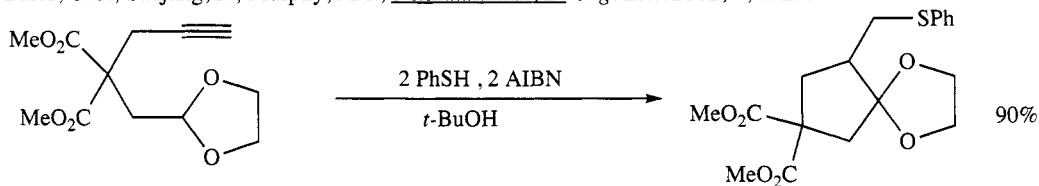
CHAPTER 9

PREPARATION OF ETHERS, EPOXIDES, AND THIOETHERS

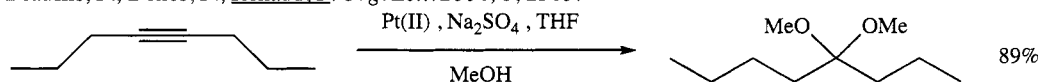
SECTION 121: ETHERS, EPOXIDES, AND THIOETHERS FROM ALKYNES



Bates, C.G.; Saejung, P.; Murphy, J.M.; Venkataraman, D. *Org. Lett.* **2002**, 4, 4727.

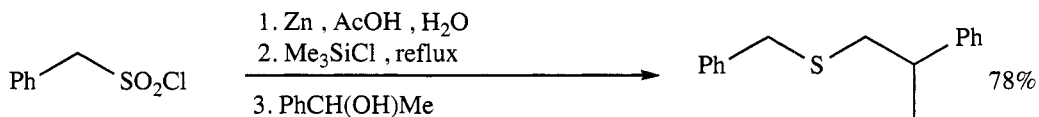


Beaufils, F.; Dénès, F.; Renaud, P. *Org. Lett.* **2004**, 6, 2563.



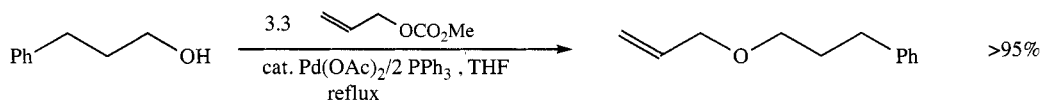
Hartman, J.W.; Sperry, L. *Tetrahedron Lett.* **2004**, 45, 3787.

SECTION 122: ETHERS, EPOXIDES, AND THIOETHERS FROM ACID DERIVATIVES

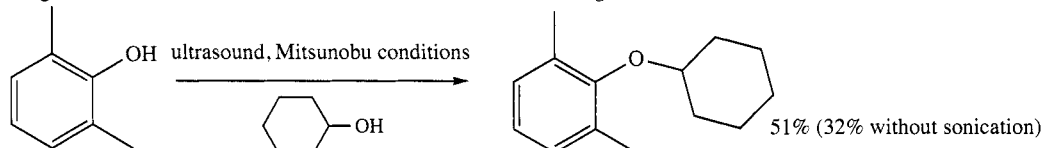


Martin, M.T.; Thomas, A.M.; York, D.G. *Tetrahedron Lett.* **2002**, 43, 2145.

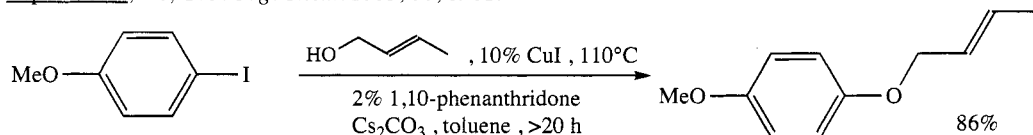
SECTION 123: ETHERS, EPOXIDES, AND THIOETHERS FROM ALCOHOLS AND THIOLS



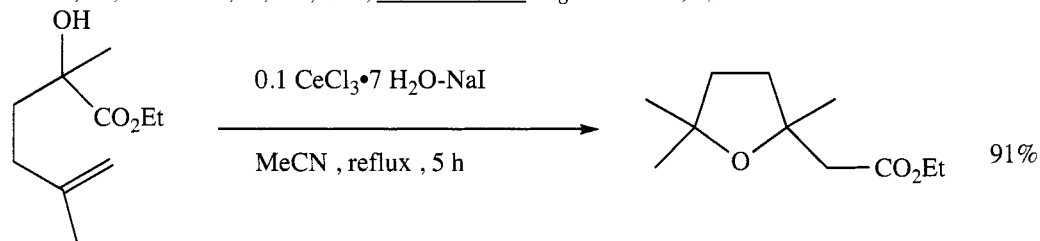
Haight, A.R.; Stoner, E.J.; Peterson, M.J.; Grover, V.K. *J. Org. Chem.* **2003**, 68, 8092.



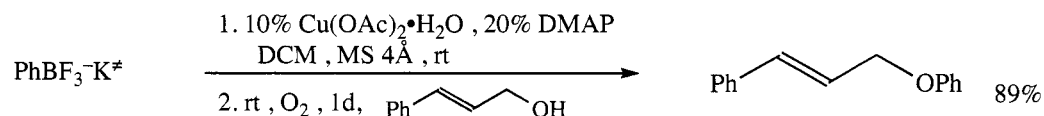
Lepore, S.D.; He, Y. *J. Org. Chem.* **2003**, 68, 8261.



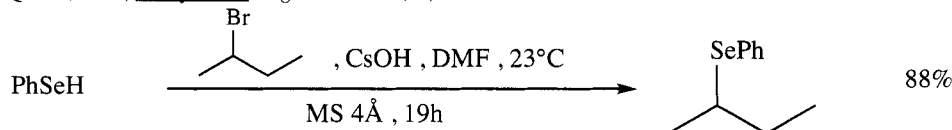
Wolter, M.; Nordmann, G.; Job, G.E.; Buchwald, S.L. *Org. Lett.* **2002**, 4, 973.



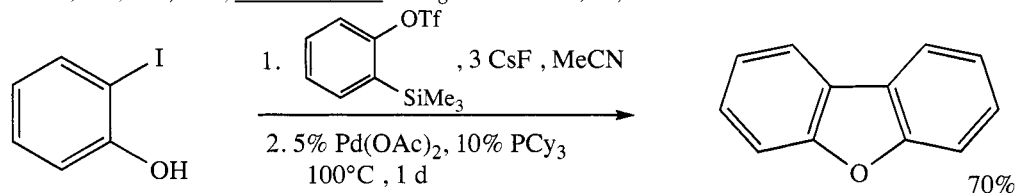
Martta, E.; Foresti, E.; Marcelli, T.; Peri, F.; Righi, P.; Scardovi, N.; Rosini, G. *J. Org. Chem.* **2002**, 67, 4451.



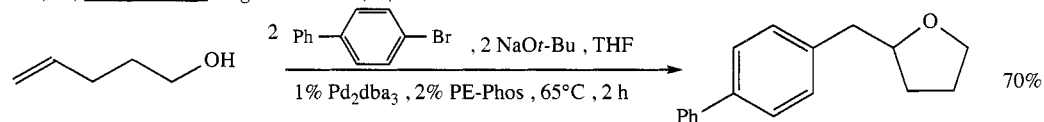
Quach, T.D.; Batey, R.A. *Org. Lett.* **2003**, 5, 1381.



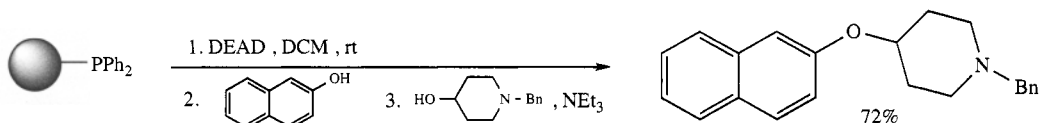
Cohen, R.J.; Fox, D.L.; Salvatore, R.N. *J. Org. Chem.* **2004**, 69, 4265.



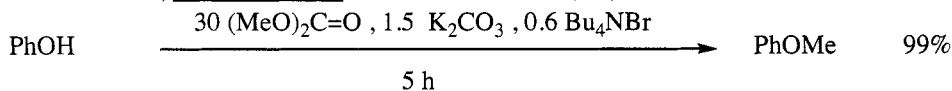
Liu, Z.; Larock, R.C. *Org. Lett.* **2004**, 6, 3739.



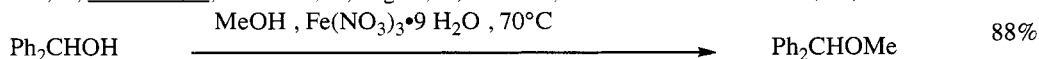
Wolfe, J.P.; Rossi, M.A. *J. Am. Chem. Soc.* **2004**, 126, 1620.



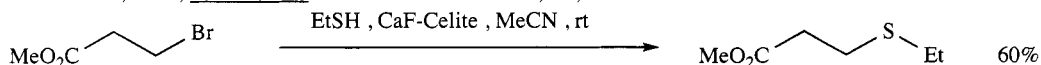
Lizarzabru M.E.; Shuttleworth, S.J., *Tetrahedron Lett.* **2002**, 43, 2157.



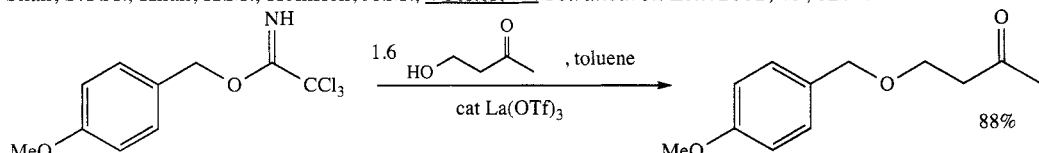
Ouk, S.; Thiebaud, S.; Borredon, E.; Legars, P.; Lecomte, L. *Tetrahedron Lett.* **2002**, 43, 2661.



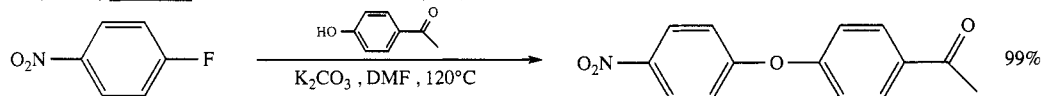
Namboodiri, V.V.; Varma, R.S., *Tetrahedron Lett.* **2002**, 43, 4593.



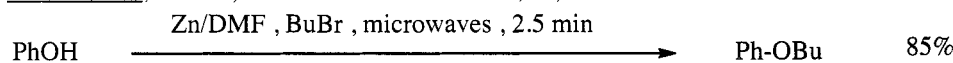
Shah, S.T.A.; Khan, K.M.; Heinrich, A.M.; Voelter, W., *Tetrahedron Lett.* **2002**, 43, 8281.



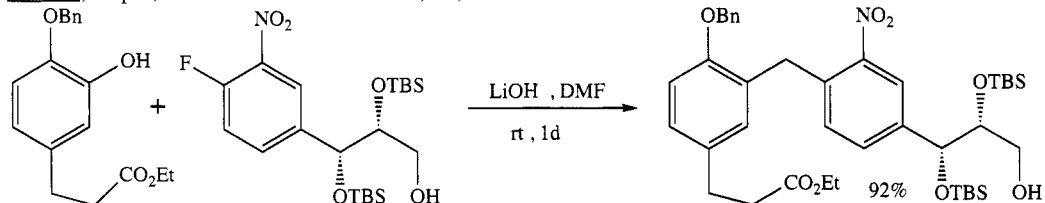
Rai, A.N.; Basu, A., *Tetrahedron Lett.* **2003**, 44, 2267.



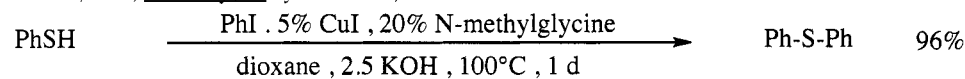
Mitchell, L.H.; Barvian, N.C. *Tetrahedron Lett.* **2004**, 45, 5669.



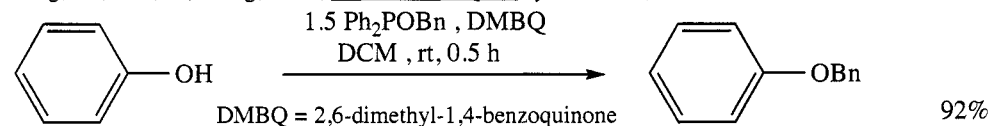
Paul, S.; Gupta, M. *Tetrahedron Lett.* **2004**, 45, 8825.



Ankala, S.V.; Fenteany, G., *Synlett* **2003**, 825.



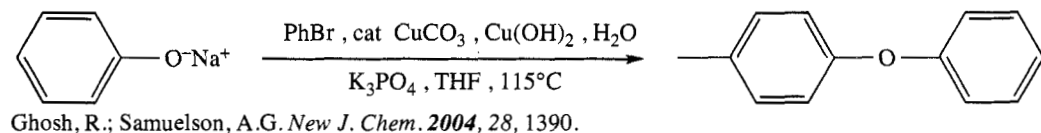
Deng, W.; Zou, Y.; Wang, Y.-F.; Liu, L.; Guo, Q.-X., *Synlett* **2004**, 1254.



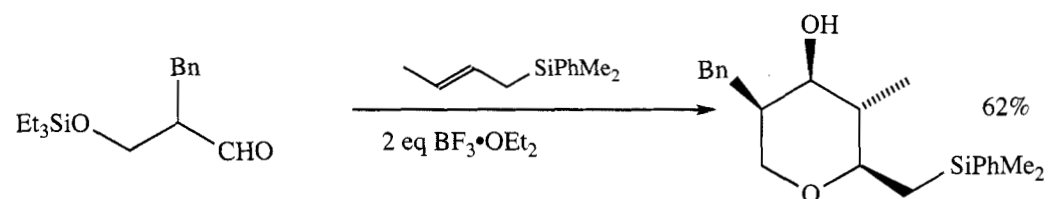
Shintou, T.; Kikuchi, W.; Mukaiyama, T. *Chem. Lett.* **2003**, 32, 22.



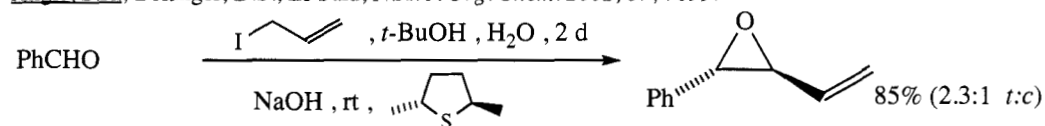
Mukaiyama, T.; Ikegai, K. *Chem. Lett.* **2004**, 33, 1522.



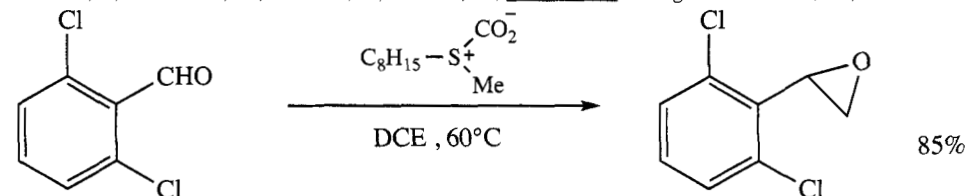
SECTION 124: ETHERS, EPOXIDES, AND THIOETHERS FROM ALDEHYDES



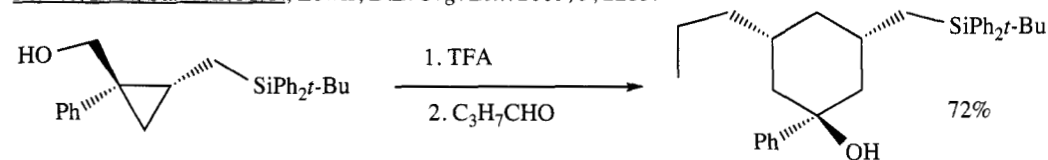
Angle, S.R.; Belanger, D.S.; El-Said, N.A. *J. Org. Chem.* **2002**, 67, 7699.



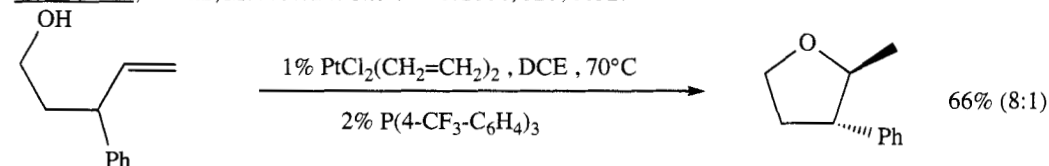
Zanardi, J.; Lamazure, D.; Minière, S.; Reboul, V.; Metzner, P. *J. Org. Chem.* **2002**, 67, 9083.



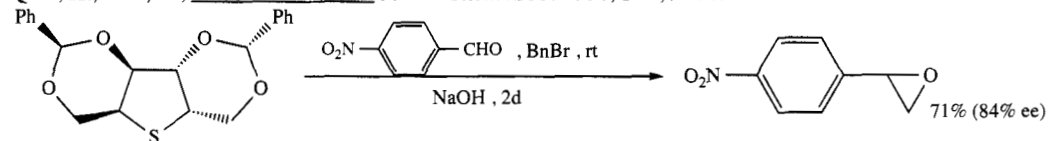
Forbes, D.C.; Standen, M.C.; Lewis, D.L. *Org. Lett.* **2003**, 5, 2283.



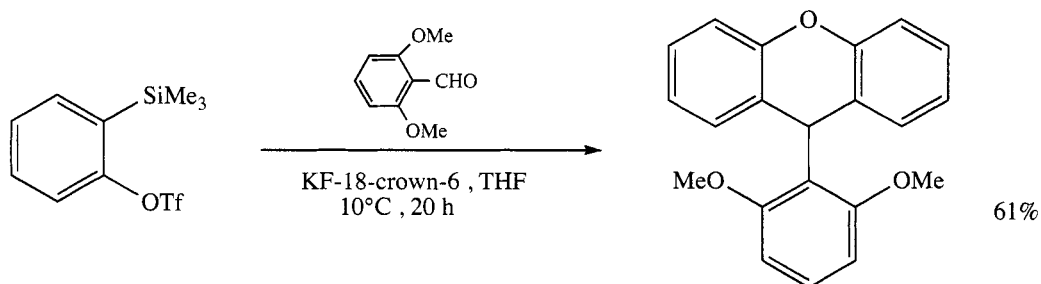
Yadav, V.K.; Kumar, M.V. *J. Am. Chem. Soc.* **2004**, 126, 8652.



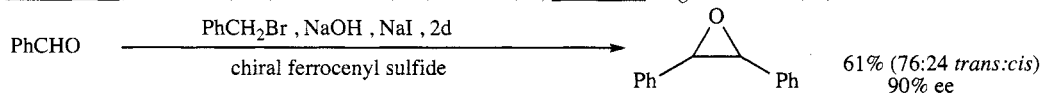
Qian, H.; Han, X.; Widenhoefer, R.A. *J. Am. Chem. Soc.* **2004**, 126, 9536.



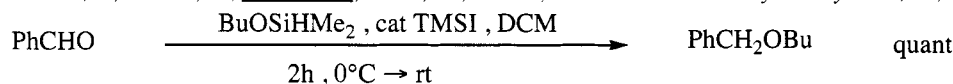
Winn, C.L.; Bellenie, B.R.; Gordman, J.M. *Tetrahedron Lett.* **2002**, 43, 5427.



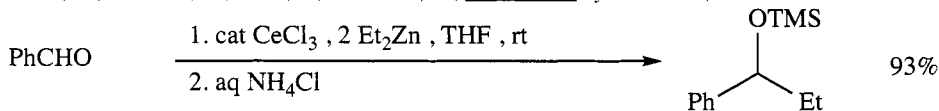
Yoshida, H.; Watanabe, M.; Rukushima, H.; Ohshita, J.; Kunai, A. *Org. Lett.* **2004**, 6, 4049.



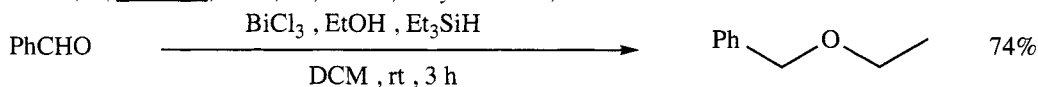
Minière, S.; Reboul, V.; Metzner, P.; Fochi, M.; Bonini, B.F. *Tetrahedron: Asymmetry* **2004**, 15, 3275.



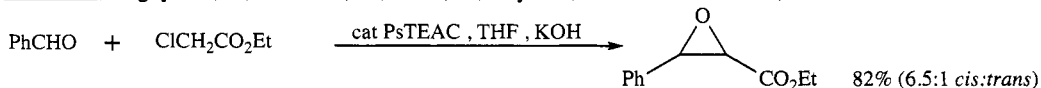
Miura, K.; Ootsuka, K.; Suda, S.; Nishikari, H.; Hosomi, A. *Synlett* **2002**, 313.



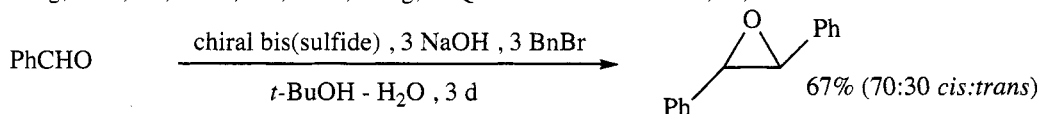
Fischer, S.; Groth, U.; Jeske, M.; Schütz, T. *Synlett* **2002**, 1922.



Wada, M.; Nagayama, S.; Mizutani, K.; Hiori, R.; Miyoshi, N. *Chem. Lett.* **2002**, 248.

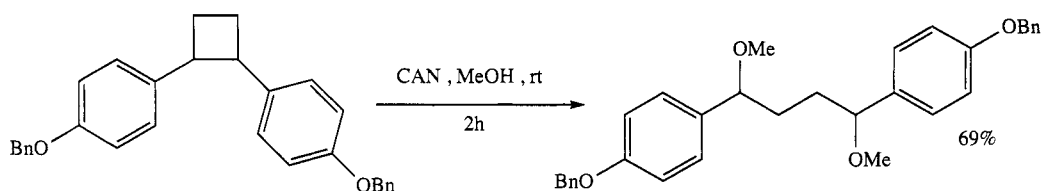


Wang, Z.-T.; Xu, L.-W.; Xia, C.-G.; Wsng, H.-Q. *Helv. Chim. Acta* **2004**, 87, 1958.



Ishizaki, M.; Hoshino, O. *Heterocycles* **2002**, 57, 1399.

SECTION 125: ETHERS, EPOXIDES, AND THIOETHERS FROM ALKYL, METHYLENES, AND ARYLS



Nir, V.; Rajan, R.; Mohanan, K.; Sheeba, V. *Tetrahedron Lett.* **2003**, 44, 4585.

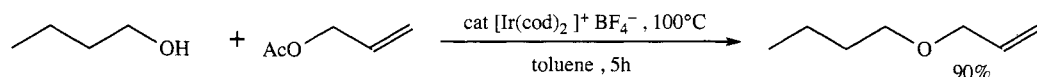
SECTION 126: ETHERS, EPOXIDES, AND THIOETHERS FROM AMIDES

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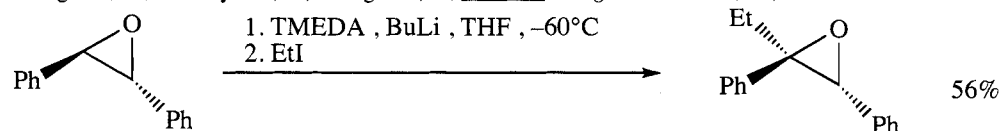
SECTION 127: ETHERS, EPOXIDES, AND THIOETHERS FROM AMINES

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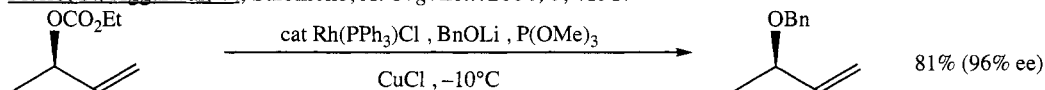
SECTION 128: ETHERS, EPOXIDES, AND THIOETHERS FROM ESTERS



Nakagawa, H.; Hirabayashi, T.; Sakaguchi, S.; Ishii, Y. *J. Org. Chem.* **2004**, *69*, 3474.

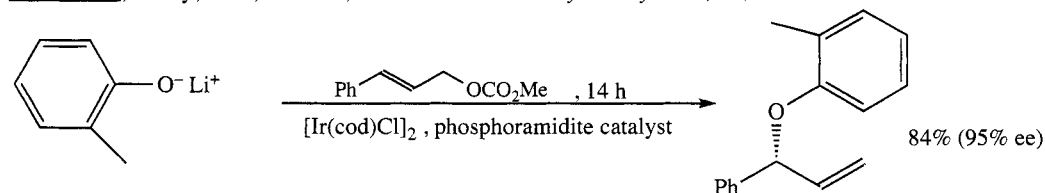


Florio, S.; Aggarwal, V.; Salomone, A. *Org. Lett.* **2004**, *6*, 4191.

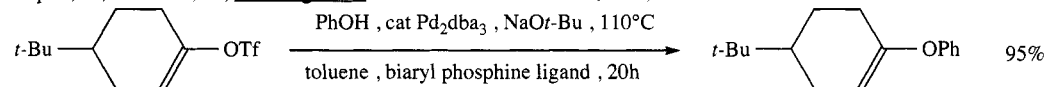


Evans, P.A.; Leahy, D.K. *J. Am. Chem. Soc.* **2002**, *124*, 7882.

Evans, P.A.; Leahy, D.K.; Slikaer, L.M. *Tetrahedron: Asymmetry* **2003**, *14*, 3613.

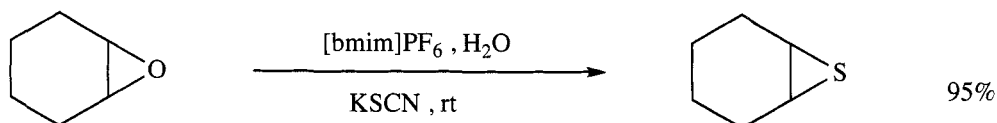


López, F.; Chmura, T.; Hartwig, J.F. *J. Am. Chem. Soc.* **2003**, *125*, 3426.

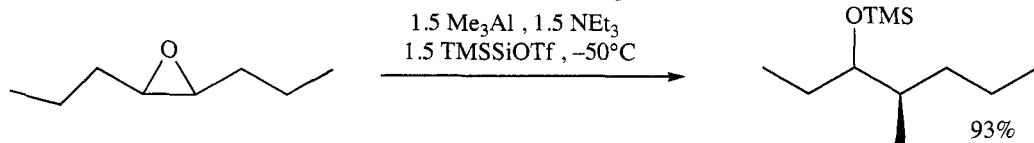


Willis, M.C.; Taylor, D.; Gillmore, A.T. *Chem. Commun.* **2003**, 2222.

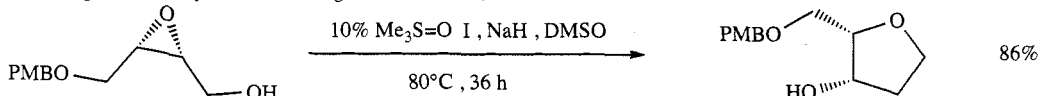
SECTION 129: ETHERS, EPOXIDES, AND THIOETHERS FROM ETHERS, EPOXIDES, AND THIOETHERS



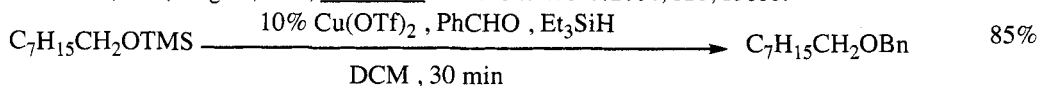
Yadav, J.S.; Reddy, B.V.S.; Reddy, Ch.S.; Rajasekhar, K. *J. Org. Chem.* **2003**, 68, 2525.



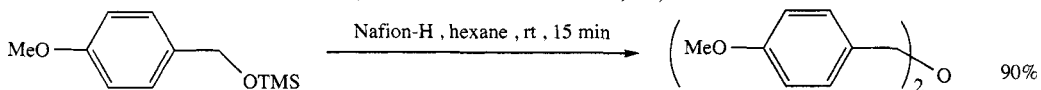
Shanmugam, P.; Miyashita, M. *Org. Lett.* **2003**, 5, 3265.



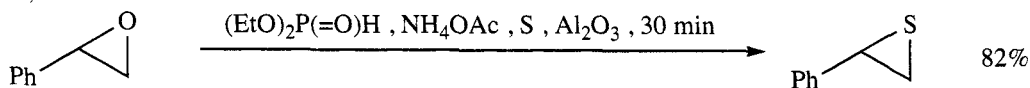
Schomaker, J.M.; Pulgam, V.R.; Borhan, B. *J. Am. Chem. Soc.* **2004**, 126, 13600.



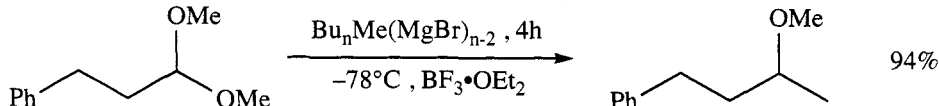
Takeda, T.; Shono, T.; Ito, K.; Sasak, H. *Tetrahedron Lett.* **2003**, 44, 7837.



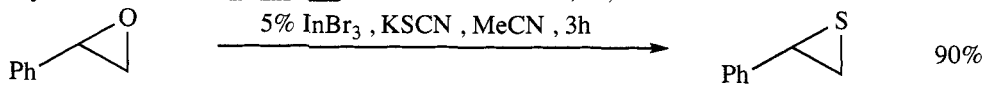
Zolfigol, M.A.; Mohammadpor-Baltork, I.; Habibi, D.; Mirjalili, B.F.; Bamoniri, A. *Tetrahedron Lett.* **2003**, 44, 8165.



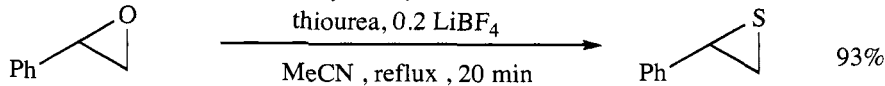
Tamami, B.; Kolahdoozan, M. *Tetrahedron Lett.* **2004**, 45, 1535.



Hojo, M.; Ushioda, N.; Hosomi, A. *Tetrahedron Lett.* **2004**, 45, 4499.

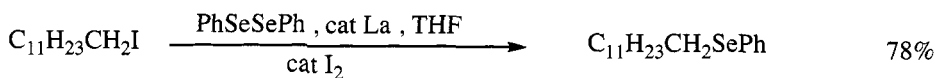


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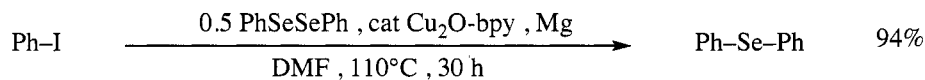


Kazemi, F.; Kiasat, A.R.; Ebrahimi, S. *Synth. Commun.* **2003**, 33, 595.

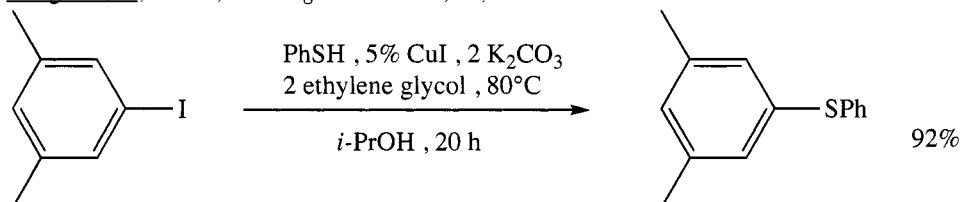
SECTION 130: ETHERS, EPOXIDES, AND THIOETHERS FROM HALIDES AND SULFONATES



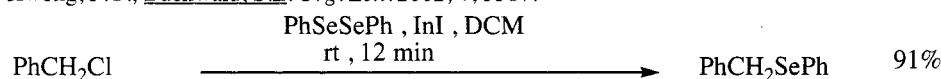
Nishino, T.; Okada, M.; Kuroki, T.; Watanabe, T.; Nishiyama, Y.; Sonoda, N. *J. Org. Chem.* **2002**, 67, 8696.



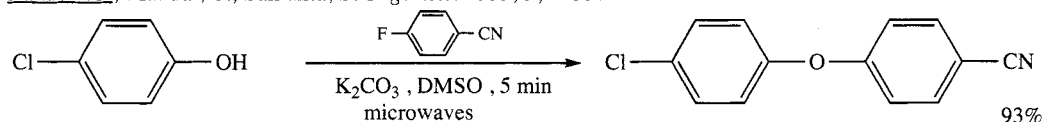
Taniguchi, N.; Onami, T. *J. Org. Chem.* **2004**, 69, 915.



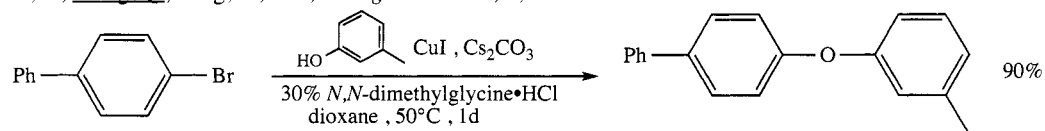
Kwong, F.Y.; Buchwald, S.L. *Org. Lett.* **2002**, 4, 3517.



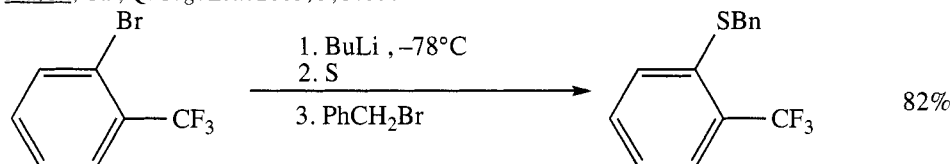
Ranu, B.C.; Mandal, T.; Samanta, S. *Org. Lett.* **2003**, 5, 1439.



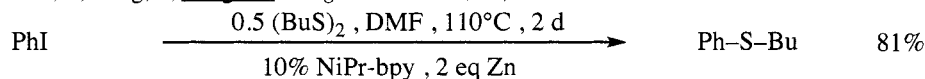
Li, F.; Wang, Q.; Ding, Z.; Tao, F. *Org. Lett.* **2003**, 5, 2169.



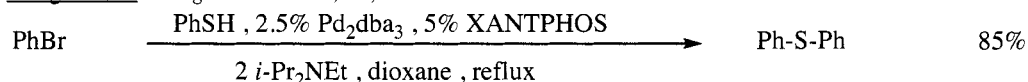
Ma, D.; Cai, Q. *Org. Lett.* **2003**, 5, 3799.



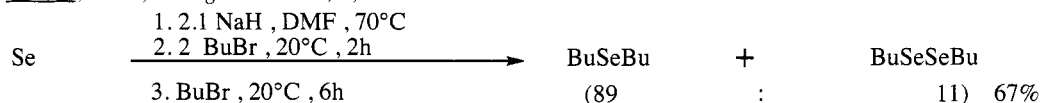
Ham, J.; Yang, I.; Kang, H. *J. Org. Chem.* **2004**, 69, 3236.



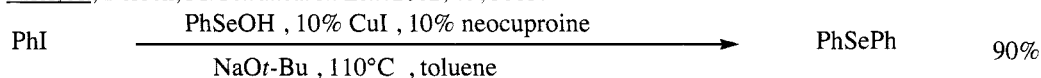
Taniguchi, N. *J. Org. Chem.* **2004**, 69, 6904.



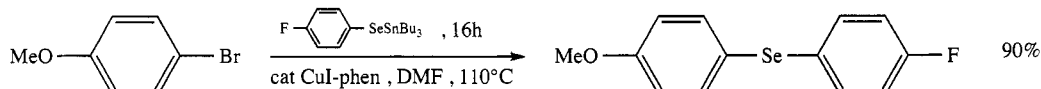
Itoh, T.; Mase, T. *Org. Lett.* **2004**, 6, 4587.



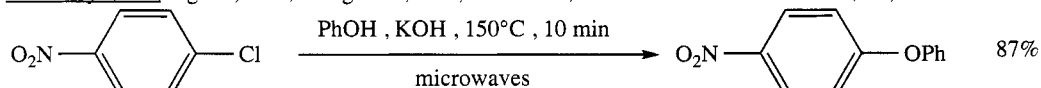
Krief, A.; Derock, M. *Tetrahedron Lett.* **2002**, 43, 3083.



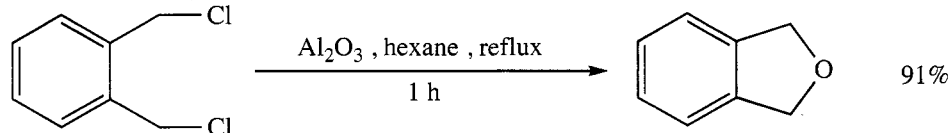
Gujadhar, R.K.; Venkataraman, D. *Tetrahedron Lett.* **2003**, 44, 81.



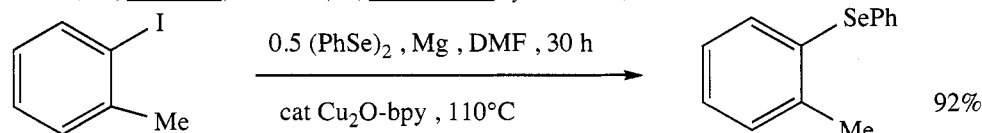
Beletskaya, I.P.; Sigeev, A.S.; Peregudov, A.S.; Petrovskii, P.V. *Tetrahedron Lett.* **2003**, *44*, 7039.



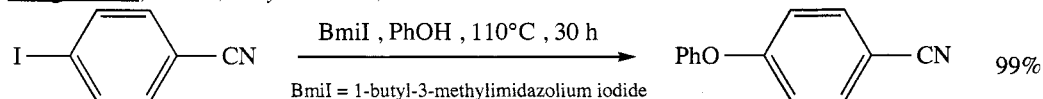
Chaouchi, M.; Loupy, A.; Margue, S.; Petit, A. *Eur. J. Org. Chem.* **2003**, 1278.



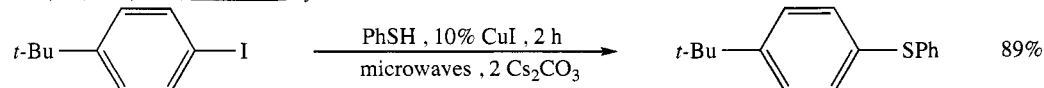
Mihara, M.; Ishino, Y.; Minakata, S.; Komatsu, M. *Synlett* **2002**, 1526.



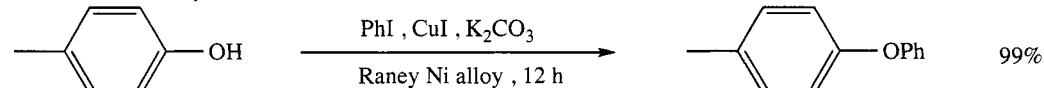
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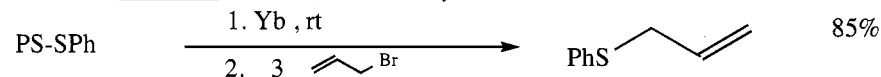
Luo, Y.; Wu, J.X.; Ren, R.X. *Synlett* **2003**, 1734.



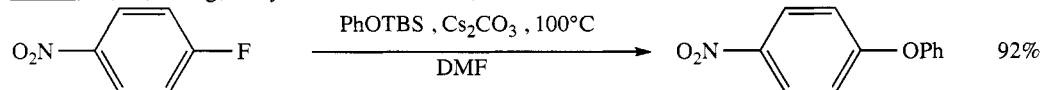
Wu, Y.-J.; He, H. *Synlett* **2003**, 1789.



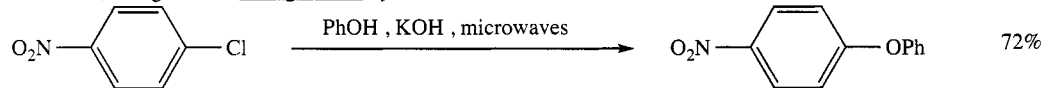
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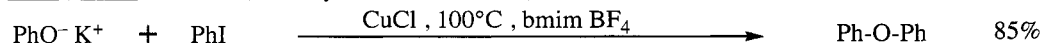
Su, W.; Li, Y.; Zhang, Y. *Synth. Commun.* **2002**, *32*, 2101.



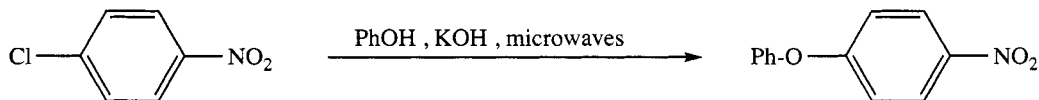
Cui, S.-L.; Jiang, Z.-Y.; Wang, Y.-G. *Synlett* **2004**, 1829.



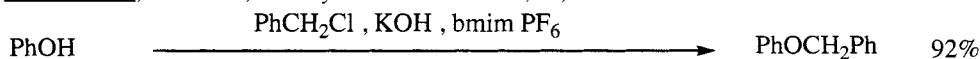
Rebeiro, G.L.; Khadilkar, B.M. *Synth. Commun.* **2003**, *33*, 1405.



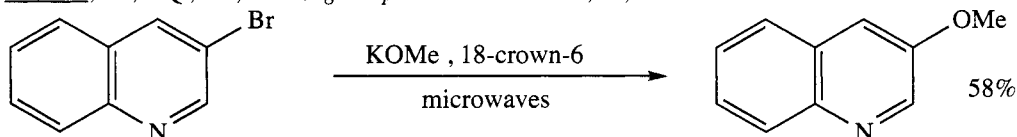
Chauhan, S.M.S.; Jain, N.; Kumar, A.; Srinivas, K.A. *Synth. Commun.* **2003**, *33*, 3607.



Rebeiro, G.L.; Khadilkar, B.M. *Synth. Commun.* **2004**, *34*, 1405.



Xu, Z.Y.; Xu, D.Q.; Liu, B.Y. *Org. Prep. Proceed. Int.* **2004**, *36*, 156.



Llounç, M.; Loupy, A.; Marque, S.; Petit, A. *Heterocycles* **2004**, *63*, 297.

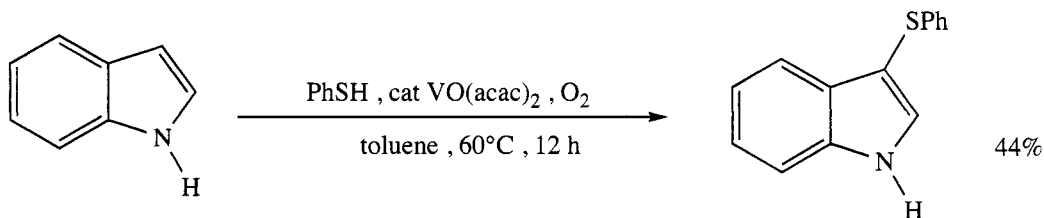
REVIEW:

"Renaissance of Ullmann and Goldberg Reactions: Progress in Copper Catalyzed C–N, C–O and C–S Coupling"

Kunz, K.; Scholz, U.; Ganzer, D. *Synlett* **2003**, 2428.

Related Method: Section 123 (Ethers, Epoxides and Thioethers from Alcohols and Thiols).

SECTION 131: ETHERS, EPOXIDES, AND THIOETHERS FROM HYDRIDES



Maeda, Y.; Koyabu, M.; Nishimura, T.; Uemura, S. *J. Org. Chem.* **2004**, *69*, 7688.

SECTION 132: ETHERS, EPOXIDES, AND THIOETHERS FROM KETONES

NO ADDITIONAL EXAMPLES

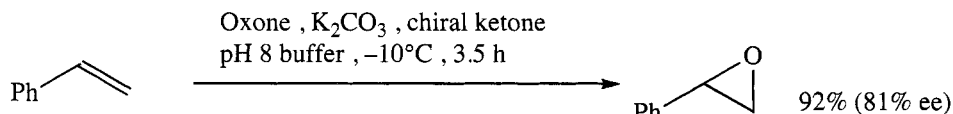
Related Method: Section 124 (Epoxide, Ethers and Thioethers from Aldehydes).

SECTION 133: ETHERS, EPOXIDES, AND THIOETHERS FROM NITRILES

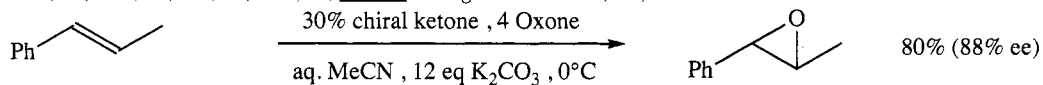
NO ADDITIONAL EXAMPLES

SECTION 134: ETHERS, EPOXIDES, AND THIOETHERS FROM ALKENES

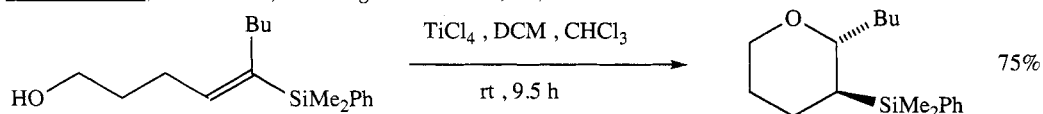
ASYMMETRIC COMPOUNDS



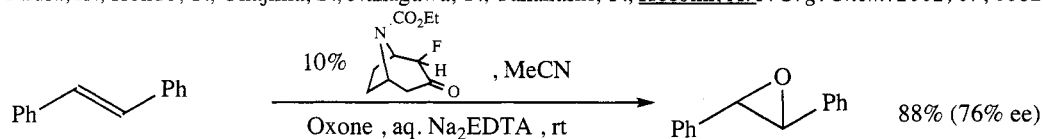
Tian, H.; She, X.; Yu, H.; Shu, L.; Shi, Y. *J. Org. Chem.* **2002**, 67, 2435.



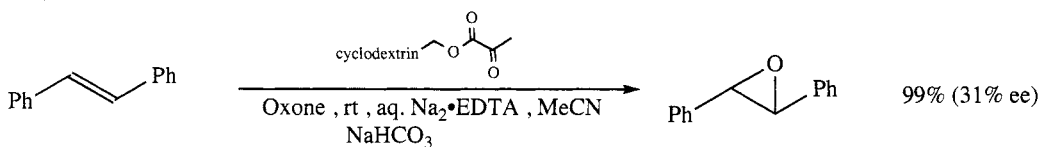
Denmark, S.E.; Matsuhashi, H. *J. Org. Chem.* **2002**, 67, 3479.



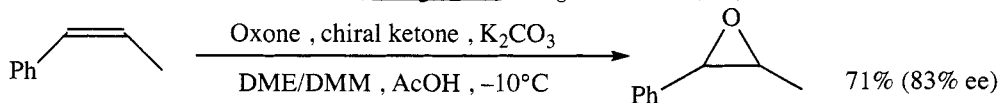
Miura, K.; Hondo, T.; Okajima, S.; Nakagawa, T.; Takahashi, T.; Hosomi, A. *J. Org. Chem.* **2002**, 67, 6082.



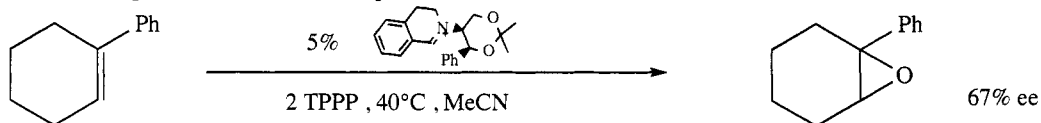
Armstrong, A.; Ahmed, G.; Donminguiz-Fernandez, B.; Hayter, B.R.; Wailes, J.S. *J. Org. Chem.* **2002**, 67, 8610.



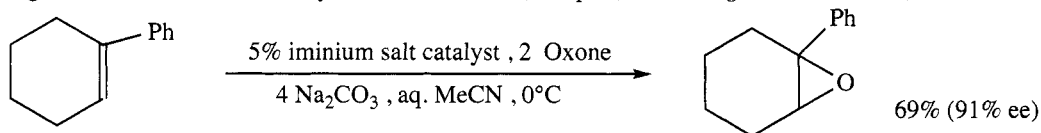
Chan, W.-K.; Yu, W.-Y.; Che, C.-M.; Wong, M.-K. *J. Org. Chem.* **2003**, 68, 6576.



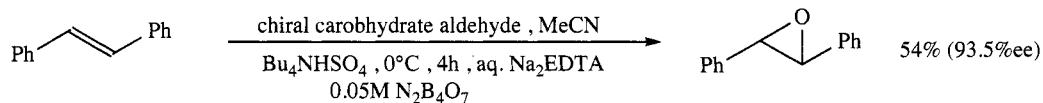
Shu, L.; Wang, P.; Gan, Y.; Shi, Y. *Org. Lett.* **2003**, 5, 293.



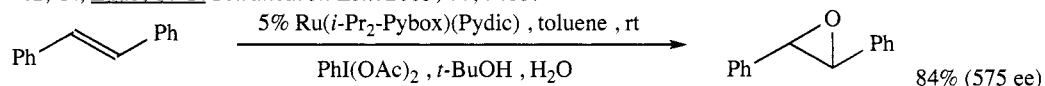
Page, P.C.B.; Barros, D.; Buckley, B.R.; Ardakani, A.; Marples, B.A. *J. Org. Chem.* **2004**, 69, 3595.



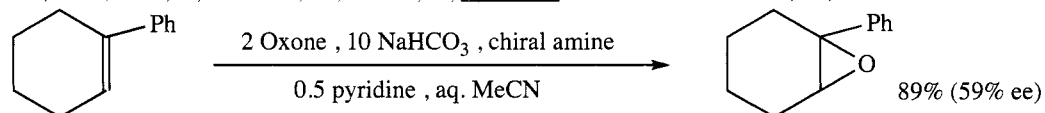
Page, P.C.B.; Buckley, B.R.; Blacker, A.J. *Org. Lett.* **2004**, 6, 1543.



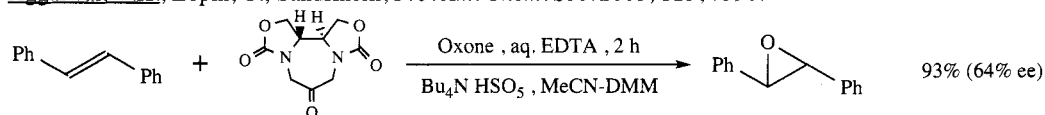
Bez, G.; Zhao, C.-G. *Tetrahedron Lett.* **2003**, 44, 7403.



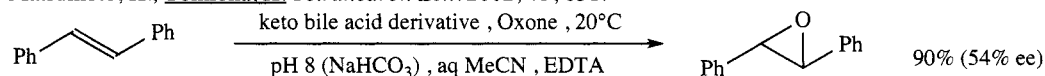
Tse, M.K.; Bhor, S.; Klawonn, M.; Döbler, C.; Beller, M. *Tetrahedron Lett.* **2003**, 44, 7479.



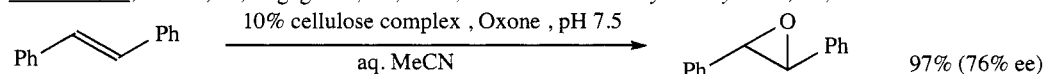
Aggarwal, V.K.; Lopin, C.; Sandrinelli, F. *J. Am. Chem. Soc.* **2003**, 125, 7596.



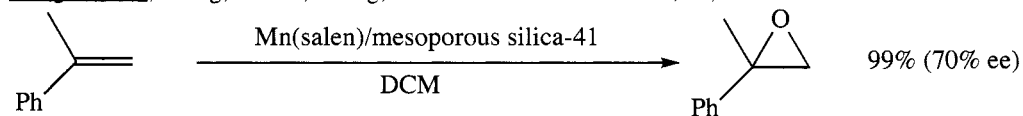
Matsumoto, K.; Tomioka, K. *Tetrahedron Lett.* **2002**, 43, 631.



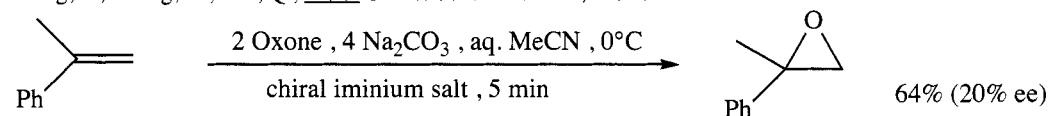
Bortolini, O.; Fantin, G.; Fogagnolo, M.; Mari, L. *Tetrahedron: Asymmetry* **2004**, 15, 3831.



Shing, T.K.M.; Leung, G.Y.C.; Yeung, K.W. *Tetrahedron Lett.* **2003**, 44, 9225.

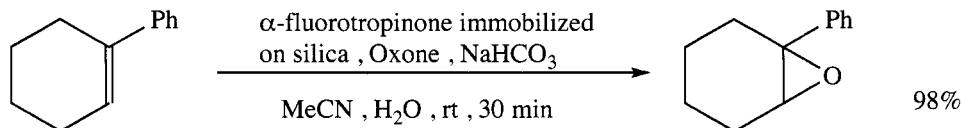


Xiang, S.; Zhang, Y.; Xin, Q.; Li, C. *Chem. Commun.* **2002**, 2696.

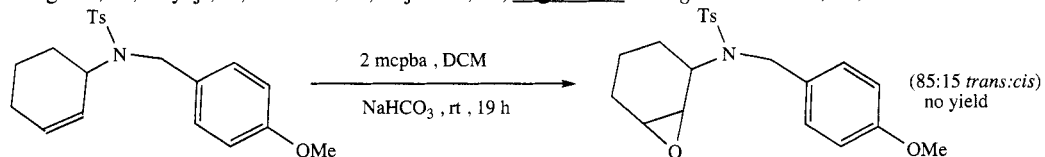


Page, P.C.B.; Rassias, G.A.; Barros, D.; Ardakani, A.; Bethell, D.; Merifield, E. *Synlett* **2002**, 580.

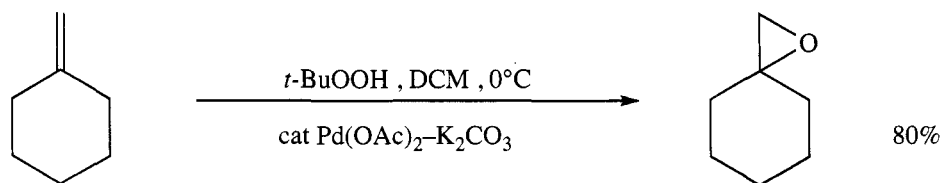
NONASYMMETRIC COMPOUNDS



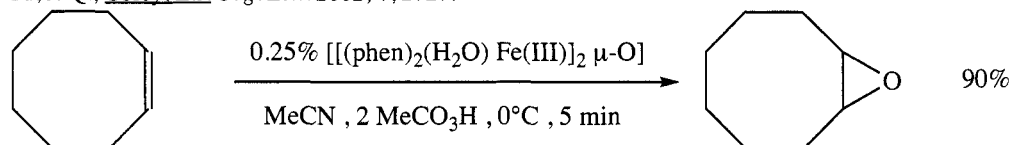
Kitagawa, O.; Miyaji, S.; Yamada, Y.; Fujiwara, H.; Taguchi, T. *J. Org. Chem.* **2003**, 68, 3184.



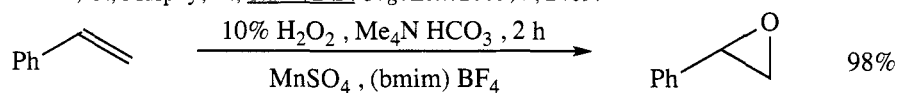
O'Brien, P.; Childs, A.C.; Ensor, G.J.; Hill, C.L.; Kirby, J.P.; Deardon, M.J.; Oxenford, S.J.; Rosser, C.M. *Org. Lett.* **2003**, 5, 4955.



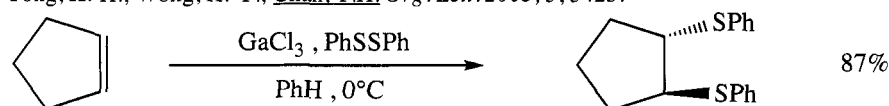
Yu, J.-Q.; Corey, E.J. *Org. Lett.* **2002**, 4, 2727.



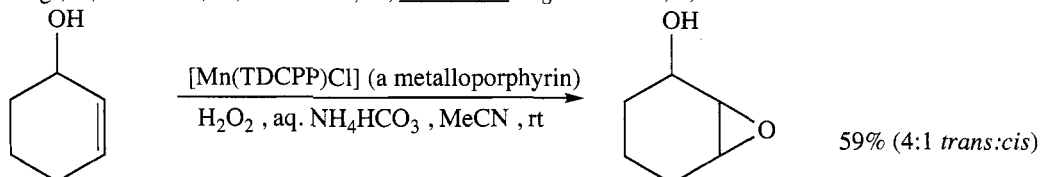
Dubois, G.; Murphy, A.; Stack, D.P. *Org. Lett.* **2003**, 5, 2469.



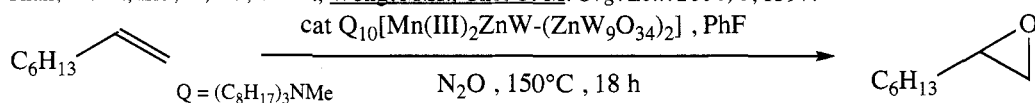
Tong, K.-H.; Wong, K.-Y.; Chan, T.H. *Org. Lett.* **2003**, 5, 3423.



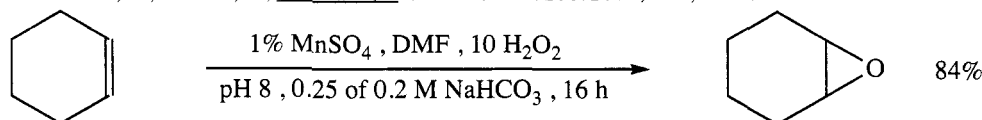
Usagi, S.; Yorimitsu, H.; Shinokubo, H.; Oshima, K. *Org. Lett.* **2004**, 6, 601.



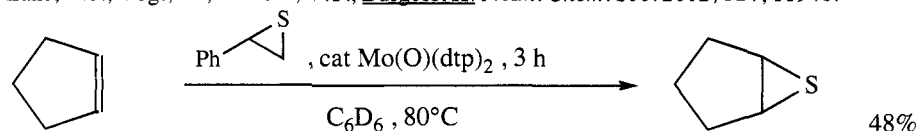
Chan, W.-K.; Liu, P.; Yu, W.-Y.; Wong, M.K.; Che, C.-M. *Org. Lett.* **2004**, 6, 1597.



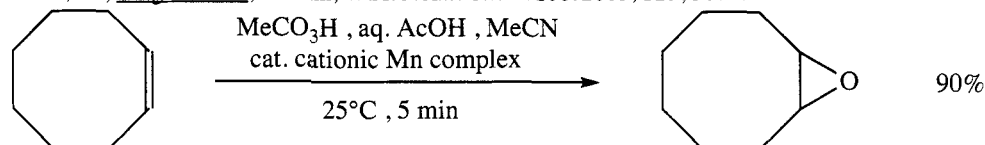
Ben-Daniel, R.; Weiner, L.; Neumann, R. *J. Am. Chem. Soc.* **2002**, 124, 8788.



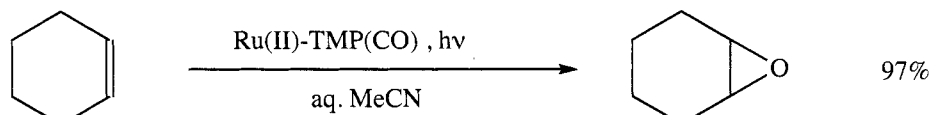
Lane, B.S.; Vogt, M.; DeRose, V.T.; Burgess, K. *J. Am. Chem. Soc.* **2002**, 124, 11946.



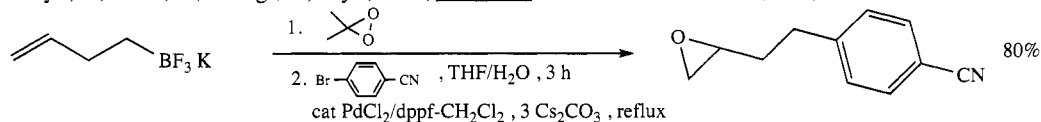
Adam, W.; Bargon, R.M.; Schenk, W.A. *J. Am. Chem. Soc.* **2003**, 125, 3871.



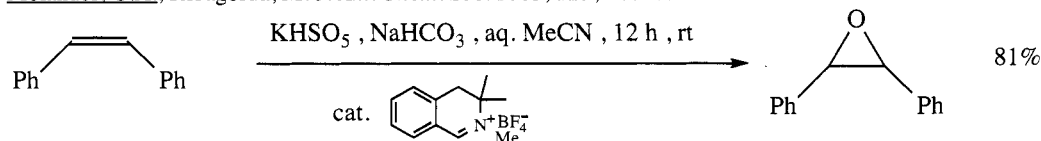
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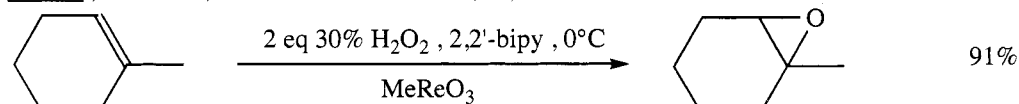
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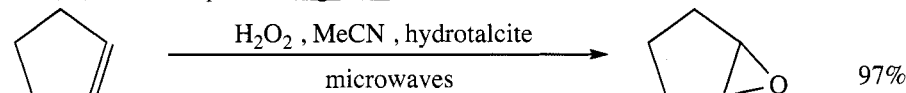
Molander, G.A.; Ribagorda, M. *J. Am. Chem. Soc.* **2003**, 125, 11148.



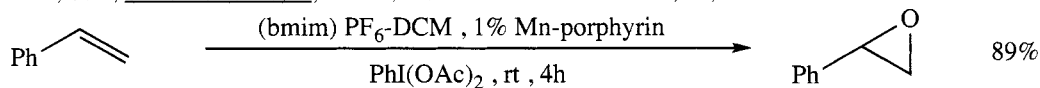
Bohé, L.; Kammoun, M. *Tetrahedron Lett.* **2002**, 43, 803.



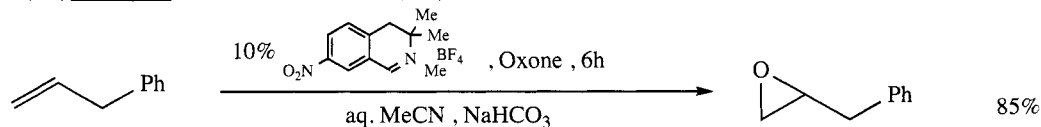
Iskra, J.; Bonnet-Delpon, D.; Bégue, J.-P. *Tetrahedron Lett.* **2002**, 43, 1001.



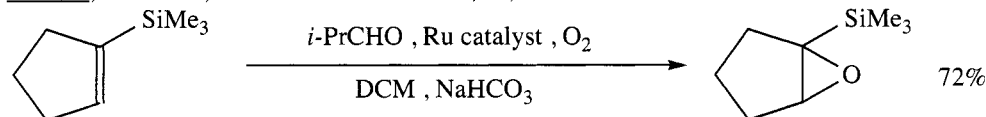
Pillai, U.R.; Sahle-Demessie, E.; Varma, R.S. *Tetrahedron Lett.* **2002**, 43, 2909.



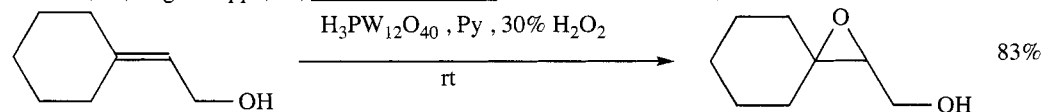
Li, Z.; Xia, C.-G. *Tetrahedron Lett.* **2003**, 44, 2069.



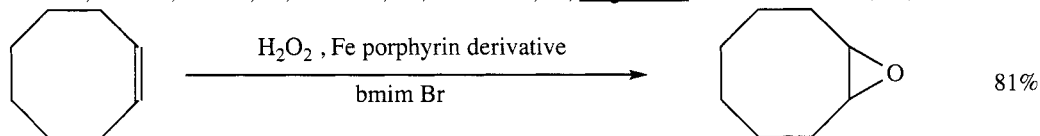
Bohé, L.; Kammoun, M. *Tetrahedron Lett.* **2004**, 45, 747.



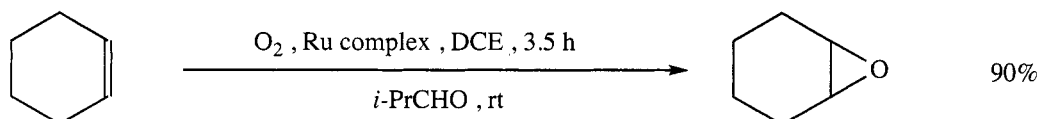
Srikanth, A.; Nagendrappa, G.; Chandrasekaran, S. *Tetrahedron* **2003**, 59, 7761.



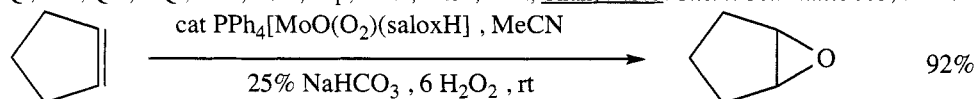
Yamada, Y.M.A.; Tabafa, H.; Ichinohe, M.; Takahashi, H.; Ikegami, S. *Tetrahedron* **2004**, 60, 4087.



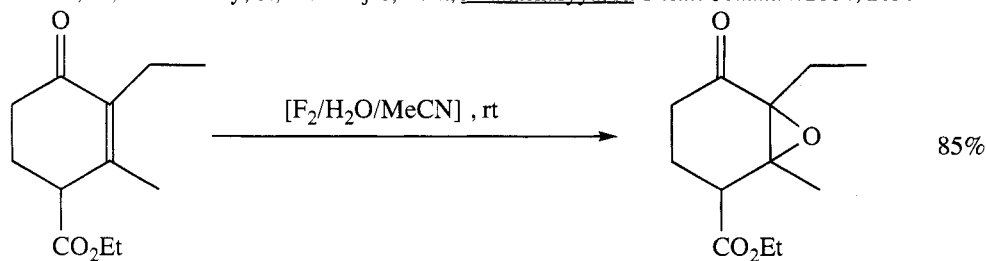
Srinivas, K.A.; Kumar, A.; Chauhan, S.M.S. *Chem. Commun.* **2002**, 2456.



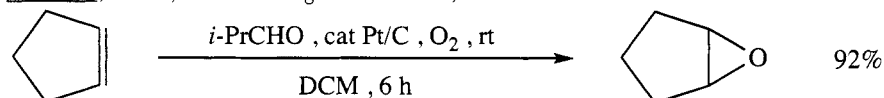
Qi, J.Y.; Qiu, L.Q.; Lam, K.H.; Yip, C.W.; Zhou, Z.Y.; Chan, A.S.C. *Chem. Commun.* **2003**, 1058.



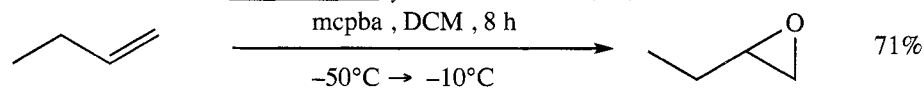
Gharah, N.; Chakraborty, S.; Mukherjee, A.K.; Bhattacharyya, R. *Chem. Commun.* **2004**, 2630.



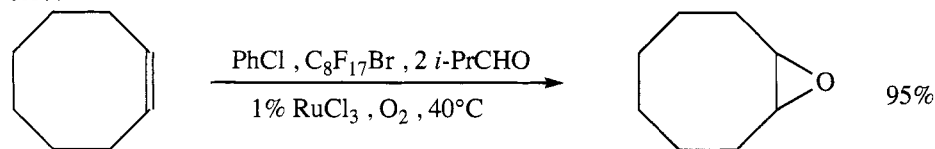
Rozen, S.; Golan, E. *Eur. J. Org. Chem.* **2003**, 1915.



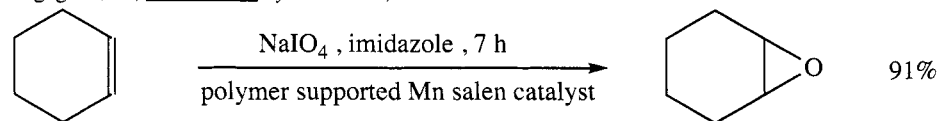
Chen, W.; Yamada, J.; Matsumoto, K. *Synth. Commun.* **2002**, 32, 17.



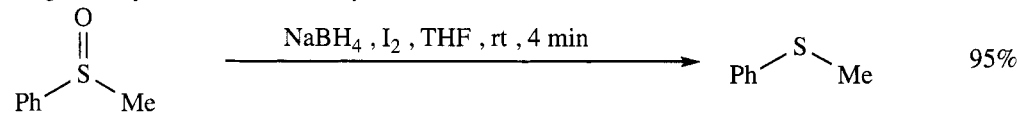
Srinivasan, R.; Chandrasekharan, M.; Vani, P.V.S.N.; Chida, A.S.; Singh, A.K. *Synth. Commun.* **2002**, 32, 1853.



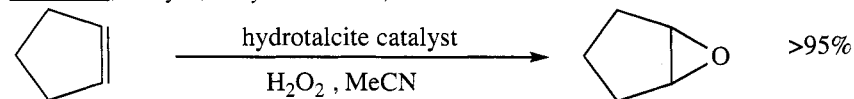
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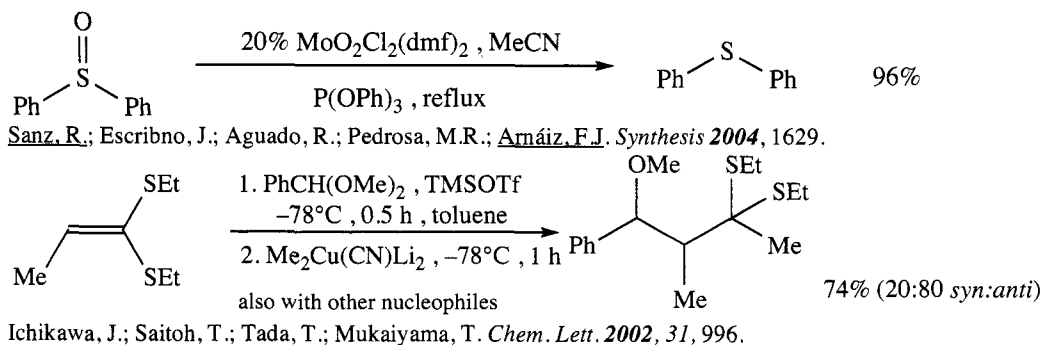
Tangestaninejad, S.; Habibi, M.H. *Synth. Commun.* **2002**, 32, 3331.



Karimi, B.; Zareyee, D. *Synthesis* **2003**, 335.



Pillai, U.R.; Sahle-Demessie, E.; Varma, R.S. *Synth. Commun.* **2003**, 33, 2017.



REVIEWS:

"A Critical Outlook and Comparison of Enantioselective Oxidation Methodologies of Olefins"
 Bonni, C.; Righi, G. *Tetrahedron* **2002**, 58, 4981.

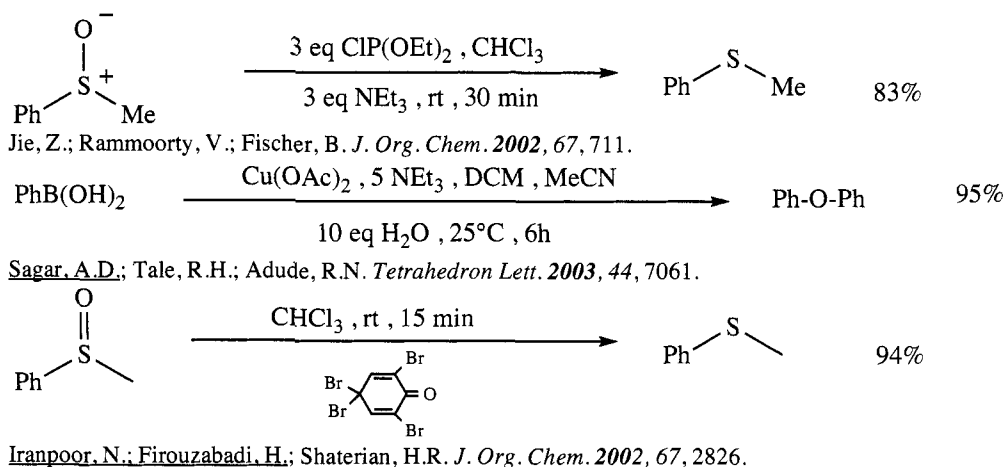
"Oxidation, Epoxidation and Sulfoxidation Reactions Catalyzed by Haloperoxidases"
 Dembitsky, V.M. *Tetrahedron* **2003**, 59, 4701.

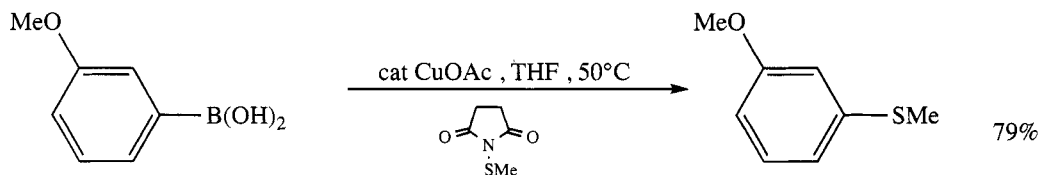
"Organocatalytic Asymmetric Epoxidation of Olefins by Chiral Ketones"
 Shi, Y. *Acc. Chem. Res.* **2004**, 37, 488.

Ketone-Catalyzed Asymmetric Epoxidation Reactions"
 Yang, D. *Acc. Chem. Res.* **2004**, 37, 497.

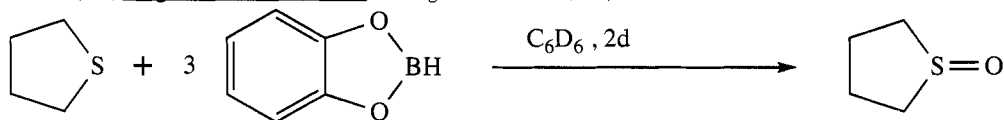
"Olefin Epoxidation with Inorganic Peroxides: Solutions to Four Long-Standing Controversies on the Mechanism of Oxygen Transfer"
 Deubel, D.V.; Frenking, G.; Gisdakis, P.; Herrmann, W.A.; Rösch, N.; Sundemeyer, J. *Acc. Chem. Res.* **2004**, 37, 645.

SECTION 135: ETHERS, EPOXIDES, AND THIOETHERS FROM MISCELLANEOUS COMPOUNDS

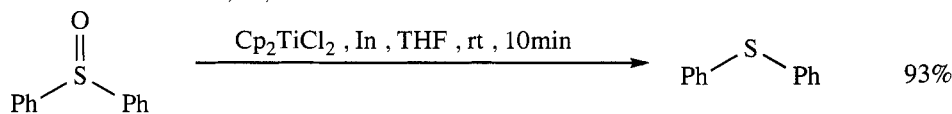




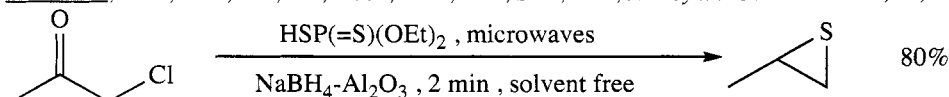
Savarin, C.; Srogl, J.; Liebeskind, L.S. *J. Org. Chem.* **2002**, 67, 4309.



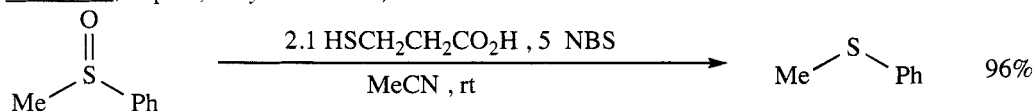
Harrison, D.J.; Tam, N.C.; Vogels, C.M.; Langler, R.F.; Baker, R.T.; Becken, A.; Westcott, S.A. *Tetrahedron Lett.* **2004**, 45, 8493.



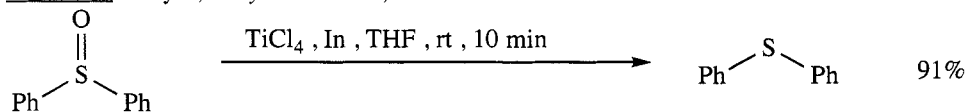
Yoo, B.W.; Choi, K.H.; Lee, S.J.; Yoon, C.M.; Kim, S.H.; Kim, J.H. *Synth. Commun.* **2002**, 32, 63.



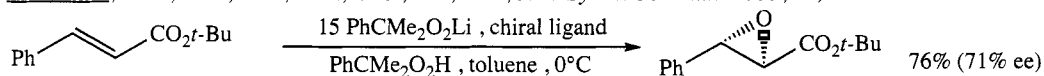
Yadav, J.S.; Kapoor, R. *Synthesis* **2002**, 2344.



Karimi, B.; Zareyee, D. *Synthesis* **2003**, 1875.



You, B.W.; Choi, K.H.; Kim, D.Y.; Choi, K.I.; Kim, J.H. *Synth. Commun.* **2003**, 33, 53.



Tanaka, Y.; Nishimura, K.; Tomioka, K. *Heterocycles* **2002**, 58, 71.

CHAPTER 10

PREPARATION OF HALIDES AND SULFONATES

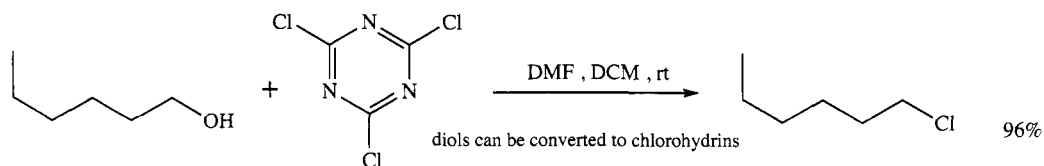
SECTION 136: HALIDES AND SULFONATES FROM ALKYNES

NO ADDITIONAL EXAMPLES

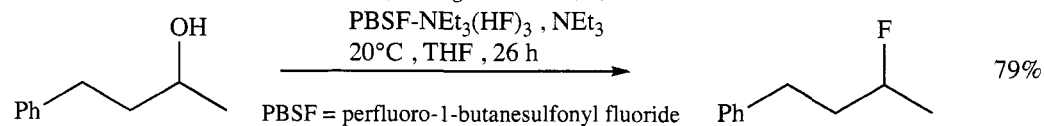
SECTION 137: HALIDES AND SULFONATES FROM ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

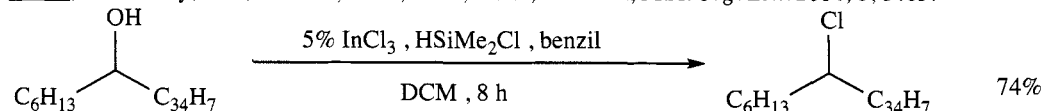
SECTION 138: HALIDES AND SULFONATES FROM ALCOHOLS AND THIOLS



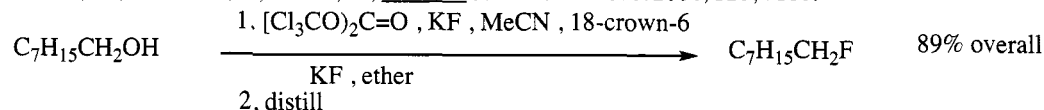
DeLuca, L.; Giacomelli, G.; Porcheddu, A. *Org. Lett.* **2002**, 4, 553.



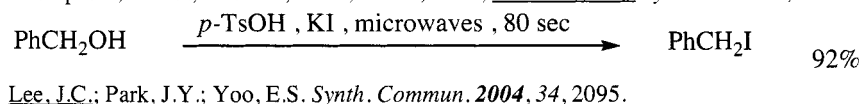
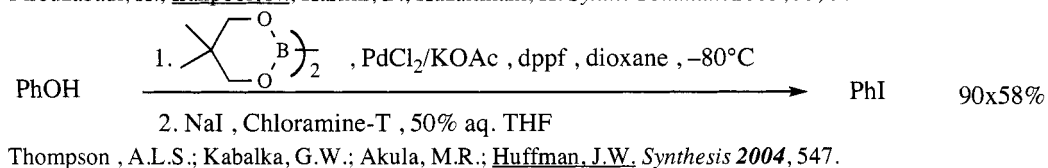
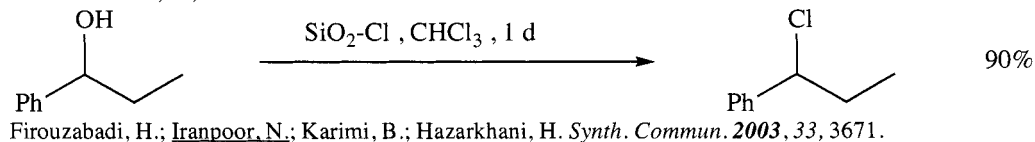
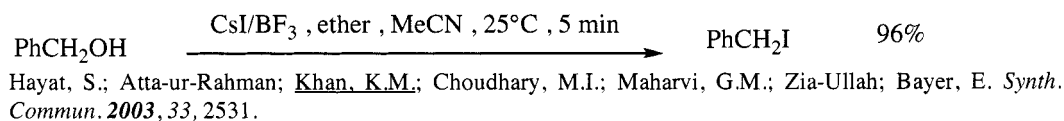
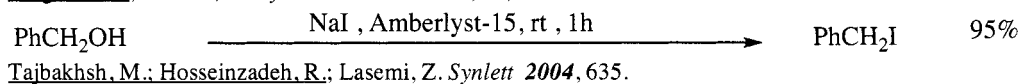
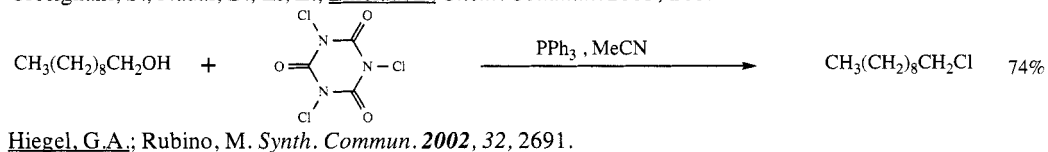
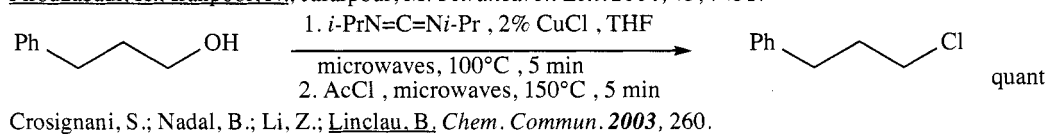
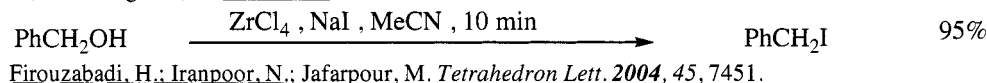
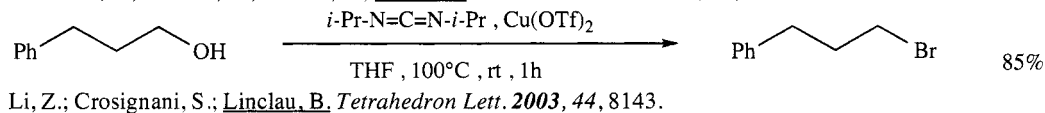
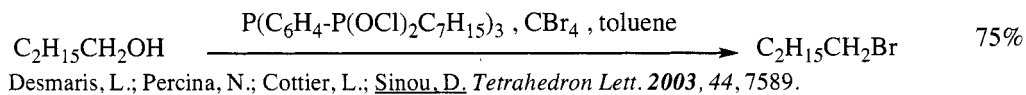
Yin, J.; Zarkowsky, D.S.; Thomas, D.W.; Zhao, M.W.; Huffman, M.A. *Org. Lett.* **2004**, 6, 1465.



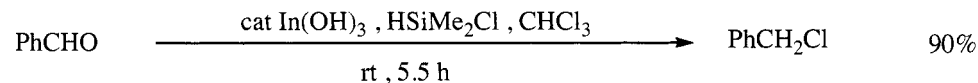
Yasuda, M.; Yamasaki, S.; Onishi, Y.; Baba, A. *J. Am. Chem. Soc.* **2004**, 126, 7186.



Flosser, D.A.; Olofson, R.A. *Tetrahedron Lett.* **2002**, 43, 4275.



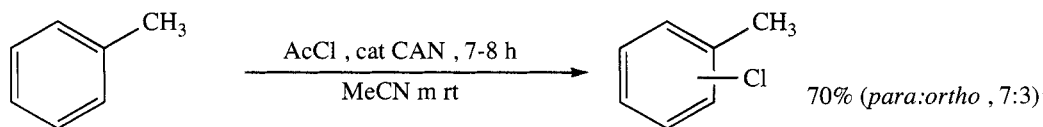
SECTION 139: HALIDES AND SULFONATES FROM ALDEHYDES



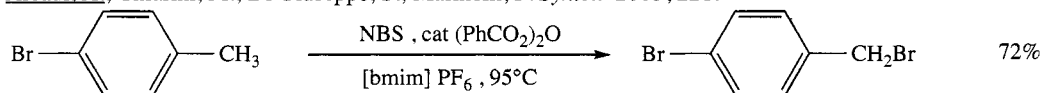
Onishi, Y.; Ogawa, D.; Yasuda, M.; Baba, A. *J. Am. Chem. Soc.* **2002**, *124*, 13690.

SECTION 140: HALIDES AND SULFONATES FROM ALKYL, METHYLENES, AND ARYLS

For the conversion $R-H \rightarrow R-Halogen$, see Section 146 (Halides and Sulfonates from Hydrides).



Arcadi, A.; Chiarini, M.; Di Giuseppe, S.; Marinelli, F. *Synlett* **2003**, 221.



Togo, H.; Hirai, T. *Synlett* **2003**, 702.

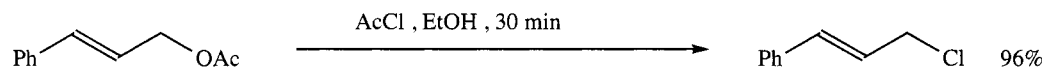
SECTION 141: HALIDES AND SULFONATES FROM AMIDES

NO ADDITIONAL EXAMPLES

SECTION 142: HALIDES AND SULFONATES FROM AMINES

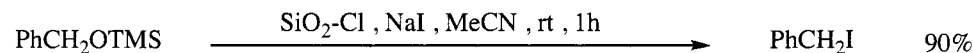
NO ADDITIONAL EXAMPLES

SECTION 143: HALIDES AND SULFONATES FROM ESTERS



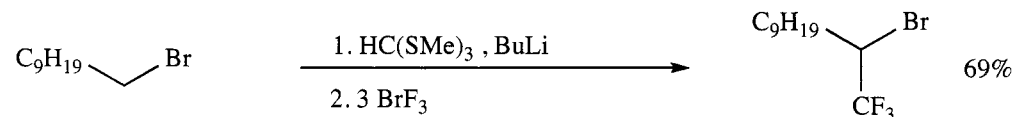
Yadav, V.K.; Babu, K.G. *Tetrahedron* **2003**, 59, 9111.

SECTION 144: HALIDES AND SULFONATES FROM ETHERS, EPOXIDES, AND THIOETHERS

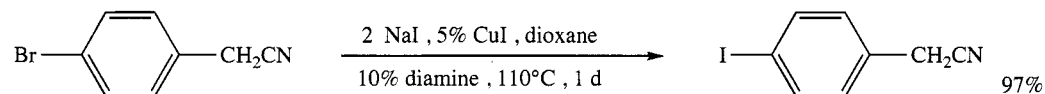


Firouzabadi, H.; Iranpoor, N.; Hazarkhani, H. *Tetrahedron Lett.* **2002**, 43, 7139.

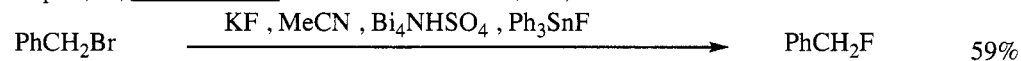
SECTION 145: HALIDES AND SULFONATES FROM HALIDES AND SULFONATES



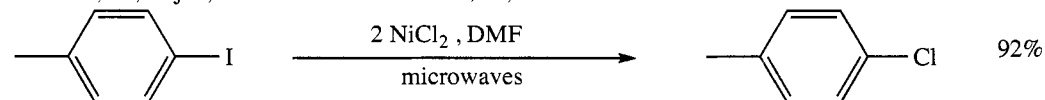
Hageoly, A.; Ben-David, I.; Rozen, S. *J. Org. Chem.* **2002**, 67, 8430.



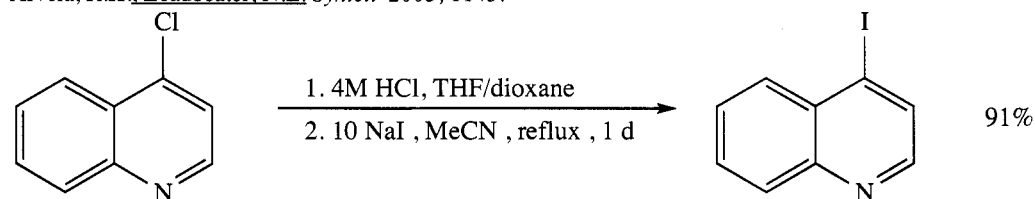
Klapars, A.; Buchwald, S.L. *J. Am. Chem. Soc.* **2002**, *124*, 14844.



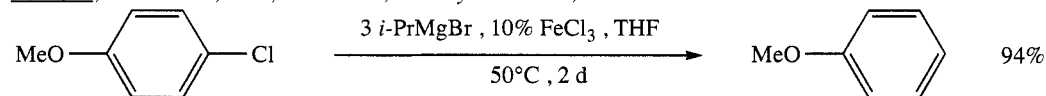
Makosza, M.; Bujok, R. *Tetrahedron Lett.* **2002**, *43*, 2761.



Arvela, R.K.; Leadbeater, N.E. *Synlett* **2003**, 1145.



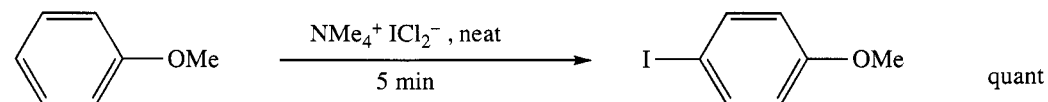
Wolf, C.; Tumambac, G.E.; Villalobos, C.N. *Synlett* **2003**, 1801.



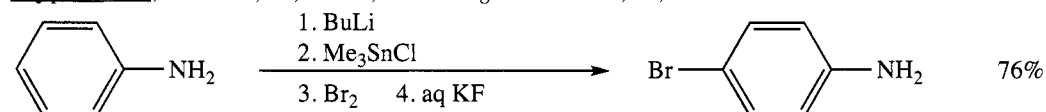
Guo, H.; Kanno, K.; Takahashi, T. *Chem Lett.* **2004**, *33*, 1356.

SECTION 146: HALIDES AND SULFONATES FROM HYDRIDES

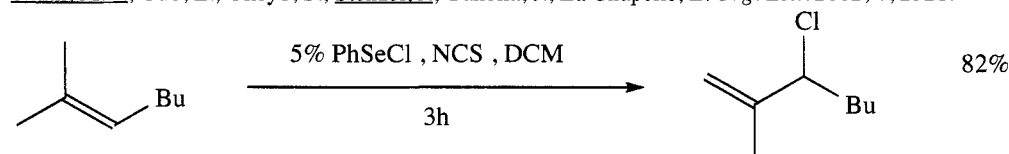
α -Halogenations of aldehydes, ketones and acids are given in Sections 338 (Halide-Aldehyde), 369 (Halide-Ketone), 359 (Halide-Esters) and 319 (Acid-Halide).



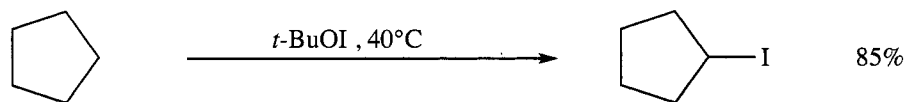
Hajipour, A.R.; Arbabian, M.; Ruoho, A.E. *J. Org. Chem.* **2002**, *67*, 8622.



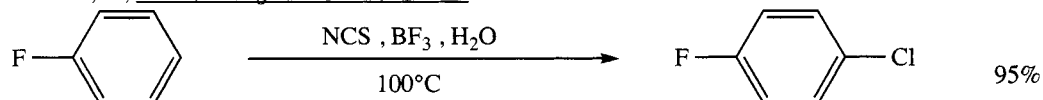
Smith, M.B.; Guo, L.; Okeyo, S.; Stenzel, J.; Yanella, J.; La Chapelle, E. *Org. Lett.* **2002**, *4*, 2321.



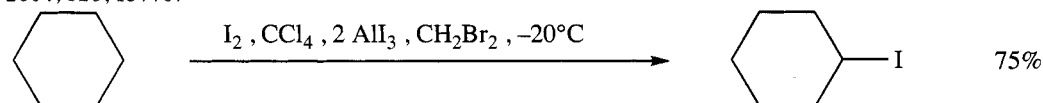
Tunge, J.A.; Mellegaard, S.R. *Org. Lett.* **2004**, *6*, 1205.



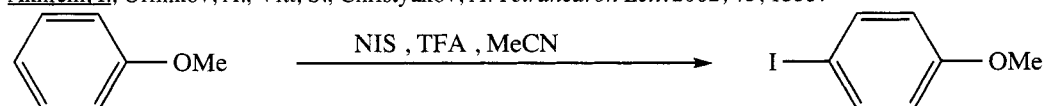
Montoro, R.; Wirth, T. *Org. Lett.* **2003**, *5*, 4729.



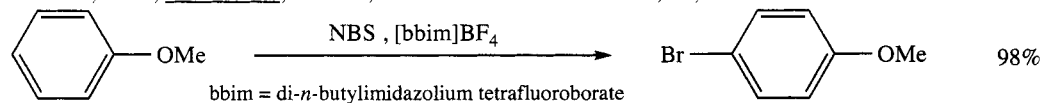
Prakash, G.K.S.; Mathew, T.; Hoole, D.; Esteves, M.; Wang, Q.; Rasul, G.; Olah, G.A. *J. Am. Chem. Soc.* **2004**, *126*, 15770.



Akhrem, I.; Orlinkov, A.; Vitt, S.; Christyakov, A. *Tetrahedron Lett.* **2002**, *43*, 1333.

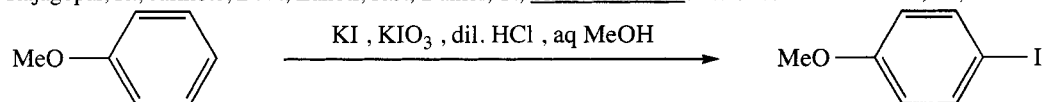


Castanet, A.-S.; Colobert, F.; Broutin, P.-E. *Tetrahedron Lett.* **2002**, *43*, 5047.

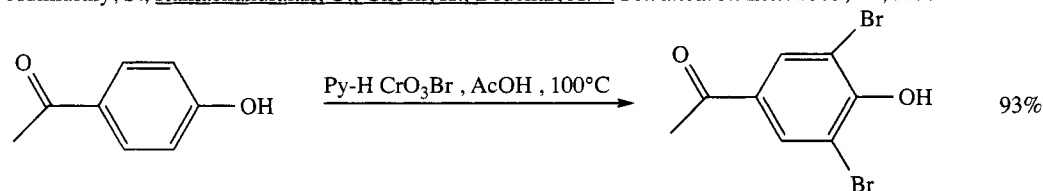


bbim = di-*n*-butylimidazolium tetrafluoroborate

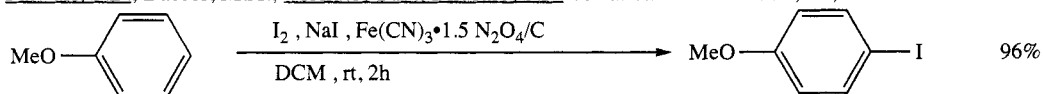
Rajagopal, R.; Jarikote, D.V.; Lahoti, R.J.; Daniel, T.; Srinivasan, K.V. *Tetrahedron Lett.* **2003**, *44*, 1815.



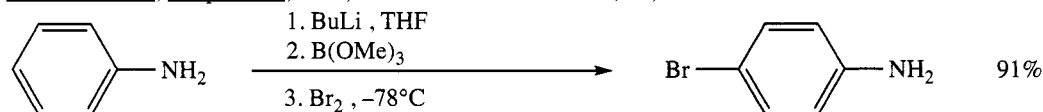
Adimurthy, S.; Ramachandraiah, G.; Ghosh, K.; Bedekar, A.V. *Tetrahedron Lett.* **2003**, *44*, 5099.



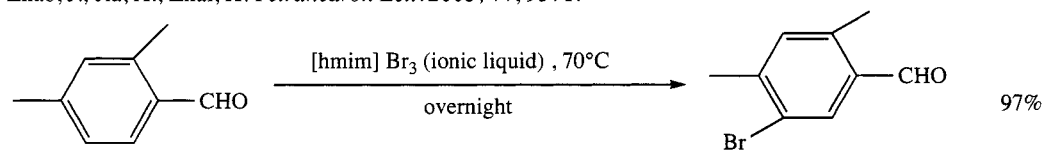
Patwari, S.B.; Baseer, M.A.; Vibhute, Y.B.; Bhusare, S.R. *Tetrahedron Lett.* **2003**, *44*, 4893.



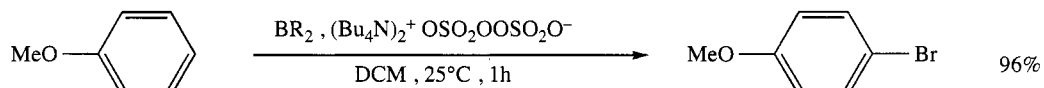
Firouzabadi, H.; Iranpoor, N.; Shiri, M. *Tetrahedron Lett.* **2003**, *44*, 8781.



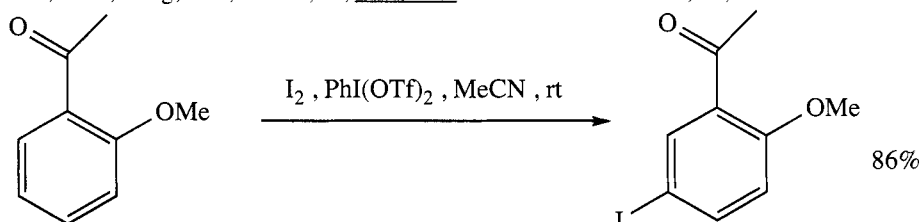
Zhao, J.; Jia, X.; Zhai, H. *Tetrahedron Lett.* **2003**, *44*, 9371.



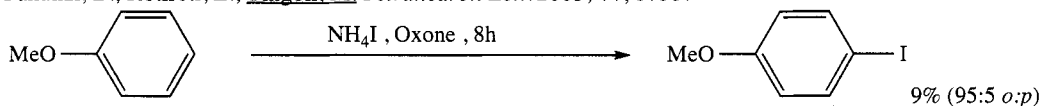
Boñaga, L.V.R.; Zhang, H.-C.; Maryannoff, B.E. *Chem. Commun.* **2004**, 2394.



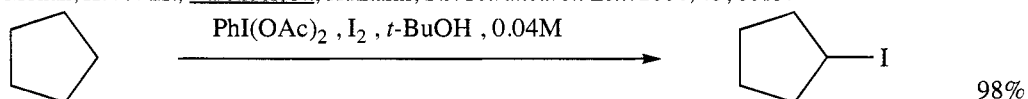
Park, M.Y.; Yang, S.G.; Jadhav, V.; Kim, Y.H. *Tetrahedron Lett.* **2004**, *45*, 4887.



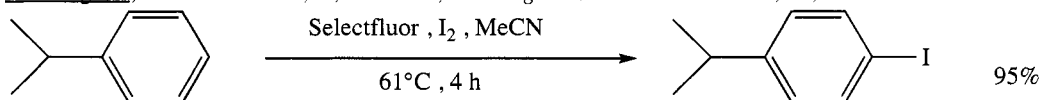
Panunzi, B.; Rotiroti, L.; Tingoli, M. *Tetrahedron Lett.* **2003**, *44*, 8753.



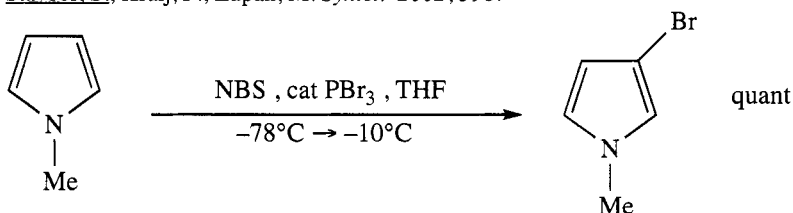
Mohan, K.V.V.K.; Narender, N.; Kulkarni, S.J. *Tetrahedron Lett.* **2004**, *45*, 8015.



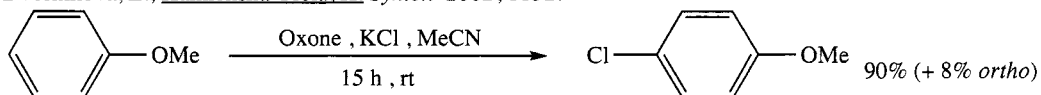
Barluenga, J.; González-Bobes, F.; González, J.M. *Angew. Chem. Int. Ed.* **2002**, *41*, 2556.



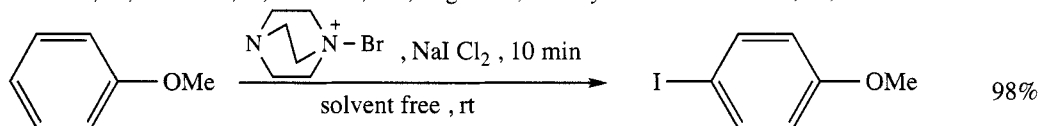
Stavber, S.; Kralj, P.; Zupan, M. *Synlett* **2002**, 598.



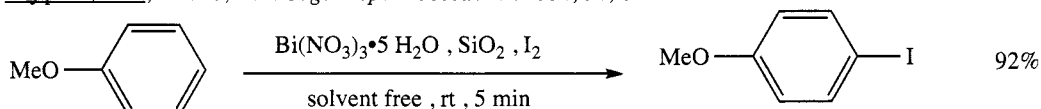
Dvornikova, E.; Kamienska-Trela, K. *Synlett* **2002**, 1152.



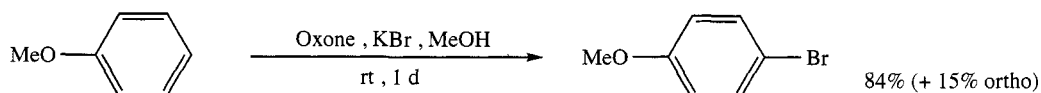
Narender, N.; Srinivasu, P.; Kulkarni, S.J.; Raghavan, K.V. *Synth. Commun.* **2002**, *32*, 279.



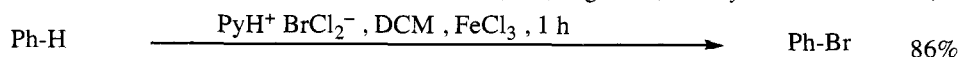
Hajipour, A.R.; Ruoho, A.E. *Org. Prep. Proceed. Int.* **2002**, *34*, 647.



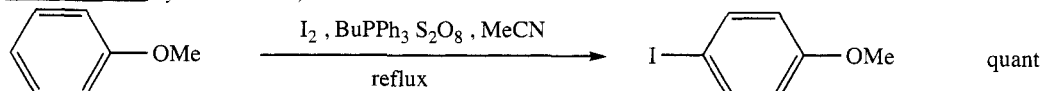
Alexander, V.M.; Khandekar, A.C.; Samant, S.D. *Synlett* **2003**, 1895.



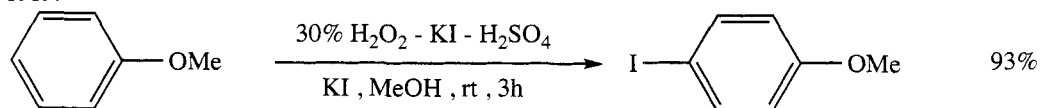
Narender, N.; Srinivasu, P.; Prasad, M.R.; Kulkarni, S.J.; Raghavan, K.V. *Synth. Commun.* **2002**, 32, 2313.



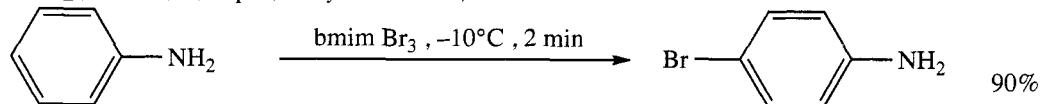
Muathen, H.A. *Synthesis* **2002**, 169.



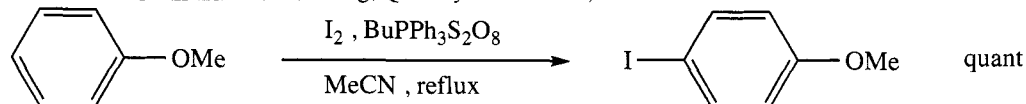
Tajik, H.; Esmaili, A.A.; Mohammadpoor-Baltork, I.; Ershadi, A.; Tajmehri, H. *Synth. Commun.* **2003**, 33, 1319.



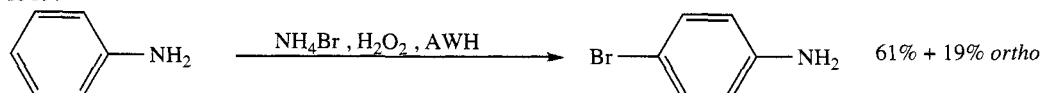
Iskra, J.; Stavber, S.; Zupan, M. *Synthesis* **2004**, 1869.



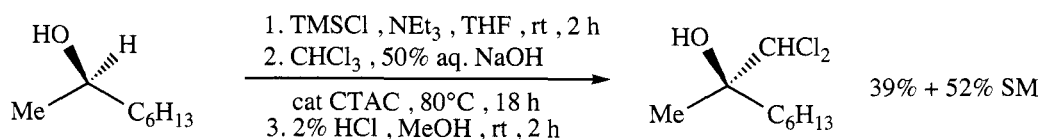
Le, Z.-G.; Chen, Z.-C.; Hu, Y.; Zheng, Q.-G. *Synthesis* **2004**, 2809.



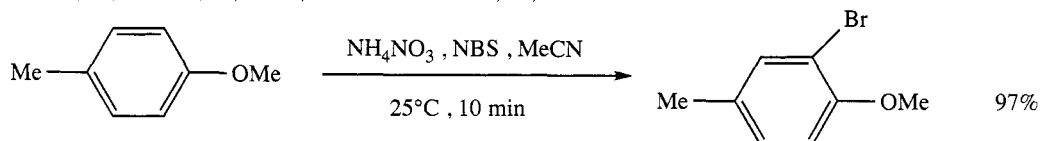
Tajik, H.; Esmaili, A.A.; Mohammadpoor-Baltork, I.; Ershadi, A.; Tajmehri, A. *Synth. Commun.* **2004**, 34, 1319.



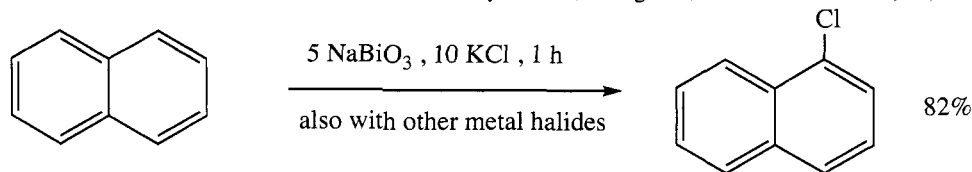
Mohan, K.V.V.K.; Narender, N.; Srinivasu, P.; Kulkarni, S.J.; Raghavan, K.V. *Synth. Commun.* **2004**, 34, 2143.



Masaki, Y.; Arasaki, H.; Iwata, I. *Chem. Lett.* **2003**, 32, 4.



Tanemura, K.; Suzuki, T.; Nishida, Y.; Satsumabayashi, K.; Horaguchi, T. *Chem. Lett.* **2003**, 32, 932.



Muathen, H.A. *Helv. Chim. Acta* **2003**, 86, 168.

SECTION 147: HALIDES AND SULFONATES FROM KETONES

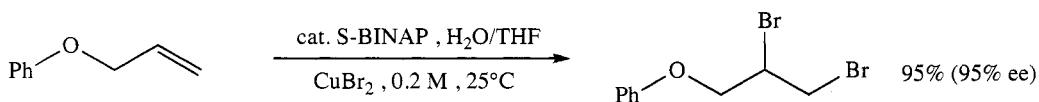
NO ADDITIONAL EXAMPLES

SECTION 148: HALIDES AND SULFONATES FROM NITRILES

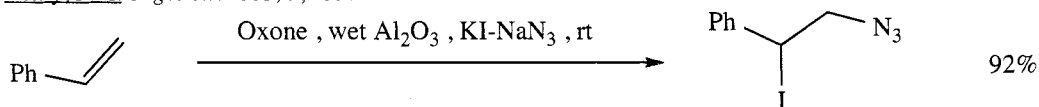
NO ADDITIONAL EXAMPLES

SECTION 149: HALIDES AND SULFONATES FROM ALKENES

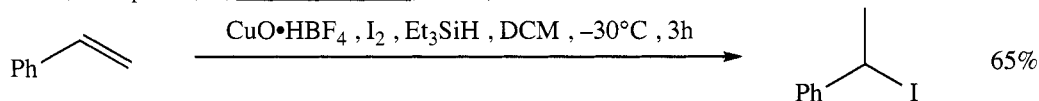
For halocyclopropanations, see Section 74F (Alkyls from Alkenes: Cyclopropanations).



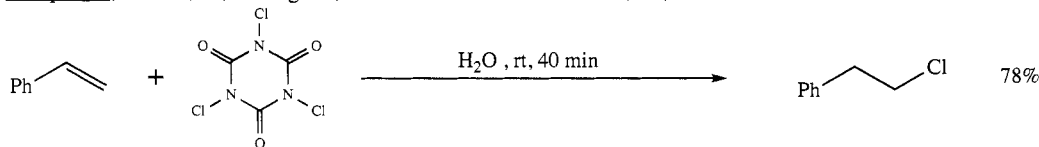
El-Qisairi, A.K.; Qaseer, H.A.; Kaatsigras, G.; Lorenzi, P.; Trivedi, U.; Tracz, S.; Hartman, A.; Miller, J.A.; Henry, P.M. *Org. Lett.* **2003**, 5, 439.



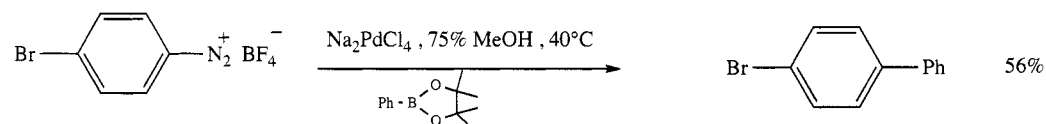
Curini, M.; Epifano, F.; Marcotullio, M.C.; Rosati, O. *Tetrahedron Lett.* **2002**, 43, 1201.



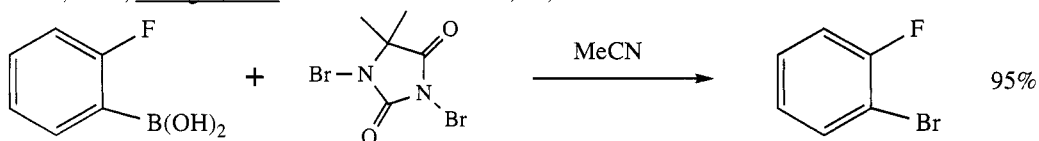
Campos, J.; García, B.; Rodríguez, M.A. *Tetrahedron Lett.* **2002**, 43, 6111.



Mendonca, G.F.; Sanseverino, A.M.; de Mattos, M.C.S. *Synthesis* **2003**, 45.

SECTION 150: HALIDES AND SULFONATES FROM MISCELLANEOUS COMPOUNDS

Willis, D.M.; Strongin, R.M. *Tetrahedron Lett.* **2000**, 41, 6271.



Szumigala Jr. D.R.; Devine, P.N.; Gauthier Jr. D.R.; Volante, R.P. *J. Org. Chem.* **2004**, 69, 566.

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

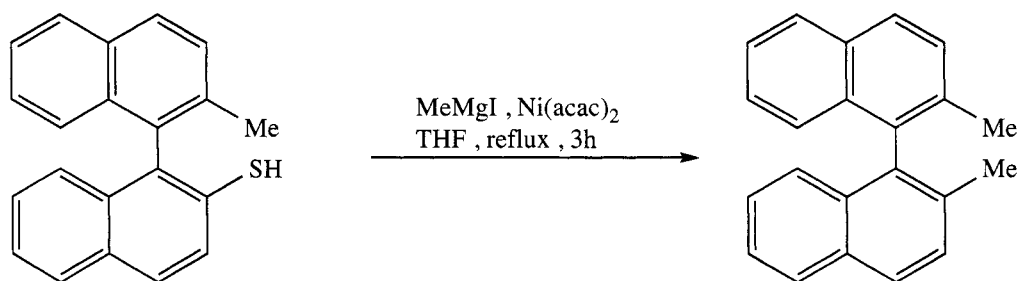
SECTION 152: HYDRIDES FROM ACID DERIVATIVES

This section lists examples of decarboxylations ($\text{RCO}_2\text{H} \rightarrow \text{R-H}$) and related reactions.

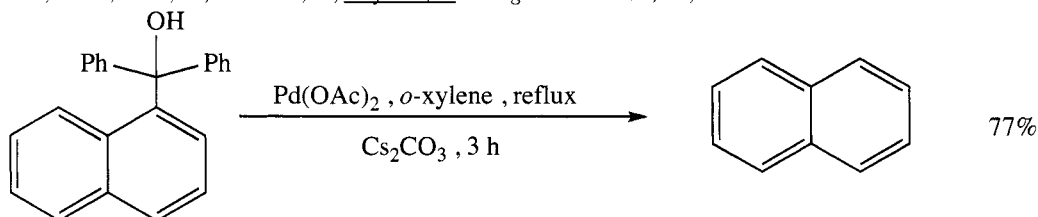
NO ADDITIONAL EXAMPLES

SECTION 153: HYDRIDES FROM ALCOHOLS AND THIOLS

This section lists examples of the hydrogenolysis of alcohols and phenols ($\text{ROH} \rightarrow \text{R-H}$).



Cho, Y.-H.; Kina, A.; Shimada, T.; Hayashi, T. *J. Org. Chem.* **2004**, 69, 3811.

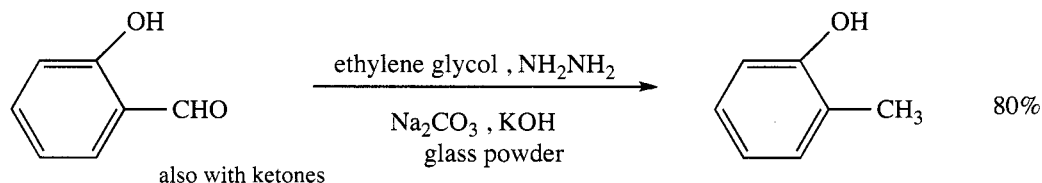


Terao, Y.; Nomoto, M.; Satoh, T.; Miura, M.; Nomura, M. *J. Org. Chem.* **2004**, 69, 6942.

Also via: Section 160 (Hydrides from Halides and Sulfonates).

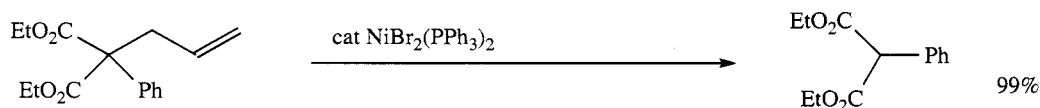
SECTION 154: HYDRIDES FROM ALDEHYDES

For the conversion $\text{RCHO} \rightarrow \text{R-Me}$, etc., see Section 64 (Alkyl, Methylene, and Aryls from Aldehydes).



Jaisankar, P.; Pal, B.; Giri, V.S. *Synth. Commun.* **2002**, 32, 2569.

SECTION 155: HYDRIDES FROM ALKYL, METHYLENES AND ARYLS



Necas, D.; Tursky, M.; Kotora, M. *J. Am. Chem. Soc.* **2004**, 126, 10222.

SECTION 156: HYDRIDES FROM AMIDES

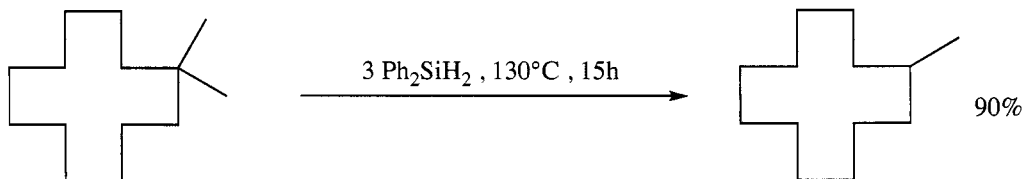
NO ADDITIONAL EXAMPLES

SECTION 157: HYDRIDES FROM AMINES

This section lists examples of the conversion RNH_2 (or R_2NH) \rightarrow R-H .

NO ADDITIONAL EXAMPLES

SECTION 158: HYDRIDES FROM ESTERS



Kim, J.-G.; Cho, D.H.; Jang, D.O. *Tetrahedron Lett.* **2004**, 45, 3031.

This section lists examples of the reactions $\text{RCO}_2\text{R}' \rightarrow \text{R-H}$ and $\text{RCO}_2\text{R}' \rightarrow \text{R'H}$.

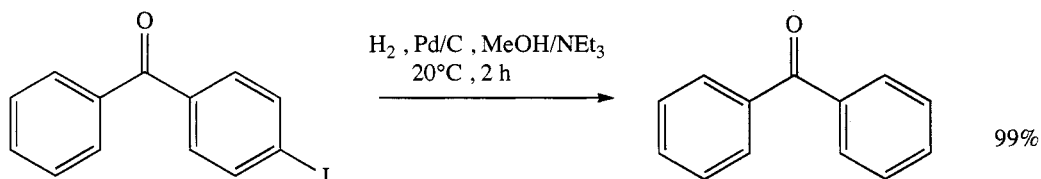
SECTION 159: HYDRIDES FROM ETHERS, EPOXIDES, AND THIOETHERS

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

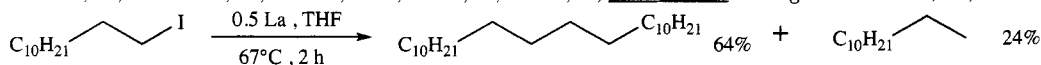
NO ADDITIONAL EXAMPLES

SECTION 160: HYDRIDES FROM HALIDES AND SULFONATES

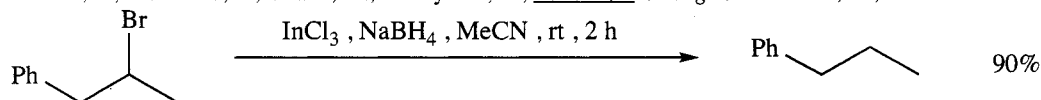
This section lists the reductions of halides and sulfonates, $R-X \rightarrow R-H$.



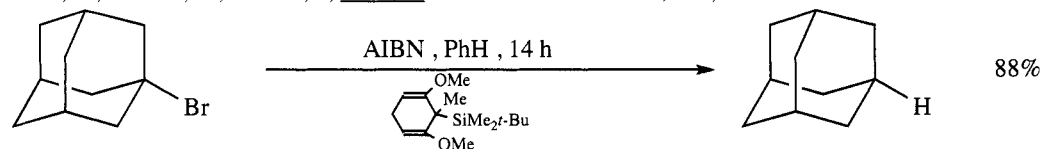
Faucher, N.; Ambroise, Y.; Cintrat, J.-C.; Doris, E.; Pillon, F.; Rousseau, B. *J. Org. Chem.* **2002**, 67, 932.



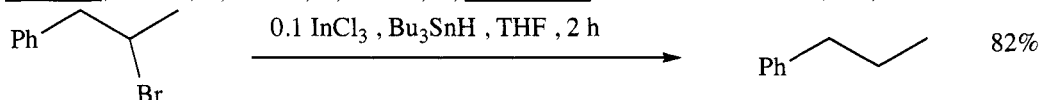
Nishino, T.; Watanabe, T.; Okada, M.; Nishiyama, Y.; Sonoda, N. *J. Org. Chem.* **2002**, 67, 966.



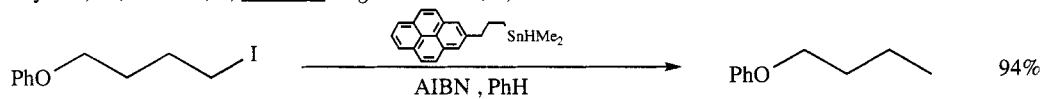
Inoue, K.; Sawada, A.; Shibata, I.; Baba, A. *J. Am. Chem. Soc.* **2002**, 124, 906.



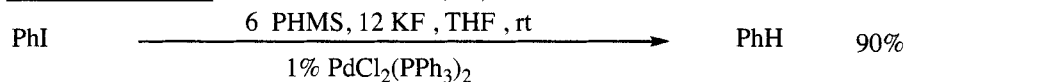
Studer, A.; Amrein, S.; Schleich, F.; Schulte, T.; Walton, J.C. *J. Am. Chem. Soc.* **2003**, 125, 5726.



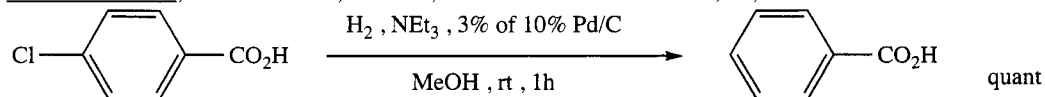
Hayashi, N.; Shibata, I.; Baba, A. *Org. Lett.* **2004**, 6, 4981.



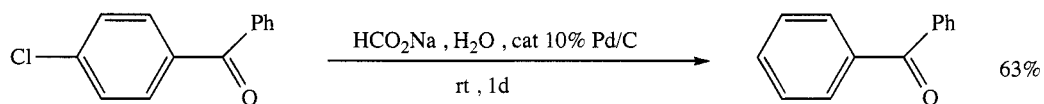
Gastaldi, S.; Stein, D. *Tetrahedron Lett.* **2002**, 43, 4309.



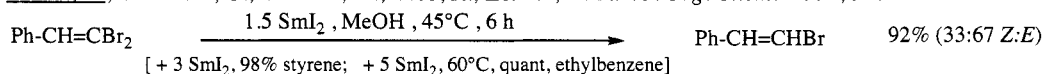
Maleczka Jr. R.E.; Rahaim Jr. R.J.; Teixeira, R.R. *Tetrahedron Lett.* **2002**, 43, 7087.



Sajiki, H.; Kume, A.; Hattori, K.; Hirota, K. *Tetrahedron Lett.* **2002**, 43, 7247.

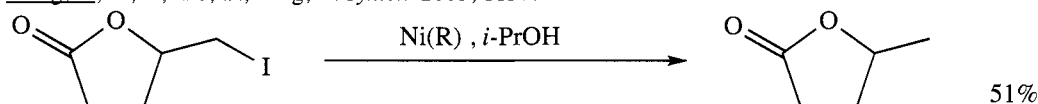


Arcadi, A.; Cerichelli, G.; Chiarini, M.; Vico, R.; Zorzan, D. *Eur. J. Org. Chem.* **2004**, 3404.

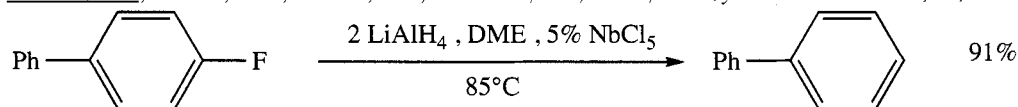


[+ 3 SmI₂, 98% styrene; + 5 SmI₂, 60°C, quant, ethylbenzene]

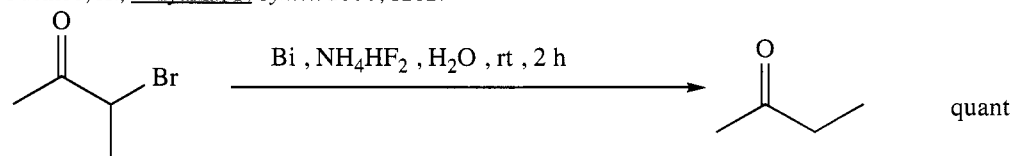
Wang, L.; Li, P.; Xie, Y.; Ding, Y. *Synlett* **2003**, 1137.



Mebane, R.C.; Grimes, K.D.; Jenkins, S.R.; Deardorff, J.D.; Gross, B.H. *Synth. Commun.* **2002**, 32, 2049.



Fuchibe, K.; Akiyama, T. *Synlett* **2004**, 1282.



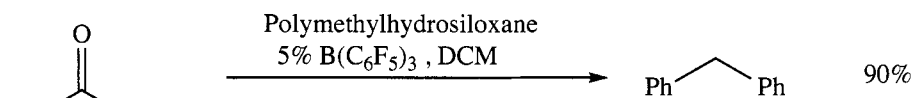
Lee, Y.J.; Chan, T.H. *Can. J. Chem.* **2004**, 82, 71.

SECTION 161: HYDRIDES FROM HYDRIDES

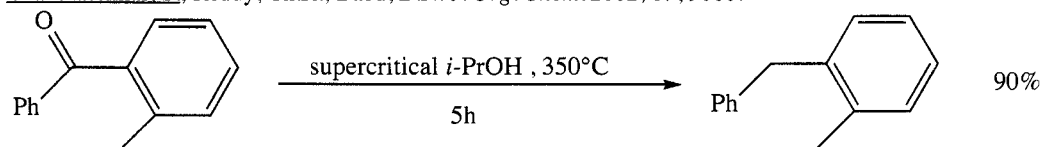
NO ADDITIONAL EXAMPLES

SECTION 162: HYDRIDES FROM KETONES

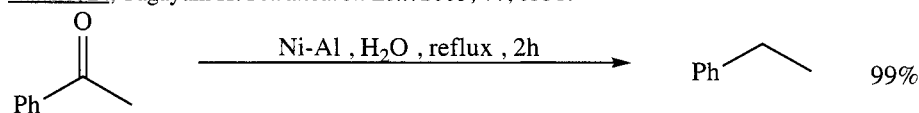
This section lists examples of the reaction $\text{R}_2\text{C}-(\text{C}=\text{O})\text{R} \rightarrow \text{R}_2\text{C}-\text{H}(\text{R})$.



Chandrasekhar, S.; Reddy, Ch.R.; Babu, B.N. *J. Org. Chem.* **2002**, 67, 9080.



Hatano, B.; Tagayam H. *Tetrahedron Lett.* **2003**, 44, 6331.



Ishimoto, K.; Mitoma, Y.; Negashima, S.; Tashiro, H.; Prakash, G.K.S.; Olah, G.A.; Tashiro, M. *Chem. Commun.* **2003**, 514.

SECTION 163: HYDRIDES FROM NITRILES

This section lists examples of the reaction, $[R-C\equiv N \rightarrow R-H]$ (includes reactions of isonitriles ($R-N\equiv C$)).

NO ADDITIONAL EXAMPLES

SECTION 164: HYDRIDES FROM ALKENES

NO ADDITIONAL EXAMPLES

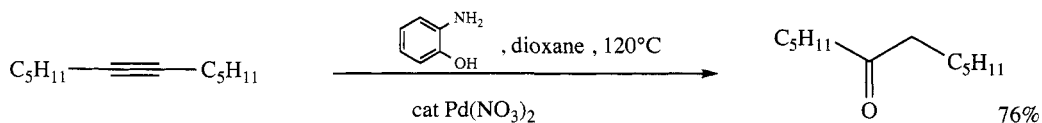
SECTION 165: HYDRIDES FROM MISCELLANEOUS COMPOUNDS

NO ADDITIONAL EXAMPLES

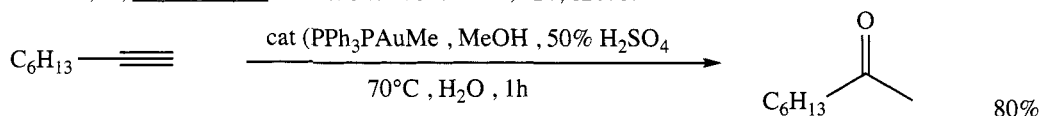
CHAPTER 12

PREPARATION OF KETONES

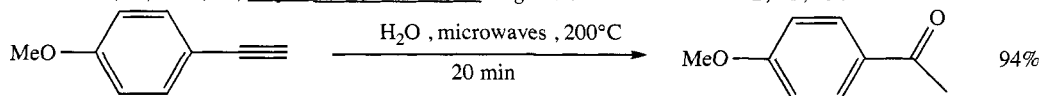
SECTION 166: KETONES FROM ALKYNES



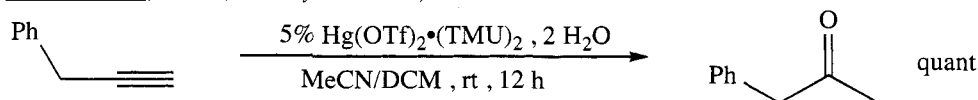
Shimada, T.; Yamamoto, Y. *J. Am. Chem. Soc.* **2002**, *124*, 12670.



Mizushima, E.; Sato, K.; Hayashi, T.; Tanaka, M. *Angew. Chem. Int. Ed.* **2002**, *41*, 4563.

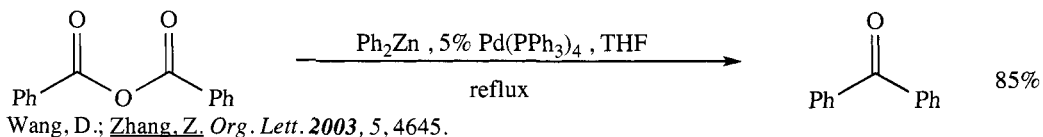


Vasudevan, A.; Verzal, M.K. *Synlett* **2004**, 631.

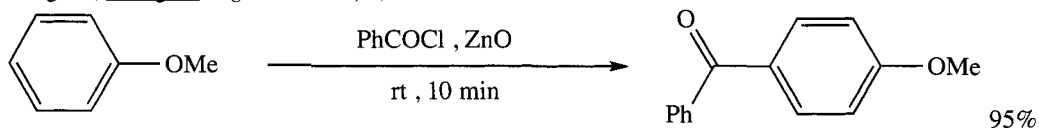


Nishizawa, M.; Skwarczynski, M.; Imagawa, H.; Sugihara, T. *Chem. Lett.* **2002**, 12.

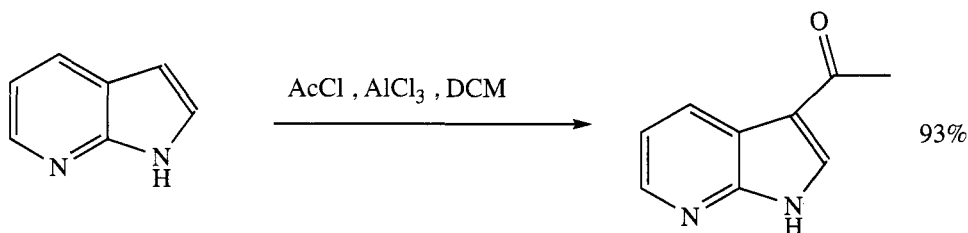
SECTION 167: KETONES FROM ACID DERIVATIVES



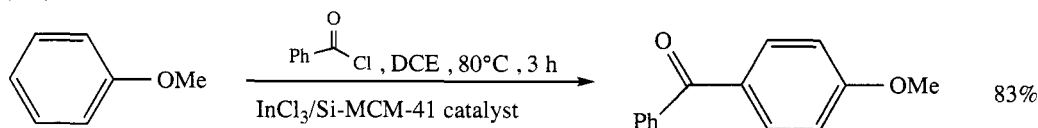
Wang, D.; Zhang, Z. *Org. Lett.* **2003**, *5*, 4645.



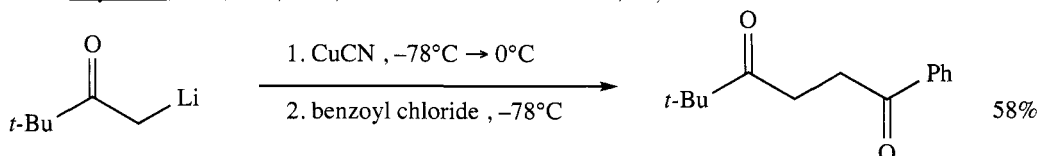
Sarvari, M.H.; Sharghi, H. *J. Org. Chem.* **2004**, *69*, 6953.



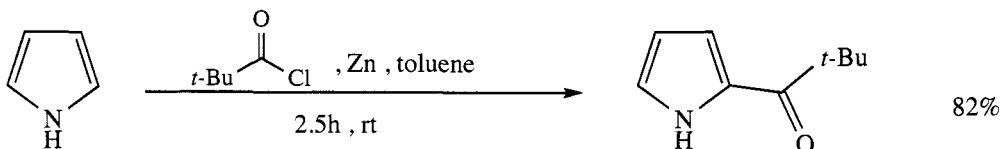
Zhang, Z.; Yang, Z.; Wong, H.; Zhu, J.; Meanwell, N.A.; Kadow, J.F.; Wang, T. *J. Org. Chem.* **2002**, *67*, 6226.



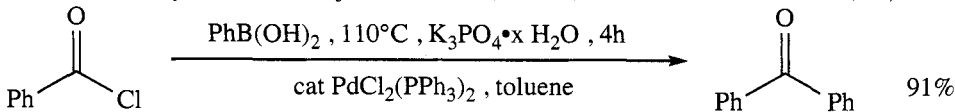
Choudhary, V.R.; Jana, S.K.; Patil, N.S. *Tetrahedron Lett.* **2002**, *43*, 1105.



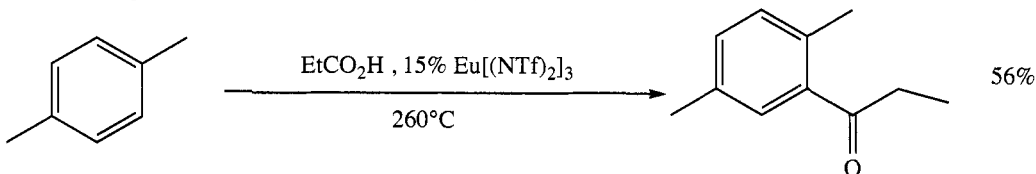
Ryu, I.; Ikebe, M.; Sonoda, N.; Yamato, S.-y.; Yamaguchi, G.-h.; Komatsu, M. *Tetrahedron Lett.* **2002**, *43*, 1257.



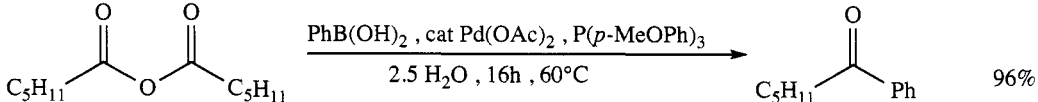
Yadav, J.S.; Reddy, B.V.S.; Kondaji, G.; Rao, R.S.; Kumar, S.P. *Tetrahedron Lett.* **2002**, *43*, 8133.



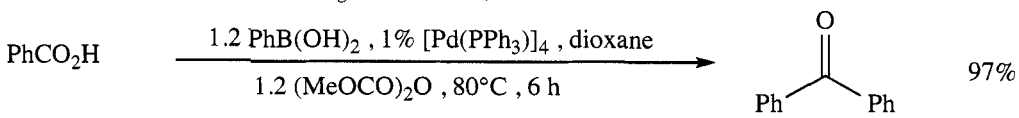
Urawa, Y.; Ogura, K. *Tetrahedron Lett.* **2003**, *44*, 271.



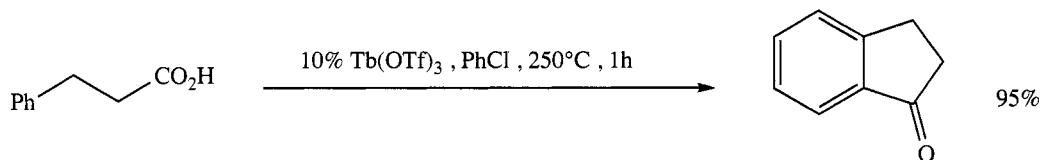
Kawamura, M.; Cui, D.-M.; Hayashi, T.; Shimda, S. *Tetrahedron Lett.* **2003**, *44*, 7715.



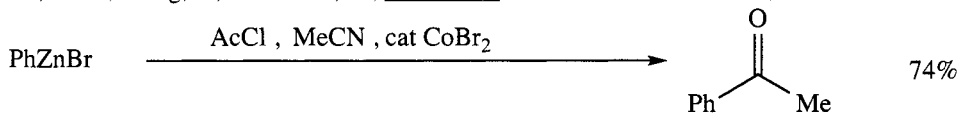
Gooßen, L.J.; Ghosh, K. *Eur. J. Org. Chem.* **2002**, 3254.



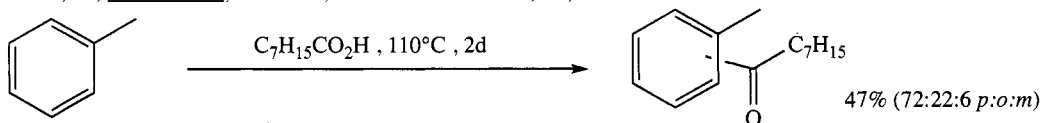
Kakino, R.; Narahashi, H.; Shimizu, I.; Yamamoto, A. *Bull. Chem. Soc. Jpn.* **2002**, *75*, 1333.



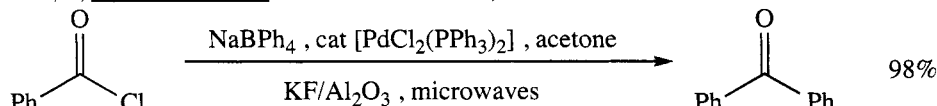
Cui, D.-M.; Zhang, C.; Kawamura, M.; Shimada, S. *Tetrahedron Lett.* **2004**, 45, 1741.



Fillon, H.; Gosmini, C.; P  richon, J. *Tetrahedron* **2003**, 59, 8199.



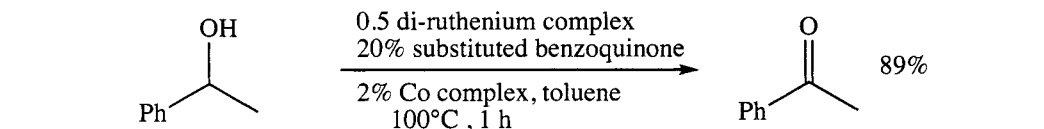
Kaur, J.; Kozhevnikov, I.V. *Chem. Commun.* **2002**, 2508.



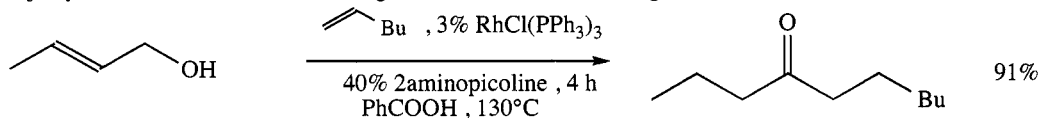
Wang, J.-X.; Yang, Y.; Wei, B.; Hu, Y.; Fu, Y. *Bull. Chem. Soc. Jpn.* **2002**, 75, 1381.

SECTION 168: KETONES FROM ALCOHOLS AND THIOLS

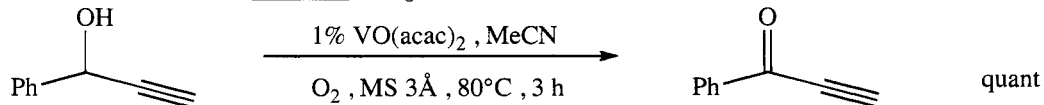
Related Methods: Section 48 (Aldehydes from Alcohols and Thiols).



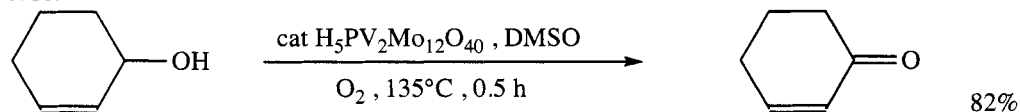
Cs  rnyik, G.;   il, A.H.; Fadini, L.; Pugin, B.; B  ckvall, J.-E. *J. Org. Chem.* **2002**, 67, 1657.



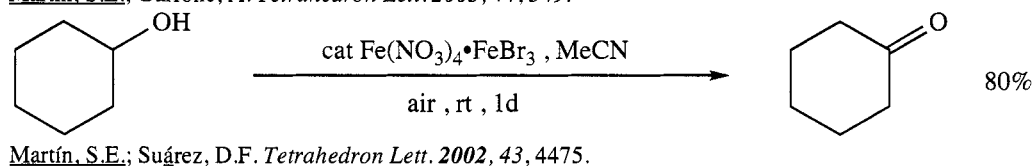
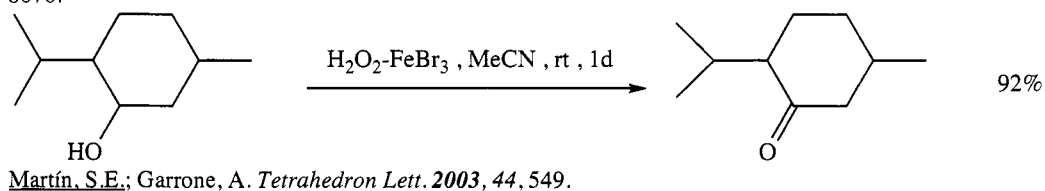
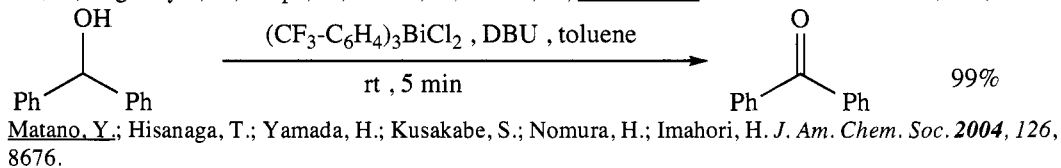
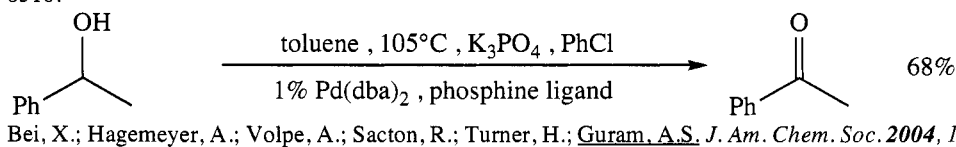
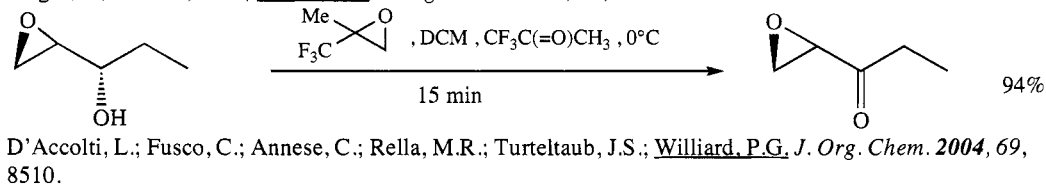
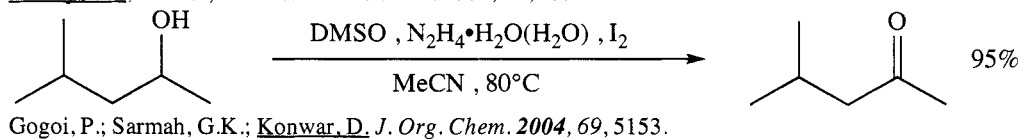
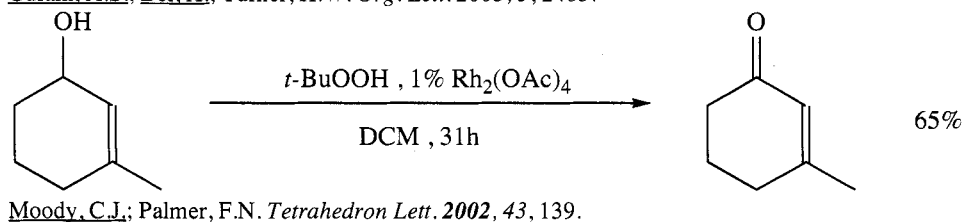
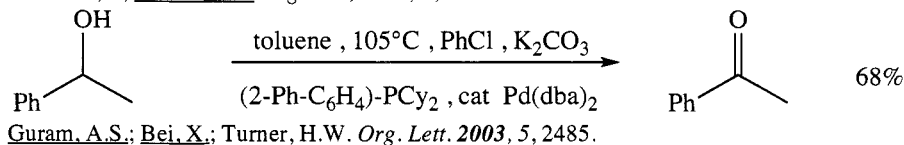
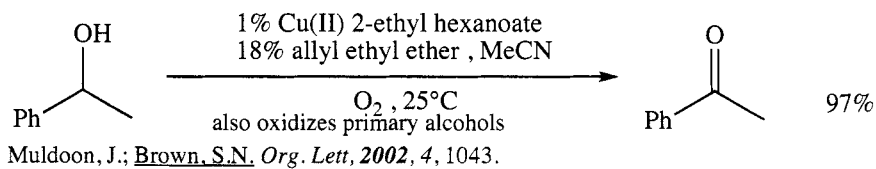
Lee, D.-Y.; Moon, C.W.; Jun, C.-H. *J. Org. Chem.* **2002**, 67, 3945.

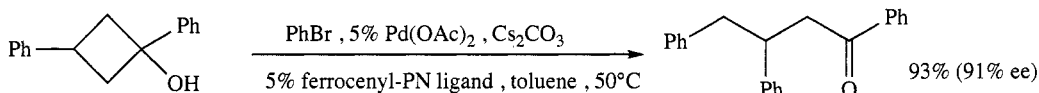


Maeda, Y.; Kakiuchi, N.; Matsumura, S.; Nishimura, T.; Kawamura, T.; Uemura, S. *J. Org. Chem.* **2002**, 67, 6718.

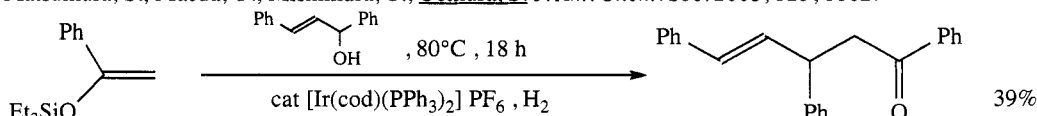


Khenkin, A.M.; Neumann, R. *J. Org. Chem.* **2002**, 67, 7075.

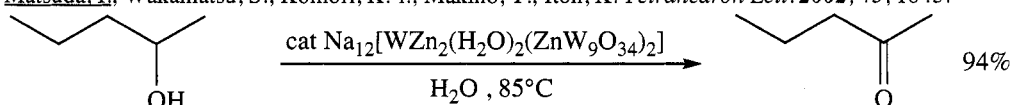




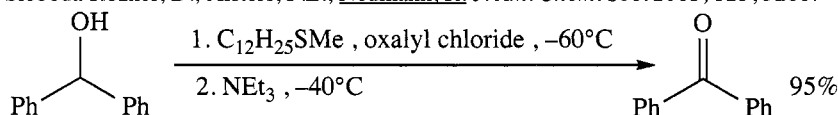
Matsumura, S.; Maeda, Y.; Mishimura, T.; Uemura, S. *J. Am. Chem. Soc.* **2003**, *125*, 8862.



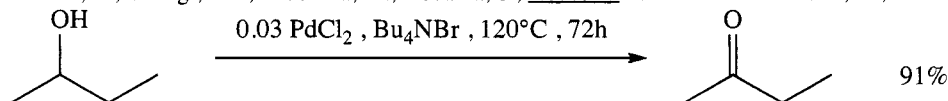
Matsuda, I.; Wakamatsu, S.; Komori, K.-i.; Makino, T.; Itoh, K. *Tetrahedron Lett.* **2002**, *43*, 1043.



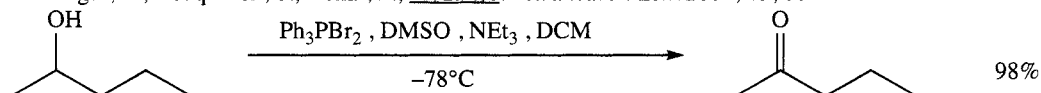
Sloboda-Rozner, D.; Alsters, P.L.; Neumann, R. *J. Am. Chem. Soc.* **2003**, *125*, 5280.



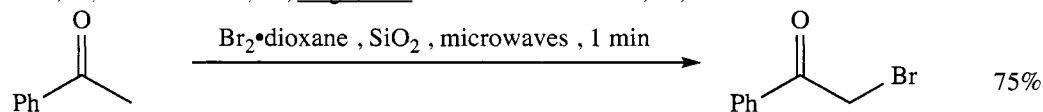
Nishide, K.; Ohsugi, S.-i.; Fudesaka, M.; Kodama, S.; Node, M. *Tetrahedron Lett.* **2002**, *43*, 5177.



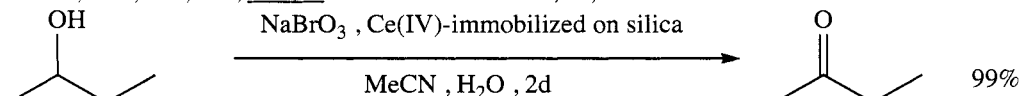
Gancheui, B.; Bouquillon, S.; Hénin, F.; Muzart, J. *Tetrahedron Lett.* **2002**, *43*, 6641.



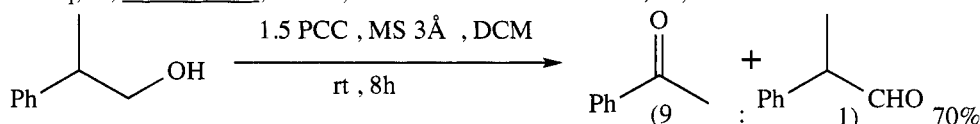
Bisai, A.; Chandrasekhar, M.; Singh, V.K. *Tetrahedron Lett.* **2002**, *43*, 8355.



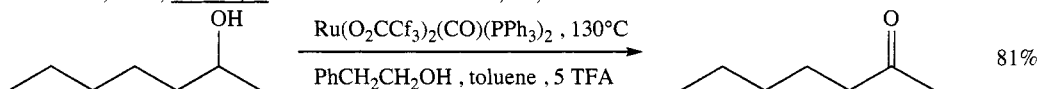
Sharma, V.B.; Jain, S.L.; Sain, B. *Tetrahedron Lett.* **2003**, *44*, 383.



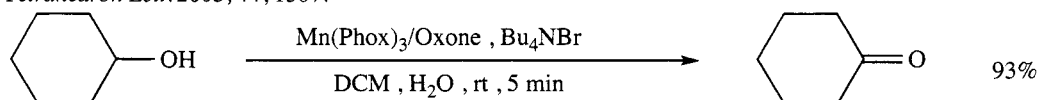
Al-Haq, N.; Sullivan, A.C.; Wilson, J.R.H. *Tetrahedron Lett.* **2003**, *44*, 769.



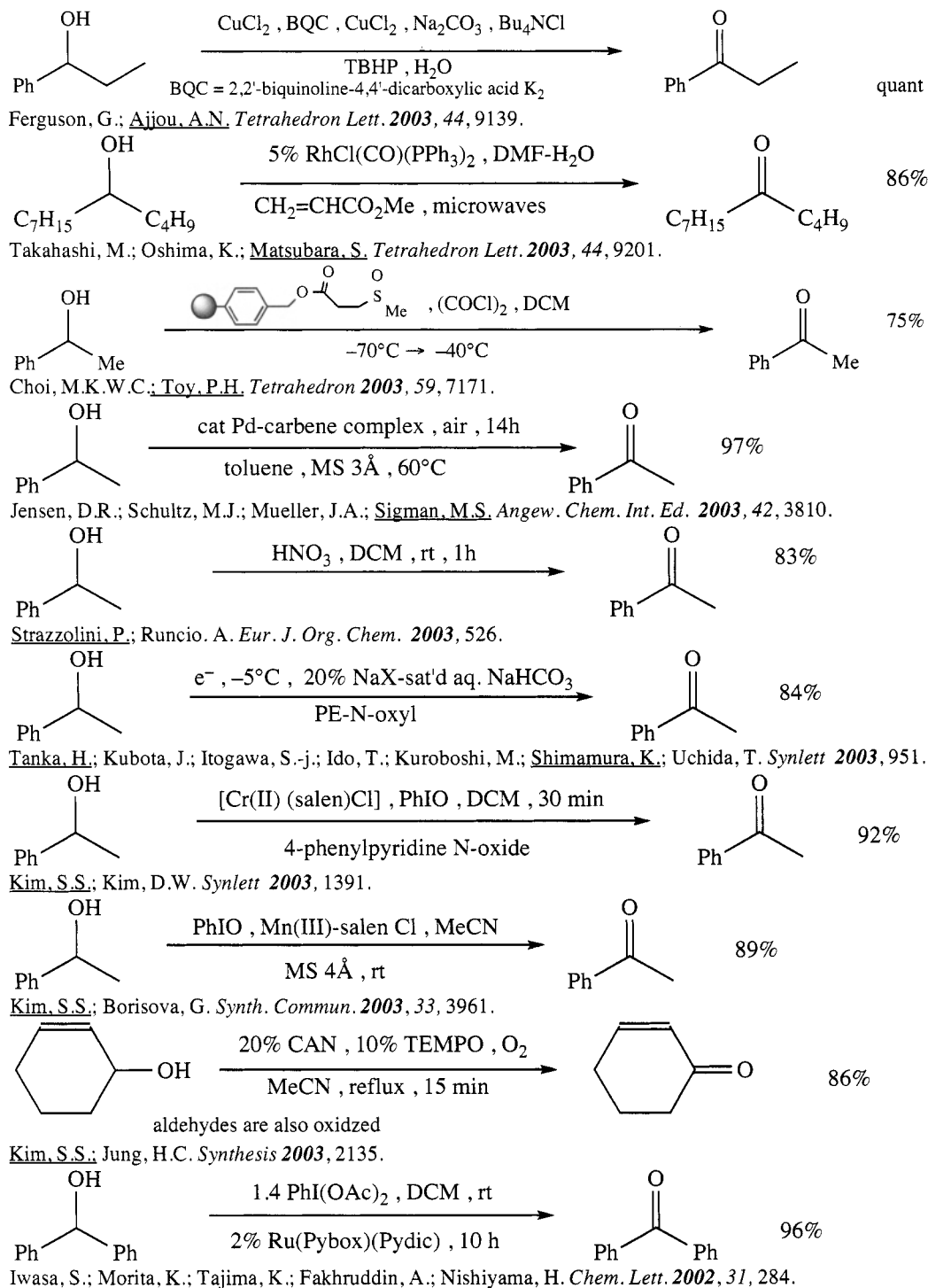
Fernandes, R.A.; Kumar, P. *Tetrahedron Lett.* **2003**, *44*, 1275.

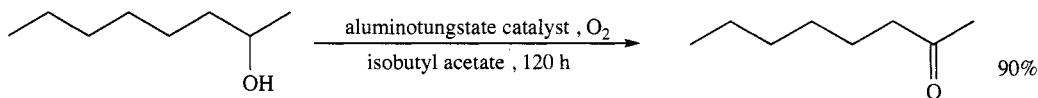


Ligthart, G.B.W.L.; Meijer, R.H.; Donners, M.P.J.; Meuldijk, J.; Vekemans, J.A.J.M.; Hulshof, L.A. *Tetrahedron Lett.* **2003**, *44*, 1507.

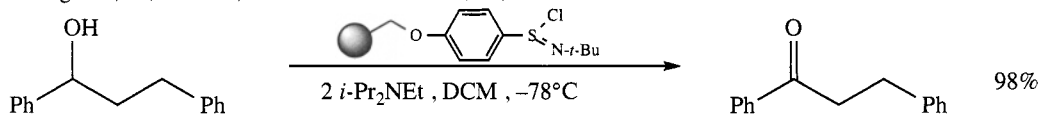


Bagherzadeh, M. *Tetrahedron Lett.* **2003**, *44*, 8943.





Yamaguchi, K.; Mizuno, N. *New J. Chem.* **2002**, 26, 972.



Matsuo, J.-i.; Kawana, A.; Yamanaka, H.; Kamiyama, H. *Bull. Chem. Soc. Jpn.* **2003**, 76, 1433.

REVIEWS:

“Palladium Catalyzed Oxidation of Primary and Secondary Alcohols”

Murart, J. *Tetrahedron* **2003**, 59, 5789.

“Recent Developments in the Aerobic Oxidation of Alcohols”

Zhan, B.-Z.; Thompson, A. *Tetrahedron* **2004**, 60, 2917.

“Transposition of Allylic Alcohols into Carbonyl Compounds Mediated by Transition Metal Complexes”

Uma, R.; Crévisy, C.; Grée, R. *Chem. Rev.* **2003**, 103, 27.

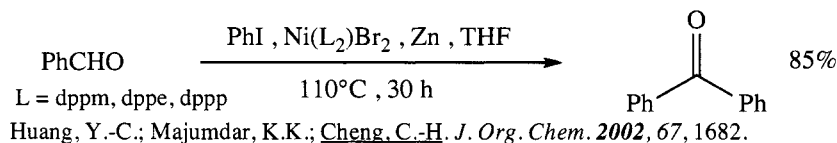
“Oxidation of Alcohols with Molecular Oxygen on Solid Catalysts”

Mallat, T.; Baiker, A. *Chem. Rev.* **2004**, 104, 3037.

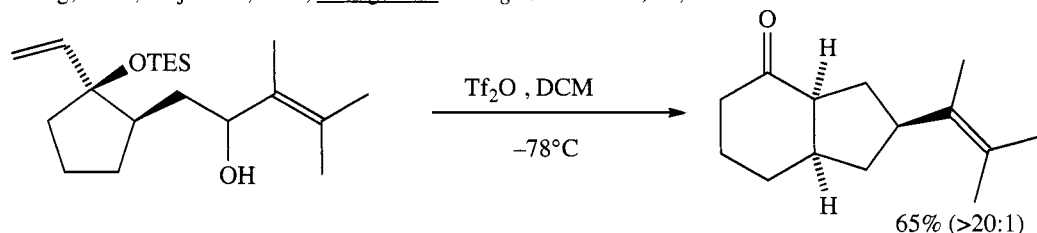
“Green, Catalytic Oxidations of Alcohols”

Sheldon, R.A.; Arends, I.W.C.E.; ten Brink, G.-J.; Dijkman, A. *Acc. Chem. Res.* **2002**, 35, 774.

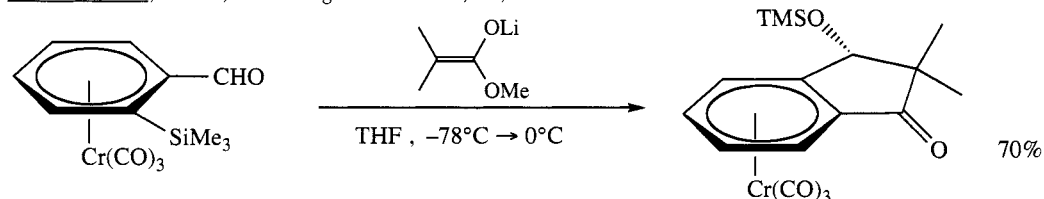
SECTION 169: KETONES FROM ALDEHYDES



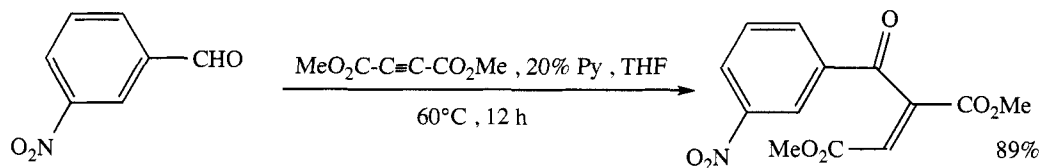
Huang, Y.-C.; Majumdar, K.K.; Cheng, C.-H. *J. Org. Chem.* **2002**, 67, 1682.



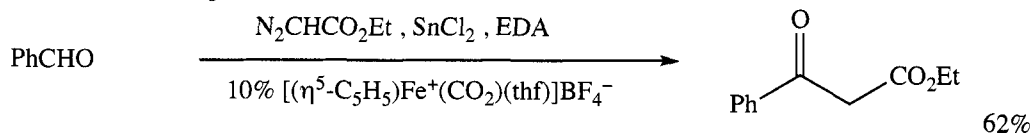
Overman, L.E.; Wolfe, J.P. *J. Org. Chem.* **2002**, 67, 6421.



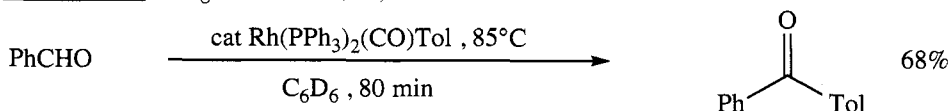
Moser, W.H.; Zhang, J.; Lecher, C.S.; Frazier, T.L.; Pink, M. *Org. Lett.* **2002**, 4, 1981.



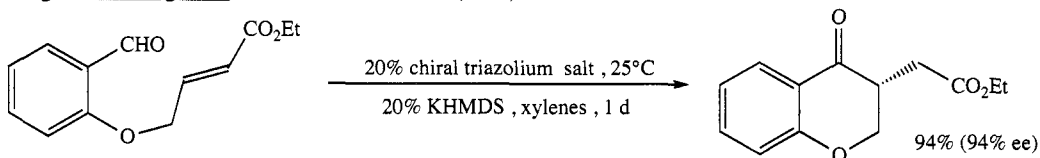
Li, C.-Q.; Shi, M. *Org. Lett.* **2003**, 5, 4273.



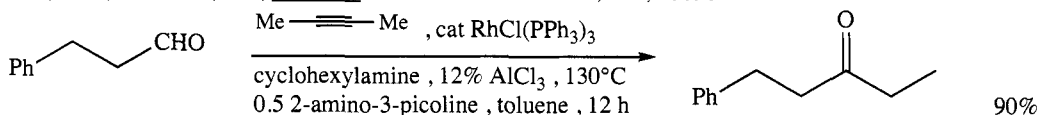
Dudley, M.E.; Morshed, Md.M.; Brennan, C.L.; Islam, M.S.; Ahmad, M.S.; Atuu, M.-R.; Branstetter, B.; Hossain, M.M. *J. Org. Chem.* **2004**, 69, 7599.



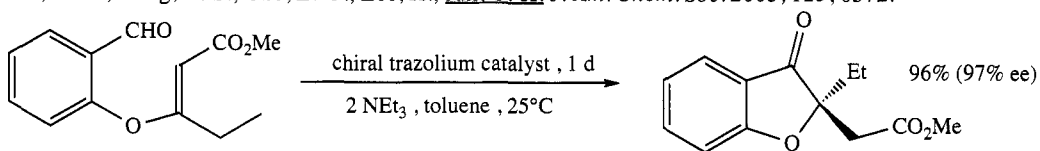
Krug, C.; Hartwig, J.F. *J. Am. Chem. Soc.* **2002**, 124, 1674.



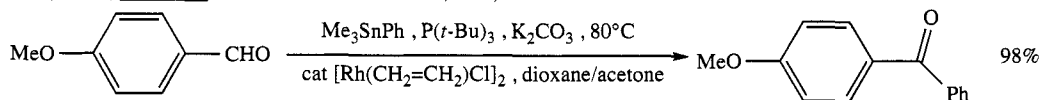
Kerr, M.S.; de Alaniz, J.R.; Rovis, T. *J. Am. Chem. Soc.* **2002**, 124, 10298.



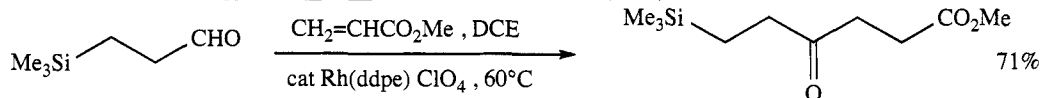
Lee, D.-Y.; Hong, B.-S.; Cho, E.-G.; Lee, H.; Jun, C.-H. *J. Am. Chem. Soc.* **2003**, 125, 6372.



Kerr, M.S.; Rovis, T. *J. Am. Chem. Soc.* **2004**, 126, 8876.



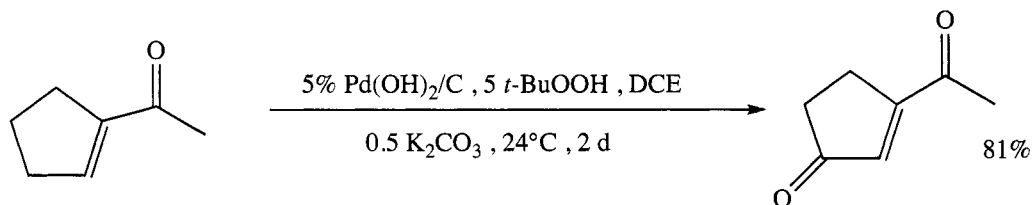
Pucheault, M.; Darses, S.; Genet, J.-P. *J. Am. Chem. Soc.* **2004**, 126, 15356.



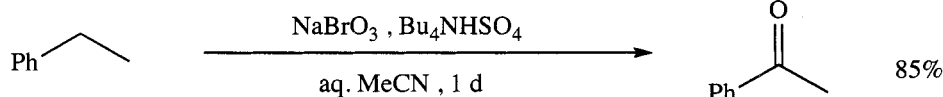
Willis, M.C.; McNally, S.J.; Beswick, P.J. *Angew. Chem. Int. Ed.* **2004**, 43, 340.

SECTION 170: KETONES FROM ALKYL, METHYLENE, AND ARYL

This section lists examples of the reaction, $R-CH_2-R' \rightarrow R(C=O)-R'$.

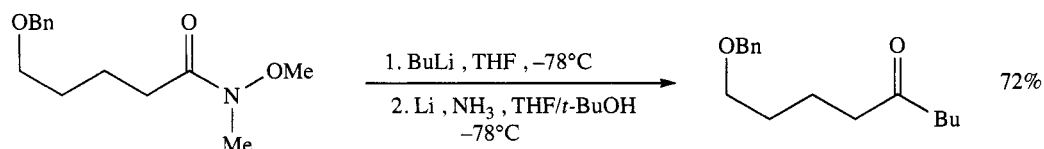


Yu, J.-Q.; Corey, E.J. *J. Am. Chem. Soc.* **2003**, 125, 3232.

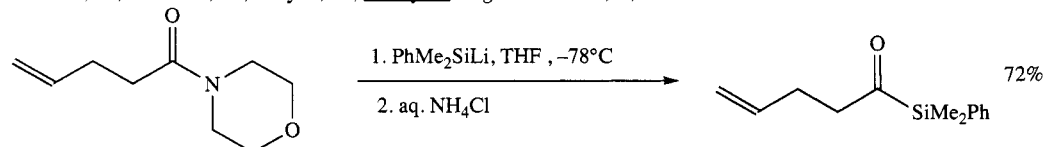


Shaabani, A.; Bazgir, A.; Abdoli, M. *Synth. Commun.* **2002**, 32, 675.

SECTION 171: KETONES FROM AMIDES

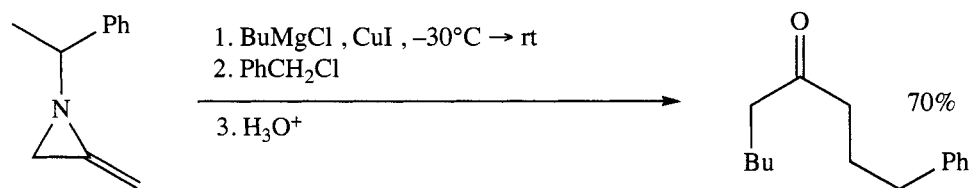


Thallier, C.; Bellosta, V.; Meyer, C.; Cossy, J. *Org. Lett.* **2004**, 6, 2145.

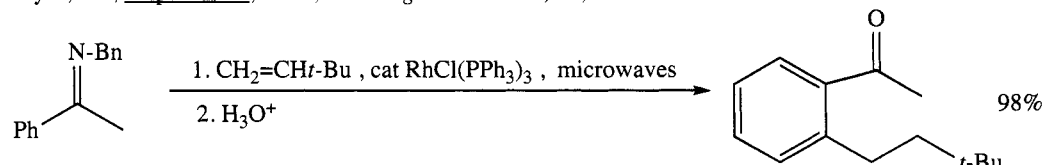


Clark, C.T.; Milgram, B.C.; Scheidt, K.A. *Org. Lett.* **2004**, 6, 3977.

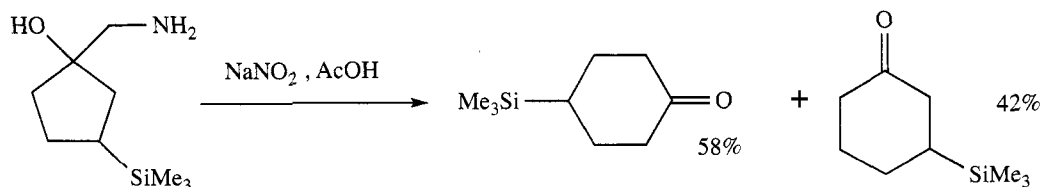
SECTION 172: KETONES FROM AMINES



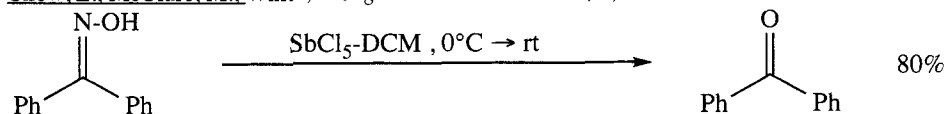
Hayes, J.F.; Shipman, M.; Twin, H. *J. Org. Chem.* **2002**, 67, 935.



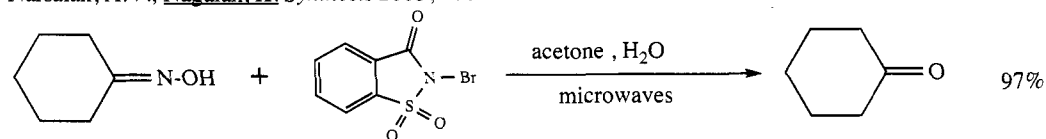
Vo-Thanh, G.; Lahrache, H.; Loupy, A.; Kim, I.-J.; Chang, D.-H.; Jun, C.-H. *Tetrahedron* **2004**, 60, 5539.



Chow, L.; McClure, M.; White, J. *Org. Biomol. Chem.* **2004**, 2, 648.

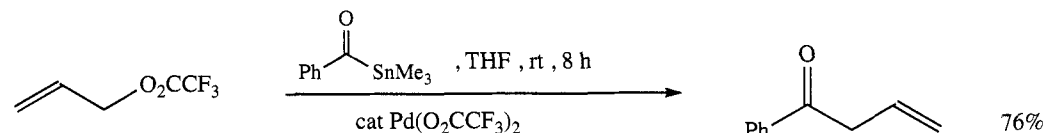


Narsaiah, A.V.; Nagaiah, K. *Synthesis* **2003**, 1881.

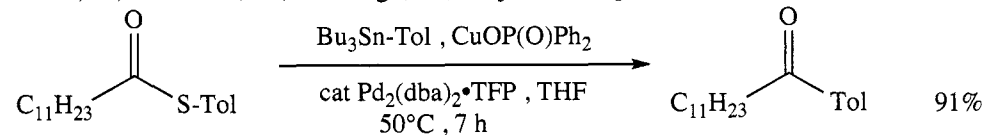


Khazaei, A.; Manesh, A.A. *Synthesis* **2004**, 1739.

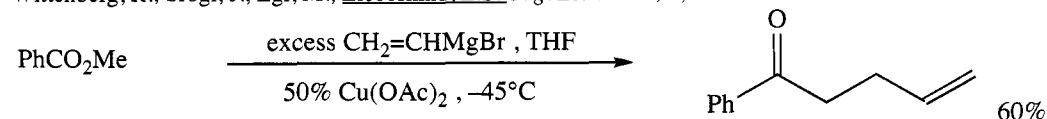
SECTION 173: KETONES FROM ESTERS



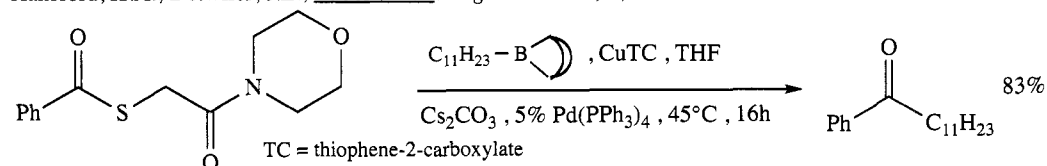
Obora, Y.; Nakanishi, M.; Tokunaga, M.; Tsuji, Y. *J. Org. Chem.* **2002**, 67, 5835.



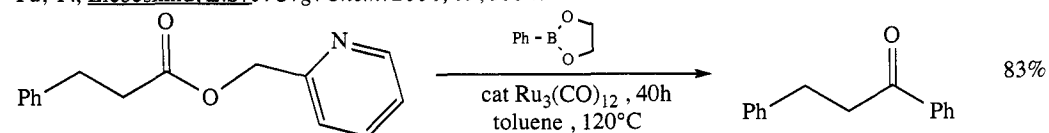
Wittenberg, R.; Srogl, J.; Egi, M.; Liebeskind, L.S. *Org. Lett.* **2003**, 5, 3033.



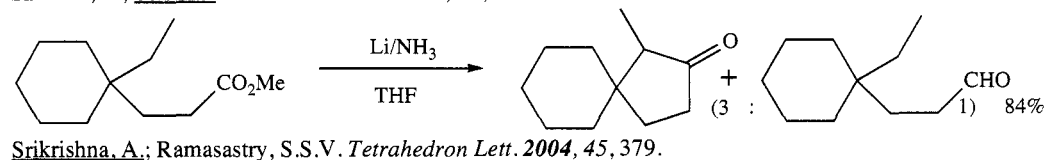
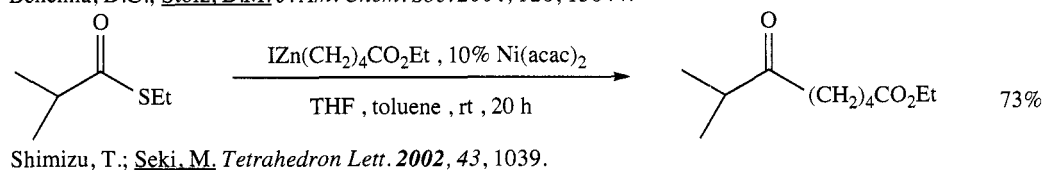
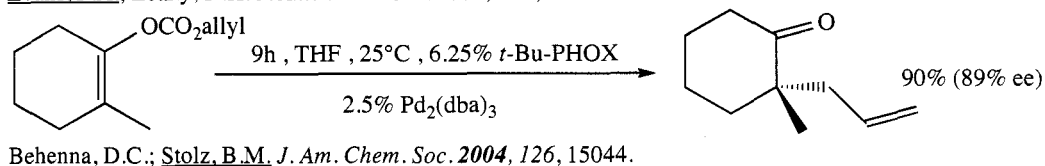
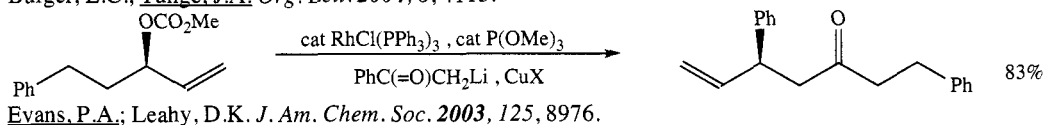
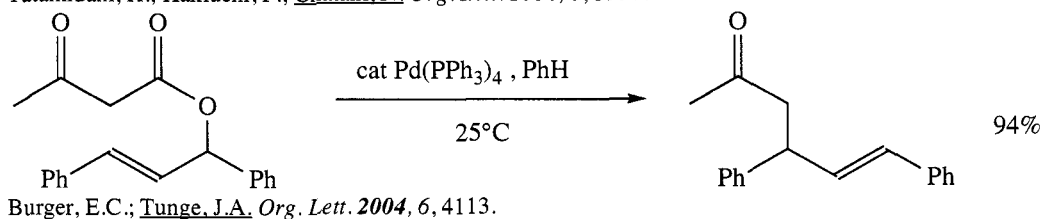
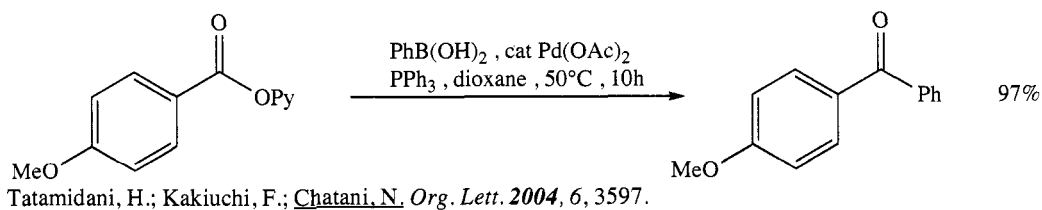
Hansford, K.A.; Detwiler, J.E.; Lubell, W.D. *Org. Lett.* **2003**, 5, 4887.



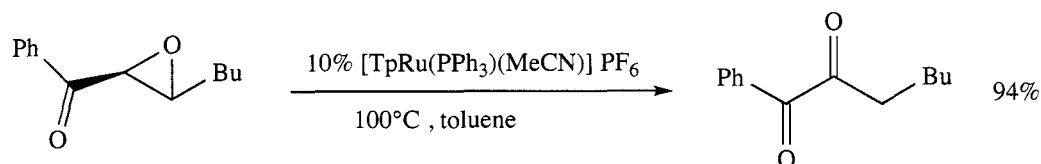
Yu, Y.; Liebeskind, L.S. *J. Org. Chem.* **2004**, 69, 3554.



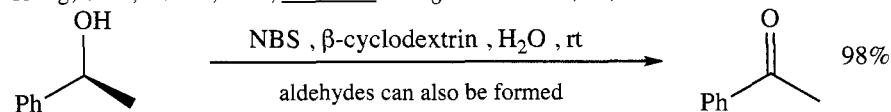
Tatamidani, H.; Yokota, K.; Kakiuchi, F.; Chatani, N. *J. Org. Chem.* **2004**, 69, 5615.



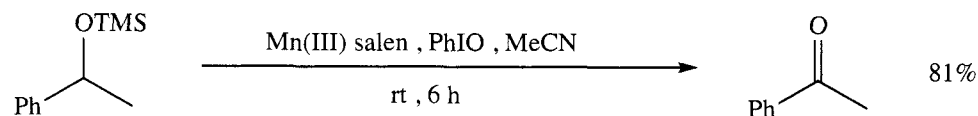
SECTION 174: KETONES FROM ETHERS, EPOXIDES, AND THIOETHERS



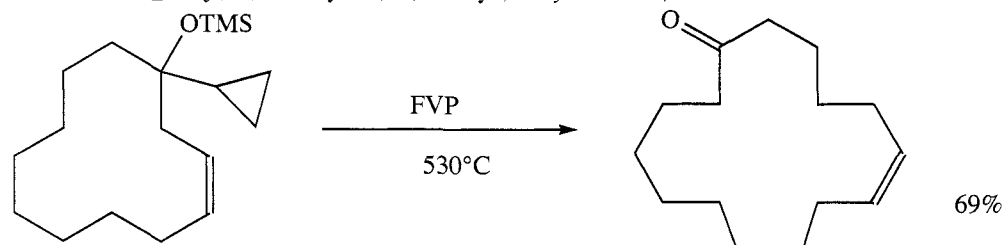
Chang, C.-L.; Kumar, M.P.; Liu, R.-S. *J. Org. Chem.* **2004**, 69, 2793.



Narender, M.; Reddy, M.S.; Rao, K.R. *Synthesis* **2004**, 1741.

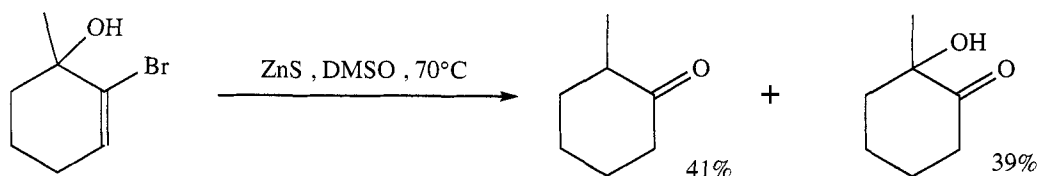


Murahashi, S.-I.; Noji, S.; Hirabayashi, T.; Komiya, N. *Synlett* **2004**, 1739.

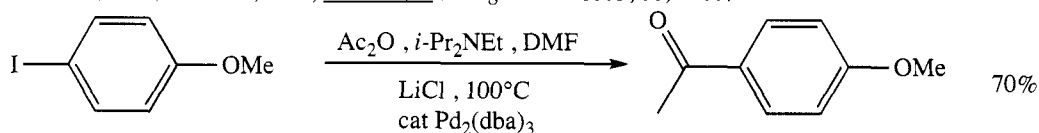


Rüedi, G.; Nagel, M.; Hansen, H.-J. *Org. Lett.* **2004**, 6, 2989.

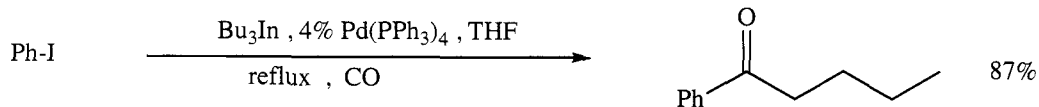
SECTION 175: KETONES FROM HALIDES AND SULFONATES



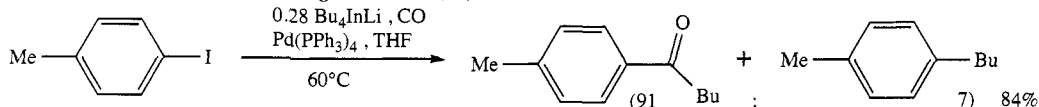
Bettadiah, B.K.; Gurudutt, K.N.; Srinivas, P. *J. Org. Chem.* **2003**, 68, 2460.



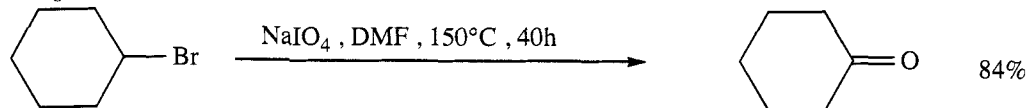
Cacchi, S.; Fabrizi, G.; Gavazza, F.; Goggiamani, A. *Org. Lett.* **2003**, 5, 289.



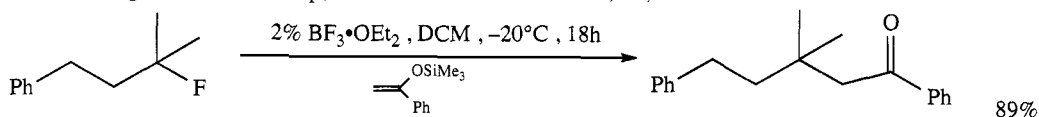
Lee, P.H.; Lee, S.W.; Lee, K. *Org. Lett.* **2003**, 5, 1103.



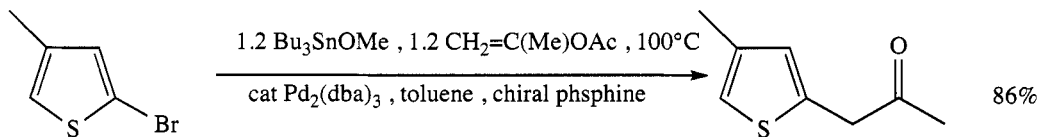
Lee, S.W.; Lee, K.; Seomoon, D.; Kim, S.; Kim, H.; Kim, H.; Shim, E.; Lee, M.; Le, S.; Kim, M.; Lee, P.H. *J. Org. Chem.* **2004**, 69, 4852.



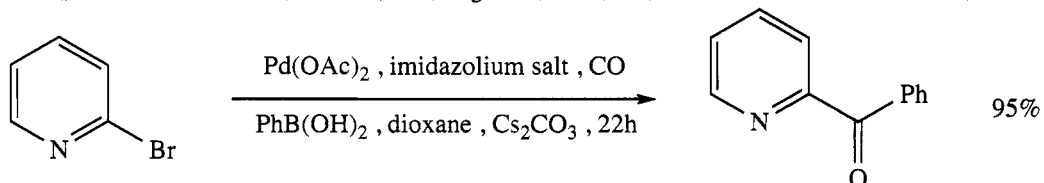
Das, S.; Panigrahi, A.K.; Maikap, G.C. *Tetrahedron Lett.* **2003**, 44, 1375.



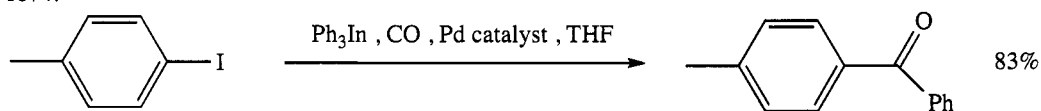
Hirabo, K.; Fujita, K.; Yorimitsu, H.; Shinokubo, H.; Oshima, K. *Tetrahedron Lett.* **2004**, 45, 2555.



Liu, P.; Lanza Jr. T.J.; Jewell, J.; Jones, C.P.; Hagmann, W.K.; Lin, L.S. *Tetrahedron Lett.* **2003**, 44, 8869.



Maerten, E.; Hassouna, F.; Couve-Bonnaire, S.; Mortreux, A.; Carpentier, J.-F.; Castanet, Y. *Synlett* **2003**, 1874.



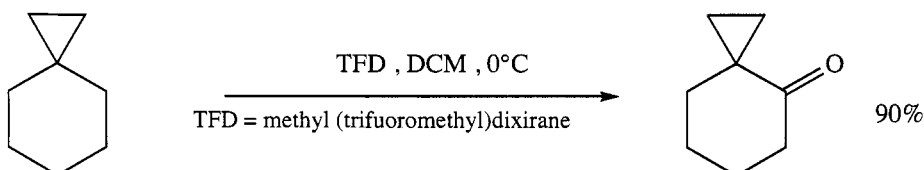
Pena, M.A.; Sestelo, J.P.; Sarandeses, L.A. *Synthesis* **2003**, 780.

Related Methods:

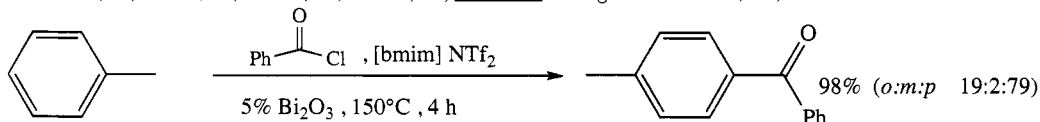
Section 177 (Ketones from Ketones)

Section 55 (Aldehydes from Halides and Sulfonates)

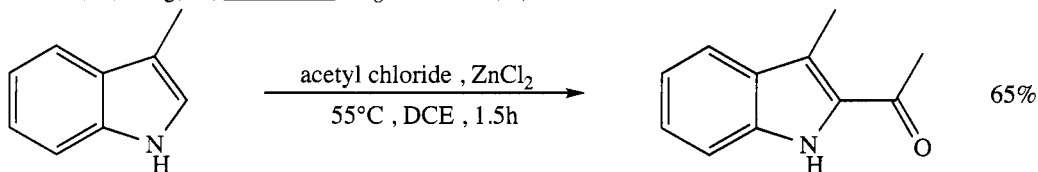
SECTION 176: KETONES FROM HYDRIDES



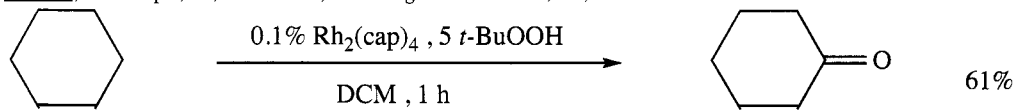
D'Accolti, L.; Dinoi, A.; Fusco, C.; Russo, A.; Curci, R. *J. Org. Chem.* **2003**, 68, 7806.



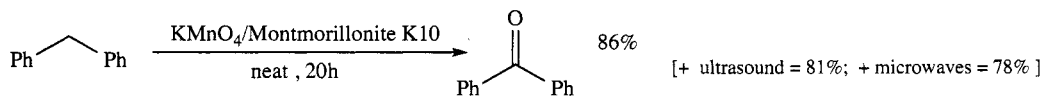
Gmouth, S.; Yang, H.; Vaultier, M. *Org. Lett.* **2003**, 5, 2219.



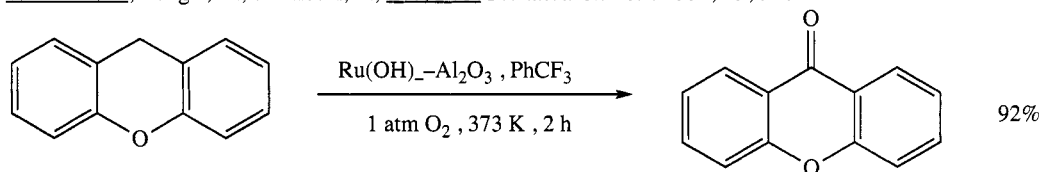
Pal, M.; Dakarapu, R.; Padakanti, S. *J. Org. Chem.* **2004**, 69, 2913.



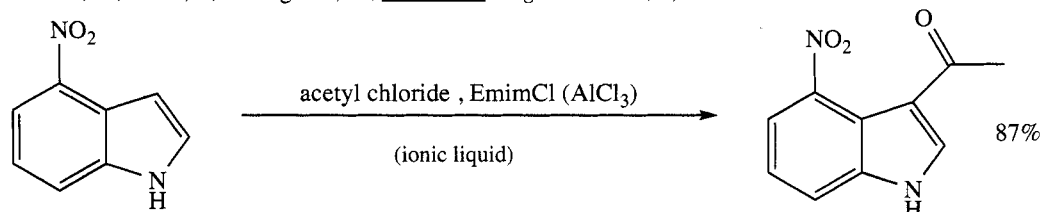
Catino, A.J.; Forslund, R.E.; Doyle, M.P. *J. Am. Chem. Soc.* **2004**, 126, 13622.



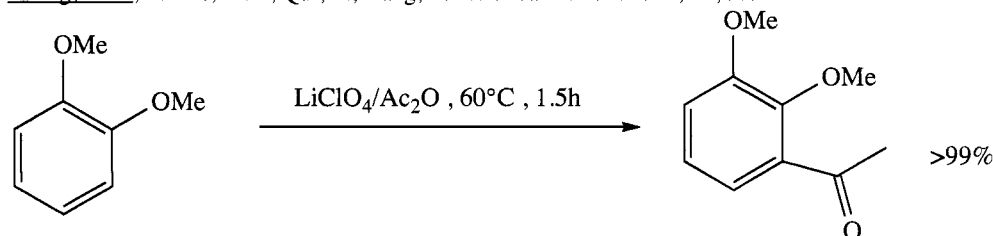
Shaabani, A.; Bazgir, A.; Teimouri, F.; Lee, D.G. *Tetrahedron Lett.* **2002**, *43*, 5165.



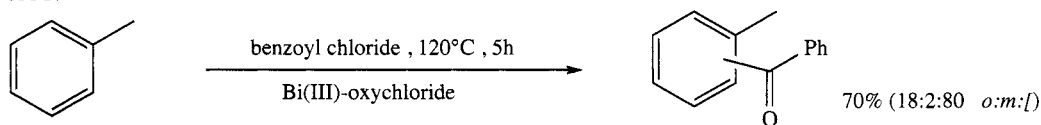
Kamata, K.; Kasai, J.; Yamaguchi, K.; Mizuno, N. *Org. Lett.* **2004**, *6*, 3577.



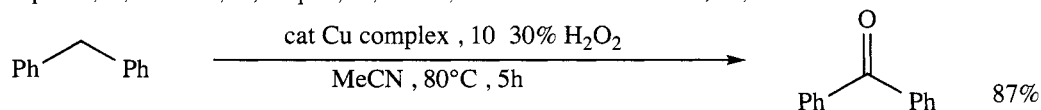
Yeung, K.-S.; Farkas, M.E.; Qui, Z.; Yang, Z. *Tetrahedron Lett.* **2002**, *43*, 5793.



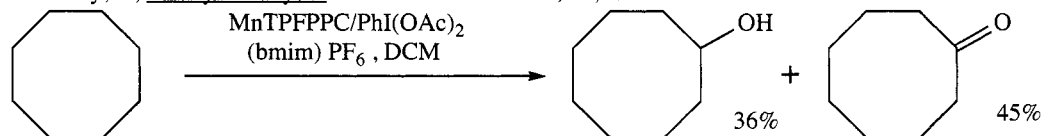
Bartoli, G.; Bosco, M.; Marcantoni, E.; Massaccesi, M.; Rinaldi, S.; Sambri, L. *Tetrahedron Lett.* **2002**, *43*, 6331.



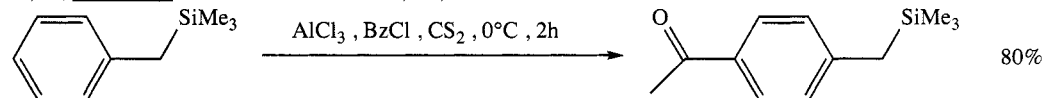
Répichet, S.; Le Roux, C.; Roques, N.; Dubac, J. *Tetrahedron Lett.* **2003**, *44*, 2037.



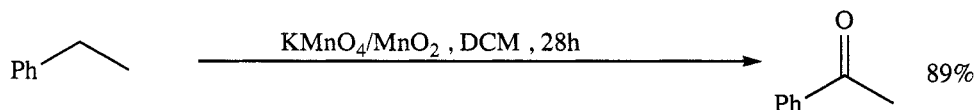
Velusamy, S.; Punniyamurthy, T. *Tetrahedron Lett.* **2003**, *44*, 8955.



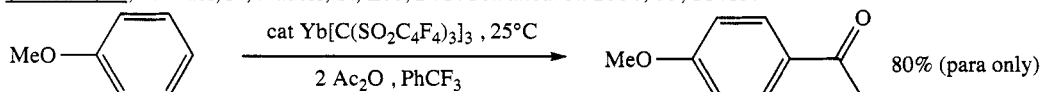
Li, Z.; Xia, C.-G. *Tetrahedron Lett.* **2003**, *44*, 9229.



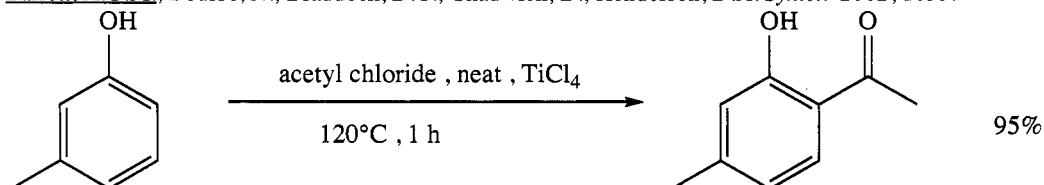
Georgakilas, V.; Perdikomatis, G.P.; Triantafyllou, A.S.; Siskos, M.G.; Zerkadis, A.K. *Tetrahedron* **2002**, *58*, 2441.



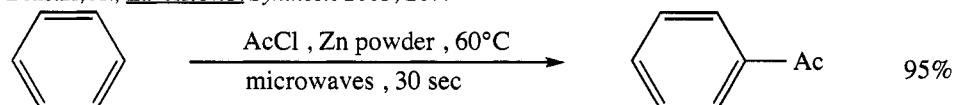
Shaabani, A.; Mirzaei, P.; Naderi, S.; Lee, D.G. *Tetrahedron* **2004**, 60, 11415.



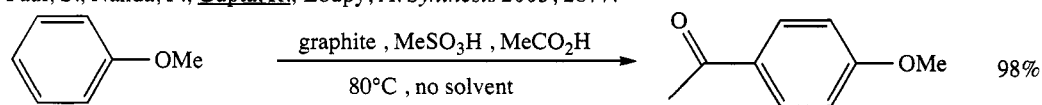
Barrett, A.G.M.; Boulloc, N.; Braddock, D.C.; Chadwick, D.; Henderson, D.A. *Synlett* **2002**, 1653.



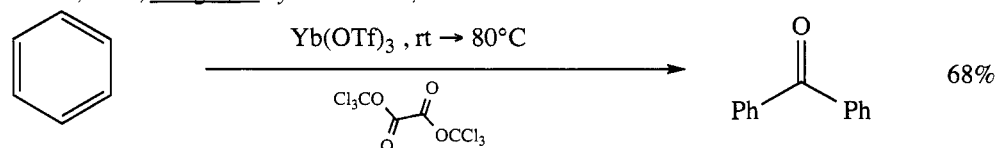
Bensari, A.; Zaveri, N.T. *Synthesis* **2003**, 267.



Paul, S.; Nanda, P.; Gupta, R.; Loupy, A. *Synthesis* **2003**, 2877.



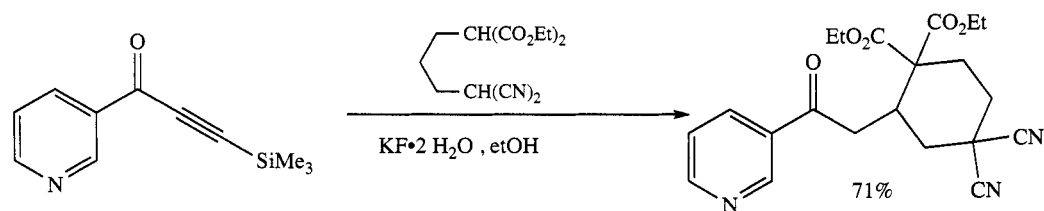
Sarvari, M.H.; Sharghi, H. *Synthesis* **2004**, 2165.



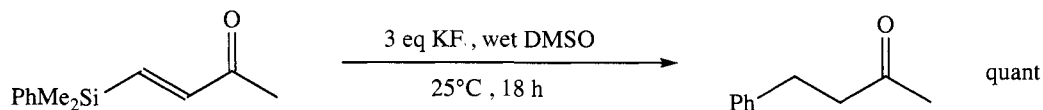
Su, W.; Jin, C. *Synth. Commun.* **2004**, 34, 4249.

SECTION 177: KETONES FROM KETONES

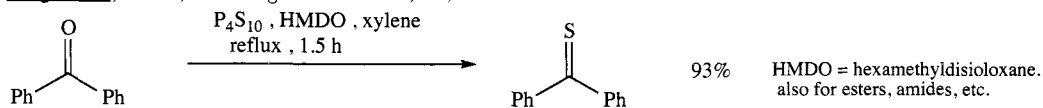
This section contains alkylations of ketones and protected ketones, ketone transpositions and annulations, ring expansions and ring openings, and dimerizations. Conjugate reductions and Michael alkylations of enone are listed in Section 74 (Alkyls, Methylens, and Aryls from Alkenes). For the preparation of enamines or imines from ketones, see Section 356 (Amine-Alkene).



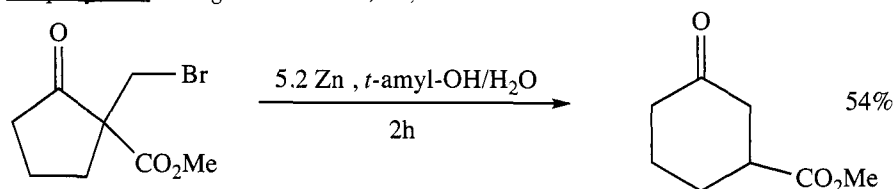
Holeman, D.S.; Rasne, R.M.; Grossman, R.B. *J. Org. Chem.* **2002**, 67, 3149.



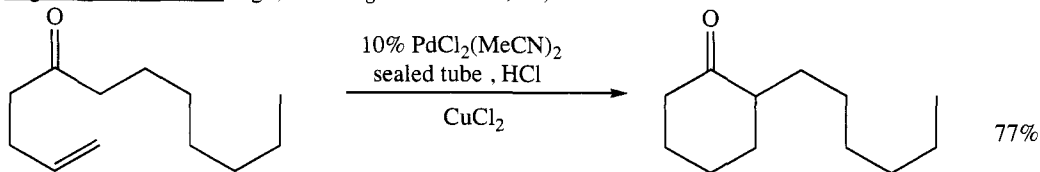
Jung, M.E.; Piizzi, G. *J. Org. Chem.* **2002**, 67, 3911.



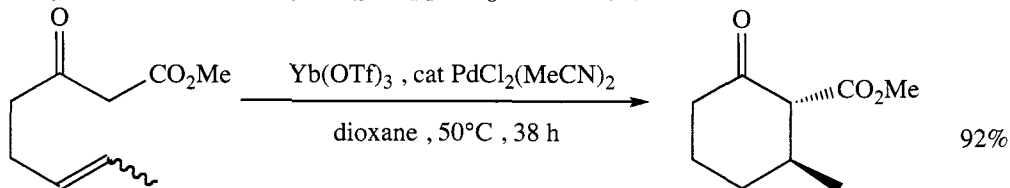
Curphey, T.J. *J. Org. Chem.* **2002**, 67, 6461.



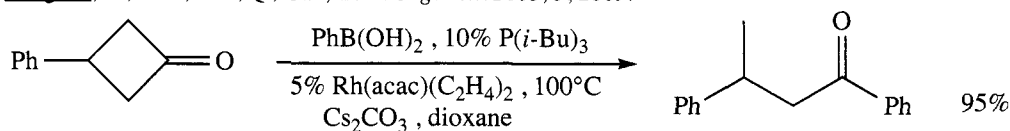
Sugi, M.; Sakuma, D.; Togo, H. *J. Org. Chem.* **2003**, 68, 7629.



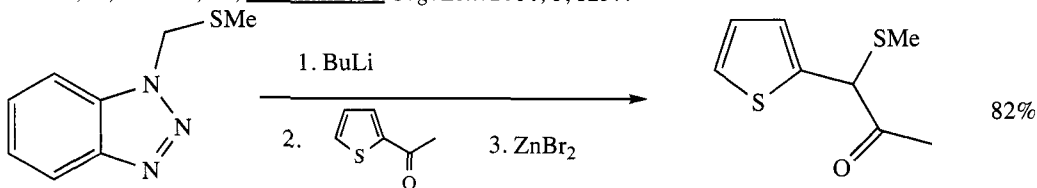
Wang, X.; Pei, T.; Han, X.; Widenhoefer, R.A. *Org. Lett.* **2003**, 5, 2699.



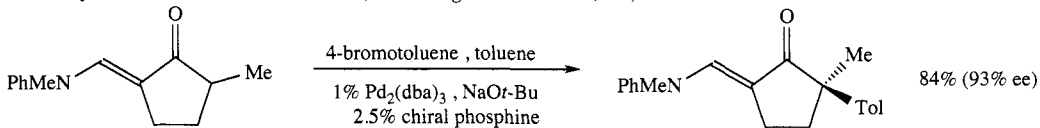
Yang, D.; Li, J.-H.; Gao, Q.; Yan, Y.-L. *Org. Lett.* **2003**, 5, 2869.



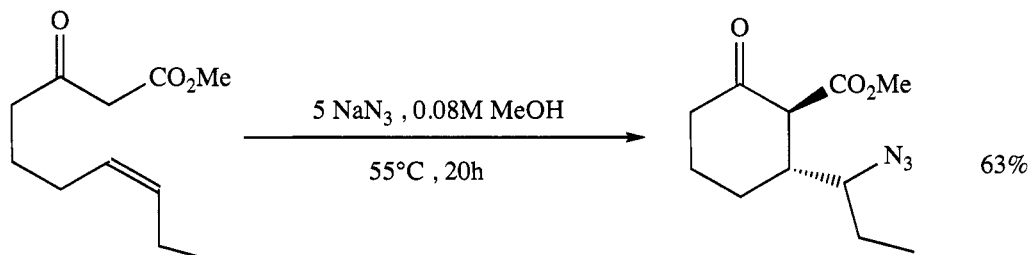
Matuda, T.; Makino, M.; Murakami, M. *Org. Lett.* **2004**, 6, 1257.



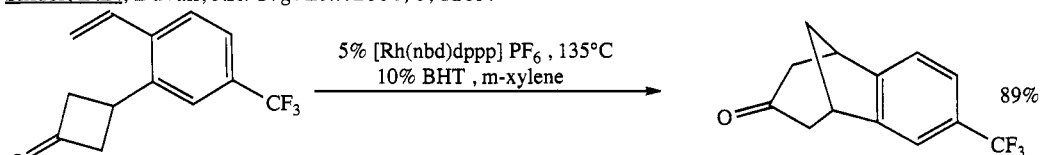
Katritzky, A.R.; Bobrov, S.; Khashab, N. *J. Org. Chem.* **2004**, 69, 4269.



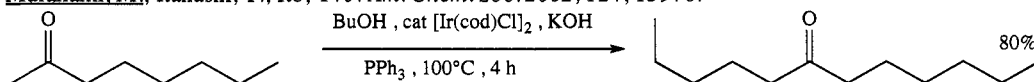
Hamada, T.; Chieffi, A.; Åhman, J.; Buchwald, S.L. *J. Am. Chem. Soc.* **2002**, 124, 1261.



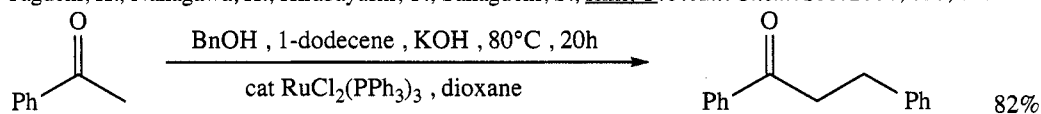
Snider, B.B.; Duvall, J.R. *Org. Lett.* **2004**, *6*, 1265.



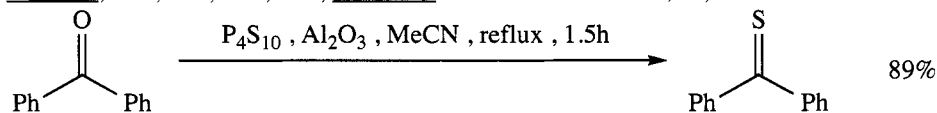
Murakami, M.; Itahashi, T.; Ito, Y. *J. Am. Chem. Soc.* **2002**, *124*, 13976.



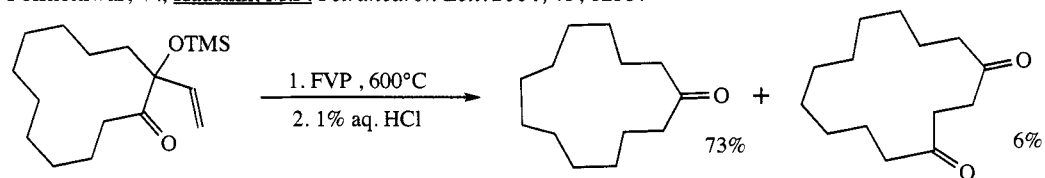
Taguchi, K.; Nakagawa, H.; Hirabayashi, T.; Sakaguchi, S.; Ishii, Y. *J. Am. Chem. Soc.* **2004**, *126*, 72.



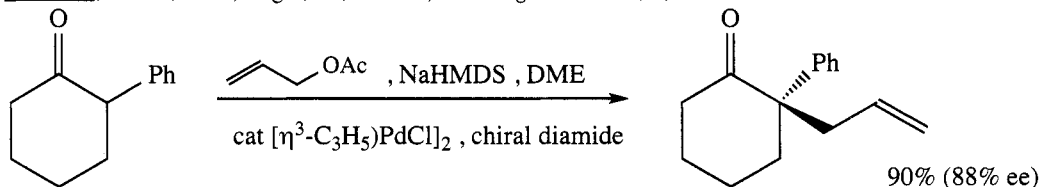
Cho, C.S.; Kim, B.T.; Kim, T.-J.; Shim, S.C. *Tetrahedron Lett.* **2002**, *43*, 7987.



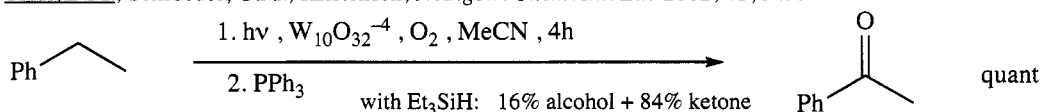
Polshettiwar, V.; Kaushik, M.P. *Tetrahedron Lett.* **2004**, *45*, 6255.



Rüedi, G.; Oberli, M.A.; Nagel, M.; Hansen, H.-J. *Org. Lett.* **2004**, *6*, 3179.



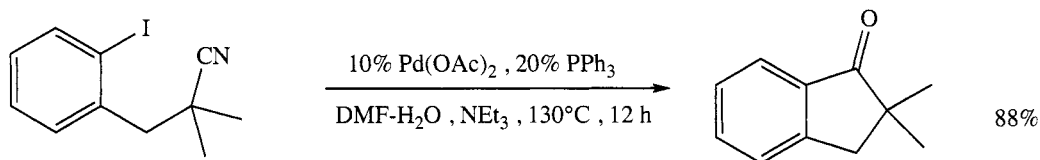
Trost, B.M.; Schroeder, G.M.; Kristensen, J. *Angew. Chem. Int. Ed.* **2002**, *41*, 3492.



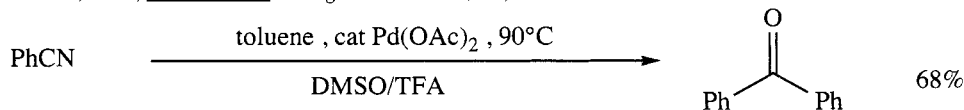
Lykakis, I.N.; Orfanopulos, M. *Tetrahedron Lett.* **2004**, *45*, 7645.

Related Method: Section 49 (Aldehydes from Aldehydes)

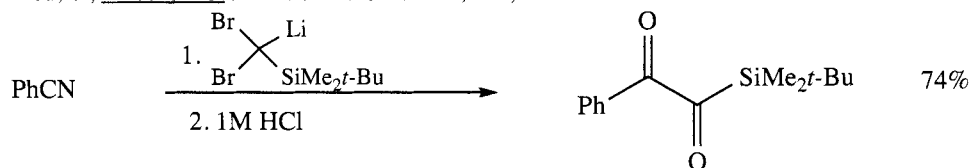
SECTION 178: KETONES FROM NITRILES



Pletnev, A.A.; Larock, R.C. *J. Org. Chem.* **2002**, 67, 9428.



Zhou, C.; Larock, R.C. *J. Am. Chem. Soc.* **2004**, 126, 2302.



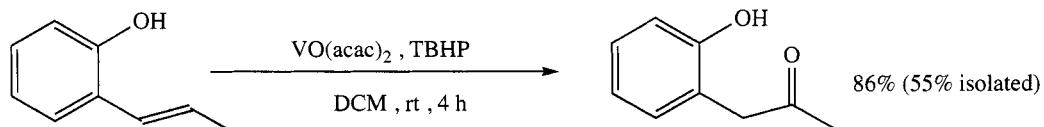
Yagi, K.; Tsuritani, T.; Takami, K.; Shinokubo, H.; Oshima, K. *J. Am. Chem. Soc.* **2004**, 126, 8618.

REVIEW:

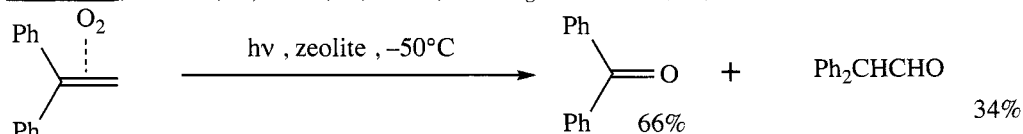
"Additions to Metal-Activated Organonitriles"

Kukushkin, V.Yu.; Pombeiro, A.J.L. *Chem. Rev.* **2002**, 102, 1771.

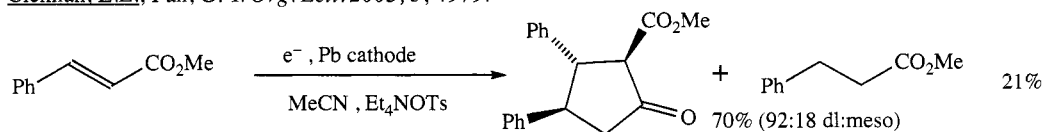
SECTION 179: KETONES FROM ALKENES



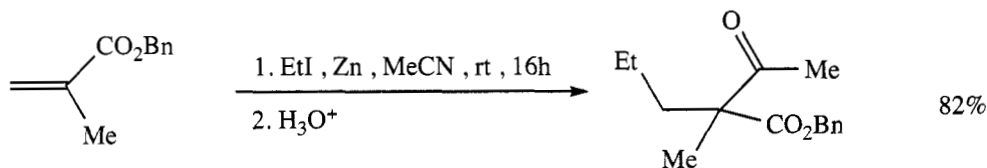
Lattanzi, A.; Senatore, A.; Massa, A.; Scettri, A. *J. Org. Chem.* **2003**, 68, 3691.



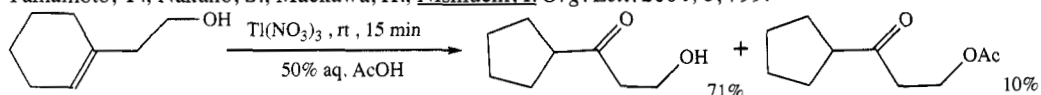
Clennan, E.L.; Pan, G.-I. *Org. Lett.* **2003**, 5, 4979.



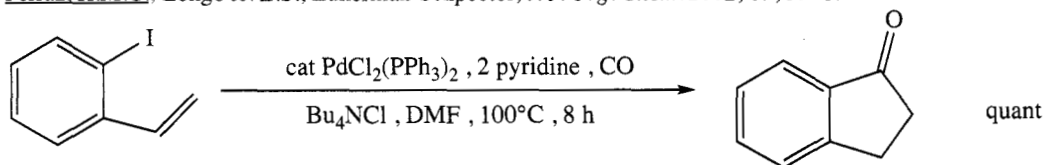
Kise, N.; Iitaka, S.; Iwasaki, K.; Ueda, N. *J. Org. Chem.* **2002**, 67, 8305.



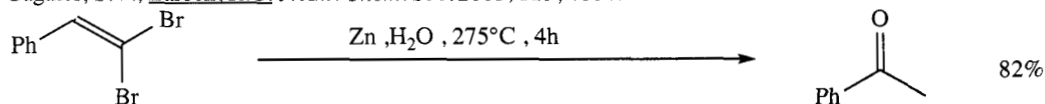
Yamamoto, Y.; Nakano, S.; Maekawa, H.; Nishiuchi, I. *Org. Lett.* **2004**, 6, 799.



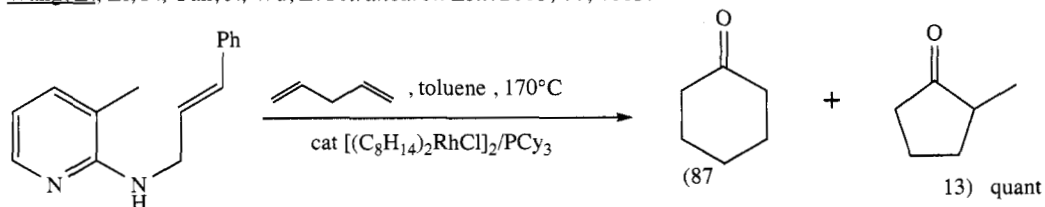
Ferraz, H.M.C.; Longo Jr. L.S.; Zukerman-Schpector, J. *J. Org. Chem.* **2002**, 67, 3518.



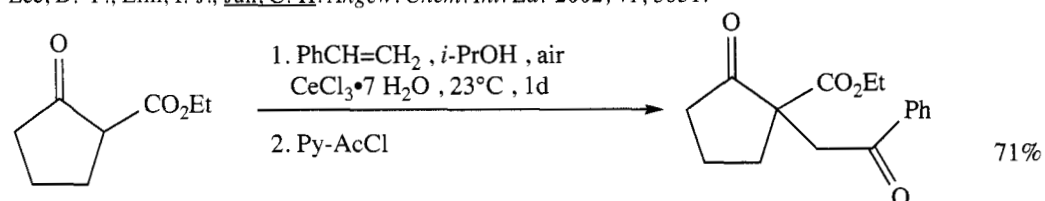
Gagnier, S.V.; Larock, R.C. *J. Am. Chem. Soc.* **2003**, 125, 4804.



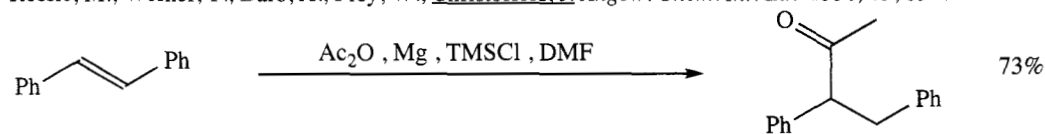
Wang, L.; Li, P.; Yan, J.; Wu, Z. *Tetrahedron Lett.* **2003**, 44, 4685.



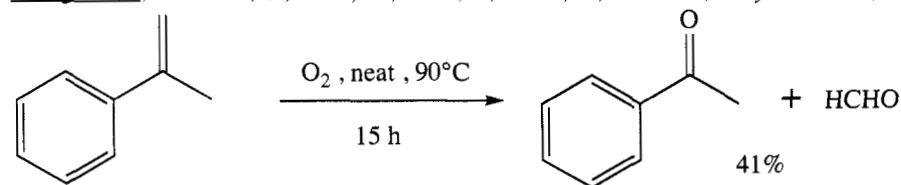
Lee, D.-Y.; Lim, I.-J.; Jun, C.-H. *Angew. Chem. Int. Ed.* **2002**, 41, 3031.



Rösle, M.; Werner, T.; Baro, A.; Frey, W.; Christoffers, J. *Angew. Chem. Int. Ed.* **2004**, 43, 6547.



Nishiguchi, I.; Yamamoto, Y.; Sakai, M.; Ohno, T.; Ishino, Y.; Maekawa, H. *Synlett* **2002**, 759.

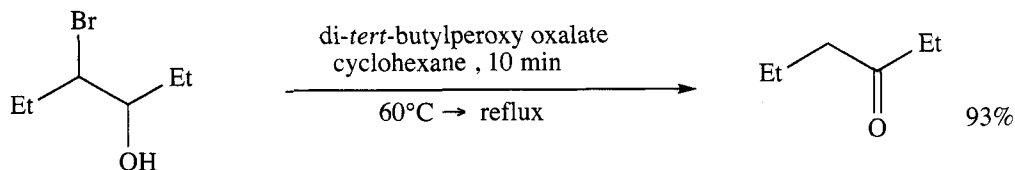
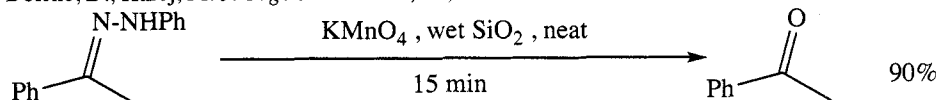
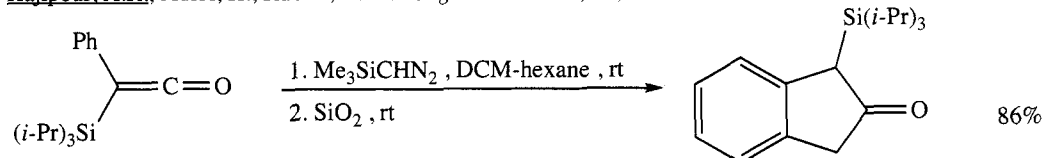
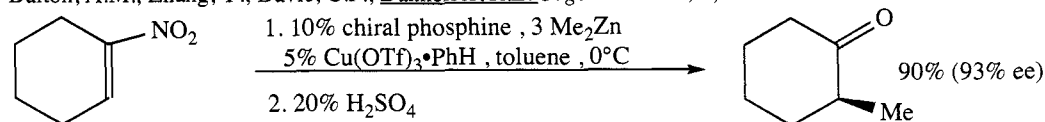
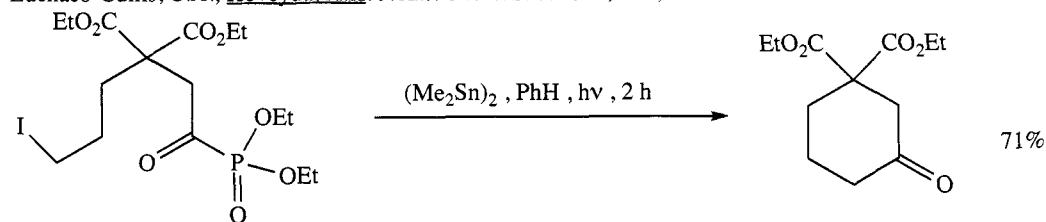
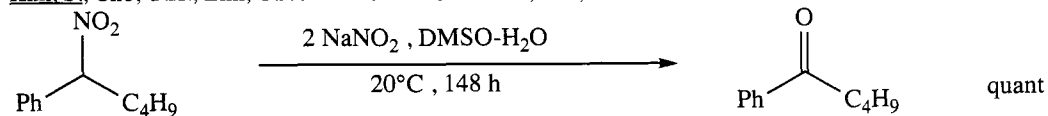
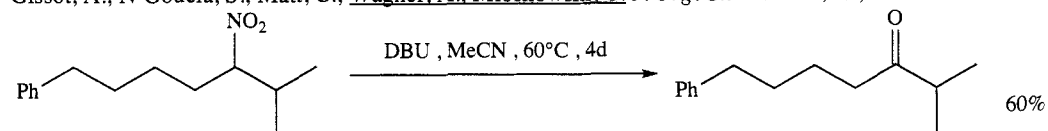


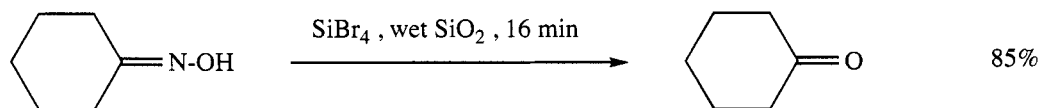
Hayashi, Y.; Takeda, M.; Miyamoto, Y.; Shoji, M. *Chem. Lett.* **2002**, 31, 414.

See also:

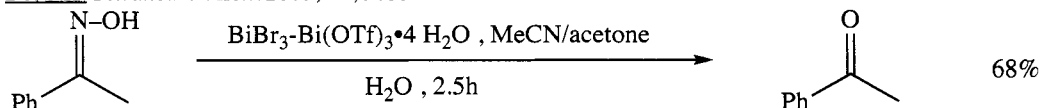
Section 134 (Ethers, Epoxides, and Thioethers from Alkenes)
 Section 174 (Ketones from Ethers, Epoxides, and Thioethers)

SECTION 180: KETONES FROM MISCELLANEOUS COMPOUNDS

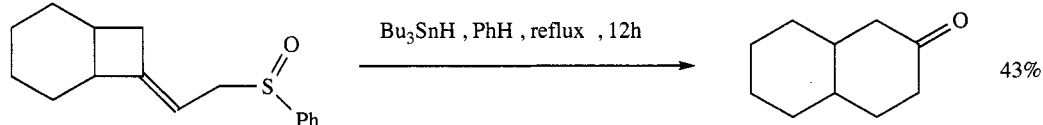
Dolenc, D.; Harej, M. *J. Org. Chem.* **2002**, 67, 312.Hajipour, A.R.; Adibi, H.; Ruoho, A.E. *J. Org. Chem.* **2003**, 68, 4553.Dalton, A.M.; Zhang, Y.; Davie, C.P.; Danheiser, R.L. *Org. Lett.* **2002**, 4, 2465.Luchaco-Cullis, C.A.; Hoveyda, A.H. *J. Am. Chem. Soc.* **2002**, 124, 8192.Kim, S.; Cho, C.H.; Lim, C.J. *J. Am. Chem. Soc.* **2003**, 125, 9574.Gissot, A.; N'Gouela, S.; Matt, C.; Wagner, A.; Mioskowski, C. *J. Org. Chem.* **2004**, 69, 8997.Ballini, R.; Bosica, G.; Fiorini, D.; Petrini, M. *Tetrahedron Lett.* **2002**, 43, 5233.



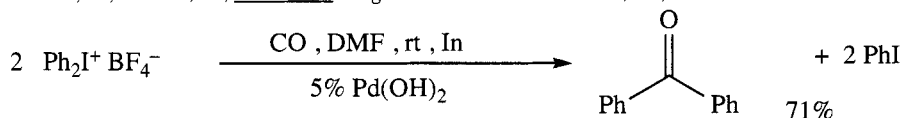
De, S.K. *Tetrahedron Lett.* **2003**, *44*, 9055.



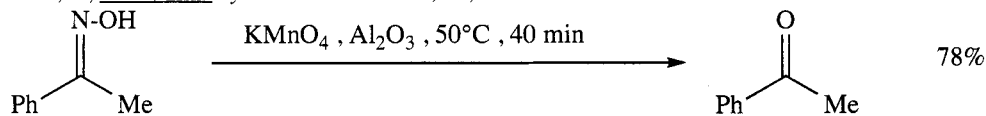
Arnold, J.N.; Hayes, P.D.; Kohaus, R.L.; Mohan, R.S. *Tetrahedron Lett.* **2003**, *44*, 9173.



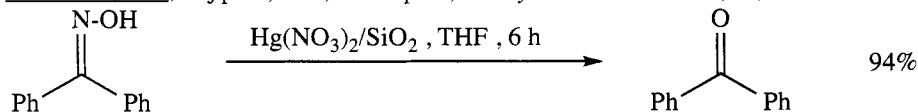
Chuard, R.; Giraud, A.; Renaud, P. *Angew. Chem. Int. Ed.* **2002**, *41*, 4323.



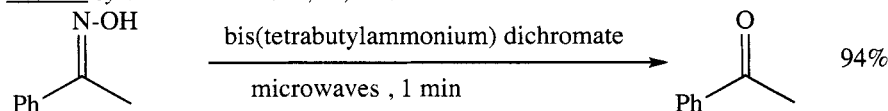
Zhou, T.; Chen, Z.-C. *Synth. Commun.* **2002**, *32*, 3431.



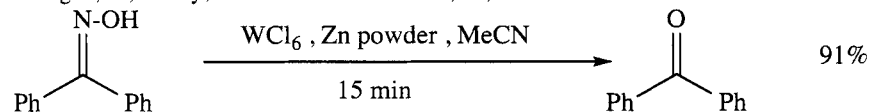
Imanzadeh, G.H.; Hajipour, A.R.; Mallakpour, S.E. *Synth. Commun.* **2004**, *34*, 735.



De, S.K. *Synth. Commun.* **2004**, *34*, 2289.



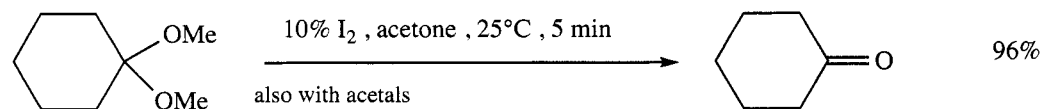
Murugan, R.; Reddy, B.S.R. *Chem. Lett.* **2004**, *33*, 1038.



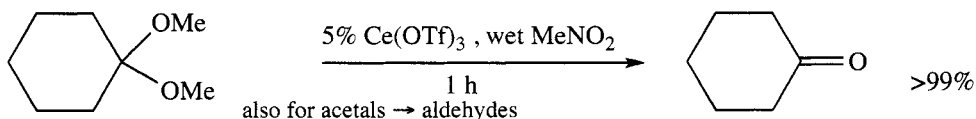
Firouzabadi, H.; Jamalian, A.; Karimi, B. *Bull. Chem. Soc. Jpn.* **2002**, *75*, 1761.

Conjugate reductions and reductive alkylations of enones are listed in Section 74 (Alkyls, Methylene, and Aryls from Alkenes).

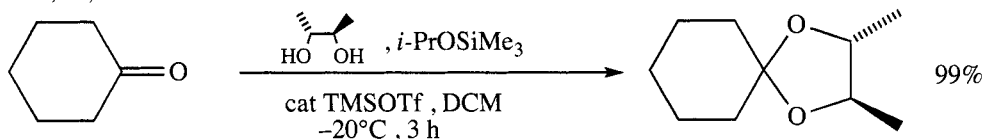
SECTION 180A: PROTECTION OF KETONES



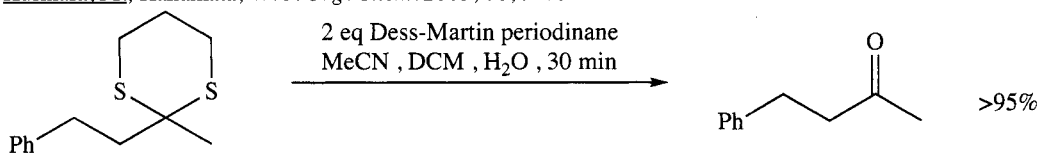
Sun, J.; Dong, Y.; Cao, L.; Wang, X.; Wang, S.; Hu, Y. *J. Am. Chem. Soc.* **2004**, *126*, 8932.



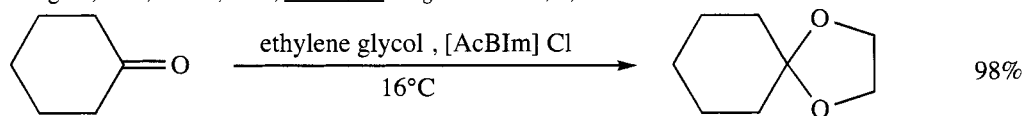
Dalpozzo, R.; DeNino, A.; Maiuolo, L.; Procopio, A.; Tagarelli, A.; Sindona, G.; Bartoli, G. *J. Org. Chem.* **2002**, 67, 9093.



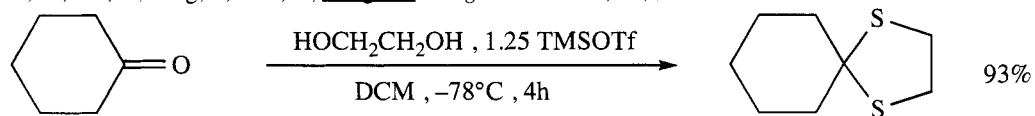
Kurihara, M.; Hakamata, W. *J. Org. Chem.* **2003**, 68, 3413.



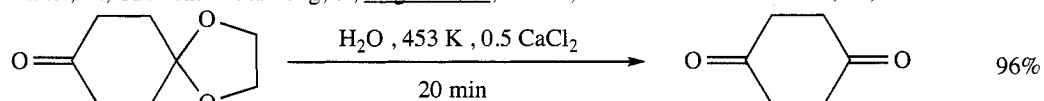
Langille, N.F.; Dakin, L.A.; Panek, J.S. *Org. Lett.* **2003**, 5, 575.



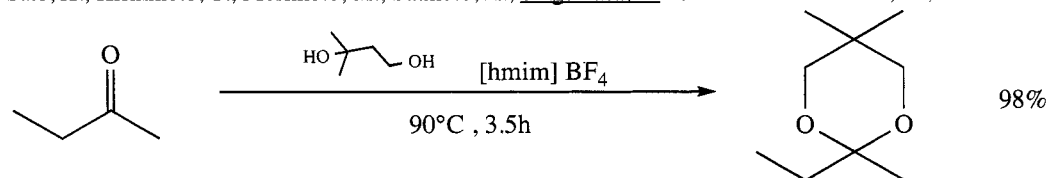
Li, D.; Shi, F.; Peng, J.; Guo, S.; Deng, Y. *J. Org. Chem.* **2004**, 69, 3582.



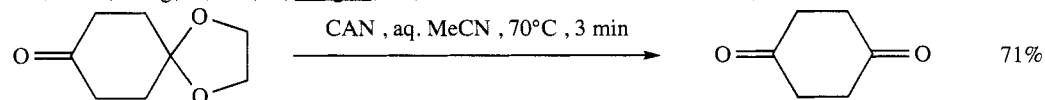
Martel, A.; Chewchanwuttiwong, S.; Dugardin, G.; Brown, E. *Tetrahedron Lett.* **2003**, 44, 1491.



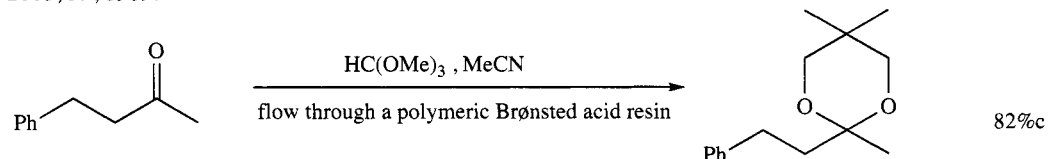
Sato, K.; Kishimoto, T.; Morimoto, M.; Saimoto, H.; Shigemasa, Y. *Tetrahedron Lett.* **2003**, 44, 8623.



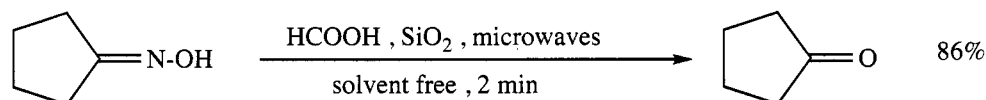
Wu, H.-H.; Yang, F.; Cui, P.; Tang, J.; He, M.-Y. *Tetrahedron Lett.* **2004**, 45, 4963.



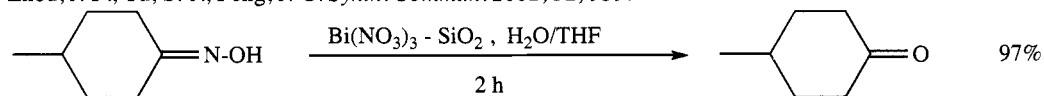
Ates, A.; Gautier, A.; Leroy, B.; Plancher, J.-M.; Quesnel, Y.; Vanherck, J.-C.; Markó, I.E. *Tetrahedron* **2003**, 59, 8989.



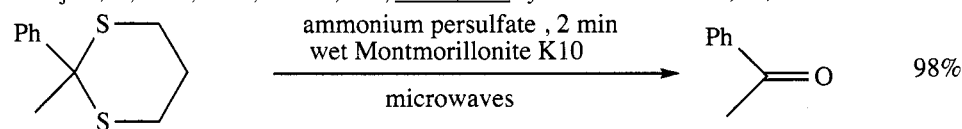
Ishihara, K.; Hasegawa, A.; Yamamoto, H. *Synlett* **2002**, 1296.



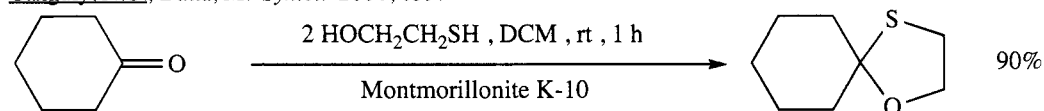
Zhou, J.-F.; Tu, S.-J.; Feng, J.-C. *Synth. Commun.* **2002**, 32, 959.



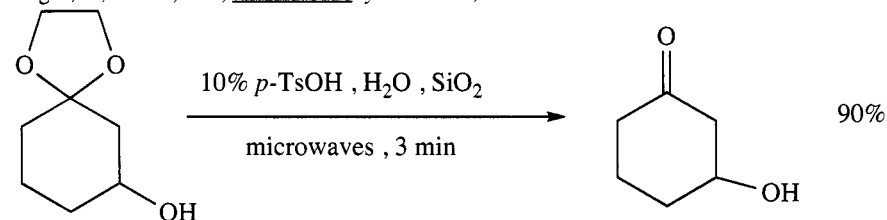
Samajdar, S.; Basu, M.K.; Becker, F.F.; Banik, B.K. *Synth. Commun.* **2002**, 32, 1917.



Ganguly, N.C.; Datta, M. *Synlett* **2004**, 659.



Gogoi, S.; Borah, J.C.; Barua, N.C. *Synlett* **2004**, 1592.



He, Y.; Johansson, M.; Stermer, Q. *Synth. Commun.* **2004**, 34, 4153.

REVIEW:

“Regeneration of Carbonyl Compounds from Oximes, Hydrazones, Semicarbazones, Acetals, 1,1-Diacetates, 1,3-Dithiolanes, 1,3-Dithianes, and 1,3-Oxathiolanes”

Khooe, S.; Ruoho, A.E. *Org. Prep. Proceed. Int.* **2003**, 35, 527.

See Section 362 (Ester-Alkene) for the formation of enol esters and Section 367 (Ether-Alkene) 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

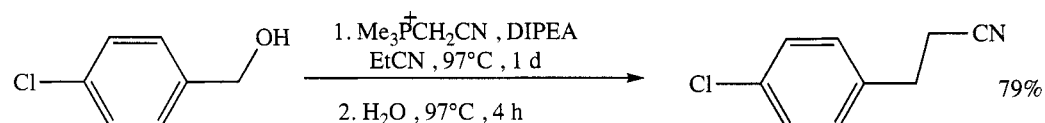
SECTION 181: NITRILES FROM ALKYNES

NO ADDITIONAL EXAMPLES

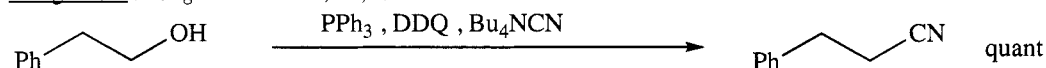
SECTION 182: NITRILES FROM ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

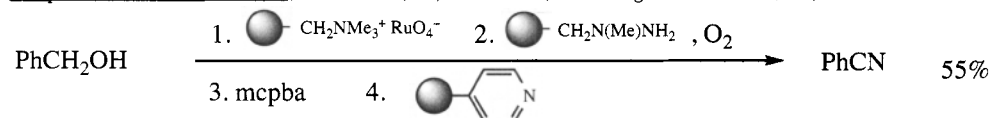
SECTION 183: NITRILES FROM ALCOHOLS AND THIOLS



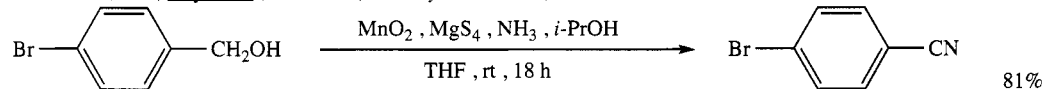
Zaragoza, F. *J. Org. Chem.* **2002**, 67, 4963.



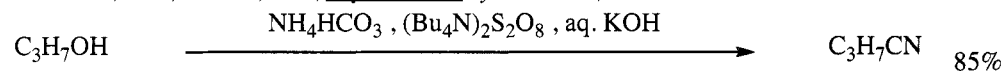
Iranpoor, N.; Firouzabadi, H.; Akhlahina, B.; Nowrouzi, N. *J. Org. Chem.* **2004**, 69, 2562.



Baxendale, I.R.; Ley, S.V.; Sneddon, H.F. *Synlett* **2002**, 775.

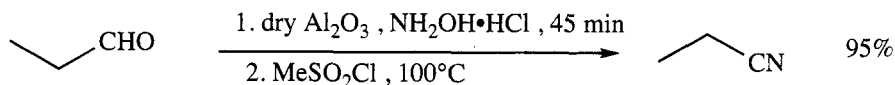


McAllister, G.D.; Wilfred, C.D.; Taylor, R.J.K. *Synlett* **2002**, 1291.

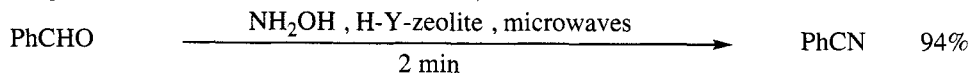


Chen, F.-E.; Li, Y.-Y.; Xu, M.; Jia, H.-Q. *Synthesis* **2002**, 1804.

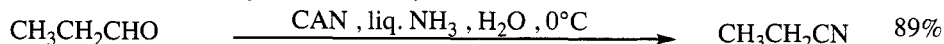
SECTION 184: NITRILES FROM ALDEHYDES



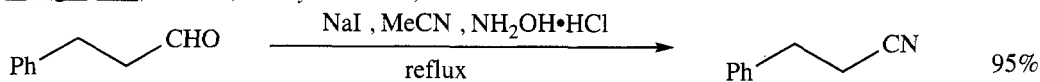
Sharghi, H.; Sarvari, M.H. *Tetrahedron* **2002**, 58, 10323.



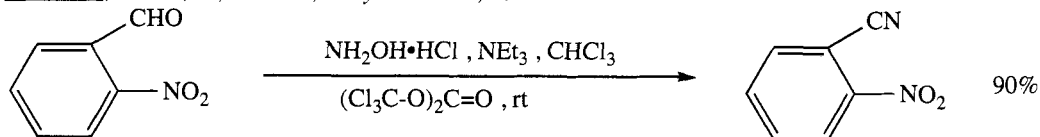
Srinivas, K.V.N.S.; Reddy, E.B.; Das, B. *Synlett* **2002**, 625.



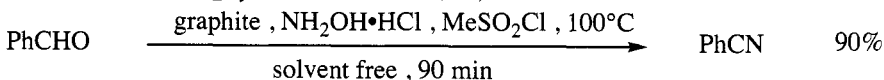
Bandgar, B.P.; Makone, S.S. *Synlett* **2003**, 262.



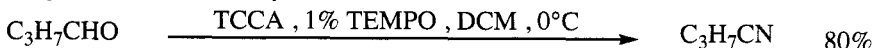
Ballini, R.; Fiorini, D.; Palmieri, A. *Synlett* **2003**, 1841.



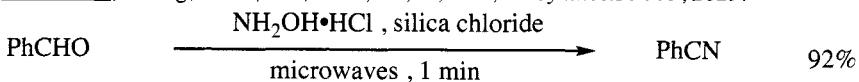
Bose, D.S.; Goud, P.R. *Synth. Commun.* **2002**, 32, 3621.



Sharghi, H.; Sarvari, M.H. *Synthesis* **2003**, 243.



Chen, F.-E.; Kuang, Y.-Y.; Dai, H.-F.; Lu, L.; Huo, M. *Synthesis* **2003**, 2629.

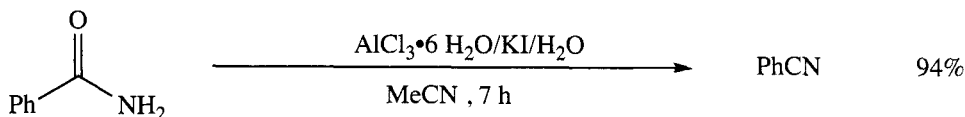


Srinivas, K.V.N.S.; Mahender, I.; Das, B. *Chem. Lett.* **2003**, 32, 738

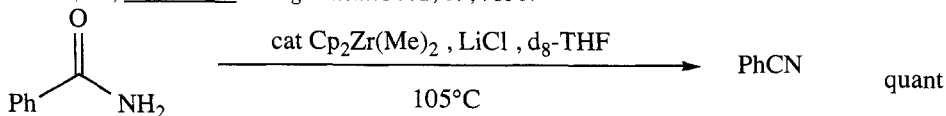
SECTION 185: NITRILES FROM ALKYL, METHYLENES, AND ARYL

NO ADDITIONAL EXAMPLES

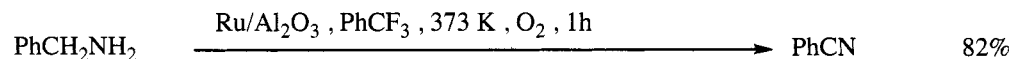
SECTION 186: NITRILES FROM AMIDES



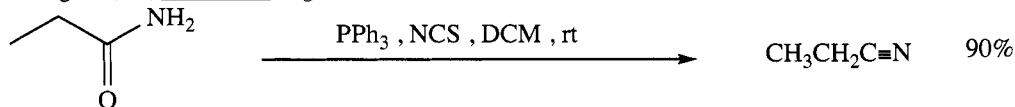
Boruah, M.; Konwar, D. *J. Org. Chem.* **2002**, 67, 7138.



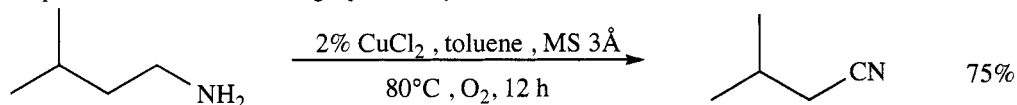
Ruck, R.T.; Bergman, R.G. *Angew. Chem. Int. Ed.* **2004**, 43, 5375.



Yamaguchi, K.; Mizuno, N. *Angew. Chem. Int. Ed.* **2003**, 42, 1479.



Iranpoor, N.; Firouzabadi, H.; Aghapoor, G. *Synth. Commun.* **2002**, 32, 2535.



Maeda, Y.; Nishimura, T.; Uemura, S. *Bull. Chem. Soc. Jpn.* **2003**, 76, 2399.

SECTION 187: NITRILES FROM AMINES

NO ADDITIONAL EXAMPLES

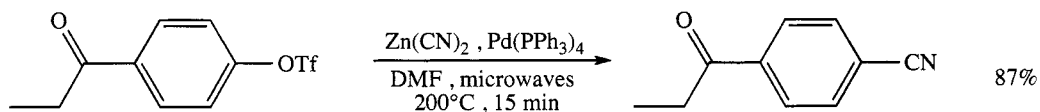
SECTION 188: NITRILES FROM ESTERS

NO ADDITIONAL EXAMPLES

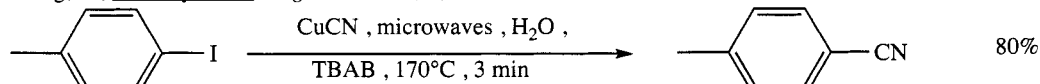
SECTION 189: NITRILES FROM ETHERS, EPOXIDES, AND THIOETHERS

NO ADDITIONAL EXAMPLES

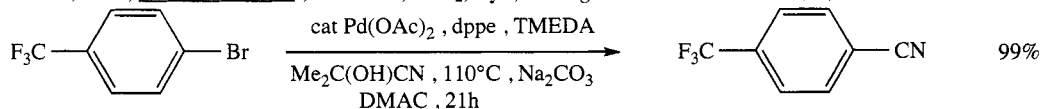
SECTION 190: NITRILES FROM HALIDES AND SULFONATES



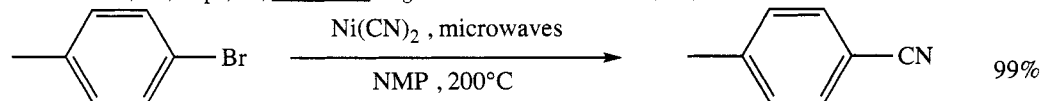
Zhang, A.; Neumeier, J.L. *Org. Lett.* **2003**, 5, 201.



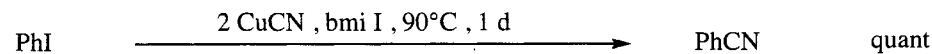
Arvela, R.K.; Leadbeater, N.E.; Torenus, H.M.; Tye, H. *Org. Biomol. Chem.* **2003**, 1, 1119.



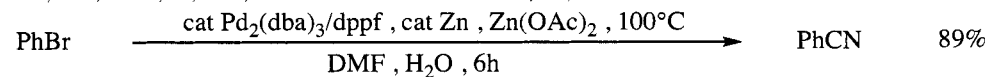
Sundermeier, M.; Zapf, A.; Beller, M. *Angew. Chem. Int. Ed.* **2003**, 42, 1661.



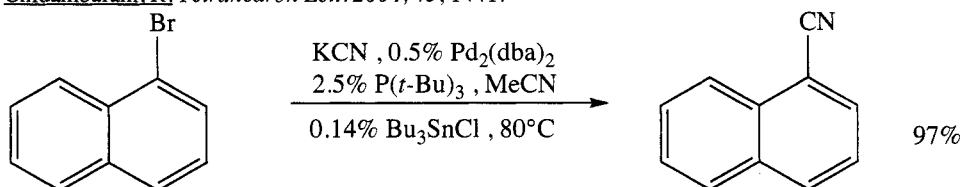
Arvela, R.K.; Leadbeater, N.E. *J. Org. Chem.* **2003**, 68, 9122.



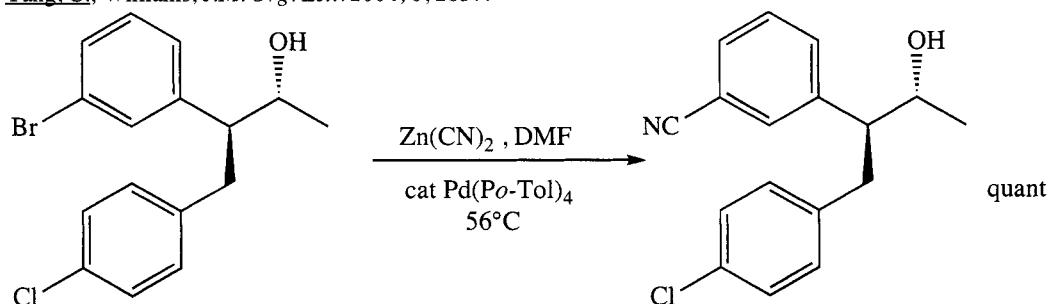
Wu, J.X.; Beck, B.; Ren, R.X. *Tetrahedron Lett.* **2002**, 43, 387.



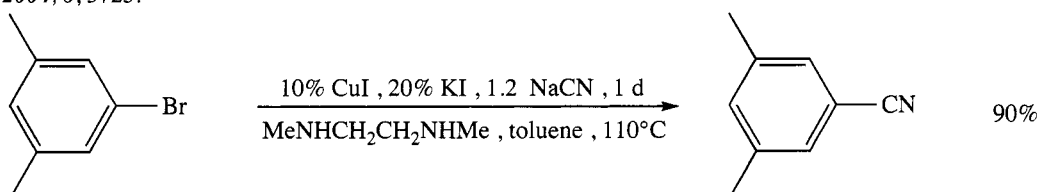
Chidambaram, R. *Tetrahedron Lett.* **2004**, 45, 1441.



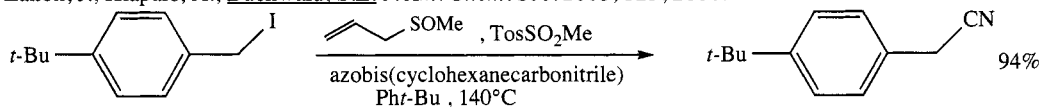
Yang, C.; Williams, J.M. *Org. Lett.* **2004**, 6, 2837.



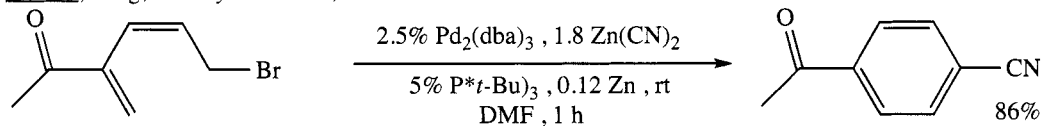
Marcantonio, K.M.; Frey, L.F.; Liu, Y.; Chen, Y.; Strine, J.; Phenix, B.; Wallace, D.J.; Chen, C.-y. *Org. Lett.* **2004**, 6, 3723.



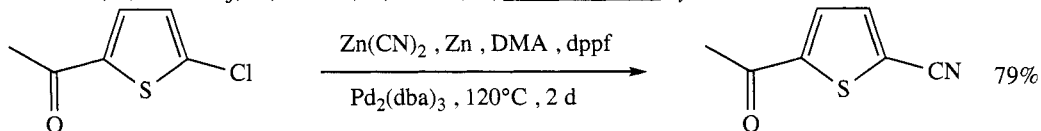
Zanon, J.; Klapars, A.; Buchwald, S.L. *J. Am. Chem. Soc.* **2003**, 125, 2886.



Kim, S.; Song, H.-J. *Synlett* **2002**, 2110.

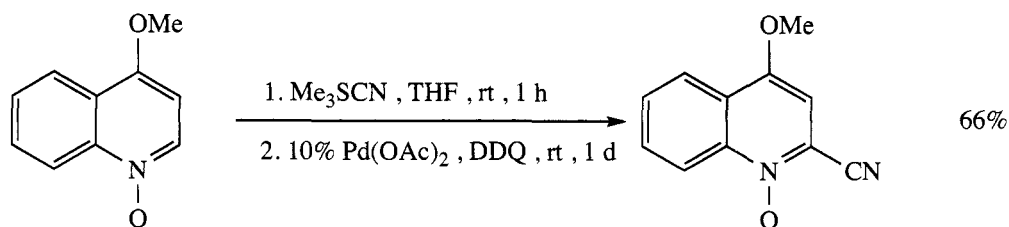


Ramnauth, J.; Bhardwaj, N.; Renton, P.; Rakhit, S.; Maddaford, S.P. *Synlett* **2003**, 2237.



Ekker, T.; Nemec, S. *Synthesis* **2004**, 23.

SECTION 191: NITRILES FROM HYDRIDES



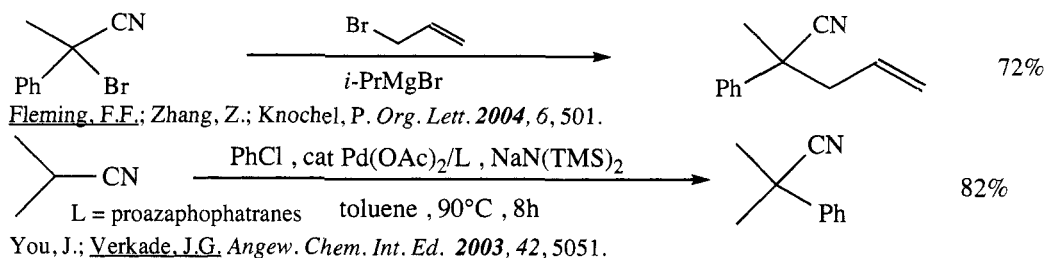
Tagawa, Y.; Higuchi, Y.; Yamagata, K.; Shibata, K.; Teshima, D. *Heterocycles* **2004**, 63, 2859.

SECTION 192: NITRILES FROM KETONES

NO ADDITIONAL EXAMPLES

SECTION 193: NITRILES FROM NITRILES

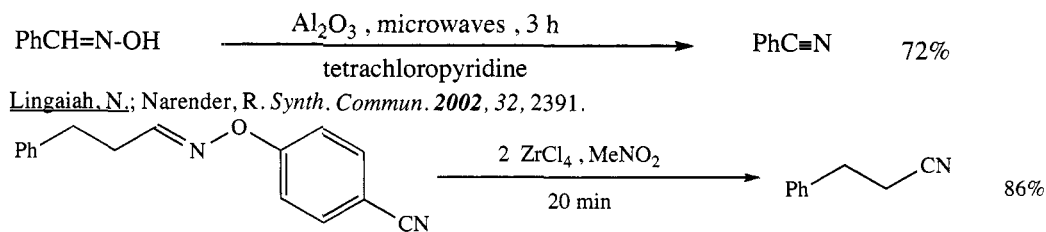
Conjugate reductions and Michael alkylations of alkene nitriles are given in Sections 74D and 74E (Conjugate Reductions and Alkylations of α,β -Unsaturated Carbonyl Compounds and Nitriles, respectively).



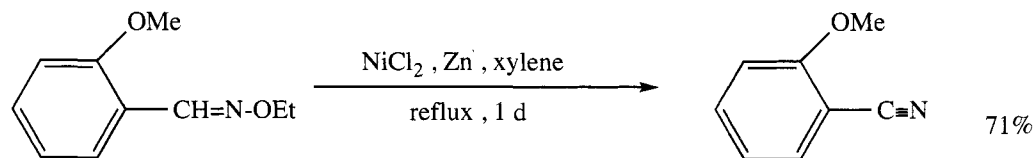
SECTION 194: NITRILES FROM ALKENES

NO ADDITIONAL EXAMPLES

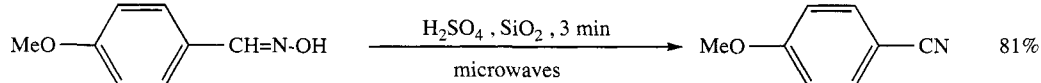
SECTION 195: NITRILES FROM MISCELLANEOUS COMPOUNDS



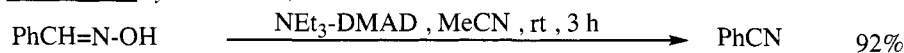
Tsuji, C.; Miyazawa, E.; Sakamoto, T.; Kikugawa, Y. *Synth. Commun.* **2002**, 32, 3871.



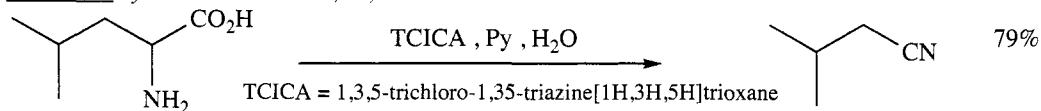
Maeyama, K.; Kobayashi, M.; Kato, H.; Yonezawa, N. *Synth. Commun.* **2002**, 32, 2519.



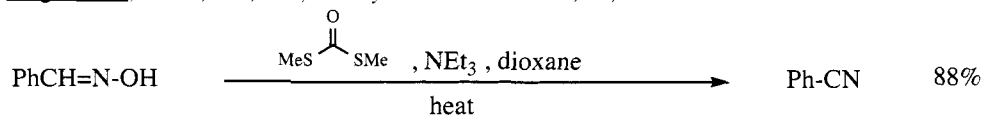
Sarvari, M.H. *Synthesis* **2004**, 787.



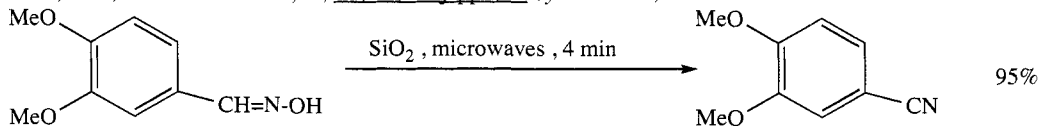
Coskun, N. *Synth. Commun.* **2004**, 34, 1625.



Hiegel, G.A.; Lewis, J.C.; Bae, J.W. *Synth. Commun.* **2004**, 34, 3449.



Khan, T.A.; Peruncheralathan, S.; Ila, H.; Junjappa, H. *Synlett* **2004**, 2019.

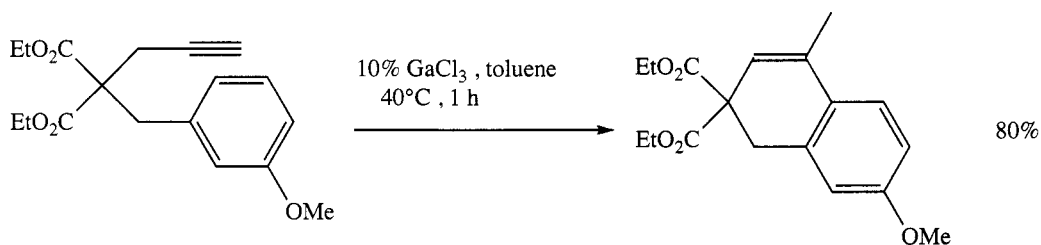


Dewan, S.K.; Singh, R.; Kumar, A. *Synth. Commun.* **2004**, 34, 2025.

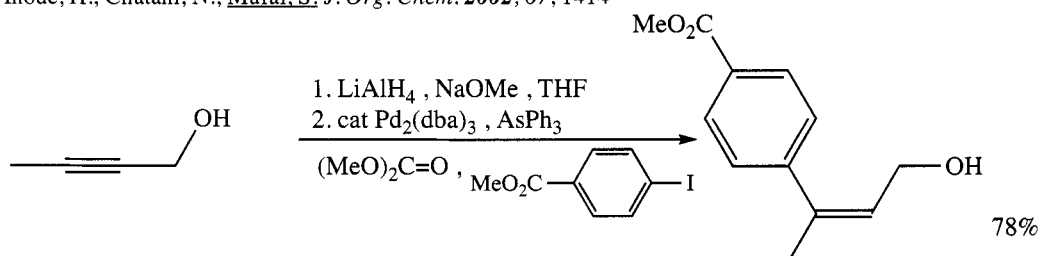
CHAPTER 14

PREPARATION OF ALKENES

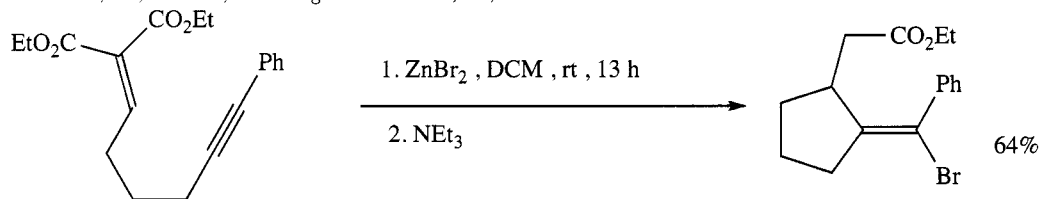
SECTION 196: ALKENES FROM ALKYNES



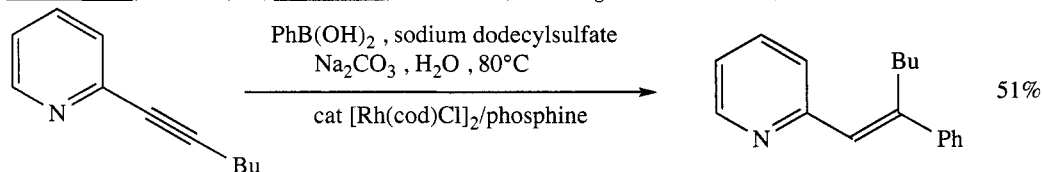
Inoue, H.; Chatani, N.; Murai, S. *J. Org. Chem.* **2002**, 67, 1414



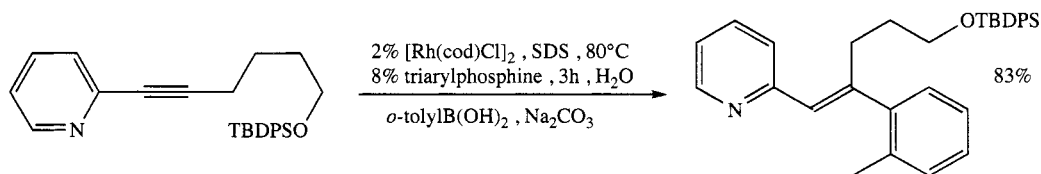
Havránek, M.; Dvorrák, D. *J. Org. Chem.* **2002**, 67, 2125.



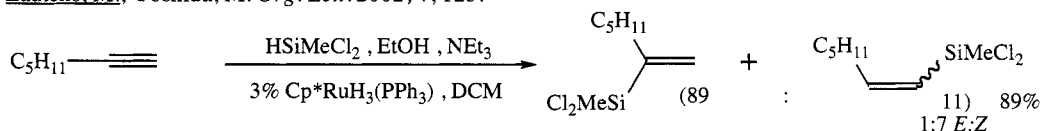
Yamazaki, S.; Yamada, K.; Yamabe, S.; Yamamoto, K. *J. Org. Chem.* **2002**, 67, 2889.



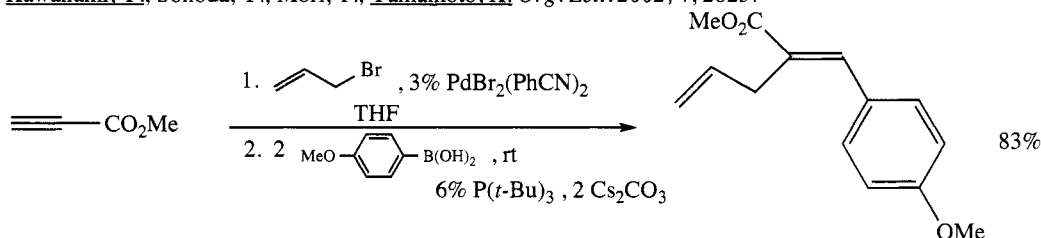
Lautens, M.; Yoshida, M. *J. Org. Chem.* **2003**, 68, 762.



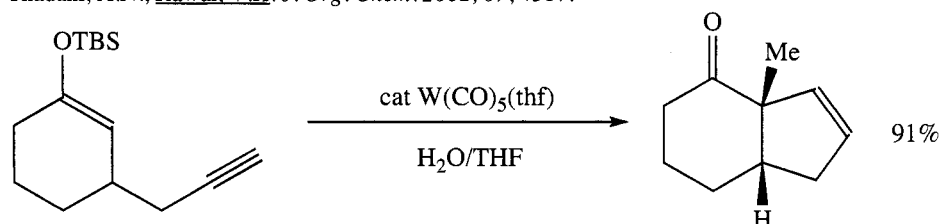
Lautens, M.; Yoshida, M. *Org. Lett.* **2002**, 4, 123.



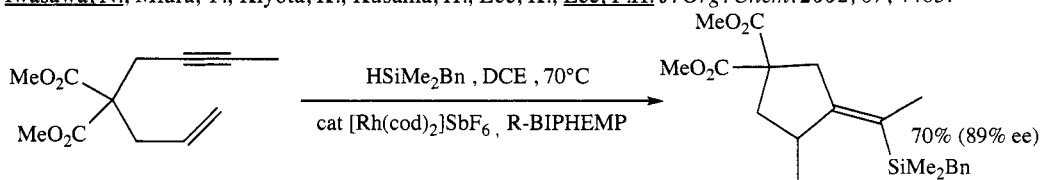
Kawanami, Y.; Sonoda, Y.; Mori, T.; Yamamoto, K. *Org. Lett.* **2002**, 4, 2825.



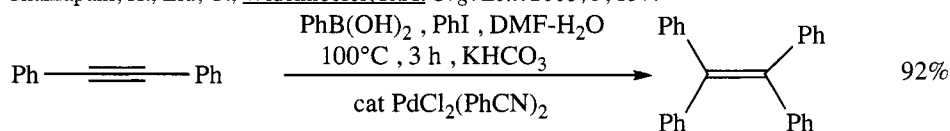
Thadani, A.N.; Rawal, V.H. *J. Org. Chem.* **2002**, 67, 4317.



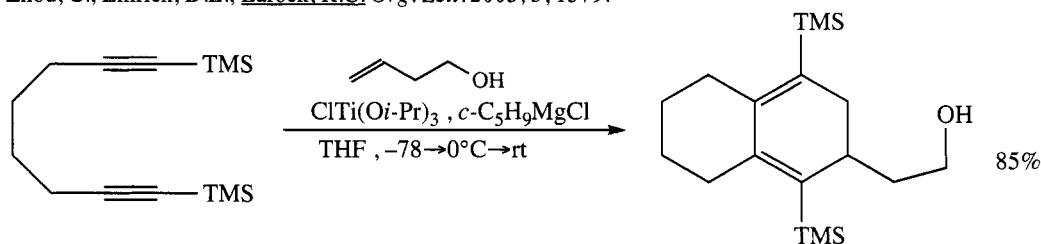
Iwasawa, N.; Miura, T.; Kiyota, K.; Kusama, H.; Lee, K.; Lee, P.H. *J. Org. Chem.* **2002**, 67, 4463.



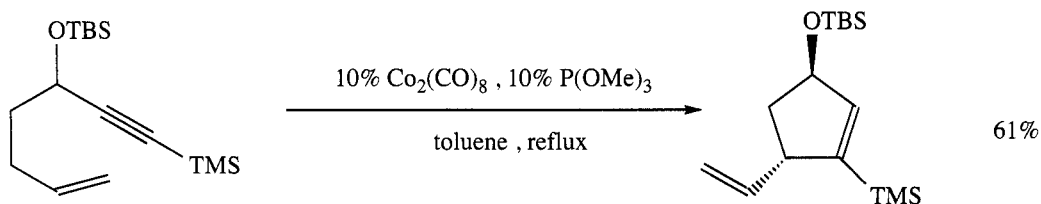
Chakrapani, H.; Liu, C.; Widenhoefer, R.A. *Org. Lett.* **2003**, 5, 157.



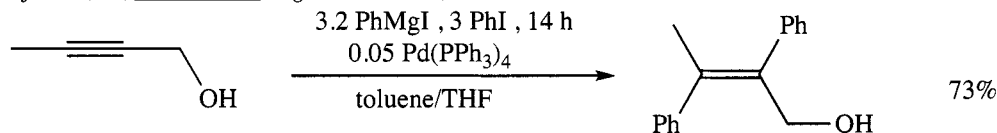
Zhou, C.; Emrich, D.E.; Larock, R.C. *Org. Lett.* **2003**, 5, 1579.



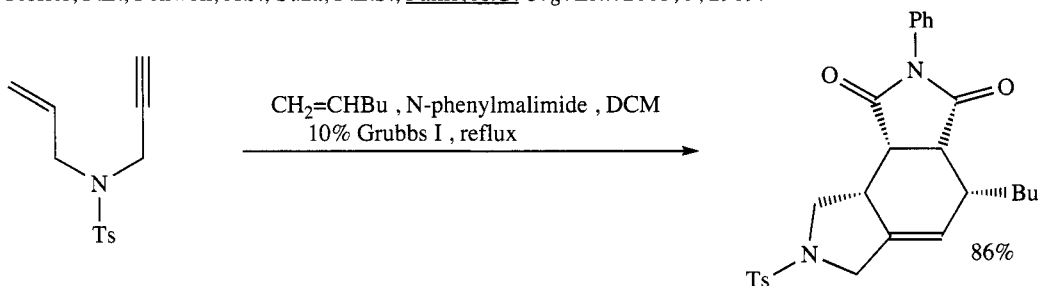
Sung, M.J.; Pang, J.-H.; Park, S.-B.; Cha, J.K. *Org. Lett.* **2003**, 5, 2137.



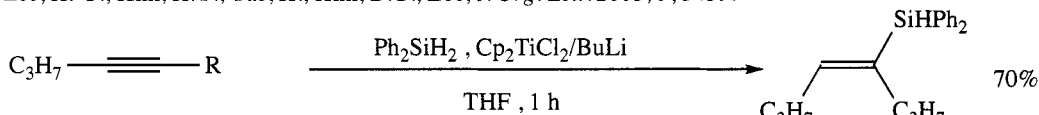
Ajamian, A.; Gleason, J.L. *Org. Lett.* **2003**, 5, 2409.



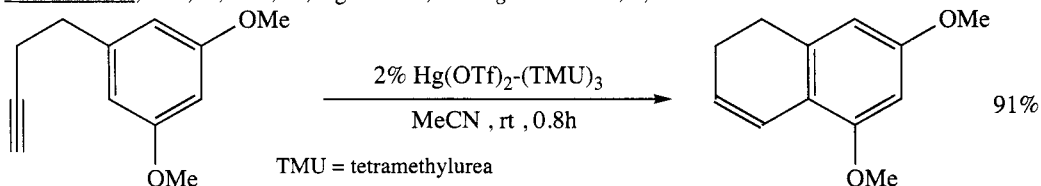
Tessier, P.E.; Penwell, A.J.; Suza, F.E.S.; Fallis, A.G. *Org. Lett.* **2003**, 5, 2989.



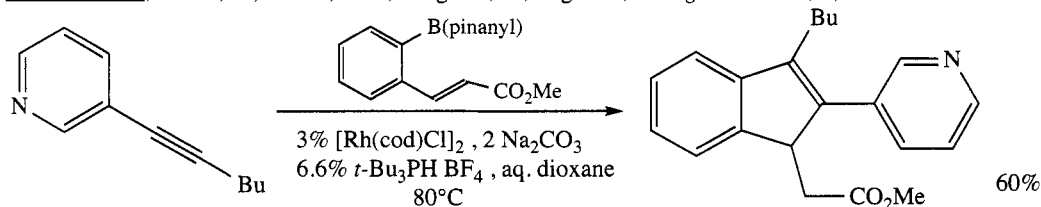
Lee, H.-Y.; Kim, H.Y.; Tae, H.; Kim, B.G.; Lee, J. *Org. Lett.* **2003**, 5, 3439.



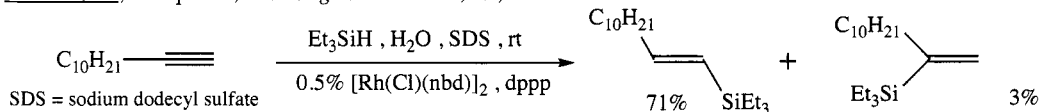
Takahashi, T.; Bao, F.; Gao, G.; Ogasawara, M. *Org. Lett.* **2003**, 5, 3479.



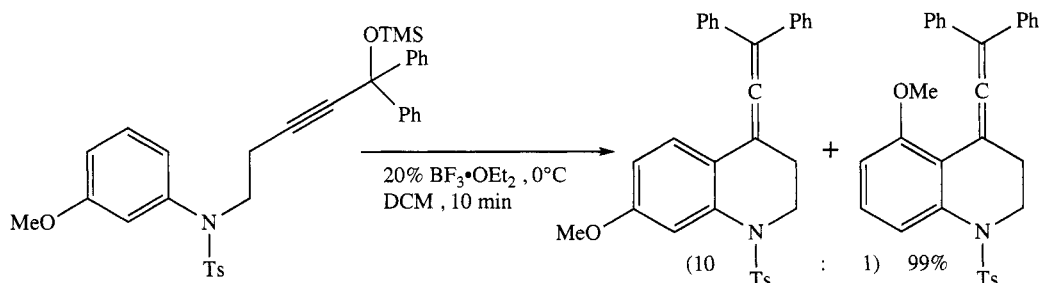
Nishizawa, M.; Takao, H.; Yadav, V.K.; Imagawa, H.; Sugihara, T. *Org. Lett.* **2003**, 5, 4563.



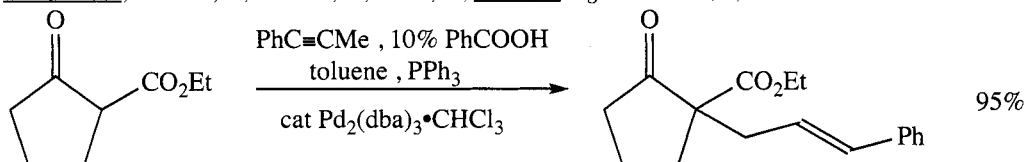
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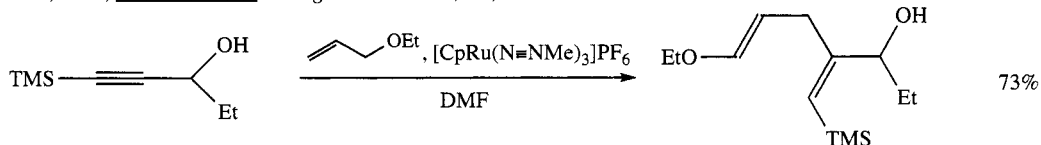
Sato, A.; Kinoshita, H.; Shinokubo, H.; Oshima, K. *Org. Lett.* **2004**, 6, 2217.



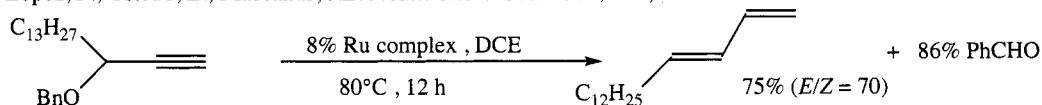
Ishikawa, T.; Manabe, S.; Aikawa, T.; Kudo, T.; Saito, S. *Org. Lett.* **2004**, 6, 2361.



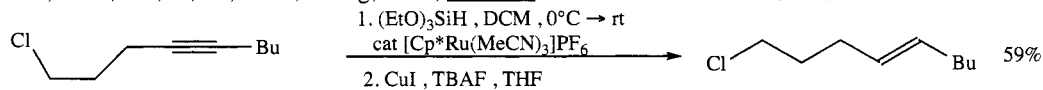
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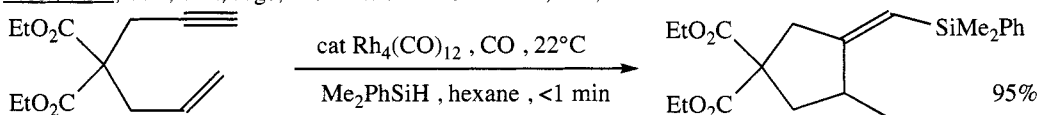
López, F.; Cstedo, L.; Mascañas, J.L. *J. Am. Chem. Soc.* **2002**, 124, 4218.



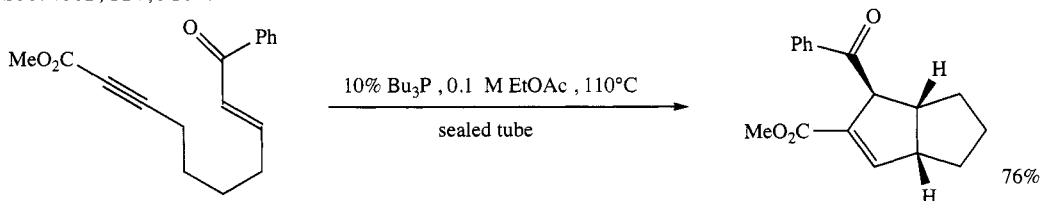
Yeh, K.-L.; Liu, B.; Lo, C.-Y.; Huang, H.-L.; Liu, R.-S. *J. Am. Chem. Soc.* **2002**, 124, 6510.



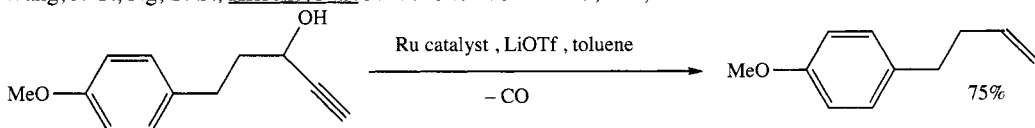
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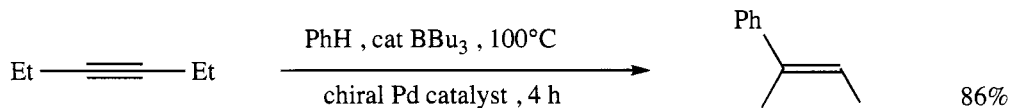
Ojima, I.; Vu, A.T.; Lee, S.-Y.; McCullagh, J.V.; Moralee, A.C.; Fuiwara, M.; Hoang, T.H. *J. Am. Chem. Soc.* **2002**, 124, 9164.



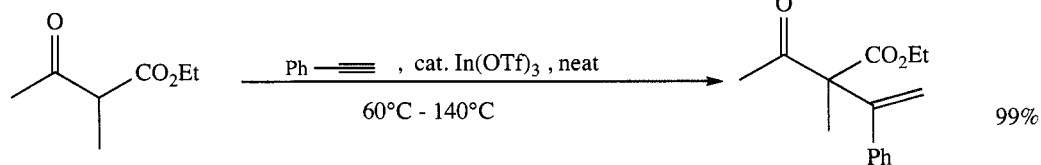
Wang, J.-C.; Ng, S.-S.; Krische, M.J. *J. Am. Chem. Soc.* **2003**, 125, 3682.



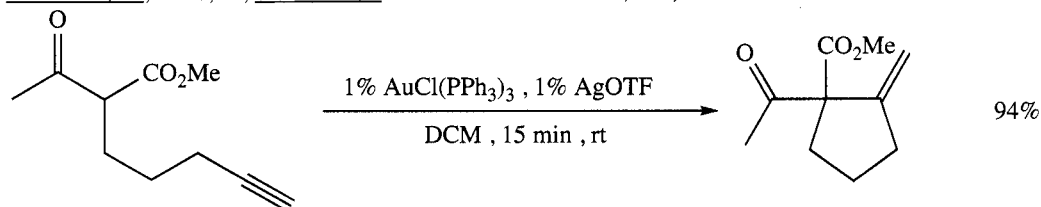
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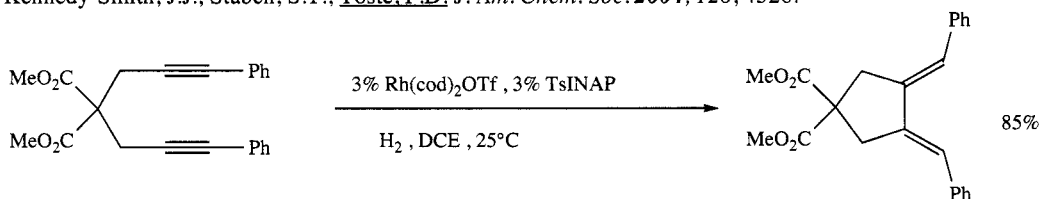
Isukada, N.; Mitsuboshi, T.; Setoguchi, H.; Inoue, Y. *J. Am. Chem. Soc.* **2003**, 125, 12102.



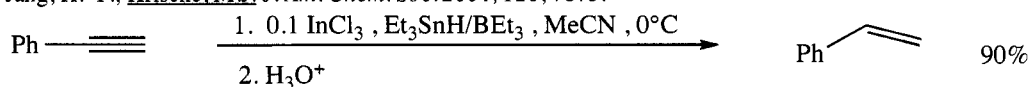
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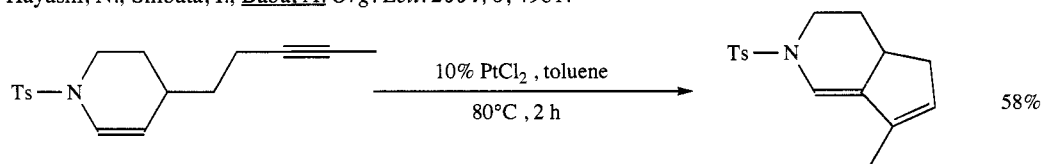
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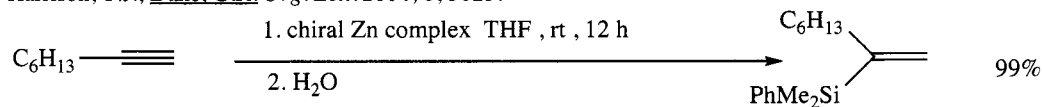
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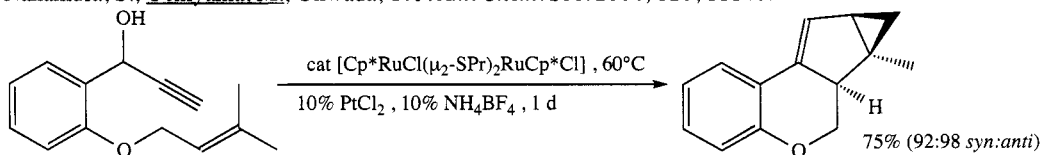
Hayashi, N.; Shibata, I.; Baba, A. *Org. Lett.* **2004**, 6, 4981.



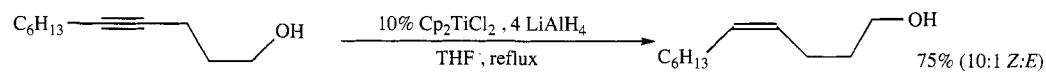
Harrison, T.J.; Dake, G.R. *Org. Lett.* **2004**, 6, 5023.



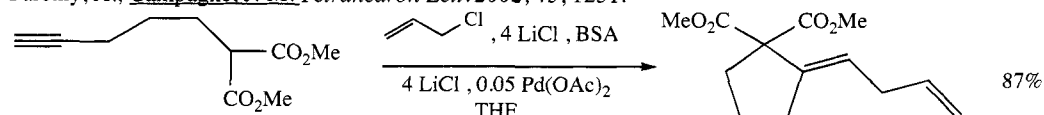
Nakamura, S.; Uchiyama, M.; Ohwada, T. *J. Am. Chem. Soc.* **2004**, 126, 11146.



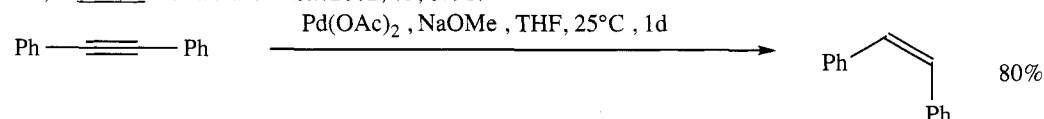
Nishibayashi, Y.; Yoshikawa, M.; Inada, Y.; Hidai, M.; Uemura, S. *J. Am. Chem. Soc.* **2004**, 126, 16066.



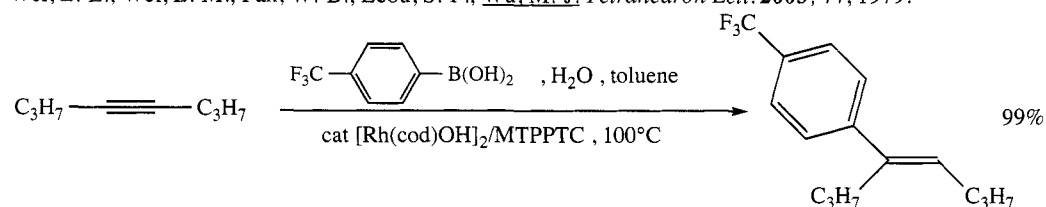
Paretny, A.; Campagne, J.-M. *Tetrahedron Lett.* **2002**, *43*, 1231.



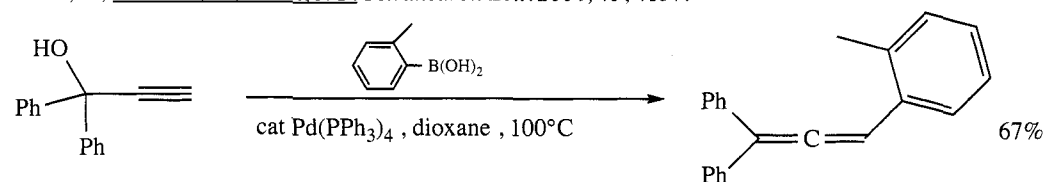
Liu, G.; Lu, X. *Tetrahedron Lett.* **2002**, *43*, 6791.



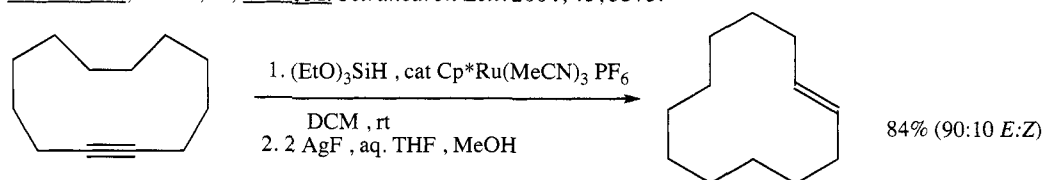
Wei, L.-L.; Wei, L.-M.; Pan, W.-B.; Leou, S.-P.; Wu, M.-J. *Tetrahedron Lett.* **2003**, *44*, 1979.



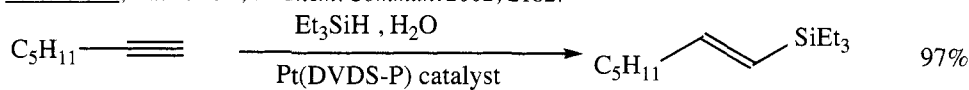
Genin, E.; Michelet, V.; Genêt, J.-P. *Tetrahedron Lett.* **2004**, *45*, 4157.



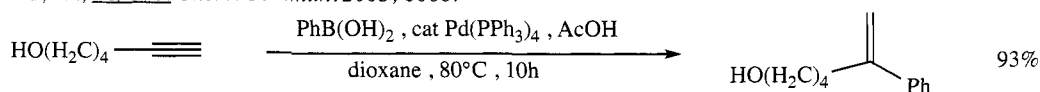
Yoshida, M.; Gotou, T.; Ihara, M. *Tetrahedron Lett.* **2004**, *45*, 5573.



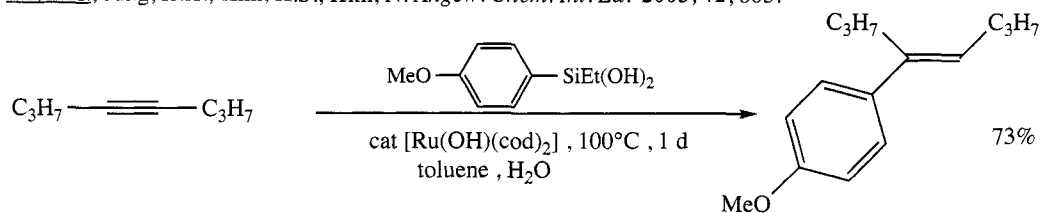
Fürstner, A.; Radkowski, K. *Chem. Commun.* **2002**, 2182.



Wu, W.; Li, C.-J. *Chem. Commun.* **2003**, 1668.



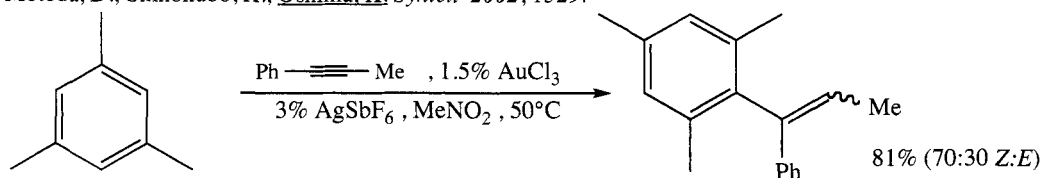
Oh, C.H.; Jung, H.H.; Kim, K.S.; Kim, N. *Angew. Chem. Int. Ed.* **2003**, *42*, 805.



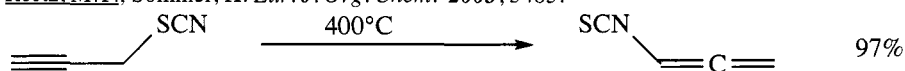
Fujii, T.; Koike, T.; Mori, A.; Osakada, K. *Synlett* **2002**, 295.



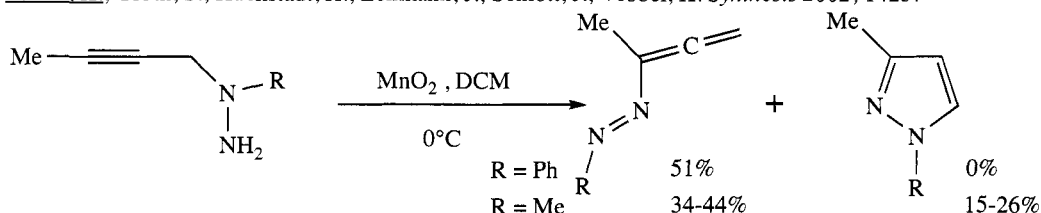
Motoda, D.; Shinokubo, H.; Oshima, K. *Synlett* **2002**, 1529.



Reetz, M.T.; Sommer, K. *Eur. J. Org. Chem.* **2003**, 3485.



Banert, K.; Groth, S.; Hückstädt, H.; Lehmann, J.; Schlott, J.; Vrobel, K. *Synthesis* **2002**, 1423.



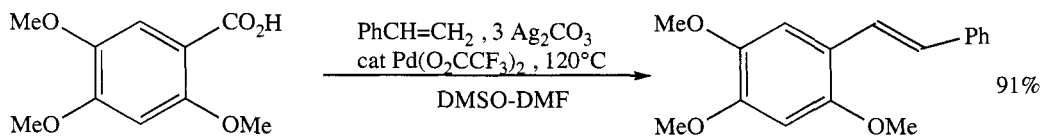
Banert, K.; Haagedorn, M.; Schlott, J. *Chem Lett.* **2003**, 32, 360.

REVIEW:

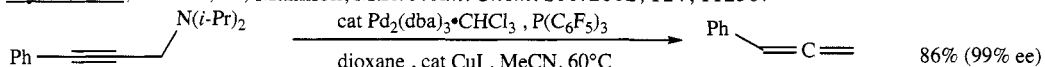
“Enyne Methathesis Catalyzed by Ruthenium Carbene Complexes”

Poulsen, C.S.; Madsen, R. *Synthesis* **2003**, 1.

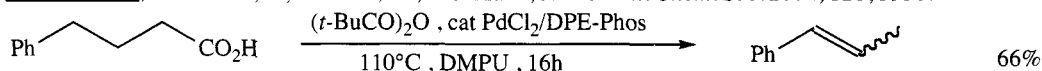
SECTION 197: ALKENES FROM ACID DERIVATIVES



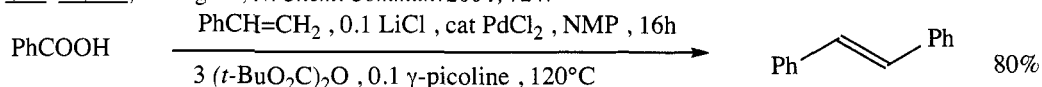
Myers, A.G.; Tanaka, D.; Mannion, M.R. *J. Am. Chem. Soc.* **2002**, 124, 11250.



Nakamura, H.; Kamakura, T.; Ishikura, M.; Biellmann, J.-F. *J. Am. Chem. Soc.* **2004**, 126, 5958.

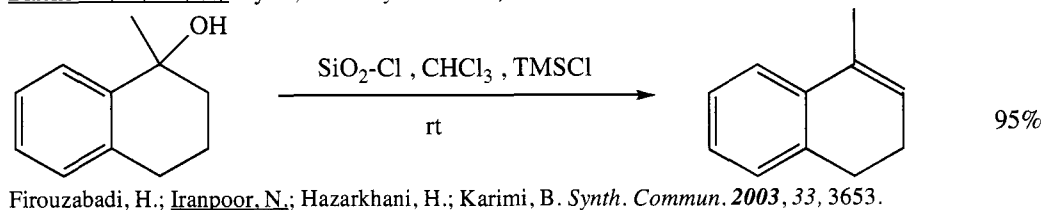
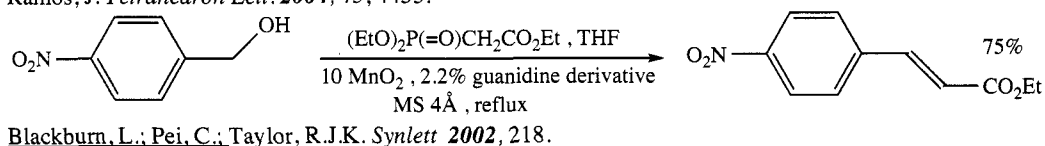
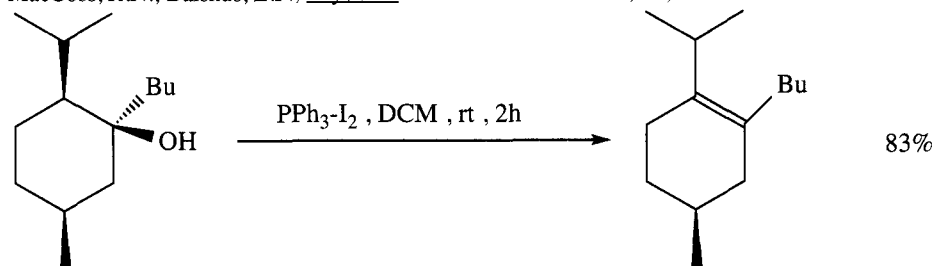
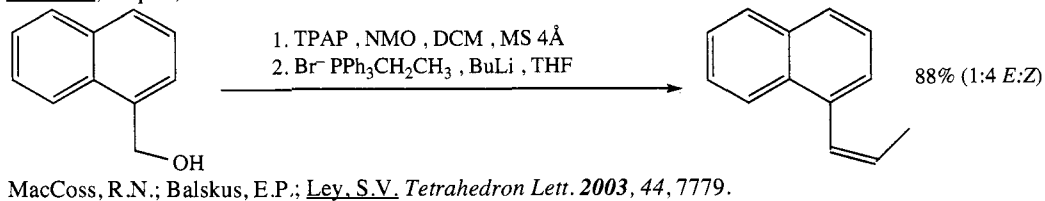
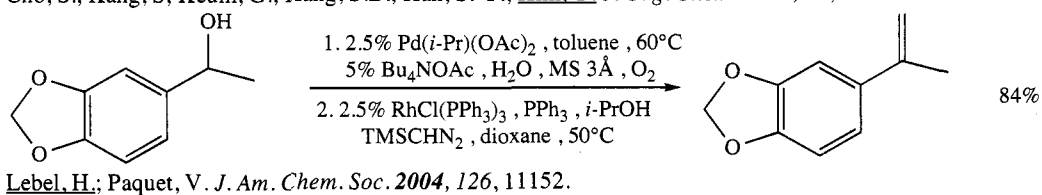
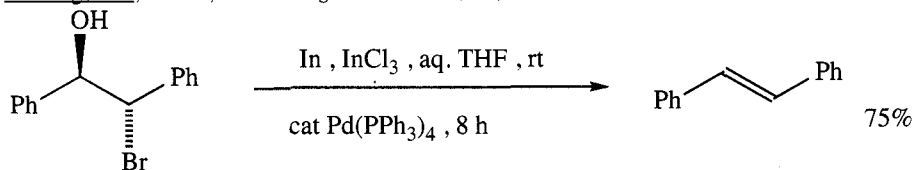
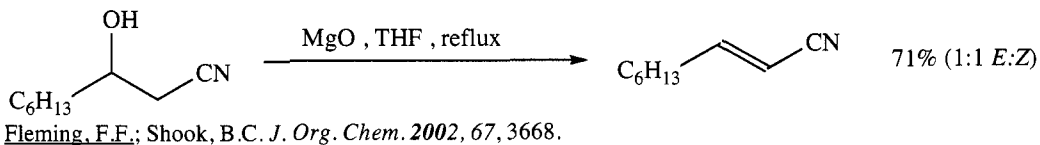


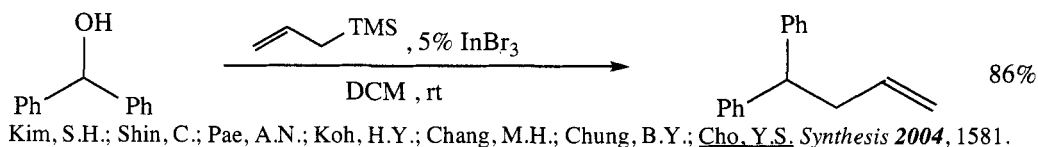
Gooßen, L.J.; Rodríguez, N. *Chem. Commun.* **2004**, 724.



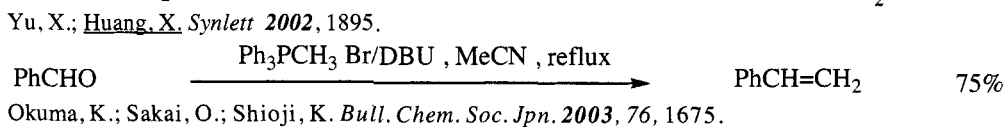
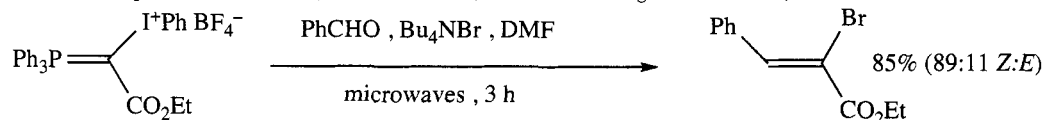
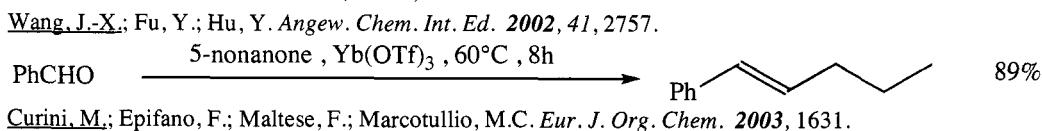
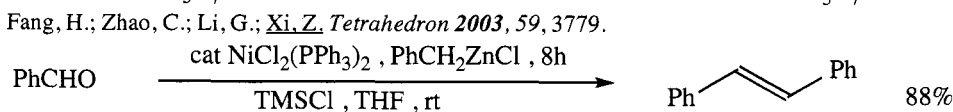
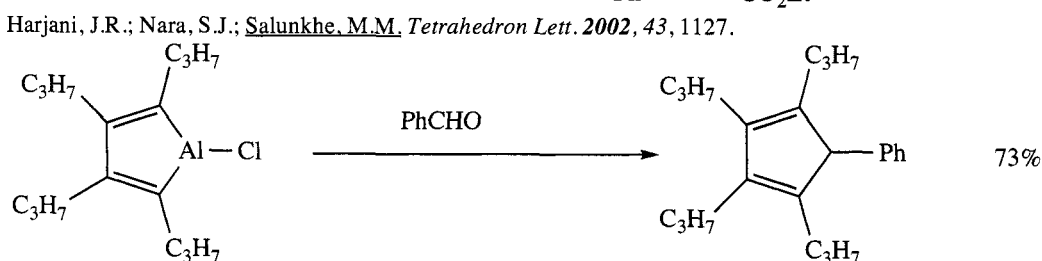
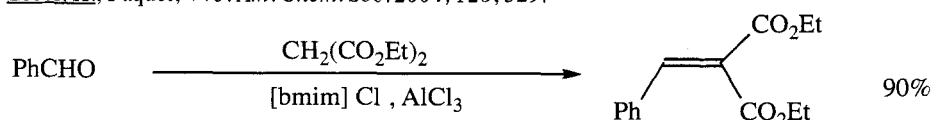
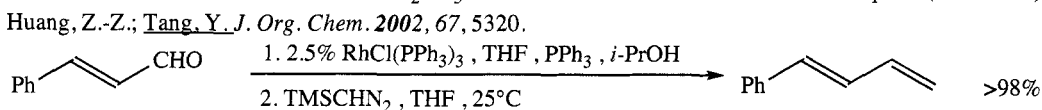
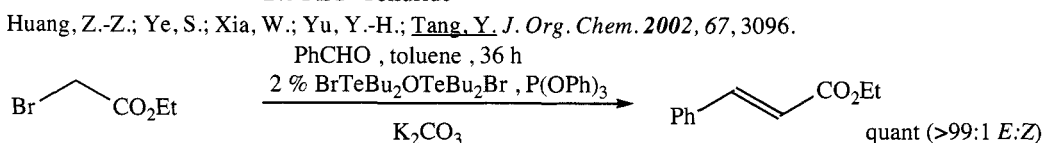
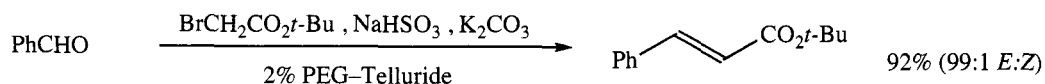
Gooßen, L.J.; Paetzold, J.; Winkel, L. *Synlett* **2002**, 1721.

SECTION 198: ALKENES FROM ALCOHOLS AND THIOLS





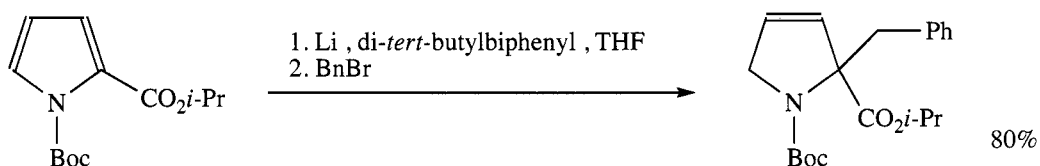
SECTION 199: ALKENES FROM ALDEHYDES



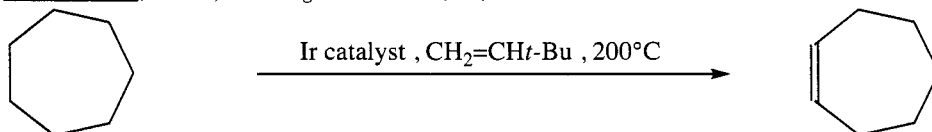
Related Methods: Section 207 (Alkenes from Ketones).

SECTION 200: ALKENES FROM ALKYLs, METHYLENES AND ARYLs

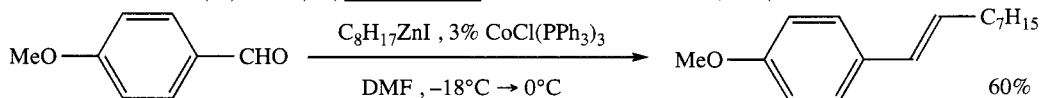
This section contains dehydrogenations to form alkenes and unsaturated ketones, esters, and Amides and also the conversion of aromatic rings to alkenes. Reduction of aryls to dienes is given in Section 377 (Alkene-Alkene). Hydrogenation of aryls to alkanes and dehydrogenations to form aryls are given in Section 74 (Alkyls, Methylene, and Aryls from Alkenes).



Donohoe, T.J.; House, D. *J. Org. Chem.* **2002**, 67, 5015.



Göttker-Schnetmann, I.; White, P.; Brookhart, M. *J. Am. Chem. Soc.* **2004**, 126, 1804.



Wang, J.-X.; Fu, Y.; Hu, Y.; Wang, K. *Synthesis* **2003**, 1506.

REVIEWS:

“Allenes from Cyclopropanes and Their Use in Organic Synthesis: Recent Developments”
Sydnies L.K. *Chem. Rev.* **2003**, 103, 1133.

“Thermal Rearrangements of Vinylcyclopropanes to Cyclopentenones”
Baldwin, J.E. *Chem. Rev.* **2003**, 103, 1197.

SECTION 201: ALKENES FROM AMIDES

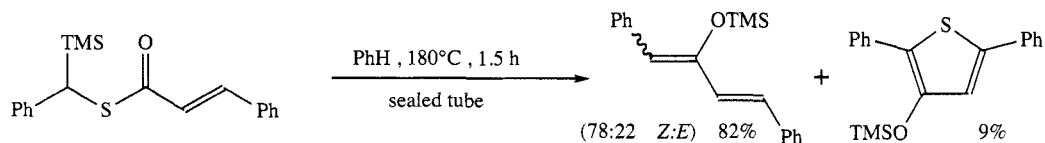
Related Methods: Section 65 (Alkyls, Methylene, and Aryls from Alkyls)
Section 74 (Alkyls, Methylene, and Aryls from Alkenes)

NO ADDITIONAL EXAMPLES

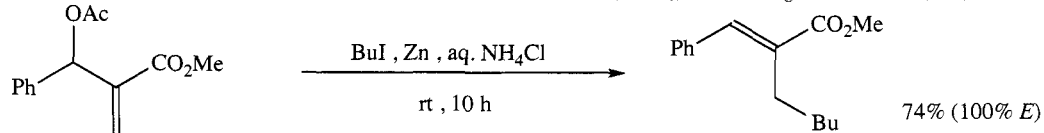
SECTION 202: ALKENES FROM AMINES

NO ADDITIONAL EXAMPLES

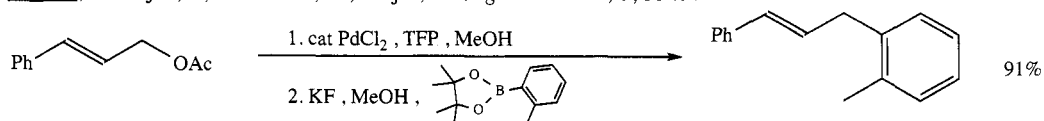
SECTION 203: ALKENES FROM ESTERS



Choi, J.; Imai, E.; Mihara, M.; Oderaotoshi, Y.; Minakata, S.; Komatsu, M. *J. Org. Chem.* **2003**, 68, 6164.

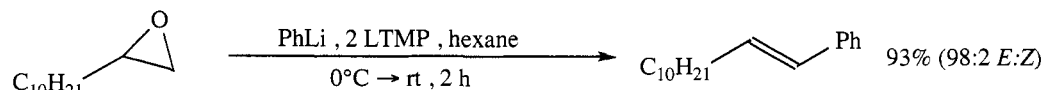


Das, B.; Banerjee, J.; Mahender, G.; Majhi, A. *Org. Lett.* **2004**, 6, 3349.

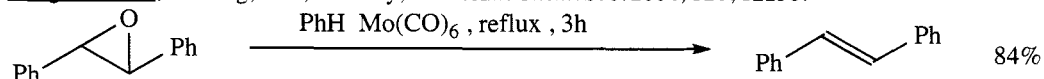


Ortar, G. *Tetrahedron Lett.* **2003**, 44, 4311.

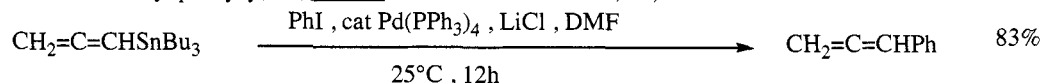
SECTION 204: ALKENES FROM ETHERS, EPOXIDES AND THIOETHERS



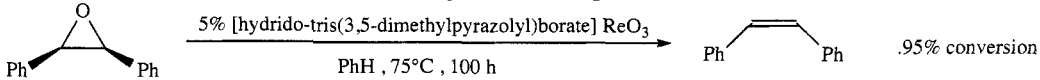
Hodgson, D.M.; Fleming, M.J.; Stanway, S.J. *J. Am. Chem. Soc.* **2004**, 126, 12250.



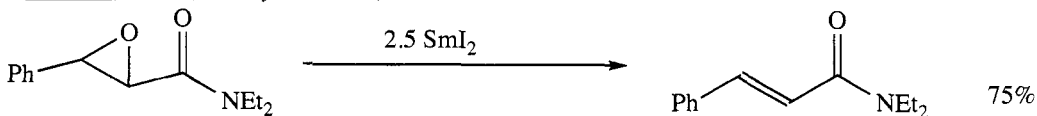
Patra, A.; Bandyopadhyay, M.; Mal, D. *Tetrahedron Lett.* **2003**, 44, 2355.



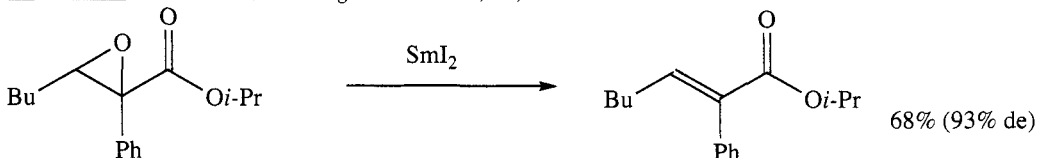
Huang, C.-W.; Shanmugasundaram, M.; Chang, H.-M.; Cheng, C.-H. *Tetrahedron* **2003**, 59, 3635.



Gable, K.P.; Brown, E.C. *Synlett* **2003**, 2243.



Concellón, J.M.; Bardales, E. *J. Org. Chem.* **2003**, 68, 9492.



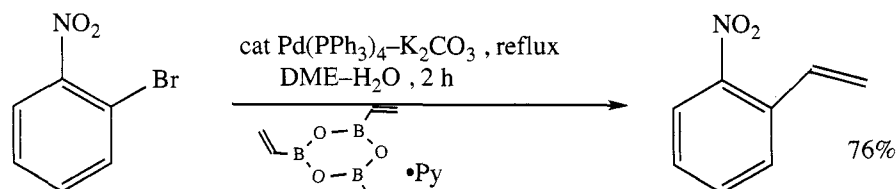
Concellón, J.M.; Bardales, E. *Org. Lett.* **2002**, 4, 189.

REVIEW:

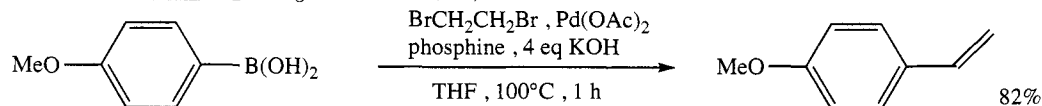
"Molybdenum and Tungsten Imide Alkylidene Complexes as Efficient Olefin-Metathesis Catalysts"

Schrock, R.R.; Hoveyda, A.H. *Angew. Chem. Int. Ed.* **2003**, *42*, 4592.

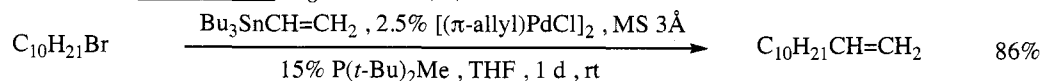
SECTION 205: ALKENES FROM HALIDES AND SULFONATES



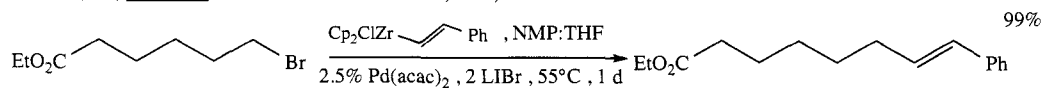
Kerins, F.; O'Shea, D.F. *J. Org. Chem.* **2002**, *67*, 4968.



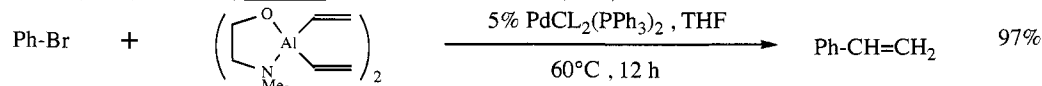
Lando, V.R.; Moneiro, A.L. *Org. Lett.* **2003**, *5*, 2891.



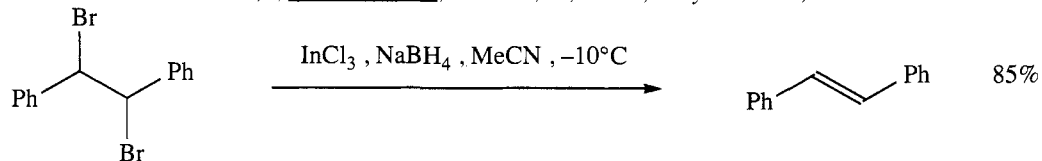
Menzel, K.; Fu, G.C. *J. Am. Chem. Soc.* **2003**, *125*, 3718.



Wiskur, S.L.; Korte, A.; Fu, G.C. *J. Am. Chem. Soc.* **2004**, *126*, 82.



Schumann, H.; Kaufmann, J.; Schmalz, H.-G.; Böttcher, A.; Gotov, B. *Synlett* **2003**, 1783.



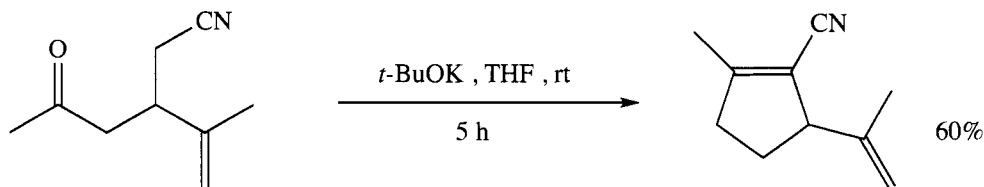
Ranu, B.C.; Das, A.; Hajra, A. *Synthesis* **2003**, 1012.

SECTION 206: ALKENES FROM HYDRIDES

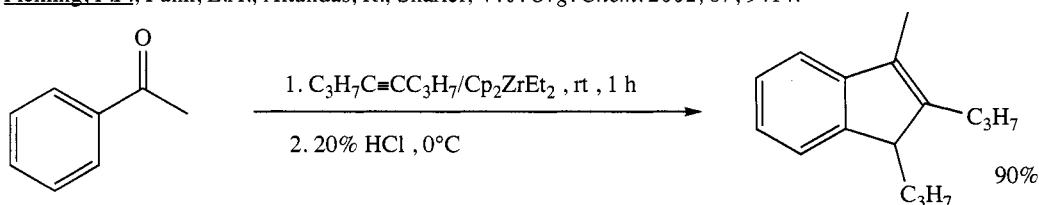
For conversions of methylenes to alkenes ($\text{RCH}_2\text{R}' \rightarrow \text{RR}'\text{C=CH}_2$), see Section 200 (Alkenes, Methylenes, and Aryls from Alkyls).

NO ADDITIONAL EXAMPLES

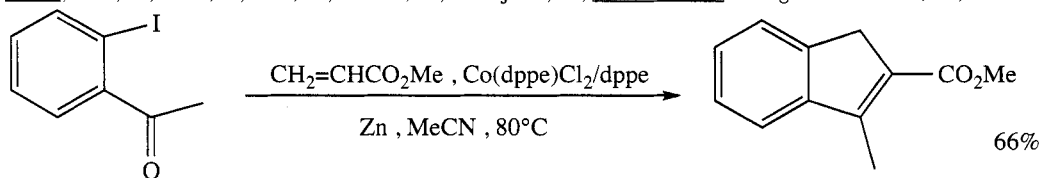
SECTION 207: ALKENES FROM KETONES



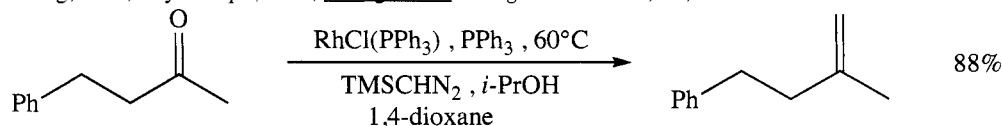
Fleming, F.F.; Funk, L.A.; Altundas, R.; Sharief, V. *J. Org. Chem.* **2002**, 67, 9414.



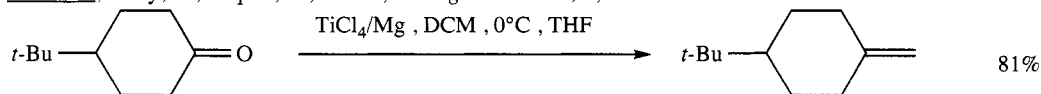
Xi, Z.; Guo, R.; Mito, S.; Yan, H.; Kanno, K.; Nakajima, K.; Takahashi, T. *J. Org. Chem.* **2003**, 68, 1252.



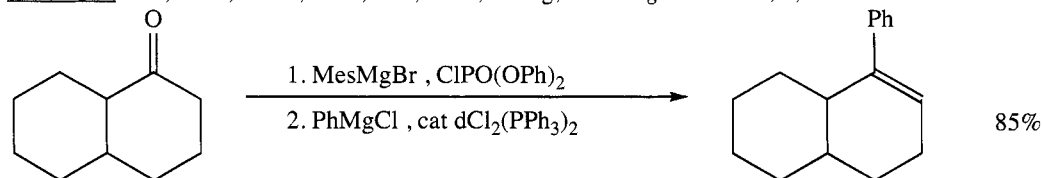
Chang, K.-J.; Rayabarapu, D.K.; Cheng, C.-H. *J. Org. Chem.* **2004**, 69, 4781.



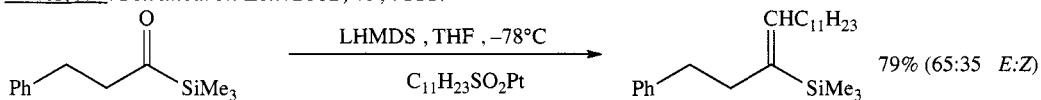
Lebel, H.; Guay, D.; Paquet, V.; Huard, K. *Org. Lett.* **2004**, 6, 3047.



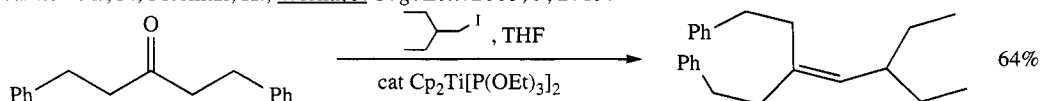
Yan, T.-H.; Tsai, C.-C.; Chien, C.-T.; Cho, C.-C.; Huang, P.-C. *Org. Lett.* **2004**, 6, 4961.



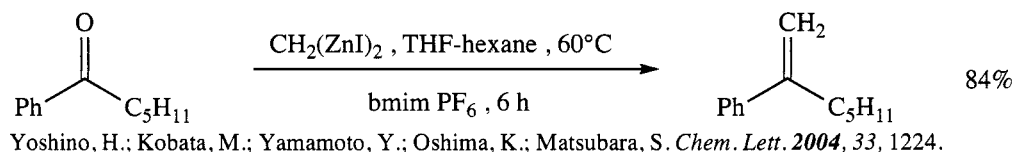
Miller, J.A. *Tetrahedron Lett.* **2002**, 43, 7111.



Jankowski, P.; Plesniak, K.; Wicha, J. *Org. Lett.* **2003**, 5, 2789.



Takeda, T.; Shimane, K.; Ito, K.; Saeki, N.; Tsubouchi, A. *Chem. Commun.* **2002**, 1974.

**REVIEW:**

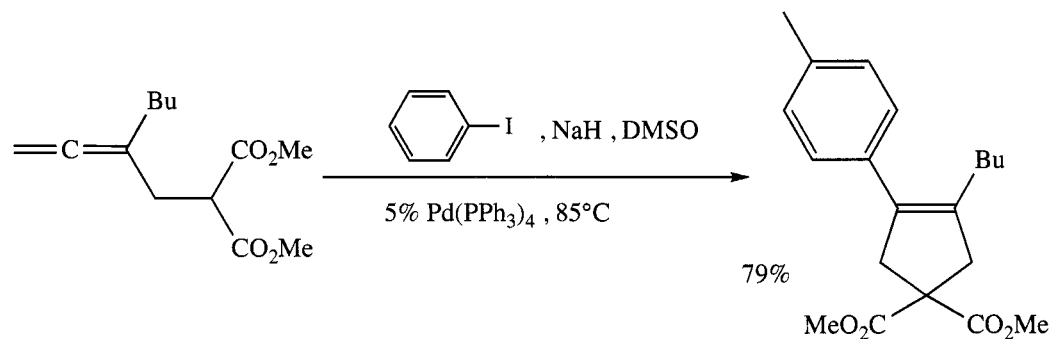
“Asymmetric Wittig-Type Reactions”

Rein, T.; Pedersen, T.M. *Synthesis* **2002**, 579.

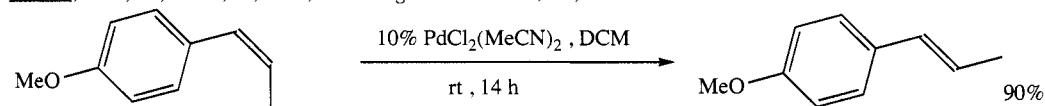
Related Method: Section 199 (Alkenes from Aldehydes)

SECTION 208: ALKENES FROM NITRILES

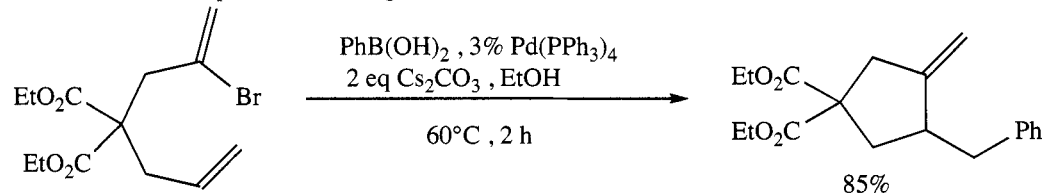
NO ADDITIONAL EXAMPLES

SECTION 209: ALKENES FROM ALKENES

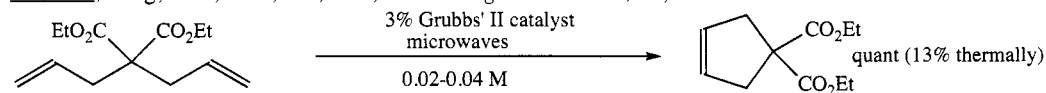
Ma, S.; Jiao, N.; Zhao, S.; Hou, H. *J. Org. Chem.* **2002**, 67, 2837.



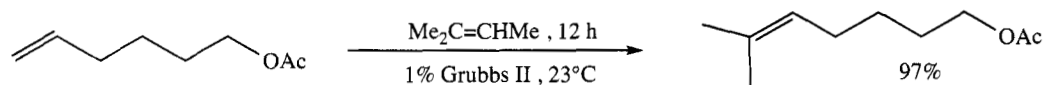
Yu, J.; Gaunt, M.J.; Spencer, J.B. *J. Org. Chem.* **2002**, 67, 4627.



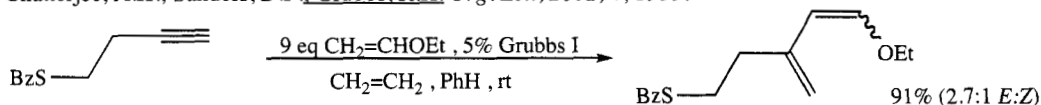
Oh, C.H.; Sung, H.R.; Park, S.J.; Ahn, K.N. *J. Org. Chem.* **2002**, 67, 7155.



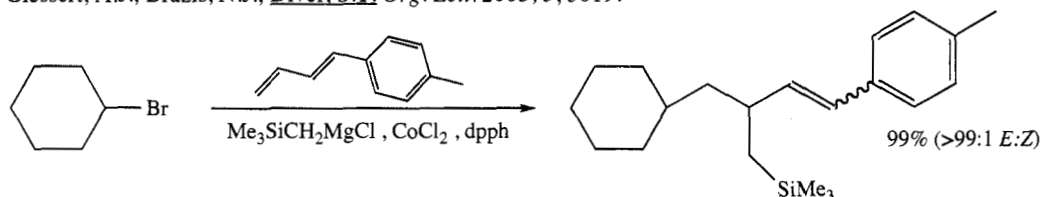
Mayo, K.G.; Nearhoof, E.H.; Kiddle, J.J. *Org. Lett.* **2002**, 4, 1567.



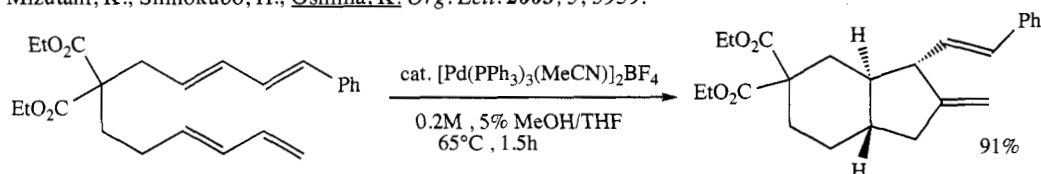
Chatterjee, A.K.; Sanders, D.P.; Grubbs, R.H. *Org. Lett.* **2002**, *4*, 1939.



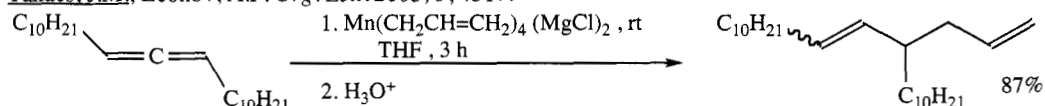
Giessert, A.J.; Brazis, N.J.; Diver, S.T. *Org. Lett.* **2003**, *5*, 3819.



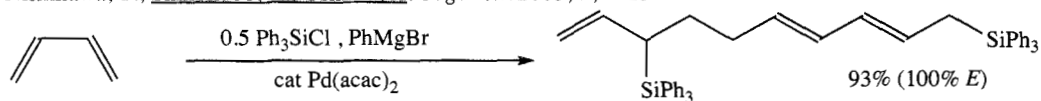
Mizutani, K.; Shinokubo, H.; Oshima, K. *Org. Lett.* **2003**, *5*, 3959.



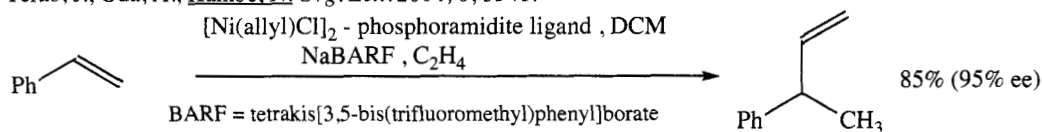
Takacs, J.M.; Leonov, A.P. *Org. Lett.* **2003**, *5*, 4317.



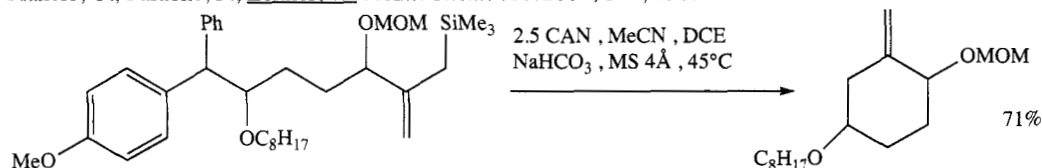
Nishikawa, T.; Shinokubo, H.; Oshima, K. *Org. Lett.* **2003**, *5*, 4623.



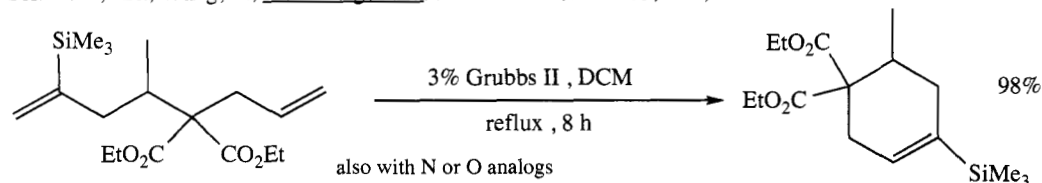
Terao, J.; Oda, A.; Kambe, N. *Org. Lett.* **2004**, *6*, 3341.



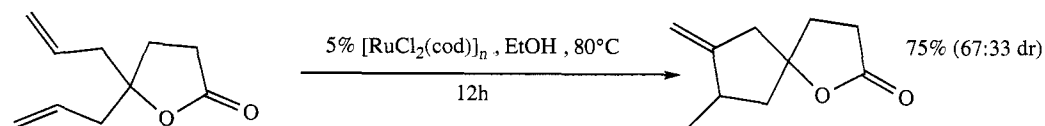
Francio, G.; Faraone, F.; Leitner, W. *J. Am. Chem. Soc.* **2002**, *124*, 736.



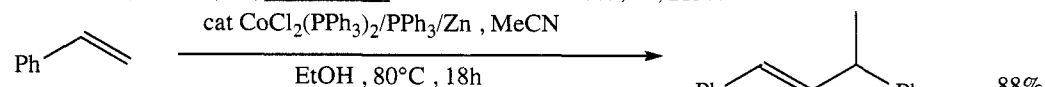
Seiders II, J.R.; Wang, L.; Floreancig, P.E. *J. Am. Chem. Soc.* **2003**, *125*, 2406.



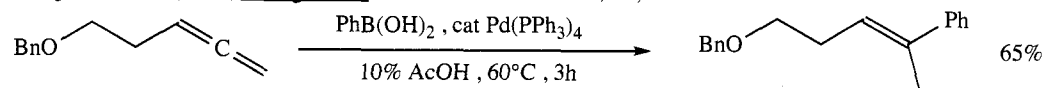
Schuman, M.; Gouverneur, V. *Tetrahedron Lett.* **2002**, *43*, 3513.



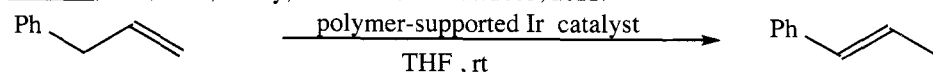
Michaut, M.; Santelli, M.; Parrain, J.-L. *Tetrahedron Lett.* **2003**, 44, 2157.



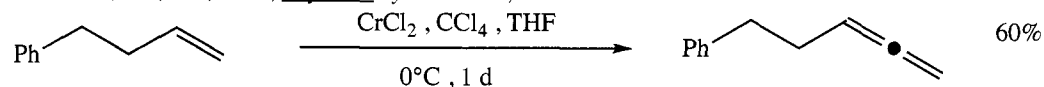
Wang, C.-C.; Lin, R.S.; Cheng, C.-H. *Tetrahedron Lett.* **2004**, 45, 6203.



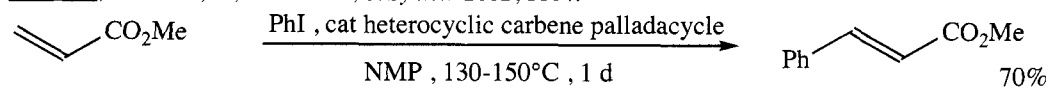
Oh, C.H.; Ahn, T.W.; Reddy, R. *Chem. Commun.* **2003**, 2622.



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REVIEWS:

"Olefin Metathesis"

Grubbs, R.H. *Tetrahedron* **2004**, 60, 7117.

"Catalytic Enantioselective Diels-Alder Reactions: Methods, Mechanism, Fundamental, Pathways, and Applications"

Corey, E.J. *Angew. Chem. Int. Ed.* **2002**, 41, 1651.

"Diels-Alder Reaction in Synthesis"

Nicolaou, K.C.; Snyder, S.A.; Montagnon, T.; Vassilikogiannakis, G. *Angew. Chem. Int. Ed.* **2002**, 41, 1669.

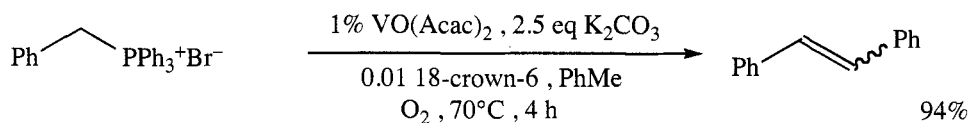
"Thermal [1,3]-Carbon Sigmatropic Rearrangements of Vinylcyclobutanes"

Perrin, C.L. *Acc. Chem. Res.* **2002**, 35, 279.

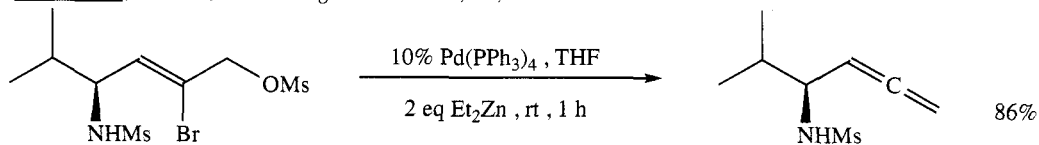
"Catalytic C-H/Olefin Coupling"

Kakiuchi, F.; Murai, S. *Acc. Chem. Res.* **2002**, 35, 826.

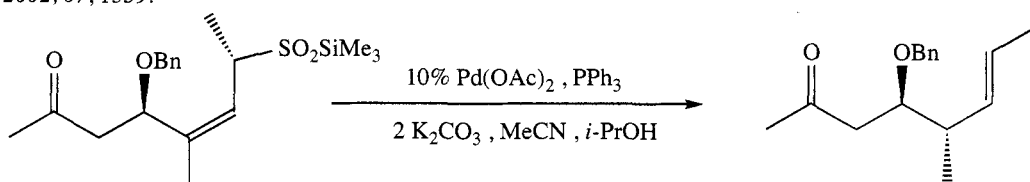
SECTION 210: ALKENES FROM MISCELLANEOUS COMPOUNDS



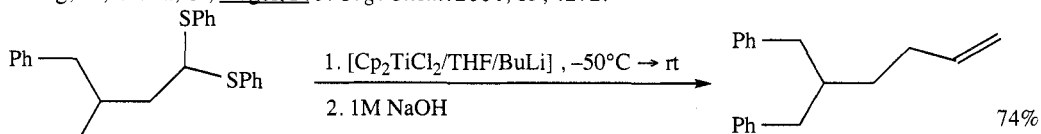
O'Brien, P.; Towers, T.D. *J. Org. Chem.* **2002**, 67, 304.



Ohno, H.; Miyamaura, K.; Tanaka, T.; Oishi, S.; Toda, A.; Takemoto, Y.; Fujii, N.; Kibuka, T. *J. Org. Chem.* **2002**, 67, 1359.



Huang, X.; Craita, C.; Vogel, P. *J. Org. Chem.* **2004**, 69, 4272.



Tsubouchi, A.; Nishio, E.; Kato, Y.; Fujiwara, T.; Takeda, T. *Tetrahedron Lett.* **2002**, 43, 5755.

CHAPTER 15

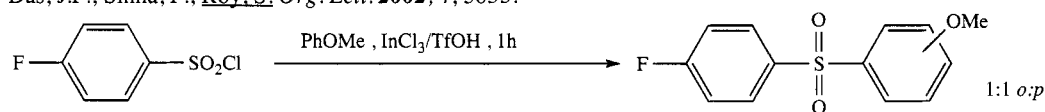
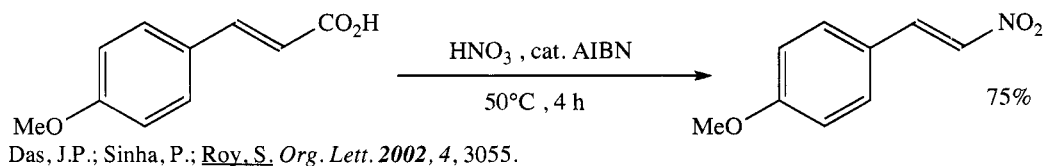
PREPARATION OF OXIDES

This chapter contains reactions that 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 is described in Chapter 2 and the preparation of sulfonate esters in Chapter 10.

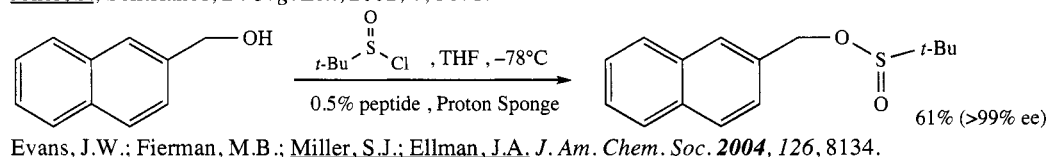
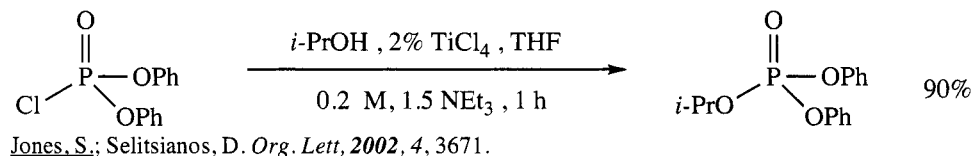
SECTION 211: OXIDES FROM ALKYNES

NO ADDITIONAL EXAMPLES

SECTION 212: OXIDES FROM ACID DERIVATIVES



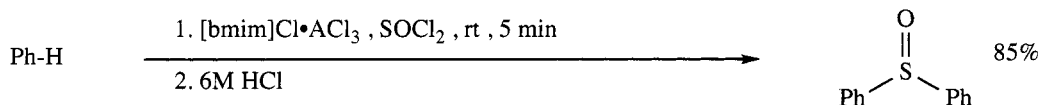
SECTION 213: OXIDES FROM ALCOHOLS AND THIOLS



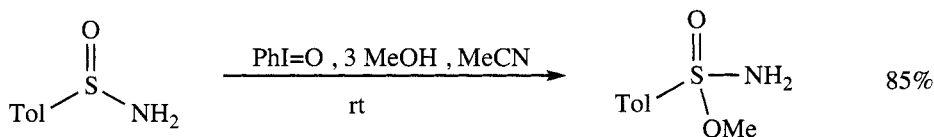
SECTION 214: OXIDES FROM ALDEHYDES

NO ADDITIONAL EXAMPLES

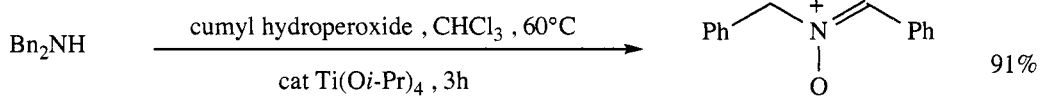
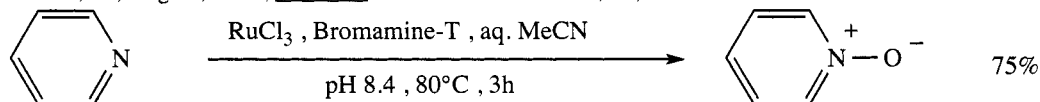
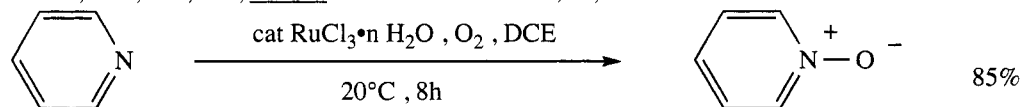
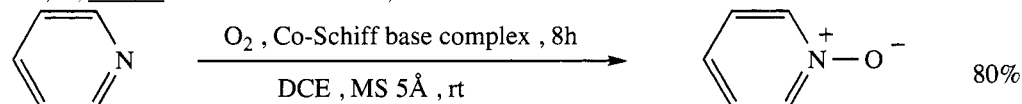
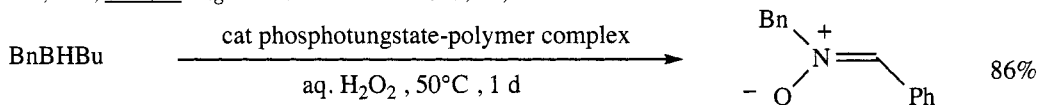
SECTION 215: OXIDES FROM ALKYL, METHYLENES, AND ARYL

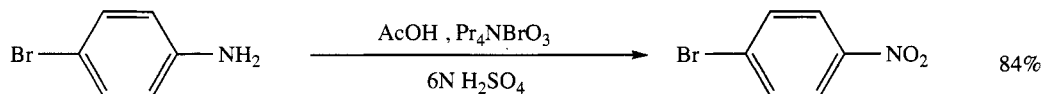
Mohile, S.S.; Potdar, M.K.; Salunkhe, M.M. *Tetrahedron Lett.* **2003**, 44, 1255.

SECTION 216: OXIDES FROM AMIDES

Leca, D.; Fensterbank, L.; Lacôte, E.; Malacria, M. *Org. Lett.* **2002**, 4, 4093.

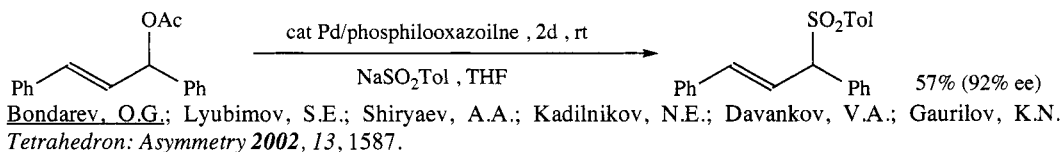
SECTION 217: OXIDES FROM AMINES

Forcato, M.; Nugent, W.A.; Licini, G. *Tetrahedron Lett.* **2003**, 44, 49.Sharma, V.B.; Jain, S.L.; Sain, B. *Tetrahedron Lett.* **2004**, 45, 4281.Jain, L.; Sain, B. *Chem. Commun.* **2002**, 1040.Jain, S.L.; Sain, B. *Angew. Chem. Int. Ed.* **2003**, 42, 1265.Yamada, Y.M.A.; Tabata, H.; Takahashi, H.; Ikegami, S. *Synlett* **2002**, 2031.

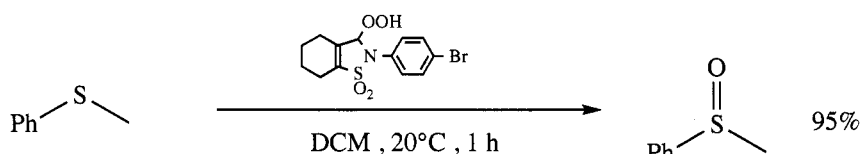


Das, S.S.; Nath, U.; Deb, D.; Das, P.J. *Synth. Commun.* **2004**, 34, 2359.

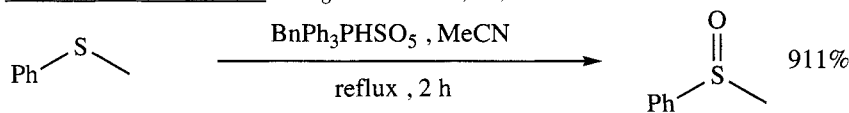
SECTION 218: OXIDES FROM ESTERS



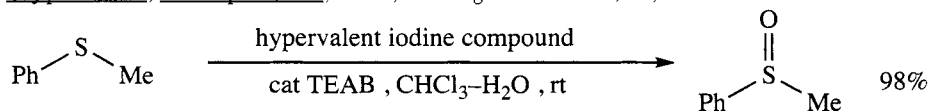
SECTION 219: OXIDES FROM ETHERS, EPOXIDES, AND THIOETHERS



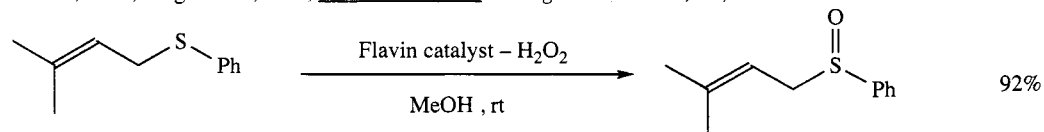
Gelalcha, F.G.; Schulze, B. *J. Org. Chem.* **2002**, 67, 8400.



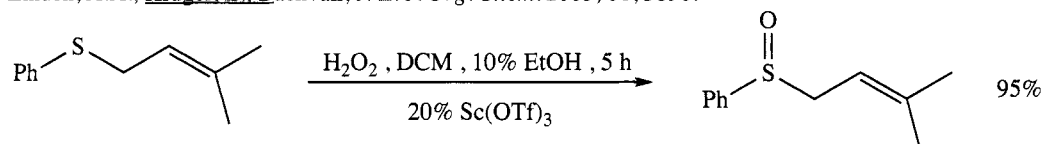
Hajipour, A.R.; Mallakpour, S.E.; Adibi, J. *J. Org. Chem.* **2002**, 67, 8666.



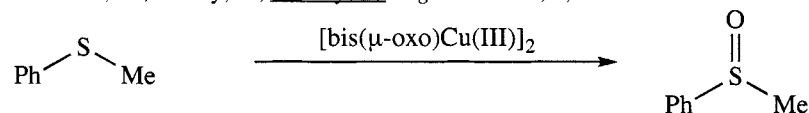
Shukla, V.G.; Salgaonkar, P.D.; Akamanchi, K.G. *J. Org. Chem.* **2003**, 68, 5422.



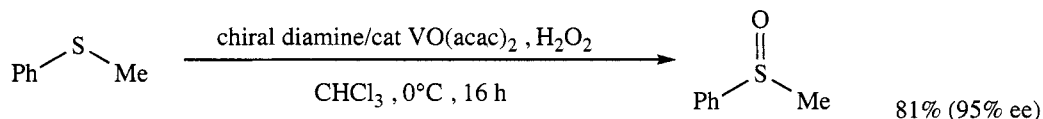
Linden, A.A.; Krüger, L.; Bäckvall, J.-E. *J. Org. Chem.* **2003**, 68, 5890.



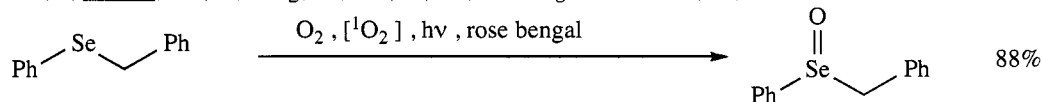
Matteucci, M.; Bhalay, G.; Bradley, M. *Org. Lett.* **2003**, 5, 235.



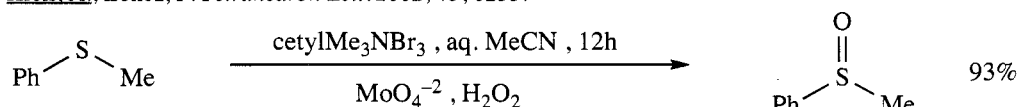
Taki, M.; Itoh, S.; Fukuzami, S. *J. Am. Chem. Soc.* **2002**, 124, 998.



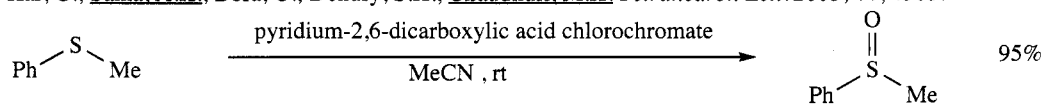
Sun, J.; Zhu, C.; Dai, Z.; Yang, M.; Pan, Y.; Hu, H. *J. Org. Chem.* **2004**, 69, 8500.



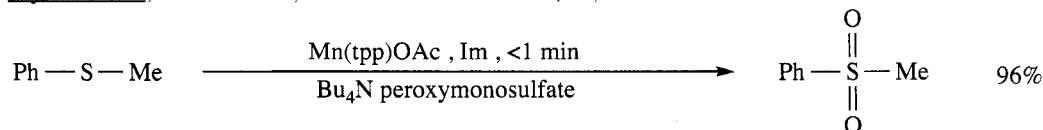
Kreif, A.; Loney, F. *Tetrahedron Lett.* **2002**, 43, 6255.



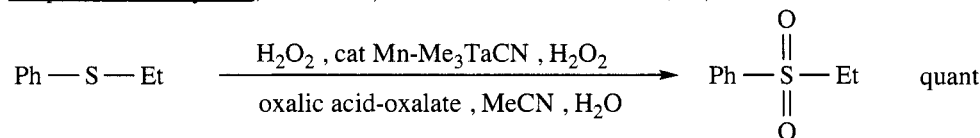
Kar, G.; Saika, A.K.; Bora, U.; Dehury, S.K.; Chaudhuri, M.K. *Tetrahedron Lett.* **2003**, 44, 4503.



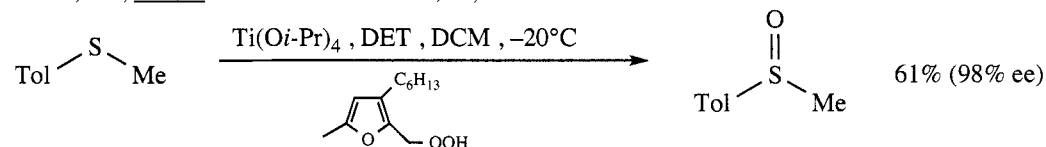
Tajbakhsh, M.; Hosseinzadeh, R. *Tetrahedron Lett.* **2004**, 45, 1889.



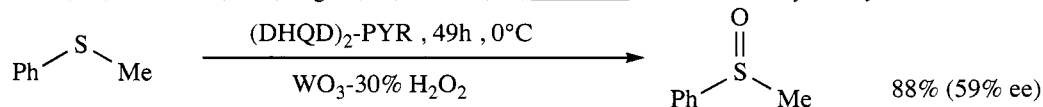
Iranpoor, N.; Mohajer, D.; Rezaeifard, A.-R. *Tetrahedron Lett.* **2004**, 45, 3811.



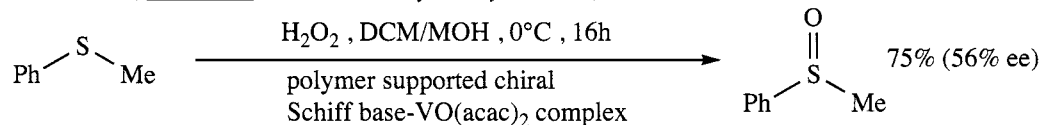
Barker, J.E.; Ren, T. *Tetrahedron Lett.* **2004**, 45, 4681.



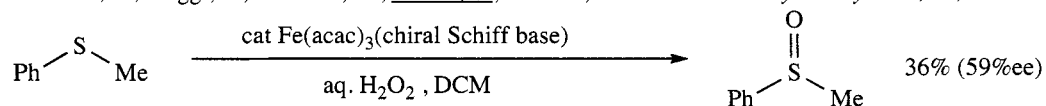
Massa, A.; Siniscalchi, F.R.; Bugatti, V.; Lattanzi, A.; Scettri, A. *Tetrahedron: Asymmetry* **2002**, 13, 1277.



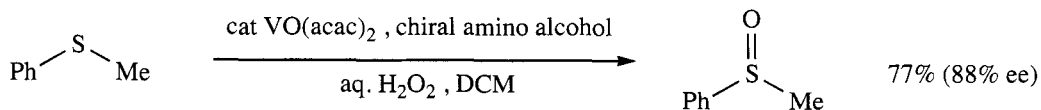
Thakur, V.V.; Sudalai, A. *Tetrahedron: Asymmetry* **2003**, 14, 407.



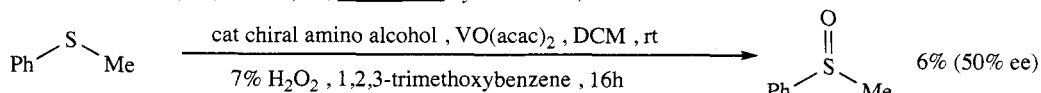
Barbarini, A.; Maggi, R.; Muratori, M.; Sartori, G.; Sartorio, R. *Tetrahedron: Asymmetry* **2004**, 15, 2467.



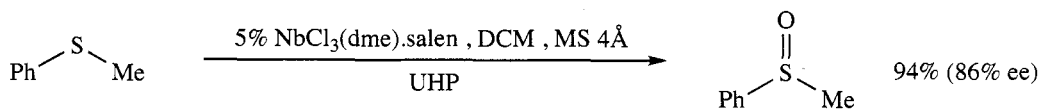
Legros, J.; Bolm, C. *Angew. Chem. Int. Ed.* **2003**, 42, 5487.



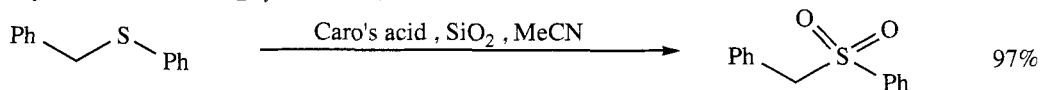
Ohta, C.; Shimizu, H.; Kondo, A.; Katsuki, T. *Synlett* **2002**, 161.



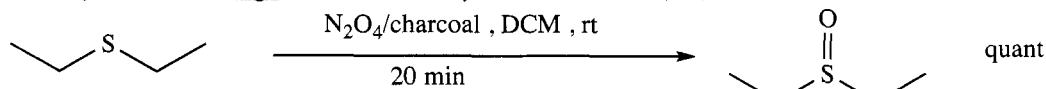
Pelotier, B.; Anson, M.S.; Campbell, I.B.; Macdonald, S.J.F.; Priem, G.; Jackson, R.F.W. *Synlett* **2002**, 1051.



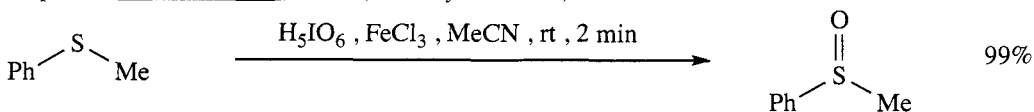
Miyazaki, T.; Katsuki, T. *Synlett* **2003**, 1046.



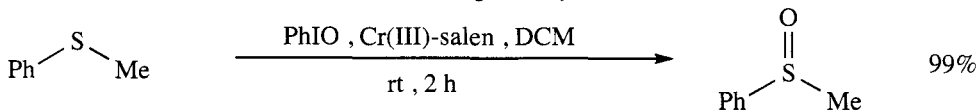
Lakouraj, M.M.; Movassagh, B.; Ghodrati, K. *Synth. Commun.* **2002**, 32, 847.



Iranpoor, N.; Firouzabadi, H.; Pourali, A.-R. *Synlett* **2004**, 347.

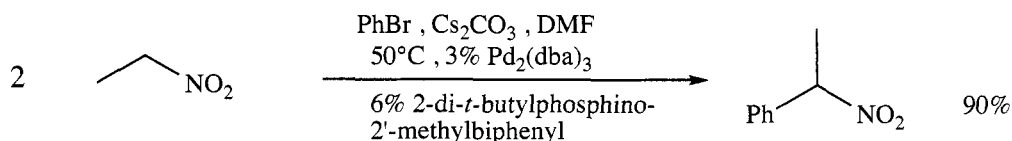


Kim, S.S.; Nehru, K.; Kim, S.S.; Kim, D.W.; Jung, H.C. *Synthesis* **2002**, 2484.

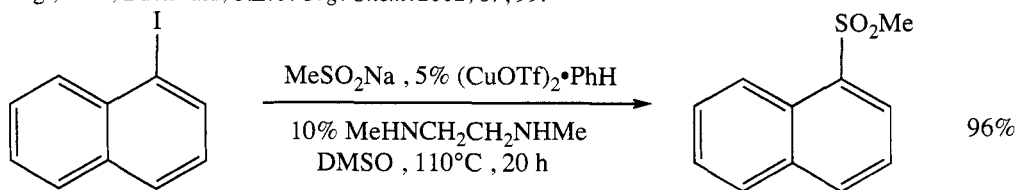


Kim, S.S.; Rajaopai, G. *Synthesis* **2003**, 2461.

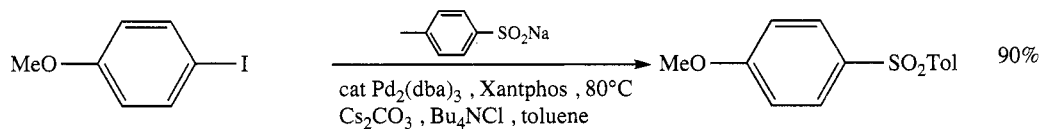
SECTION 220: OXIDES FROM HALIDES AND SULFONATES



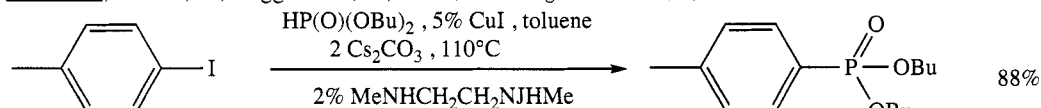
Vogl, E.M.; Buchwald, S.L. *J. Org. Chem.* **2002**, 67, 99.



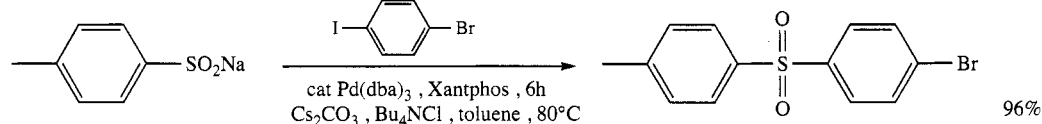
Baskin, J.M.; Wang, Z. *J. Org. Chem.* **2002**, 67, 4423.



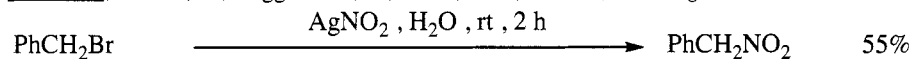
Cacchi, S.; Fabrizi, G.; Goggiamani, A.; Parisi, L.M. *Org. Lett.* **2002**, 4, 4719.



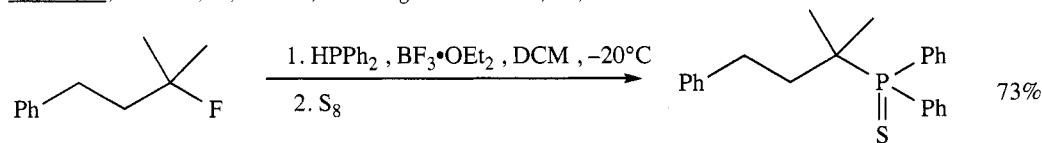
Gelman, D.; Jiang, L.; Buchwald, S.L. *Org. Lett.* **2003**, 5, 2315.



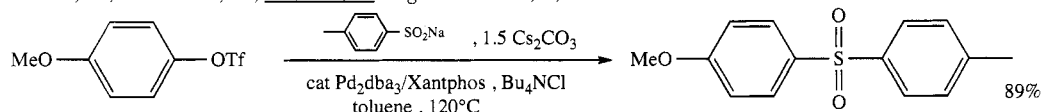
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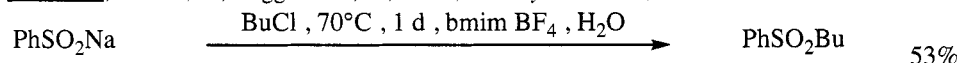
Ballini, R.; Barboni, L.; Giarlo, G. *J. Org. Chem.* **2004**, 69, 6907.



Hirano, K.; Yorimitsu, H.; Oshima, K. *Org. Lett.* **2004**, 6, 4873.

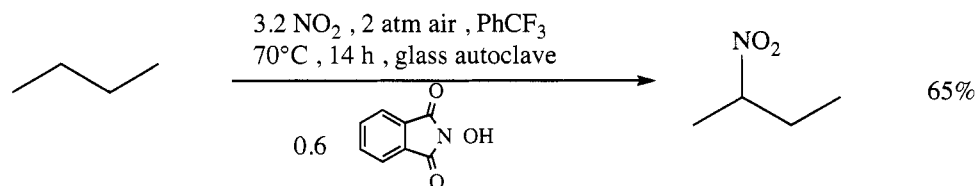


Cacchi, S.; Fabrizi, G.; Goggiamani, A.; Parisi, L.M. *Synlett* **2003**, 361.

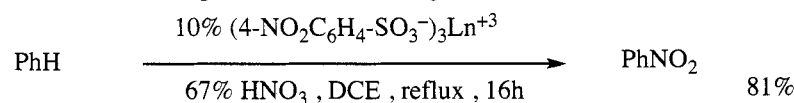


Hu, Y.; Chen, Z.-C.; Le, Z.-G.; Zheng, Q.G. *Synth. Commun.* **2004**, 34, 4031.

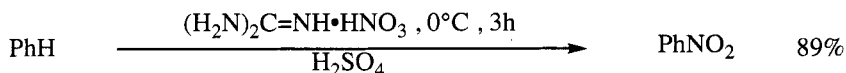
SECTION 221: OXIDES FROM HYDRIDES



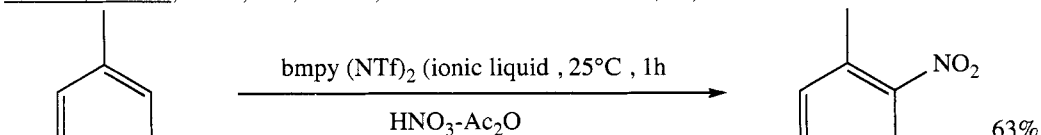
Nishiwaki, Y.; Sakaguchi, S.; Ishii, Y. *J. Org. Chem.* **2002**, 67, 5663.



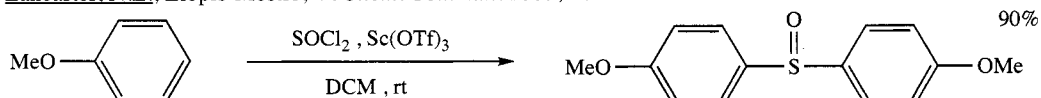
Parac-Vogt, T.N.; Binnemans, K. *Tetrahedron Lett.* **2004**, 45, 3137.



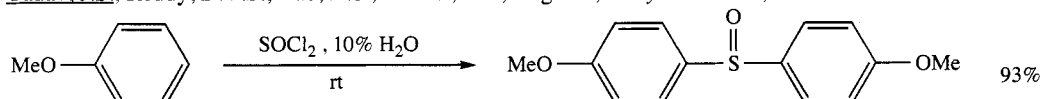
Ramana, M.M.V.; Malik, S.S.; Parihar, J.A. *Tetrahedron Lett.* **2004**, 45, 8681.



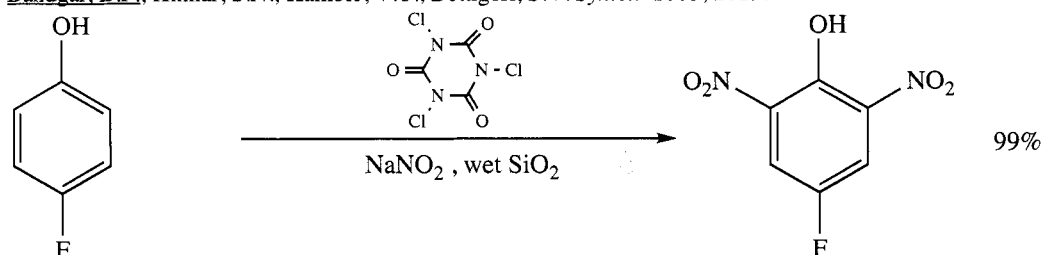
Lancaster, N.L.; Llopis-Mestre, V. *Chem. Commun.* **2003**, 2812.



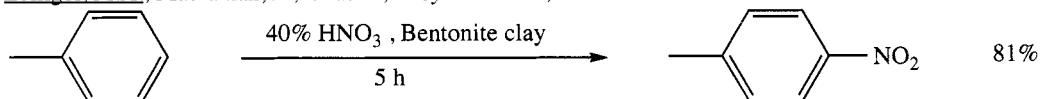
Yadav, J.S.; Reddy, B.V.S.; Rao, R.S.; Kumar, S.P.; Nagaiah, K. *Synlett* **2002**, 784.



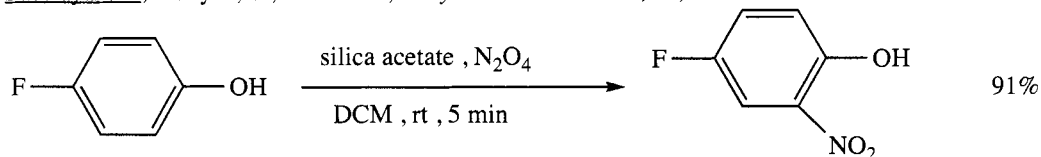
Bandgar, B.P.; Kinkar, S.N.; Kamble, V.T.; Bettigeri, S.V. *Synlett* **2003**, 2029.



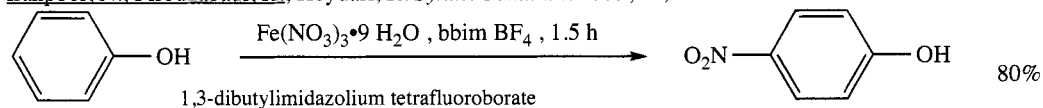
Zolfigol, M.A.; Madrakian, E.; Ghaemi, E. *Synlett* **2003**, 222.



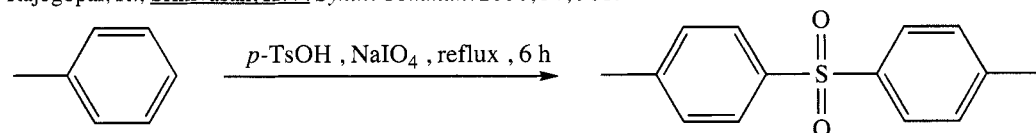
Babulayan, D.; Narayan, G.; Sreekumar, V. *Synth. Commun.* **2002**, 32, 3565.



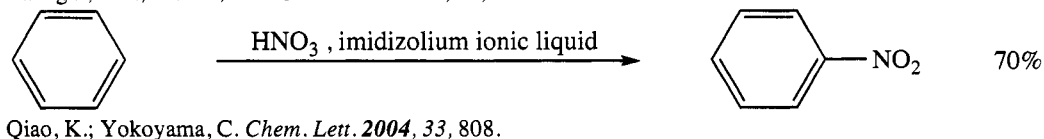
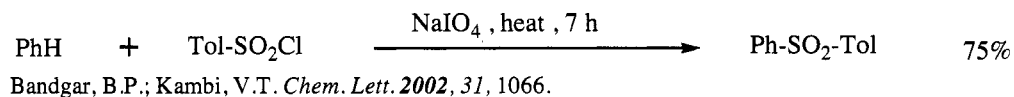
Iranpoor, N.; Firouzabadi, H.; Heydari, R. *Synth. Commun.* **2003**, 33, 703.



Rajogopal, R.; Srinivasan, K.V. *Synth. Commun.* **2004**, 34, 961.



Bandgar, B.P.; Kamble, V.T.; Fulse, D.B.; Deshmukh, M.V. *New J. Chem.* **2002**, 26, 1105.



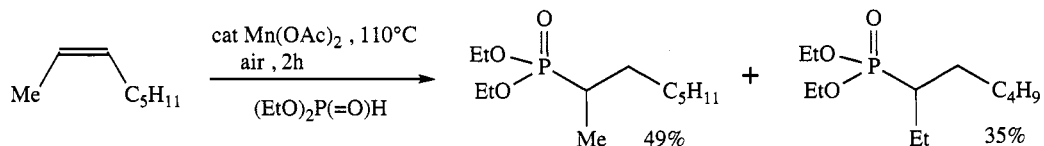
SECTION 222: OXIDES FROM KETONES

NO ADDITIONAL EXAMPLES

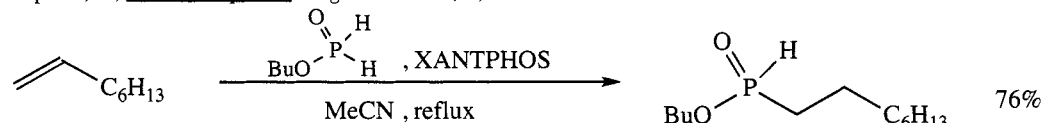
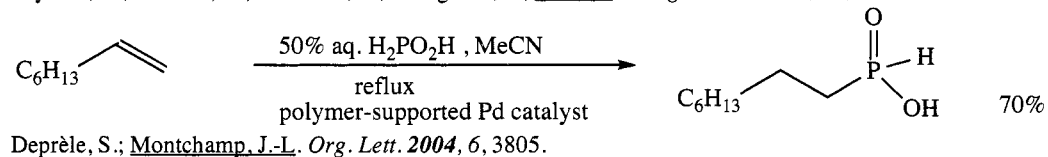
SECTION 223: OXIDES FROM NITRILES

NO ADDITIONAL EXAMPLES

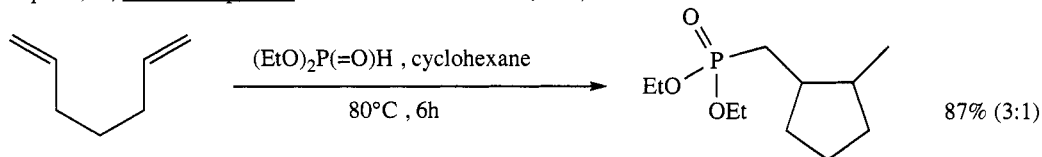
SECTION 224: OXIDES FROM ALKENES



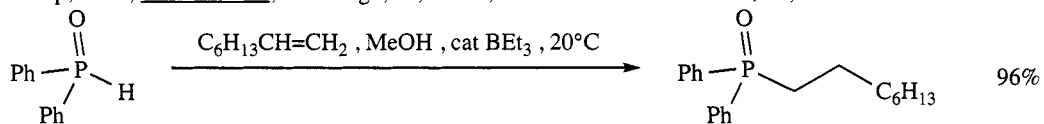
Tayama, O.; Nakano, A.; Iwahama, T.; Sakaguchi, S.; Ishii, Y. *J. Org. Chem.* **2004**, 69, 5494.



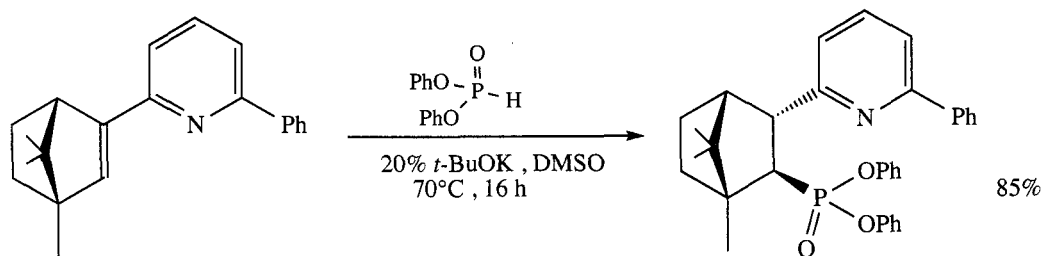
Deprère, S.; Montchamp, J.-L. *J. Am. Chem. Soc.* **2002**, 124, 9386.



Jessop, C.M.; Parsons, A.F.; Routledge, A.; Irvine, D. *Tetrahedron Lett.* **2003**, 44, 479.

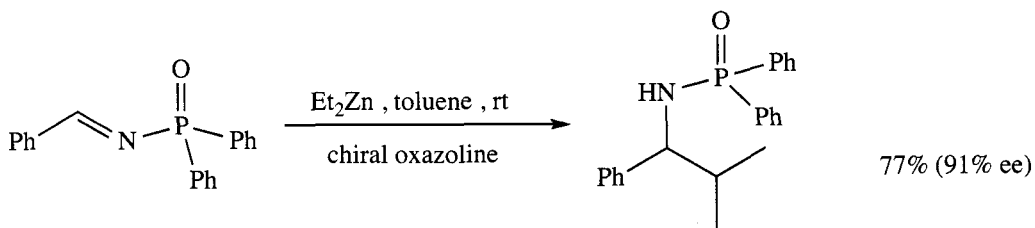


Rey, P.; Rey, P.; Taillades, J.; Rossi, J.C. *Tetrahedron Lett.* **2003**, 44, 6169.

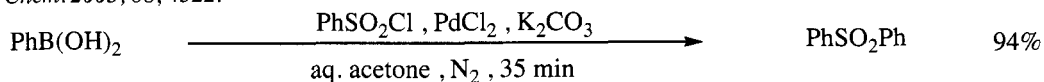


Bunaksananusorn, T.; Knochel, P. *J. Org. Chem.* **2004**, 69, 4595.

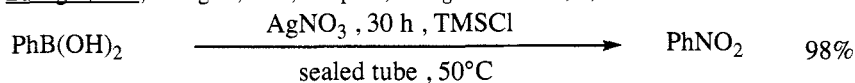
SECTION 225: OXIDES FROM MISCELLANEOUS COMPOUNDS



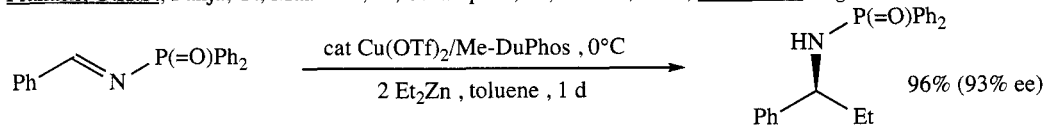
Zhang, X.-M.; Zhang, H.-L.; Lin, W.-Q.; Gong, L.-Z.; Mi, A.-Q.; Cui, X.; Jiang, Y.-Z.; Yu, K.B. *J. Org. Chem.* **2003**, 68, 4322.



Bandgar, B.P.; Bettigeri, S.V.; Phopase, J. *Org. Lett.* **2004**, 6, 2105.



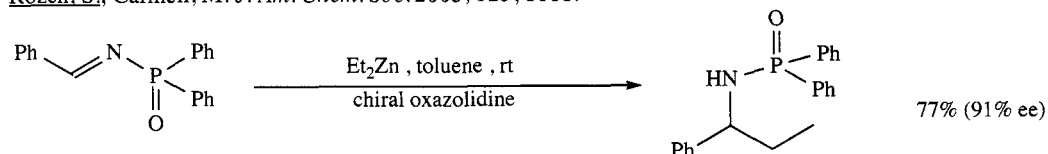
Prakash, G.K.S.; Panja, C.; Maathew, T.; Surampudi, V.; Petasis, N.A.; Olah, G.A. *Org. Lett.* **2004**, 6, 2205.



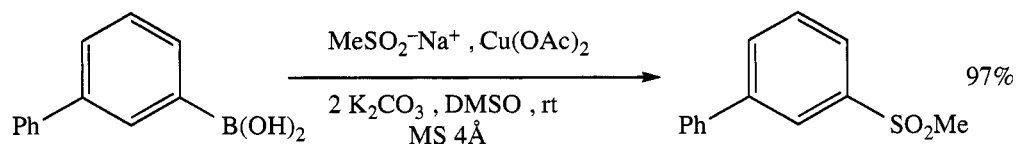
Boezio, A.A.; Charette, A.B. *J. Am. Chem. Soc.* **2003**, 125, 1692.



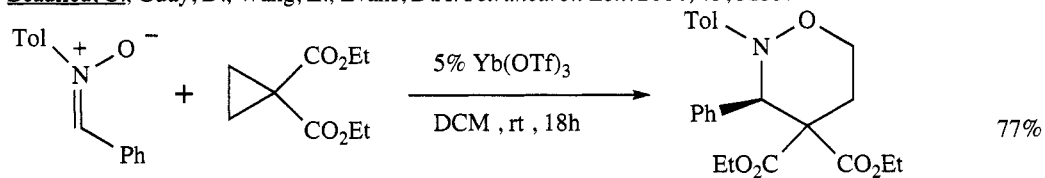
Rozen, S.; Carmeli, M. *J. Am. Chem. Soc.* **2003**, 125, 8118.



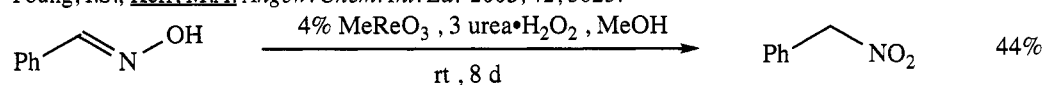
Zhang, X.; Lin, W.; Gong, L.; Mi, A.; Cui, X.; Jiang, Y.; Choi, M.C.K.; Chan, A.S.C. *Tetrahedron Lett.* **2002**, 43, 1535.



Beaulieu, C.; Guay, D.; Wang, Z.; Evans, D.A. *Tetrahedron Lett.* **2004**, 45, 3233.



Young, I.S.; Kerr, M.A. *Angew. Chem. Int. Ed.* **2003**, 42, 3023.

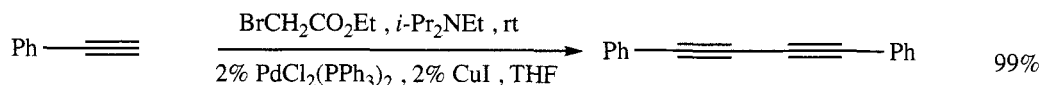


Cardona, F.; Soldaini, G.; Goti, A. *Synlett* **2004**, 1553.

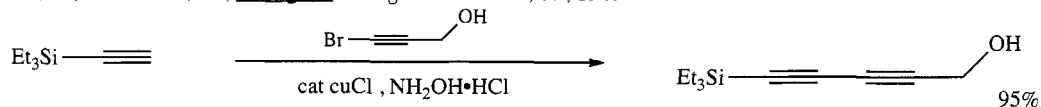
CHAPTER 16

PREPARATION OF DIFUNCTIONAL COMPOUNDS

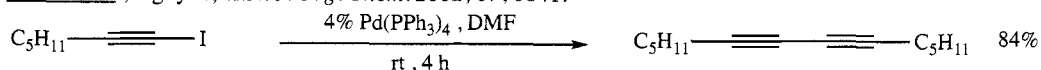
SECTION 300: ALKYNE - ALKYNE



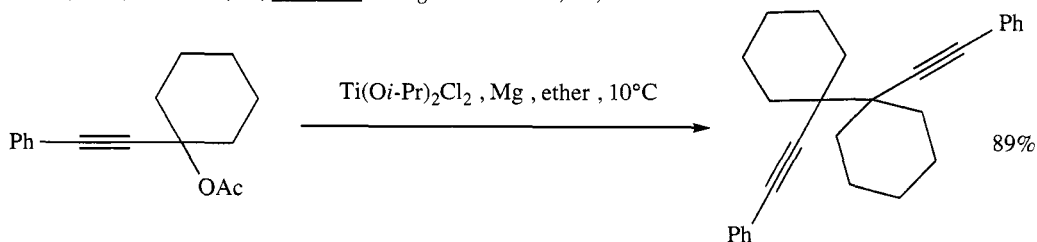
Lei, A.; Srivastava, M.; Zhang, X. *J. Org. Chem.* **2002**, 67, 1969.



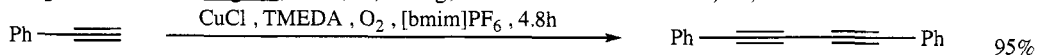
Marino, J.P.; Nguyen, H.N. *J. Org. Chem.* **2002**, 67, 6841.



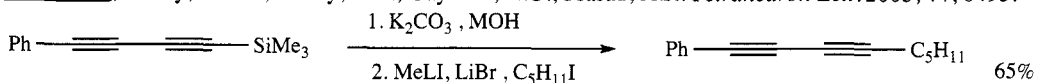
Damle, S.V.; Seomoon, D.; Lee, P.H. *J. Org. Chem.* **2003**, 68, 7085.



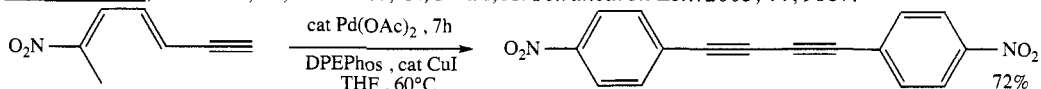
Yang, F.; Zhao, G.; Ding, Y.; Zhao, Z.; Zheng, Y. *Tetrahedron Lett.* **2002**, 43, 1289.



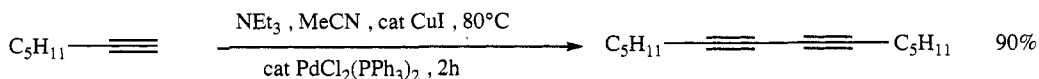
Yadav, J.S.; Reddy, B.V.S.; Reddy, K.B.; Gayathri, K.U.; Prasad, A.R. *Tetrahedron Lett.* **2003**, 44, 6493.



Fiandanese, V.; Bottalico, D.; Marchese, G.; Punzi, A. *Tetrahedron Lett.* **2003**, 44, 9087.

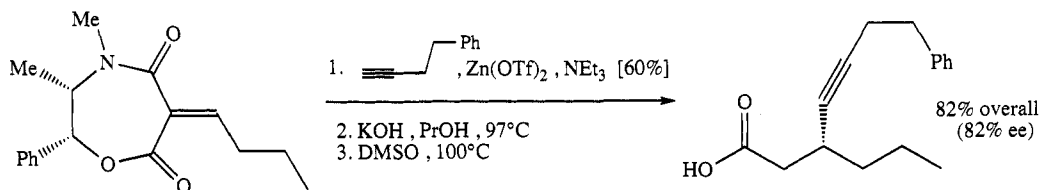


Oh, C.H.; Reddy, V.R. *Tetrahedron Lett.* **2004**, 45, 522.



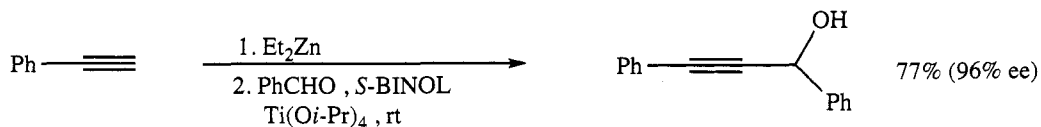
Fairlamb, I.J.S.; Bäuerlein, P.S.; Marrison, L.R.; Dickinson, J.M. *Chem. Commun.* **2003**, 632.

SECTION 301: ALKYNE - ACID DERIVATIVES

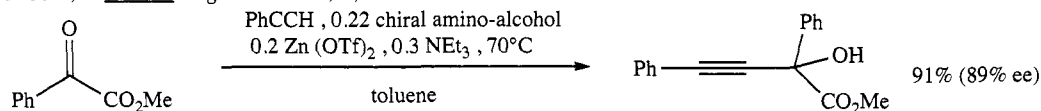


Knöpfel, T.F.; Boyall, D.; Carreira, E.M. *Org. Lett.* **2004**, 6, 2281.

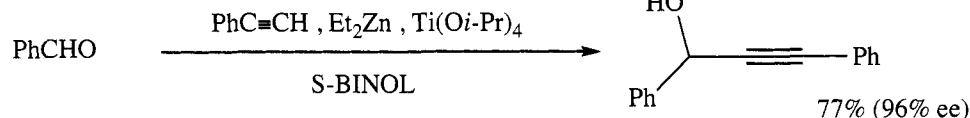
SECTION 302: ALKYNE - ALCOHOL, THIOL



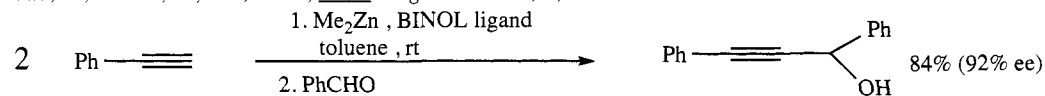
Moore, D.; Pu, L. *Org. Lett.* **2002**, 4, 1855.



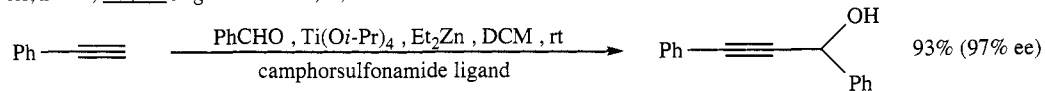
Jiang, B.; Chen, Z.; Tang, X. *Org. Lett.* **2002**, 4, 3451.



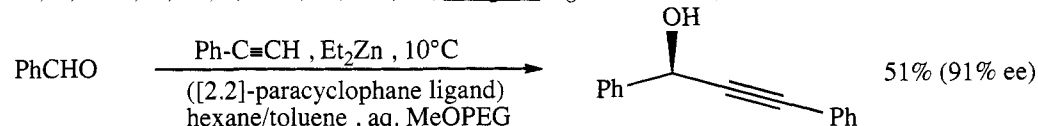
Gao, G.; Moore, D.; Xie, R.-G.; Pu, L. *Org. Lett.* **2002**, 4, 4143.



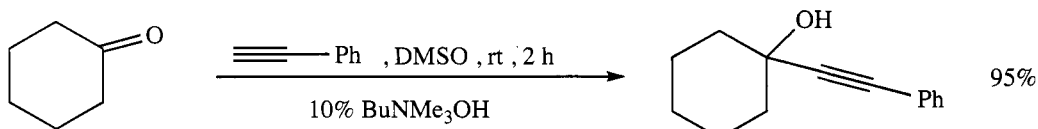
Li, Z.-B.; Pu, L. *Org. Lett.* **2004**, 6, 1065.



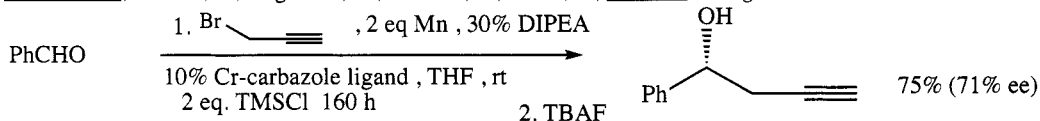
Xu, Z.; Chen, C.; Xu, J.; Miao, M.; Yan, W.; Wang, R. *Org. Lett.* **2004**, 6, 1193.



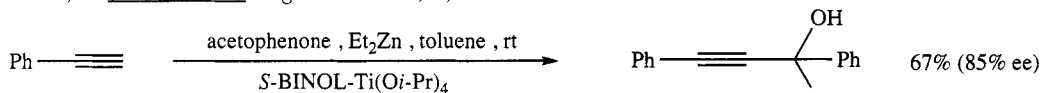
Dahmen, S. *Org. Lett.* **2004**, 6, 2113.



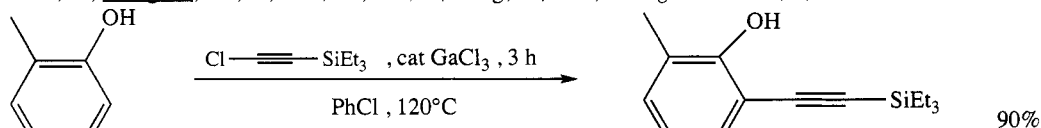
Ishikawa, T.; Mizuta, T.; Hagiwara, K.; Aikawa, T.; Kudo, T.; Saito, S. *J. Org. Chem.* **2003**, 68, 3702.



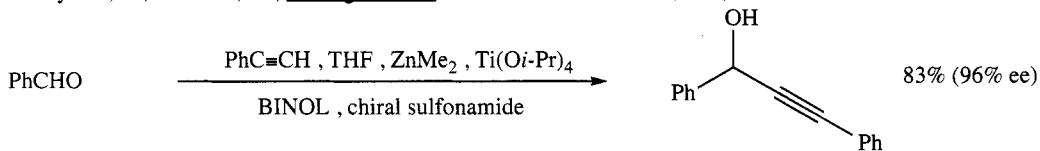
Inoue, M.; Nakada, M. *Org. Lett.* **2004**, 6, 2977.



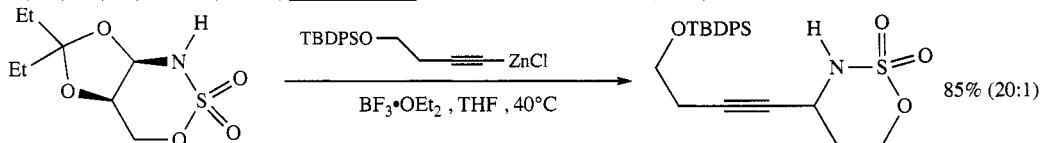
Zhou, Y.; Wang, R.; Xu, Z.; Yan, W.; Liu, L.; Kang, Y.; Han, Z. *Org. Lett.* **2004**, 6, 4147.



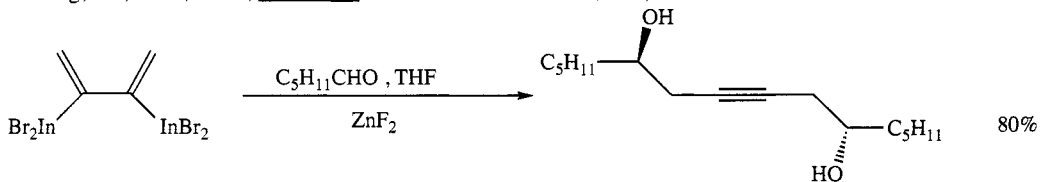
Kobayashi, K.; Arisawa, M.; Yamaguchi, M. *J. Am. Chem. Soc.* **2002**, 124, 8528.



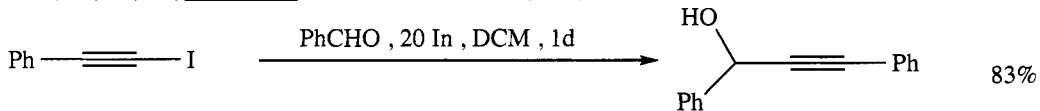
Li, X.; Lu, G.; Kwork, W.H.; Chan, A.S.C. *J. Am. Chem. Soc.* **2002**, 124, 12636.



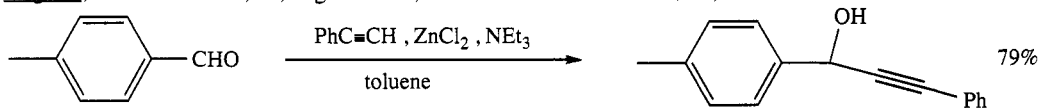
Fleming, J.J.; Fiori, K.W.; DuBois, J. *J. Am. Chem. Soc.* **2003**, 125, 2028.



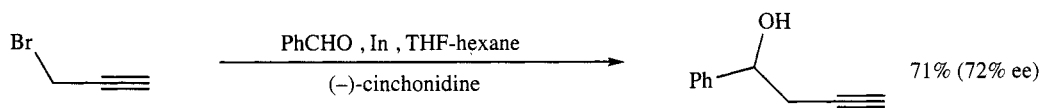
Miao, W.; Lu, W.; Chan, T.H. *J. Am. Chem. Soc.* **2003**, 125, 2412.



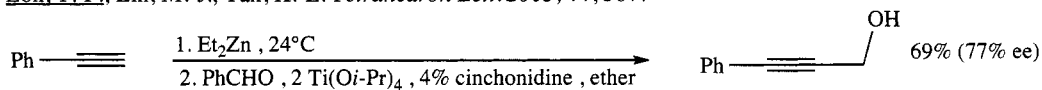
Augé, J.; Lubin-Germain, N.; Seghrouchni, L. *Tetrahedron Lett.* **2002**, 43, 5255.



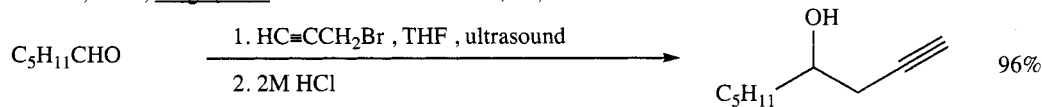
Jiang, B.; Si, Y.-G. *Tetrahedron Lett.* **2002**, 43, 8323.



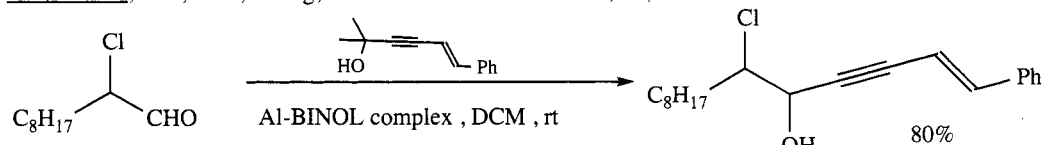
Loh, T.-P.; Lin, M.-J.; Tan, K.-L. *Tetrahedron Lett.* **2003**, *44*, 507.



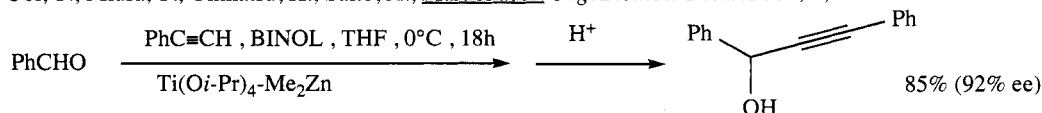
Kamble, R.M.; Singh, V.K. *Tetrahedron Lett.* **2003**, *44*, 5347.



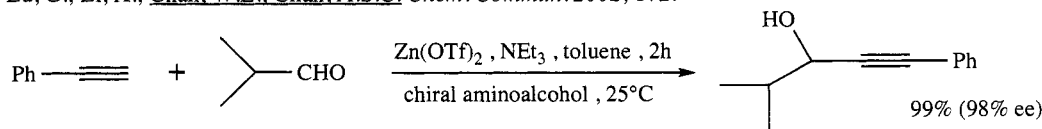
Lee, A.S.-Y.; Chu, S.-F.; Chang, Y.-T. *Tetrahedron Lett.* **2004**, *45*, 1551.



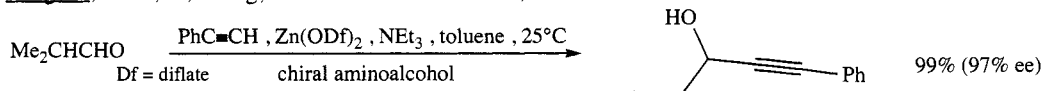
Ooi, T.; Miura, T.; Ohmatsu, K.; Saito, A.; Maruoka, K. *Org. Biomol. Chem.* **2004**, *2*, 3312.



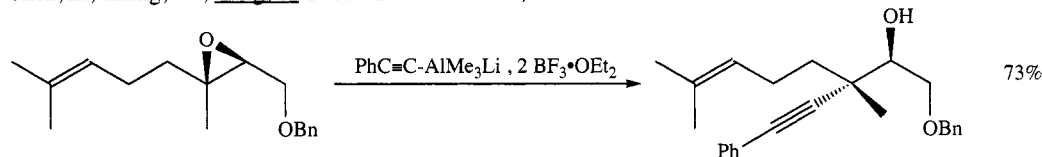
Lu, G.; Li, X.; Chan, W.L.; Chan, A.S.C. *Chem. Commun.* **2002**, 172.



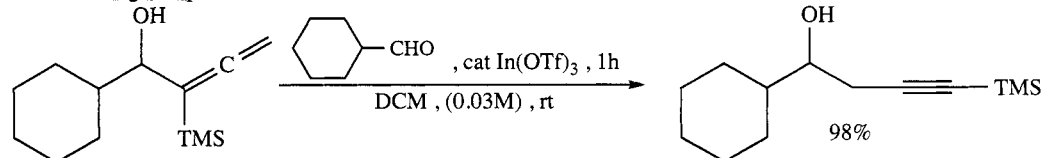
Jiang, B.; Chen, Z.; Xiong, W. *Chem. Commun.* **2002**, 1524.



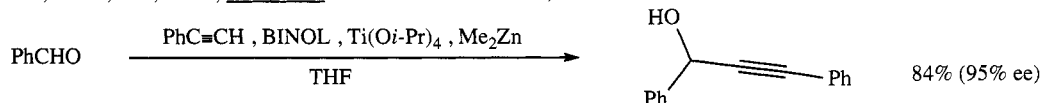
Chen, Z.; Xiong, W.; Jiang, B. *Chem. Commun.* **2002**, 2098.



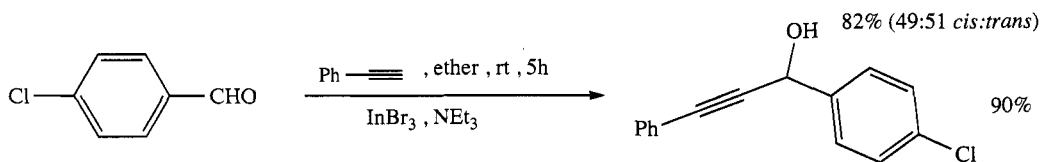
Zhao, H.; Pagenkopf, B.L. *Chem. Commun.* **2003**, 2592.



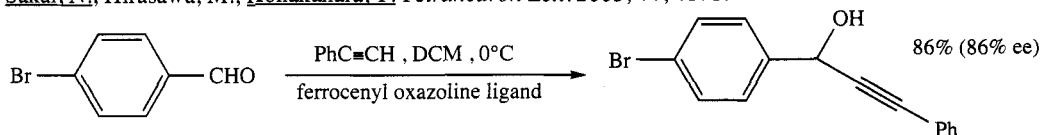
Lee, K.-C.; Lin, M.-J.; Loh, T.-P. *Chem. Commun.* **2004**, 2456.



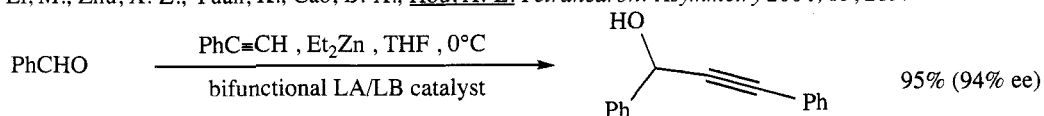
Lu, G.; Li, X.; Chen, G.; Chan, W.L.; Chan, A.S.C. *Tetrahedron: Asymmetry* **2003**, *14*, 449.



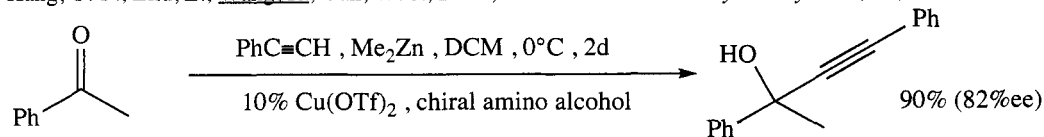
Sakai, N.; Hirasawa, M.; Konakahara, T. *Tetrahedron Lett.* **2003**, *44*, 4171.



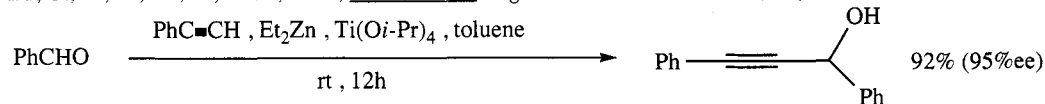
Li, M.; Zhu, X.-Z.; Yuan, K.; Cao, B.-X.; Hou, X.-L. *Tetrahedron: Asymmetry* **2004**, *15*, 219.



Kang, Y.-F.; Liiu, L.; Wang, R.; Yan, W.-J.; Zhou, Y.-F. *Tetrahedron: Asymmetry* **2004**, *15*, 3155.



Lu, G.; Li, X.; Jia, X.; Chan, W.L.; Chan, A.S.C. *Angew. Chem. Int. Ed.* **2003**, *42*, 5057.

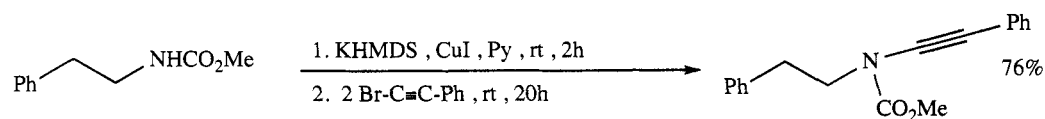


Xu, Z.; Wang, R.; Xu, J.; Da, C.-s.; Yan, W.-j.; Chen, C. *Angew. Chem. Int. Ed.* **2003**, *42*, 5747.

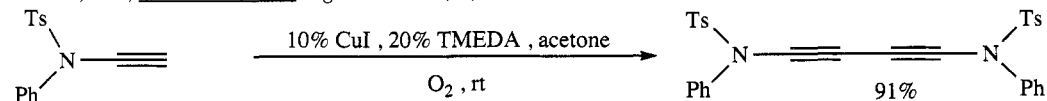
SECTION 303: ALKYNE - ALDEHYDE

NO ADDITIONAL EXAMPLES

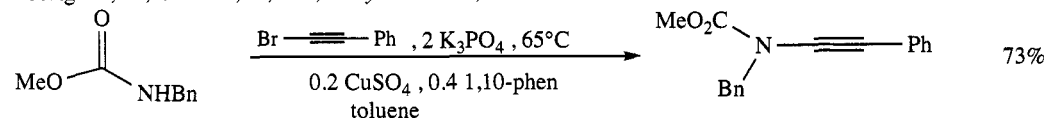
SECTION 304: ALKYNE - AMIDE



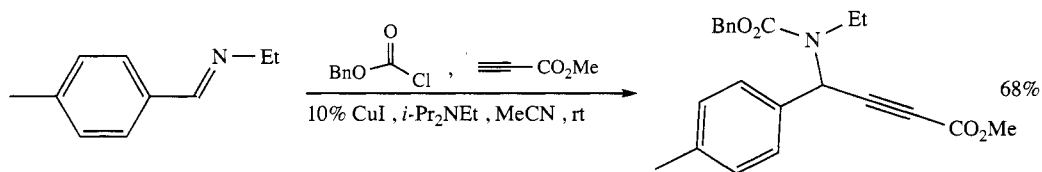
Dunetz, J.R.; Danheiser, R.L. *Org. Lett.* **2003**, *5*, 4011.



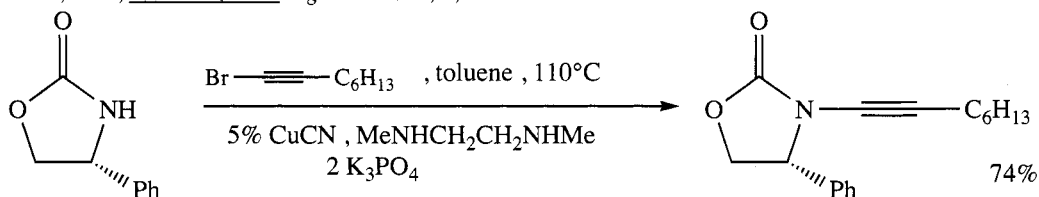
Rodríguez, D.; Castedo, L.; Saá, C. *Synlett* **2004**, 377.



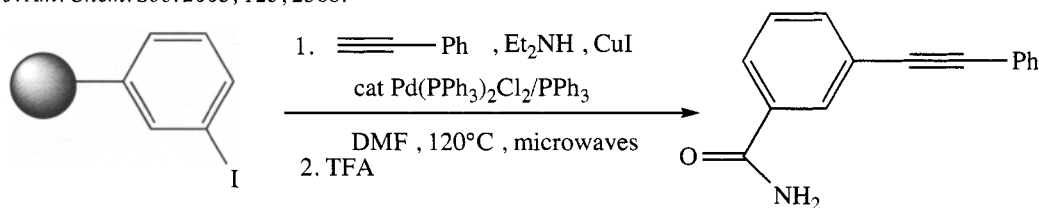
Zhang, Y.; Hsung, R.P.; Tracey, M.R.; Kurtz, K.C.M.; Vera, E.L. *Org. Lett.* **2004**, *6*, 1157.



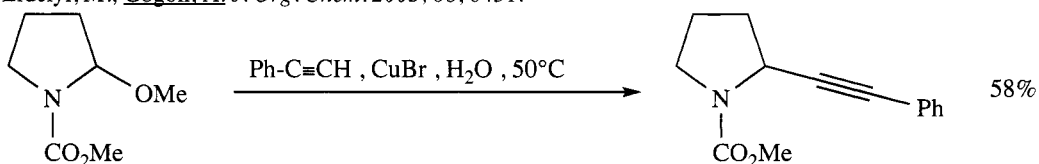
Black, D.A.; Arndtsen, B.A. *Org. Lett.* **2004**, 6, 1107.



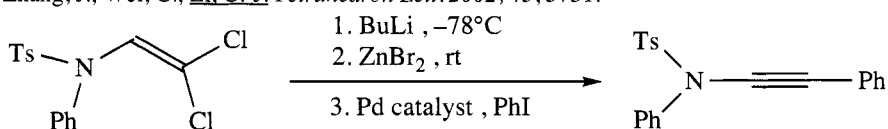
Frederick, M.O.; Mulder, J.A.; Tracey, M.R.; Hsung, R.P.; Huang, J.; Jurtz, K.C.M.; Shen, L.; Douglas, C.J. *J. Am. Chem. Soc.* **2003**, 125, 2368.



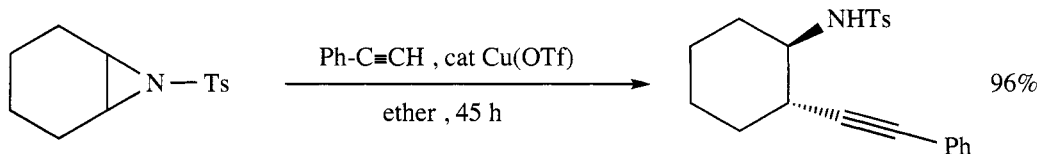
Erdélyi, M.; Gogoli, A. *J. Org. Chem.* **2003**, 68, 6431.



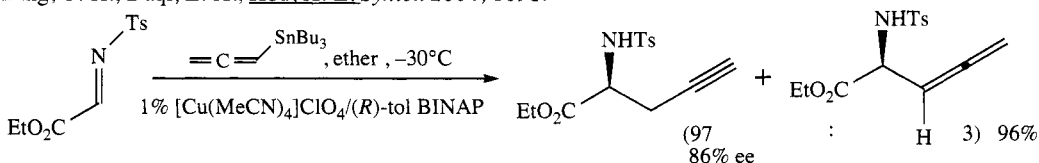
Zhang, J.; Wei, C.; Li, C.-J. *Tetrahedron Lett.* **2002**, 43, 5731.



Rodríguez, D.; Castedo, L.; Saá, C. *Synlett* **2004**, 783.



Ding, C.-H.; Daqi, L.-X.; Hou, X.-L. *Synlett* **2004**, 1691.



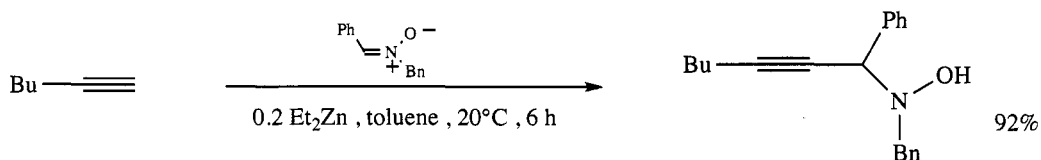
Kagoshima, H.; Uzawa, T.; Akiyama, T. *Chem. Lett.* **2002**, 31, 298.

REVIEW:

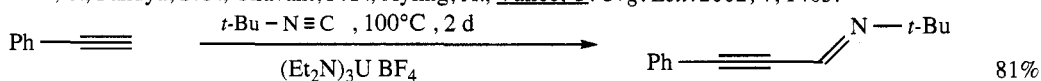
“In Search of an Atom-Economical Synthesis of Chiral Ynamides”

Mulder, J.A.; Kurtz, K.C.M.; Hsung, R.P. *Synlett* **2003**, 1379.

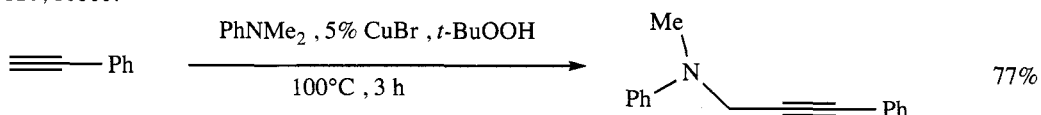
SECTION 305: ALKYNE - AMINE



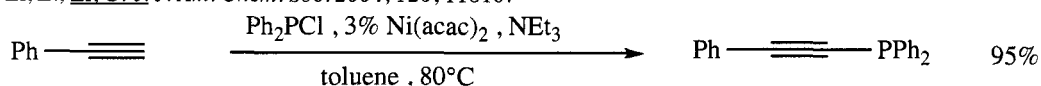
Pinet, S.; Pandya, S.U.; Chavant, P.Y.; Ayling, A.; Vallee, Y. *Org. Lett.* **2002**, 4, 1463.



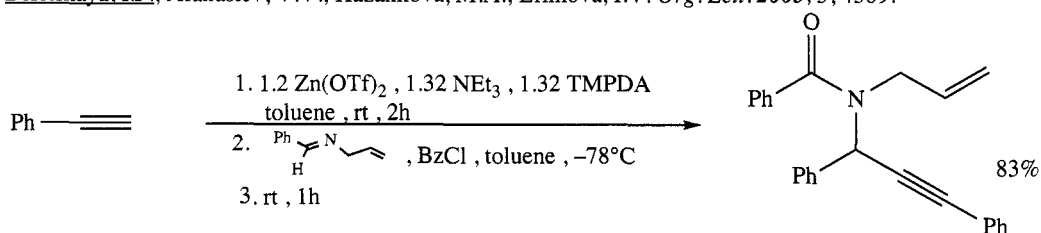
Barnea, E.; Andrea, T.; Kapon, M.; Berthet, J.-C.; Ephritikhine, M.; Wisén, M.S. *J. Am. Chem. Soc.* **2004**, 126, 10860.



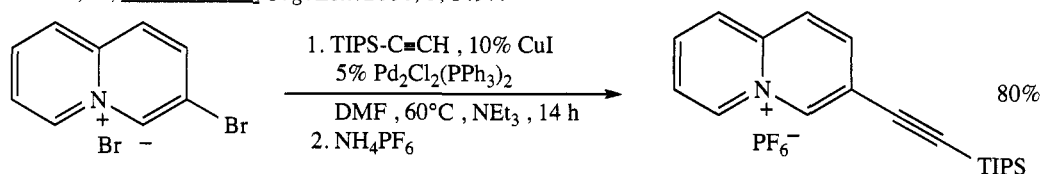
Li, Z.; Li, C.-J. *J. Am. Chem. Soc.* **2004**, 126, 11810.



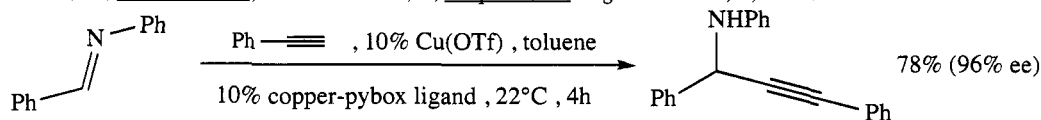
Beletskaya, I.P.; Afanasiev, V.V.; Kazankova, M.A.; Efimova, I.V. *Org. Lett.* **2003**, 5, 4309.



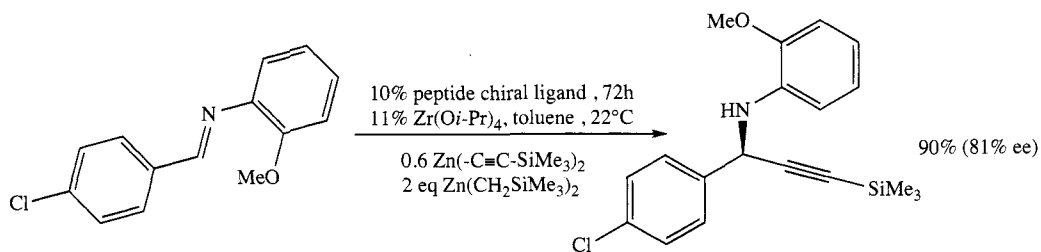
Fischer, C.; Carreira, E.M. *Org. Lett.* **2004**, 6, 1497.



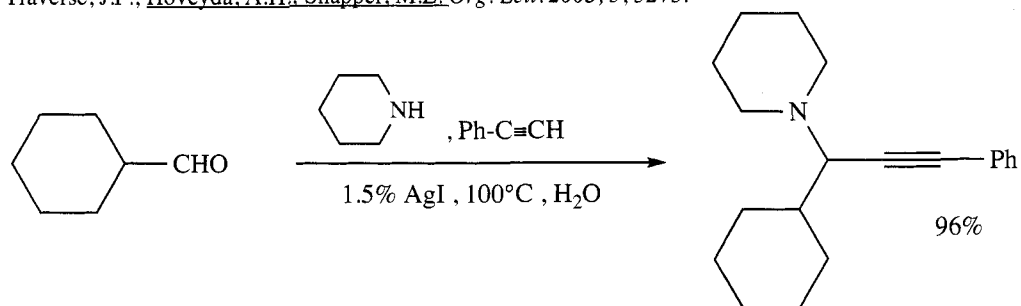
García, D.; Cuadro, A.M.; Alvarez-Builla, J.; Vaquero, J.J. *Org. Lett.* **2004**, 6, 4175.



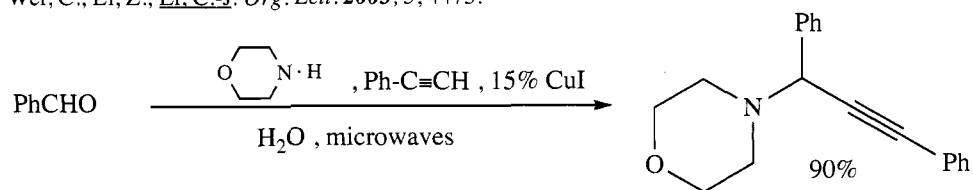
Wei, C.; Li, C.-J. *J. Am. Chem. Soc.* **2002**, 124, 5638.



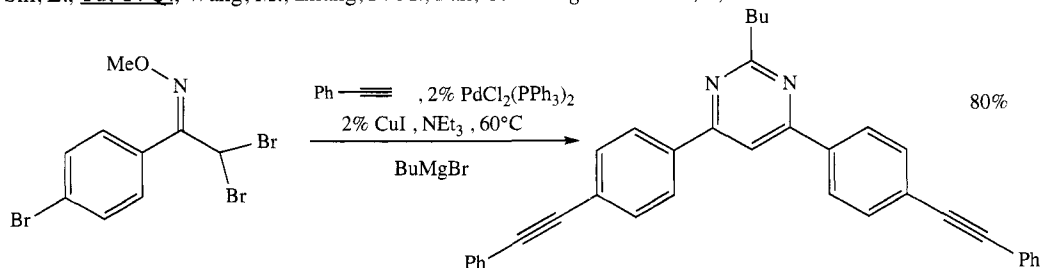
Traverse, J.F.; Hoveyda, A.H.; Snapper, M.L. *Org. Lett.* **2003**, 5, 3273.



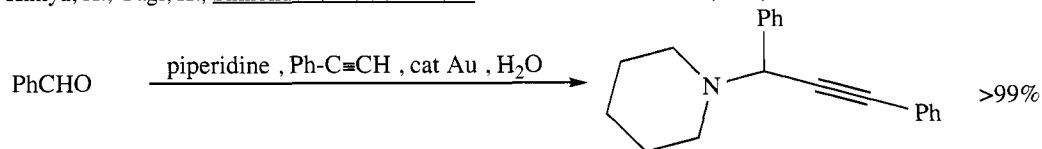
Wei, C.; Li, Z.; Li, C.-J. *Org. Lett.* **2003**, 5, 4473.



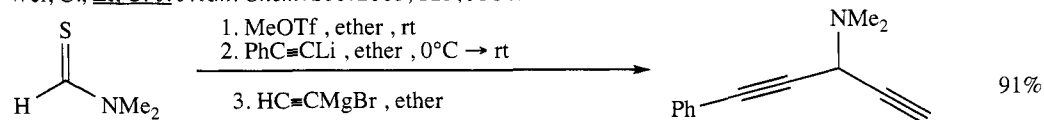
Shi, L.; Tu, Y.-Q.; Wang, M.; Zhang, F.-M.; Fan, C.-A. *Org. Lett.* **2004**, 6, 1001.



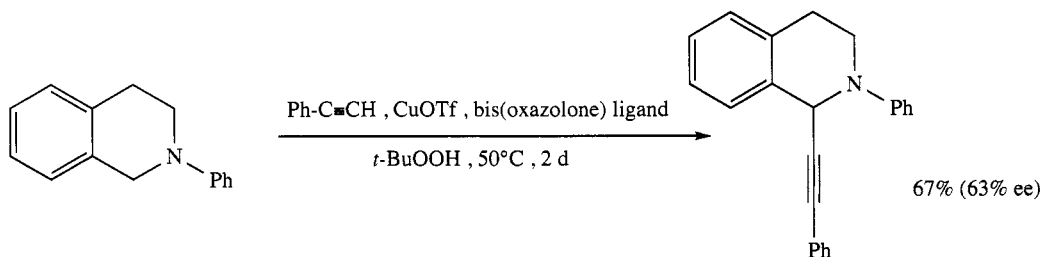
Kikiya, H.; Yagi, K.; Shinokubo, H.; Oshima, K. *J. Am. Chem. Soc.* **2002**, 124, 9032.



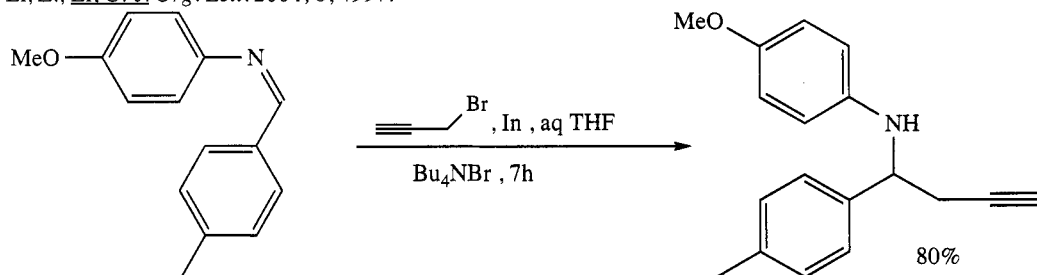
Wei, C.; Li, C.-J. *J. Am. Chem. Soc.* **2003**, 125, 9584.



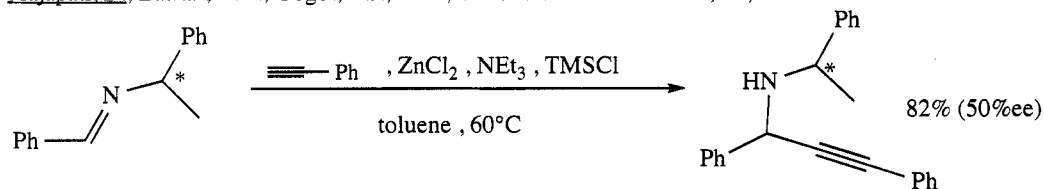
Murai, T.; Mutoh, Y.; Ohta, Y.; Murakami, M. *J. Am. Chem. Soc.* **2004**, 126, 5968.



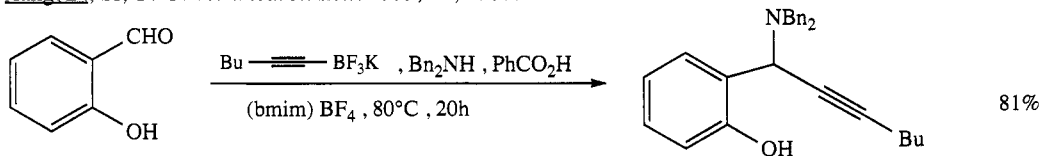
Li, Z.; Li, C.-J. *Org. Lett.* **2004**, 6, 4997.



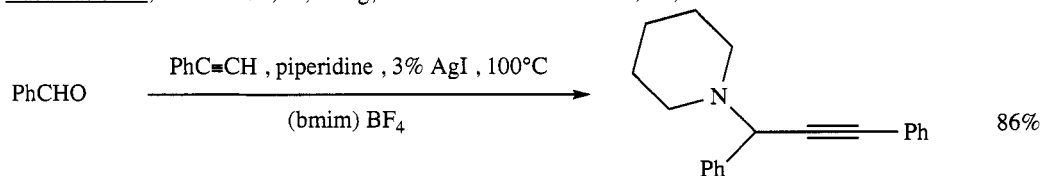
Prajapati, D.; Laskar, D.D.; Gogoi, B.J.; Devi, G. *Tetrahedron Lett.* **2003**, 44, 6755.



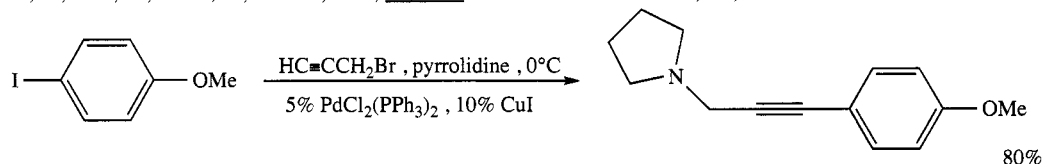
Jiang, B.; Si, Y.-G. *Tetrahedron Lett.* **2003**, 44, 6767.



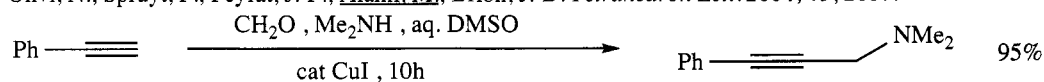
Kabalka, G.W.; Venkataiah, B.; Dong, G. *Tetrahedron Lett.* **2004**, 45, 729.



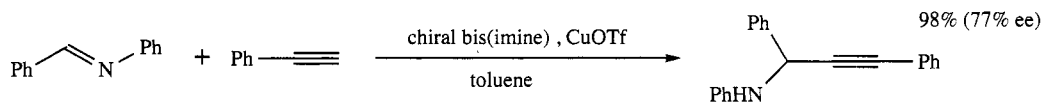
Li, Z.; Wei, C.; Chen, L.; Varma, R.S.; Li, C.-J. *Tetrahedron Lett.* **2004**, 45, 2443.



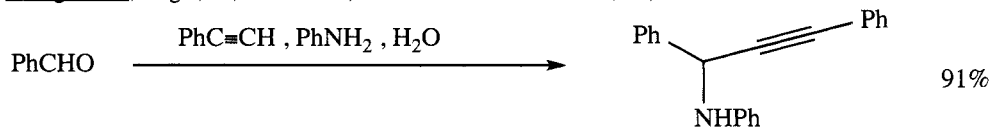
Olivi, N.; Spruyt, P.; Peyrat, J.-F.; Alami, M.; Brion, J.-D. *Tetrahedron Lett.* **2004**, 45, 2607.



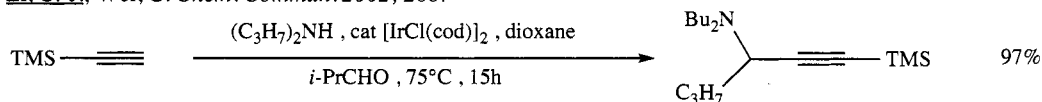
Bieber, L.W.; da Silva, M.F. *Tetrahedron Lett.* **2004**, 45, 8281.



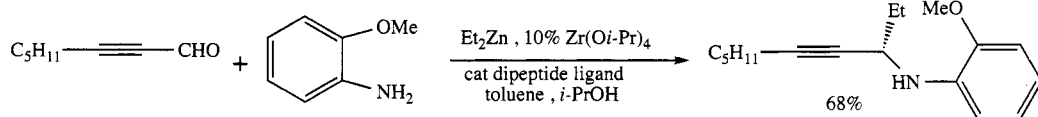
Benaglia, M.; Negri, D.; Dell'Anna, G. *Tetrahedron Lett.* **2004**, 45, 8705.



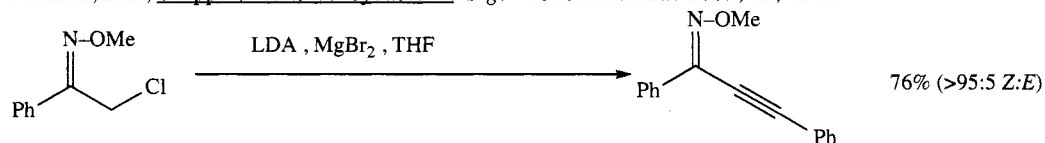
Li, C.-J.; Wei, C. *Chem. Commun.* **2002**, 268.



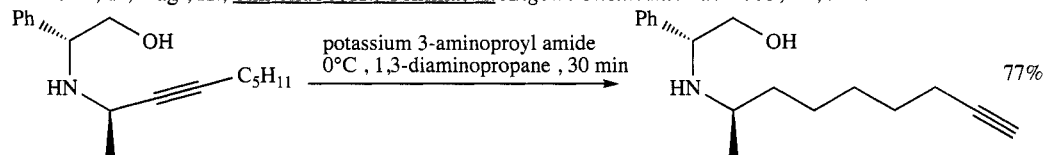
Sakaguchi, S.; Mizuta, T.; Furuwan, M.; Kubo, T.; Ishii, Y. *Chem. Commun.* **2004**, 1638.



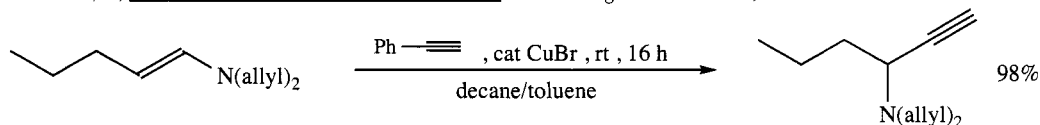
Akullian, L.C.; Snapper, M.L.; Hoveyda, A.H. *Angew. Chem. Int. Ed.* **2003**, 42, 4244.



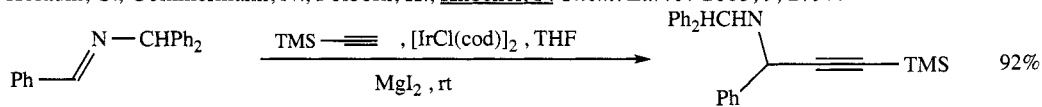
Tsuritani, T.; Yagi, K.; Shinokubo, H.; Oshima, K. *Angew. Chem. Int. Ed.* **2003**, 42, 5613.



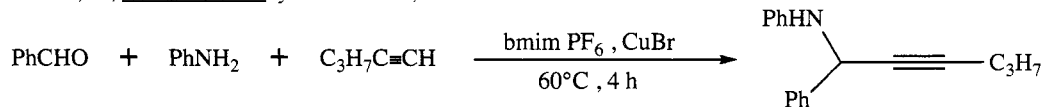
Blanchet, J.; Bonin, M.; Micouin, L.; Husson, H.-P. *Eur. J. Org. Chem.* **2002**, 2598.



Koradin, C.; Gommermann, N.; Polborn, K.; Knochel, P. *Chem. Eur. J.* **2003**, 9, 2797.

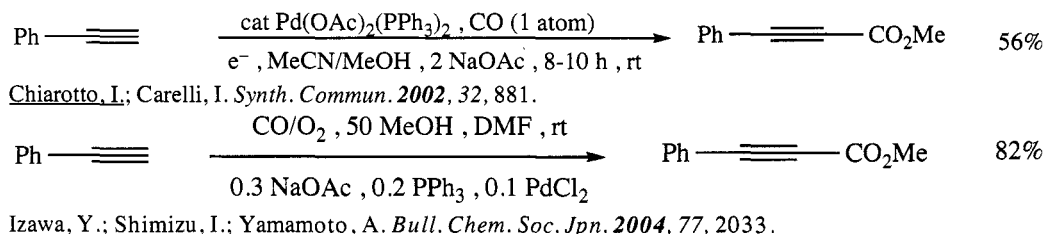


Fischer, C.; Carreira, E.M. *Synthesis* **2004**, 1497.

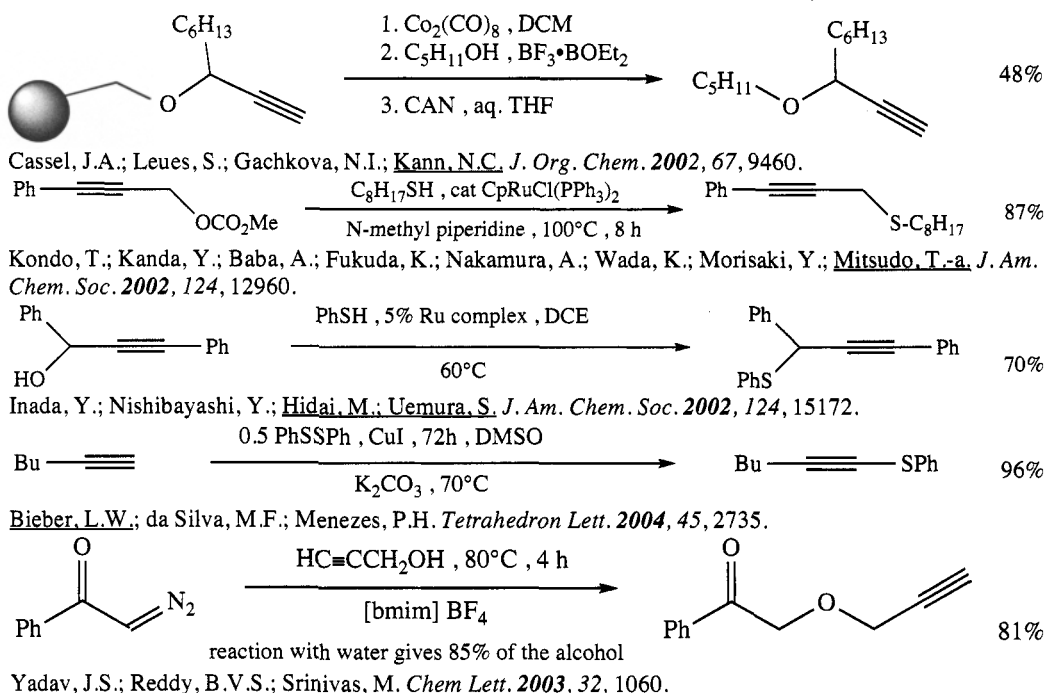


Yadav, J.S.; Reddy, B.V.S.; Naveenkumar, V.; Rao, R.S.; Nagaiah, K. *New J. Chem.* **2004**, 28, 335.

SECTION 306: ALKYNE - ESTER



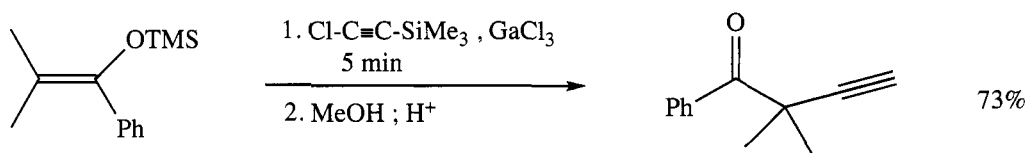
SECTION 307: ALKYNE - ETHER, EPOXIDE, THIOETHER

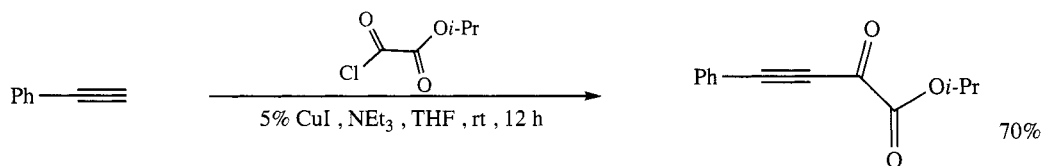


SECTION 308: ALKYNE - HALIDE

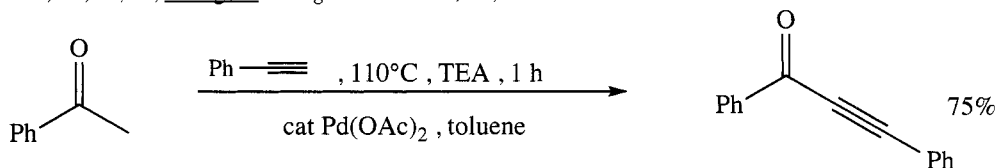
NO ADDITIONAL EXAMPLES

SECTION 309: ALKYNE - KETONE

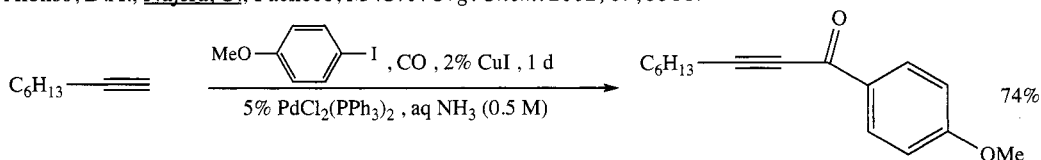




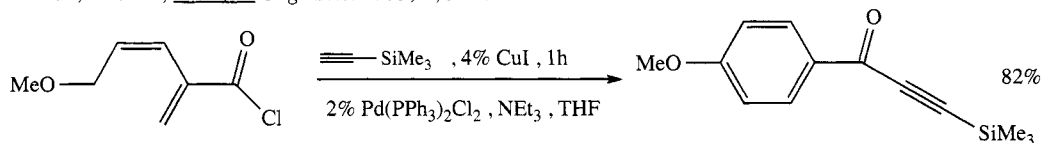
Guo, M.; Li, D.; Zhang, Z. *J. Org. Chem.* **2003**, 68, 10172.



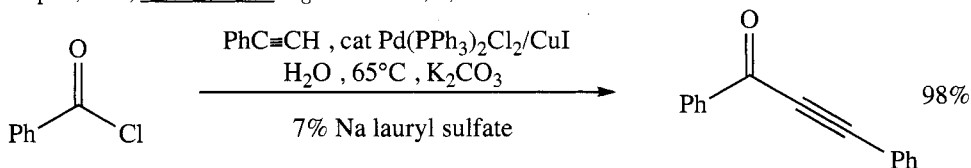
Alonso, D.A.; Nájera, C.; Pacheco, M^a.C. *J. Org. Chem.* **2002**, 67, 5588.



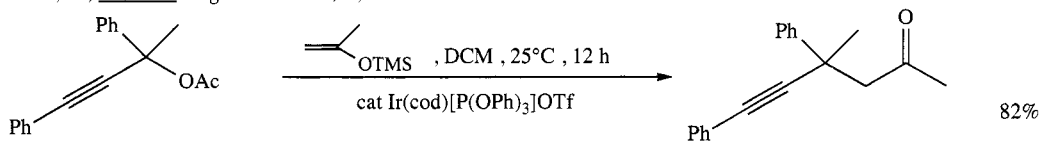
Ahmed, M.S.M.; Meri, A. *Org. Lett.* **2003**, 5, 3057.



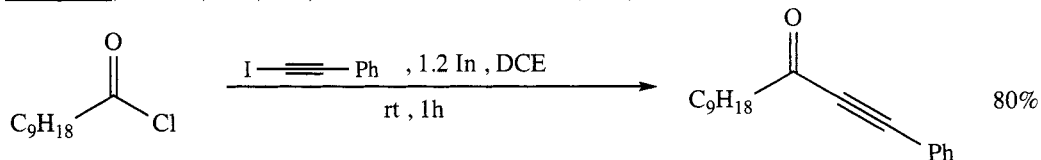
Karpov, A.S.; Müller, T.J.J. *Org. Lett.* **2003**, 5, 3451.



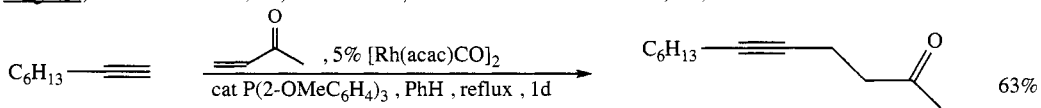
Chen, L.; Li, C.-J. *Org. Lett.* **2004**, 6, 3151.



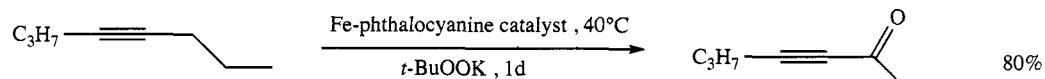
Matsuda, I.; Komori, K.-i.; Itoh, K. *J. Am. Chem. Soc.* **2002**, 124, 9072.



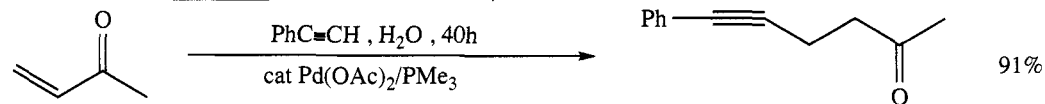
Augé, J.; Lubin-Germain, N.; Sehrouchni, L. *Tetrahedron Lett* **2003**, 44, 819.



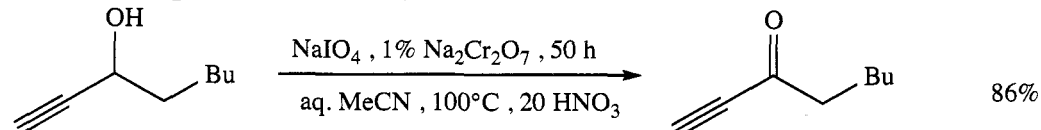
Lerum, R.V.; Chisholm, J.D. *Tetrahedron Lett.* **2004**, 45, 6591.



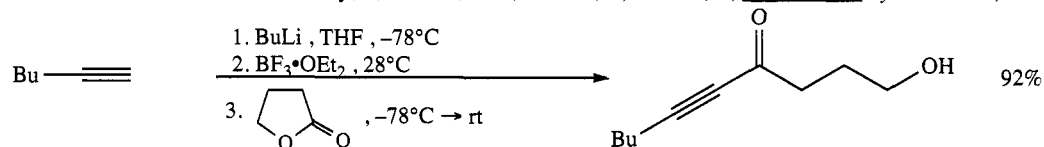
Pérollier, C.; Sorokin, A.B. *Chem. Commun.* **2002**, 1548.



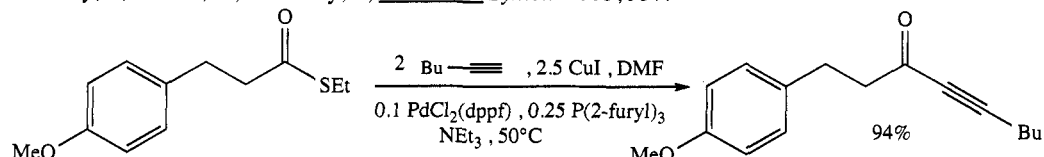
Chen, L.; Li, C.-J. *Chem. Commun.* **2004**, 2362.



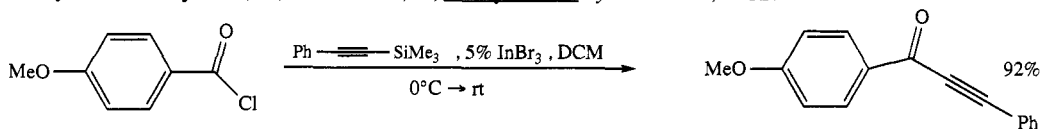
van de Vondervoot, L.S.; Bouttemy, S; Pardón, J.M.; LeBras, J.; Muzart, J.; Alsters, P.L. *Synlett* **2002**, 243.



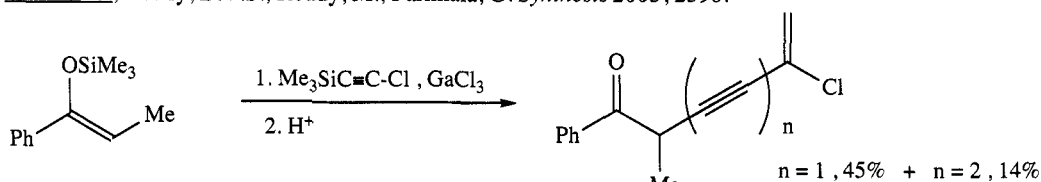
Doubisky, J.; Streinz, L.; Leseticky, L; Koutek, B. *Synlett* **2003**, 937.



Tokuyama, H.; Miyazaki, T.; Yokoshima, S.; Fukuyama, T. *Synlett* **2003**, 1512.



Yadav, J.S.; Reddy, B.V.S.; Reddy, M.; Parimala, G. *Synthesis* **2003**, 2390.

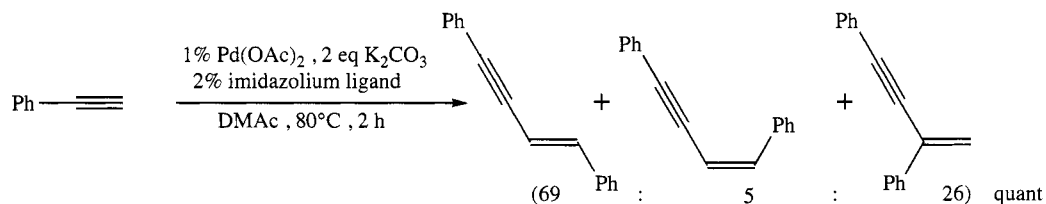


Amemiya, R.; Fujii, A.; Arisawa, M.; Yamaguchi, M. *Chem. Lett.* **2003**, 32, 298

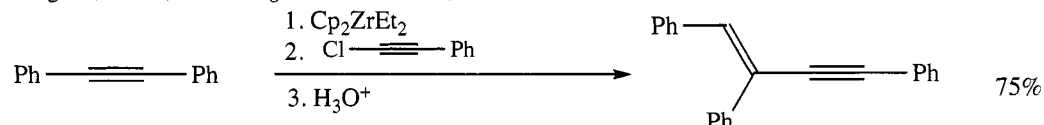
SECTION 310: ALKYNE - NITRILE

NO ADDITIONAL EXAMPLES

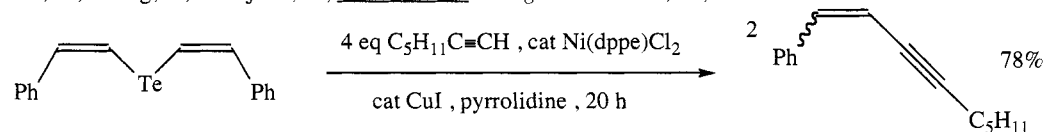
SECTION 311: ALKYNE - ALKENE



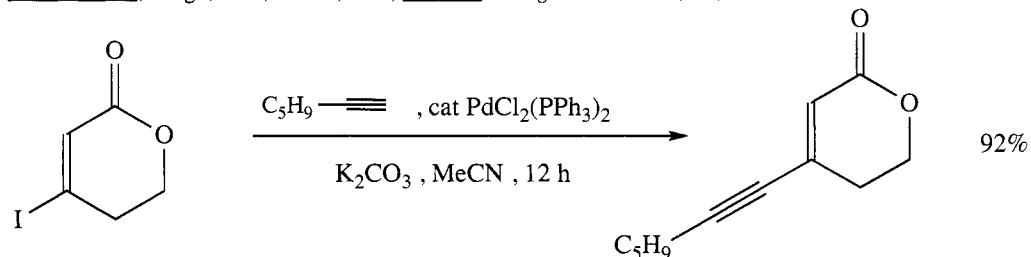
Yang, C.; Nolan, S.P. *J. Org. Chem.* **2002**, 67, 591.



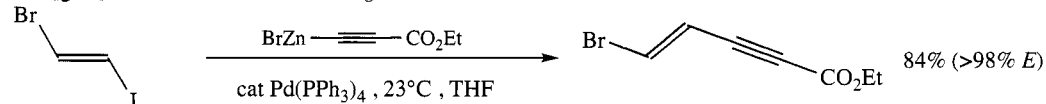
Liu, Y.; Zhong, Z.; Nakajima, K.; Takahashi, T. *J. Org. Chem.* **2002**, 67, 7451.



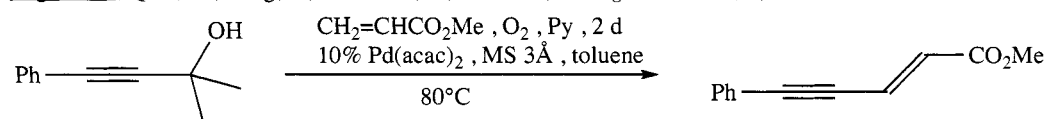
Silveira, C.C.; Braga, A.L.; Vieira, A.S.; Zeni, G. *J. Org. Chem.* **2003**, 68, 662.



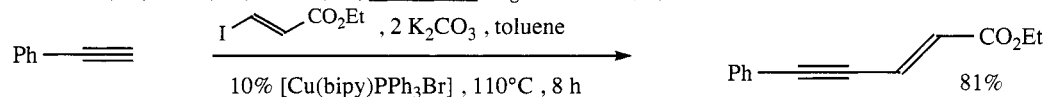
Huang, X.; Zhou, H.; Chen, W. *J. Org. Chem.* **2004**, 69, 839.



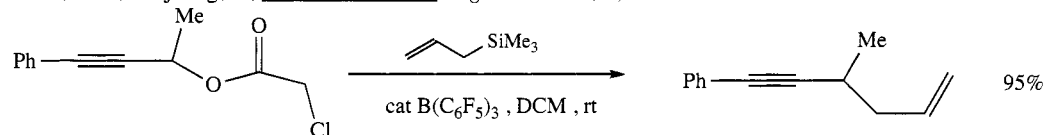
Negishi, E.; Qian, M.; Zeng, F.; Anastasia, L.; Babinski, D. *Org. Lett.* **2003**, 5, 1597.



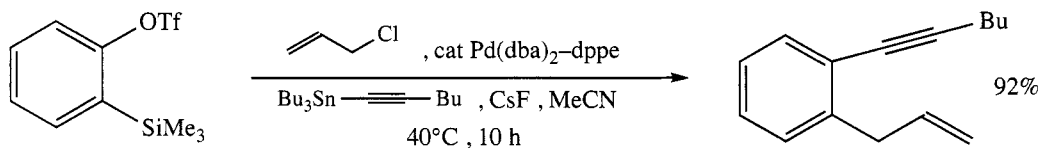
Nishimura, T.; Araki, H.; Maeda, Y.; Uemura, S. *Org. Lett.* **2003**, 5, 2997.



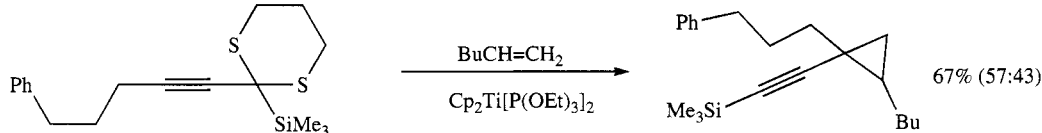
Bates, C.G.; Saejueng, P.; Venkataraman, D. *Org. Lett.* **2004**, 6, 1441.



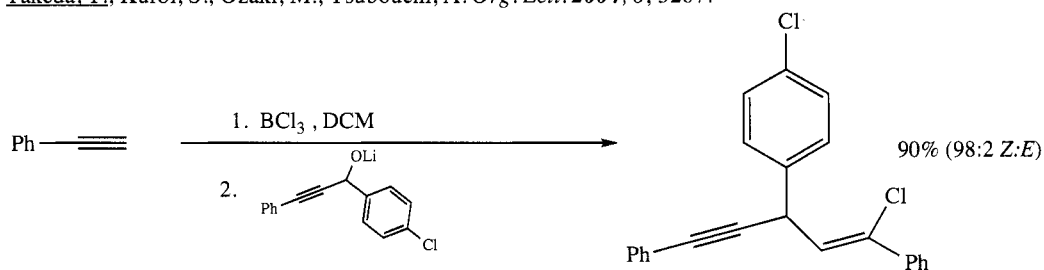
Schwier, T.; Rubin, M.; Gevorgyan, V. *Org. Lett.* **2004**, 6, 1999.



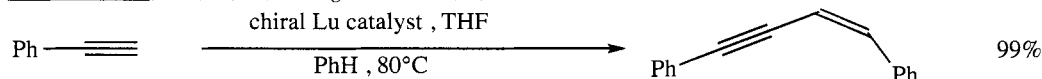
Jeganmohan, M.; Cheng, C.-H. *Org. Lett.* **2004**, 6, 2821.



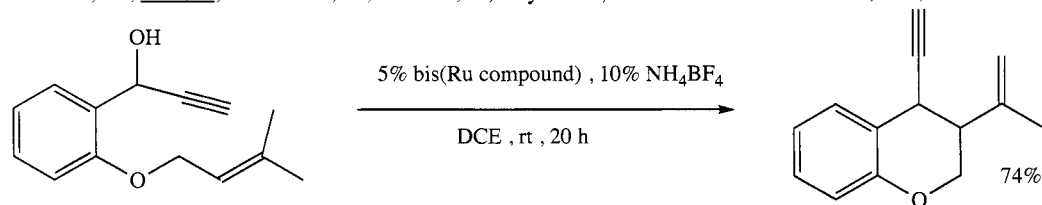
Takeda, T.; Kuroi, S.; Ozaki, M.; Tsubouchi, A. *Org. Lett.* **2004**, 6, 3207.



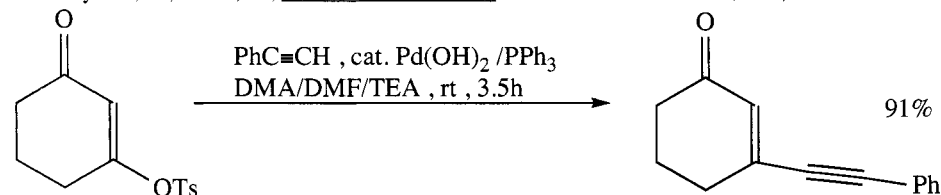
Kabalka, G.W.; Wu, Z.; Ju, Y. *Org. Lett.* **2004**, 6, 3929.



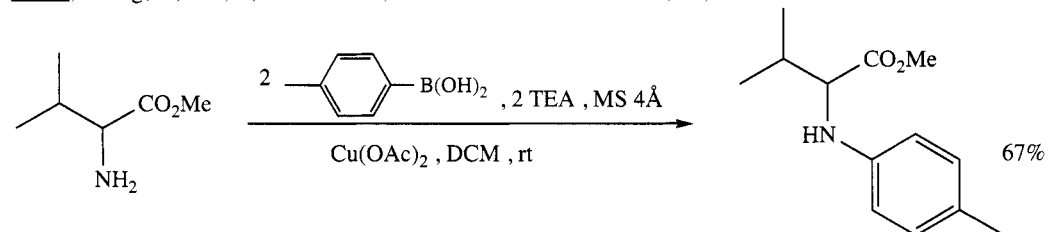
Nishiura, M.; Hou, Z.; Wakatsuki, Y.; Yamaki, T.; Miyamoto, T. *J. Am. Chem. Soc.* **2003**, 125, 1184.



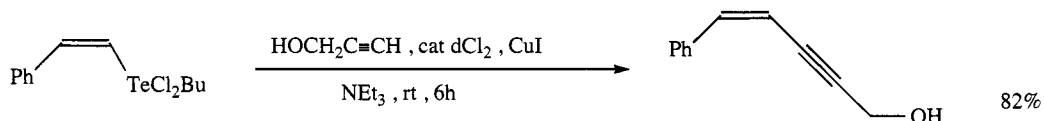
Nishibayashi, Y.; Inada, Y.; Hidai, M.; Uemura, S. *J. Am. Chem. Soc.* **2003**, 125, 6060.



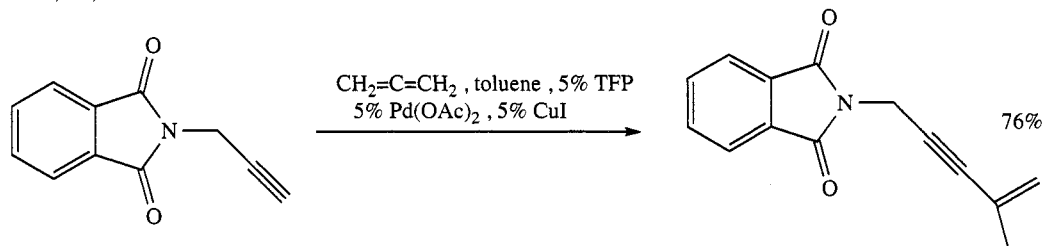
Fu, X.; Zhang, S.; Yin, J.; Schumacher, D.P. *Tetrahedron Lett.* **2002**, 43, 6773.



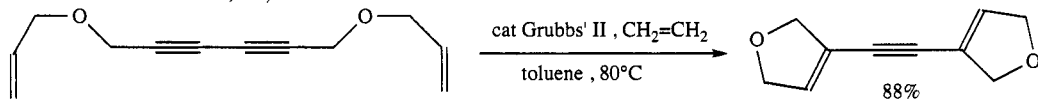
Lam, P.Y.S.; Bonne, D.; Vincent, G.; Clark, C.G.; Combs, A.P. *Tetrahedron Lett.* **2003**, 44, 1691.



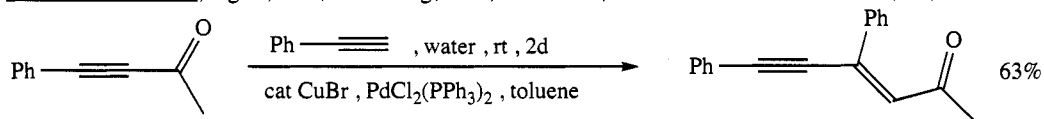
Braga, A.L.; Lüdtkke, D.S.; Vargas, F.; Donato, R.K.; Silveira, C.C.; Stefani, H.A.; Zeni, G. *Tetrahedron Lett.* **2003**, *44*, 1779.



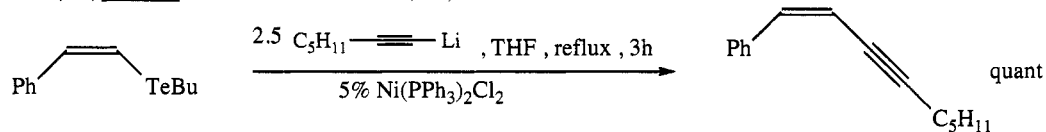
Bruyere, D.; Grigg, R.; Hinsley, J.; Hussain, R.K.; Korn, S.; DeLacierva, C.O.; Sridharan, V.; Wang, J. *Tetrahedron Lett.* **2003**, *44*, 8669.



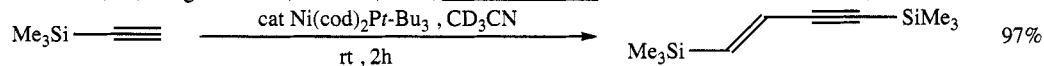
van Otterlo, W.A.L.; Ngidi, E.L.; de Koning, C.B.; Fernandes, M.A. *Tetrahedron Lett.* **2004**, *45*, 659.



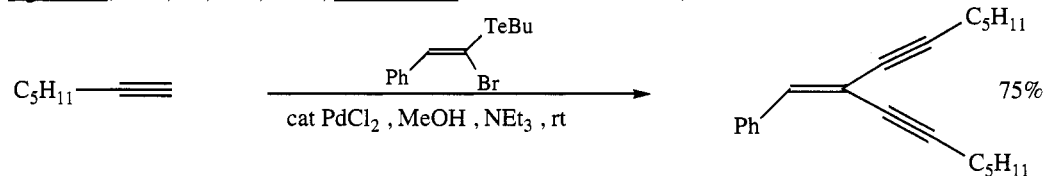
Chen, L.; Li, C.-J. *Tetrahedron Lett.* **2004**, *45*, 2771.



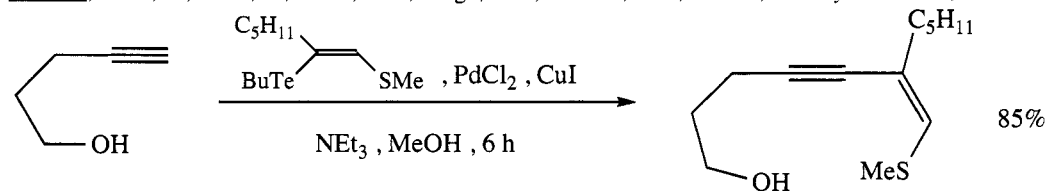
Raminelli, C.; Gargalak Jr. J.; Silveira, C.C.; Comasseto, J.V. *Tetrahedron Lett.* **2004**, *45*, 4927.



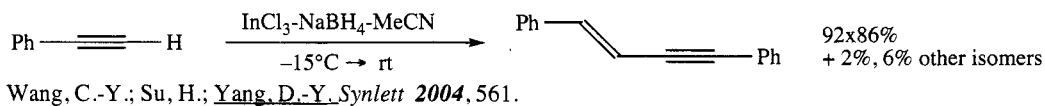
Ogoshi, S.; Ueta, M.; Oka, M.-a.; Jurosawa, H. *Chem. Commun.* **2004**, 2732.



Zeni, G.; Perin, G.; Cella, R.; Jacob, R.G.; Braga, A.L.; Silveira, C.C.; Stefani, H.A. *Synlett* **2002**, 975.



Zeni, G.; Nogueira, C.W.; Pena, J.M.; Pilassão, C.; Menezes, P.H.; Braga, A.L.; Rocha, J.B.T. *Synlett* **2003**, 579.

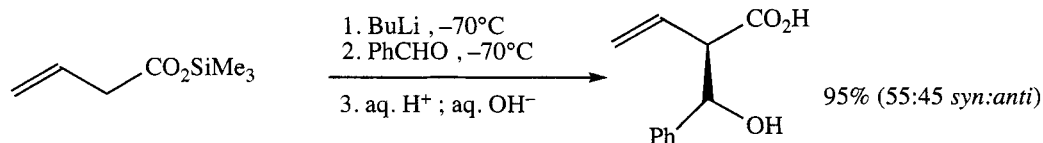
**REVIEW:**

“Enyne Metathesis (Enyne Bond Reorganization)”

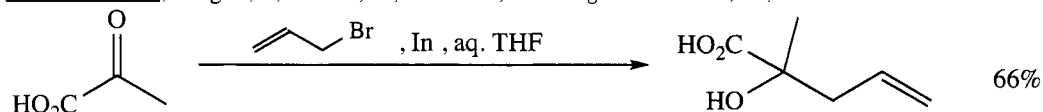
Diver, S.T.; Giessert, A.J. *Chem. Rev.* **2004**, 104, 1317.

SECTION 312: CARBOXYLIC ACID - CARBOXYLIC ACID

NO ADDITIONAL EXAMPLES

SECTION 313: CARBOXYLIC ACID - ALCOHOL, THIOL

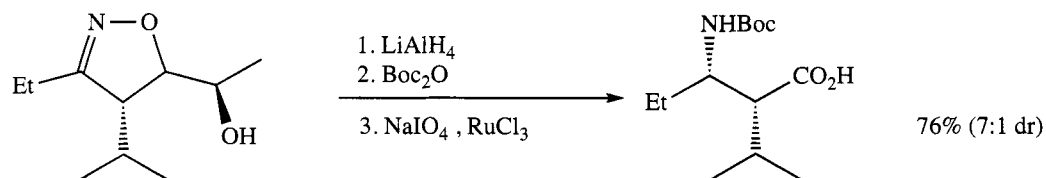
Bellassoued, M.; Grugier, J.; Lensen, N.; Catheline, A. *J. Org. Chem.* **2002**, 67, 5440.



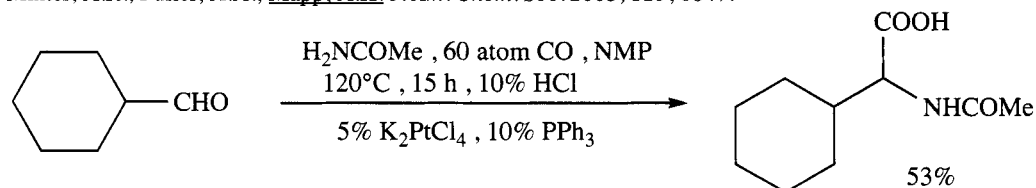
Kumar, S.; Kaur, P.; Chimni, S.S. *Synlett* **2002**, 573.

SECTION 314: CARBOXYLIC ACID - ALDEHYDE

NO ADDITIONAL EXAMPLES

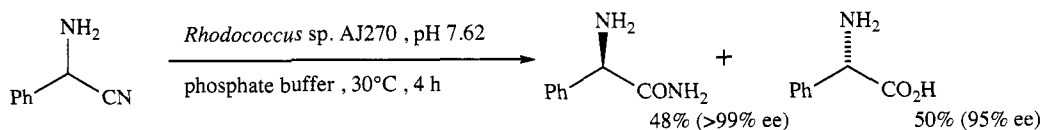
SECTION 315: CARBOXYLIC ACID - AMIDE

Minter, A.R.; Fuller, A.A.; Mapp, A.K. *J. Am. Chem. Soc.* **2003**, 125, 6847.

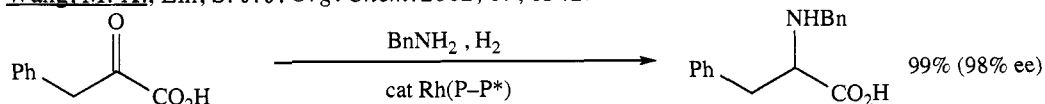


Sagae, T.; Sugiura, M.; Hagio, H.; Kobayashi, S. *Chem. Lett.* **2003**, 32, 160.

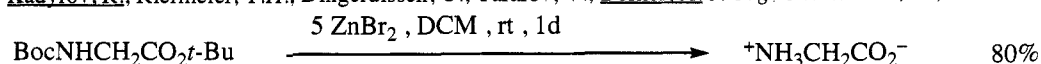
SECTION 316: CARBOXYLIC ACID - AMINE



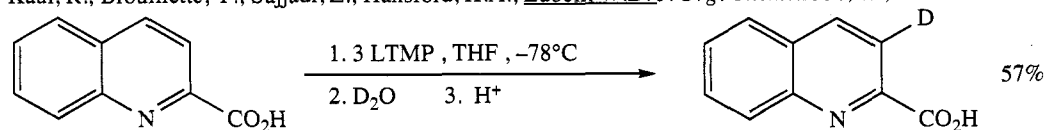
Wang, M.-X.; Lin, S.-J. *J. Org. Chem.* **2002**, 67, 6542.



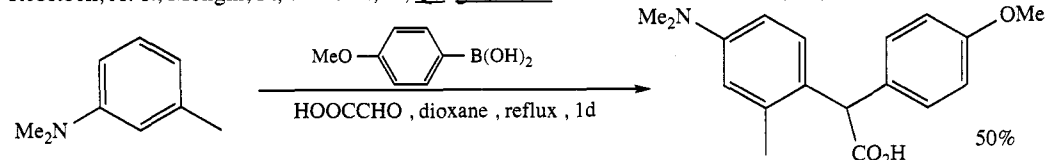
Kadyrov, R.; Riermeier, T.H.; Dingerdissen, U.; Tararov, V.; Börner, A. *J. Org. Chem.* **2003**, 68, 4067.



Kaul, R.; Brouillette, Y.; Sajjadi, Z.; Hansford, K.A.; Lubell, W.D. *J. Org. Chem.* **2004**, 69, 6131.



Rebstock, A.-s.; Mongin, F.; Trécourt, F.; Quéguiner, G. *Tetrahedron Lett.* **2002**, 43, 767.



Naskar, D.; Roy, A.; Seibel, W.L.; Portlock, D.E. *Tetrahedron Lett.* **2003**, 44, 5819.

Related Methods:

Section 315 (Carboxylic Acid - Amide)

Section 344 (Amide - Ester)

Section 351 (Amine - Ester)

SECTION 317: CARBOXYLIC ACID - ESTER

NO ADDITIONAL EXAMPLES

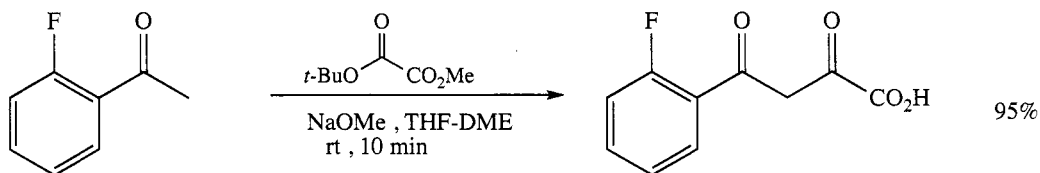
SECTION 318: CARBOXYLIC ACID - ETHER, EPOXIDE, THIOETHER

NO ADDITIONAL EXAMPLES

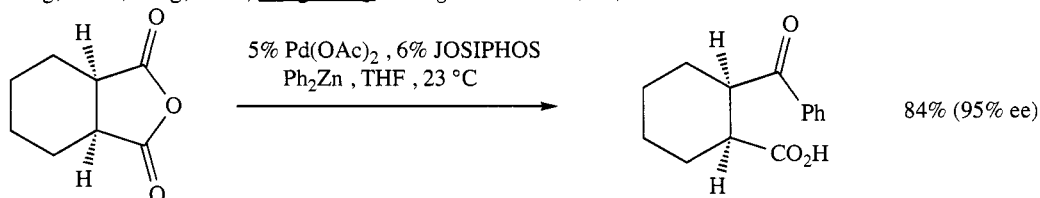
SECTION 319: CARBOXYLIC ACID - HALIDE, SULFONATE

NO ADDITIONAL EXAMPLES

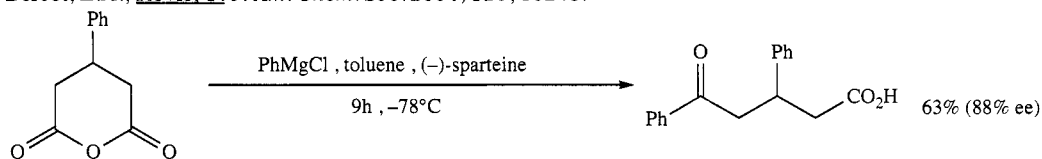
SECTION 320: CARBOXYLIC ACID - KETONE



Jiang, X.-H.; Song, L.-D.; Long, Y.-Q. *J. Org. Chem.* **2003**, 68, 7555.



Bercot, E.A.; Rovis, T. *J. Am. Chem. Soc.* **2004**, 126, 10248.



Shintani, R.; Fu, G.C. *Angew. Chem. Int. Ed.* **2002**, 41, 1057.

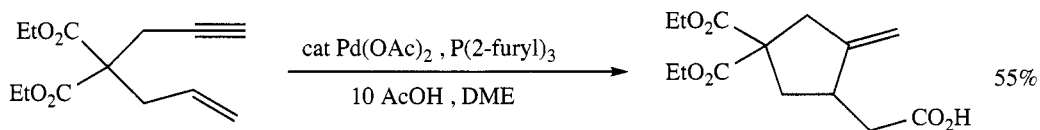
Also via: Section 360 (Ketone - Ester).

SECTION 321: CARBOXYLIC ACID - NITRILE

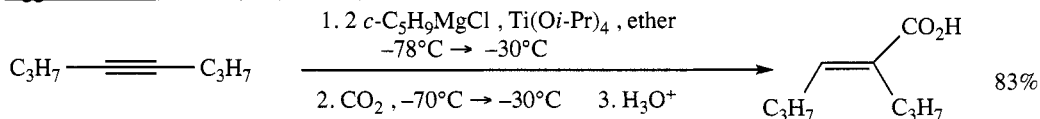
NO ADDITIONAL EXAMPLES

Also via: Section 361 (Nitrile - Ester).

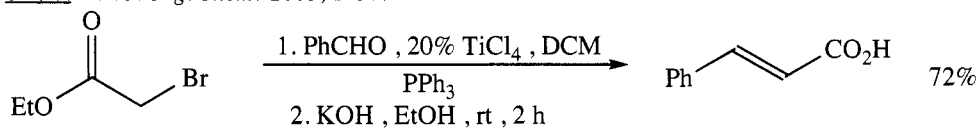
SECTION 322: CARBOXYLIC ACID - ALKENE



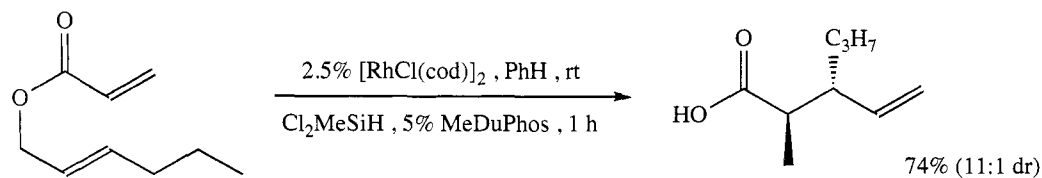
Aggarwal, V.K.; Butters, M.; Davies, P.W. *Chem. Commun.* **2003**, 1046.



Six, Y. *Eur. J. Org. Chem.* **2003**, 1157.



Basavaiah, D.; Rao, A.J. *Synth. Commun.* **2002**, 32, 195.



Miller, S.P.; Morken, J.P. *Org. Lett.* **2002**, 4, 2743.

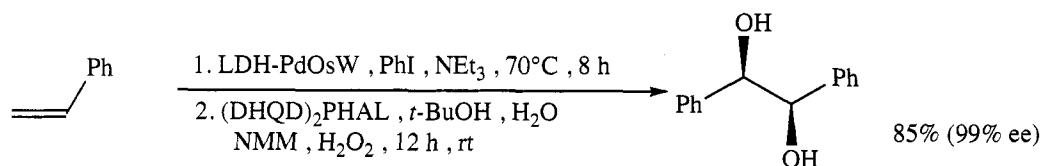
REVIEW:

"New Aspects of the Ireland and Related Claisen Rearrangements"

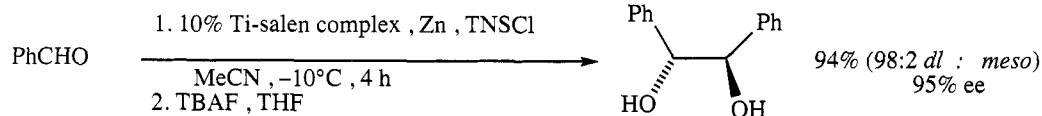
Chai, Y.; Hong, S.-p.; Lindsay, H.A.; McFarland, C.; McIntosh, M.C. *Tetrahedron* **2002**, 58, 2905.

Also via: Section 313 (Alcohol - Carboxylic Acid)
 Section 349 (Amide - Alkene)
 Section 362 (Ester - Alkene)
 Section 376 (Nitrile - Alkene)

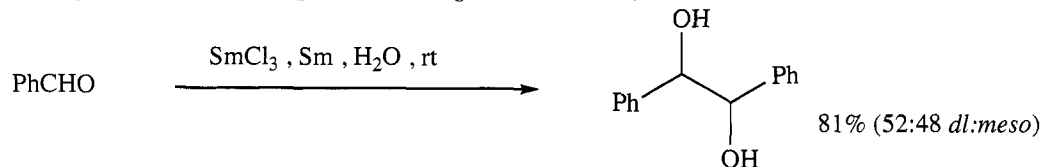
SECTION 323: ALCOHOL, THIOL - ALCOHOL, THIOL



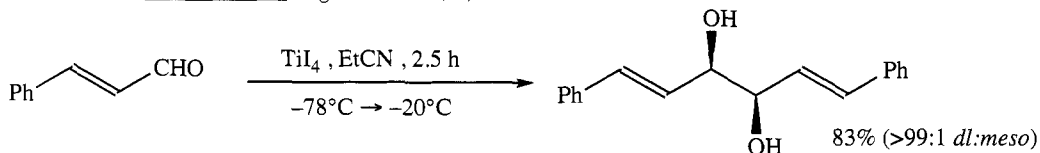
Choudary, B.M.; Chowdari, N.S.; Madhi, S.; Kantam, M.L. *J. Org. Chem.* **2003**, 68, 1736.



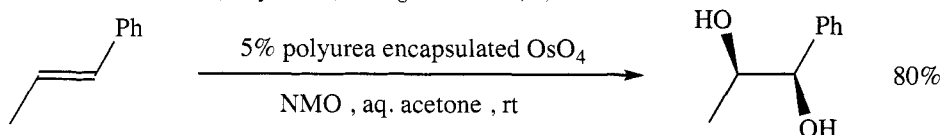
Chatterjee, A.; Bennur, T.H.; Joshi, N.N. *J. Org. Chem.* **2003**, 68, 5668.



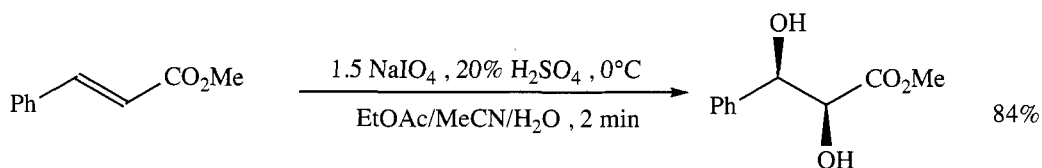
Matsukawa, S.; Hinakubo, Y. *Org. Lett.* **2003**, 5, 1221.



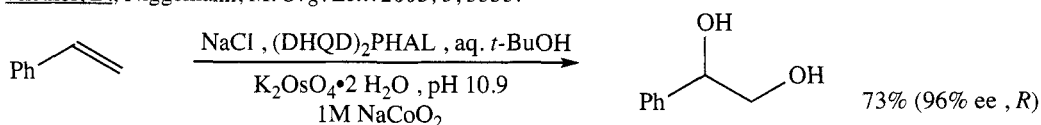
Shimizu, M.; Goto, H.; Hayakawa, R. *Org. Lett.* **2002**, 4, 4097.



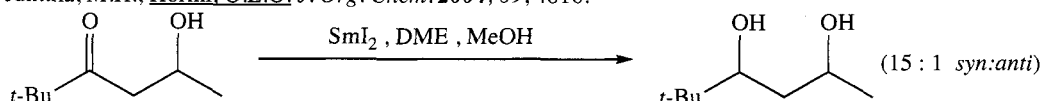
Ley, S.V.; Ramarao, C.; Lee, A.-L.; Østergaard, N.; Smith, S.C.; Shirley, I.M. *Org. Lett.* **2003**, 5, 185.



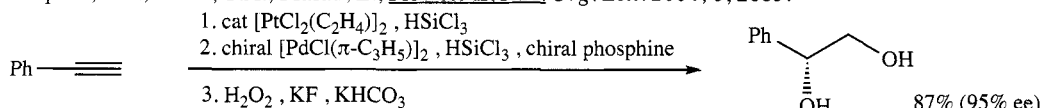
Plietker, B.; Niggemann, M. *Org. Lett.* **2003**, 5, 3353.



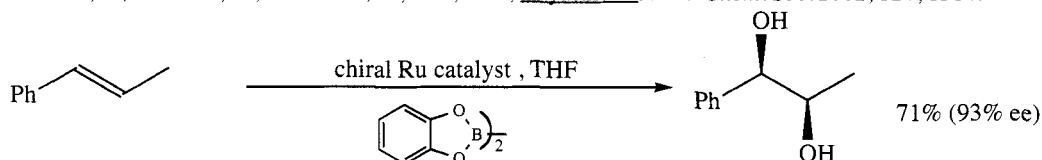
Junttila, M.H.; Hormi, O.E.O. *J. Org. Chem.* **2004**, 69, 4816.



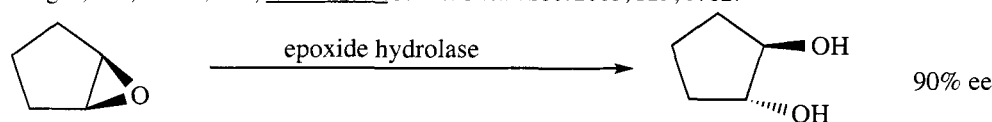
Chopade, P.R.; Davis, T.A.; Prasad, E.; Flowers II, R.A. *Org. Lett.* **2004**, 6, 2685.



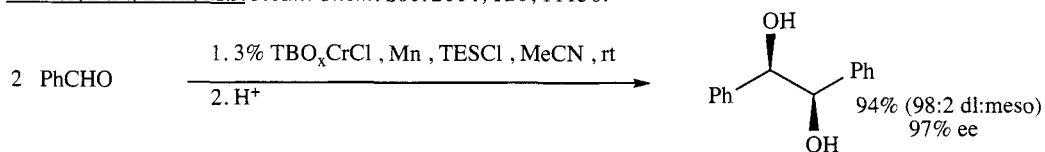
Shimada, T.; Mukaide, K.; Shinohara, A.; Han, J.W.; Hayashi, T. *J. Am. Chem. Soc.* **2002**, 124, 1584.



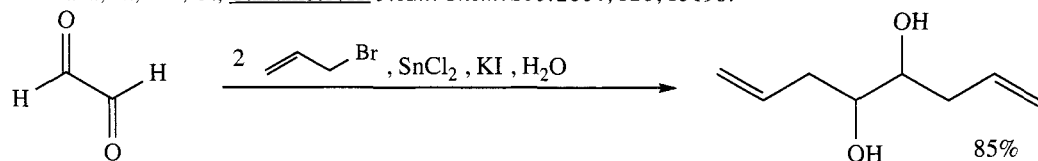
Morgan, J.B.; Miller, S.P.; Morken, J.P. *J. Am. Chem. Soc.* **2003**, 125, 8702.



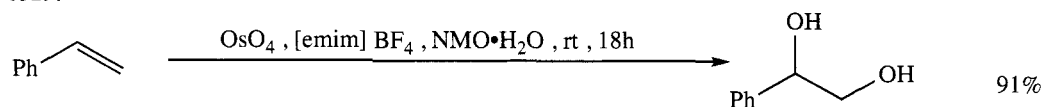
Zhao, L.; Han, B.; Huang, Z.; Miller, M.; Huang, H.; Malashock, D.S.; Zhu, Z.; Milan, A.; Robertson, D.E.; Weiner, D.P.; Burk, M.J. *J. Am. Chem. Soc.* **2004**, 126, 11156.



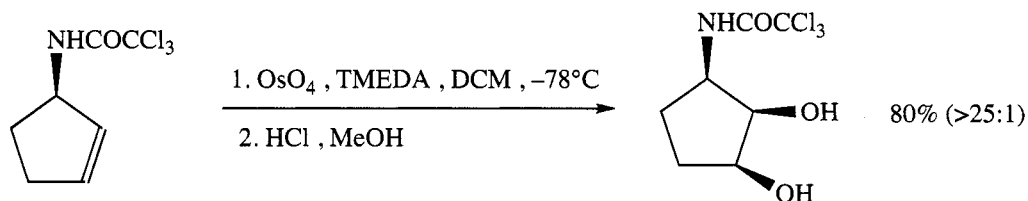
Takenaka, N.; Xia, G.; Yamamoto, H. *J. Am. Chem. Soc.* **2004**, 126, 13198.



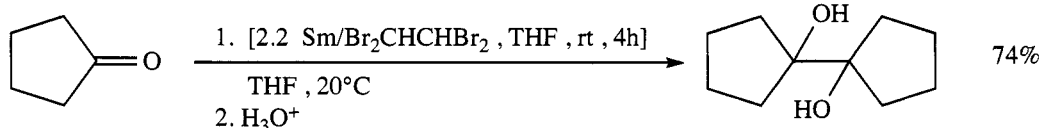
Samoshin, V.V.; Gremyachinskiy, D.E.; Smith, L.I.; Bliznets, I.V.; Gross, P.H. *Tetrahedron Lett.* **2002**, 43, 6329.



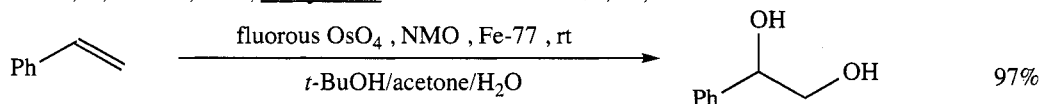
Yanada, R.; Takemoto, Y. *Tetrahedron Lett.* **2002**, 43, 6849.



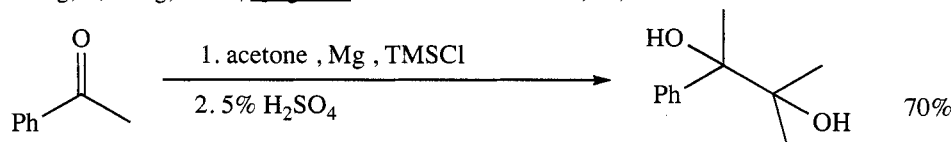
Donohoe, T.J.; Blades, K.; Moore, P.R.; Waring, M.J.; Winter, J.J.G.; Helliwell, M.; Newcombe, N.J.; Stemp, G. *J. Org. Chem.* **2002**, 67, 7946.



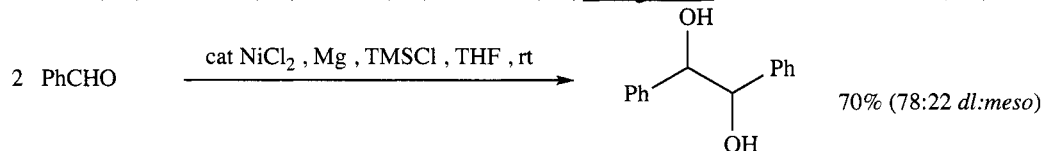
Hélión, F.; Lannou, M.-I.; Namy, J.-L. *Tetrahedron Lett.* **2003**, 44, 5507.



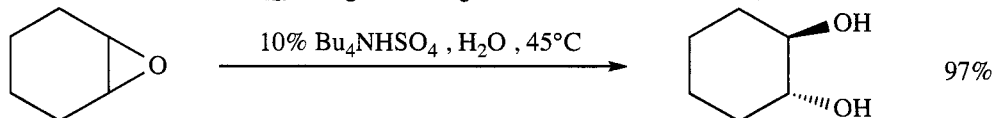
Huang, Y.; Meng, W.-D.; Qing, F.L. *Tetrahedron Lett.* **2004**, 45, 1965.



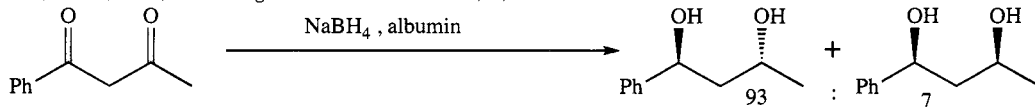
Maekawa, H.; Yamamoto, Y.; Shimada, H.; Yonemura, K.; Nishiguchi, I. *Tetrahedron Lett.* **2004**, 45, 3869.



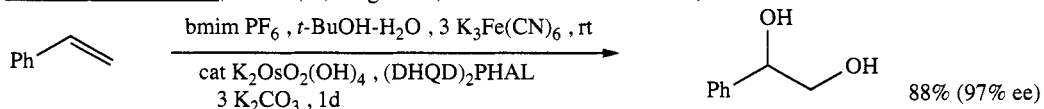
Shi, L.; Fan, C.-A.; Tu, Y.-Q.; Wang, M.; Zhang, F.-M. *Tetrahedron* **2004**, 60, 2851.



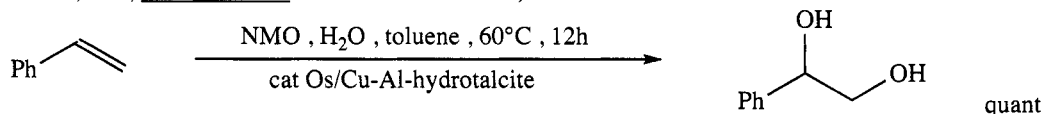
Fan, R.-H.; Hou, X.-L. *Org. Biomol. Chem.* **2003**, 1, 1565.



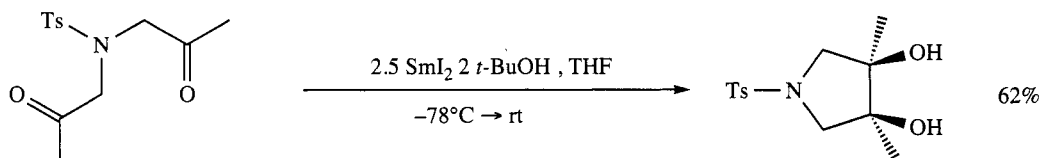
Benedetti, F.; Berti, F.; Donati, I.; Fregonese, M. *Chem. Commun.* **2002**, 828.



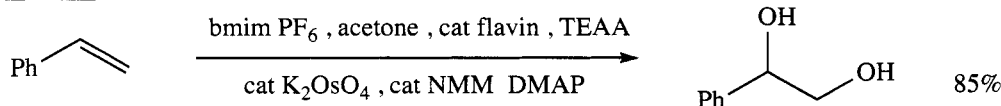
Branco, L.C.; Afonso, C.A.M. *Chem. Commun.* **2002**, 3036.



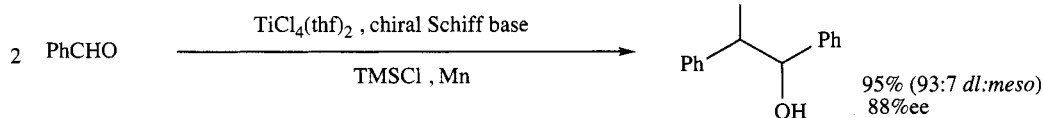
Friedrich, H.B.; Govender, M.; Makhoba, X.; Ngcoo, T.D.; Onani, M.O. *Chem. Commun.* **2003**, 2922.



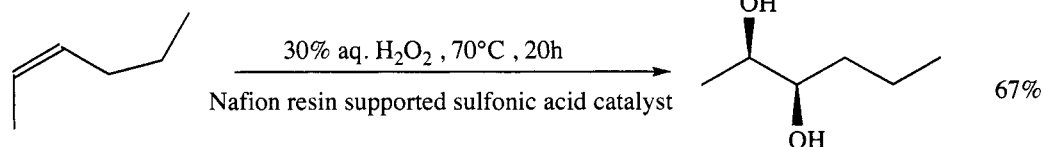
Handa, S.; Kachala, M.S.; Lowe, S.R. *Tetrahedron Lett.* **2004**, 45, 253.



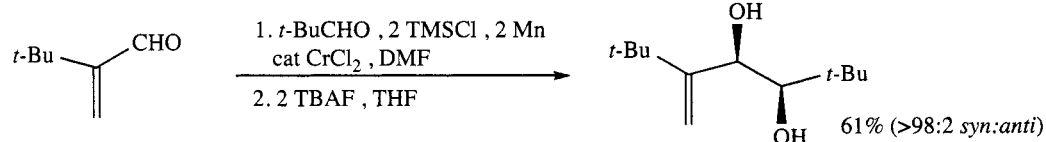
Peña, D.; López, F.; Harutyunyan, S.R.; Minnaard, A.J.; Feringa, B.L. *Chem. Commun.* **2004**, 1494.



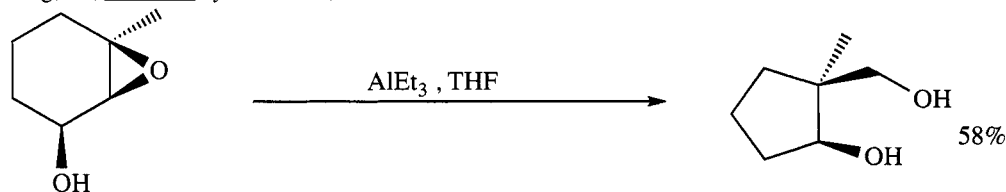
Li, Y.-G.; Tian, Q.-S.; Zhao, J.; Feng, Y.; Li, M.-J.; You, T.-P. *Tetrahedron: Asymmetry* **2004**, 15, 1707.



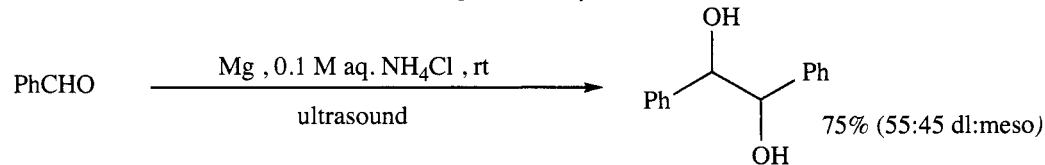
Usui, Y.; Sato, K.; Tanaka, M. *Angew. Chem. Int. Ed.* **2003**, 42, 5623.



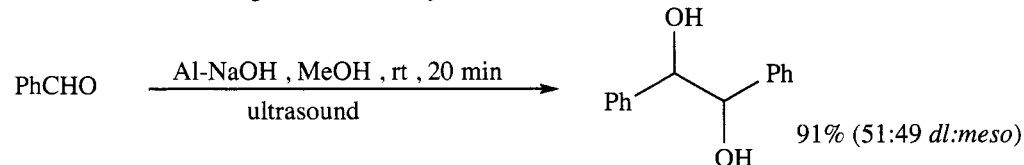
Jung, M.; Groth, U. *Synlett* **2002**, 2015.



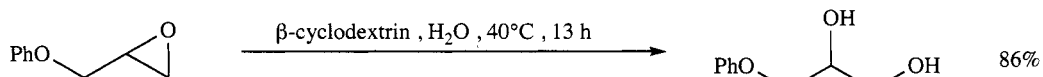
Bin, X.; Wu, B.; Zhao, X.Z.; Jia, Y.X.; Tu, Y.Q.; Li, D.R. *Synlett* **2003**, 623.



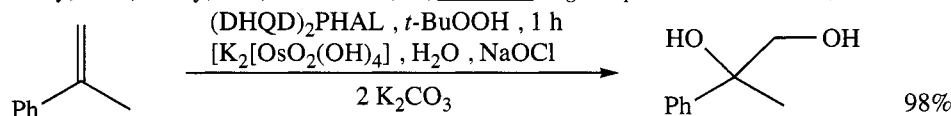
Li, J.-T.; Bian, Y.-J.; Zang, H.-J.; Li, T.-s. *Synth. Commun.* **2002**, 32, 547.



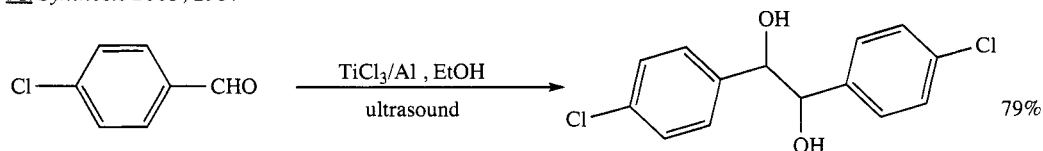
Bian, Y.-J.; Liu, S.-M.; Li, J.-T.; Li, T.-S. *Synth. Commun.* **2002**, 32, 1169.



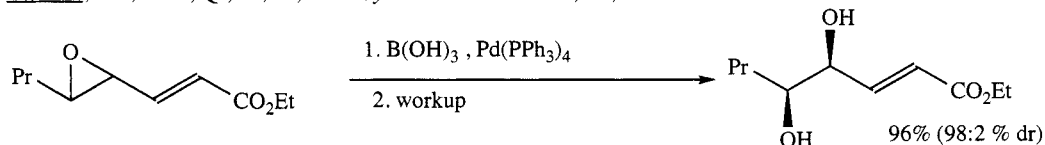
Reddy, M.A.; Reddy, L.R.; Bhanumathi, N.; Rao, K.R. *Org. Prep. Proceed. Int.* **2002**, *34*, 537.



Mehlretter, G.M.; Bhor, S.; Klawonn, M.; Döbler, C.; Sundermeier, U.; Eckert, M.; Militzer, H.-C.; Beller, M. *Synthesis* **2003**, 295.



Li, J.-T.; Lin, Z.-P.; Qi, N.; Li, T.-S. *Synth. Commun.* **2004**, *34*, 4339.



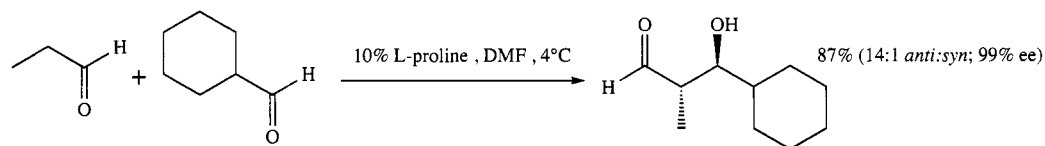
Yu, X.-Q.; Hirai, A.; Miyashita, M. *Chem Lett.* **2004**, *33*, 764.

Also via:

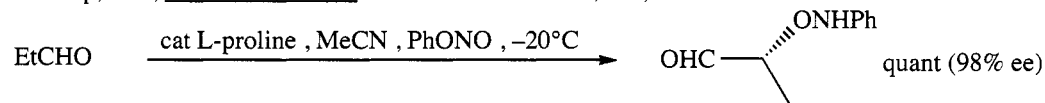
Section 327 (Alcohol - Ester)

Section 357 (Ester - Ester)

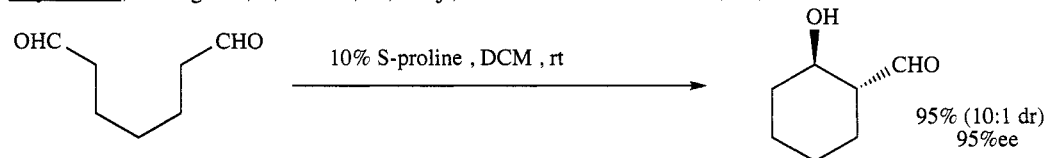
SECTION 324: ALCOHOL, THIOL - ALDEHYDE



Northrup, A.B.; MacMillan, D.W.C. *J. Am. Chem. Soc.* **2002**, *124*, 6798.



Hayashi, Y.; Yamaguchi, J.; Hibino, K.; Shoji, M. *Tetrahedron Lett.* **2003**, *44*, 8293.

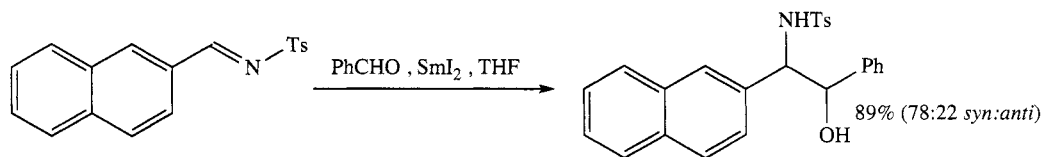


Pidathala, C.; Hoang, L.; Vignola, N.; List, B. *Angew. Chem. Int. Ed.* **2003**, *42*, 2785.

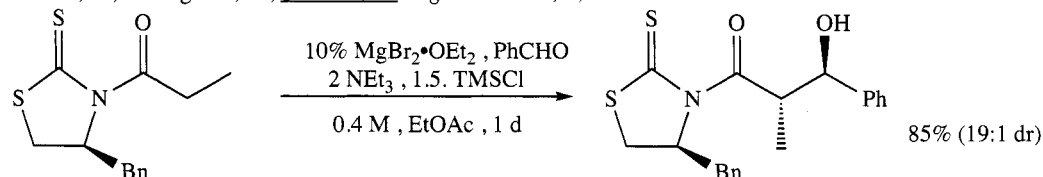
Related Method:

Section 330 (Alcohol - Ketone).

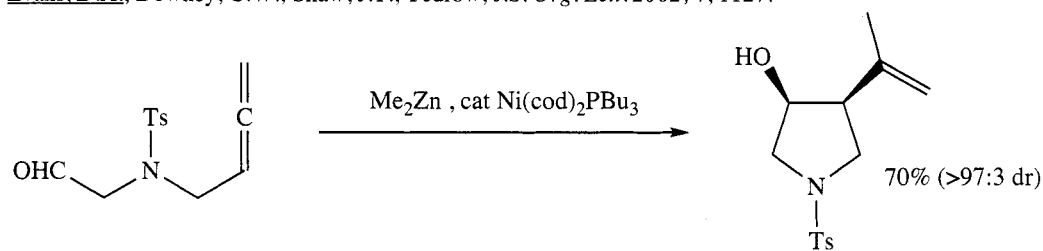
SECTION 325: ALCOHOL, THIOL - AMIDE



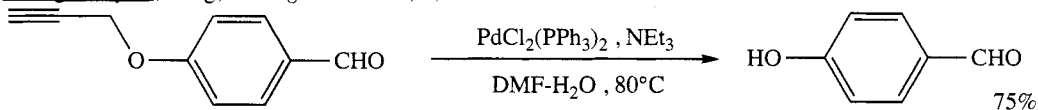
Tanaka, Y.; Tankiguchi, N.; Uemura, M. *Org. Lett.* **2002**, 4, 835.



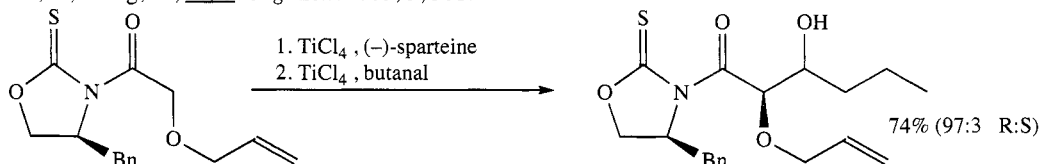
Evans, D.A.; Downey, C.W.; Shaw, J.T.; Tedrow, J.S. *Org. Lett.* **2002**, 4, 1127.



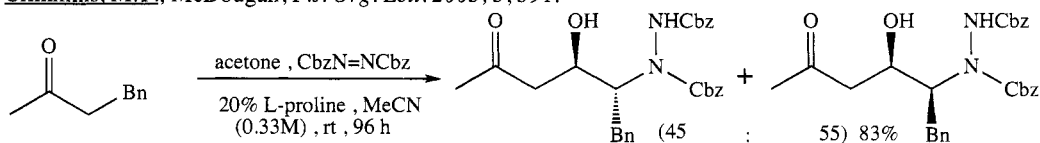
Montgomery, J.; Song, M. *Org. Lett.* **2002**, 4, 4005.



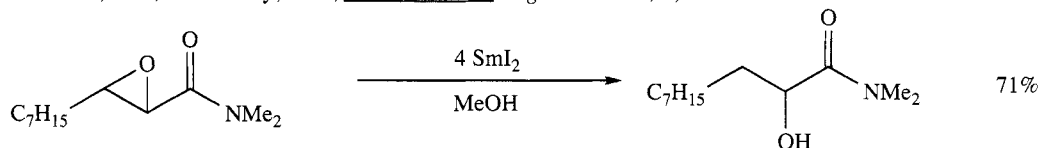
Liu, L.; Wang, X.; Li, C. *Org. Lett.* **2003**, 5, 361.



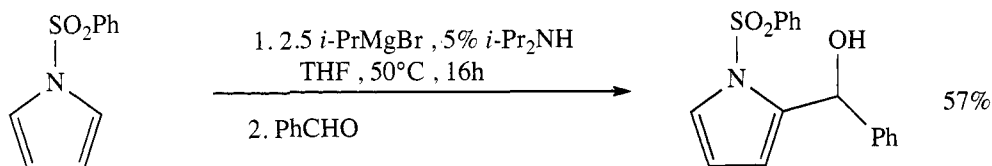
Crimmins, M.T.; McDougall, P.J. *Org. Lett.* **2003**, 5, 591.



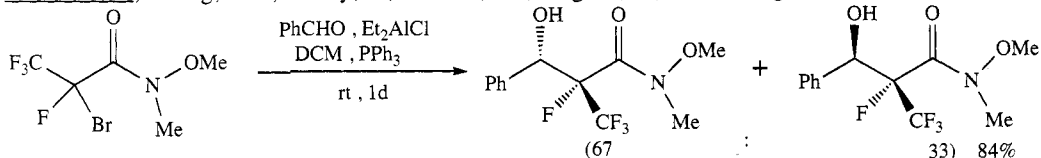
Chowdari, N.S.; Ramachary, D.B.; Barbas III, C.F. *Org. Lett.* **2003**, 5, 1685.



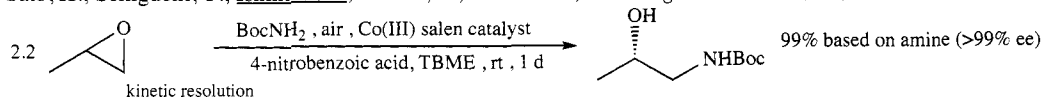
Concellón, J.M.; Bardales, E. *Org. Lett.* **2003**, 5, 4783.



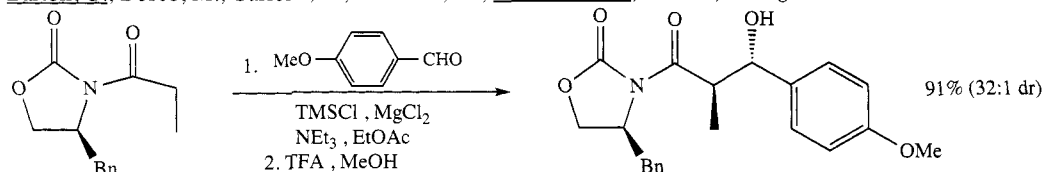
Dinsmore, A.; Billing, D.G.; Mandy, K.; Michael, J.P.; Mogano, D.; Patil, S. *Org. Lett.* **2004**, 6, 293.



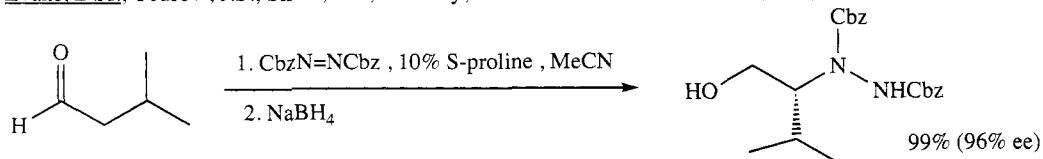
Sato, K.; Sekiguchi, T.; Ishihara, T.; Konno, T.; Yamanaka, H. *J. Org. Chem.* **2004**, 69, 5041.



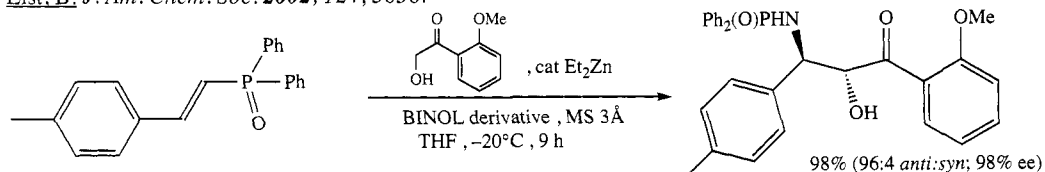
Bartoli, G.; Bosco, M.; Carlone, A.; Locatelli, M.; Melchiorre, P.; Sambri, L. *Org. Lett.* **2004**, 6, 3973.



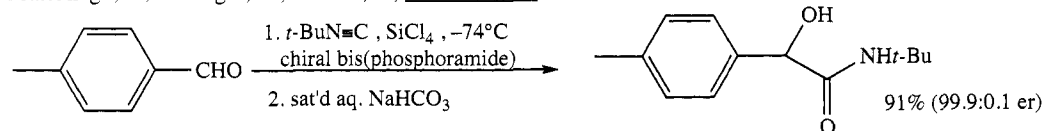
Evans, D.A.; Tedrow, J.S.; Shaw, J.T.; Downey, C.W. *J. Am. Chem. Soc.* **2002**, 124, 392.



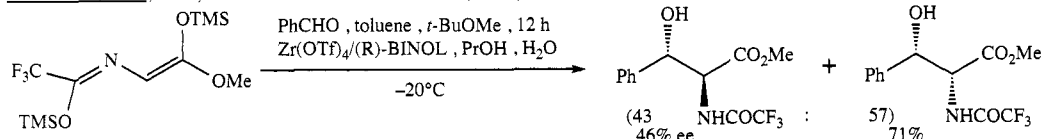
List, B. *J. Am. Chem. Soc.* **2002**, 124, 5656.



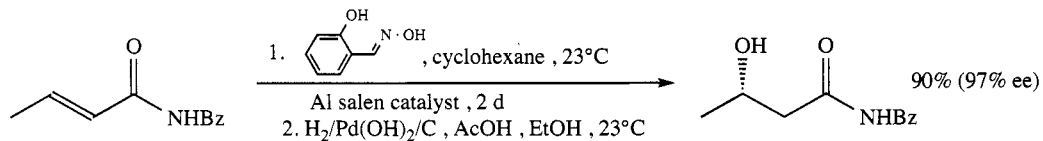
Matsunaga, S.; Kumagai, N.; Harada, S.; Shibasaki, M. *J. Am. Chem. Soc.* **2003**, 125, 4712.



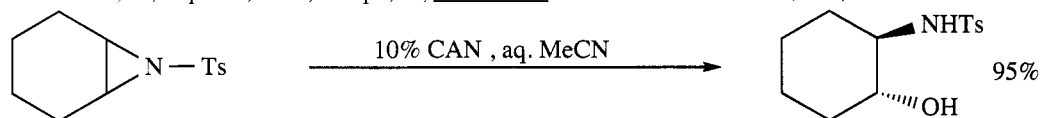
Denmark, S.E.; Fan, Y. *J. Am. Chem. Soc.* **2003**, 125, 7825.



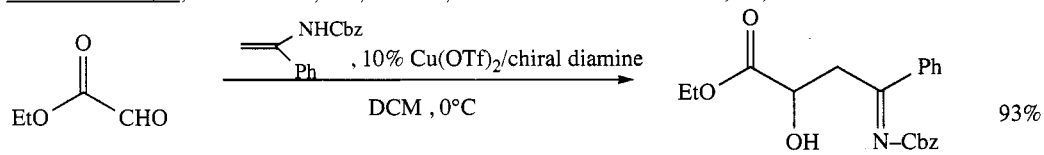
Kobayashi, J.; Nakamura, M.; Mori, Y.; Yamashita, Y.; Kobayashi, S. *J. Am. Chem. Soc.* **2004**, 126, 9182.



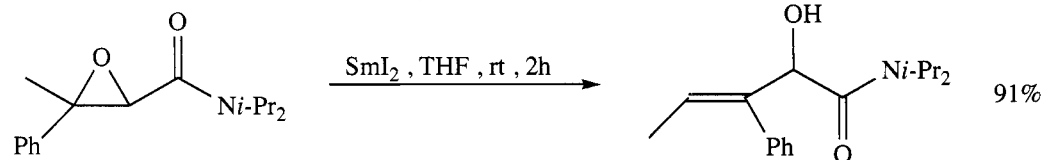
Möllerstedt, H.; Piqueras, M.C.; Crespo, R.; Ottosson, H. *J. Am. Chem. Soc.* **2004**, *126*, 13938.



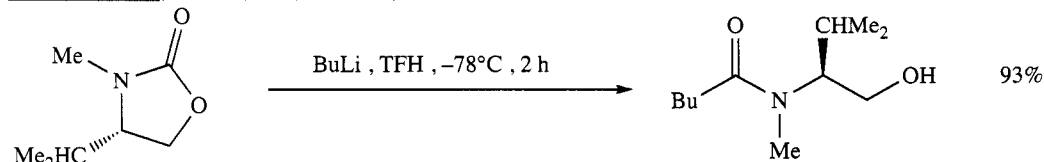
Chandrasekhar, S.; Natrsihmulu, Ch.; Sultana, S.S. *Tetrahedron Lett.* **2002**, *43*, 7361.



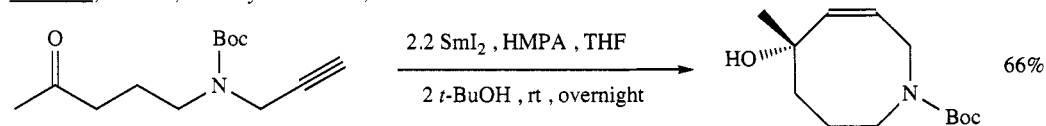
Matsubara, R.; Vital, P.; Nakamura, Y.; Kiyohara, H.; Kobayashi, S. *Tetrahedron* **2004**, *60*, 9769.



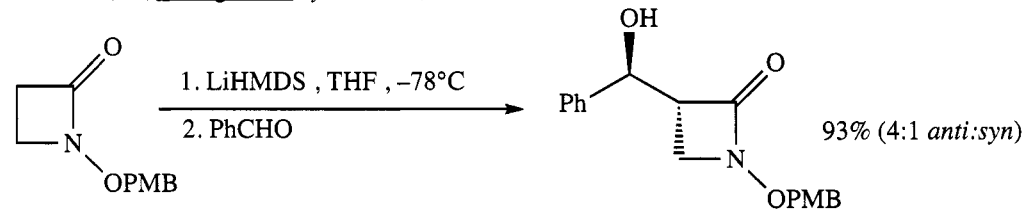
Concellón, J.M.; Bernad, P.L.; Bardales, E. *Chem. Eur. J.* **2004**, *10*, 2445.



Jones, S.; Norton, H.C. *Synlett* **2004**, 338.

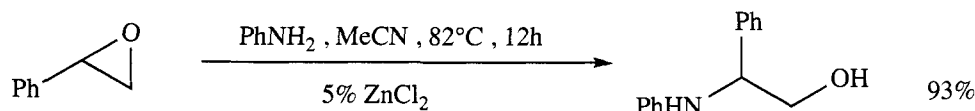


Hölemann, A.; Reissig, H.-U. *Synlett* **2004**, 2732.

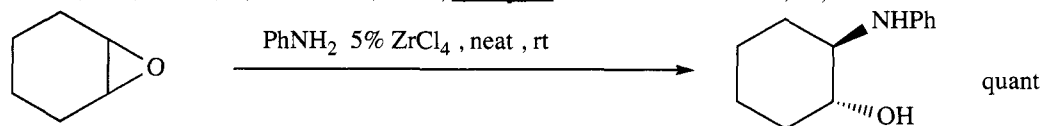


Williams, D.R.; Donnell, A.F.; Kammler, D.C. *Heterocycles* **2004**, *62*, 167.

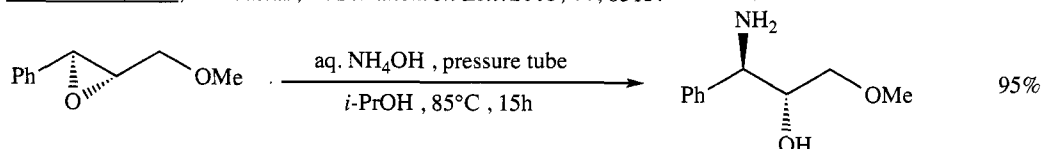
SECTION 326: ALCOHOL, THIOL - AMINE



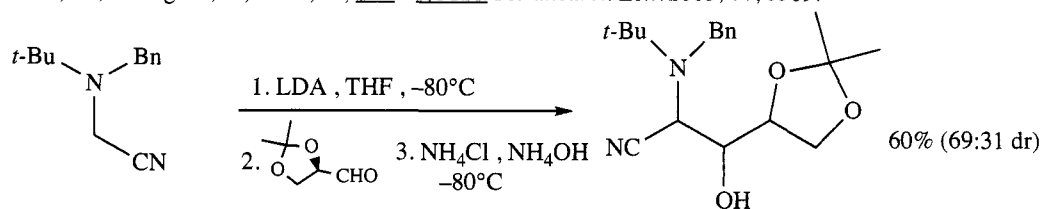
Pachón, L.D.; Gamez, P.; van Brussel, J.J.M.; Reedijk, J. *Tetrahedron Lett.* **2003**, 44, 6025.



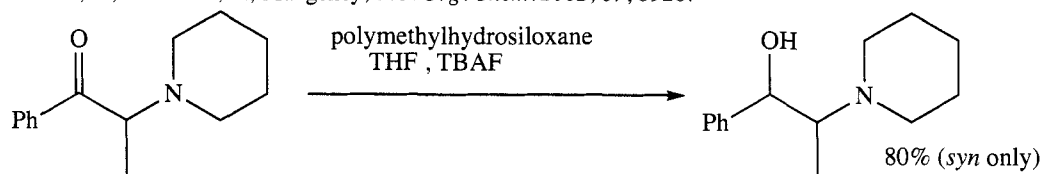
Chakraborti, A.K.; Kondaskar, A. *Tetrahedron Lett.* **2003**, 44, 8315.



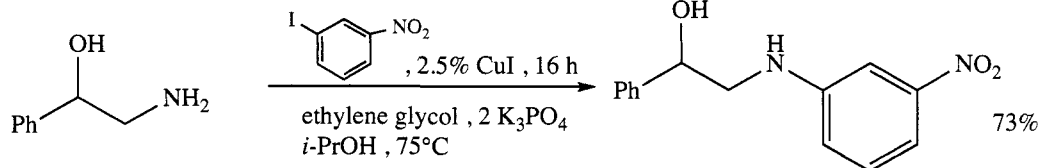
Pastó, M.; Rodríguez, B.; Riera, A.; Pericàs, M.A. *Tetrahedron Lett.* **2003**, 44, 8369.



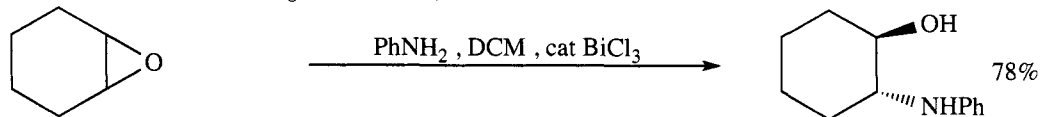
Leclerc, E.; Vrancken, E.; Mangeney, P. *J. Org. Chem.* **2002**, 67, 8928.



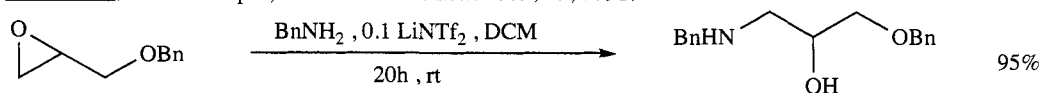
Nadkarni, D.; Hallissey, J.; Mojica, C. *J. Org. Chem.* **2003**, 68, 594.



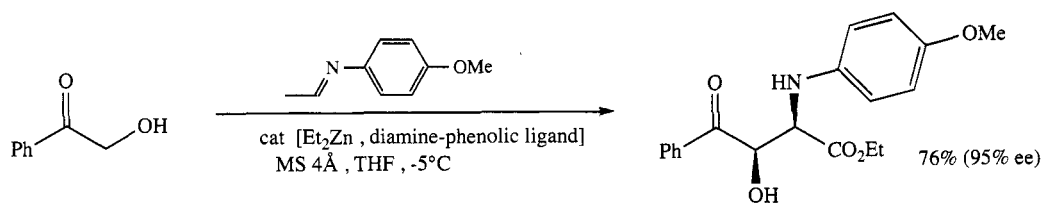
Job, G.E.; Buchwald, S.L. *Org. Lett.* **2002**, 4, 3703.



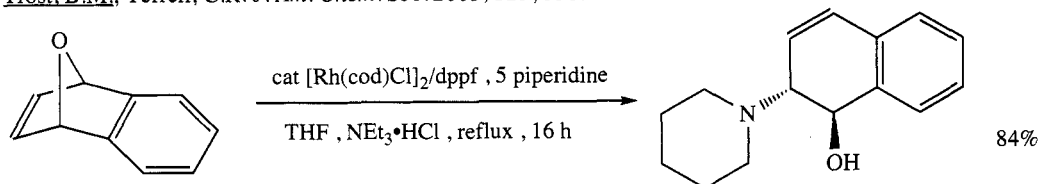
Ollevier, T.; Lavie-Compin, G. *Tetrahedron Lett.* **2002**, 43, 7891.



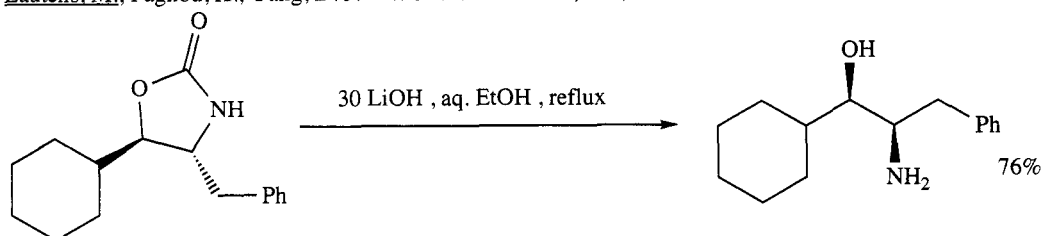
Cossy, J.; Bellosta, V.; Hamoir, C.; Desmurs, J.-R. *Tetrahedron Lett.* **2002**, 43, 7083.



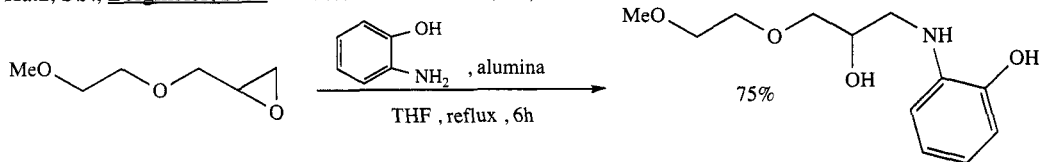
Trost, B.M.; Terrell, C.R. *J. Am. Chem. Soc.* **2003**, 125, 338.



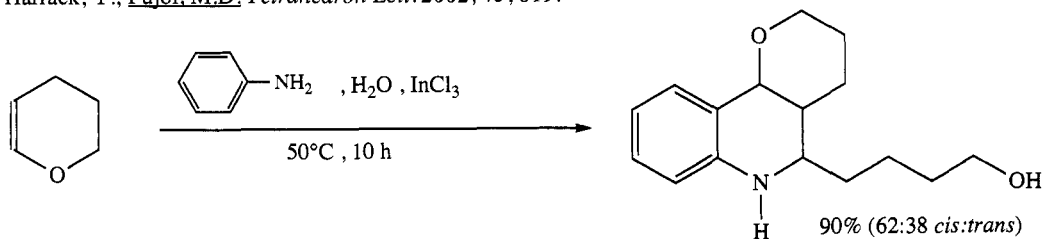
Lautens, M.; Fagnou, K.; Yang, D. *J. Am. Chem. Soc.* **2003**, 125, 14884.



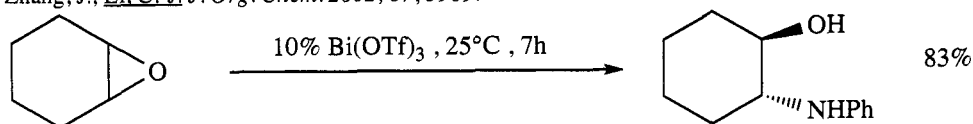
Katz, S.J.; Bergmeier, S.C. *Tetrahedron Lett.* **2002**, 43, 557.



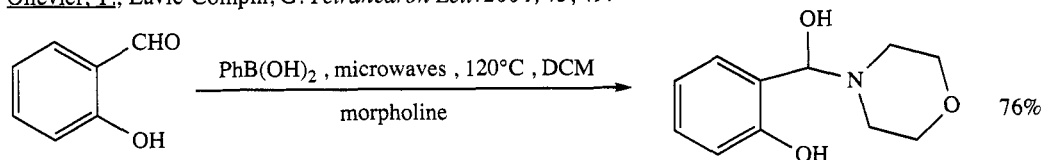
Harrack, Y.; Pujol, M.D. *Tetrahedron Lett.* **2002**, 43, 819.



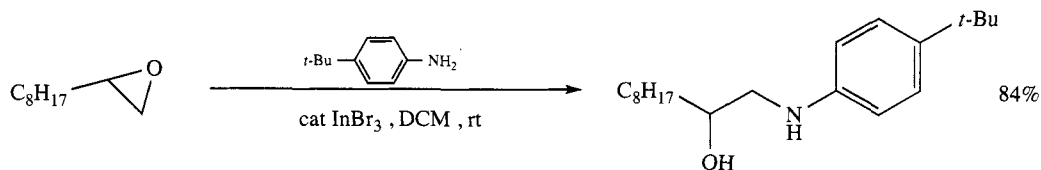
Zhang, J.; Li, C.-J. *J. Org. Chem.* **2002**, 67, 3969.



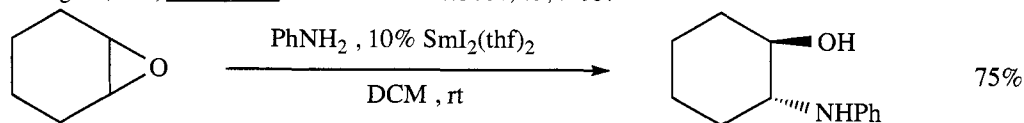
Ollevier, T.; Lavie-Compin, G. *Tetrahedron Lett.* **2004**, 45, 49.



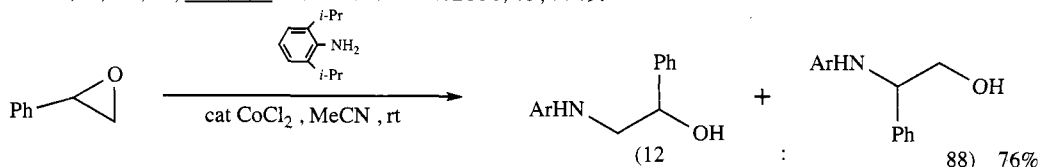
McLean, N.J.; Tye, H.; Whittaker, M. *Tetrahedron Lett.* **2004**, 45, 993.



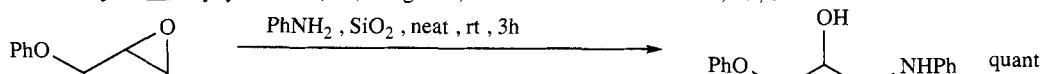
Rodríguez, J.R.; Navarro, A. *Tetrahedron Lett.* **2004**, 45, 7495.



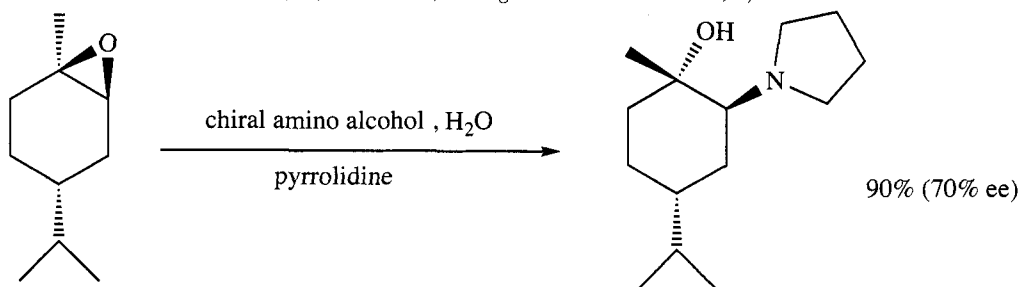
Carrée, F.; Fil, R.; Collin, J. *Tetrahedron Lett.* **2004**, 45, 7749.



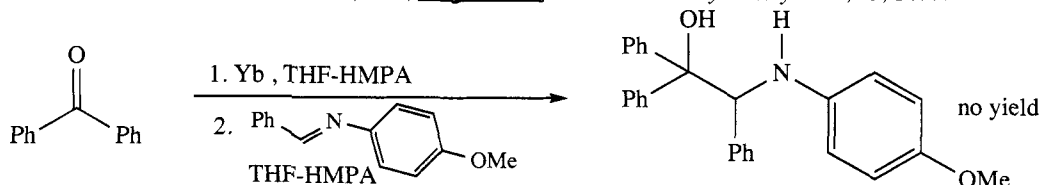
Sundararajan, G.; Viyayakrishna, K.; Varghese, B. *Tetrahedron Lett.* **2004**, 45, 8253.



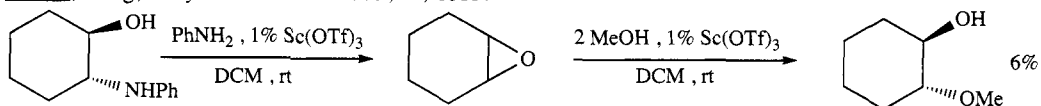
Chakraborti, A.K.; Rudrawar, S.; Kondaskar, A. *Org. Biomol. Chem.* **2004**, 2, 1277.



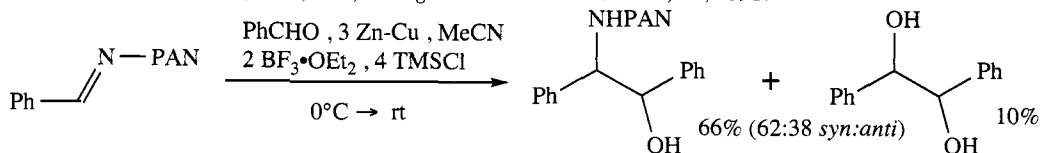
Steiner, D.; Sethofer, S.G.; Goralski, C.T.; Singaram, B. *Tetrahedron: Asymmetry* **2002**, 13, 1477.



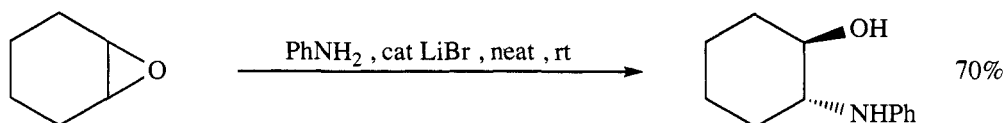
Su, W.; Yang, B. *Synth. Commun.* **2003**, 33, 2613.



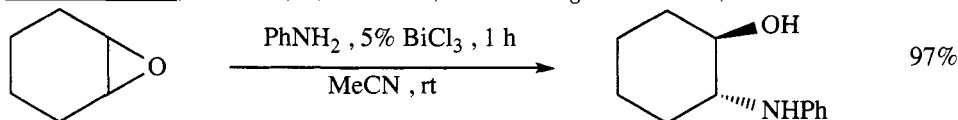
Schneider, C.; Sreekanth, A.R.; Mai, E. *Angew. Chem. Int. Ed.* **2004**, 43, 5691.



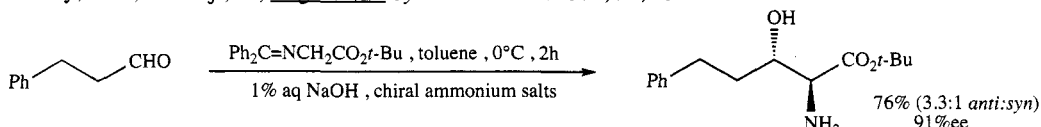
Shimizu, M.; Iwata, A.; Makino, H. *Synlett* **2002**, 1538.



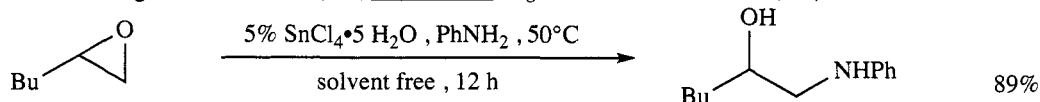
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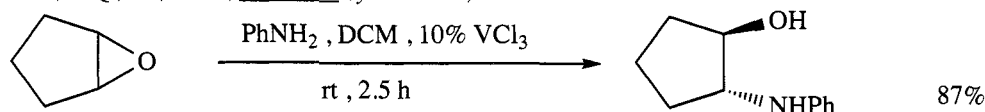
Swamy, N.R.; Kondaji, G.; Nagaiah, K. *Synth. Commun.* **2002**, 32, 2307.



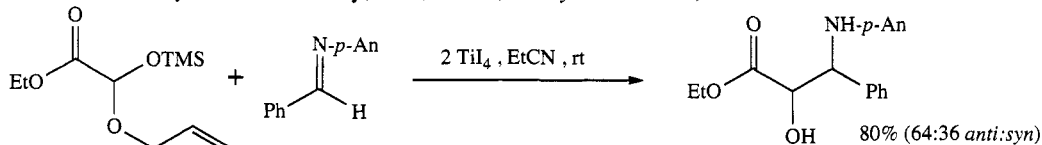
Ooi, T.; Tankguchi, M.; Kameda, M.; Maruoka, K. *Angew. Chem. Int. Ed.* **2002**, 41, 4542.



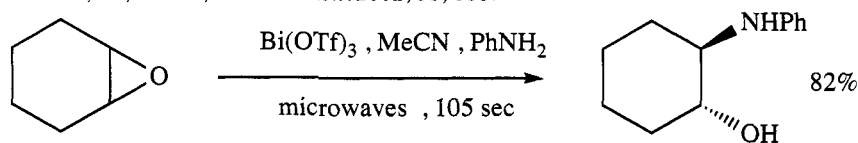
Zhao, P.-Q.; Xu, L.-W.; Xia, C.-G. *Synlett* **2004**, 846.



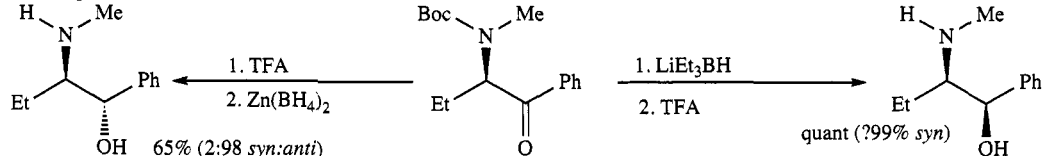
Sabitha, G.; Reddy, G.S.K.K.; Reddy, K.B.; Yadav, J.S. *Synthesis* **2003**, 2298.



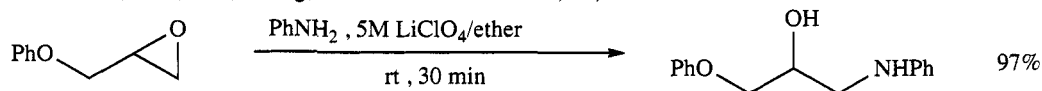
Shimizu, M.; Sahara, T. *Chem. Lett.* **2002**, 31, 888.



Khosropour, A.R.; Khodaci, M.M.; Ghosati, K. *Chem. Lett.* **2004**, 33, 304.



Fraser, D.S.; Park, S.B.; Chong, J.M. *Can. J. Chem.* **2004**, 82, 87.



Heydari, A.; Mehrdad, M.; Malecki, A.; Ahmadi, N. *Synthesis* **2004**, 1563.

REVIEWS:

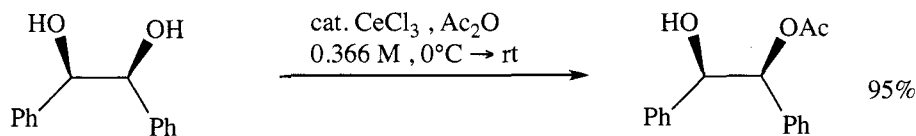
"The Sharpless Asymmetric Aminohydroxylation"

Bodkin, J.A.; McLeod, M.D. *J. Chem. Soc. Perkin Trans. 1* **2002**, 2733.

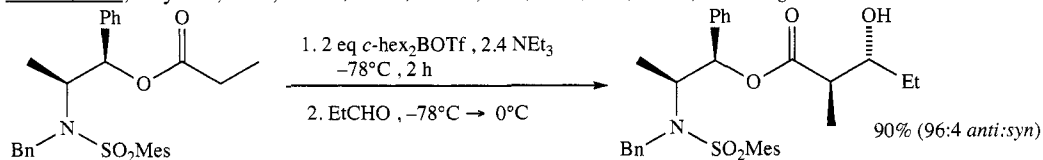
"Organolanthanide-Catalyzed Hydroamination"

Hong, S.; Marks, T.J. *Acc. Chem. Res.* **2004**, 37, 673.

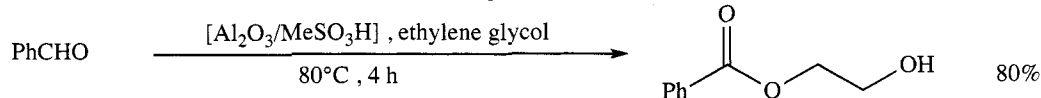
SECTION 327: ALCOHOL, THIOL - ESTER



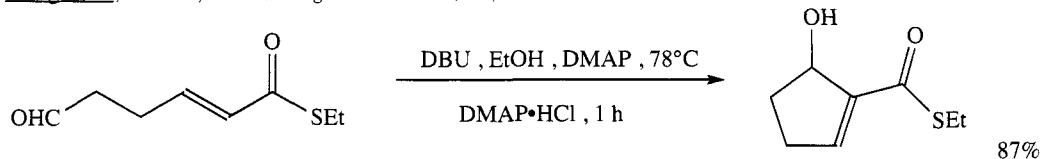
Clarke, P.A.; Kayaleh, N.E.; Smith, M.A.; Baker, J.R.; Bird, S.J.; Chan, C. *J. Org. Chem.* **2002**, 67, 5226.



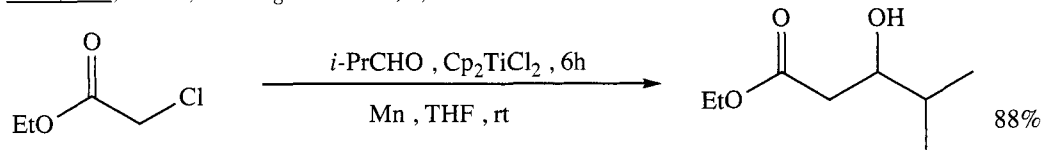
Inoue, T.; Liu, J.-F.; Buske, D.C.; Abiko, A. *J. Org. Chem.* **2002**, 67, 5250.



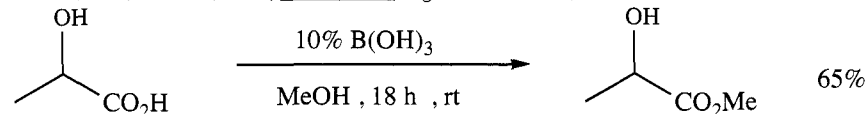
Sharghi, H.; Sarvari, M.H. *J. Org. Chem.* **2003**, 68, 4096.



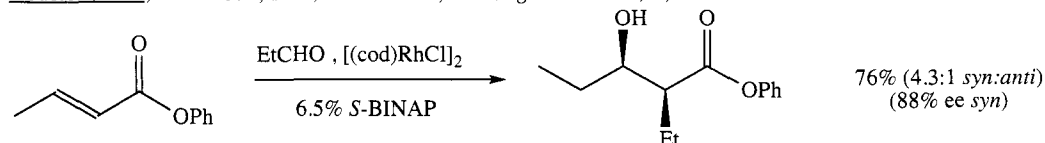
Keck, G.E.; Welch, D.S. *Org. Lett.* **2002**, 4, 3687.



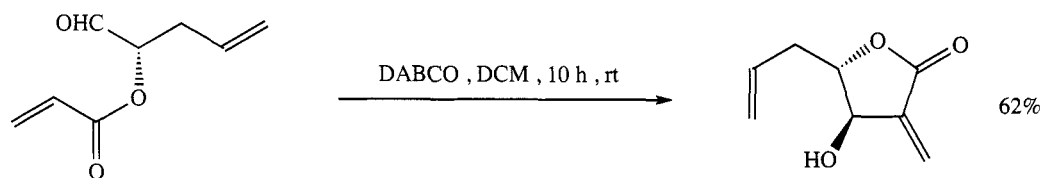
Parrish, J.D.; Shelton, D.R.; Little, R.D. *Org. Lett.* **2003**, 5, 3615.



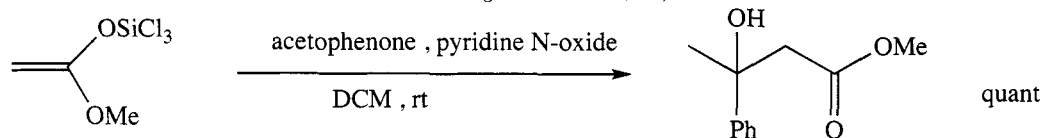
Houston, T.A.; Wilkinson, B.L.; Blanchfield, J.T. *Org. Lett.* **2004**, 6, 679.



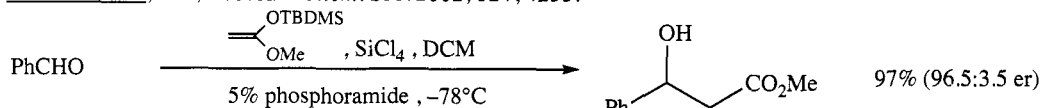
Russell, A.E.; Fuller, N.O.; Taylor, S.J.; Aurisset, P.; Morken, J.P. *Org. Lett.* **2004**, 6, 2309.



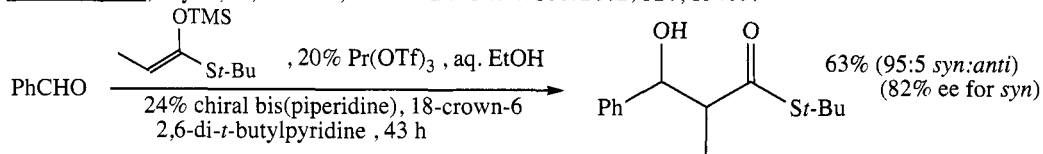
Krishna, P.R.; Kannan, V.; Sharma, G.V.M. *J. Org. Chem.* **2004**, 69, 6467.



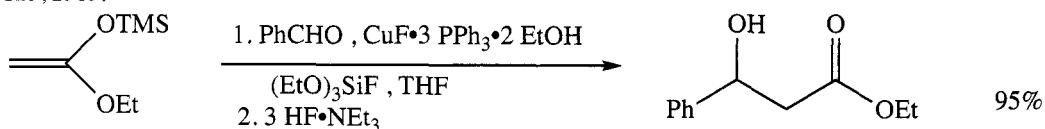
Denmark, S.E.; Fan, Y. *J. Am. Chem. Soc.* **2002**, 124, 4233.



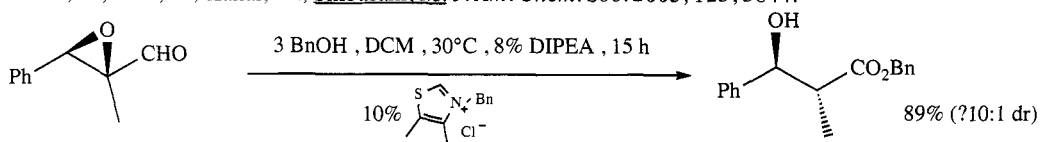
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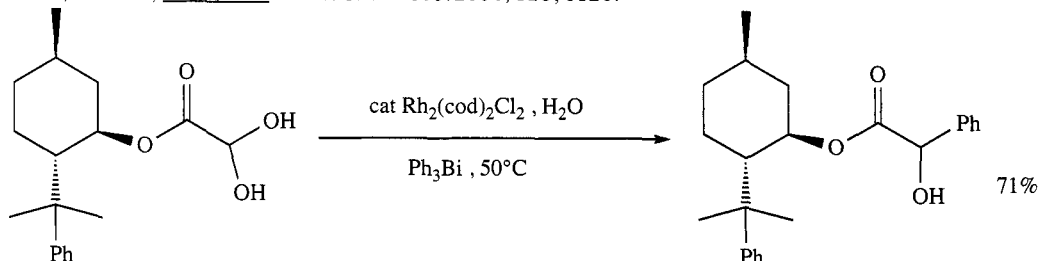
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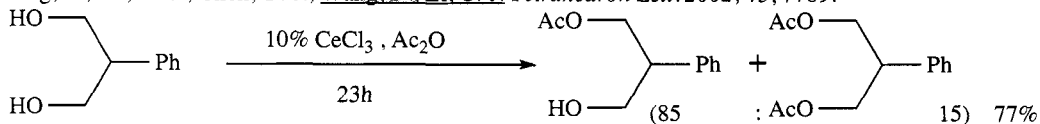
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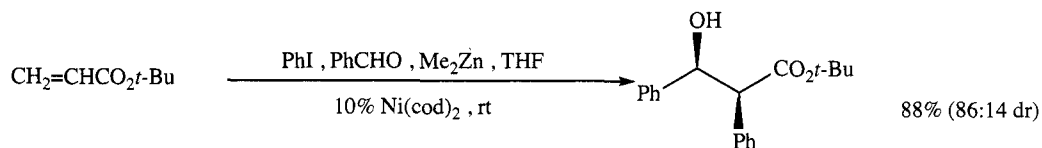
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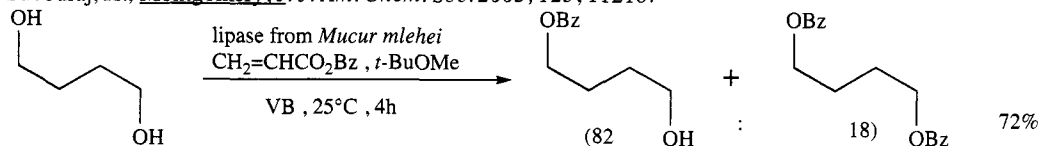
Ding, R.; Ge, C.-S.; Chen, Y.-J.; Wang, D.; Li, C.-J. *Tetrahedron Lett.* **2002**, 43, 7789.



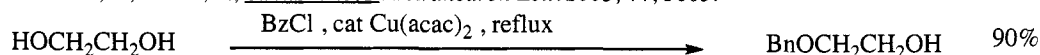
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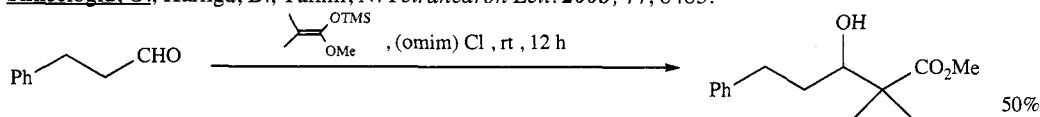
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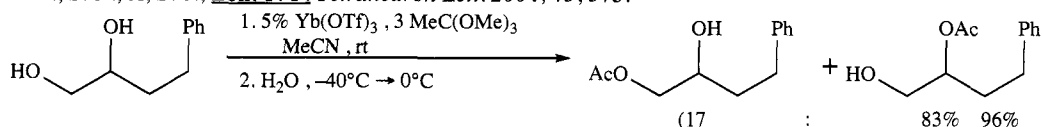
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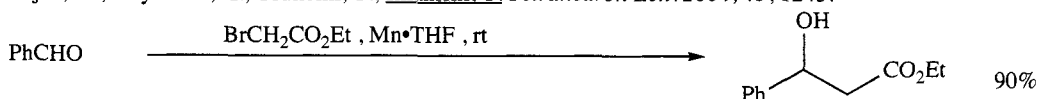
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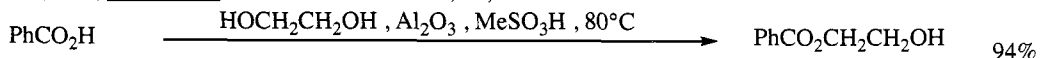
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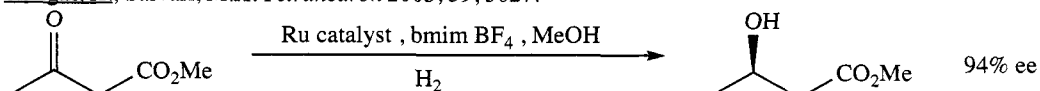
Ikejiri, M.; Miyashita, K.; Tsunemi, T.; Imanishi, T. *Tetrahedron Lett.* **2004**, *45*, 1243.



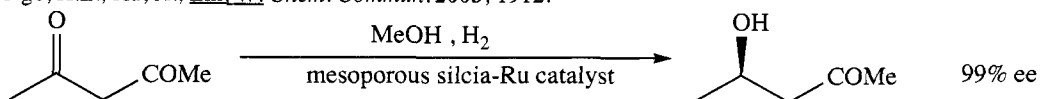
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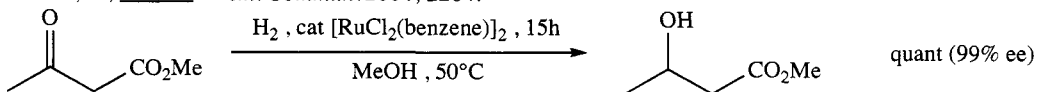
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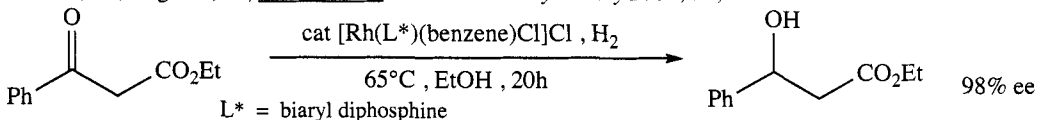
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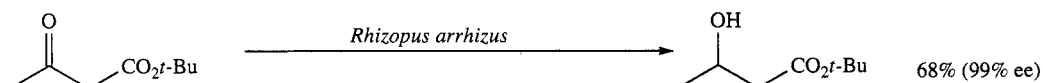
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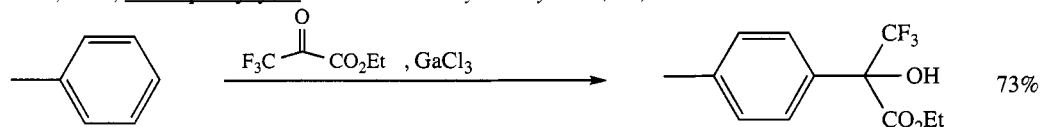
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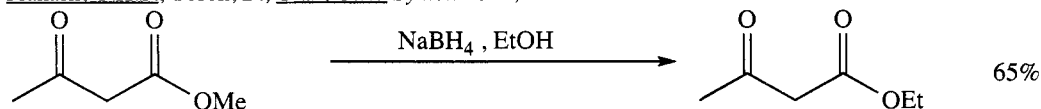
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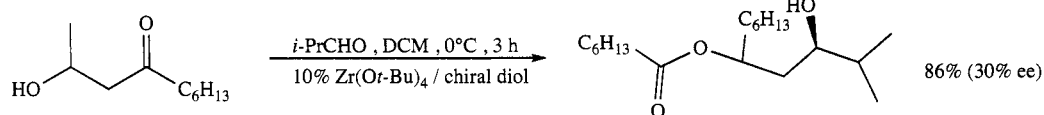
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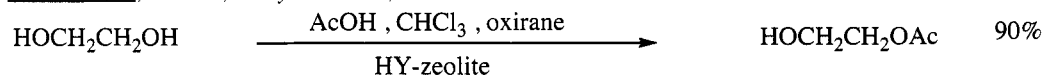
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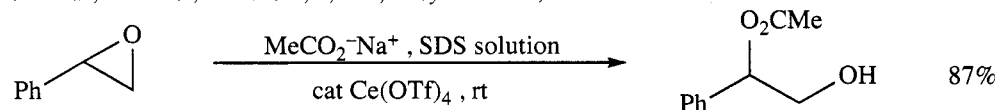
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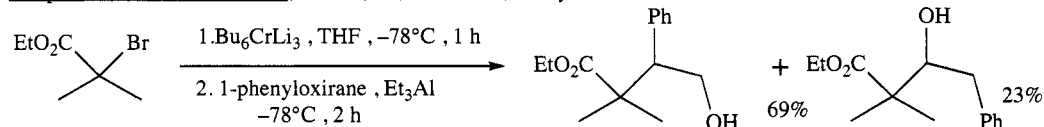
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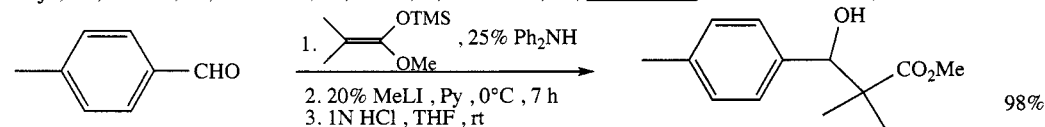
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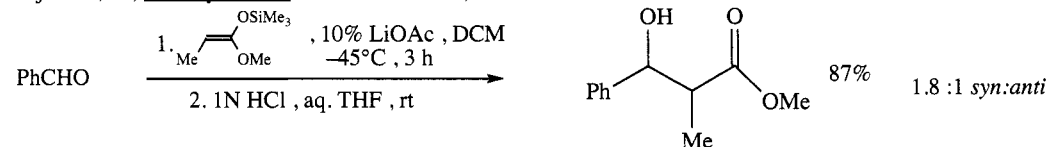
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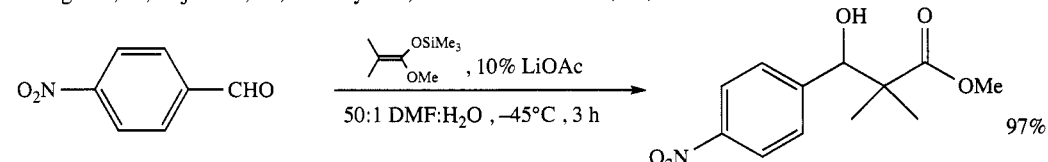
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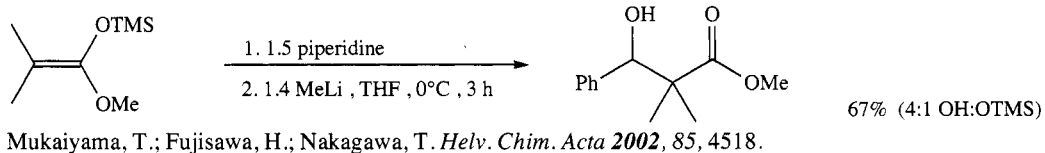
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Nakagawa, T.; Fujisawa, H.; Mukaiyama, T. *Chem. Lett.* **2003**, 32, 462.



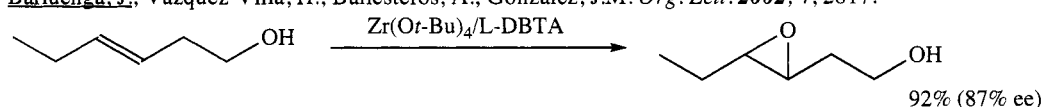
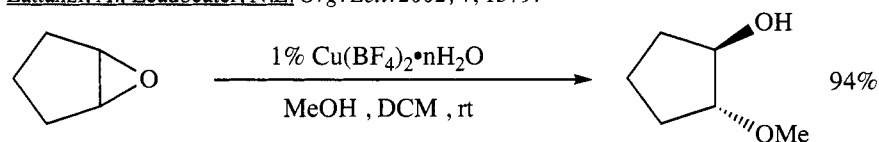
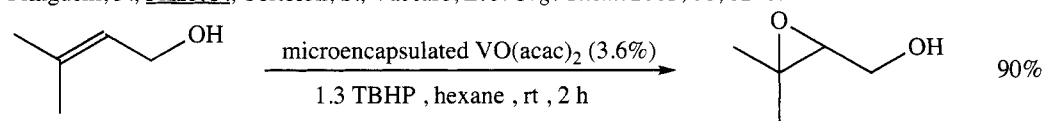
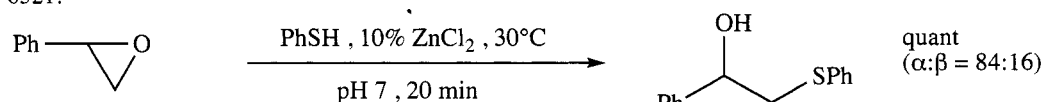
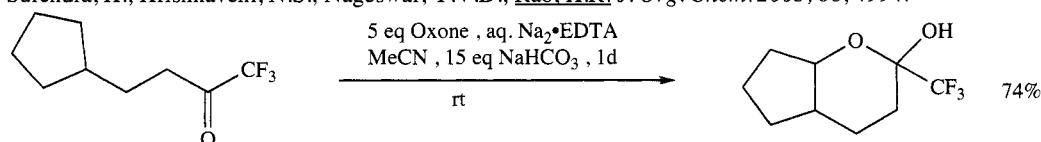
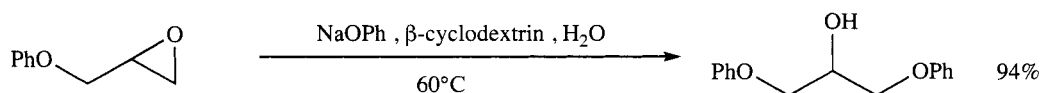
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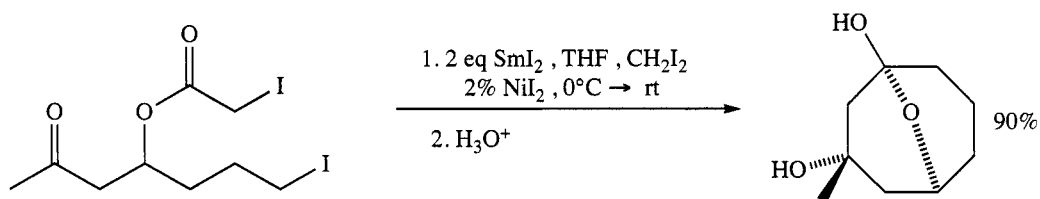
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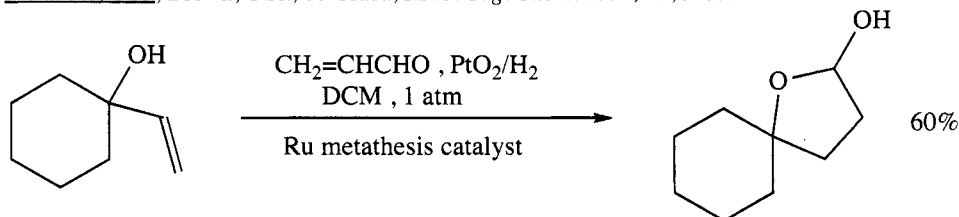
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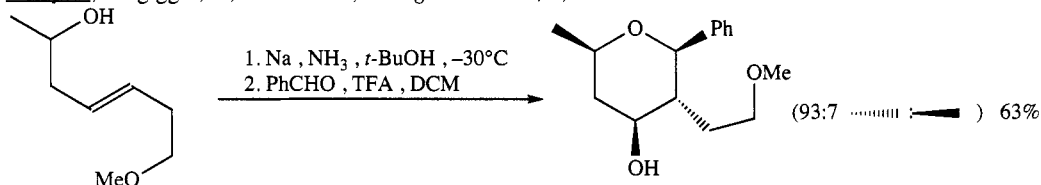
SECTION 328: ALCOHOL, THIOL - ETHER, EPOXIDE, THIOETHER




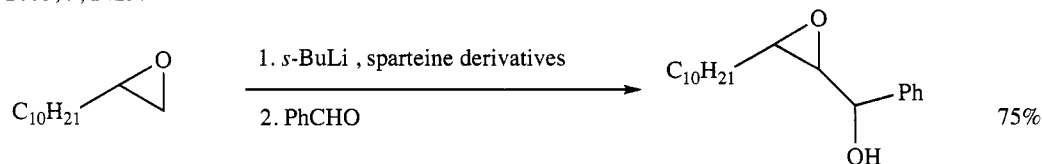
Molander, G.A.; Brown, G.A.; de Graau, I.S. *J. Org. Chem.* **2002**, 67, 3459.



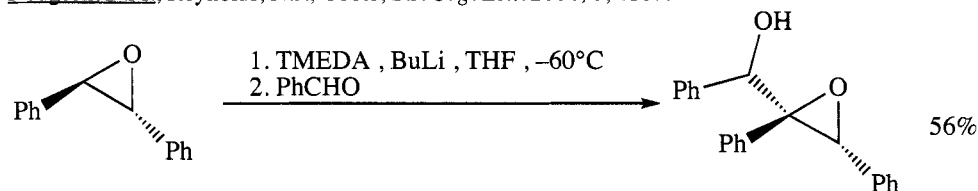
Cossy, J.; Bargiggia, F.; Bouz-Bouz, S. *Org. Lett.* **2003**, 5, 459.



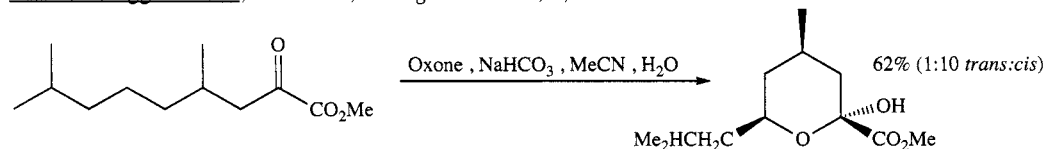
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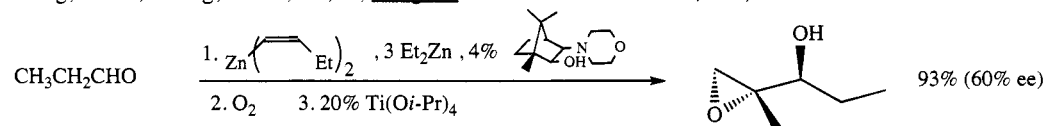
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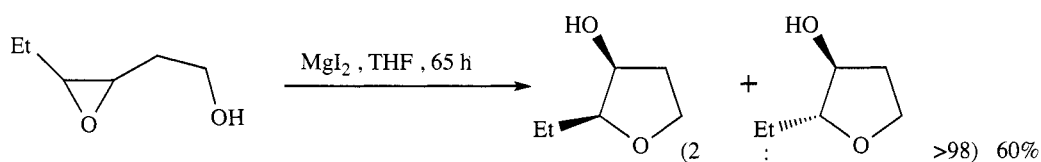
Florio, S.; Aggarwal, V.; Salomone, A. *Org. Lett.* **2004**, 6, 4191.



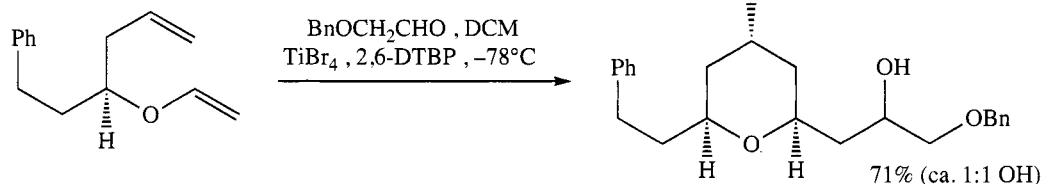
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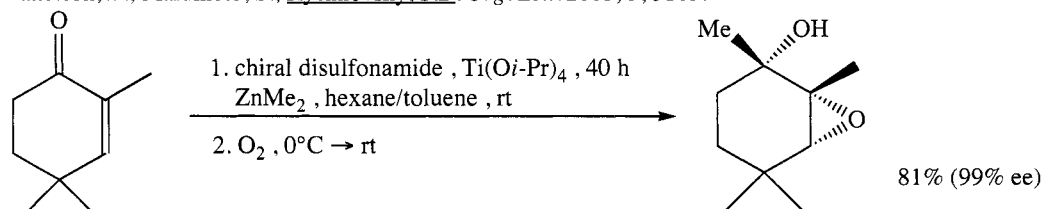
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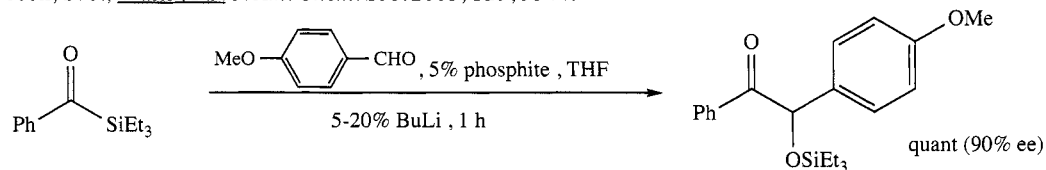
Karikomi, M.; Watanabe, S.; Kimura, Y.; Ueyehara, T. *Tetrahedron Lett.* **2002**, 43, 1495.



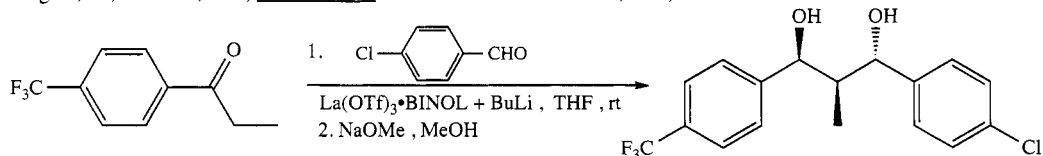
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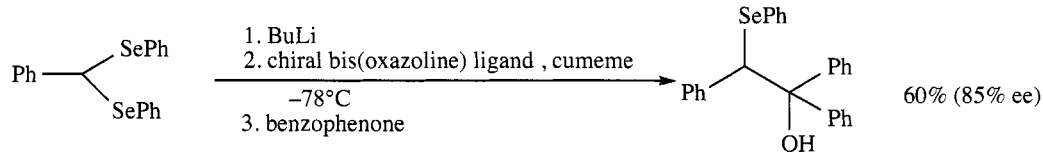
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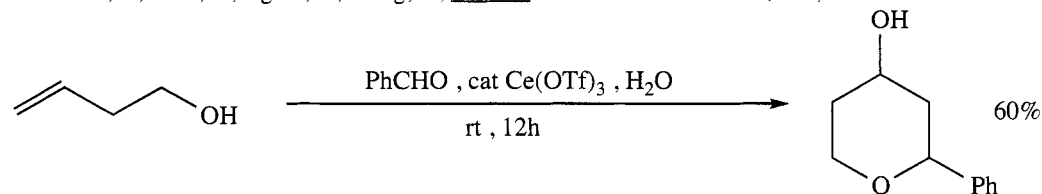
Linghu, X.; Potnick, J.R.; Johnson, J.S. *J. Am. Chem. Soc.* **2004**, 126, 3070.



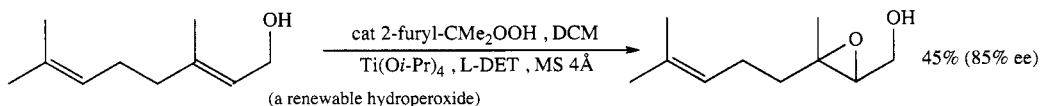
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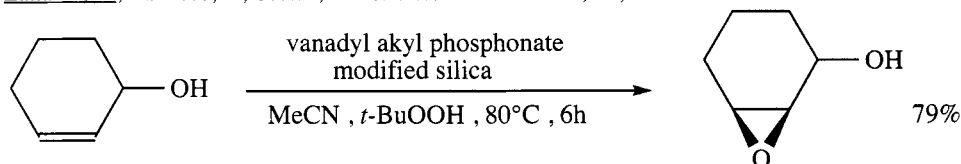
Nakamura, S.; Aoki, T.; Ogura, T.; Wang, L.; Toru, T. *J. Am. Chem. Soc.* **2004**, 126, 8916.



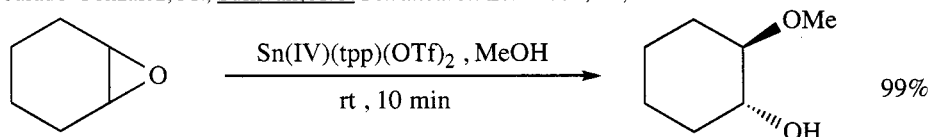
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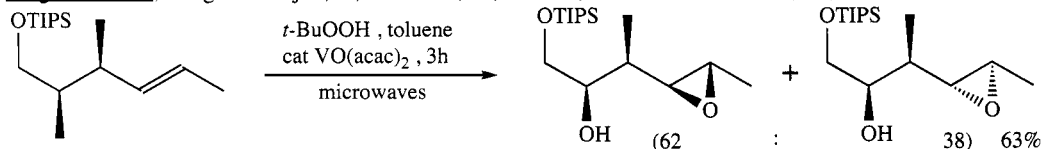
Lattanzi, A.; Tannece, P.; Scettri, A. *Tetrahedron Lett.* **2002**, 43, 5629.



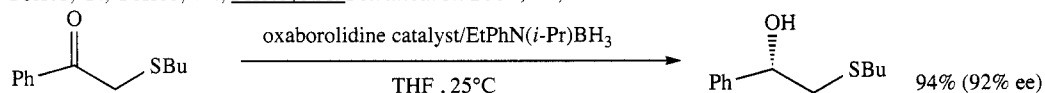
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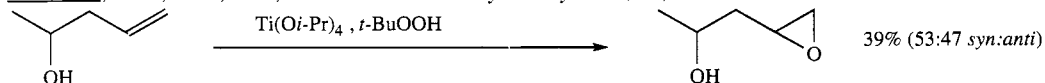
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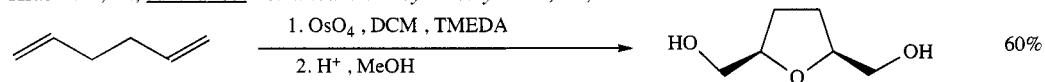
Torres, G.; Torres, W.; Prieto, J.A. *Tetrahedron* **2004**, 60, 10245.



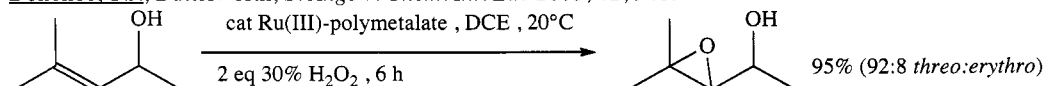
Cho, B.T.; Choi, O.K.; Kim, D.J. *Tetrahedron: Asymmetry* **2002**, 13, 697.



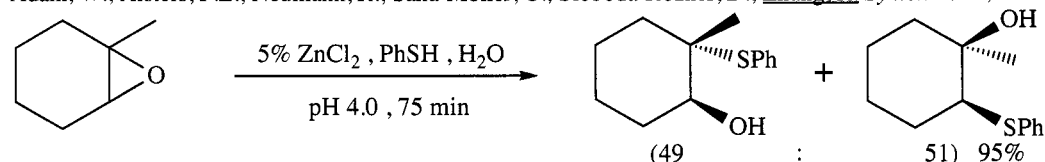
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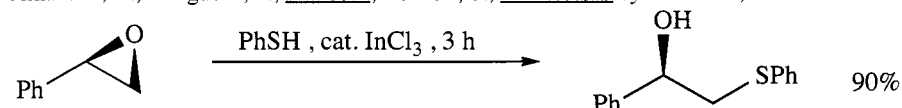
Donohoe, T.J.; Butterworth, S. *Angew. Chem. Int. Ed.* **2003**, 42, 948.



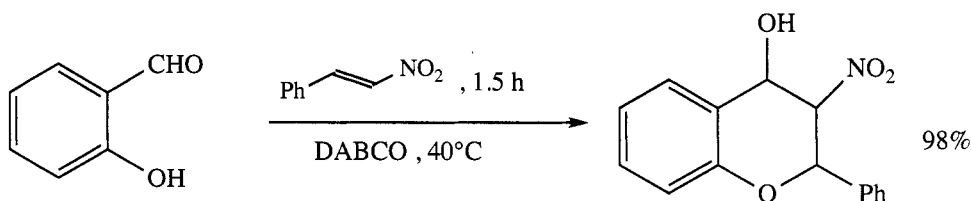
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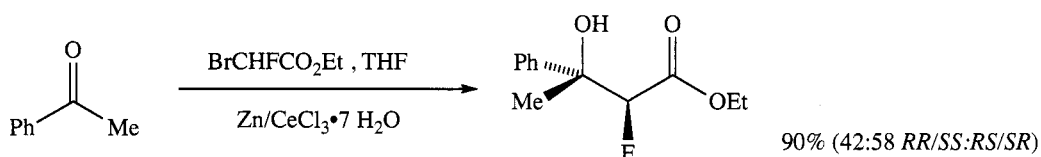


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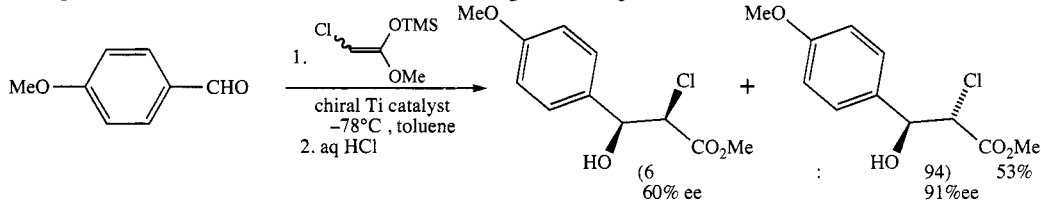


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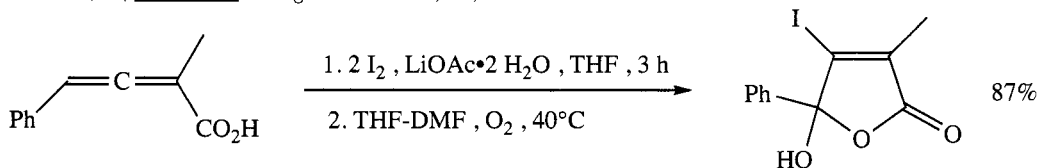
SECTION 329: ALCOHOL, THIOL - HALIDE, SULFONATE



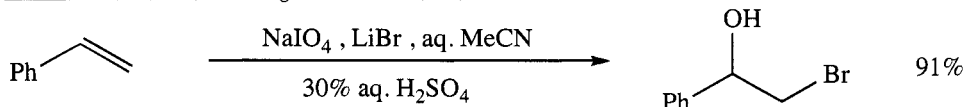
Ocampo, R.; Dolbier Jr. W.R.; Abboud, K.A.; Zuluaga, F. *J. Org. Chem.* **2002**, *67*, 72.



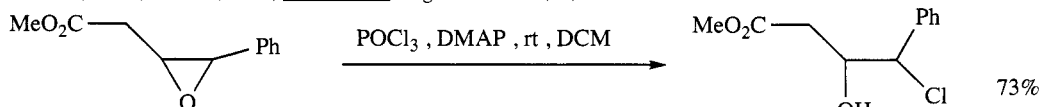
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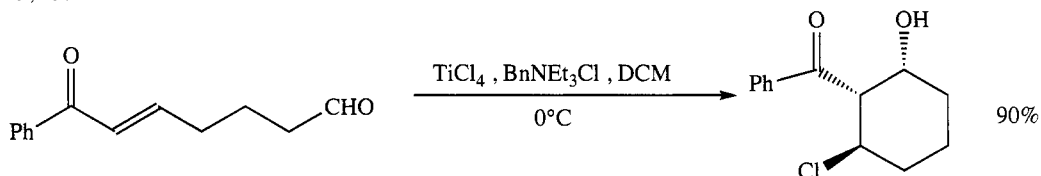
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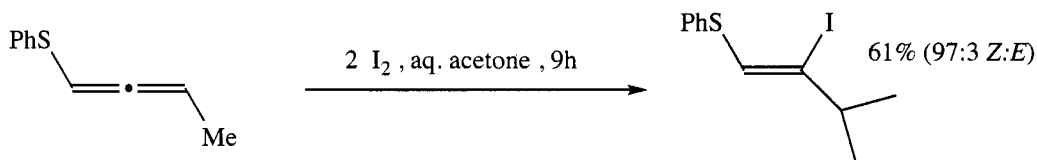
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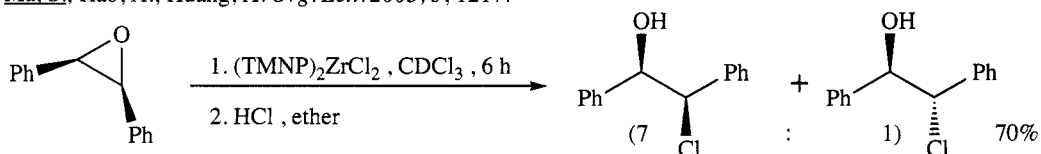
Sartillo-Piscil, F.; Quintero, L.; Villegas, C.; Santacruz-Juárez, E.; de Parrodi, C.A. *Tetrahedron Lett.* **2002**, *43*, 15.



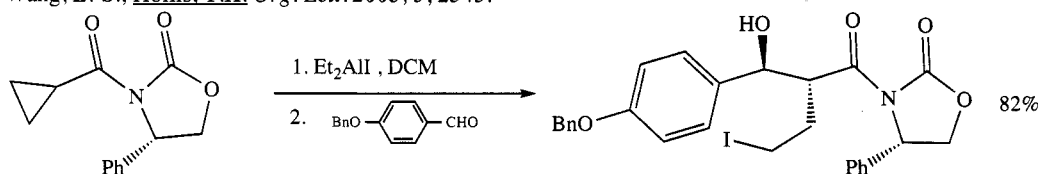
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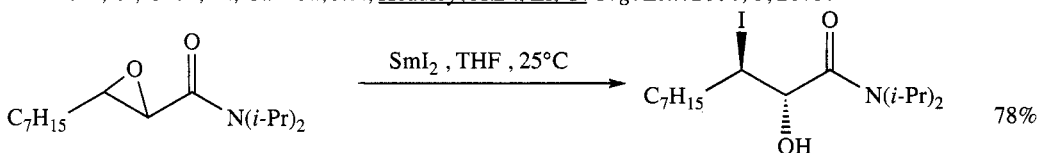
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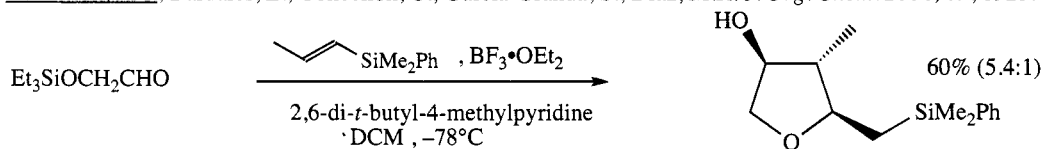
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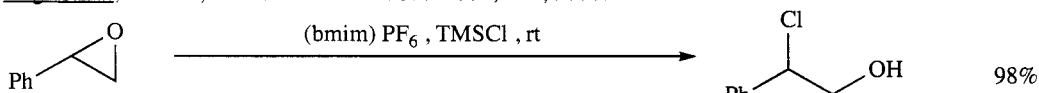
Timmons, C.; Chen, D.; Cannon, J.F.; Headley, A.D.; Li, G. *Org. Lett.* **2004**, 6, 2075.



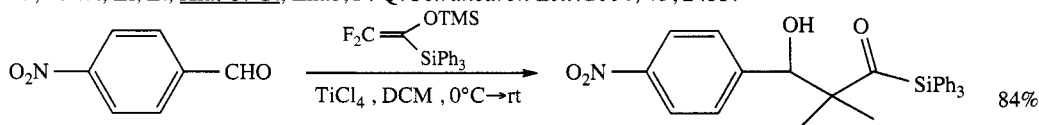
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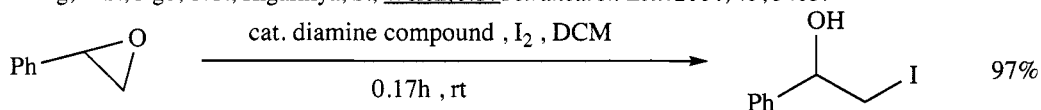
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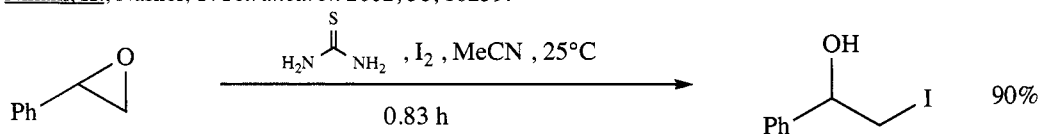
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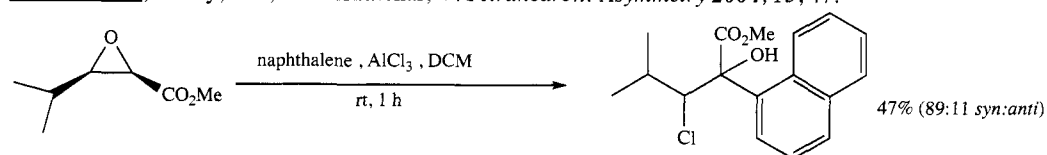
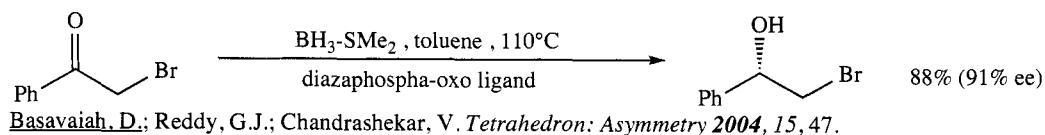
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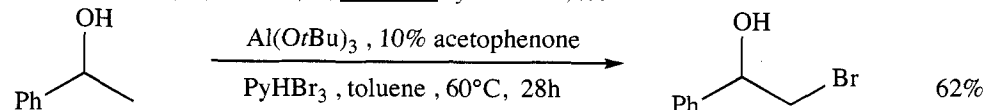
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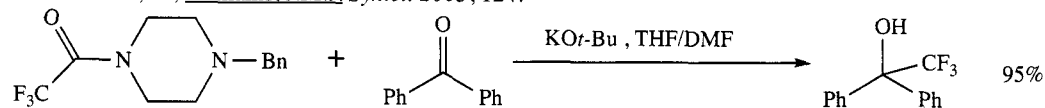
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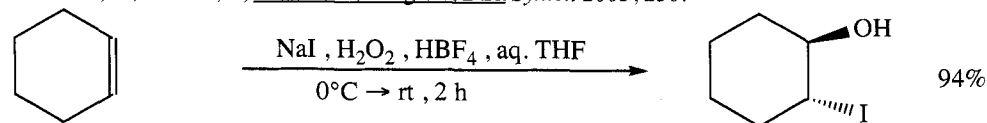
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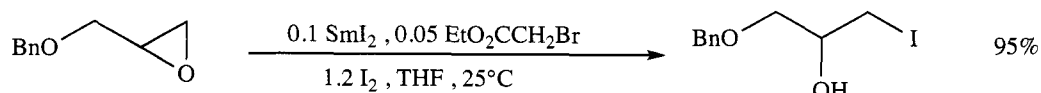
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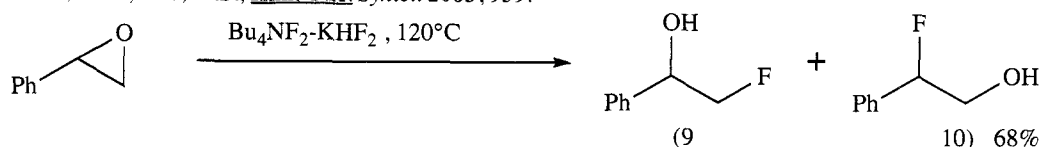
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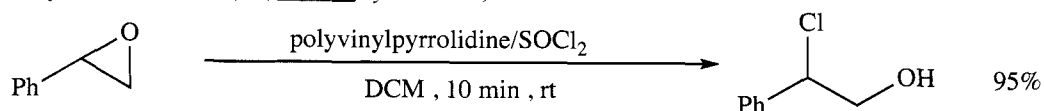
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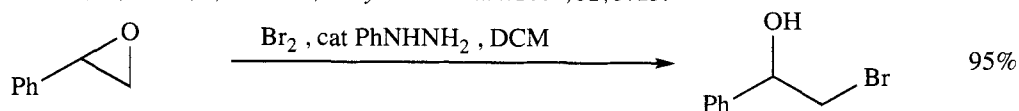
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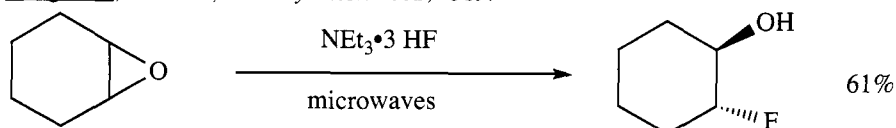
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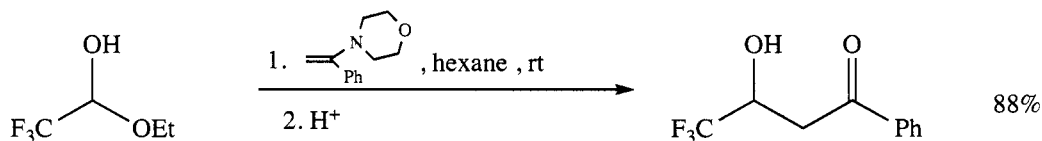


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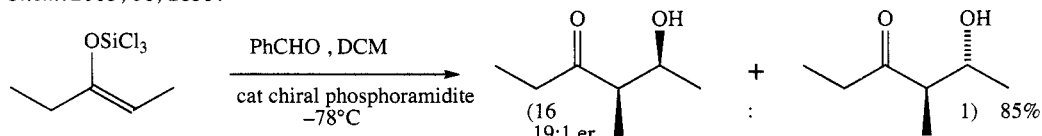


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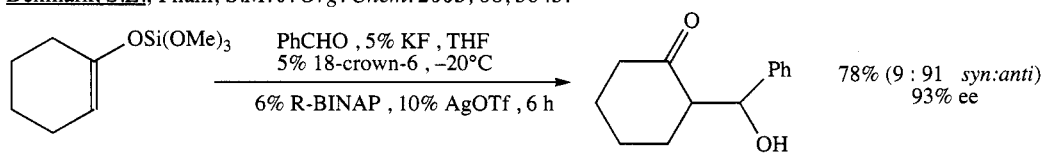
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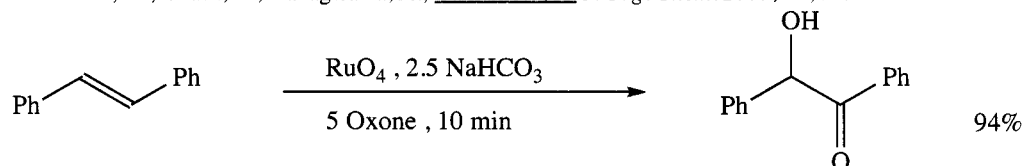
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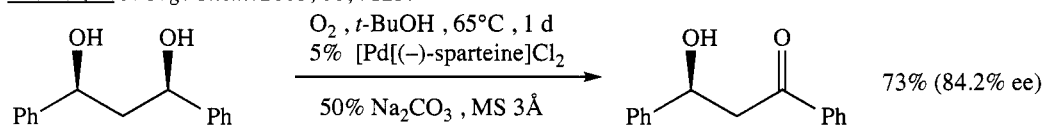
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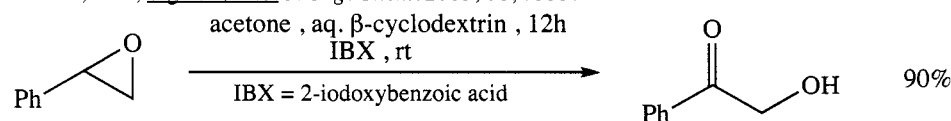
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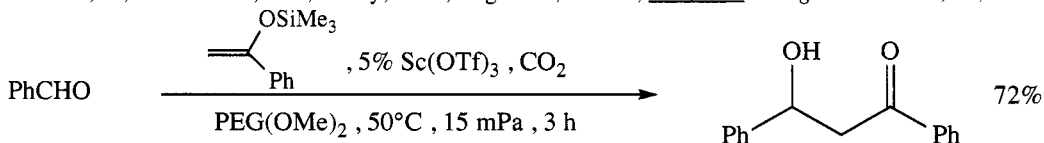
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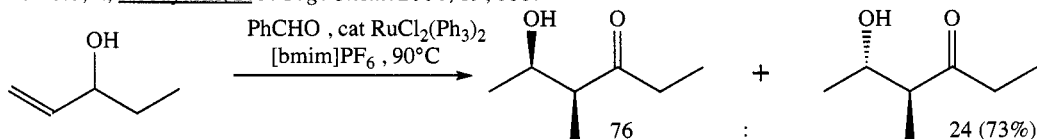
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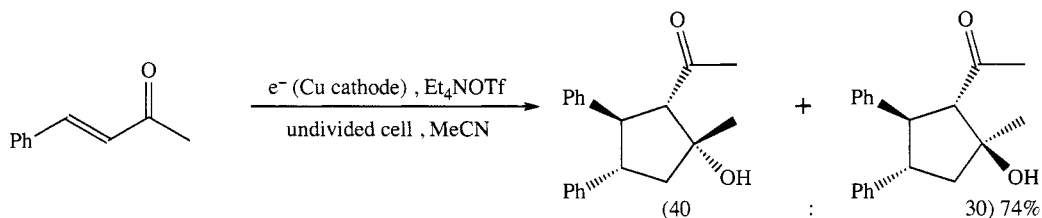
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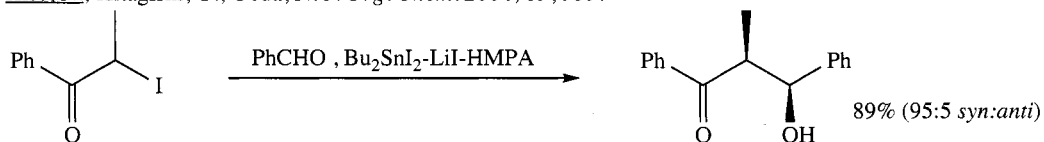
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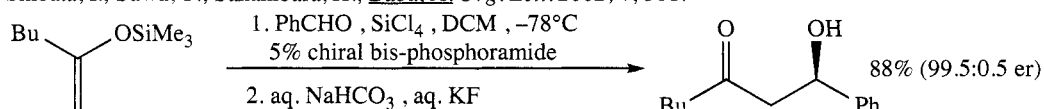
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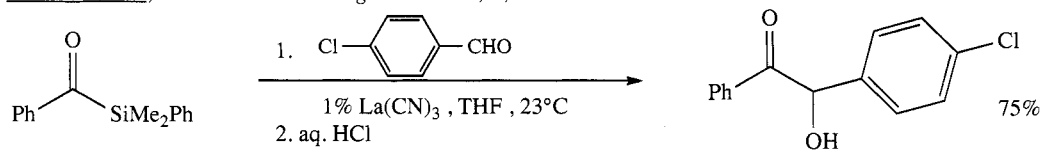
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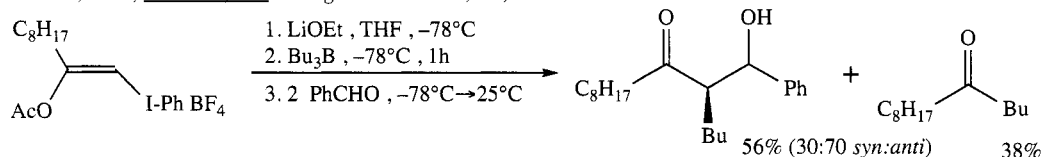
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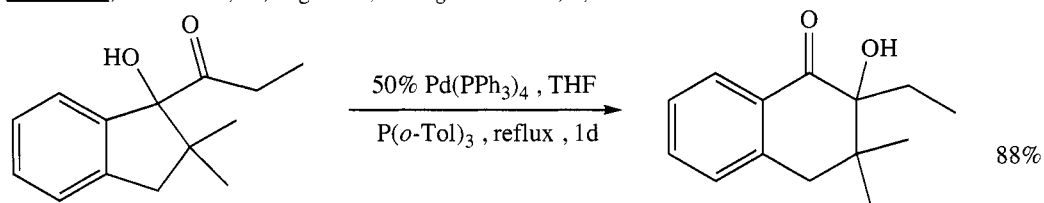
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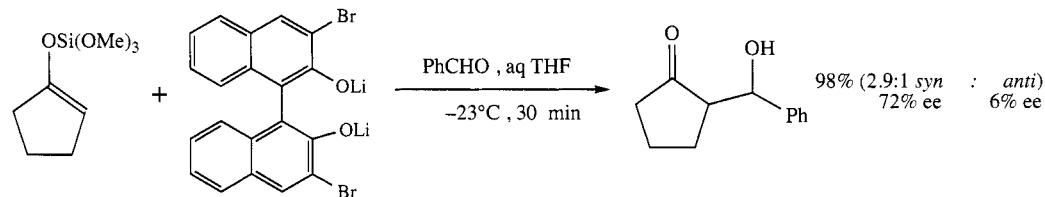
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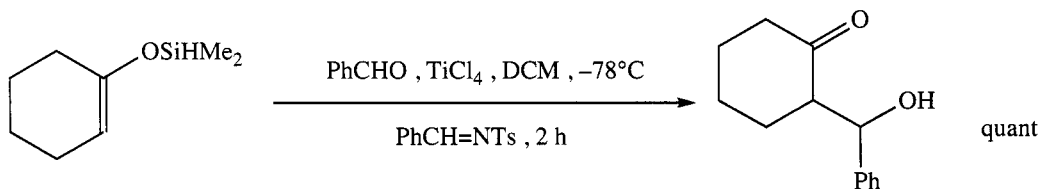
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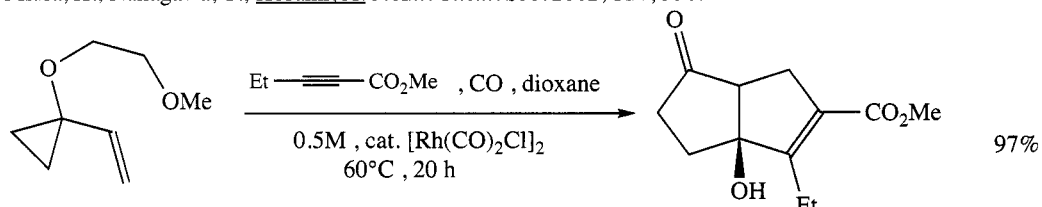
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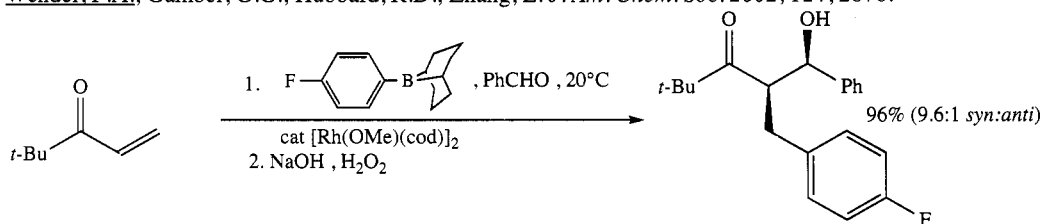
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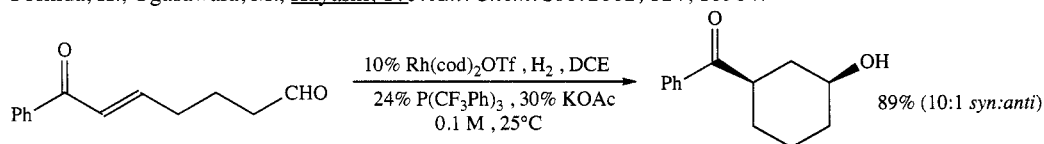
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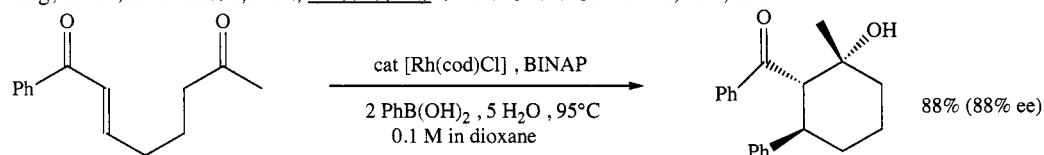
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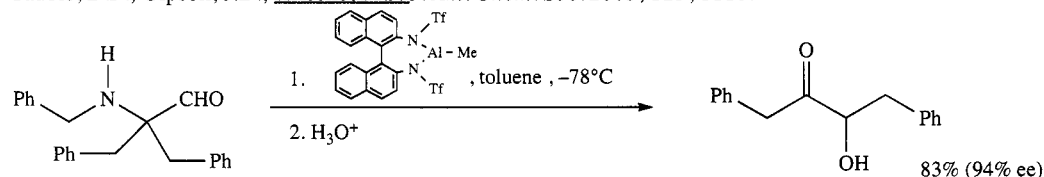
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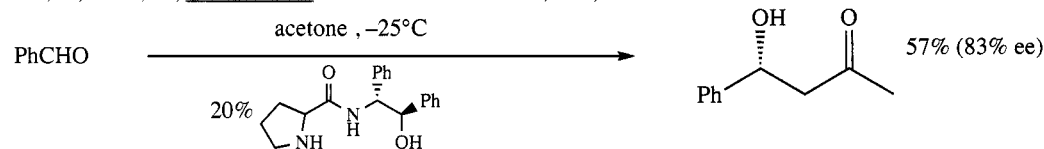
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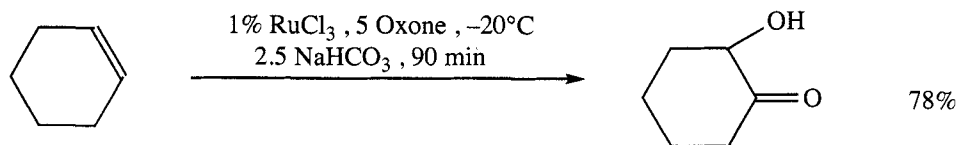
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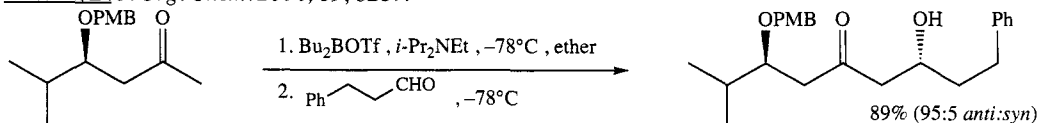
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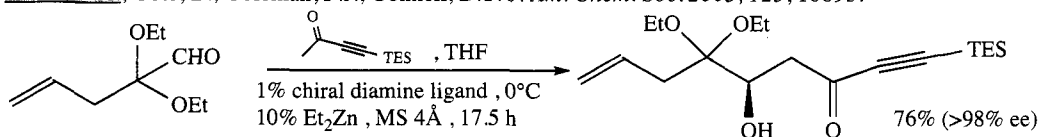
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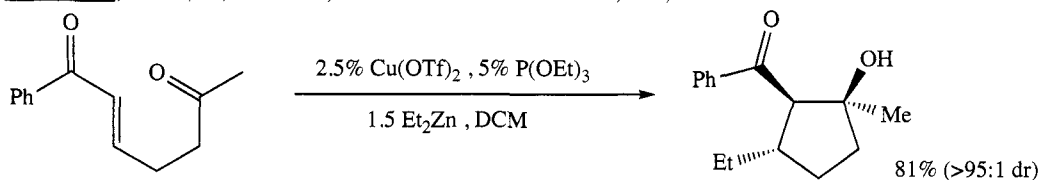
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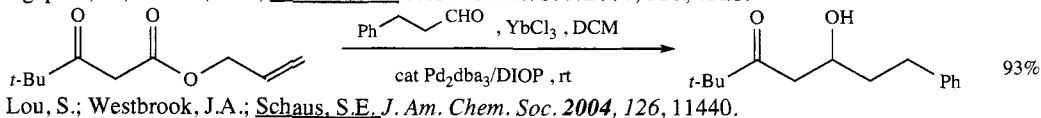
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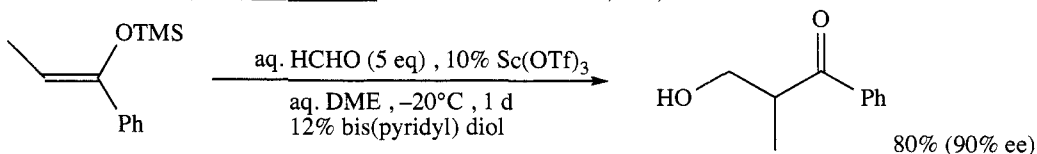
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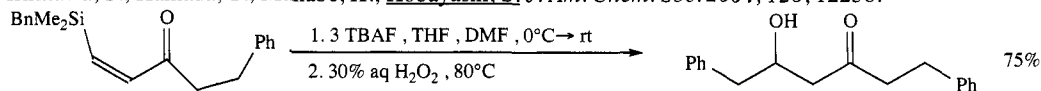
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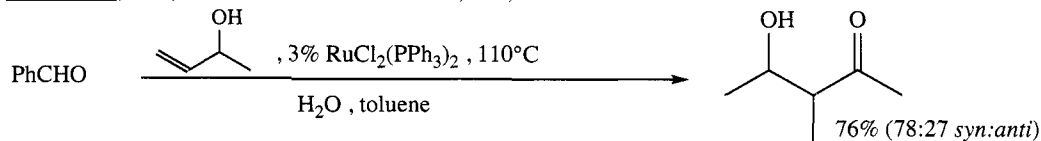
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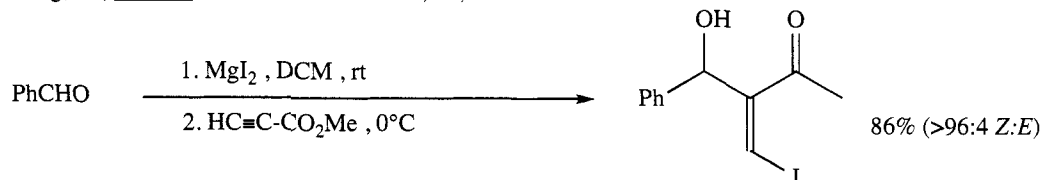
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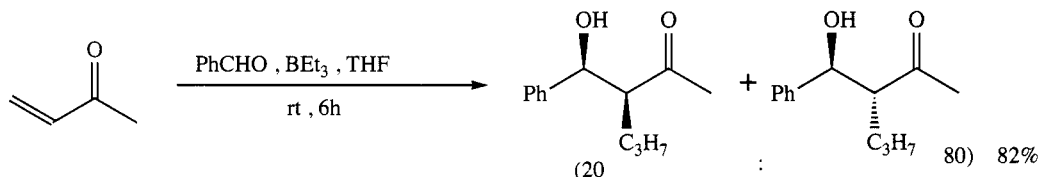
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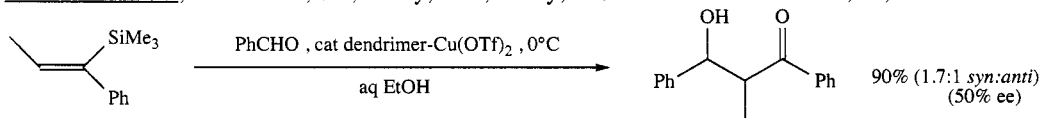
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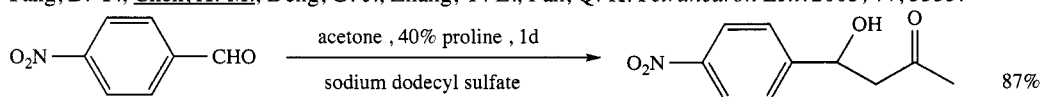
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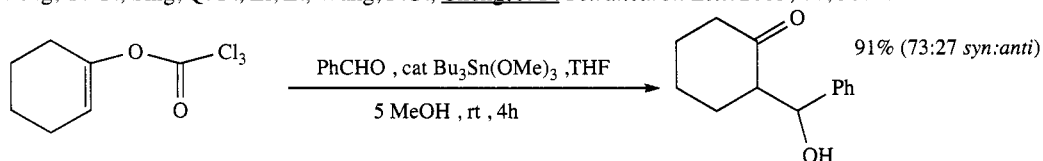
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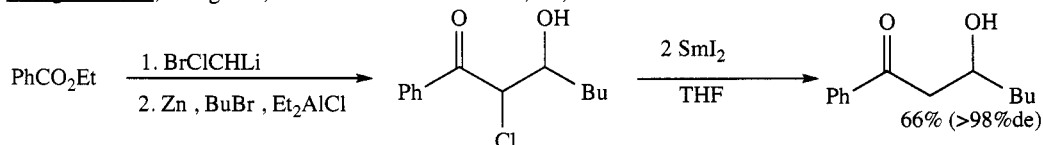
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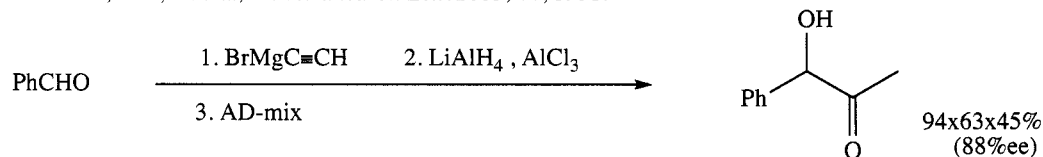
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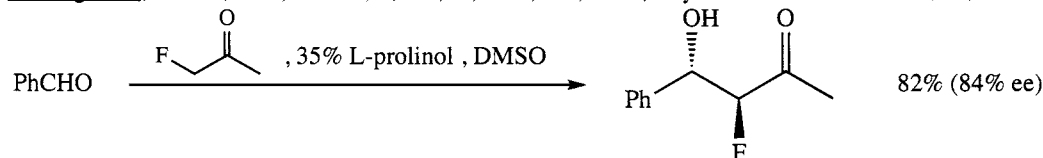
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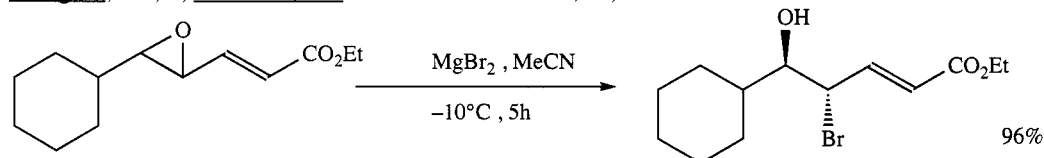
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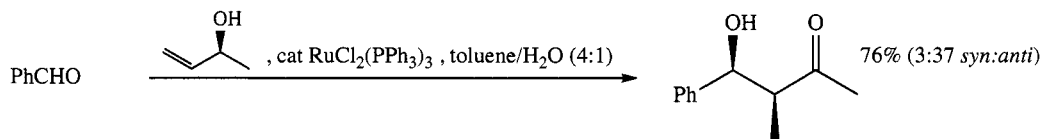
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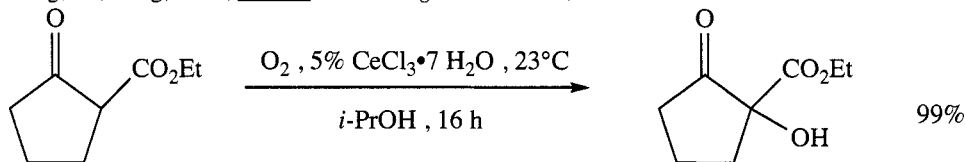
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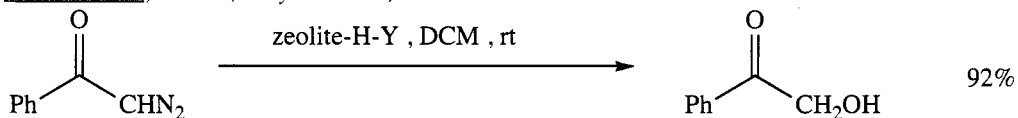
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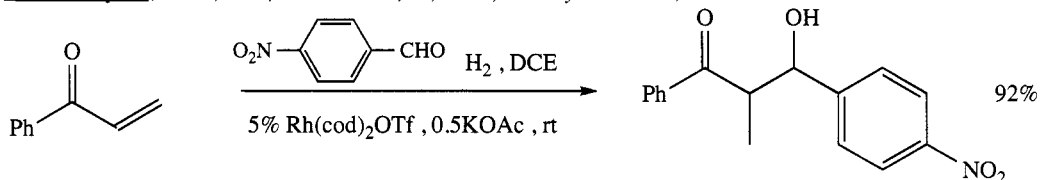
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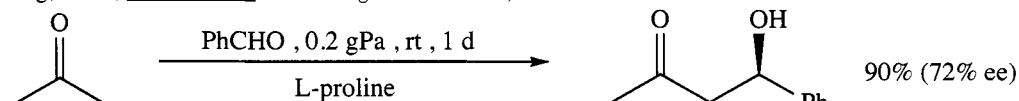
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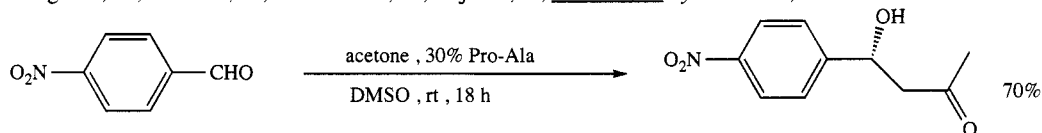
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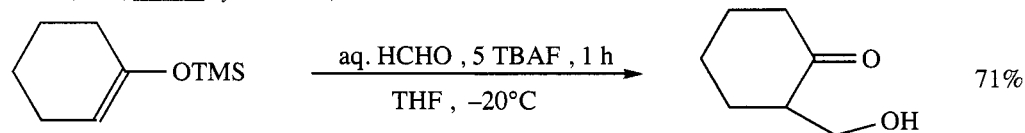
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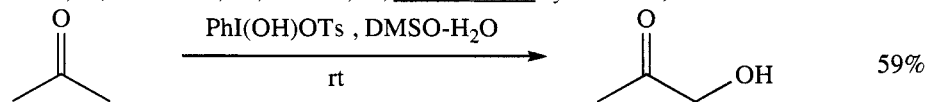
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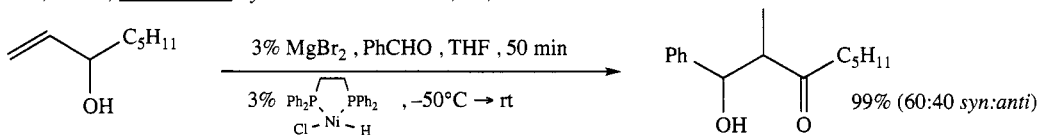
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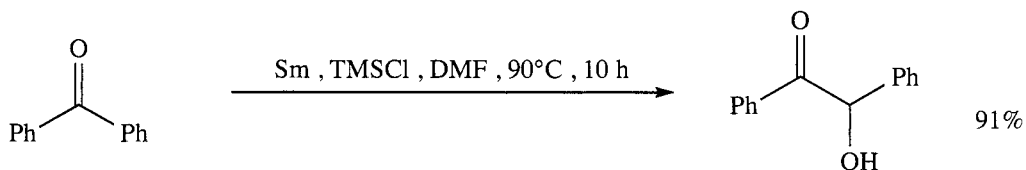
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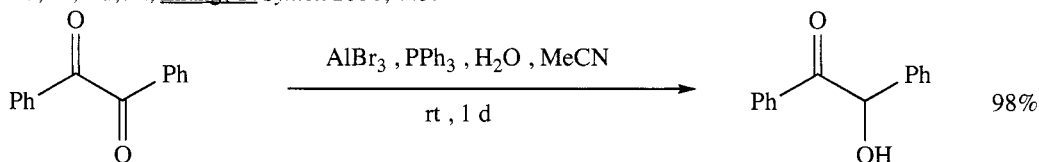
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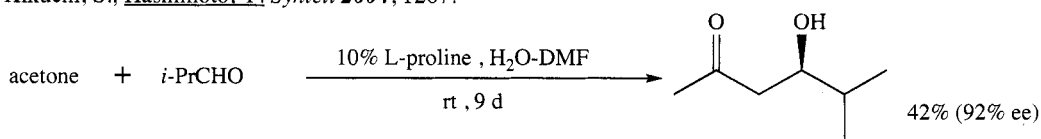
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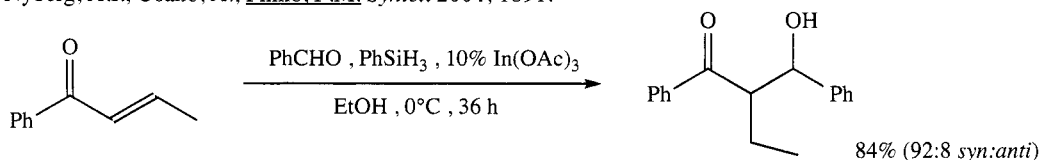
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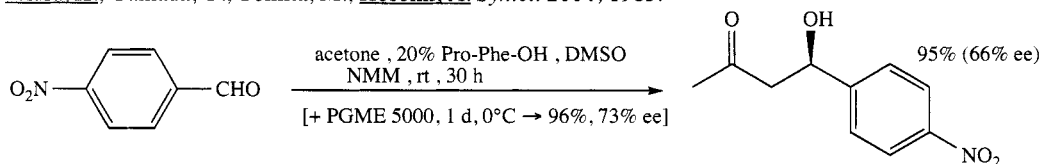
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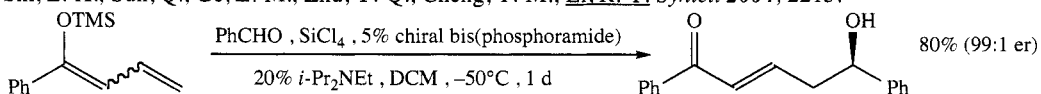
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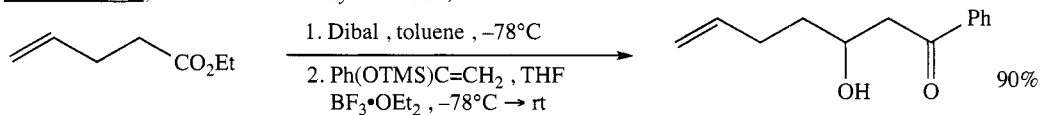
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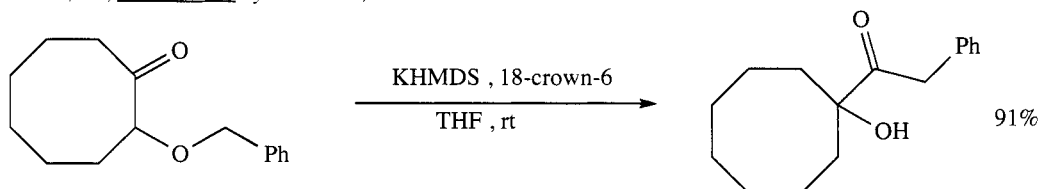
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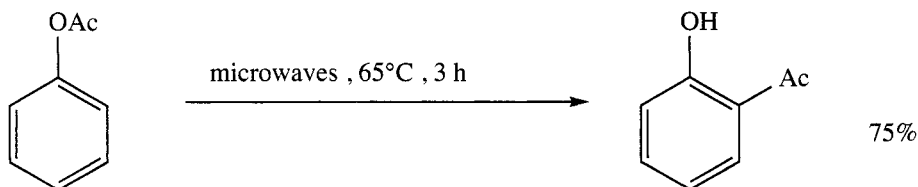
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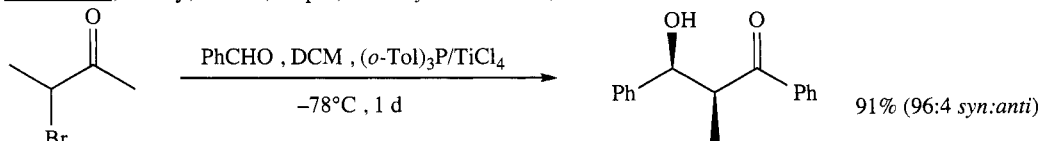
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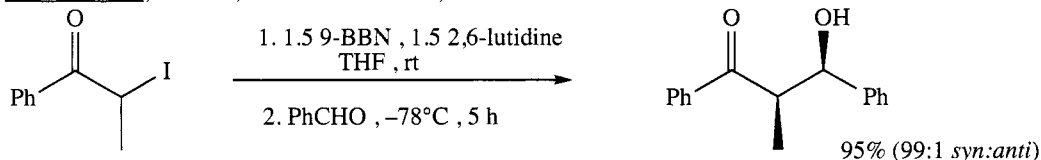
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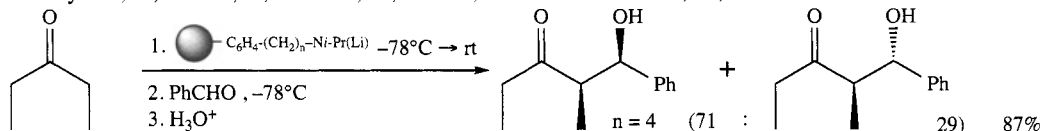
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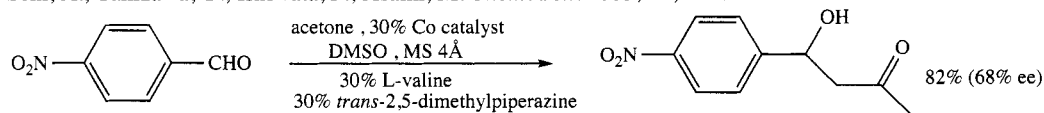
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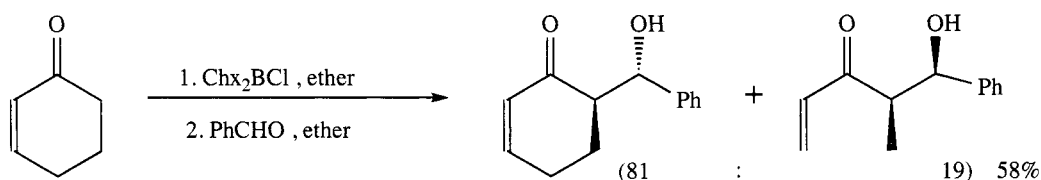
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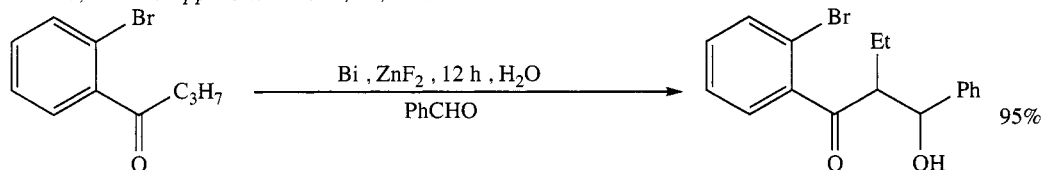
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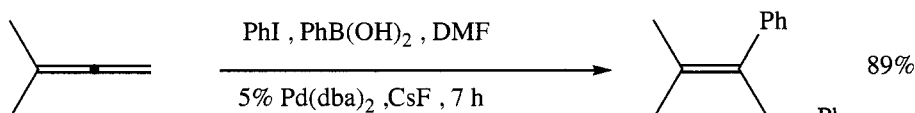
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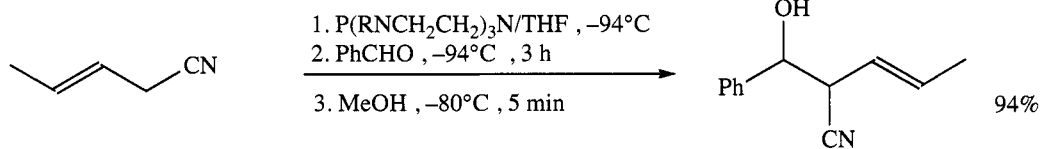
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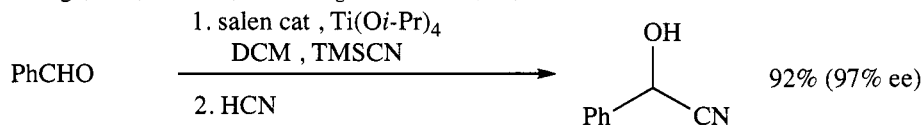
SECTION 331: ALCOHOL, THIOL - NITRILE



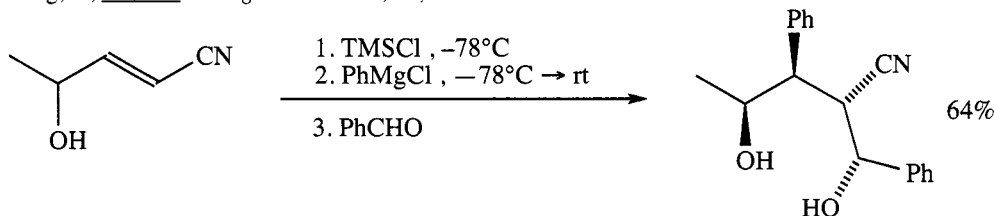
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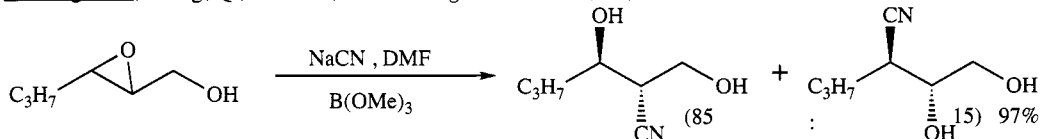
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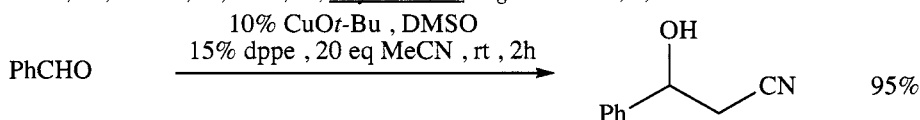
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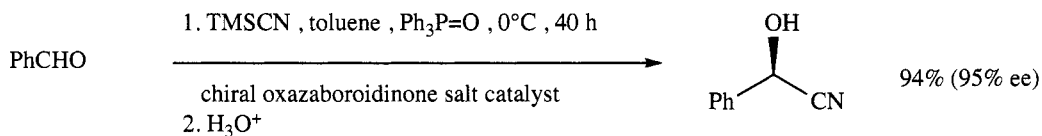
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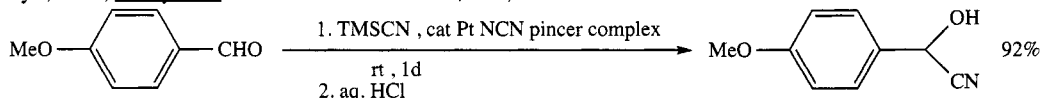
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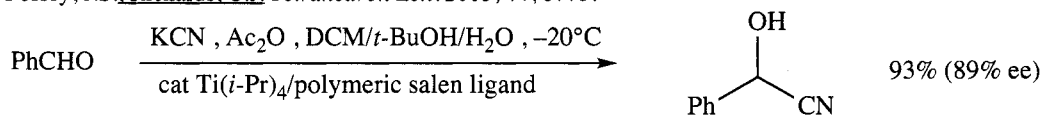
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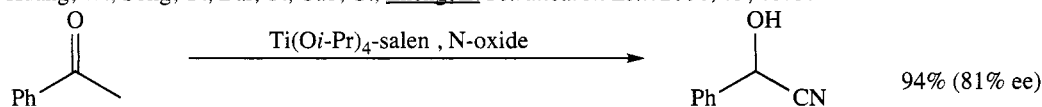
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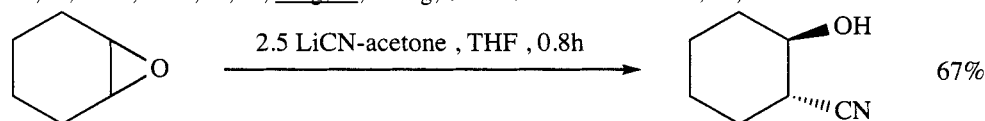
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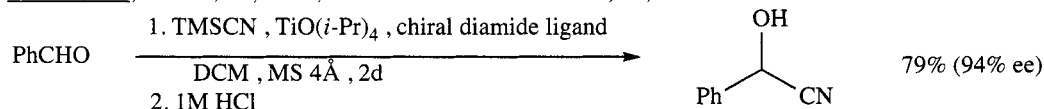
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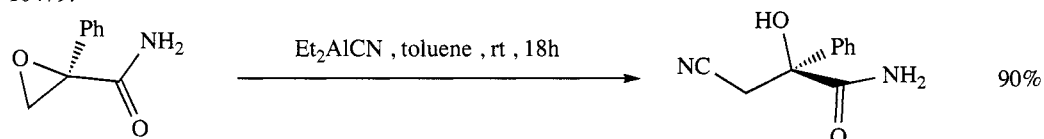
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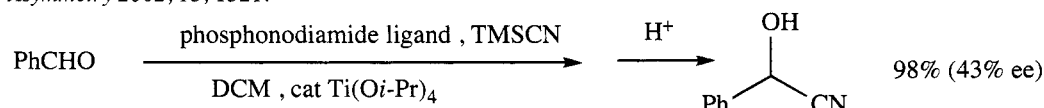
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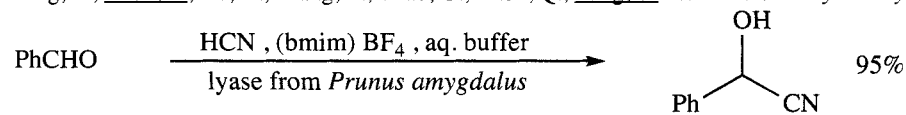
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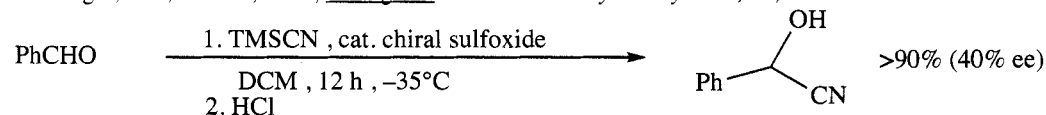
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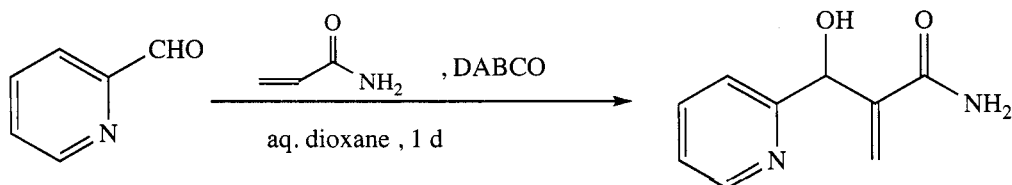
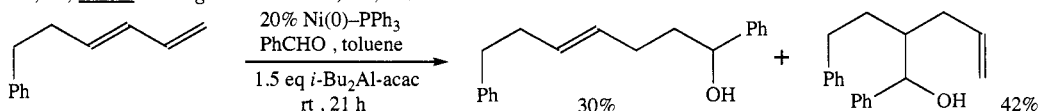
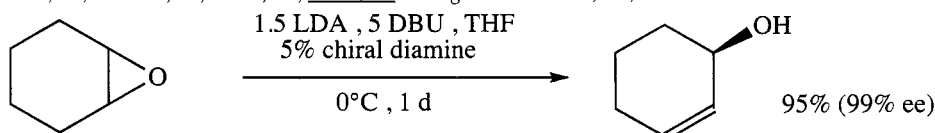
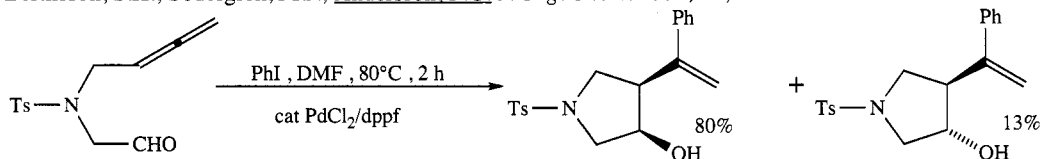
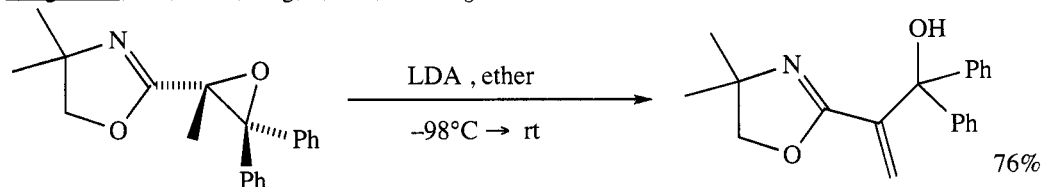
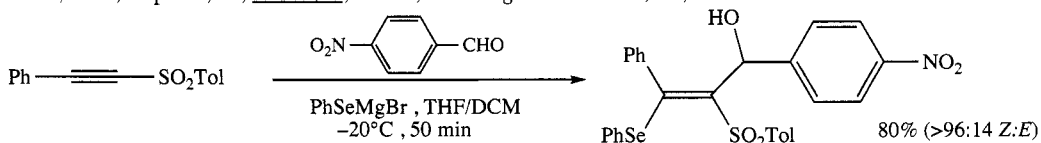
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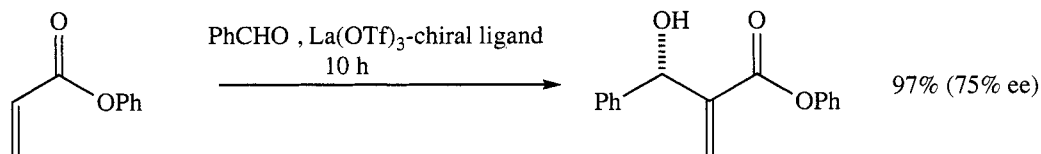
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Brunel, J.-M.; Holmes, I.P. *Angew. Chem. Int. Ed.* **2004**, 43, 2752.

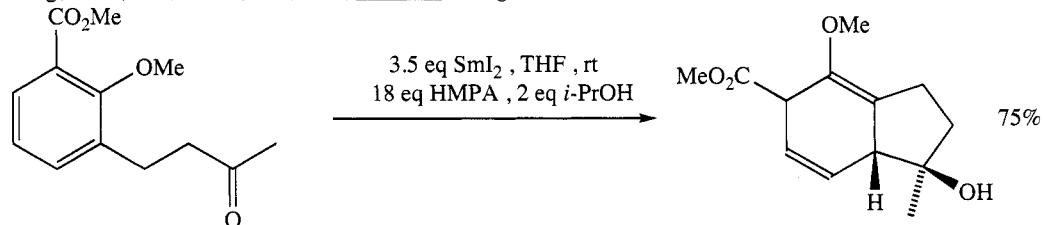
SECTION 332: ALCOHOL, THIOL - ALKENE

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

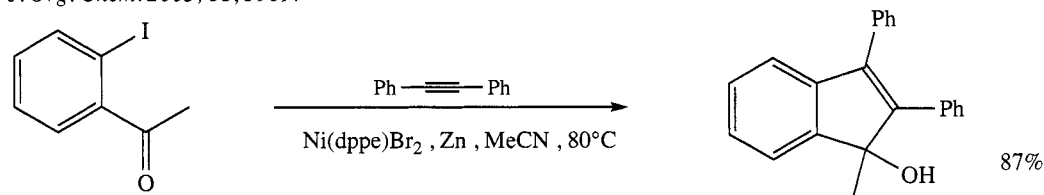
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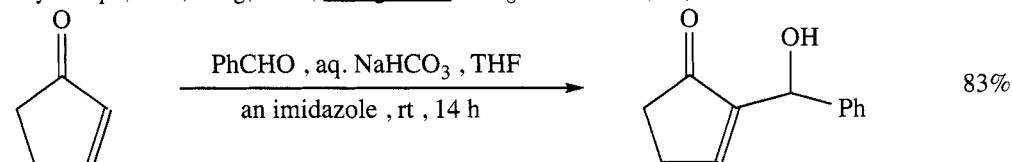
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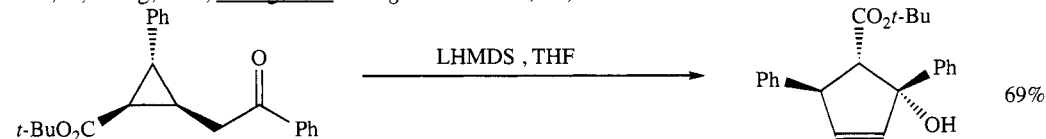
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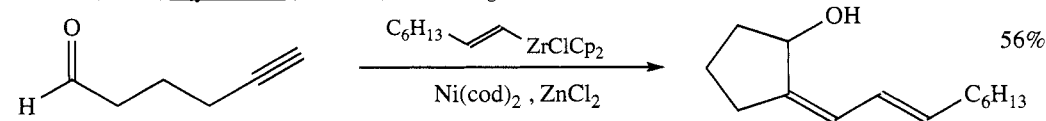
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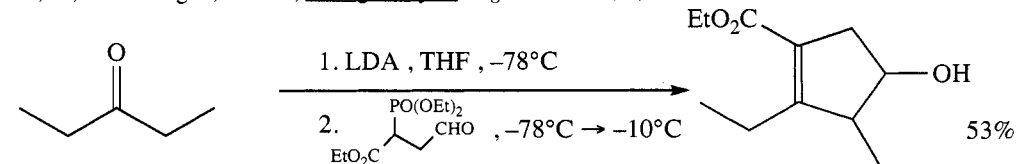
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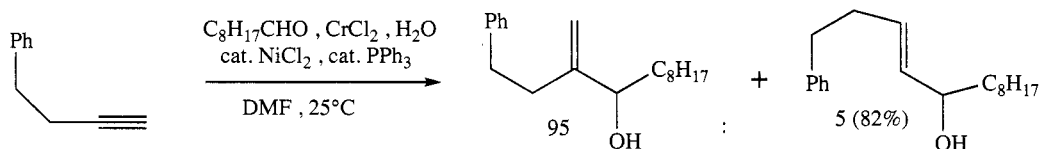
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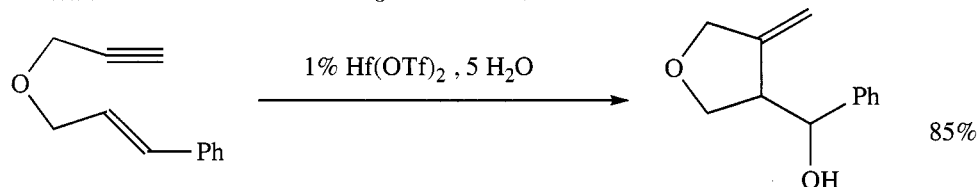
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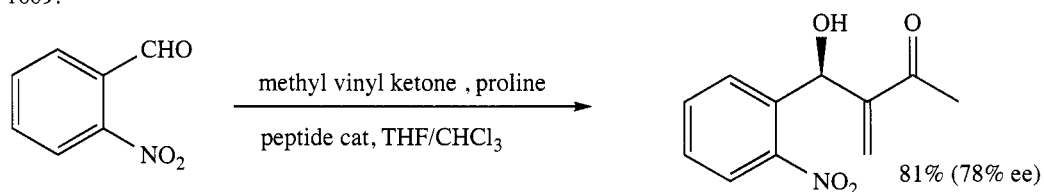
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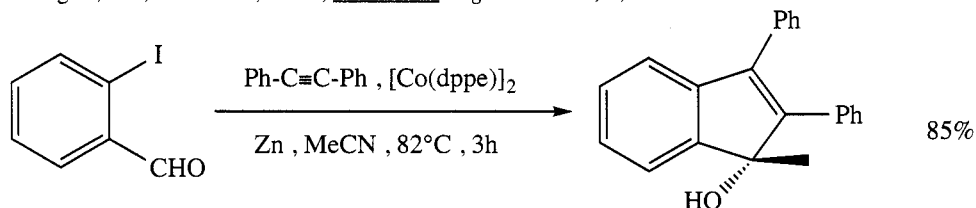
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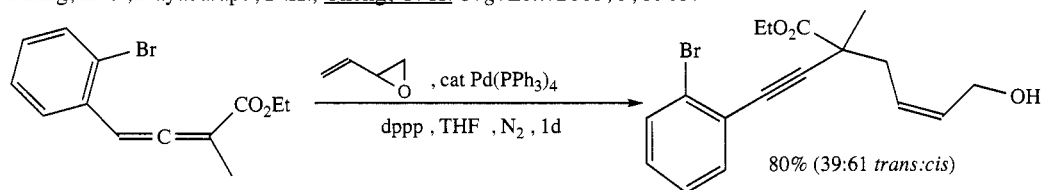
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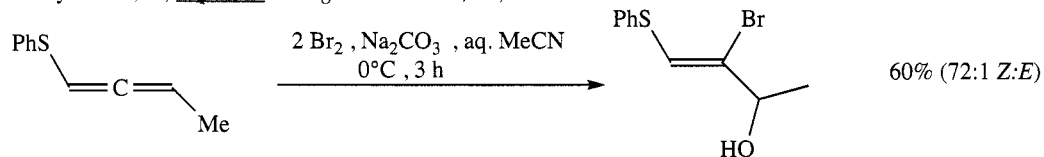
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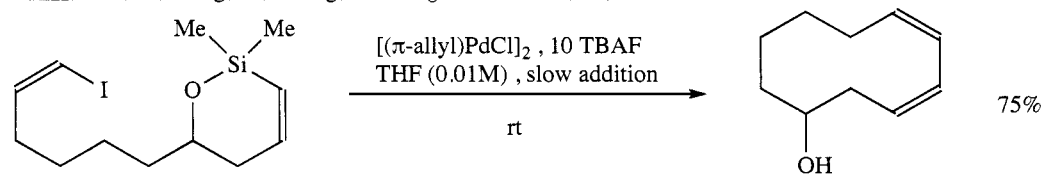
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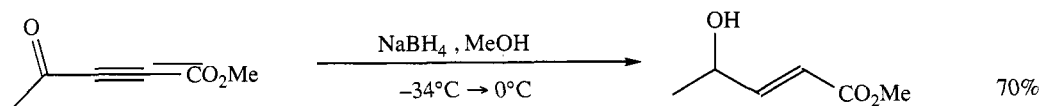
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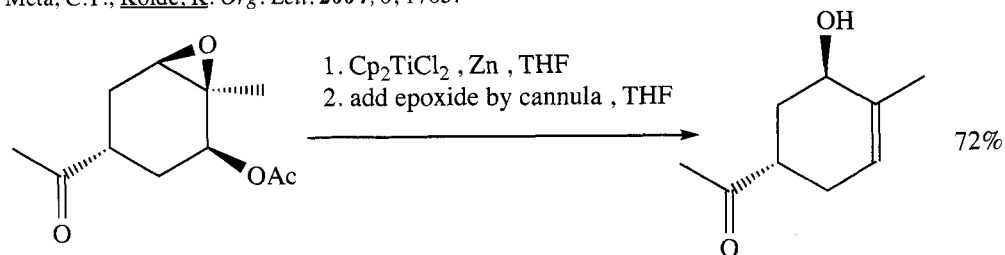
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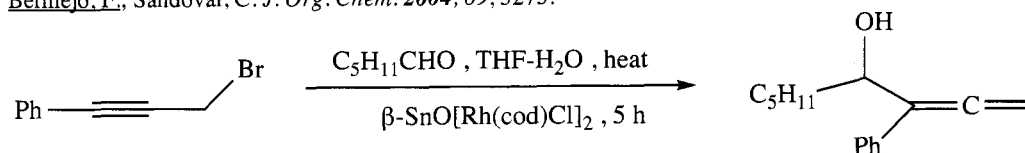
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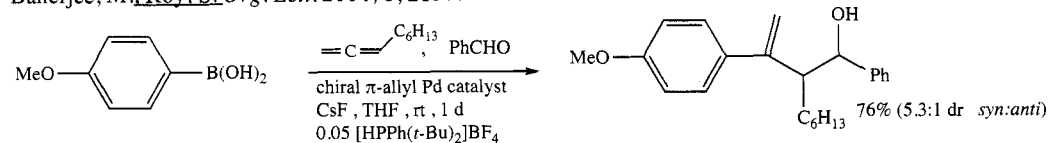
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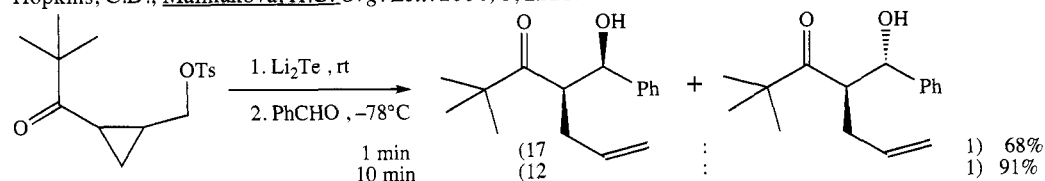
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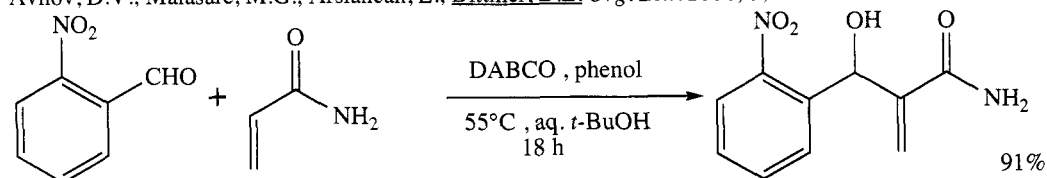
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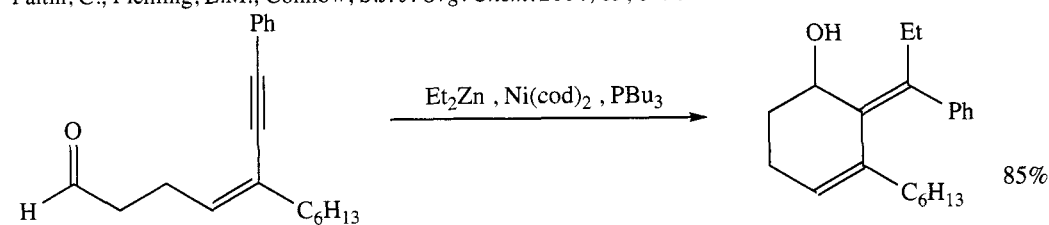
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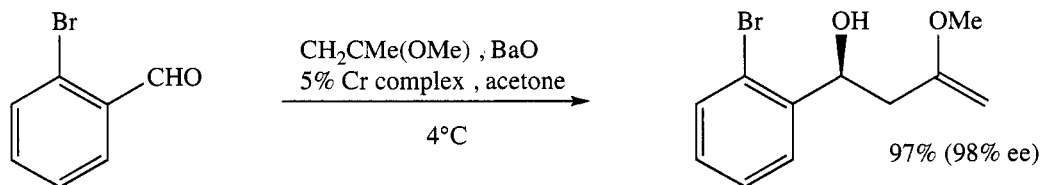
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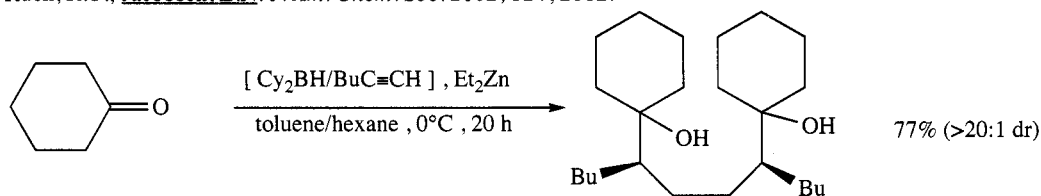
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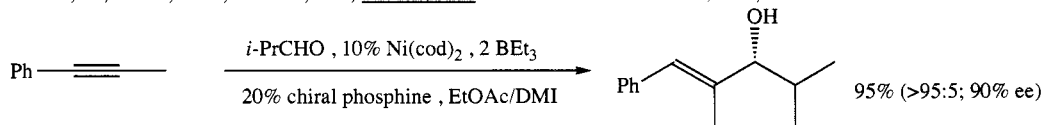
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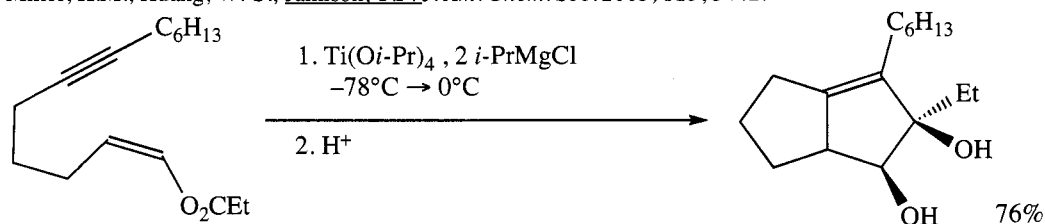
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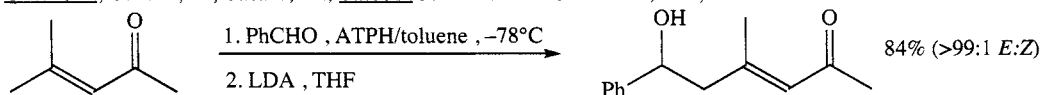
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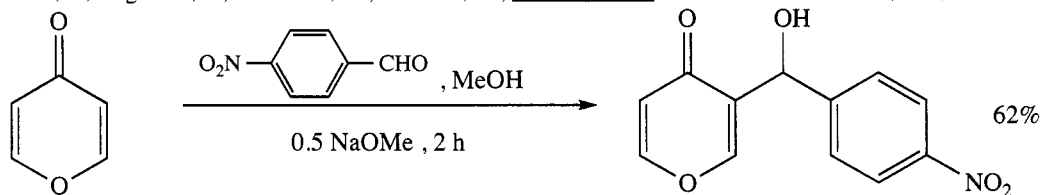
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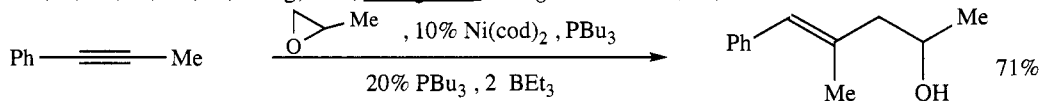
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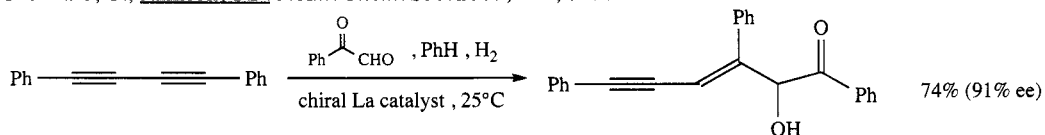
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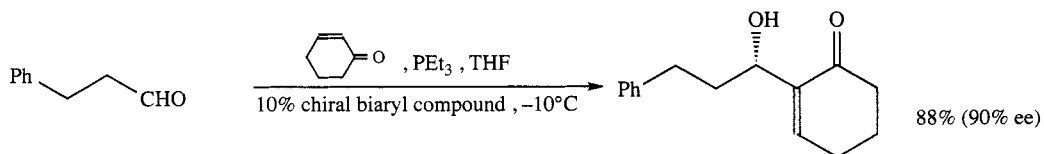
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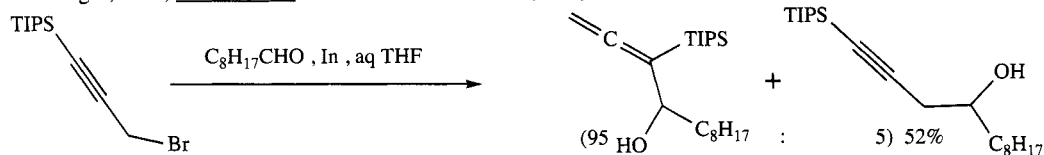
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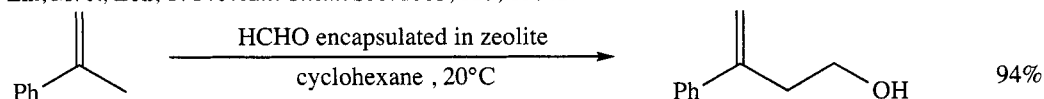
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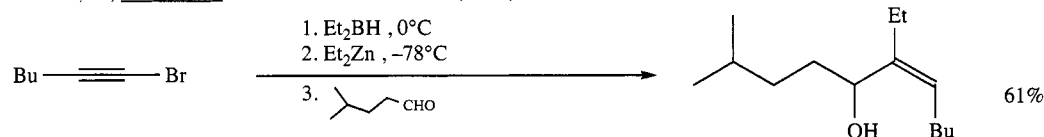
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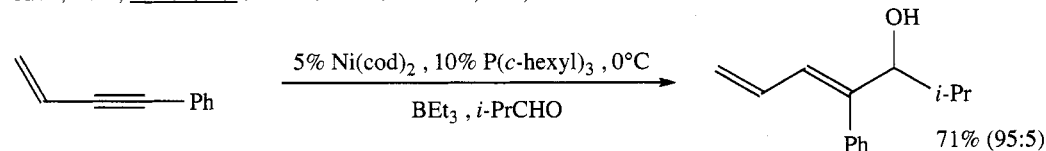
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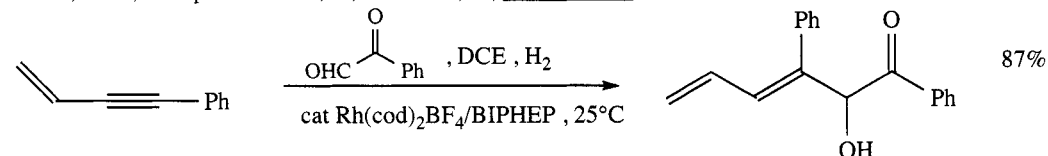
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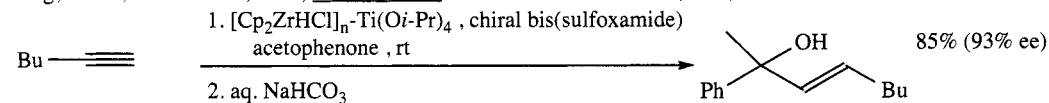
Chen, Y.K.; Walsh, P.J. *J. Am. Chem. Soc.* **2004**, *126*, 3702.



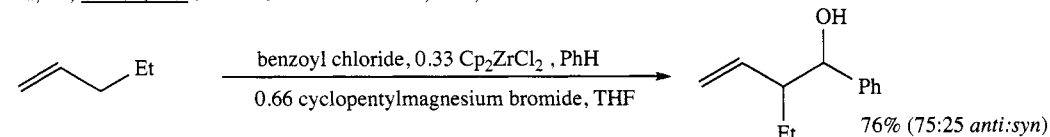
Miller, K.M.; Luanphaisarnnont, T.; Moinaaro, C.; Jamison, T.F. *J. Am. Chem. Soc.* **2004**, *126*, 4130.



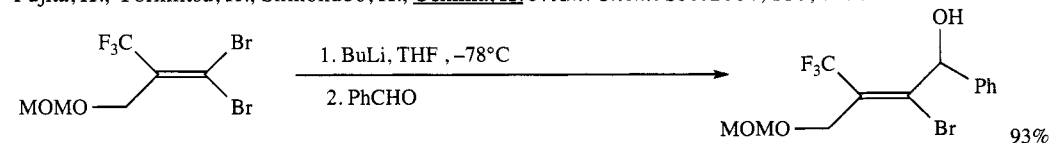
Jang, H.-Y.; Huddleston, R.R.; Krische, M.J. *J. Am. Chem. Soc.* **2004**, *126*, 4664.



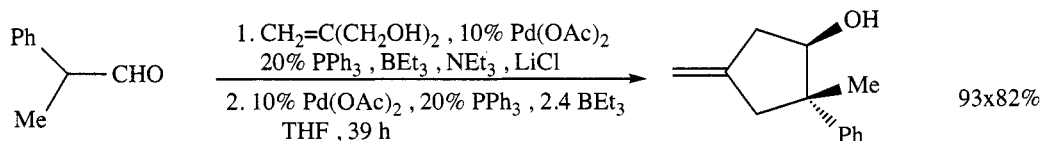
Li, H.; Walsh, P.J. *J. Am. Chem. Soc.* **2004**, *126*, 6538.



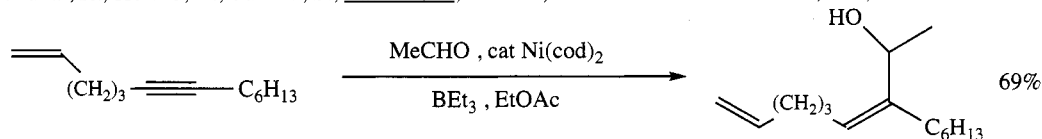
Fujita, K.; Yorimitsu, H.; Shinokubo, H.; Oshima, K. *J. Am. Chem. Soc.* **2004**, *126*, 6776.



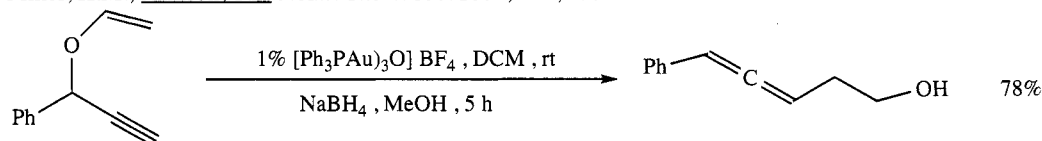
Li, Y.; Lu, L. *Org. Lett.* **2004**, 6, 4467.



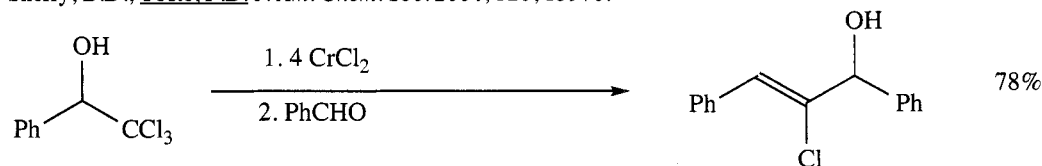
Mukai, R.; Horino, Y.; Tanaka, S.; Tamaru, Y.; Kimura, M. *J. Am. Chem. Soc.* **2004**, 126, 11138.



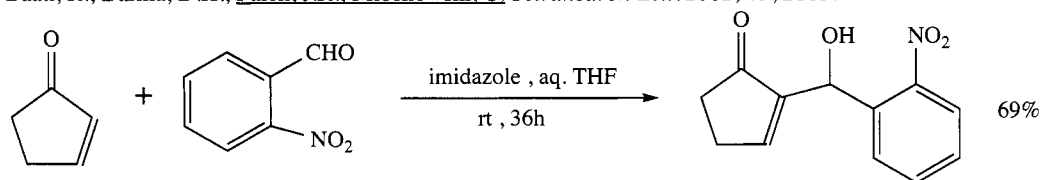
Miller, K.M.; Jamison, T.F. *J. Am. Chem. Soc.* **2004**, 126, 15342.



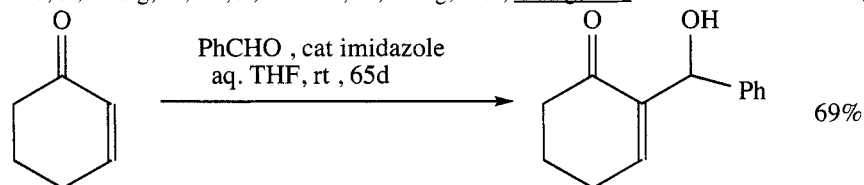
Sherry, B.D.; Toste, F.D. *J. Am. Chem. Soc.* **2004**, 126, 15978.



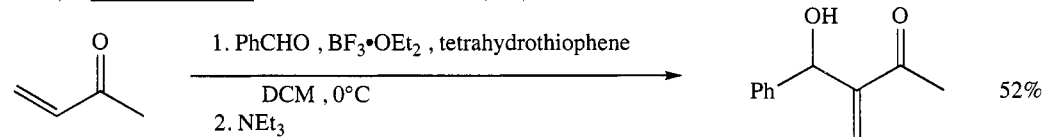
Baati, R.; Barma, D.K.; Falck, J.R.; Mioskowski, C. *Tetrahedron Lett.* **2002**, 43, 2183.



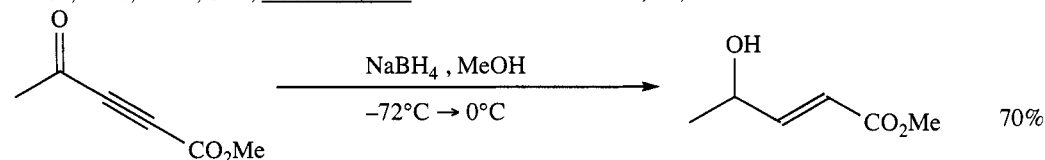
Luo, S.; Zhang, B.; He, J.; Janczuk, A.; Wang, P.G.; Cheng, J.-P. *Tetrahedron Lett.* **2002**, 43, 7369.



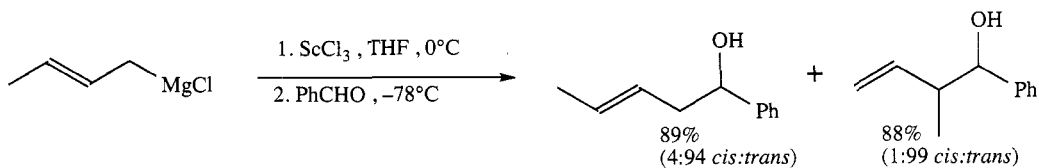
Gatri, R.; El Gaied, M.M. *Tetrahedron Lett.* **2002**, 43, 7835.



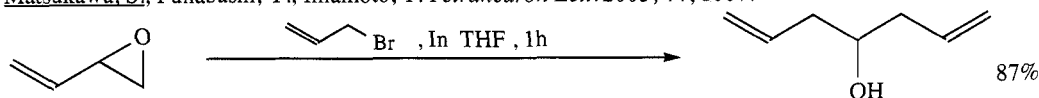
Walsh, L.M.; Winn, C.L.; Goodman, J.M. *Tetrahedron Lett.* **2002**, 43, 8219.



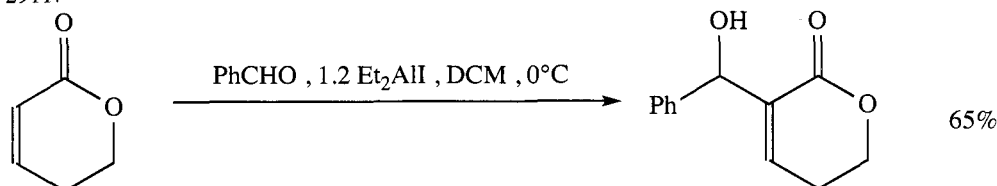
Naka, T.; Koide, K. *Tetrahedron Lett.* **2003**, 44, 443.



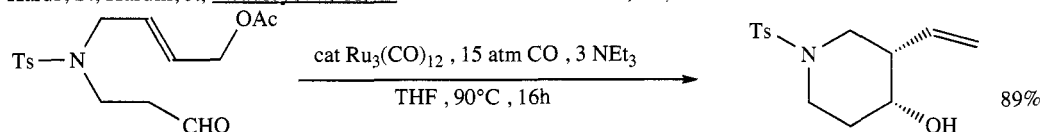
Matsukawa, S.; Funabashi, Y.; Imamoto, T. *Tetrahedron Lett.* **2003**, *44*, 1007.



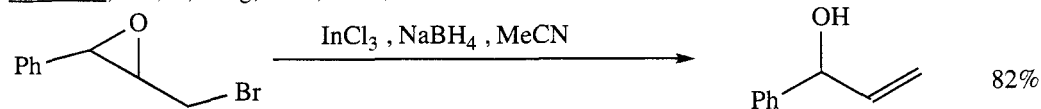
Oh, B.K.; Cha, J.H.; Cho, Y.S.; Choi, K.I.; Koh, H.Y.; Chang, M.H.; Pe, A.N. *Tetrahedron Lett.* **2003**, *44*, 2911.



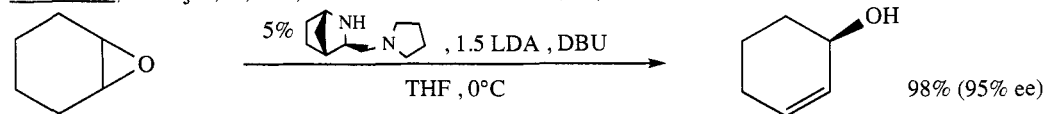
Karur, S.; Hardin, J.; Headley, A.; Li, G. *Tetrahedron Lett.* **2003**, *44*, 2991.



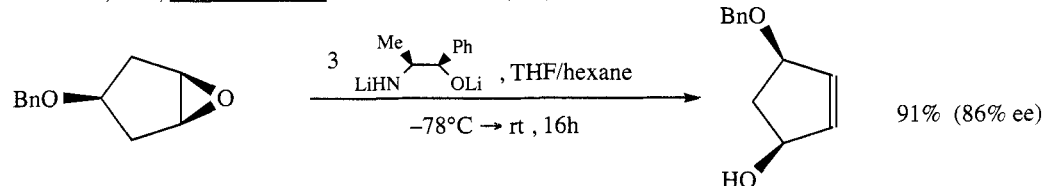
Yu, C.-M.; Lee, S.; Hong, Y.-T.; Yoon, S.-K. *Tetrahedron Lett.* **2004**, *45*, 6557.



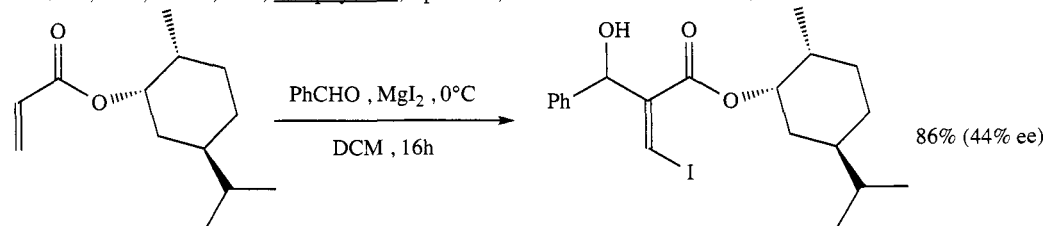
Ranu, B.C.; Banerjee, S.; Das, A. *Tetrahedron Lett.* **2004**, *45*, 8579.



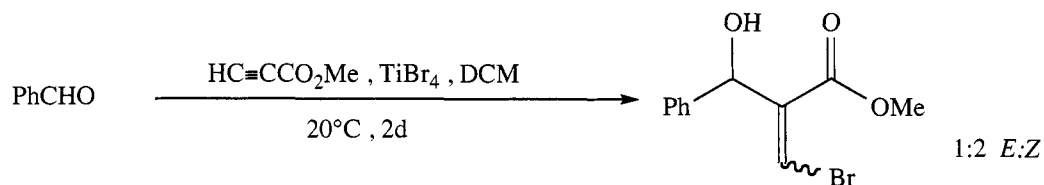
Bertilsson, S.K.; Andersson, P.G. *Tetrahedron* **2002**, *58*, 4665.



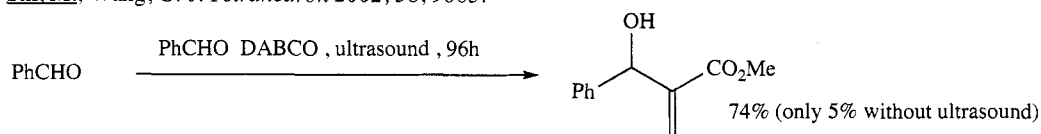
Brookes, P.C.; Milne, D.J.; Murphy, P.J.; Spolaore, B. *Tetrahedron* **2002**, *58*, 4675.



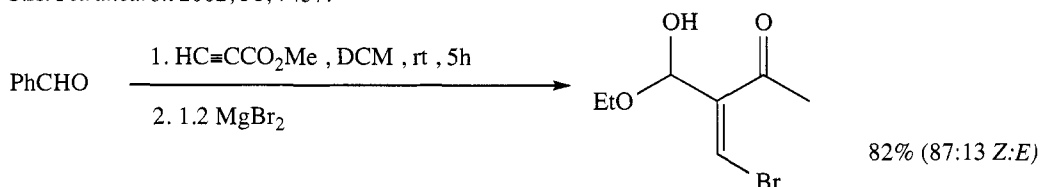
Wei, H.-X.; Chen, D.; Xu, X.; Li, G.; Paré, P.W. *Tetrahedron: Asymmetry* **2003**, *14*, 971.



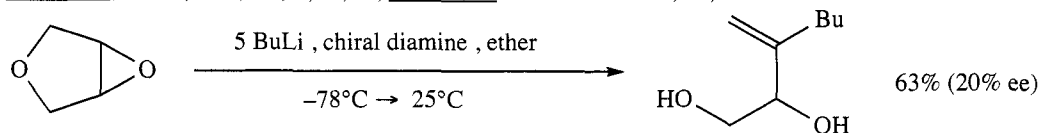
Shi, M.; Wang, C.-J. *Tetrahedron* **2002**, 58, 9063.



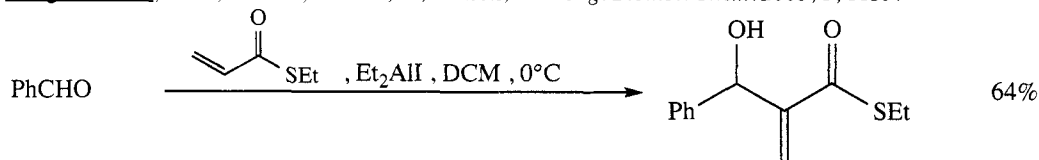
Coelho, F.; Almeida, W.P.; Veronese, D.; Mateus, C.R.; Lopes, E.C.S.; Rossi, R.C.; Silveira, G.P.C.; Pavam, C.H. *Tetrahedron* **2002**, 58, 7437.



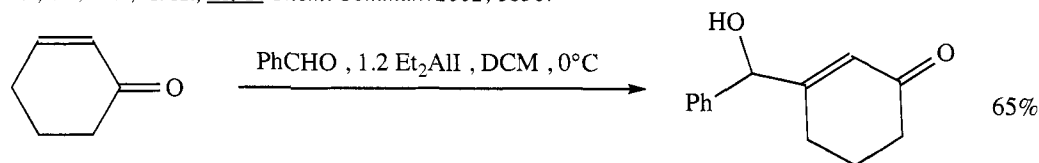
Wei, H.-X.; Jasoni, R.L.; Hu, J.; Li, G.; Paré, P.W. *Tetrahedron* **2004**, 60, 10233.



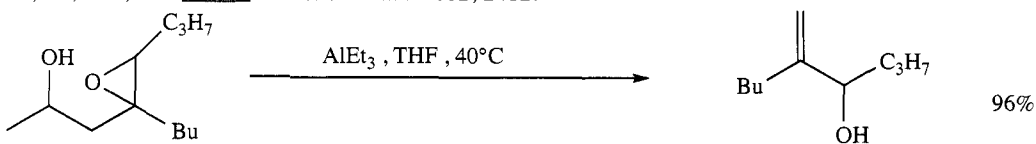
Hodgson, D.M.; Stent, M.A.H.; Stefane, B.; Wilson, F.X. *Org. Biomol. Chem.* **2003**, 1, 1139.



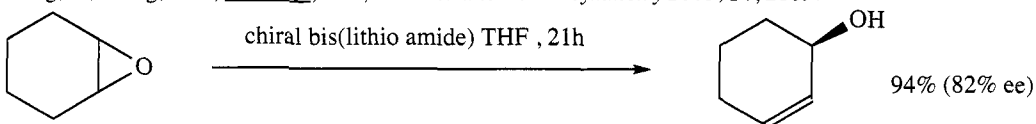
Pei, W.; Wei, H.-X.; Li, G. *Chem. Commun.* **2002**, 1856.



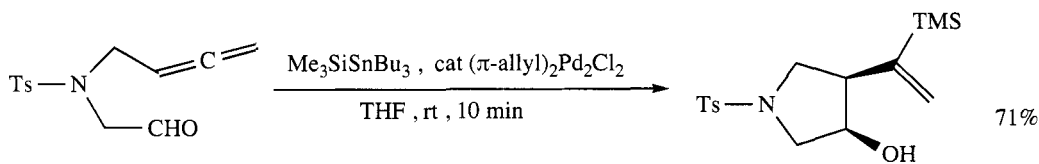
Pei, W.; Wei, H.X.; Li, G. *Chem. Commun.* **2002**, 2412.



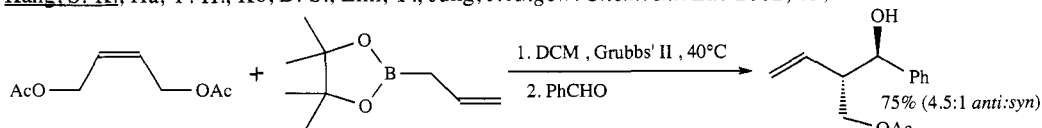
Wang, F.; Wang, S.H.; Tu, Y.Q.; Ren, S.K. *Tetrahedron: Asymmetry* **2003**, 14, 2189.



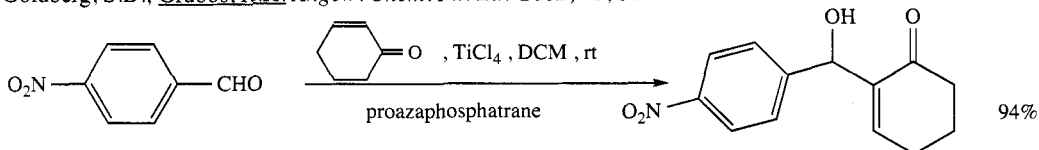
Equey, O.; Alexakis, A. *Tetrahedron: Asymmetry* **2004**, 15, 1069.



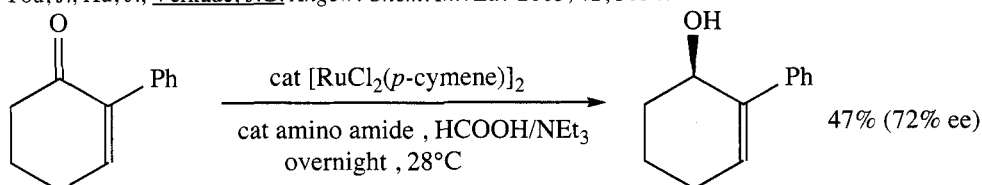
Kang, S.-K.; Ha, Y.-H.; Ko, B.-S.; Lim, Y.; Jung, J. *Angew. Chem. Int. Ed.* **2002**, *41*, 343.



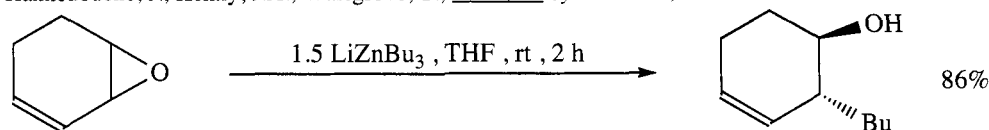
Goldberg, S.D.; Grubbs, R.H. *Angew. Chem. Int. Ed.* **2002**, *41*, 807.



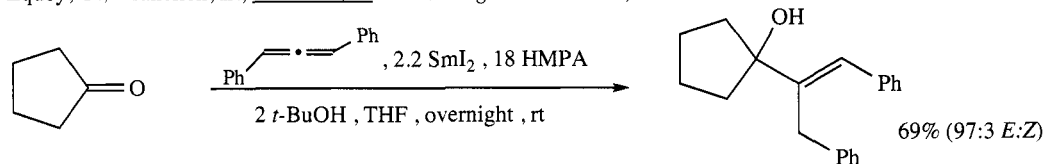
You, J.; Xu, J.; Verkade, J.G. *Angew. Chem. Int. Ed.* **2003**, *42*, 5054.



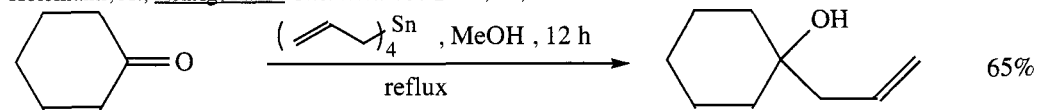
Hannedouche, J.; Kenny, J.A.; Walsgrove, T.; Wills, M. *Synlett* **2002**, 263.



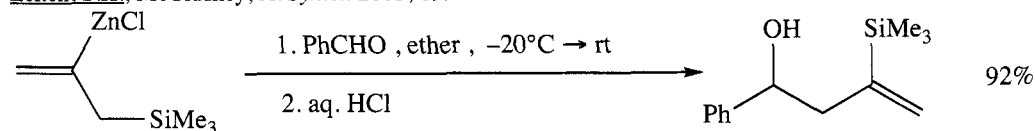
Equey, O.; Vrancken, E.; Alexakis, A. *Eur. J. Org. Chem.* **2004**, 2151.



Hölemann, A.; Reißig, H.-U. *Chem. Eur. J.* **2004**, *10*, 5493.



Leitch, S.K.; McCluskey, A. *Synlett* **2003**, 699.



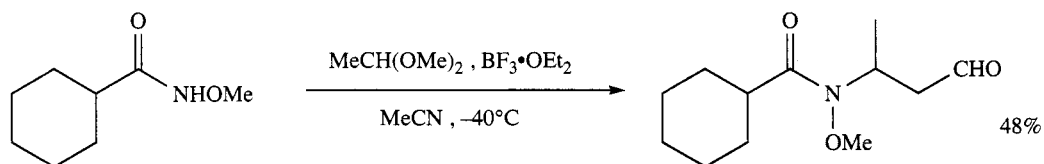
Viseux, E.M.E.; Parsons, P.J.; Pavey, J.B.J. *Synlett* **2003**, 861.

Also via: Section 302 (Alkyne - Alcohol)

SECTION 333: ALDEHYDE - ALDEHYDE

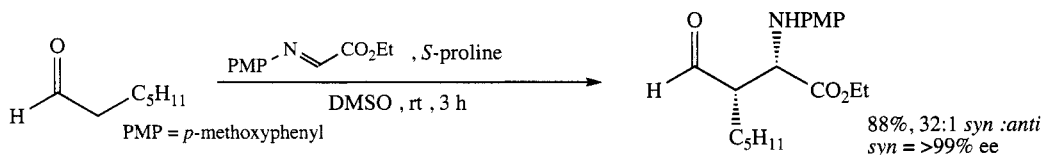
NO ADDITIONAL EXAMPLES

SECTION 334: ALDEHYDE - AMIDE

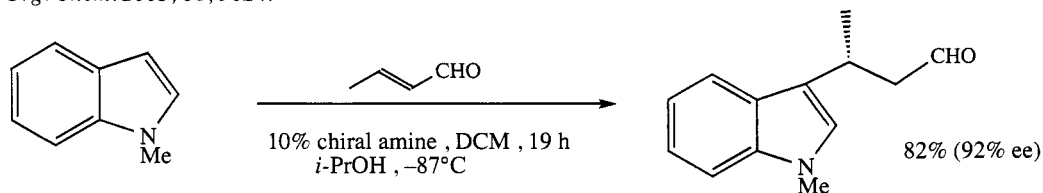


Marson, C.M.; Pucci, S. *Tetrahedron Lett.* **2004**, 45, 9007.

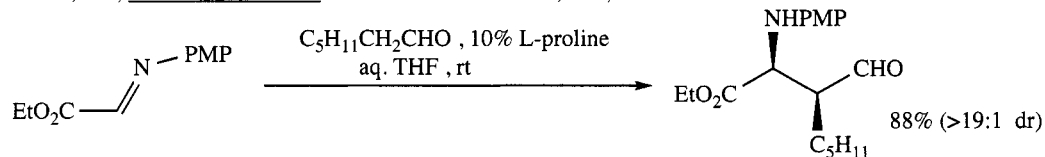
SECTION 335: ALDEHYDE - AMINE



Notz, W.; Tanaka, F.; Watanabe, S.; Chowdari, N.S.; Turner, J.M.; Thayumanavan, R.; Barbas III, C.F. *J. Org. Chem.* **2003**, 68, 9624.

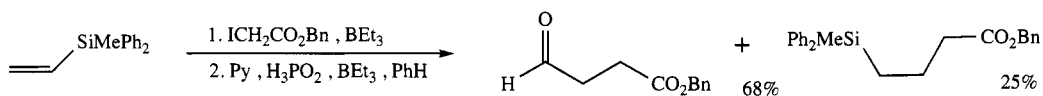


Austin, J.F.; MacMillan, D.W.C. *J. Am. Chem. Soc.* **2002**, 124, 1172.

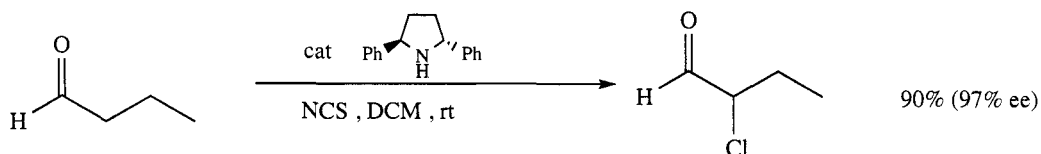


Córdova, A.; Barbas III, C.F. *Tetrahedron Lett.* **2003**, 44, 1923.

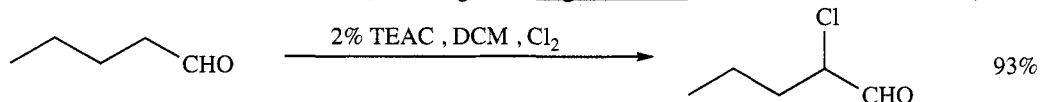
SECTION 336: ALDEHYDE - ESTER



Kondo, J.; Shinokubo, H.; Oshima, K. *Angew. Chem. Int. Ed.* **2003**, 42, 825.

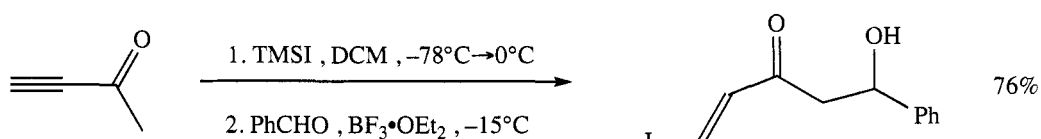


Halland, N.; Braunton, A.; Bachmann, S.; Marigo, M.; Jørgensen, K.A. *J. Am. Chem. Soc.* **2004**, 126, 4790.

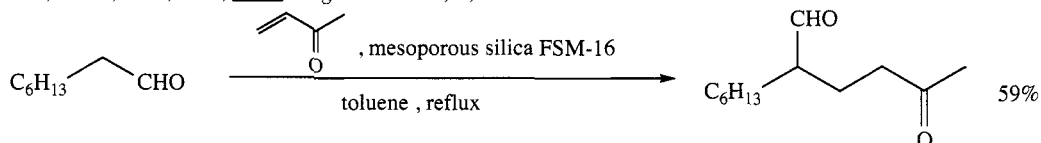


Bellesia, F.; DeBuyck, L.; Ghelfi, F.; Pagnoni, U.M.; Parsons, A.F.; Pinetti, A. *Synthesis* **2003**, 2173.

SECTION 339: ALDEHYDE - KETONE



Wei, H.-X.; Kim, S.H.; Li, G. *Org. Lett.* **2002**, 4, 3691.



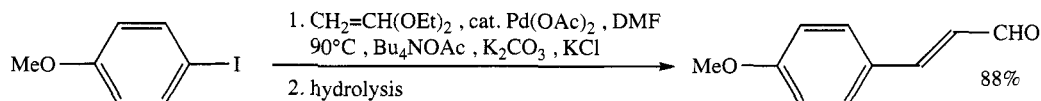
Shimizu, K.; Suzuki, H.; Hayashi, E.; Kodama, T.; Tsuchiya, Y.; Hagiwara, H.; Kitayama, Y. *Chem. Commun.* **2002**, 1068.

SECTION 340: ALDEHYDE - NITRILE

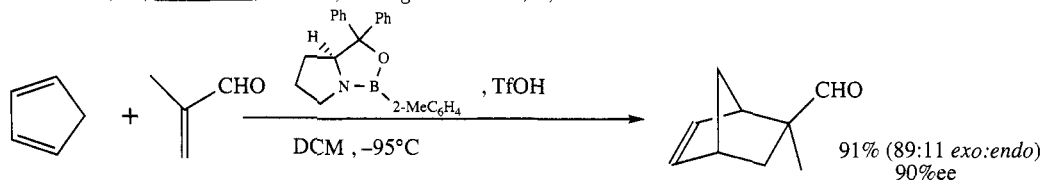
NO ADDITIONAL EXAMPLES

SECTION 341: ALDEHYDE - ALKENE

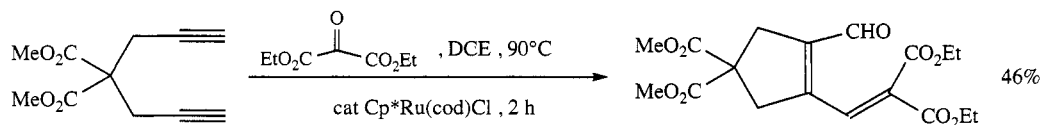
For the oxidation of allylic alcohols to alkene aldehydes, see also Section 48 (Aldehydes from Alcohols and Thiols)



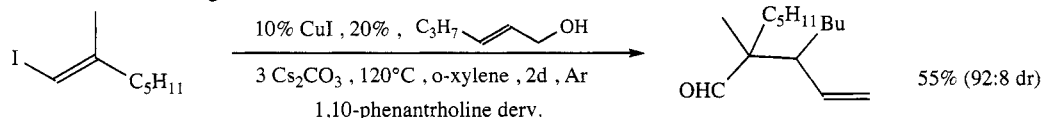
Battistuzzi, G.; Cacchi, S.; Fabrizi, G. *Org. Lett.* **2003**, 5, 777.



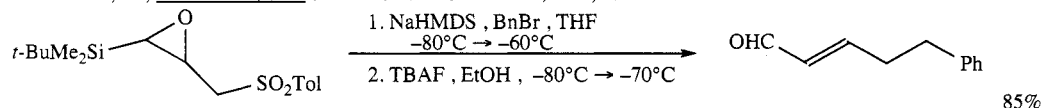
Corey, E.J.; Shibata, T.; Lee, T.W. *J. Am. Chem. Soc.* **2002**, 124, 3808.



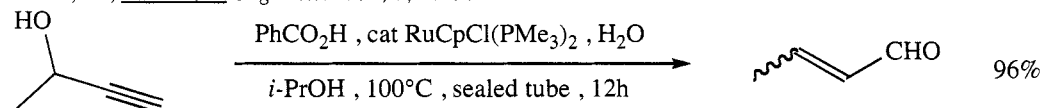
Yamamoto, Y.; Takagishi, H.; Itoh, K. *J. Am. Chem. Soc.* **2002**, *124*, 6844.



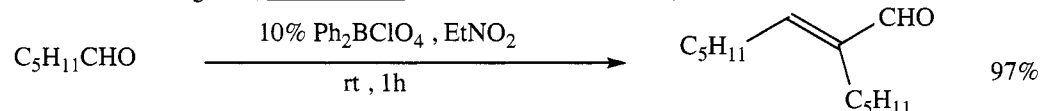
Nordmann, G.; Buchwald, S.L. *J. Am. Chem. Soc.* **2003**, *125*, 4978.



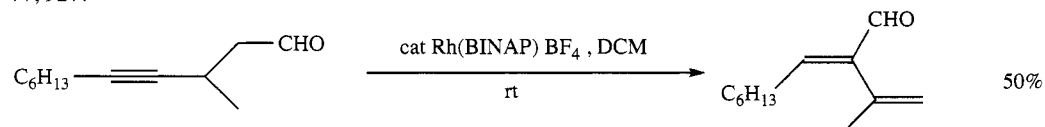
Sasaki, M.; Takeda, K. *Org. Lett.* **2004**, *6*, 4849.



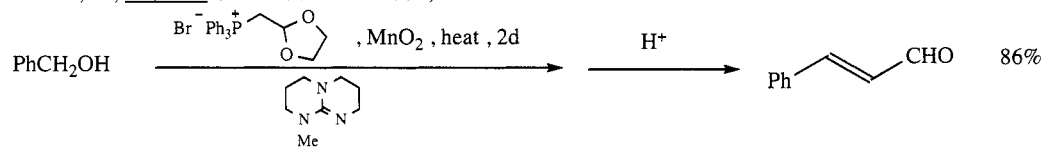
Suzuki, T.; Tokunaga, M.; Wakatsuki, Y. *Tetrahedron Lett.* **2002**, *43*, 7531.



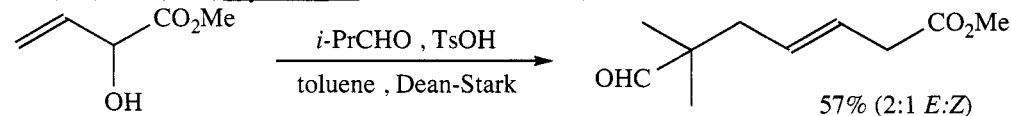
Kiyooka, S.-i.; Fujimoto, H.; Mishima, M.; Kobayashi, S.; Uddin, K.Md.; Fujio, M. *Tetrahedron Lett.* **2003**, *44*, 927.



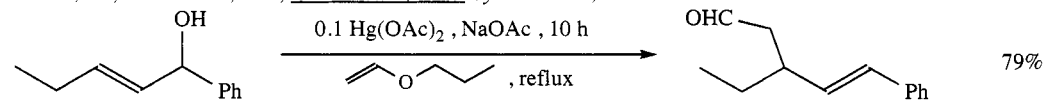
Tanaka, K.; Fu, G.C. *Chem. Commun.* **2002**, 684.



Reid, M.; Rowe, D.J.; Taylor, R.J.K. *Chem. Commun.* **2003**, 2284.



Freiría, M.; Whitehead, A.J.; Motherwell, W.B. *Synlett* **2003**, 805.



Tokuyama, H.; Makido, T.; Ueda, T.; Fukuyama, T. *Synth. Commun.* **2002**, *32*, 869.

REVIEWS:

"The Thio-Claisen Rearrangement, 1980-2001"

Mujumdar, K.C.; Ghosh, S.; Ghosh, M. *Tetrahedron* **2003**, *59*, 7251.

“Catalysis of the Claisen Rearrangement of Aliphatic Allyl Vinyl Ethers”

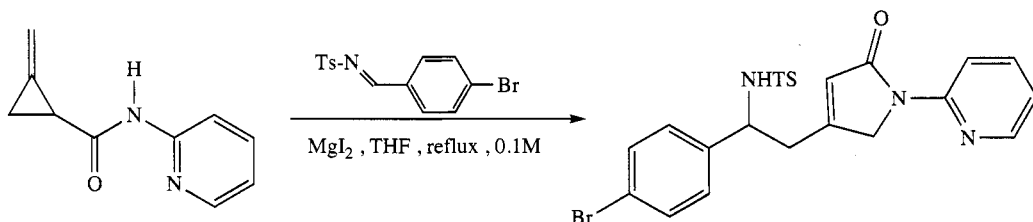
Hiersemann, M.; Abraham, L. *Eur. J. Org. Chem.* **2002**, 1461.

“Claisen Rearrangement Over the Last Nine Decades”

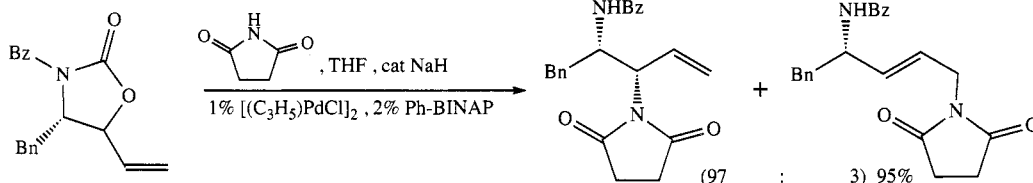
Castro, A.M.M. *Chem. Rev.* **2004**, 104, 2939.

Also via β -hydroxyaldehydes: Section 324 (Alcohol - Aldehyde)

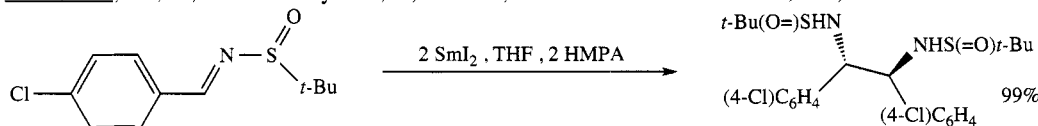
SECTION 342: AMIDE - AMIDE



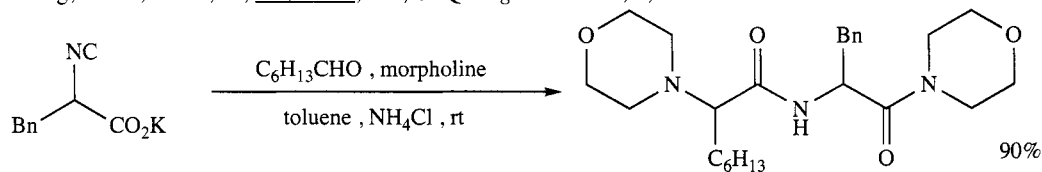
Lautens, M.; Han, W.; Liu, J.-H.C. *J. Am. Chem. Soc.* **2003**, 125, 4028.



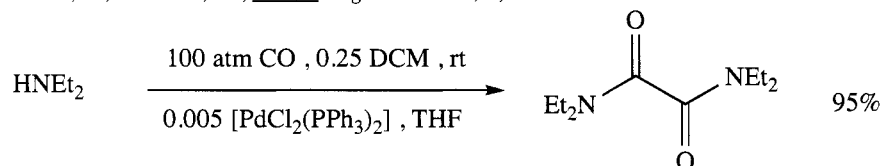
Cook, G.R.; Yu, H.; Sankaranarayanan, S.; Shanker, P.S. *J. Am. Chem. Soc.* **2003**, 125, 5115.



Zhong, Y.-W.; Izumi, K.; Xu, M.-H.; Lin, G.-Q. *Org. Lett.* **2004**, 6, 4747.



Bonne, D.; Dekhane, M.; Zhu, J. *Org. Lett.* **2004**, 6, 4771.

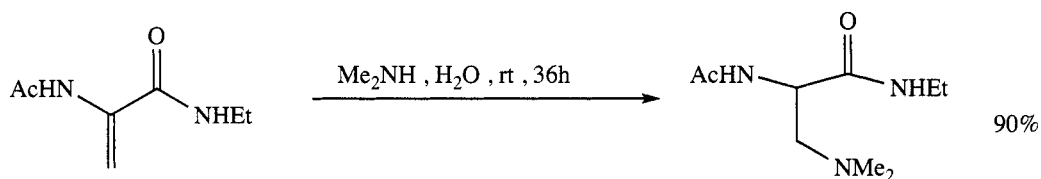


Hiwtari, K.; Kayaki, Y.; Okita, K.; Uki, T.; Shimizu, I.; Yamamoto, A. *Bull. Chem. Soc. Jpn.* **2004**, 77, 2237.

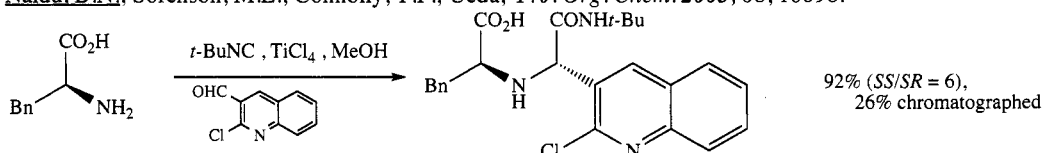
Also via Dicarboxylic Acids:
Diamines

Section 312 (Carboxylic Acid - Carboxylic Acid)
Section 350 (Amine - Amine)

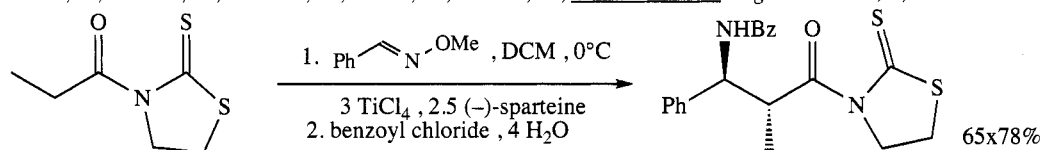
SECTION 343: AMIDE - AMINE



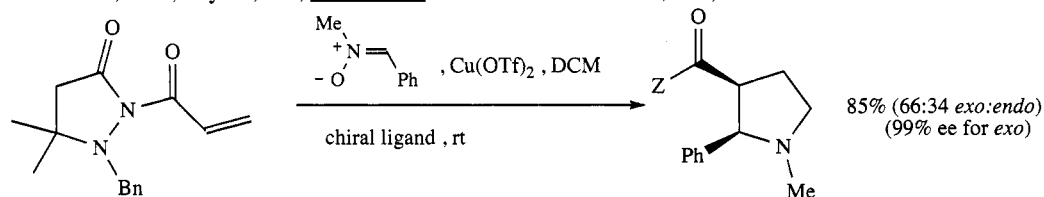
Naidu, B.N.; Sorenson, M.E.; Connolly, T.P.; Ueda, Y. *J. Org. Chem.* **2003**, 68, 10098.



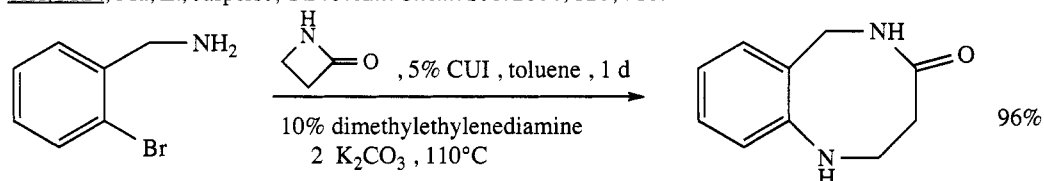
Godet, T.; Bonvin, Y.; Vincent, G.; Merle, D.; Thozet, A.; Ciufolini, M.A. *Org. Lett.* **2004**, 6, 3281.



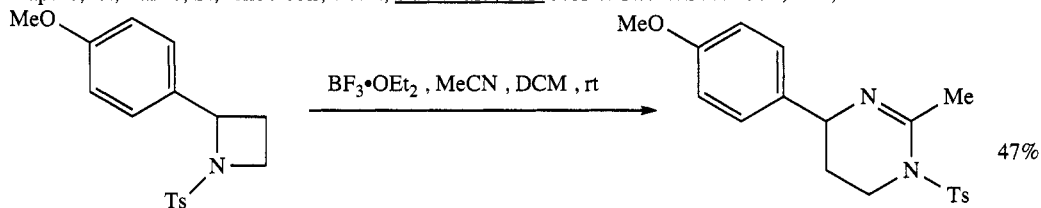
Ambhaikar, N.B.; Snyder, J.P.; Liotta, D.C. *J. Am. Chem. Soc.* **2003**, 125, 3690.



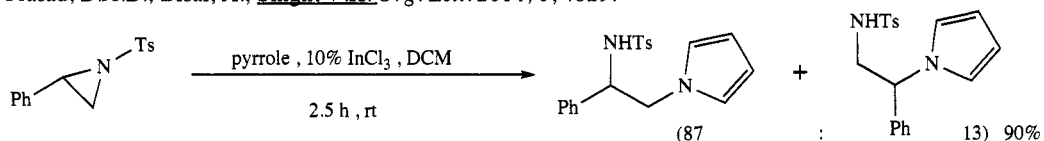
Sibi, M.P.; Ma, Z.; Jasperse, C.P. *J. Am. Chem. Soc.* **2004**, 126, 718.



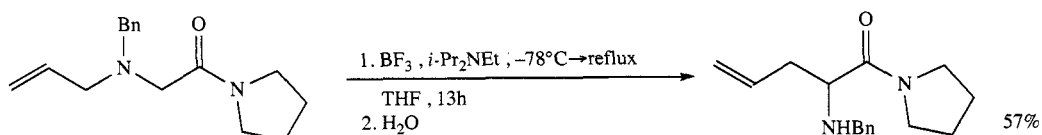
Klapars, A.; Parris, S.; Anderson, K.W.; Buchwald, S.L. *J. Am. Chem. Soc.* **2004**, 126, 3529.



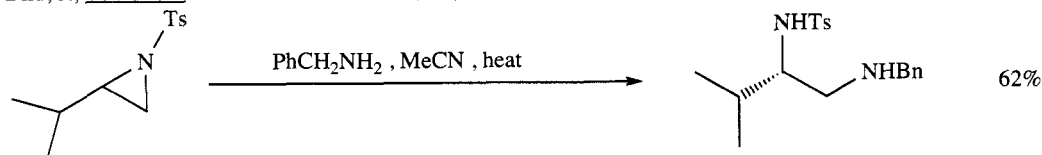
Prasad, B.A.B.; Bisai, A.; Singh, V.K. *Org. Lett.* **2004**, 6, 4829.



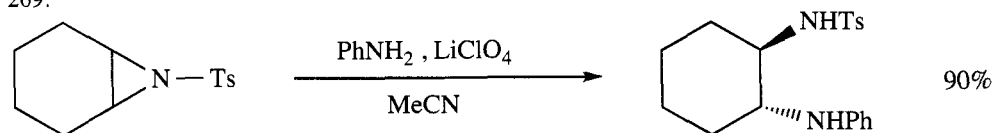
Yadav, J.S.; Reddy, B.V.S.; Abraham, S.; Sabitha, G. *Tetrahedron Lett.* **2002**, 43, 1565.



Blid, J.; Somfai, P. *Tetrahedron Lett.* **2003**, 44, 3159.

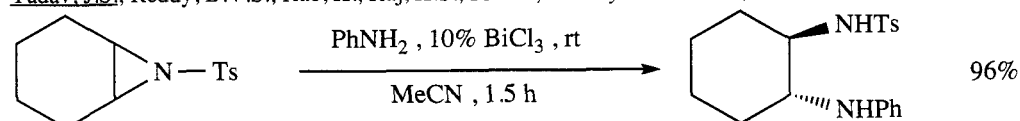


Scheuermann, J.E.W.; Ilyashenko, G.; Griffiths, D.V.; Watkinson, M. *Tetrahedron: Asymmetry* **2002**, 13, 269.

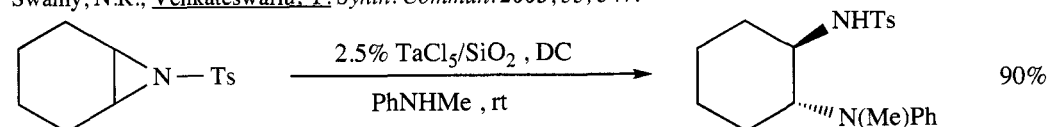


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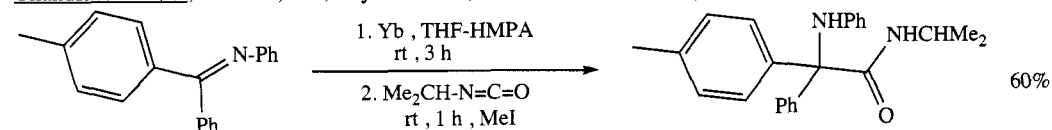
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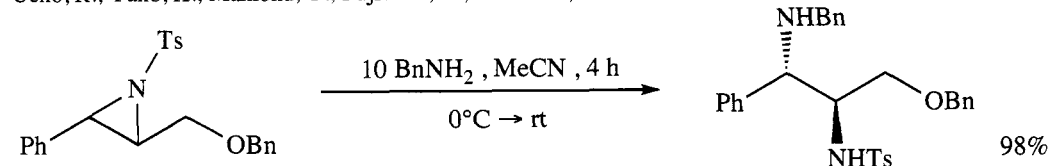
Swamy, N.R.; Venkateswarlu, Y. *Synth. Commun.* **2003**, 33, 547.



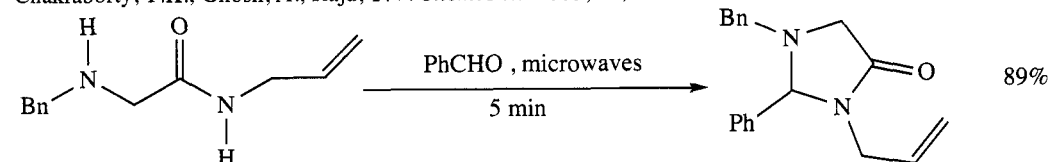
Chandrasekhar, S.; Prakash, S.J.; Shyamsunder, T.; Ramachandar, T. *Synth. Commun.* **2004**, 34, 3865.



Ueno, R.; Yano, K.; Makioka, Y.; Fujiwara, Y.; Kitamura, T. *Chem. Lett.* **2002**, 31, 790.

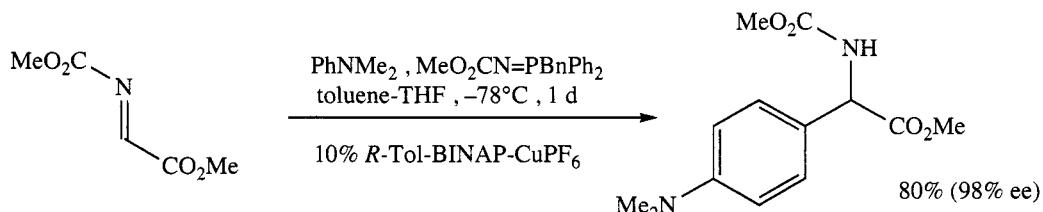


Chakraborty, T.K.; Ghosh, A.; Raju, T.V. *Chem. Lett.* **2003**, 32, 82.

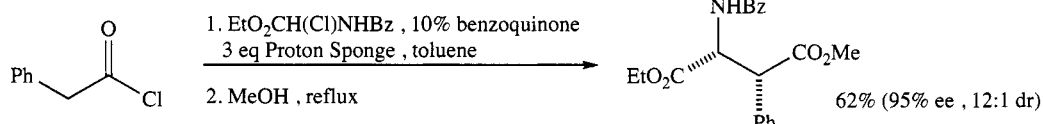


Pospíšil, J.; Potáček, M. *Heterocycles* **2004**, 63, 1165.

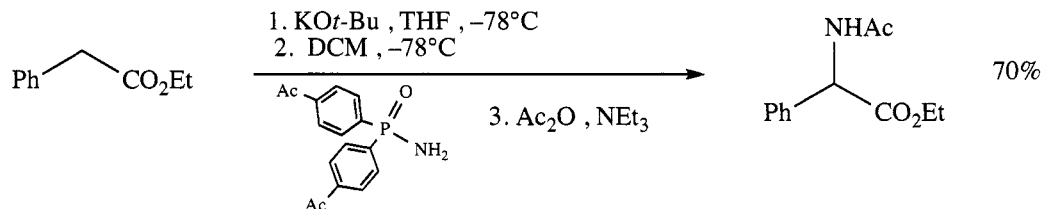
SECTION 344: AMIDE - ESTER



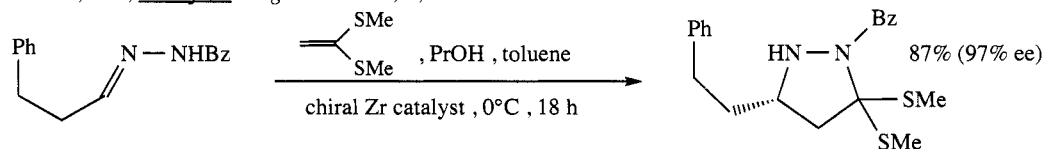
Saaby, S.; Bayón, P.; Aburel, P.S.; Jørgensen, K.A. *J. Org. Chem.* **2002**, 67, 4352.



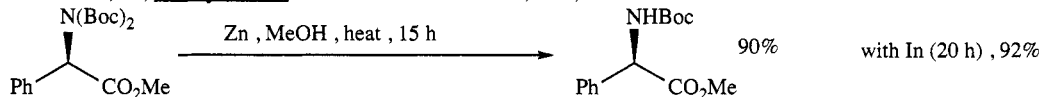
Hafez, A.M.; Dudding, T.; Wagerle, Ty.R.; Shah, M.H.; Taggi, A.E.; Lectka, T. *J. Org. Chem.* **2003**, 68, 5819.



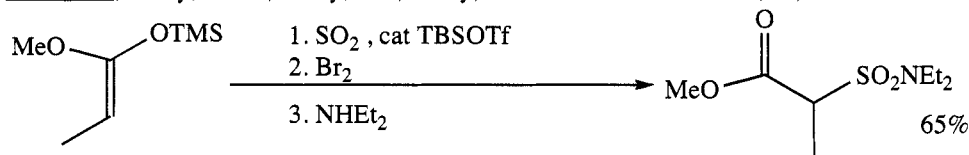
Smulik, J.A.; Vedejs, E. *Org. Lett.* **2003**, 5, 4187.



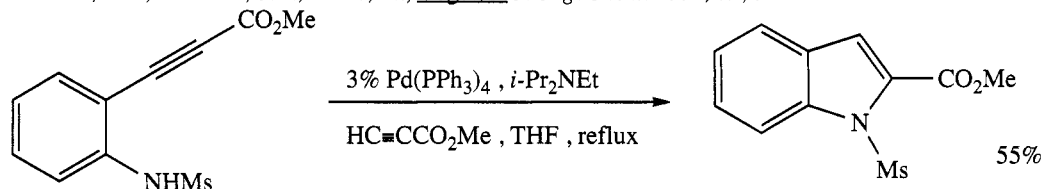
Yamashita, Y.; Kobayashi, S. *J. Am. Chem. Soc.* **2004**, 126, 11279.



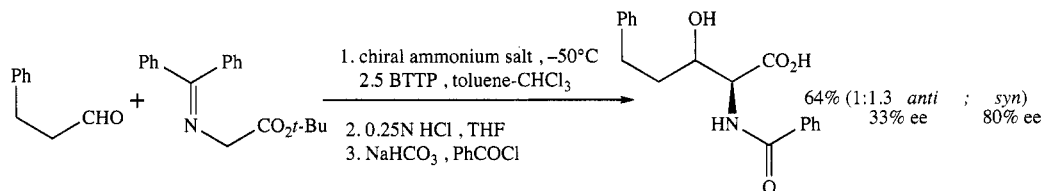
Yadav, J.S.; Reddy, B.V.S.; Reddy, K.S.; Reddy, K.B. *Tetrahedron Lett.* **2002**, 43, 1549.



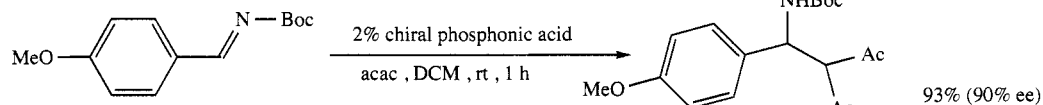
Bouchez, L.C.; Dubbaka, S.R.; Turks, M.; Vogel, P. *J. Org. Chem.* **2004**, 69, 6413.



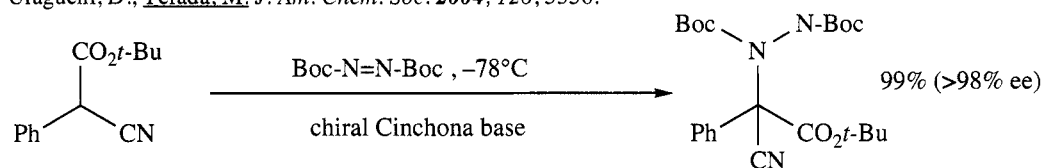
Horoya, K.; Matsumoto, S.; Sakamoto, T. *Org. Lett.* **2004**, 6, 2953.



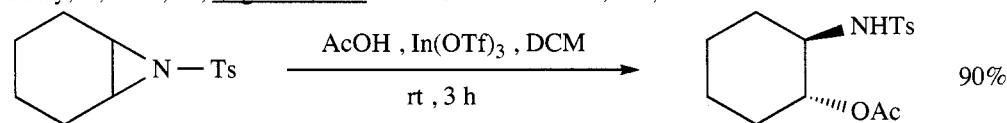
Mettath, S.; Srikanth, G.S.C.; Dangerfield, B.S.; Castle, S.L. *J. Org. Chem.* **2004**, 69, 6489.



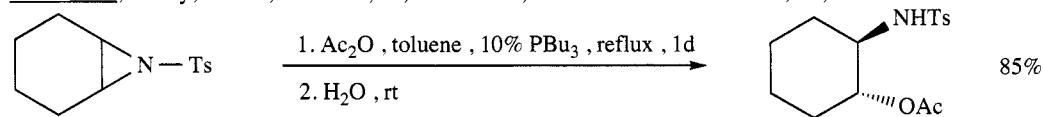
Uraguchi, D.; Terada, M. *J. Am. Chem. Soc.* **2004**, 126, 5356.



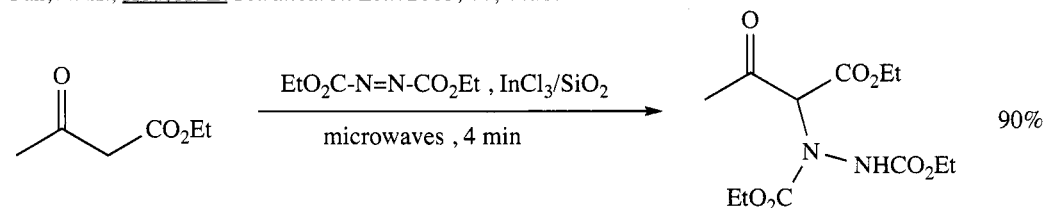
Saaby, S.; Bella, M.; Jørgensen, K.A. *J. Am. Chem. Soc.* **2004**, 126, 8120.



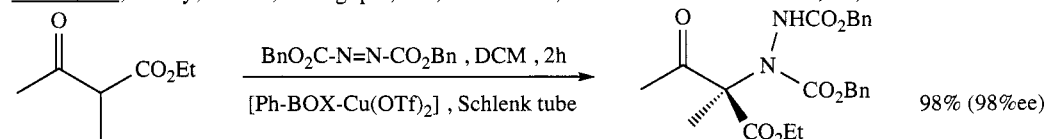
Yadav, J.S.; Reedy, B.V.S.; Sadashiv, K.; Harikishan, K. *Tetrahedron Lett.* **2002**, 43, 2099.



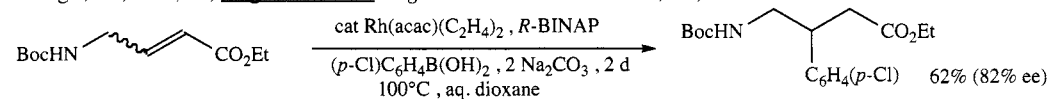
Fan, R.-H.; Hou, X.-L. *Tetrahedron Lett.* **2003**, 44, 4411.



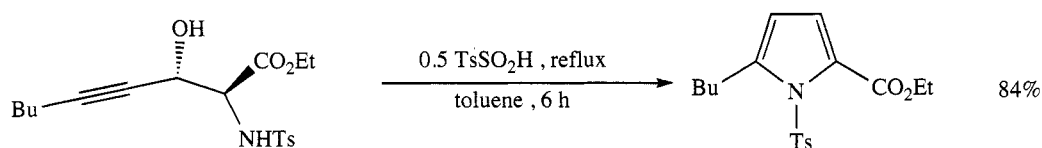
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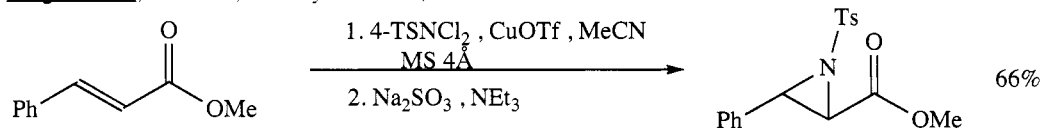
Marigo, M.; Juhl, K.; Jørgensen, K.A. *Angew. Chem. Int. Ed.* **2003**, 42, 1367.



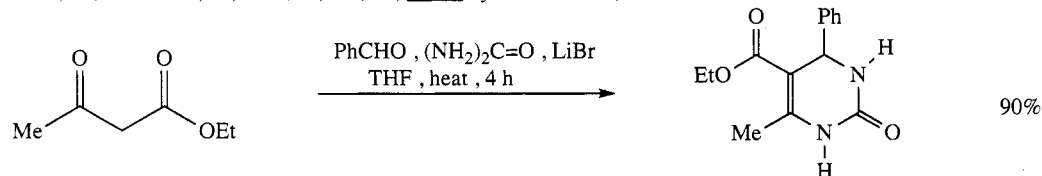
Meyer, O.; Becht, J.-M.; Helmchen, G. *Synlett* **2003**, 1539.



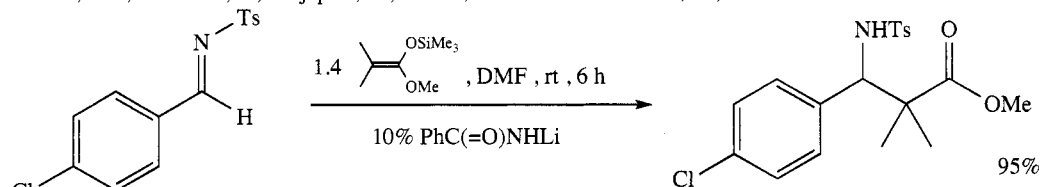
Knight, D.W.; Sharland, C.M. *Synlett* **2003**, 2258.



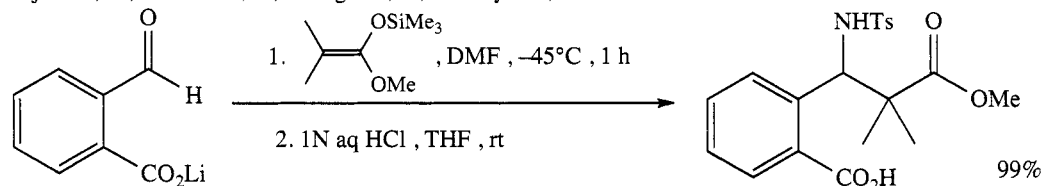
Chen, D.; Timmons, C.; Guo, L.; Xu, X.; Li, G. *Synthesis* **2004**, 2479.



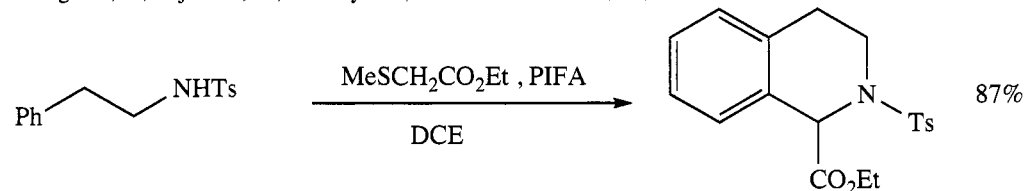
Baruah, P.P.; Gadhwal, S.; Prajapati, D.; Sandu, J.S. *Chem. Lett.* **2002**, 31, 1038.



Fujisawa, H.; Takahashi, E.; Nakagawa, T.; Mukaiyama, T. *Chem. Lett.* **2003**, 32, 1036.



Nakagawa, T.; Fujisawa, H.; Mukaiyama, T. *Chem. Lett.* **2004**, 33, 92.



Kang, L.-J.; Wang, H.-M.; Su, C.-H.; Chen, L.-C. *Heterocycles* **2002**, 57, 1.

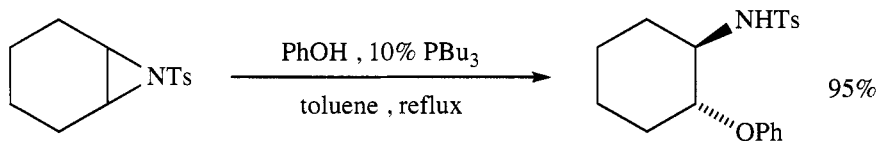
Related Methods:

Section 315 (Carboxylic Acid - Amide)

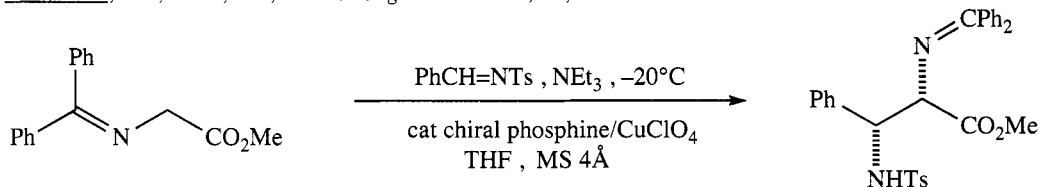
Section 316 (Carboxylic Acid - Amine)

Section 351 (Amine - Ester)

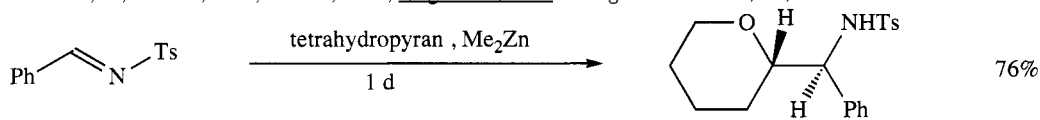
SECTION 345: AMIDE - ETHER, EPOXIDE, THIOETHER



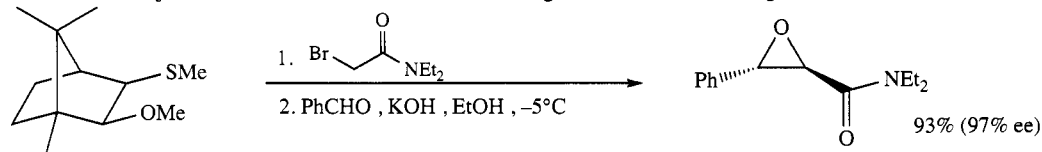
Hou, X.-L.; Fan, R.-H.; Dai, L.-X. *J. Org. Chem.* **2002**, *67*, 5295.



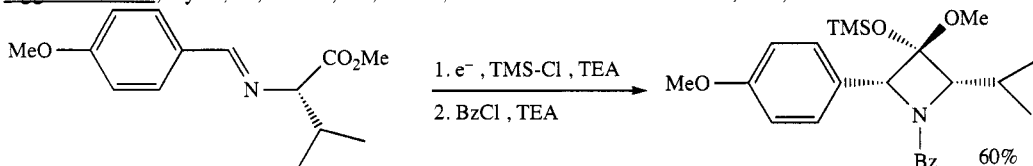
Bernardi, L.; Gothef, A.S.; Hazell, R.G.; Jørgensen, K.A. *J. Org. Chem.* **2003**, *68*, 2583.



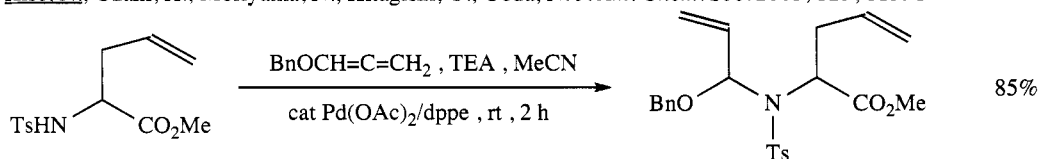
Yamada, K.; Fujihara, H.; Yamamoto, Y.; Miwa, Y.; Taga, T.; Tomioka, K. *Org. Lett.* **2002**, *4*, 3509.



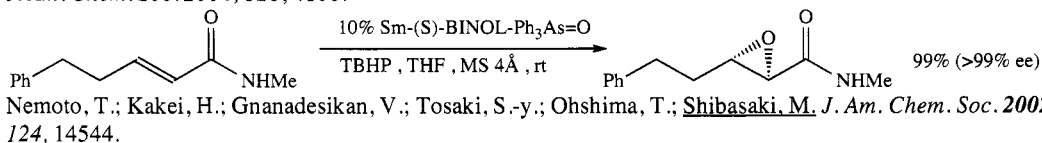
Aggarwal, V.K.; Hynd, G.; Picoul, W.; Vasse, J.-L. *J. Am. Chem. Soc.* **2002**, *124*, 9964.



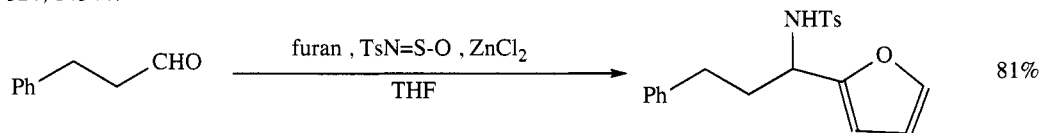
Kise, N.; Ozaki, H.; Moriyama, N.; Kitagishi, Y.; Ueda, N. *J. Am. Chem. Soc.* **2003**, *125*, 11591.



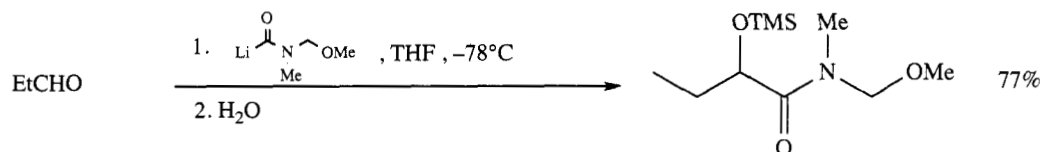
Kinderman, S.S.; de Gelder, R.; van Maarseveen, J.H.; Schoemaker, H.E.; Hiemstra, H.; Rutjes, F.P.J.T. *J. Am. Chem. Soc.* **2004**, *126*, 4100.



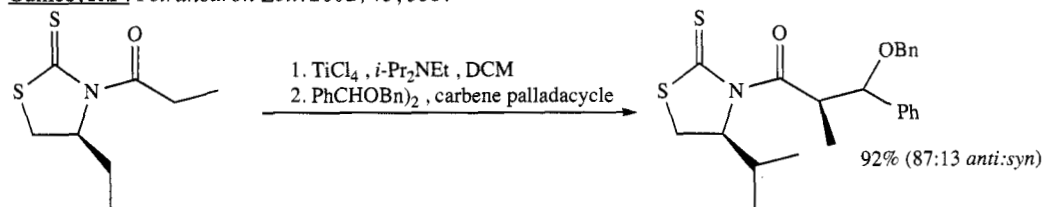
Nemoto, T.; Kakei, H.; Gnanadesikan, V.; Tosaki, S.-y.; Ohshima, T.; Shibasaki, M. *J. Am. Chem. Soc.* **2002**, *124*, 14544.



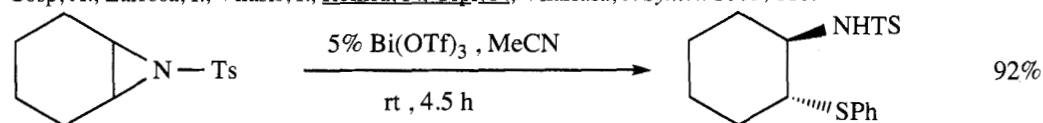
Padwa, A.; Zanka, A.; Cassidy, M.P.; Harris, J.M. *Tetrahedron* **2003**, *59*, 4939.



Cunico, R.F. *Tetrahedron Lett.* **2002**, 43, 355.

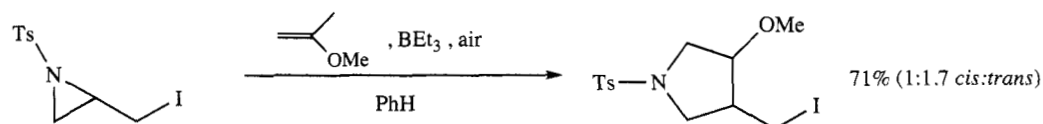


Cosp, A.; Larrosa, I.; Vilasís, I.; Romea, P.; Urpí, F.; Vilarrasa, J. *Synlett* **2003**, 1109.

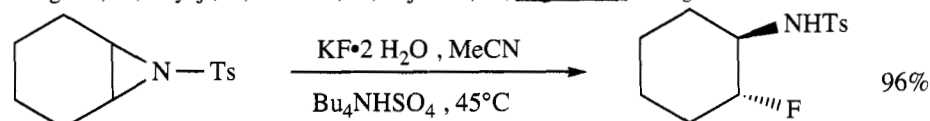


Yadav, J.S.; Reddy, B.V.S.; Baishya, G.; Reddy, V.; Harshavardhan, S.J. *Synthesis* **2004**, 1854.

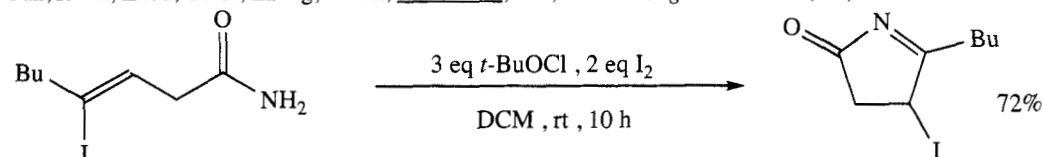
SECTION 346: AMIDE - HALIDE, SULFONATE



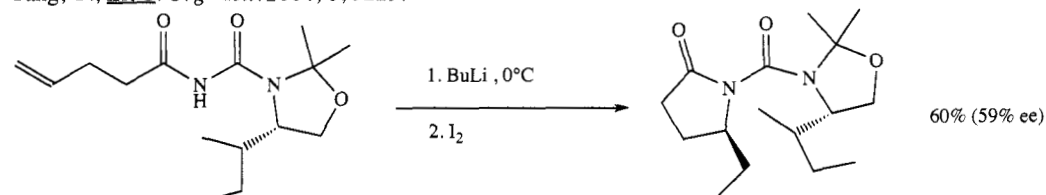
Kitagawa, O.; Miyaji, S.; Yamada, Y.; Fujiwara, H.; Taguchi, T. *J. Org. Chem.* **2003**, 68, 3184.



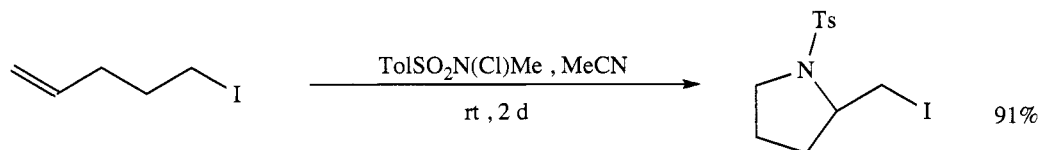
Fan, R.-H.; Zhou, Y.-G.; Zhang, W.-X.; Hou, X.-L.; Dai, L.-X. *J. Org. Chem.* **2004**, 69, 335.



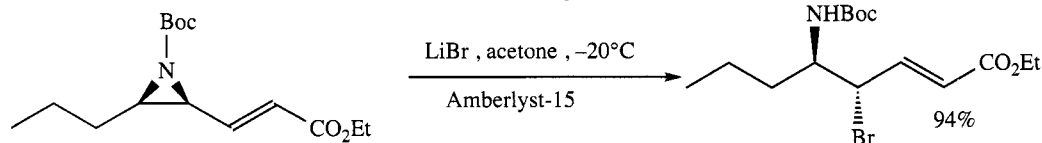
Tang, Y.; Li, C. *Org. Lett.* **2004**, 6, 3229.



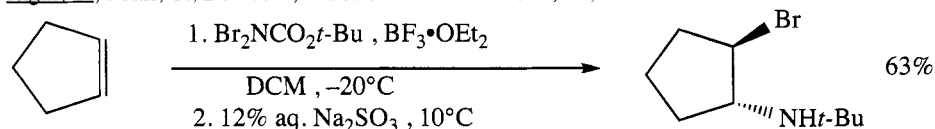
Shen, M.; Li, C. *J. Org. Chem.* **2004**, 69, 7906.



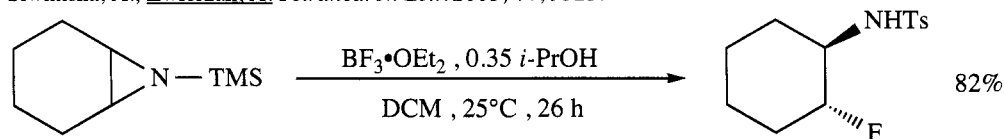
Minakata, S.; Kano, D.; Oderaotoshi, Y.; Komatsu, M. *Org. Lett.* **2002**, 4, 2097.



Righi, G.; Poini, C.; Bovicelli, P. *Tetrahedron Lett.* **2002**, 43, 5867.

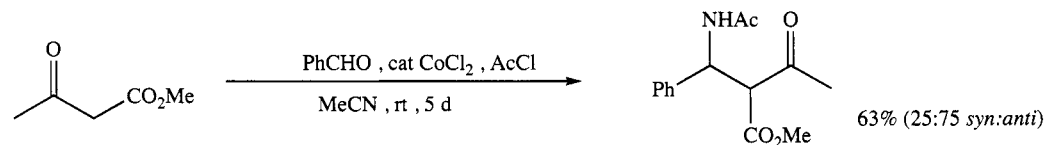


Siwnnska, A.; Zwierzak, A. *Tetrahedron Lett.* **2003**, 44, 9323.

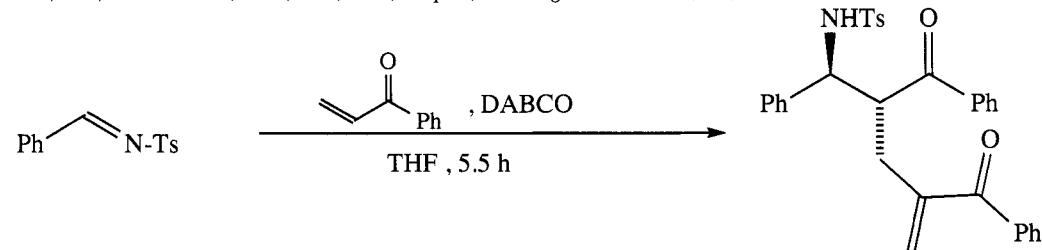


Ding, C.-H.; Dai, L.-X.; Hou, X.-L. *Synlett* **2004**, 2218.

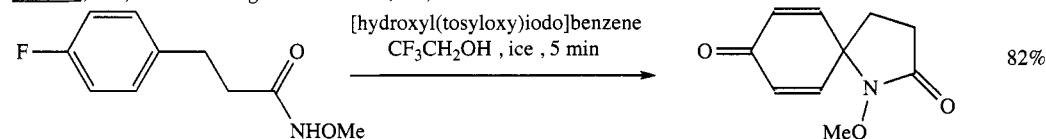
SECTION 347: AMIDE - KETONE



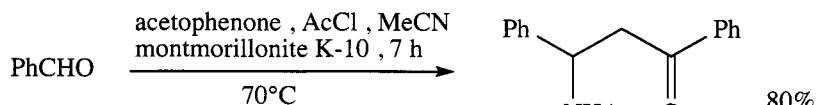
Rao, I.N.; Prabhakaran, E.N.; Das, S.K.; UIqbal, J. *J. Org. Chem.* **2003**, 68, 4079.



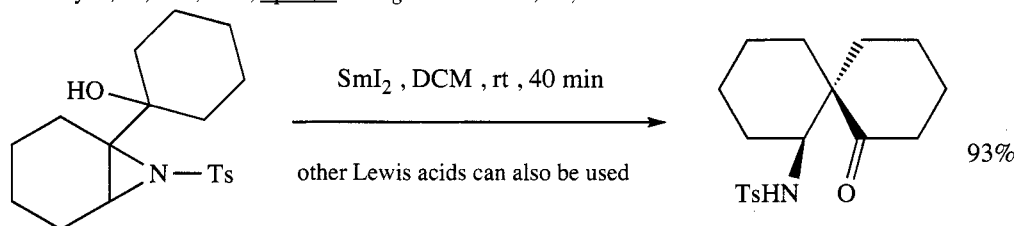
Shi, M.; Xu, Y.-M. *J. Org. Chem.* **2003**, 68, 4784.



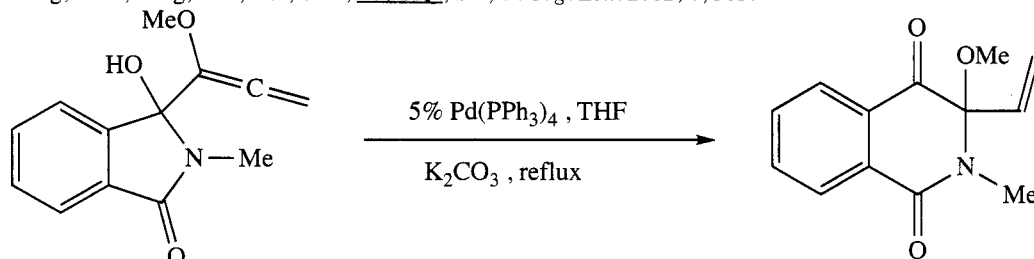
Miyazawa, E.; Sakamoto, T.; Kikugawa, Y. *J. Org. Chem.* **2003**, 68, 5429.



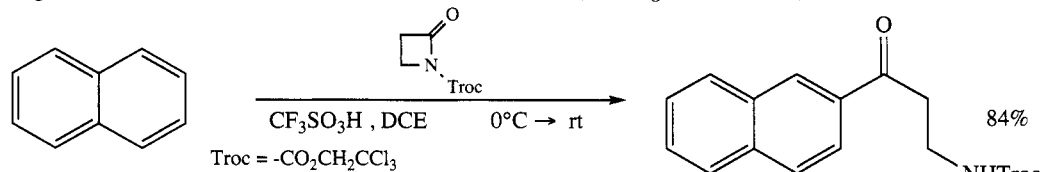
Buhulayan, D.; Das, S.K.; Iqbal, J. *J. Org. Chem.* **2003**, 68, 5735.



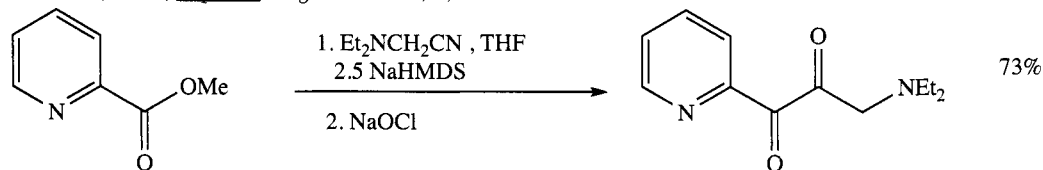
Wang, B.M.; Song, Z.L.; Fan, C.A.; Tu, Y.Q.; Shi, Y. *Org. Lett.* **2002**, 4, 363.



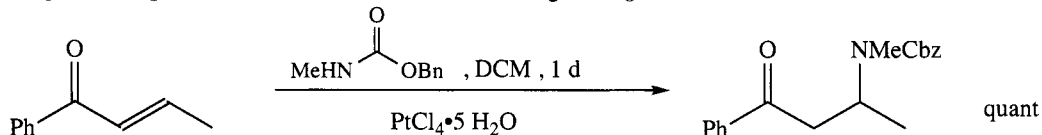
Nagao, Y.; Ueki, A.; Asano, K.; Tanaka, S.; Sano, S.; Shiro, M. *Org. Lett.* **2002**, 4, 455.



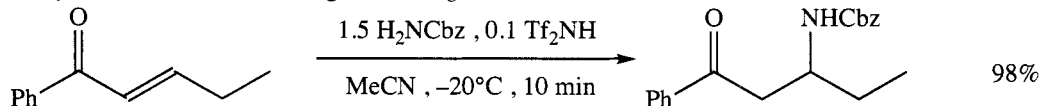
Anderson, K.W.; Tepe, J.J. *Org. Lett.* **2002**, 4, 459.



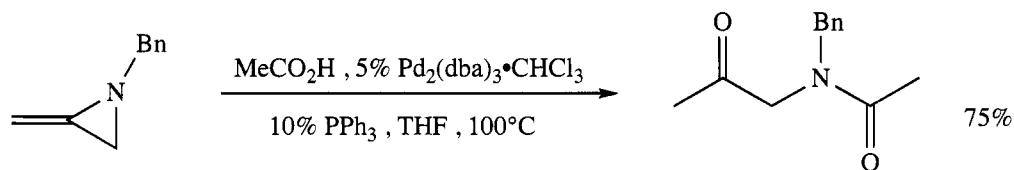
Yang, Z.; Zhang, Z.; Meanwell, N.A.; Kadow, J.F.; Wang, T. *Org. Lett.* **2002**, 4, 1103.



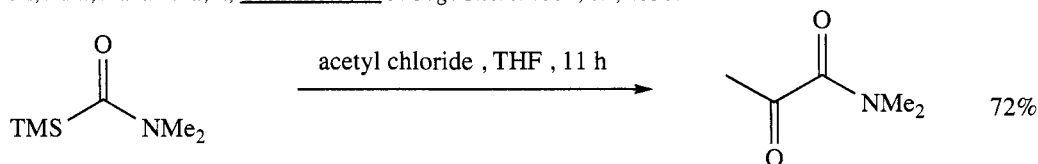
Kobayashi, S.; Kukumoto, K.; Sugiura, M. *Org. Lett.* **2002**, 4, 1319.



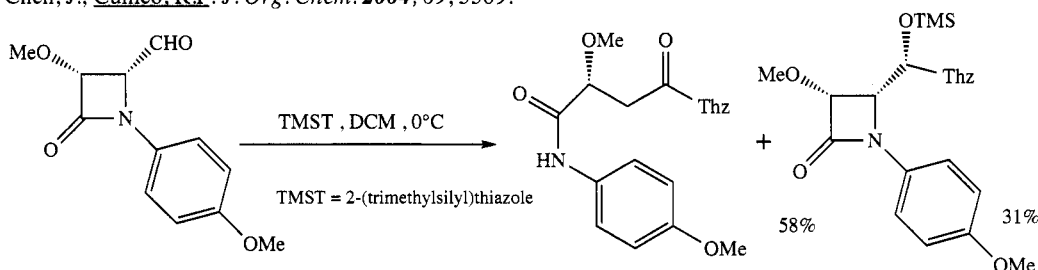
Wabintz, T.C.; Spencer, J.B. *Org. Lett.* **2003**, 5, 2141.



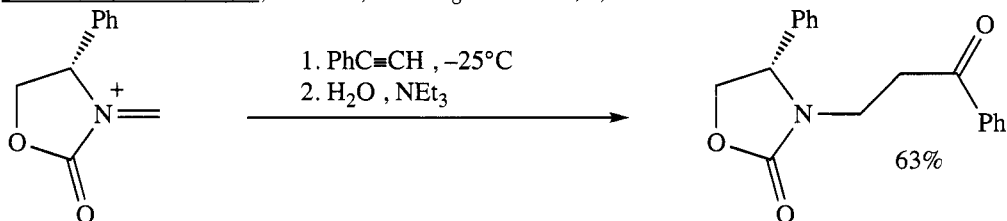
Oh, B.H.; Nakamura, I.; Yamamoto, Y. *J. Org. Chem.* **2004**, 69, 2856.



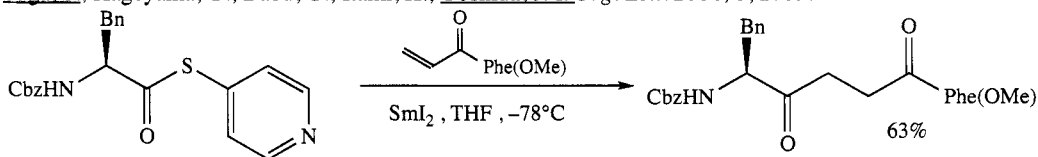
Chen, J.; Cunico, R.F. *J. Org. Chem.* **2004**, 69, 5509.



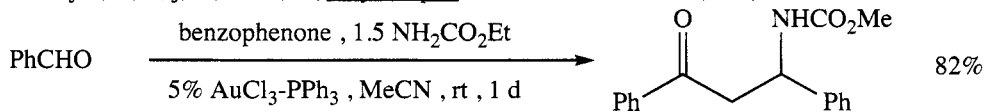
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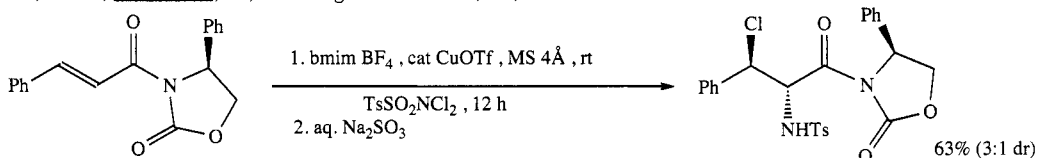
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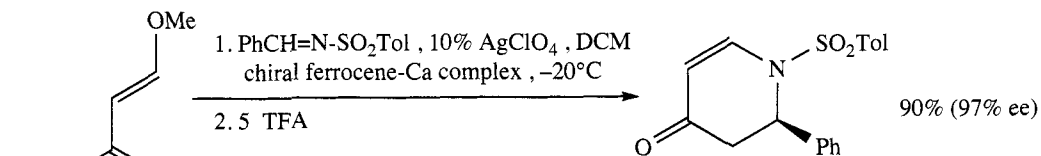
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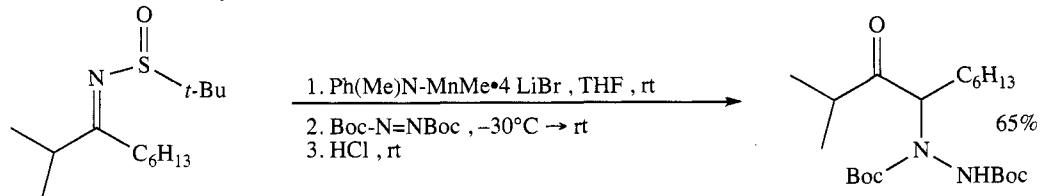
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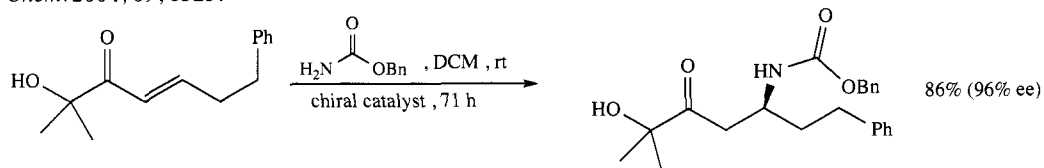
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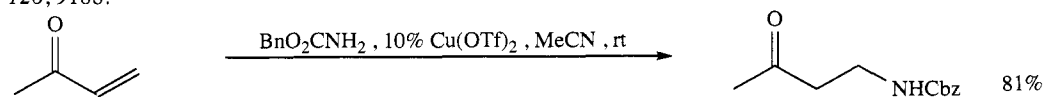
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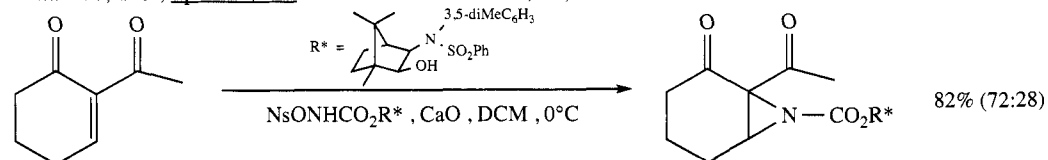
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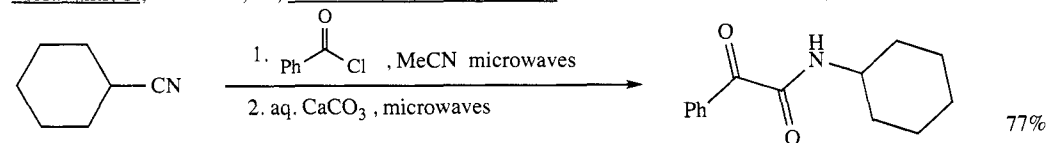
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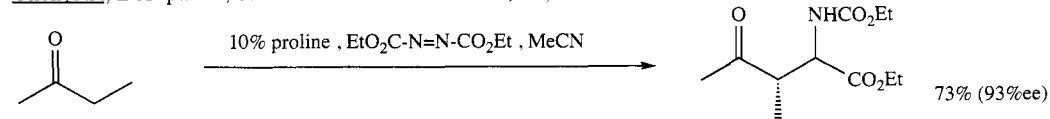
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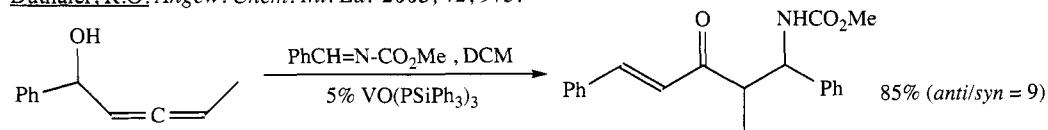
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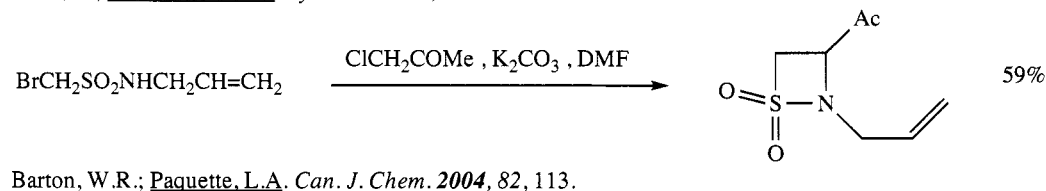
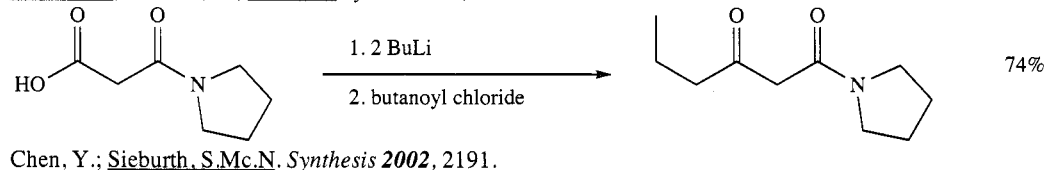
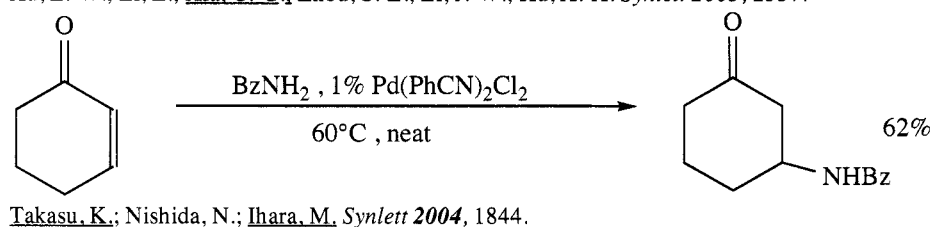
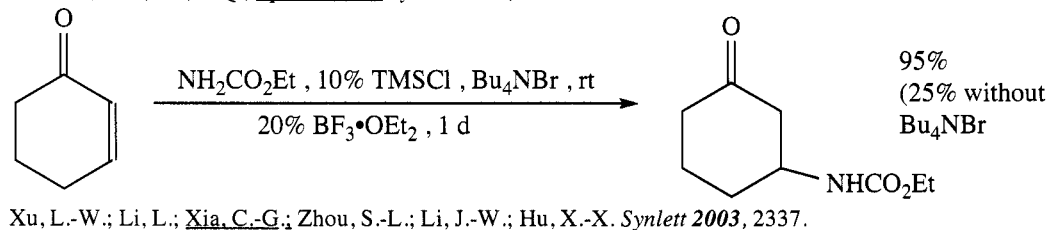
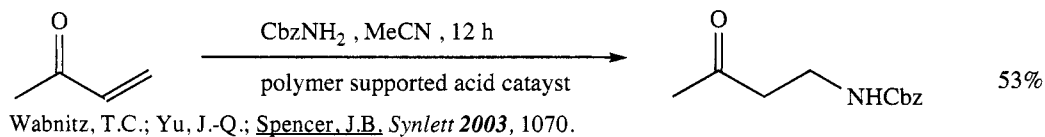
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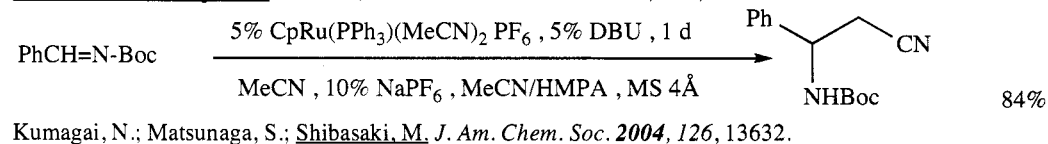
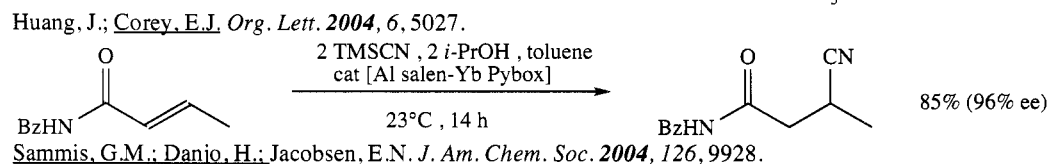
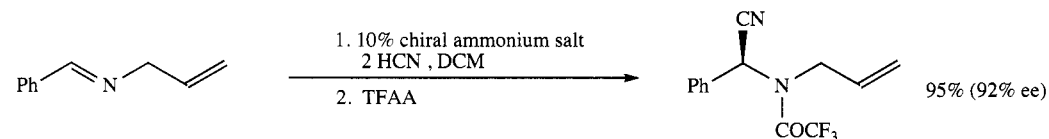
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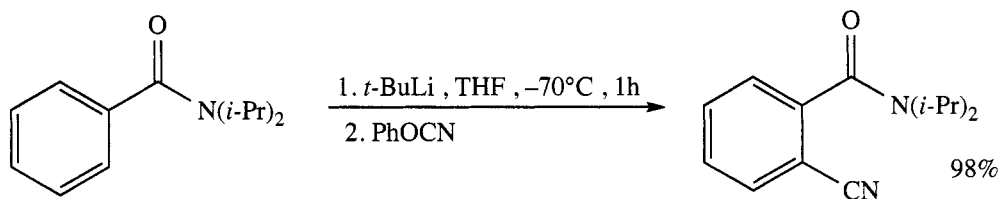


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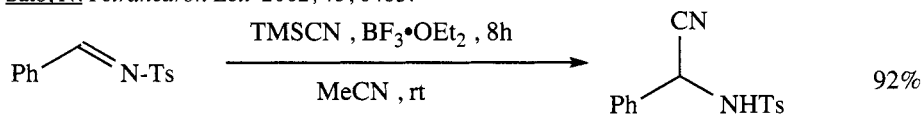


SECTION 348: AMIDE - NITRILE



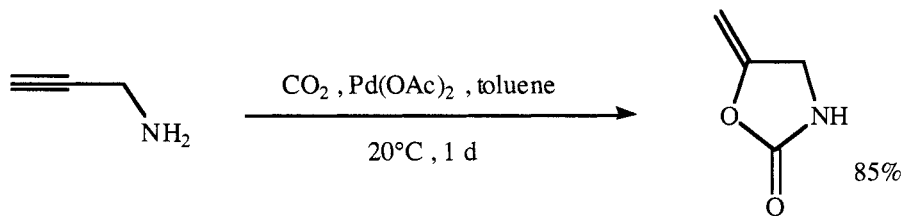


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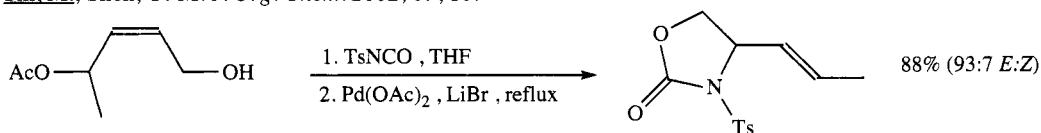


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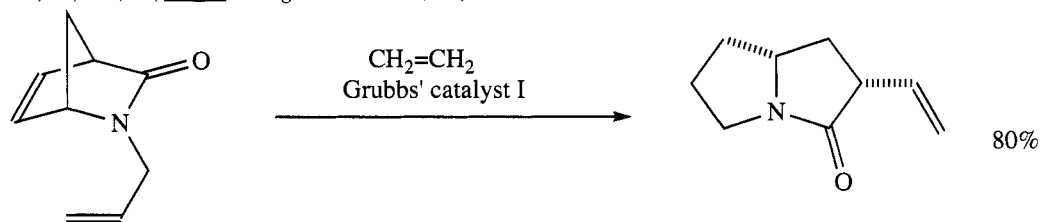
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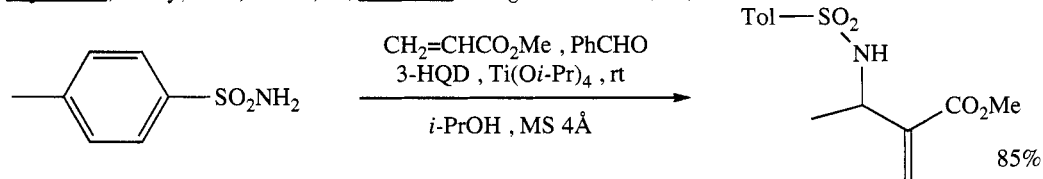
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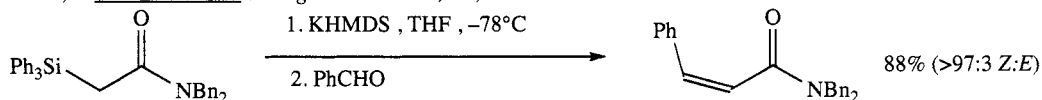
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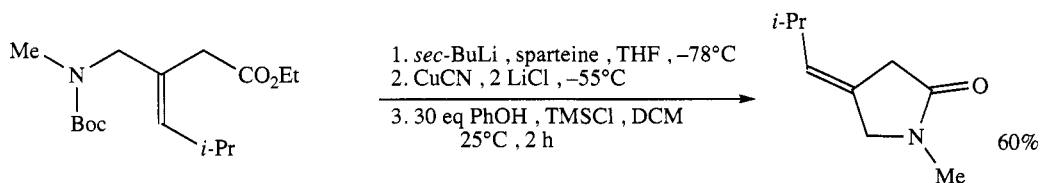
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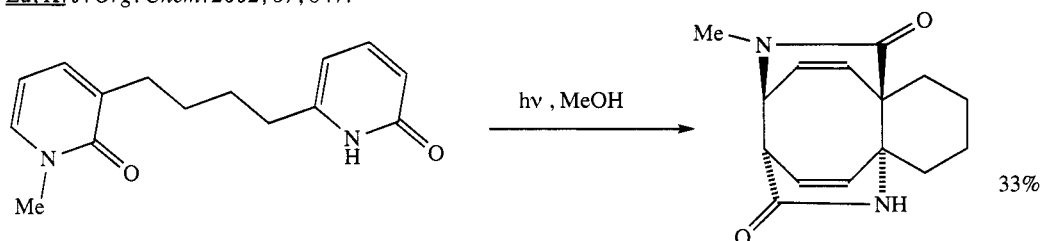
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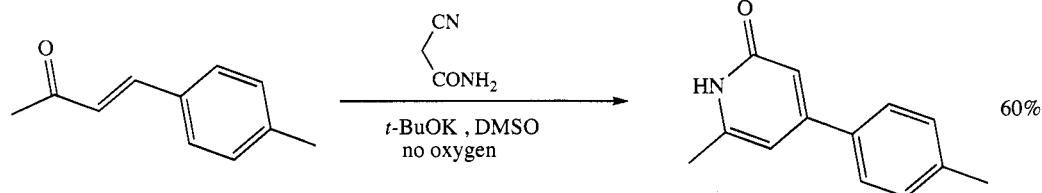
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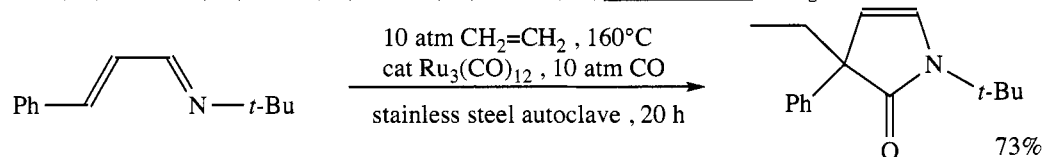
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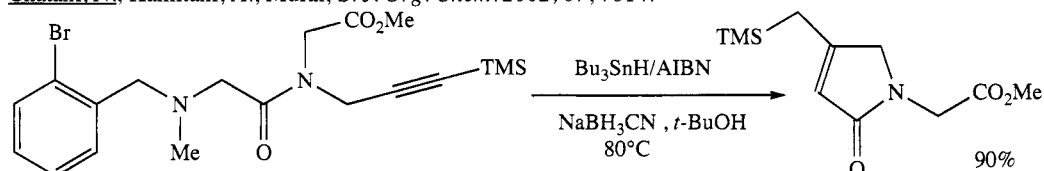
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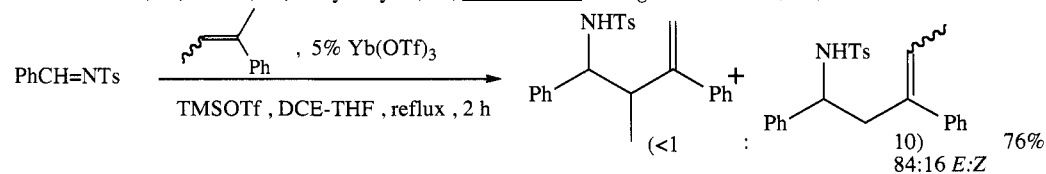
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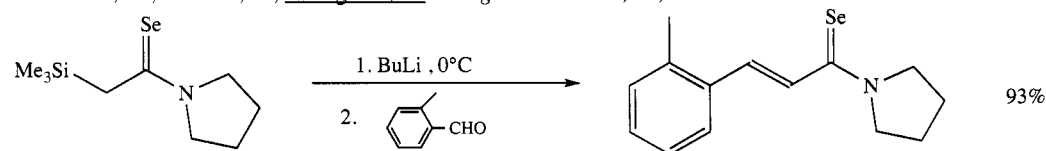
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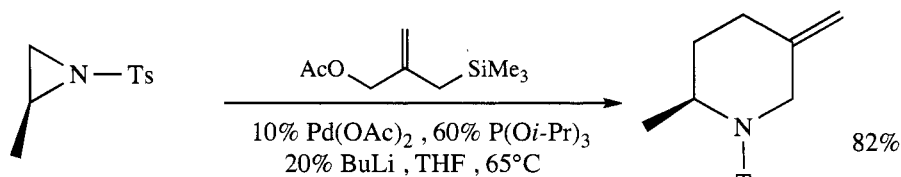
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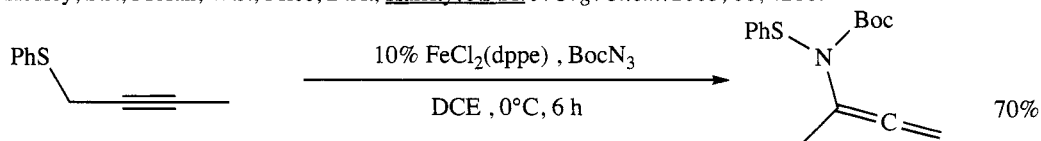
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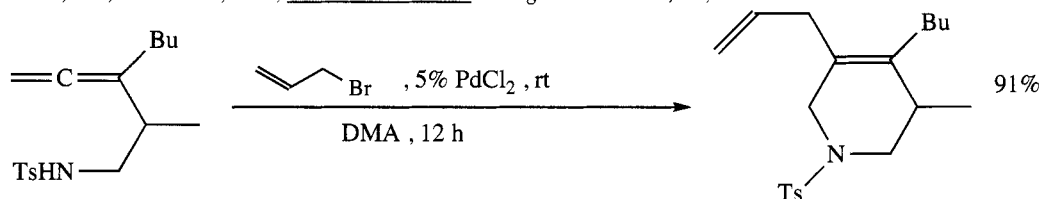
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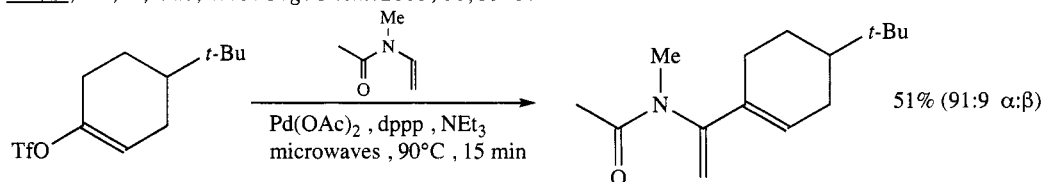
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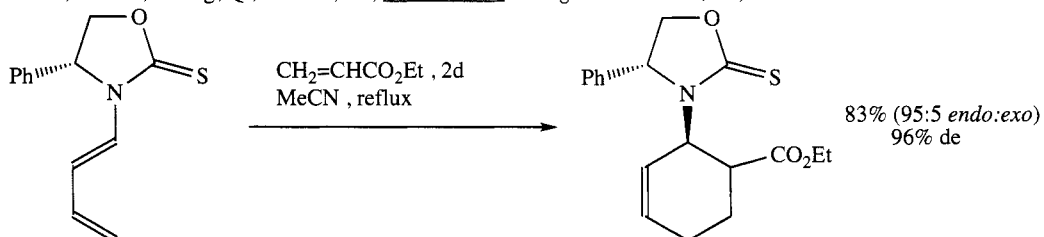
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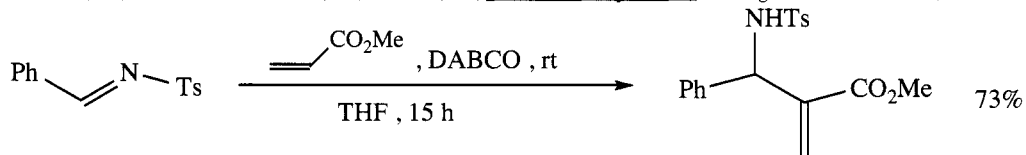
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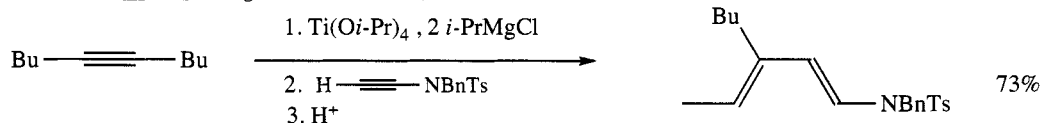
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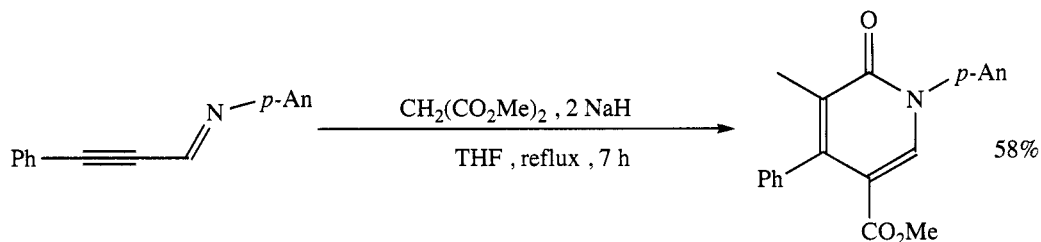
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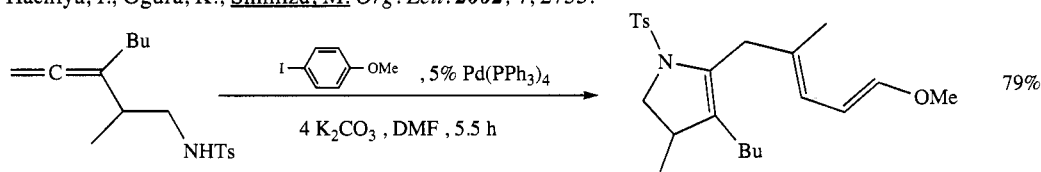
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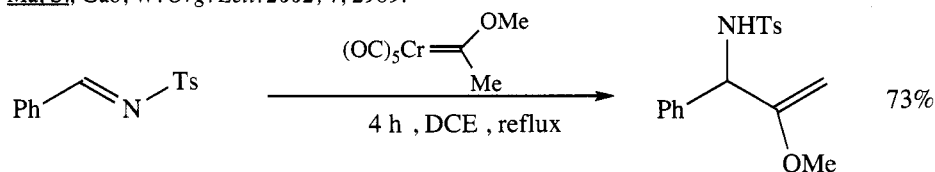
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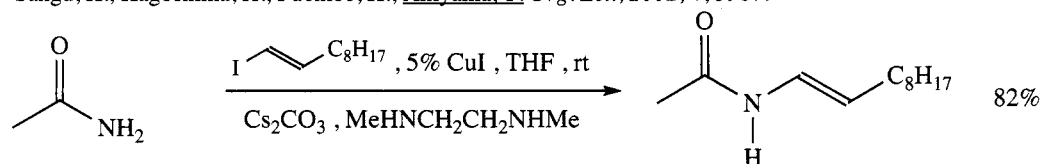
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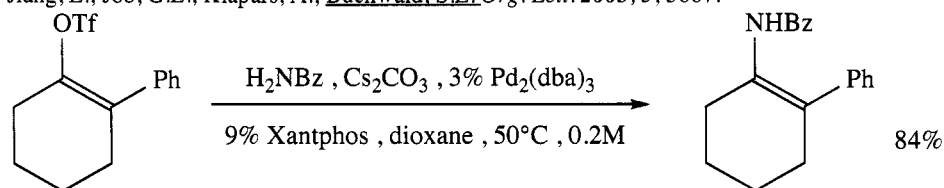
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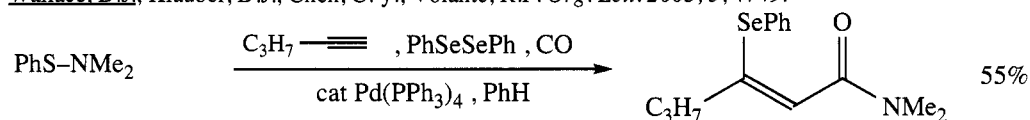
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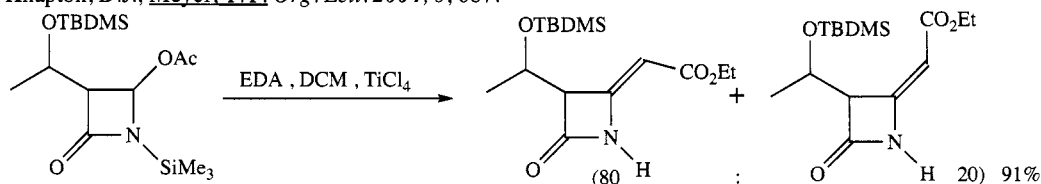
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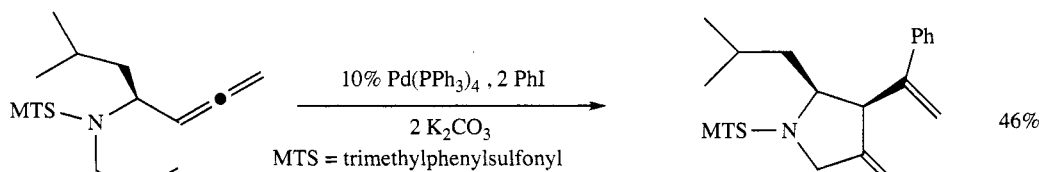
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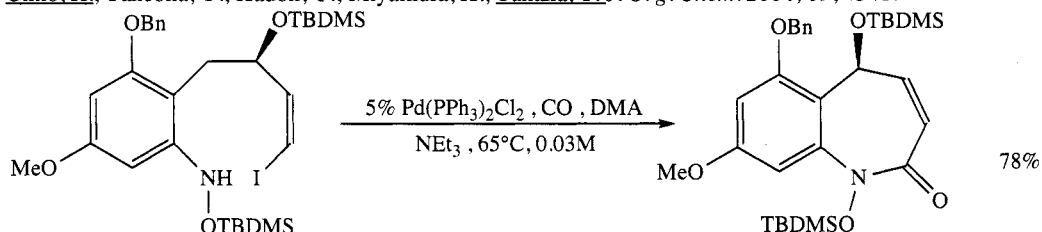
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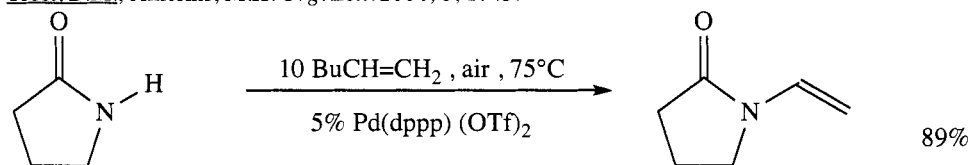
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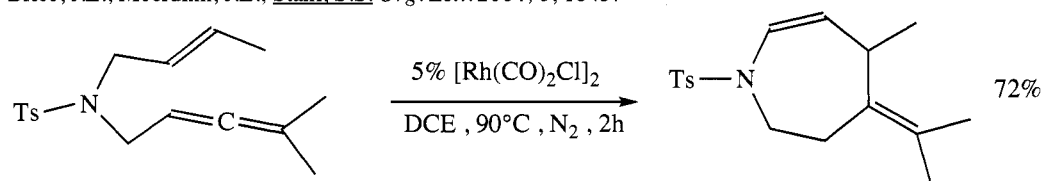
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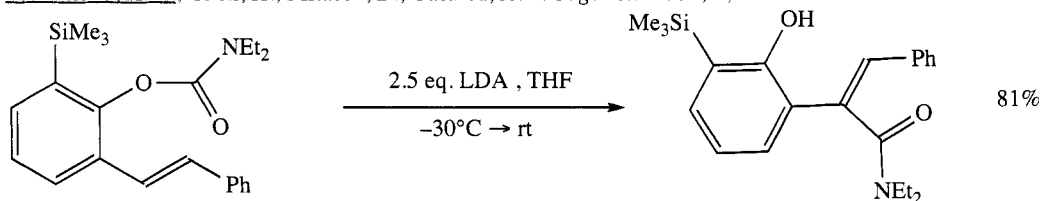
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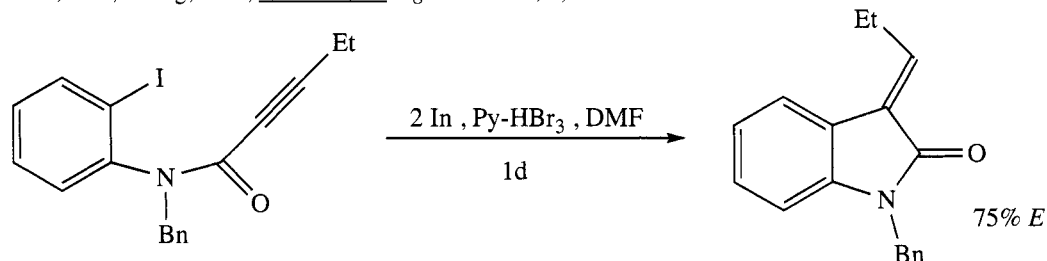
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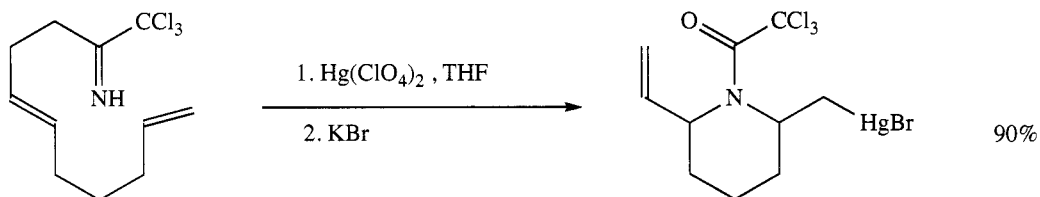
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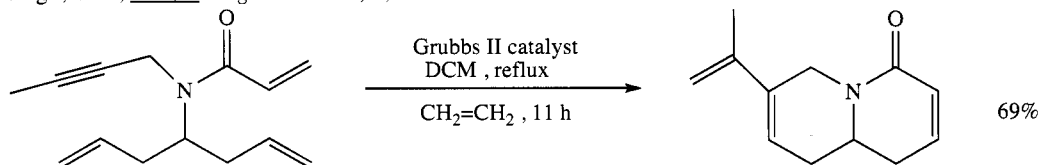
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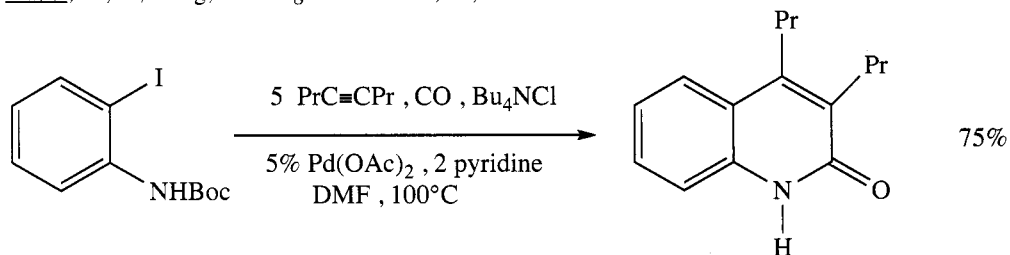
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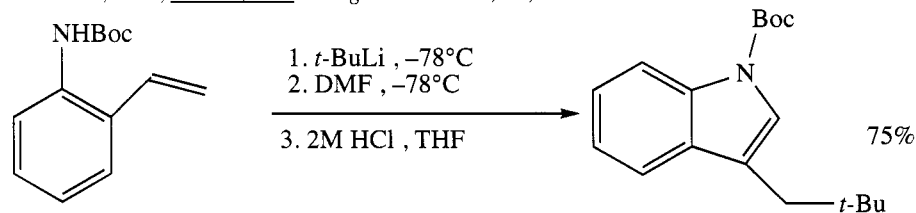
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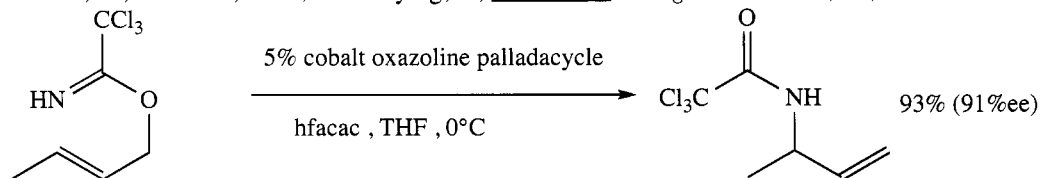
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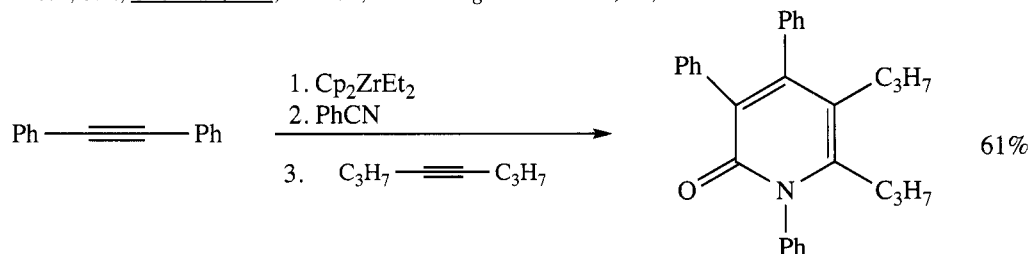
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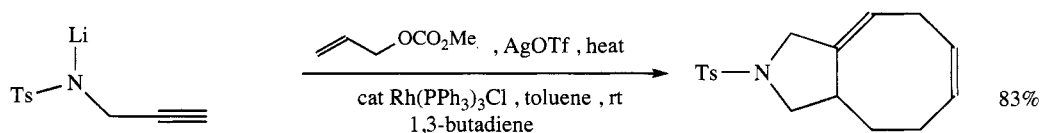
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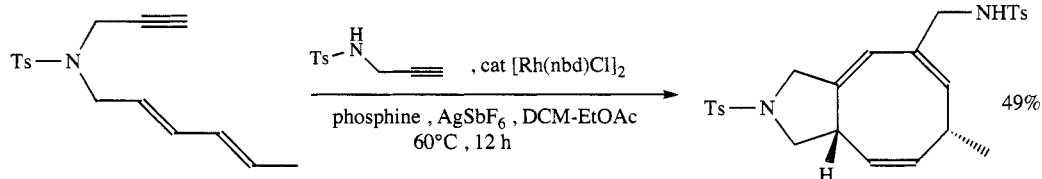
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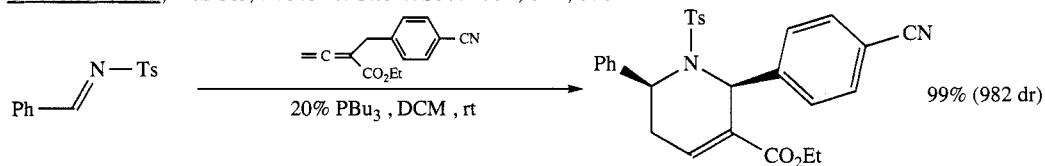
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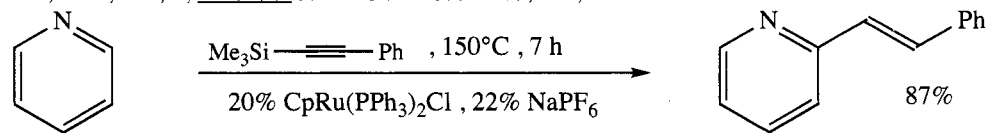
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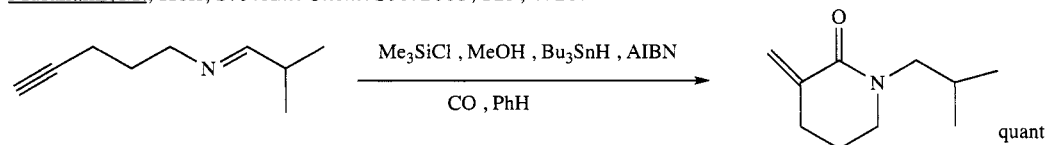
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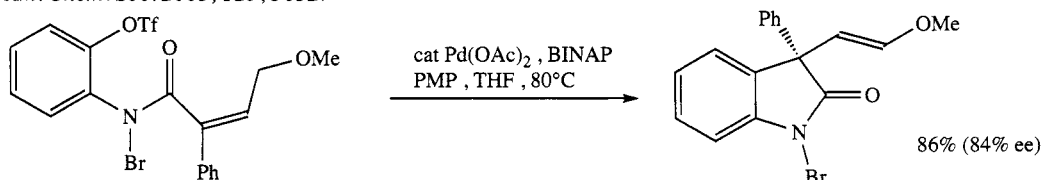
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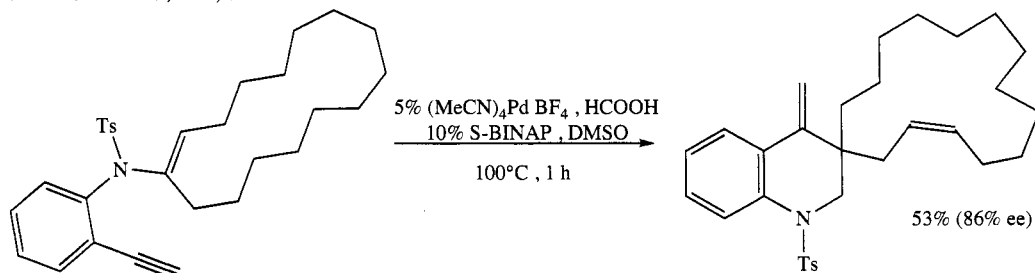
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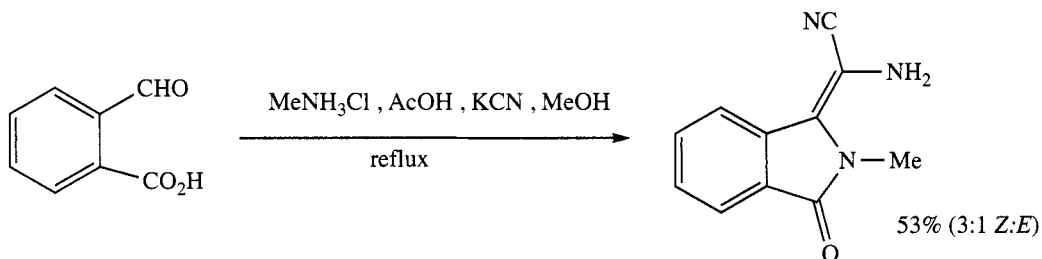
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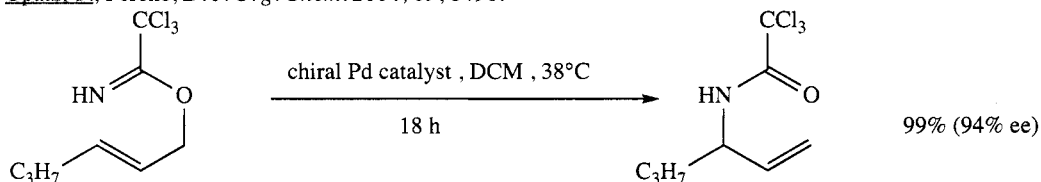
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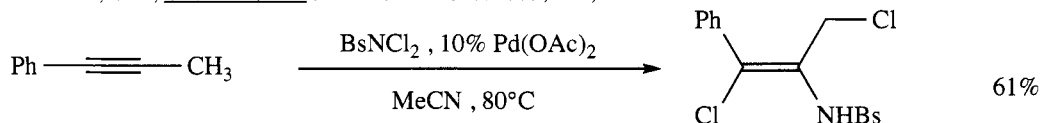
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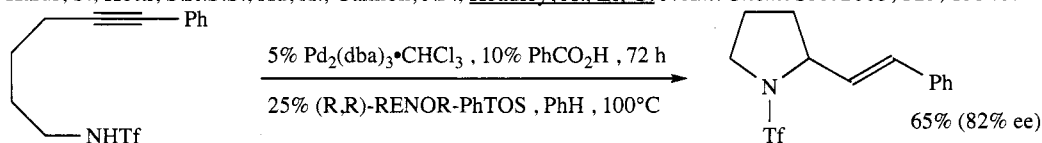
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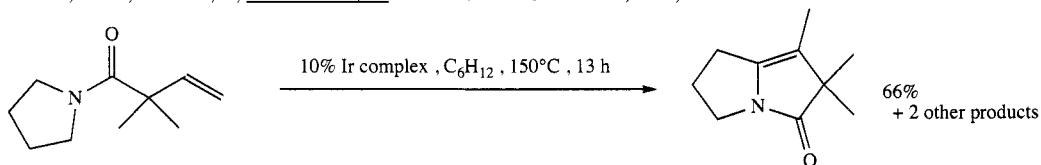
Anderson, C.E.; Overman, L.E. *J. Am. Chem. Soc.* **2003**, 125, 12412.



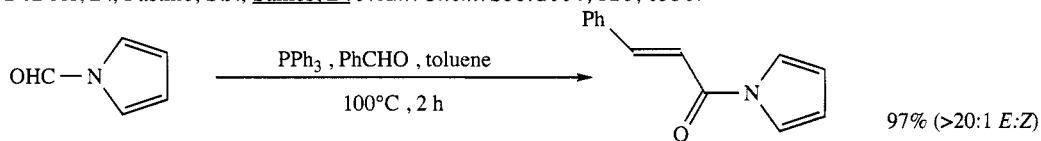
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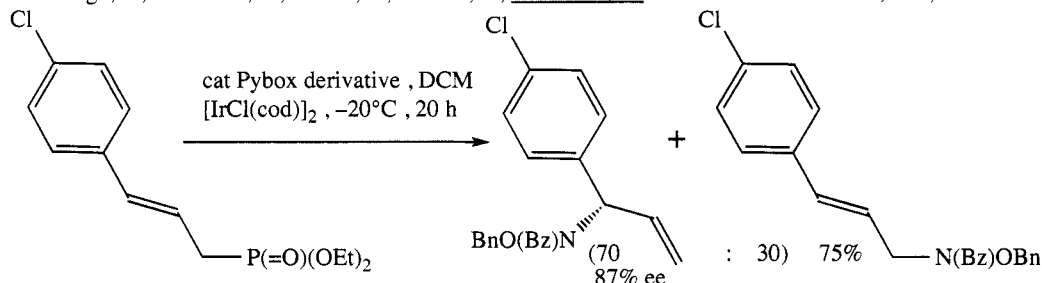
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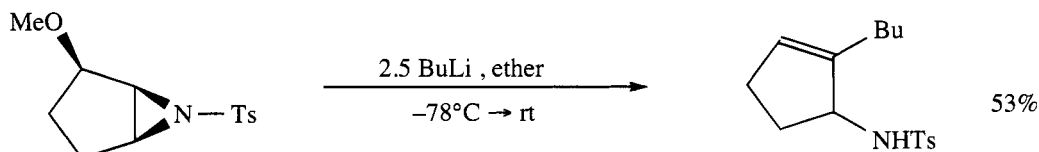
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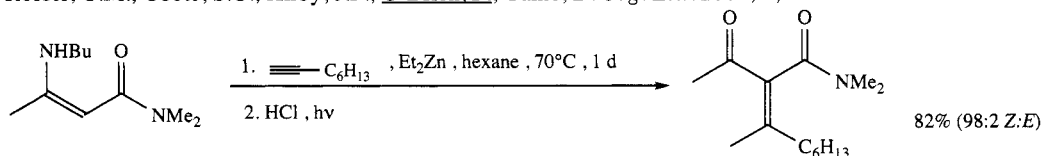
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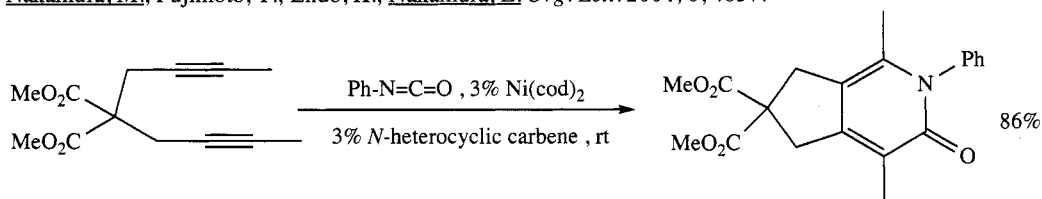
Miyabe, H.; Matsumura, A.; Moriyama, K.; Takemoto, Y. *Org. Lett.* **2004**, 6, 4631.



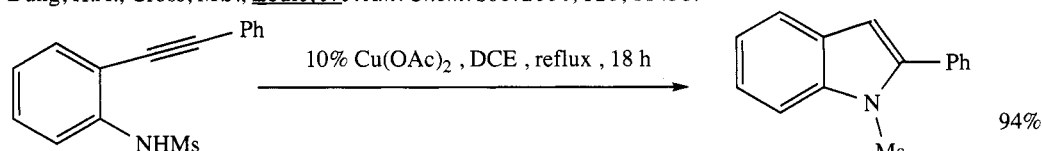
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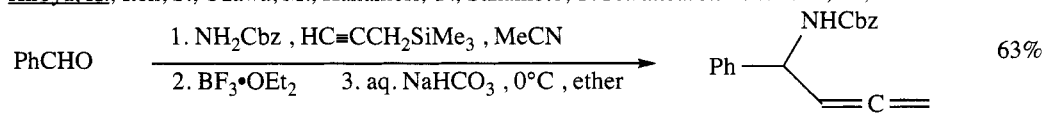
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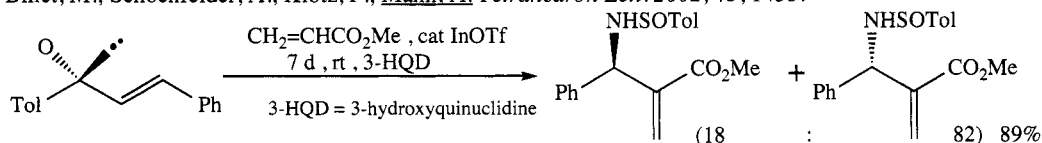
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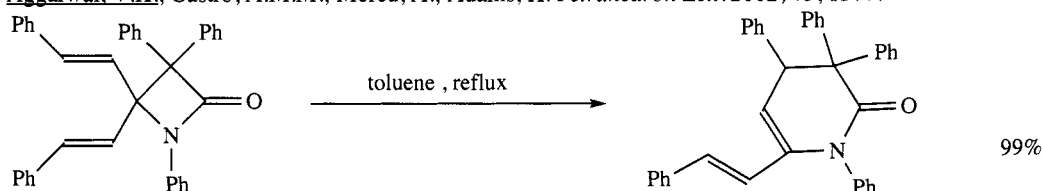
Hiroya, K.; Itoh, S.; Ozawa, M.; Kanamori, Y.; Sakamoto, T. *Tetrahedron Lett.* **2002**, 43, 1277.



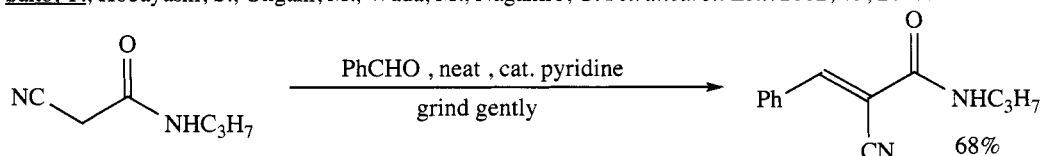
Billet, M.; Schoenfelder, A.; Klotz, P.; Mann, A. *Tetrahedron Lett.* **2002**, 43, 1453.



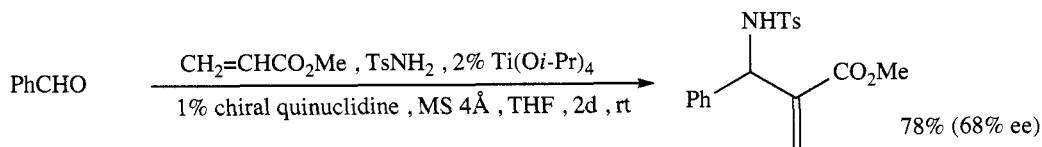
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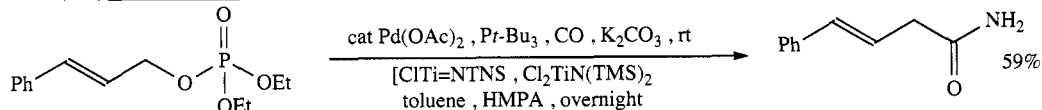
Saito, T.; Kobayashi, S.; Ohgaki, M.; Wada, M.; Nagahiro, C. *Tetrahedron Lett.* **2002**, 43, 2627.



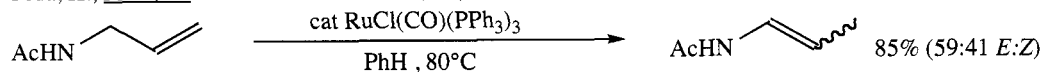
McCluskey, A.; Robinson, P.J.; Hill, T.; Scott, J.L.; Edwards, J.K. *Tetrahedron Lett.* **2002**, 43, 3117.



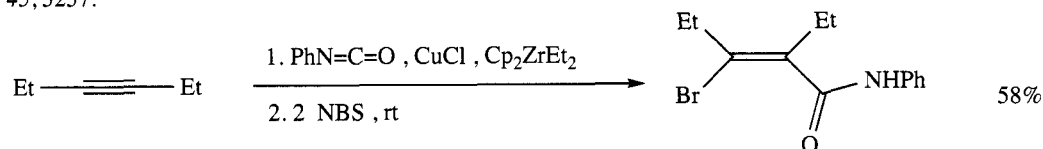
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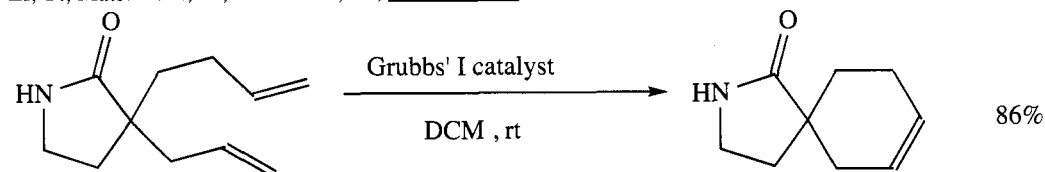
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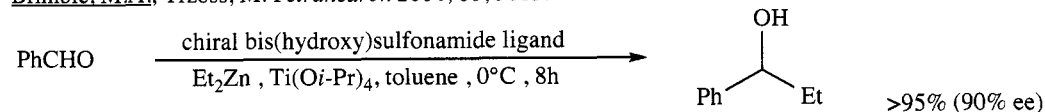
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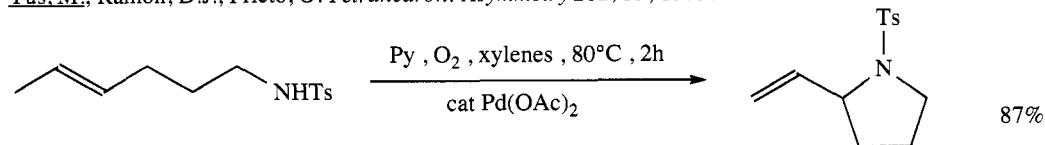
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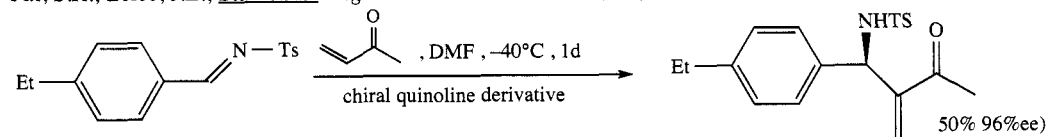
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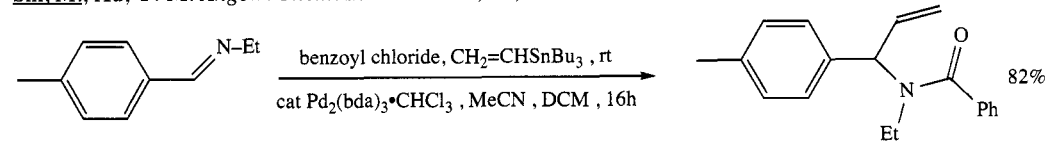
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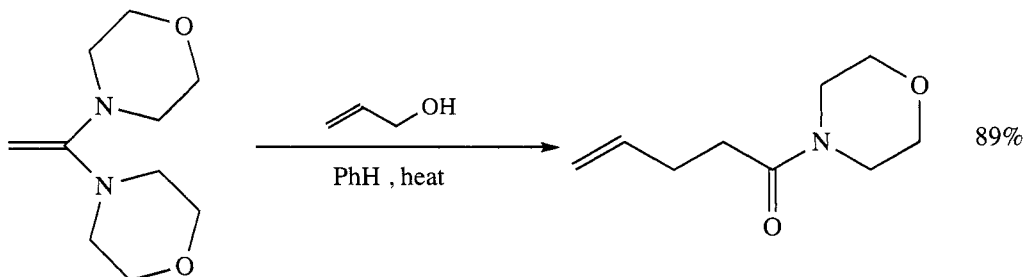
Fix, S.R.; Brice, J.L.; Stahl, S.S. *Angew. Chem. Int. Ed.* **2002**, *41*, 164.



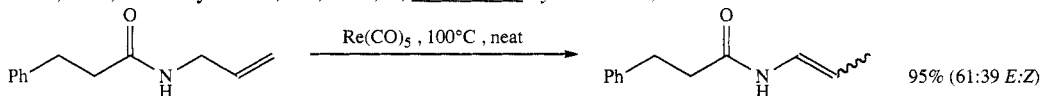
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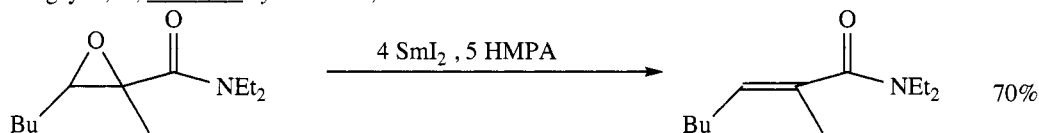
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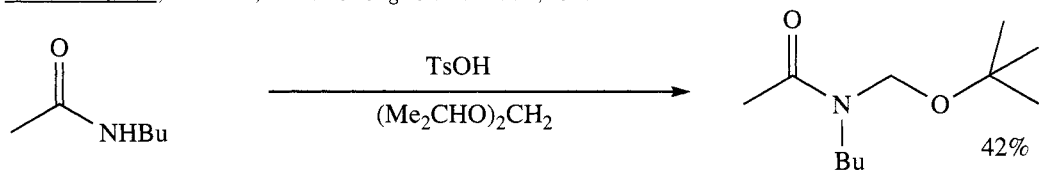
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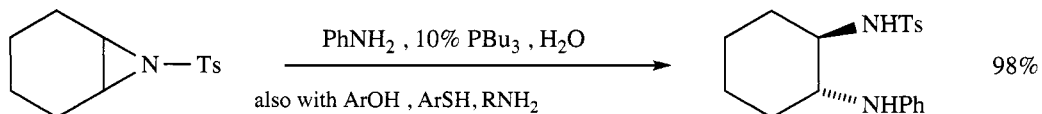
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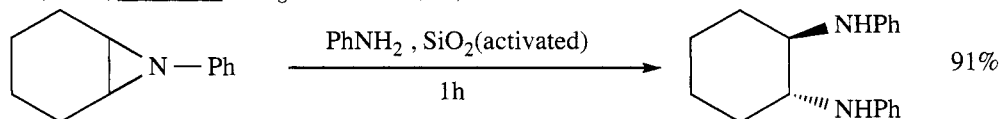
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Also via alkenyl acids: Section 322 (Carboxylic Acid -Alkene)

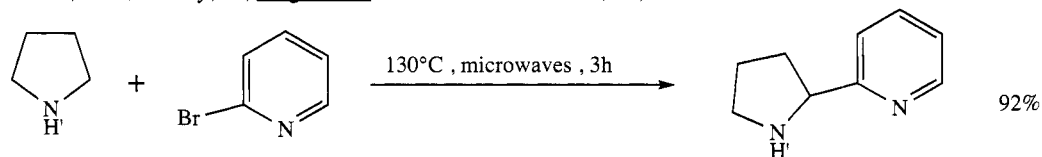
SECTION 350: AMINE - AMINE



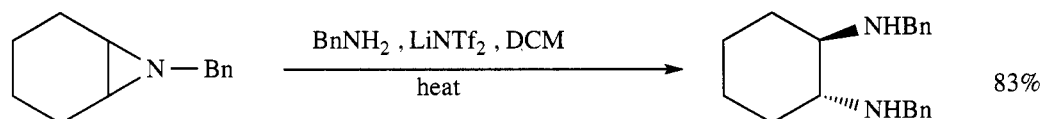
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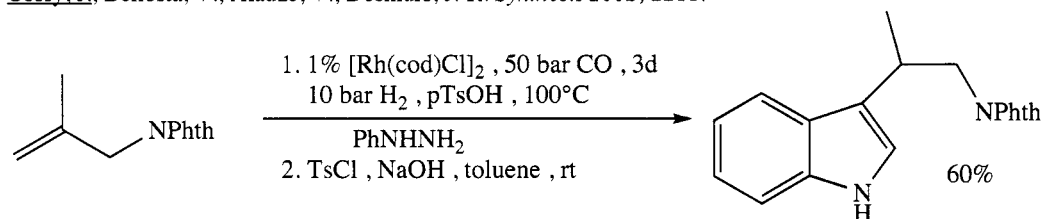
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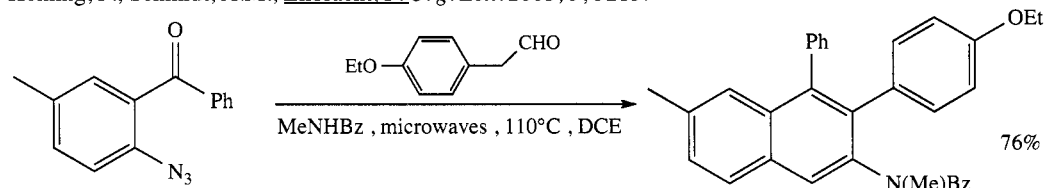
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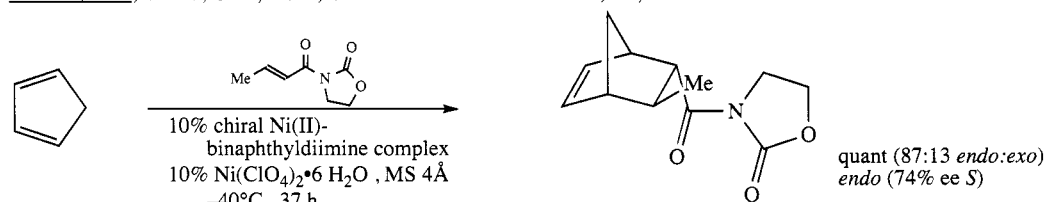
Cossy, J.; Bellosta, V.; Alauze, V.; Desmurs, J.-R. *Synthesis* **2002**, 2211.



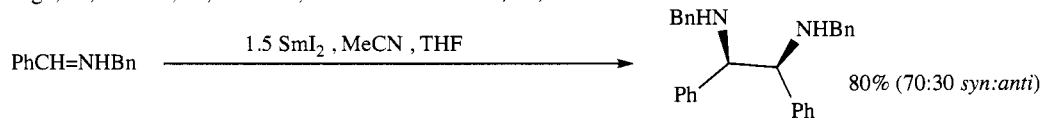
Köhling, P.; Schmidt, A.M.; Eilbracht, P. *Org. Lett.* **2003**, 5, 3213.



Wilson, N.S.; Sarko, C.R.; Roth, G.P. *Tetrahedron Lett.* **2002**, 43, 581.

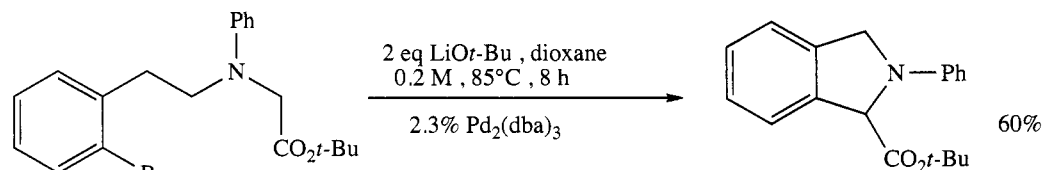


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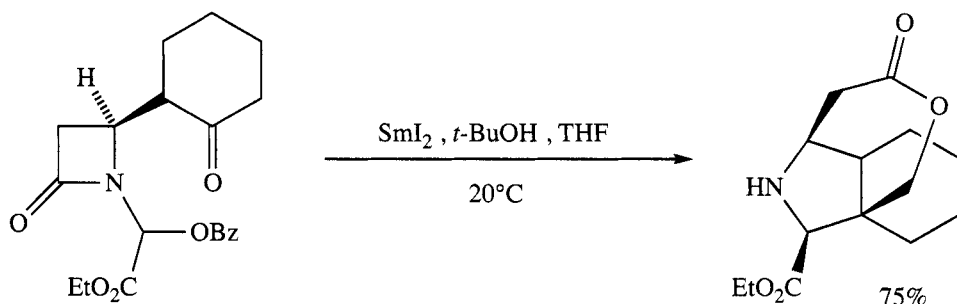


Kim, M.; Knettle, B.W.; Dahlén, A.; Hilmersson, G.; Flowers II, R.A. *Tetrahedron* **2003**, 59, 10397.

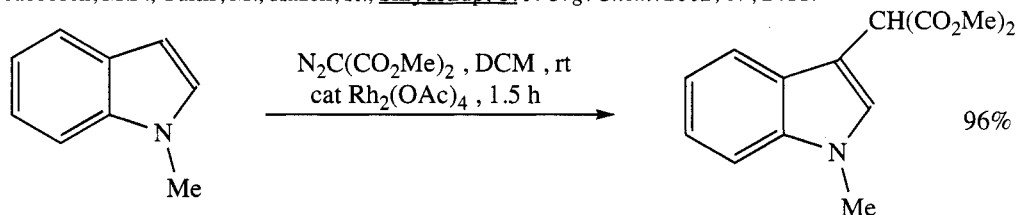
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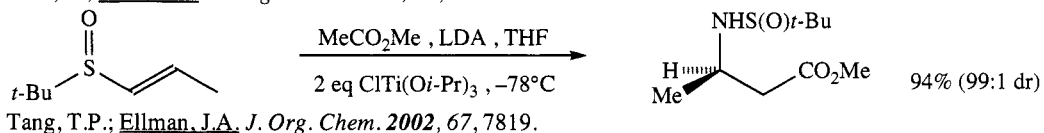
Gaertzen, O.; Buchwald, S.L. *J. Org. Chem.* **2002**, 67, 465.



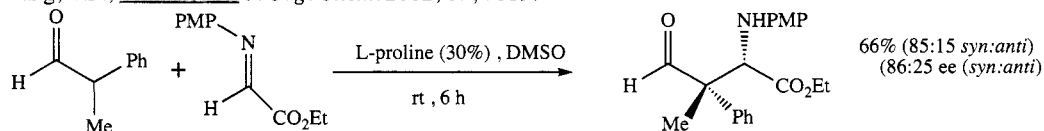
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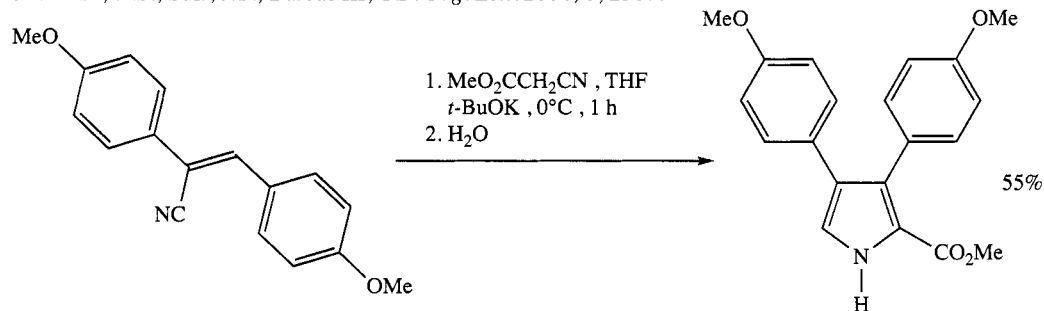
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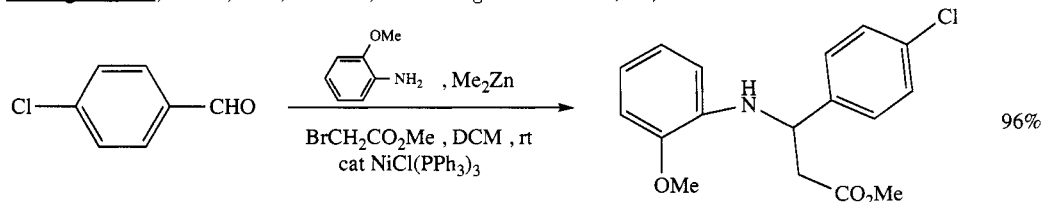
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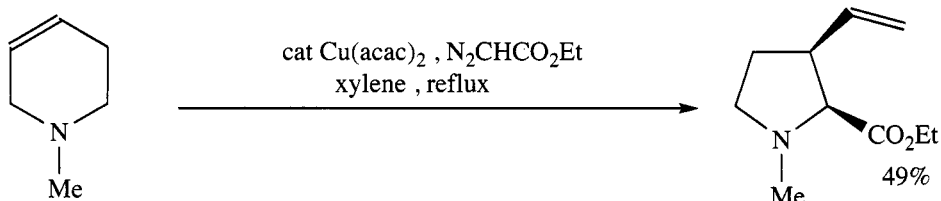
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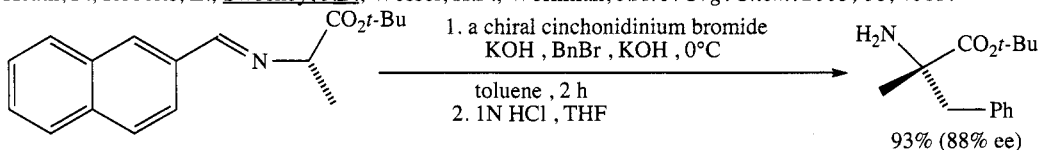
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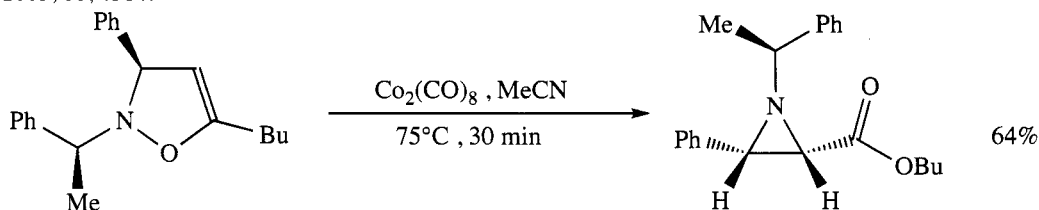
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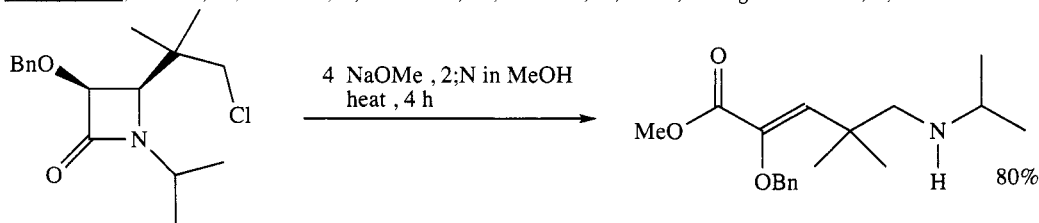
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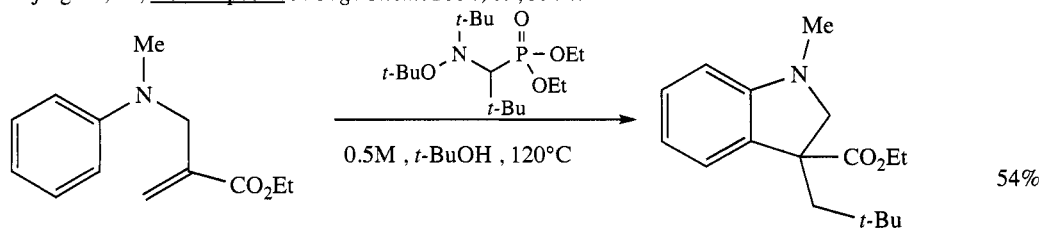
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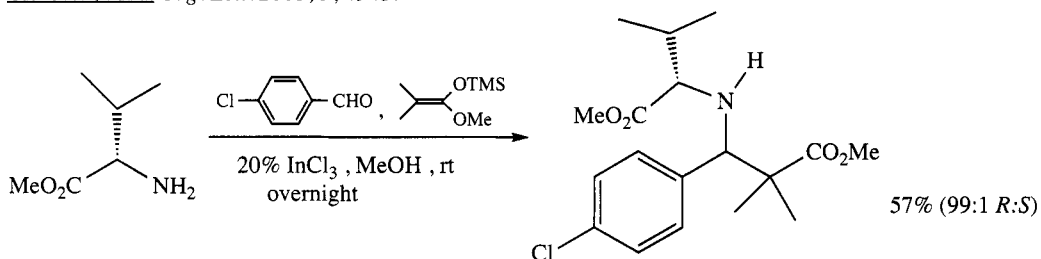
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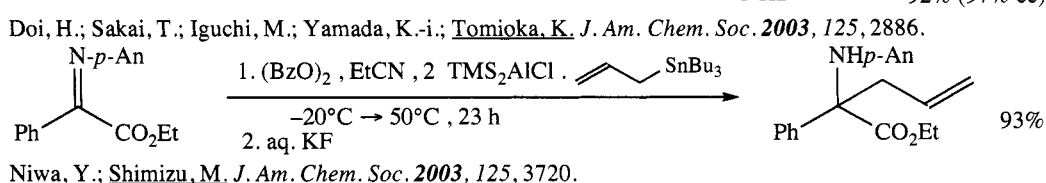
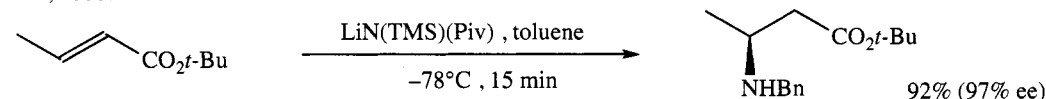
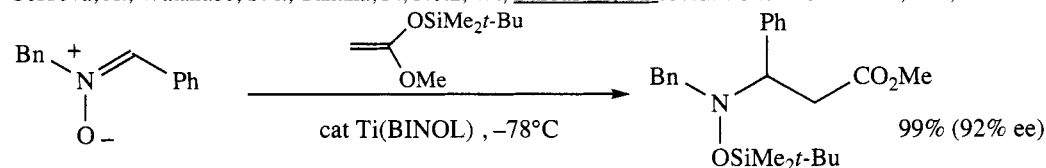
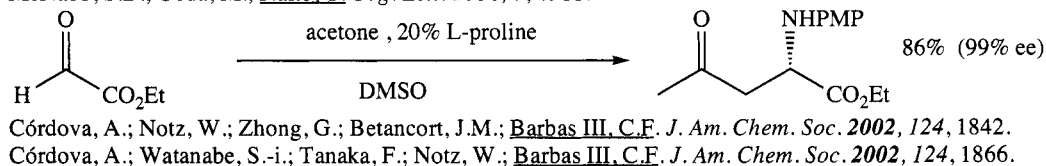
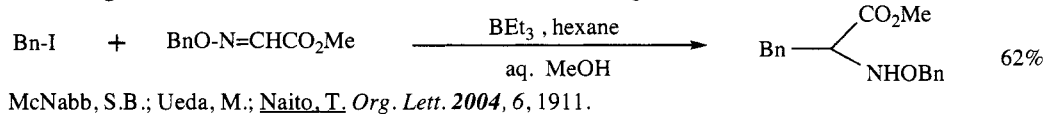
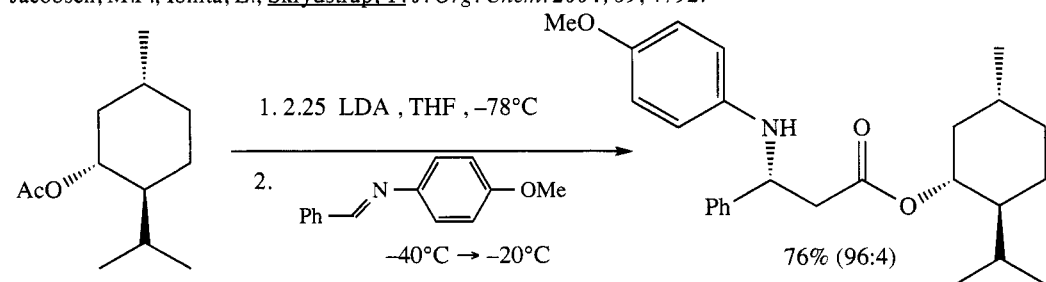
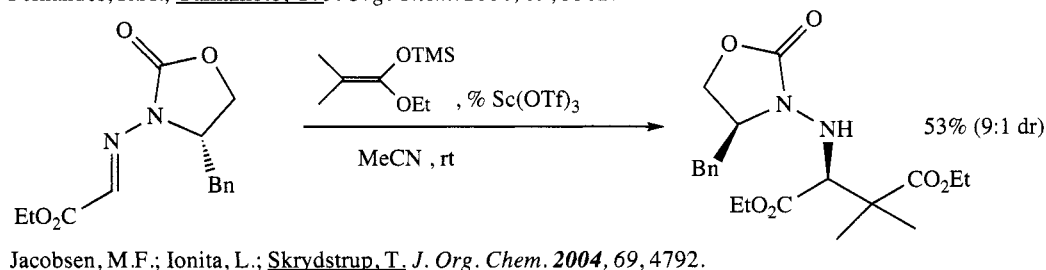
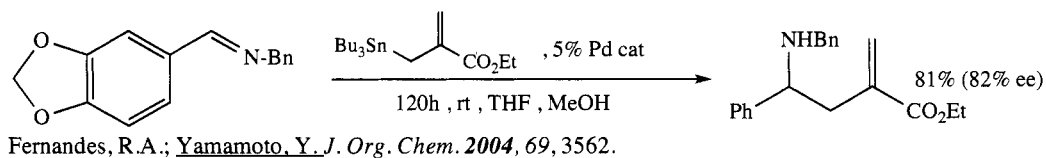
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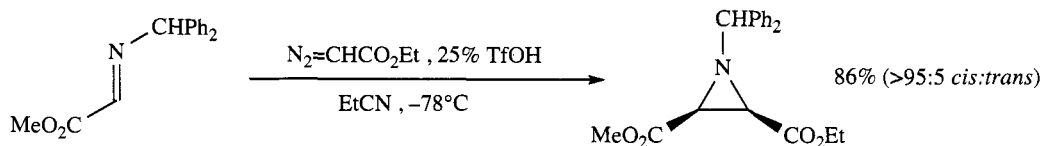


Leroi, C.; Bertin, D.; Dufils, P.-E.; Gimes, D.; Marque, S.; Tordo, P.; Couturier, J.-L.; Guerret, O.; Ciufolini, M.A. *Org. Lett.* **2003**, 5, 4943.

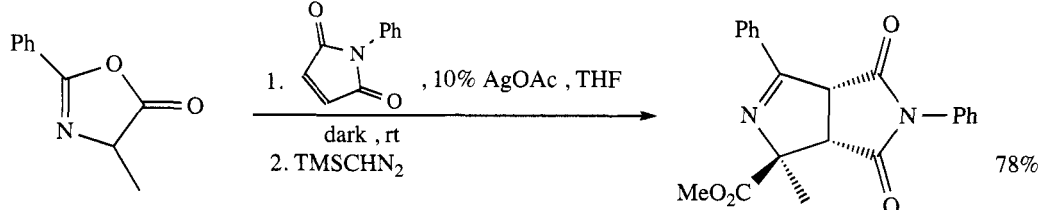


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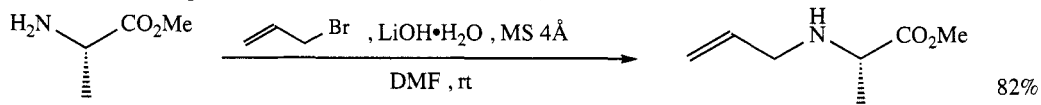




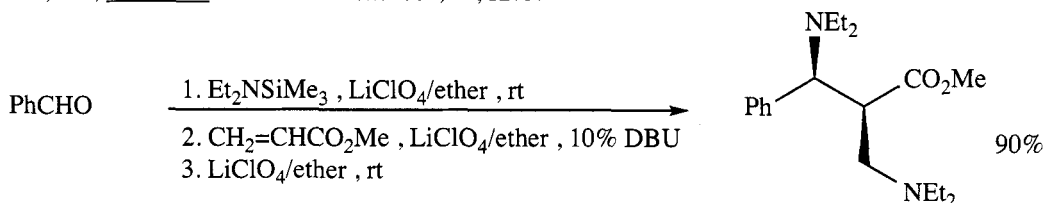
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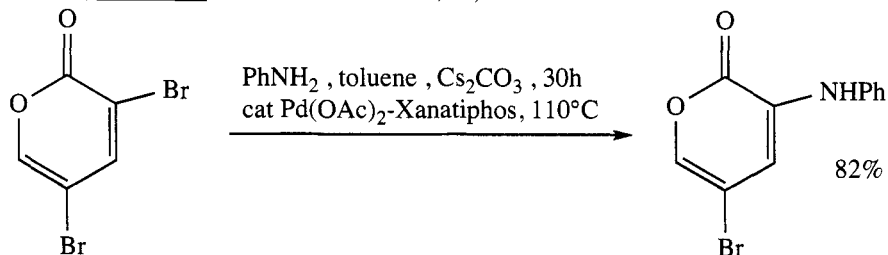
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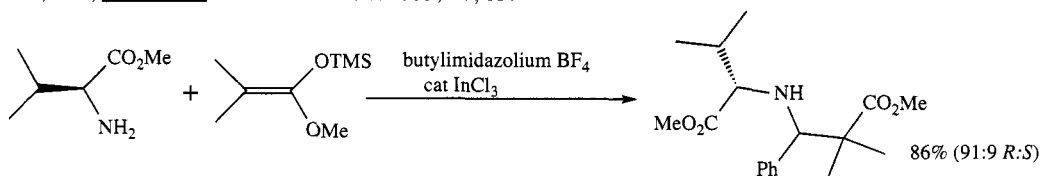
Cho, J.H.; Kim, B.M. *Tetrahedron Lett.* **2002**, *43*, 1273.



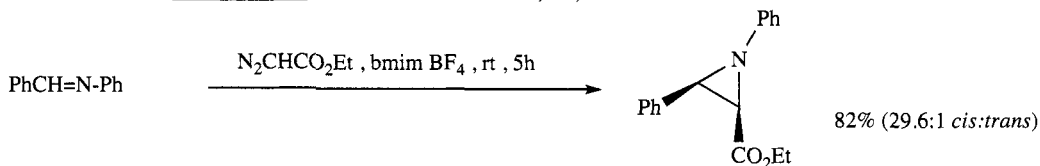
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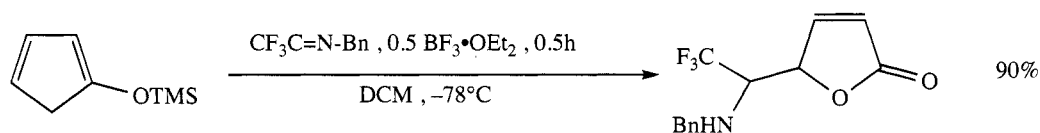
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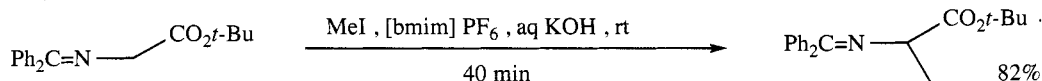
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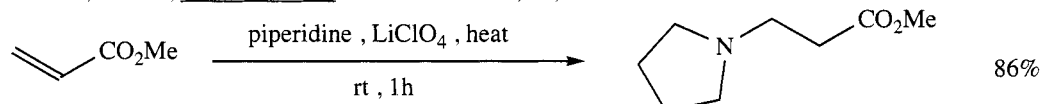
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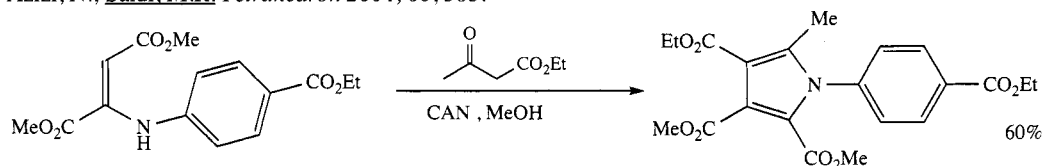
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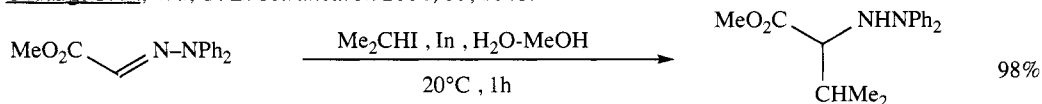
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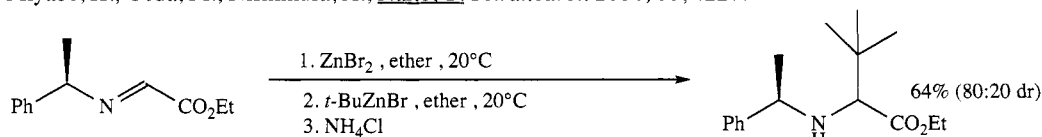
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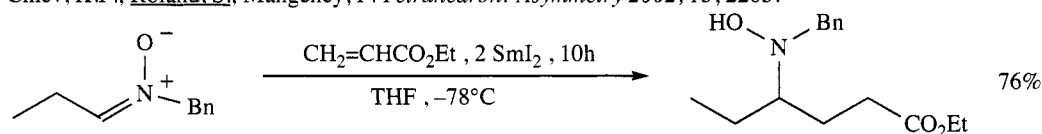
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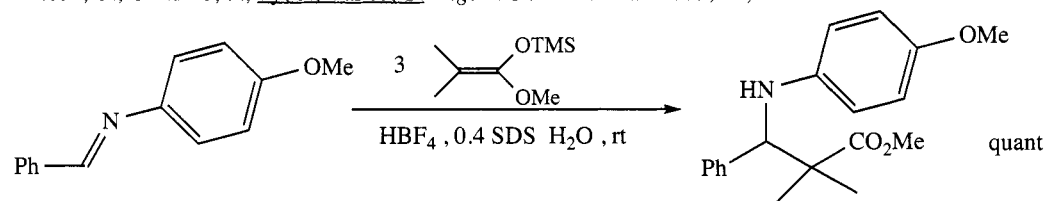
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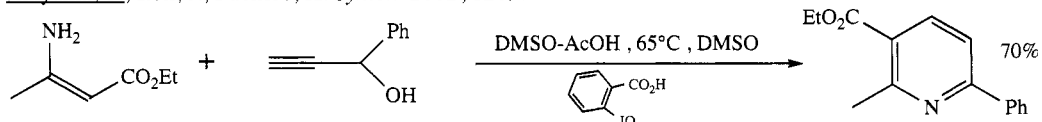
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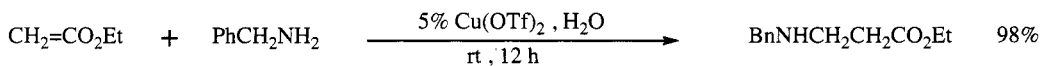
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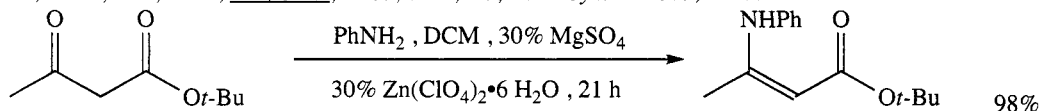
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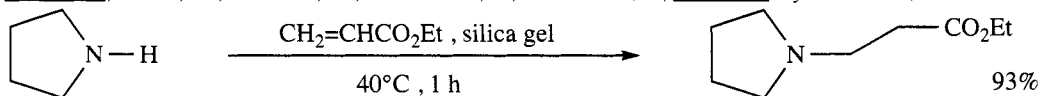
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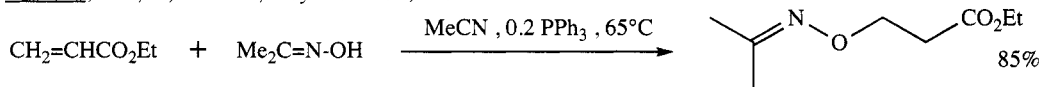
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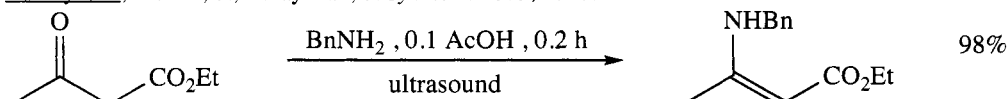
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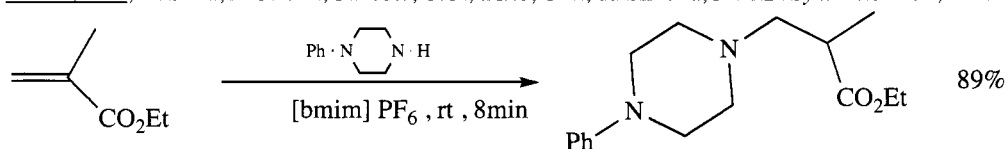
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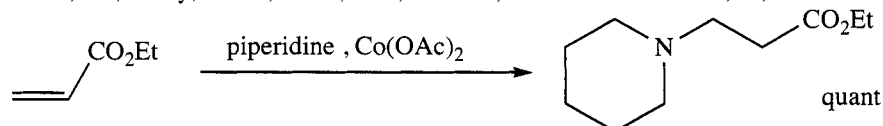
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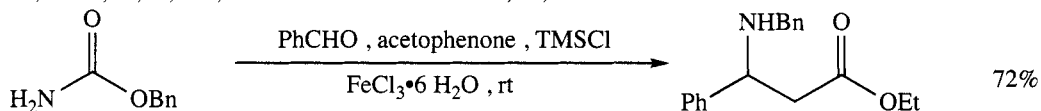
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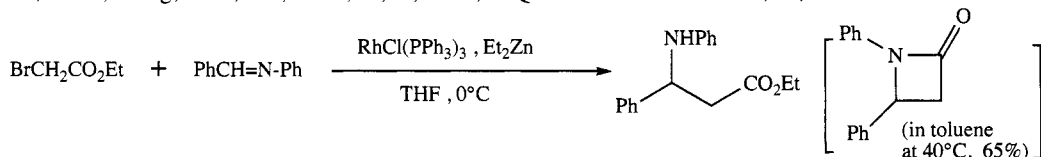
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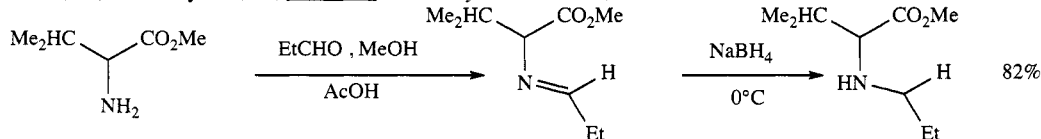
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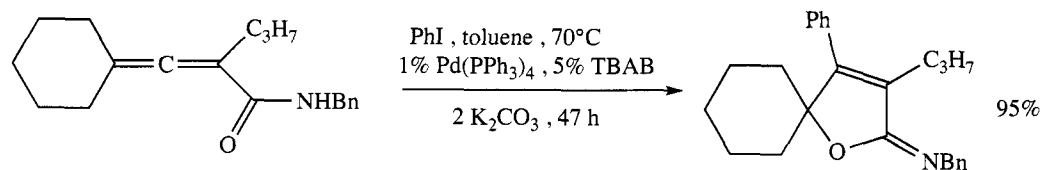
Related Methods:

Section 315 (Carboxylic Acid - Amide)

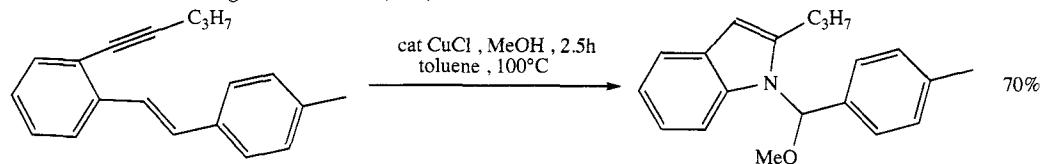
Section 316 (Carboxylic Acid - Amine)

Section 344 (Amide - Ester)

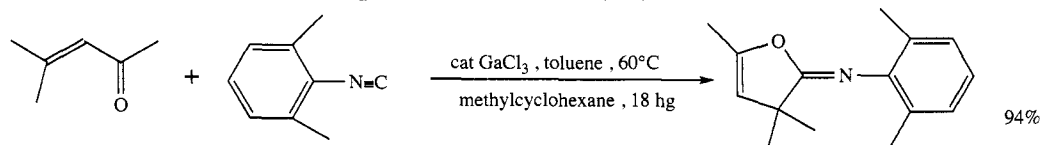
SECTION 352: AMINE - ETHER, EPOXIDE, THIOETHER



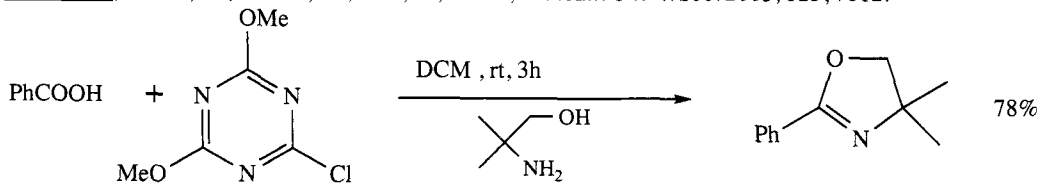
Ma, S.; Xie, H. *J. Org. Chem.* **2002**, 67, 6575.



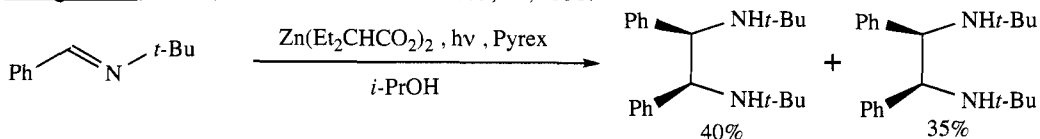
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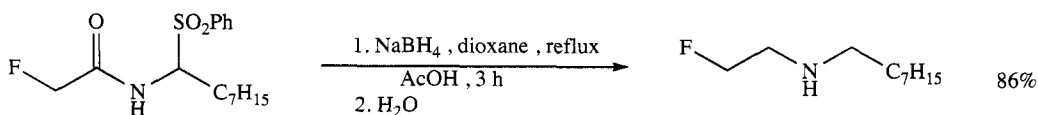


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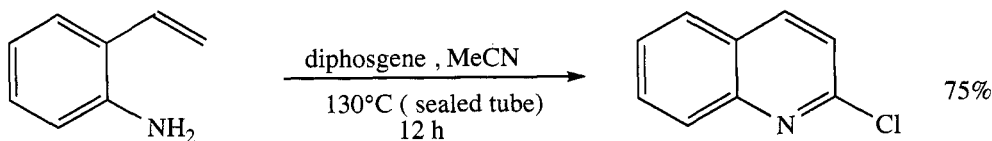


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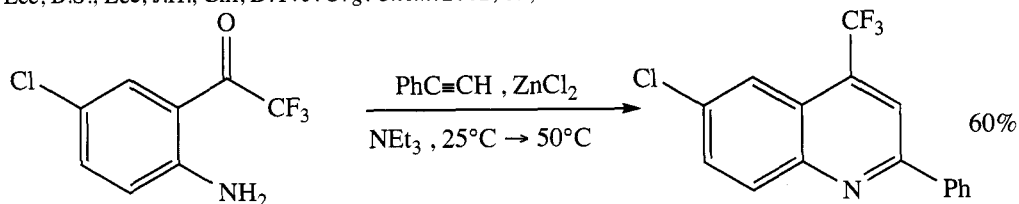
SECTION 353: AMINE - HALIDE, SULFONATE



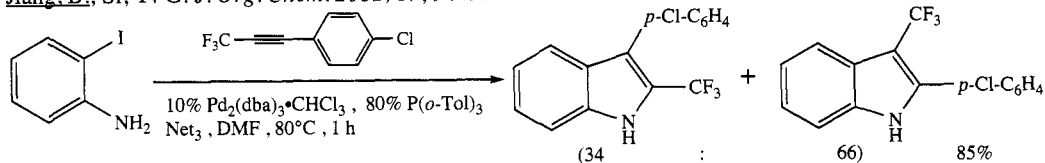
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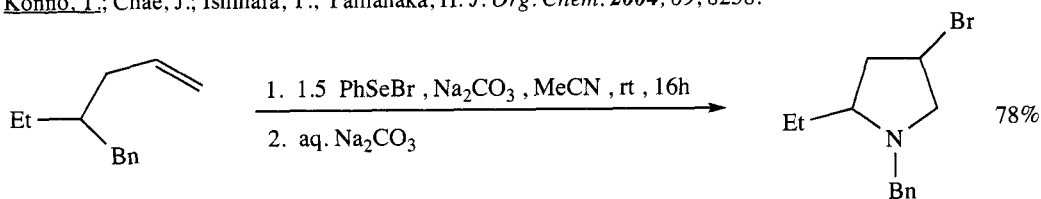
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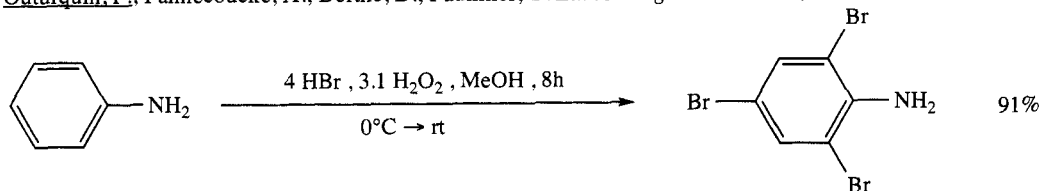
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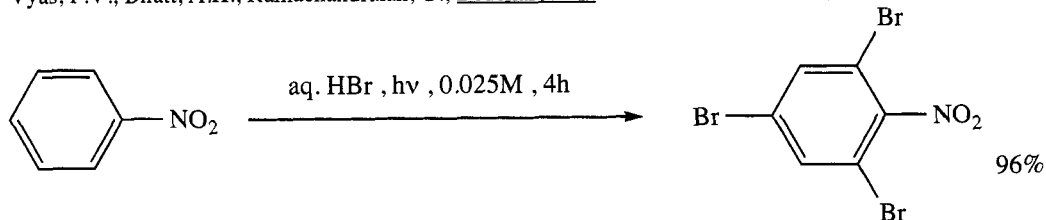
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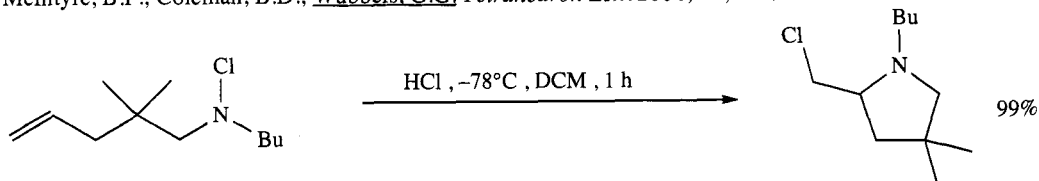
Outurquin, F.; Pannecoucke, X.; Berthe, B.; Paulmier, C. *Eur. J. Org. Chem.* **2002**, 1007.



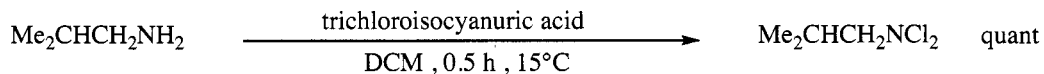
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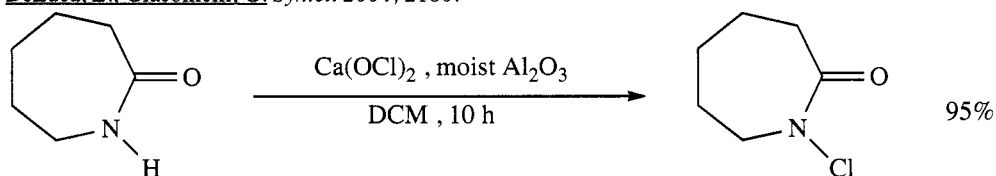
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Noack, M.; Kalsow, S.; Göttlich, R. *Synlett* **2004**, 1110.

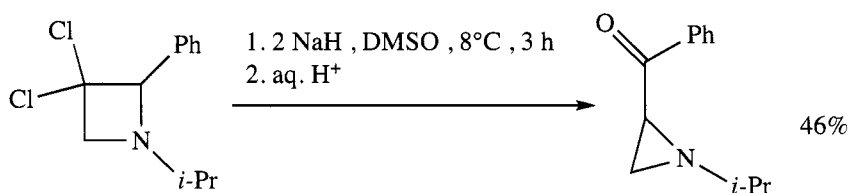


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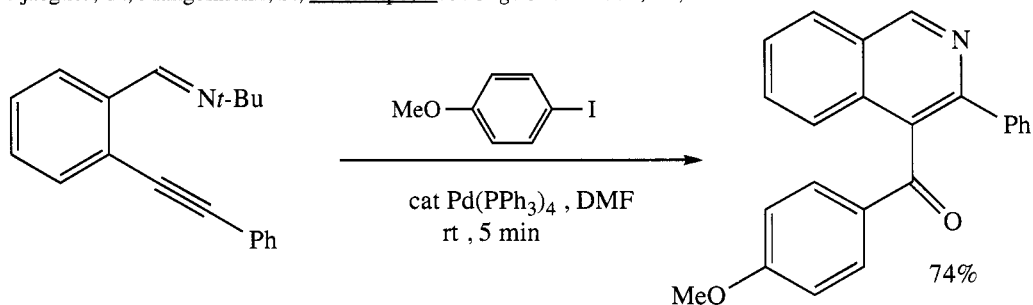


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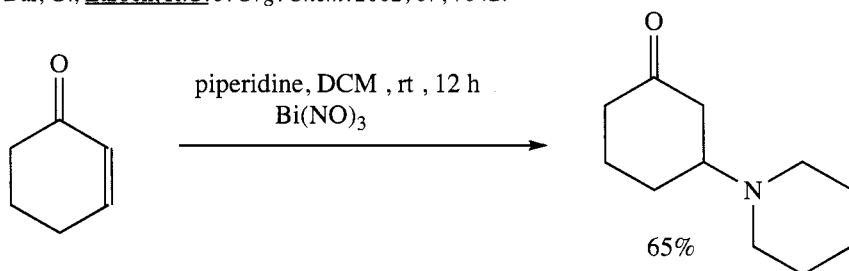
SECTION 354: AMINE - KETONE



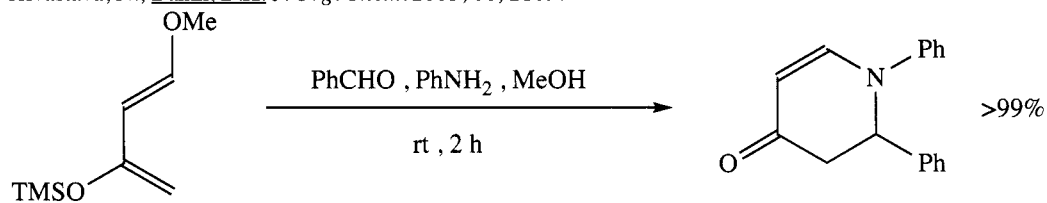
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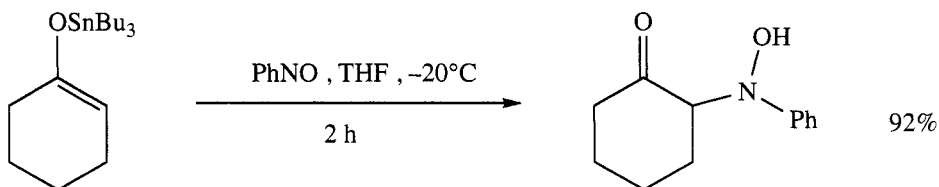
Dai, G.; Larock, R.C. *J. Org. Chem.* **2002**, 67, 7042.



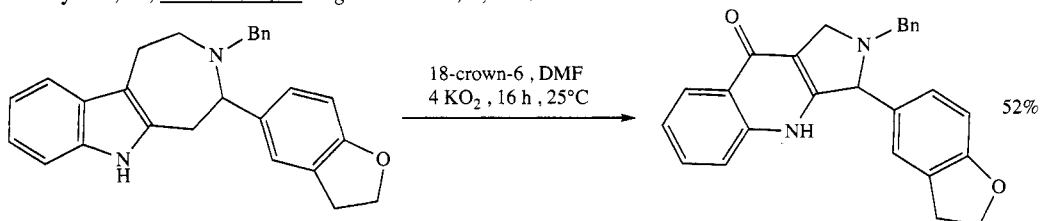
Srivastava, N.; Banik, B.K. *J. Org. Chem.* **2003**, 68, 2109.



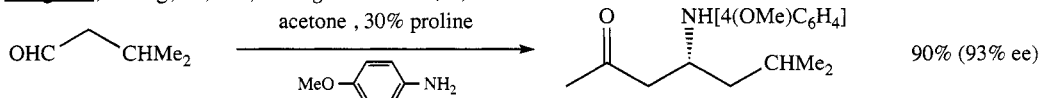
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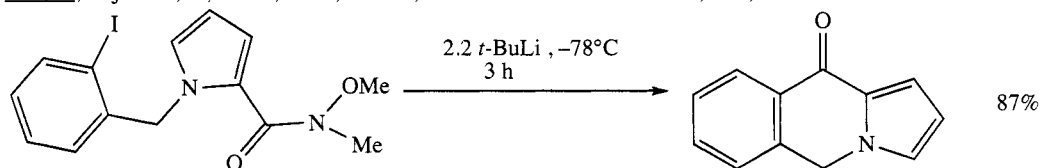
Momiyama, N.; Yamamoto, H. *Org. Lett.* **2002**, 4, 3579.



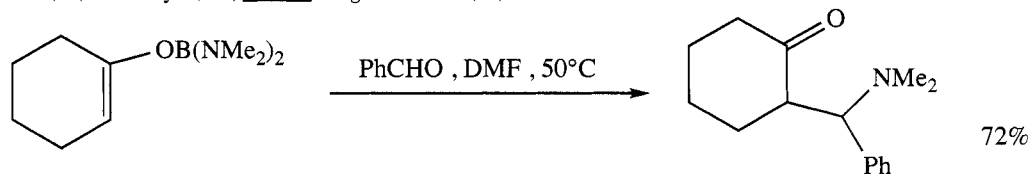
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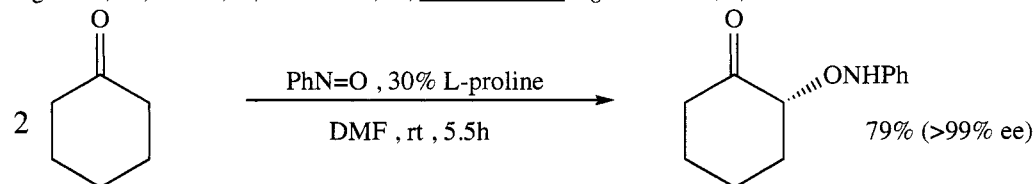
List, B.; Pojarliev, P.; Biller, W.T.; Martin, H.J. *J. Am. Chem. Soc.* **2002**, 124, 827.



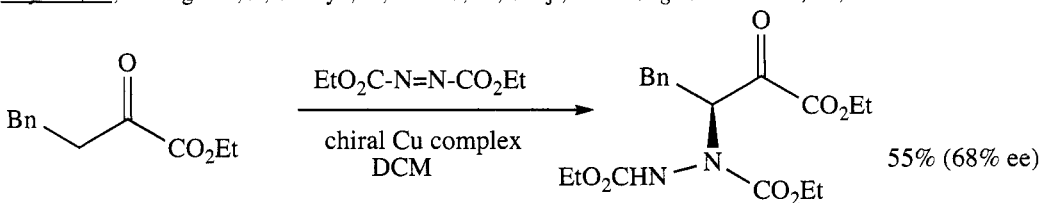
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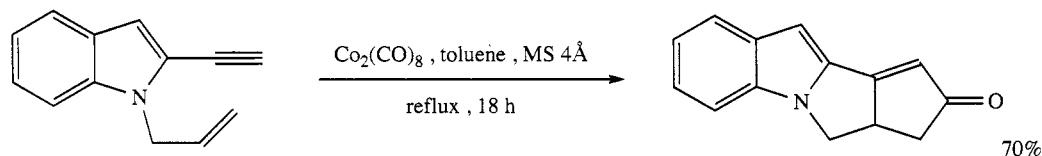
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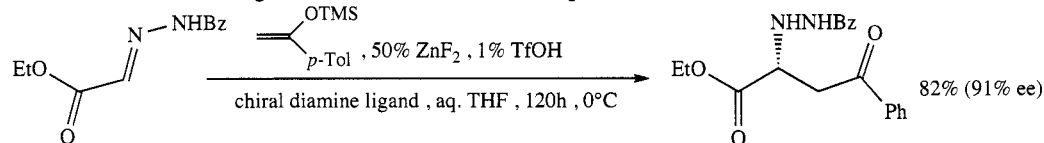
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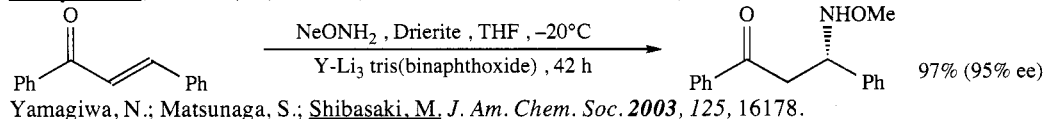
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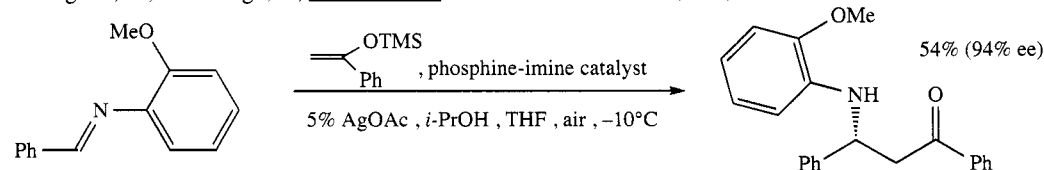
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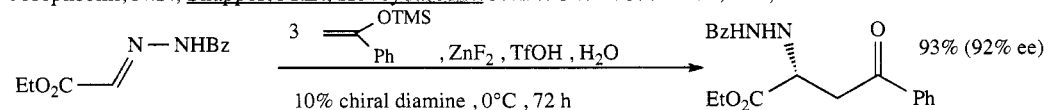
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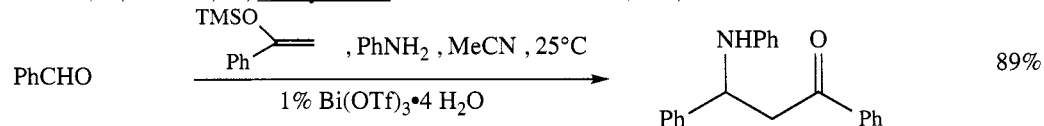
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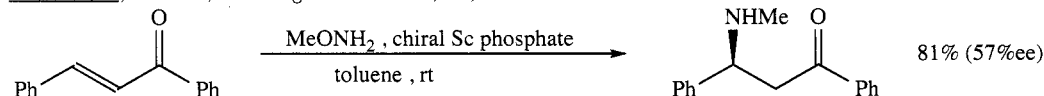
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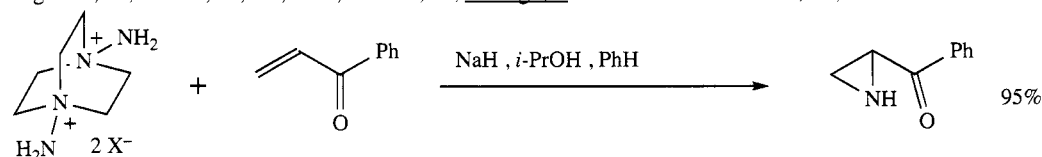
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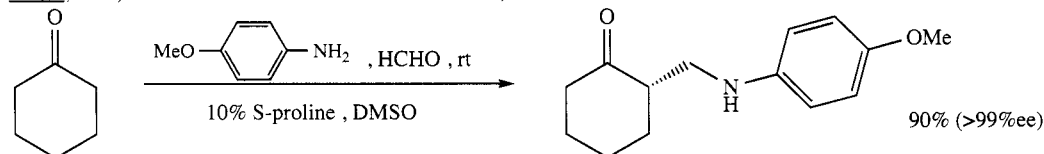
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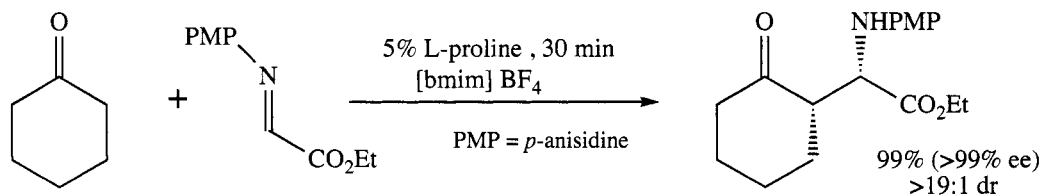
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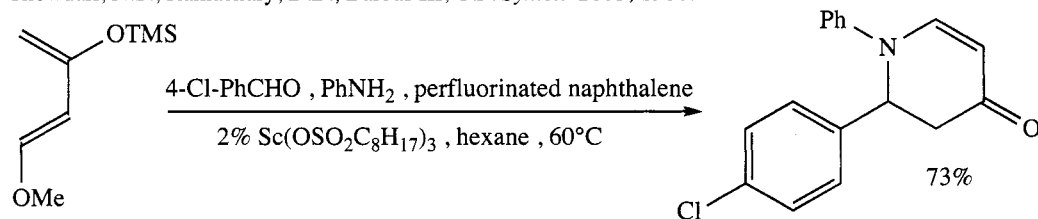
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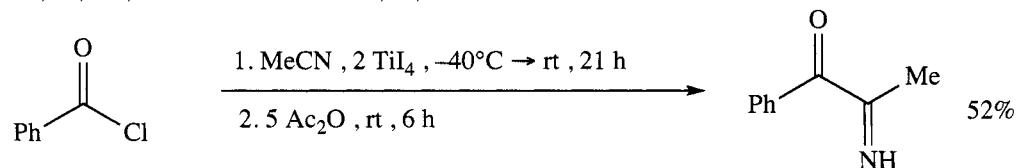
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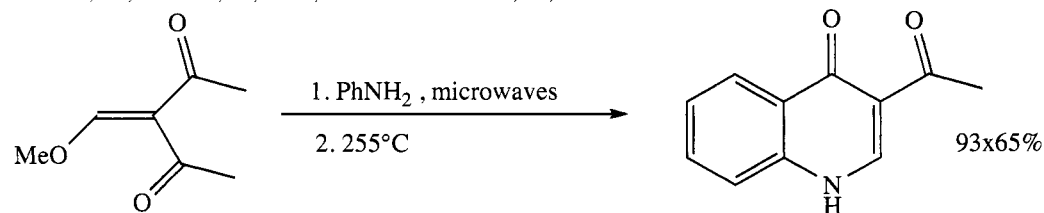
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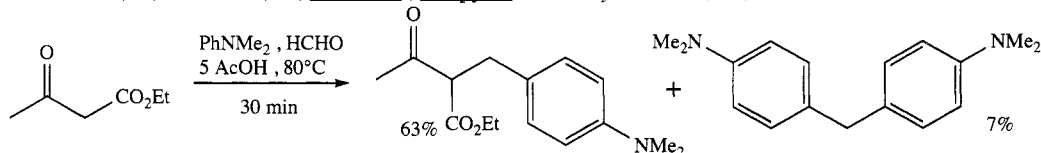
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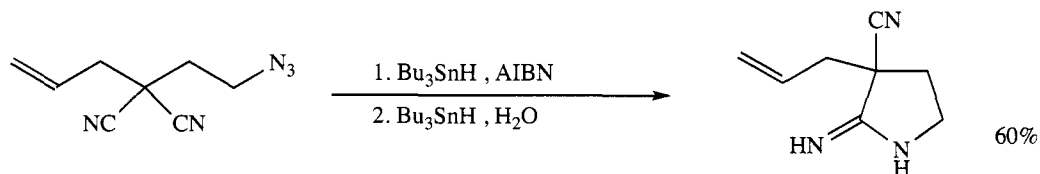
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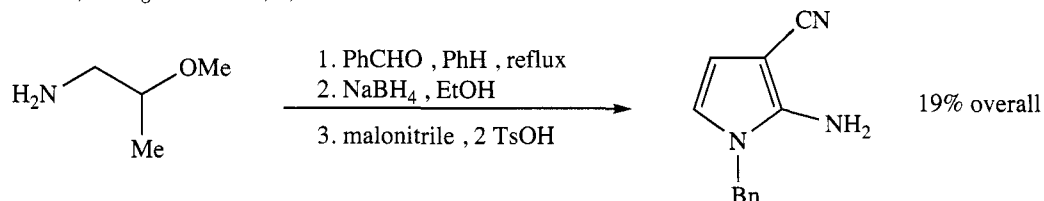
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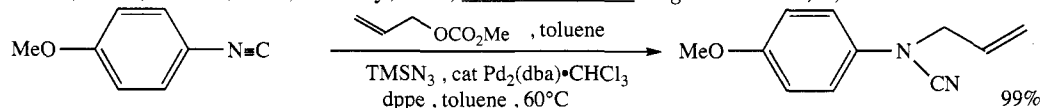
SECTION 355: AMINE - NITRILE



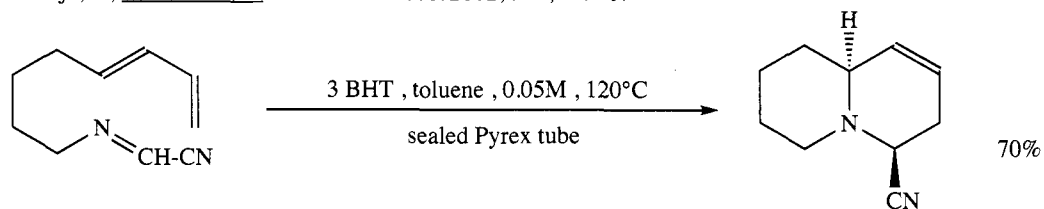
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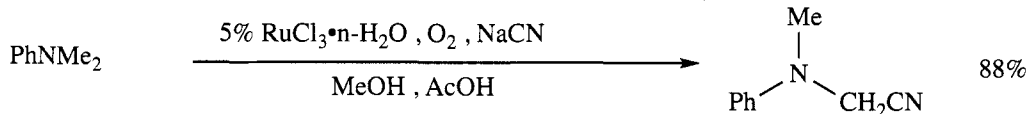
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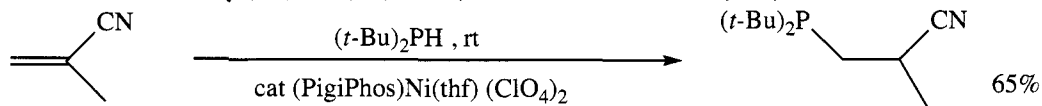
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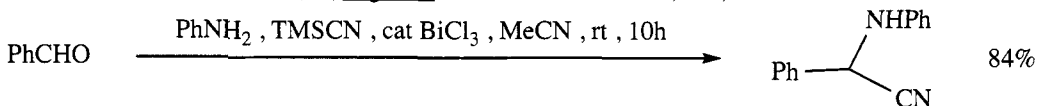
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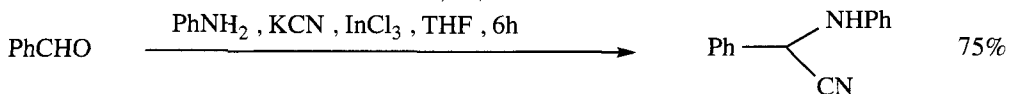
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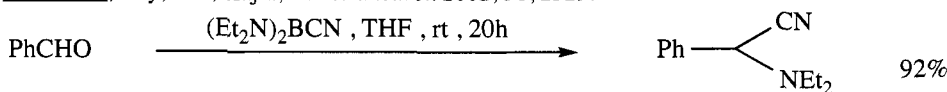
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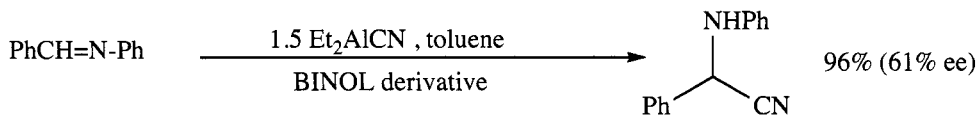
De, S.K.; Gibbs, R.A. *Tetrahedron Lett.* **2004**, *45*, 7407.



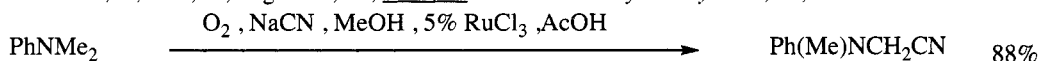
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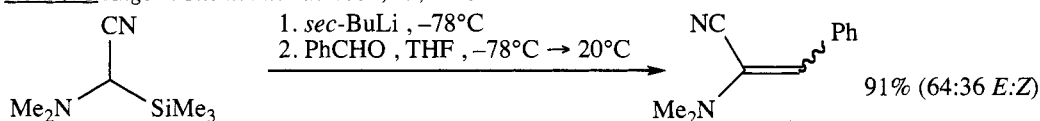
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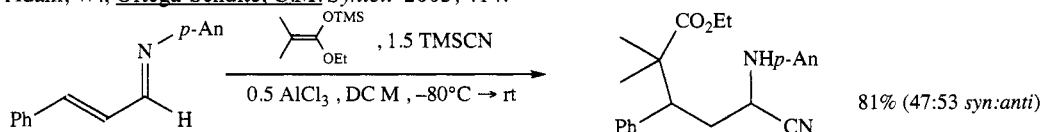
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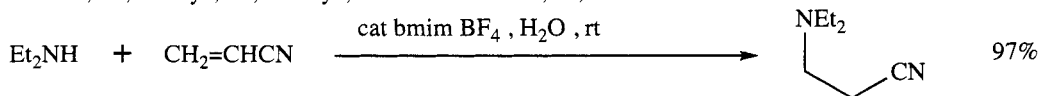
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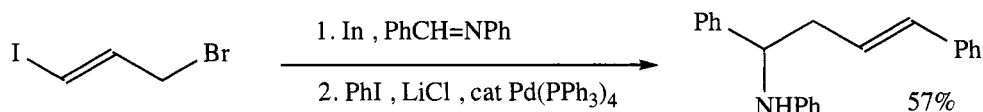


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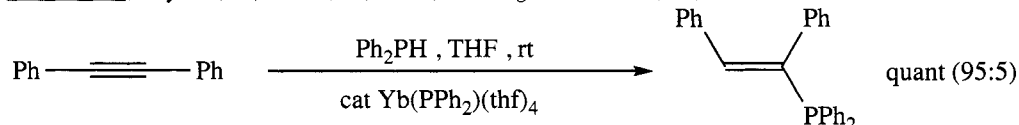


Xu, L.-W.; Li, J.-W.; Zhou, S.-L.; Xia, C.-G. *New J. Chem.* **2004**, 28, 183.

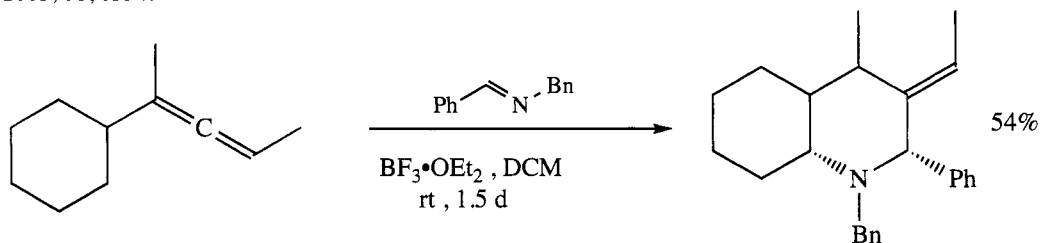
SECTION 356: AMINE - ALKENE



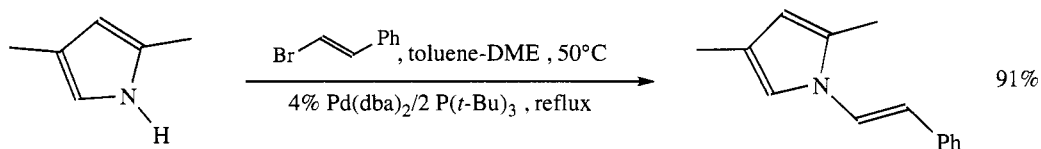
Hirashita, T.; Hayashi, Y.; Mitsui, K.; Araki, S. *J. Org. Chem.* **2003**, 68, 1309.



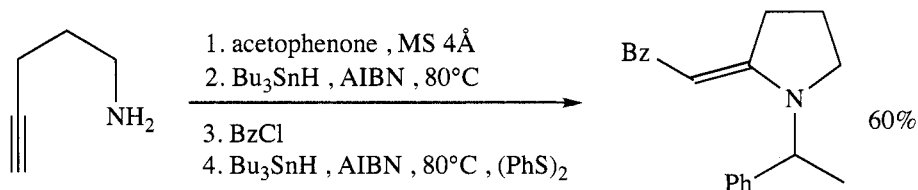
Takai, K.; Koshiji, G.; Komeyama, K.; Takeda, M.; Shishido, T.; Kitani, A.; Takhira, K. *J. Org. Chem.* **2003**, 68, 6554.



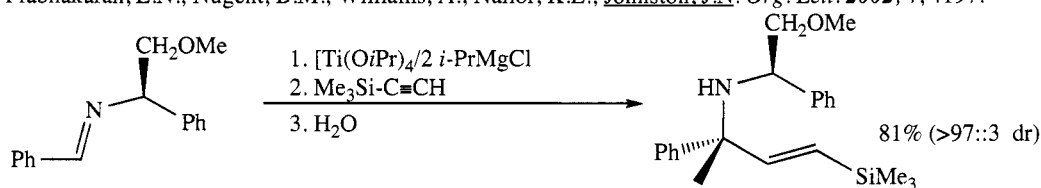
Regás, D.; Afonso, M.M.; Rodríguez, M.L.; Palenzuela, J.A. *J. Org. Chem.* **2003**, 68, 7845.



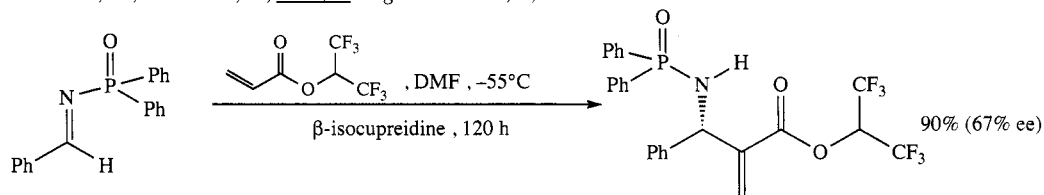
Lebedev, A.Y.; Izmer, V.V.; Kazyul'kin, D.N.; Beletskaya, I.P.; Voskoboynikov, A.Z. *Org. Lett.* **2002**, *4*, 623.



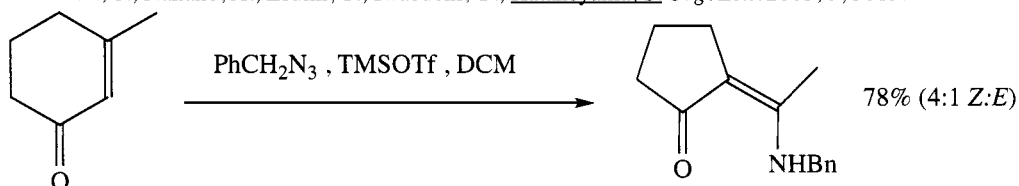
Prabhakaran, E.N.; Nugent, B.M.; Williams, A.; Nailor, K.E.; Johnston, J.N. *Org. Lett.* **2002**, *4*, 4197.



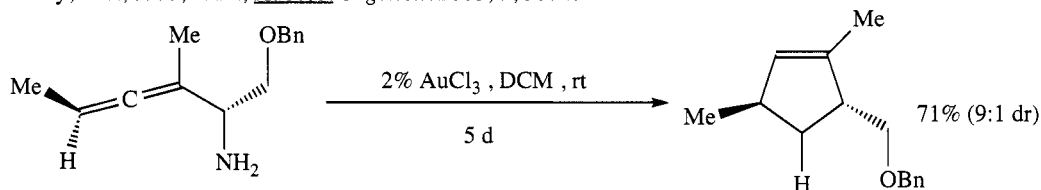
Fukuhara, K.; Okamoto, S.; Sato, F. *Org. Lett.* **2003**, *5*, 2145.



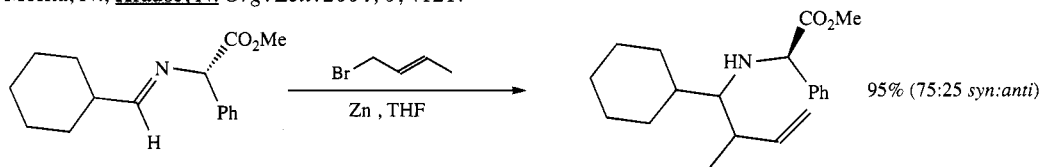
Kawahara, S.; Nakano, A.; Esumi, T.; Iwabuchi, Y.; Hatakeyama, S. *Org. Lett.* **2003**, *5*, 3013.



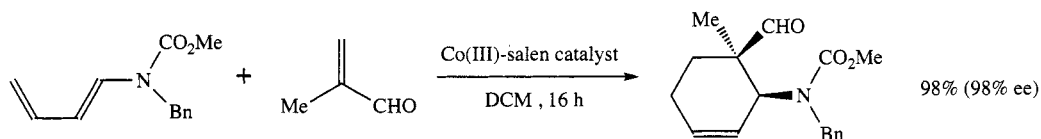
Reddy, D.S.; Judd, W.R.; Aubé, J. *Org. Lett.* **2003**, *5*, 3871.



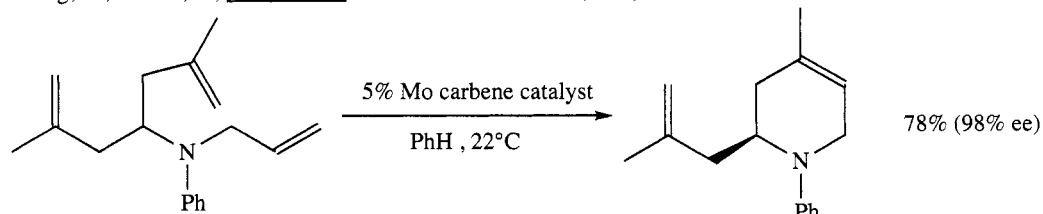
Morita, N.; Krause, N. *Org. Lett.* **2004**, *6*, 4121.



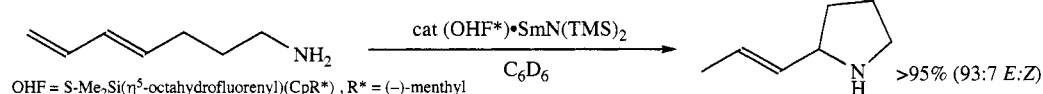
Lee, C.-L.K.; Ling, H.-Y.; Loh, T.-P. *J. Org. Chem.* **2004**, *69*, 7787.



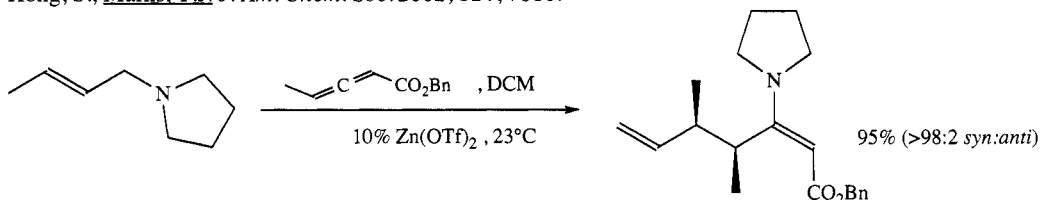
Huang, Y.; Iwama, T.; Rawal, V.H. *J. Am. Chem. Soc.* **2002**, *124*, 5950.



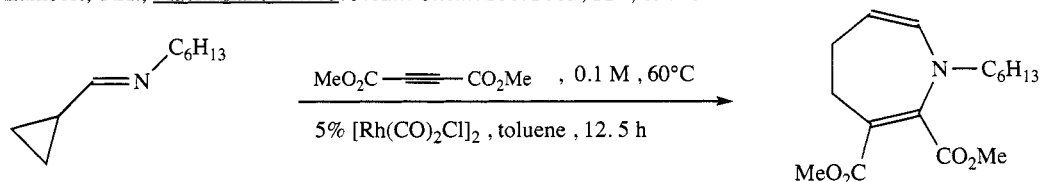
Dolman, S.J.; Sattely, E.S.; Hoveyda, A.H.; Shrock, R.R. *J. Am. Chem. Soc.* **2002**, *124*, 6991.



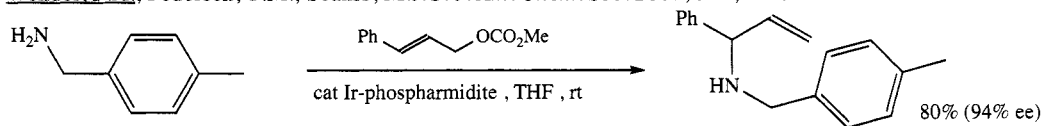
Hong, S.; Marks, T.J. *J. Am. Chem. Soc.* **2002**, *124*, 7886.



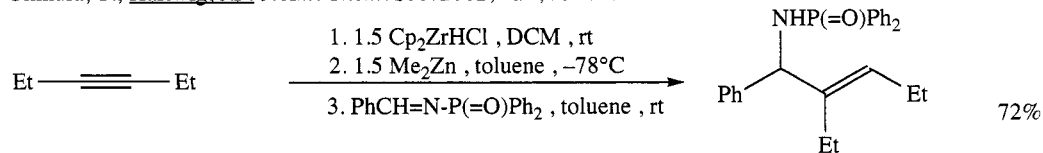
Lambert, T.H.; MacMillan, D.W.C. *J. Am. Chem. Soc.* **2002**, *124*, 13646.



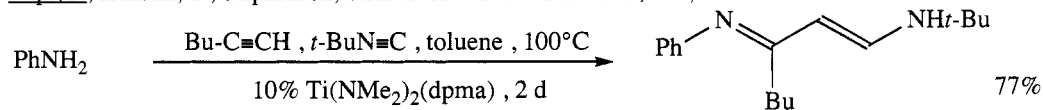
Wender, P.A.; Pedersen, T.M.; Scanio, M.J.C. *J. Am. Chem. Soc.* **2002**, *124*, 15154.



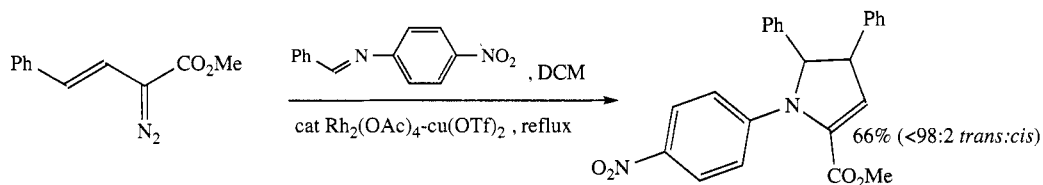
Ohmura, T.; Hartwig, J.F. *J. Am. Chem. Soc.* **2002**, *124*, 15164.



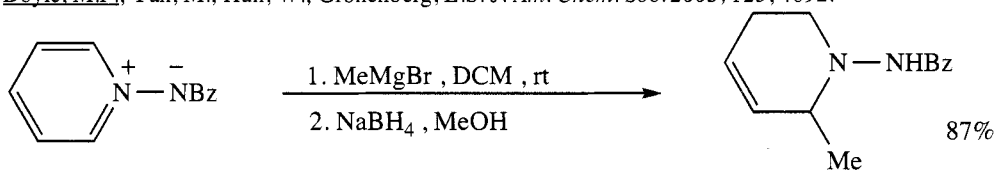
Wipf, P.; Kendall, C.; Stephenson, C.R.J. *J. Am. Chem. Soc.* **2003**, *125*, 761.



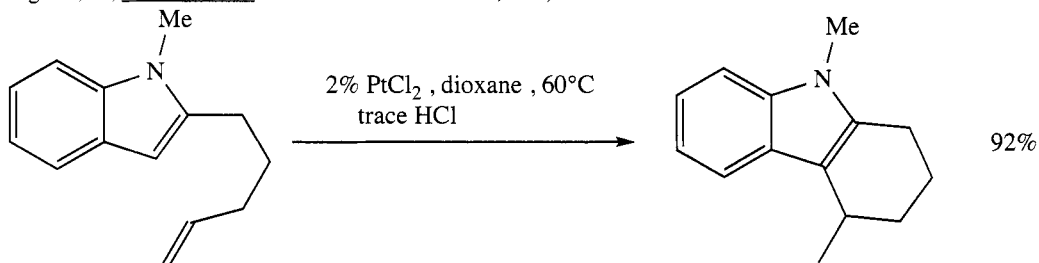
Cao, C.; Shi, Y.; Odom, A.L. *J. Am. Chem. Soc.* **2003**, *125*, 2880.



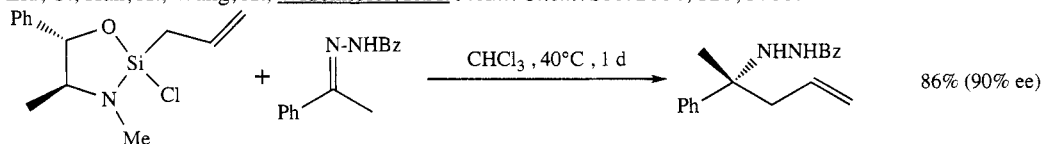
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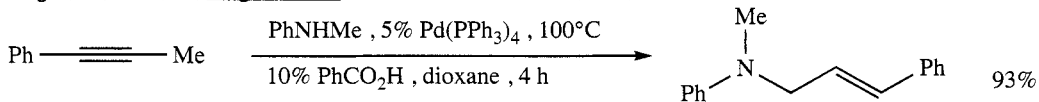
Legault, C.; Charette, A.B. *J. Am. Chem. Soc.* **2003**, *125*, 6360.



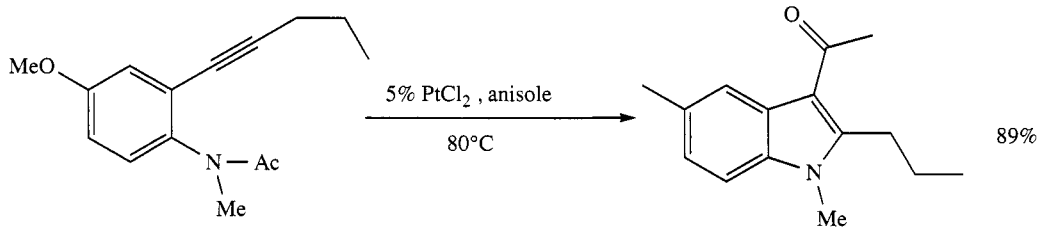
Liu, C.; Han, X.; Wang, X.; Widenhofer, R.A. *J. Am. Chem. Soc.* **2004**, *126*, 3700.



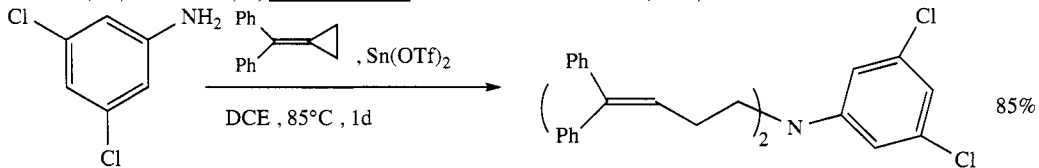
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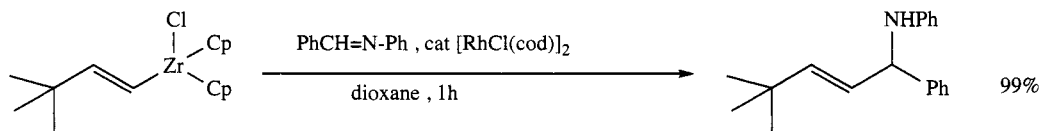
Patil, N.T.; Wu, H.; Kadota, I.; Yamamoto, Y. *J. Am. Chem. Soc.* **2004**, *126*, 8745.



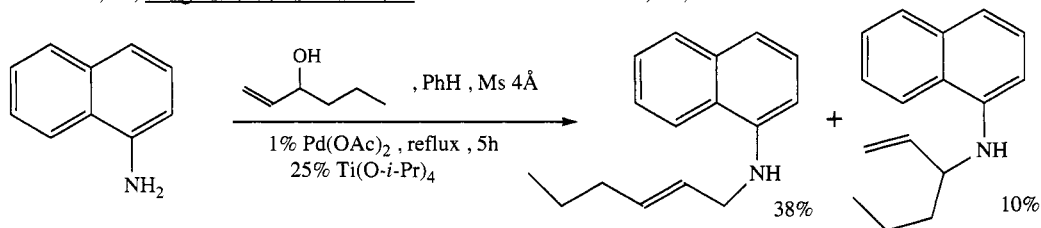
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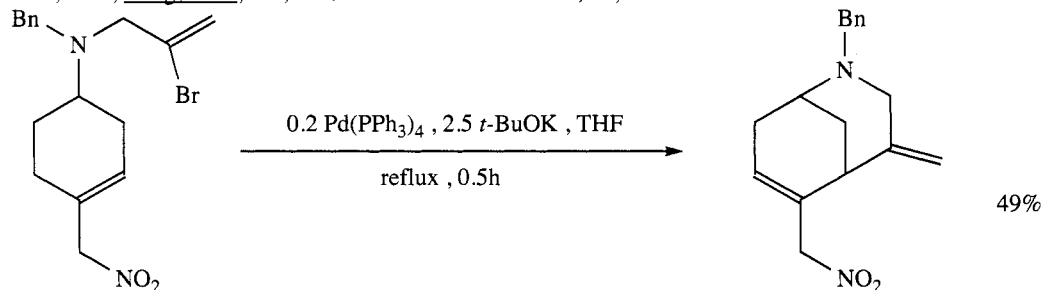
Shi, M.; Chen, Y.; Xu, B.; Tang, J. *Tetrahedron Lett.* **2002**, *43*, 8019.



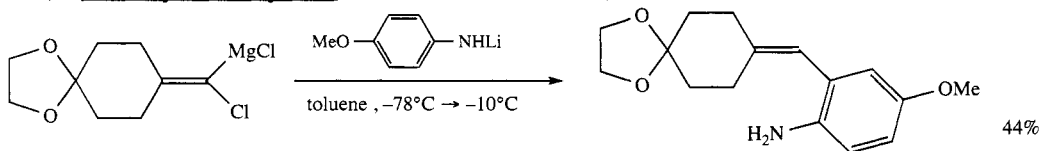
Kakuuchi, A.; Taaguchi, T.; Hanazawa, Y. *Tetrahedron Lett.* **2003**, *44*, 923.



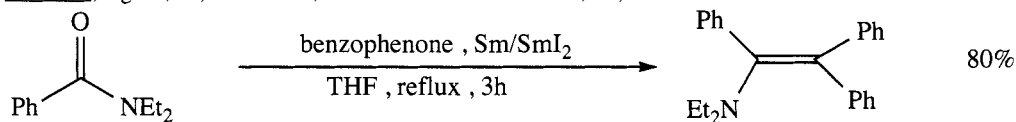
Shue, Y.-J.; Yang, S.-C.; Lai, H.-C. *Tetrahedron Lett.* **2003**, *44*, 1481.



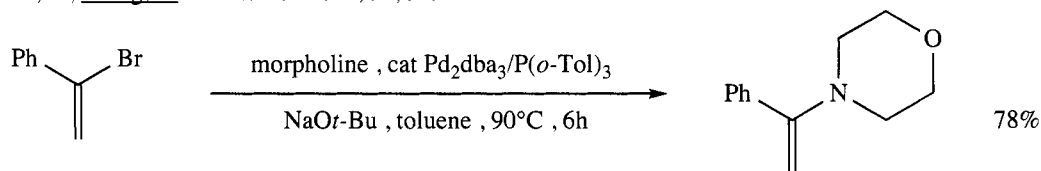
Solé, D.; Urbaneja, X.; Bonjoch, J. *Tetrahedron Lett.* **2004**, *45*, 3131.



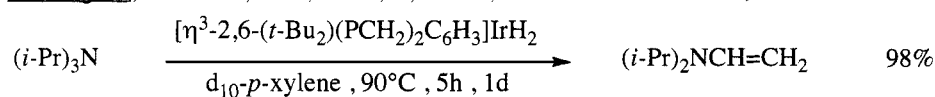
Satoh, T.; Ogino, Y.; Nakamura, M. *Tetrahedron Lett.* **2004**, *45*, 5785.



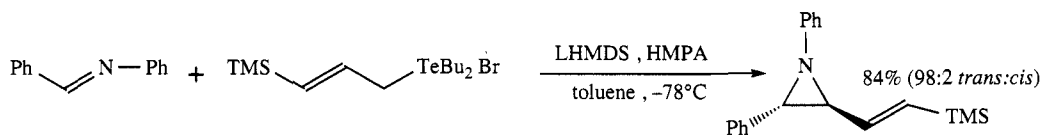
Xu, X.; Zhang, Y. *Tetrahedron* **2002**, *58*, 503.



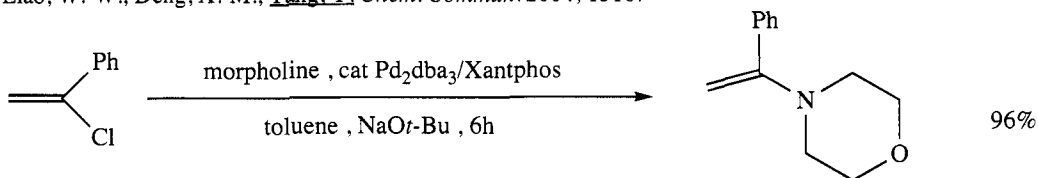
Barluenga, J.; Fernández, M.A.; Aznar, F.; Valdés, C. *Chem. Commun.* **2002**, 2362.



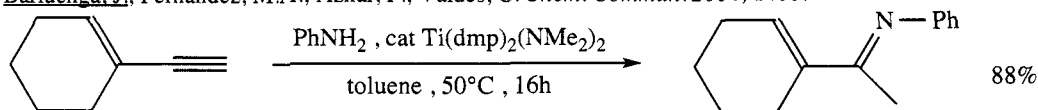
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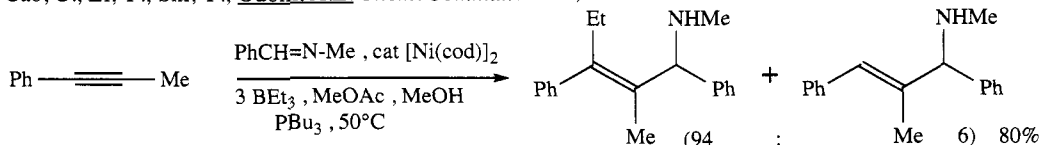
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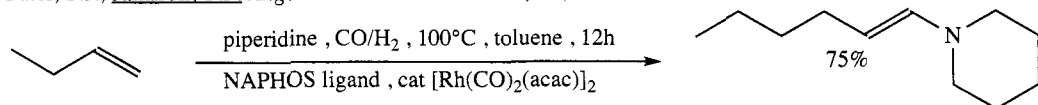
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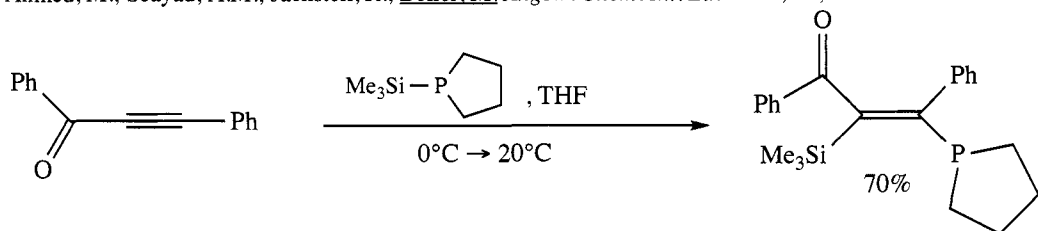
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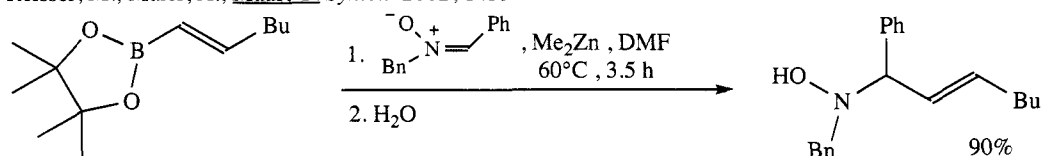
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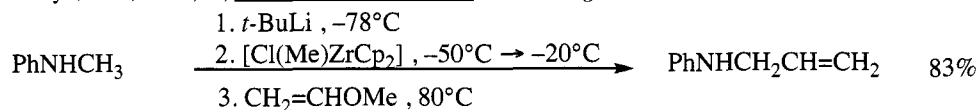
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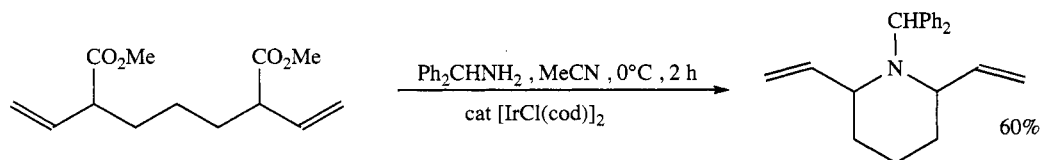
Reisser, M.; Maier, A.; Maas, G. *Synlett* **2002**, 1459.



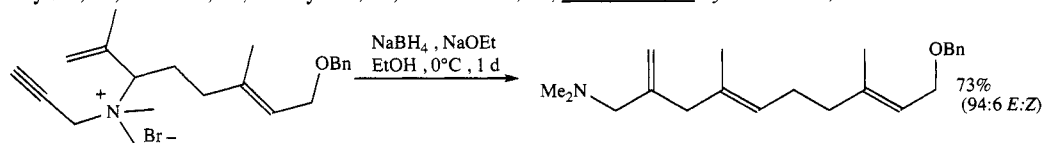
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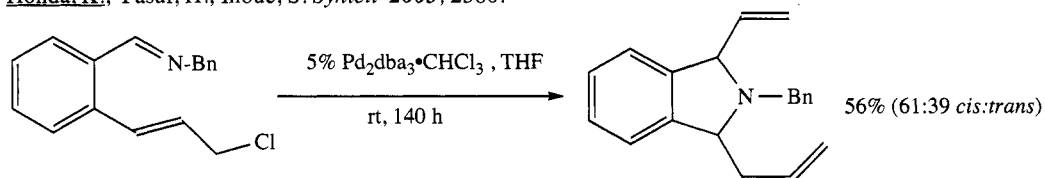
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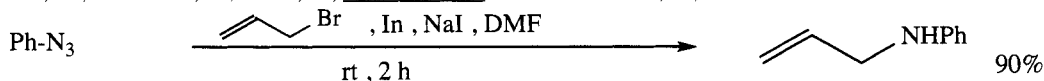
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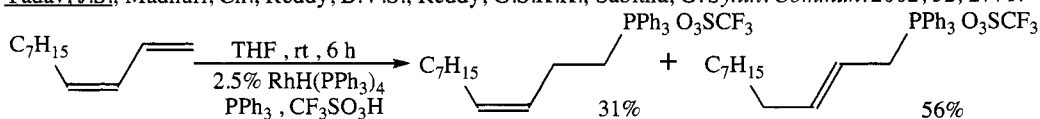
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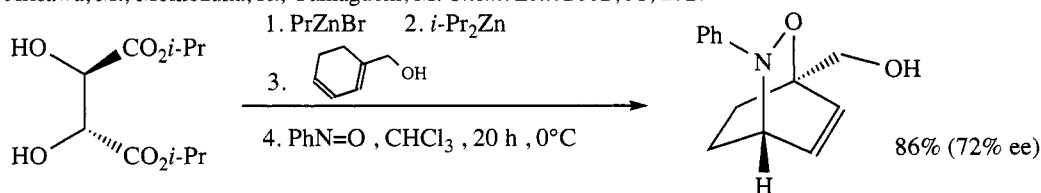
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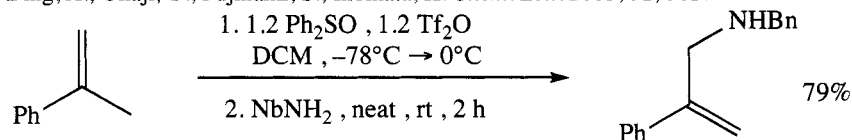
Yadav, J.S.; Madhuri, Ch.; Reddy, B.V.S.; Reddy, G.S.K.K.; Sabitha, G. *Synth. Commun.* **2002**, 32, 2771.



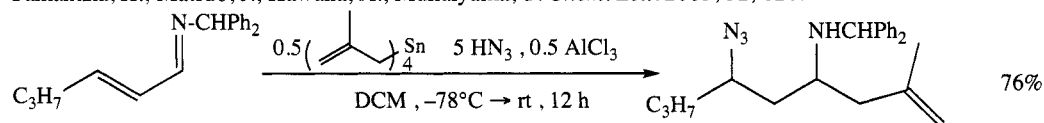
Arisawa, M.; Momozuka, R.; Yamaguchi, M. *Chem. Lett.* **2002**, 31, 272.



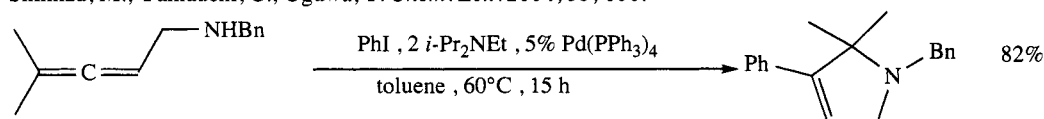
Ding, X.; Ukaji, Y.; Fujinami, S.; Inomata, K. *Chem. Lett.* **2003**, 32, 582.



Yamanaka, H.; Matsuo, J.; Kawana, A.; Mukaiyama, T. *Chem. Lett.* **2003**, 32, 626.



Shimizu, M.; Yamauchi, C.; Ogawa, T. *Chem. Lett.* **2004**, 33, 606.



Shibata, T.; Kadowaki, S.; Takagi, K. *Heterocycles* **2002**, 57, 2261.

REVIEWS:

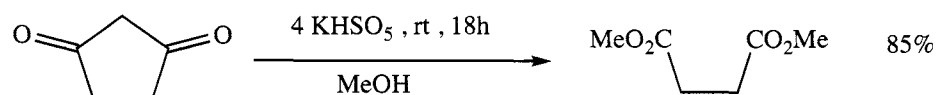
"Recent Advances in Synthetic Applications of Azadienes"

Jayakumar, S.; Ishar, M.P.S.; Mahajan, M.P. *Tetrahedron* **2002**, 58, 379.

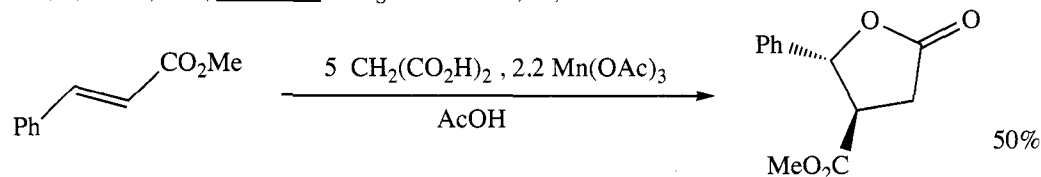
"Advances and Adventures in Amination Reactions of Olefins and Alkynes"

Beller, M.; Breindl, C.; Eichberger, M.; Hartung, C.G.; Seayad, J.; Thiel, O.R.; Tillack, A.; Trauthwen, H. *Synlett* **2002**, 1579.

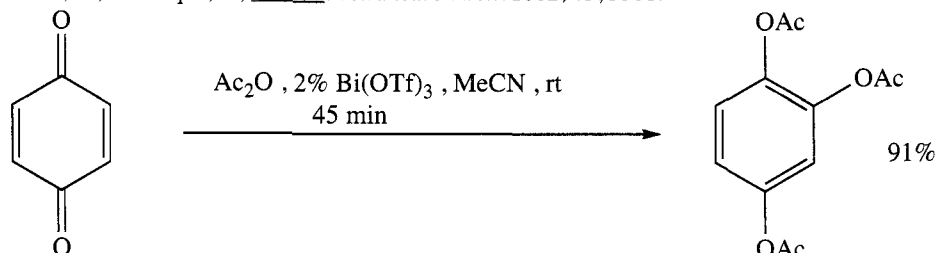
SECTION 357: ESTER - ESTER



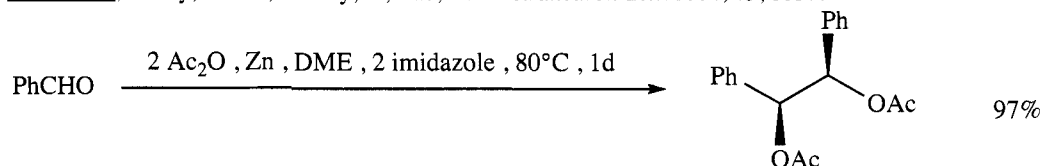
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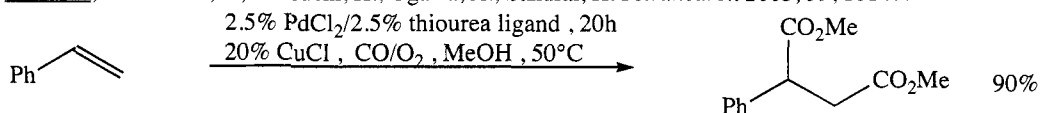
Méou, A.; Lamarque, L.; Brun, P. *Tetrahedron Lett.* **2002**, 43, 5301.



Yadav, J.S.; Reddy, B.V.S.; Swamy, T.; Rao, K.R. *Tetrahedron Lett.* **2004**, 45, 6037.



Hirao, T.; Santhitikul, S.; Takeuchi, H.; Ogawa, A.; Sakurai, H. *Tetrahedron* **2003**, 59, 10147.

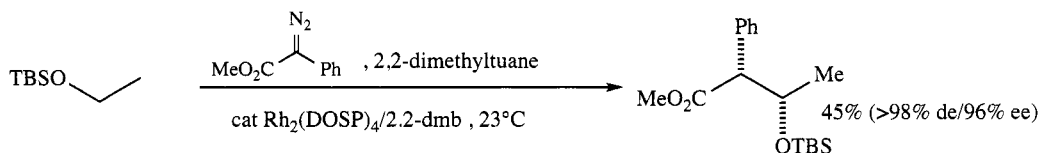


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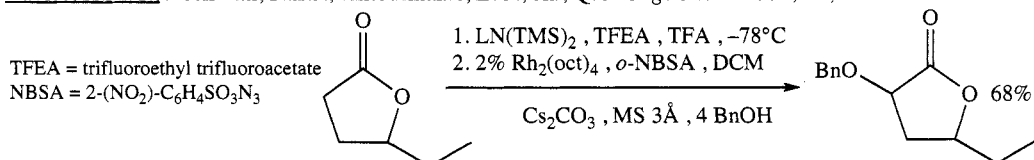
Also via Dicarboxylic Acids:
Hydroxy-esters
Diols

Section 312 (Carboxylic Acid - Carboxylic Acid)
Section 327 (Alcohol - Ester)
Section 323 (Alcohol - Alcohol)

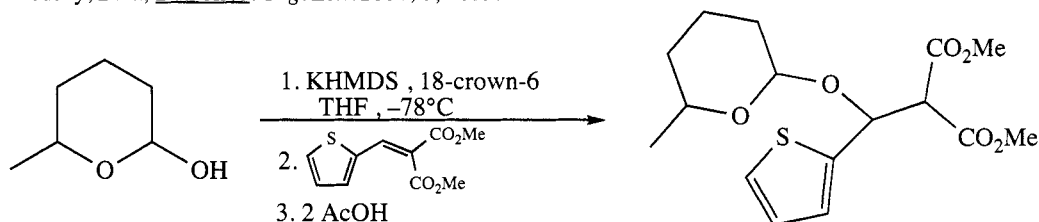
SECTION 358: ESTER - ETHER, EPOXIDE, THIOETHER



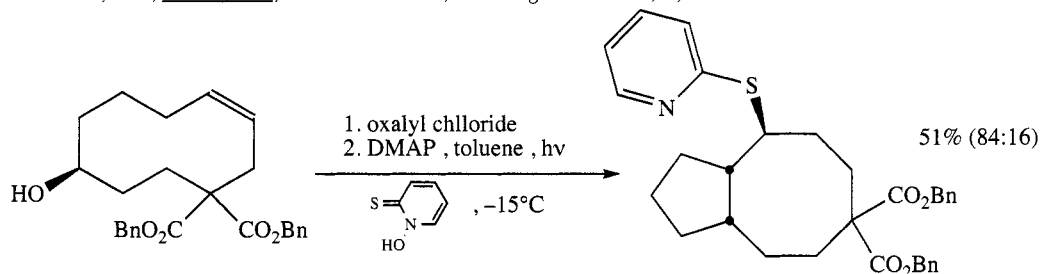
Davies, H.M.L.; Beckwith, R.E.J.; Antoulinakis, E.G.; Jin, Q. *J. Org. Chem.* **2003**, *68*, 6126.



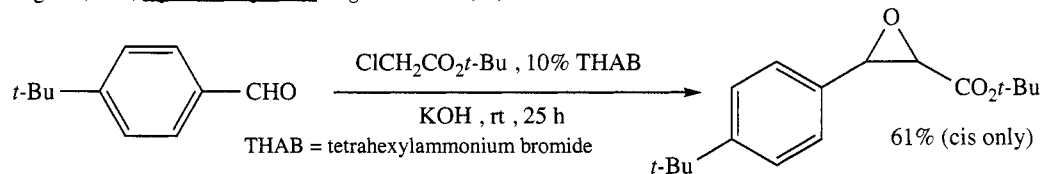
Brodsky, B.H.; DuBois, J. *Org. Lett.* **2004**, *6*, 2619.



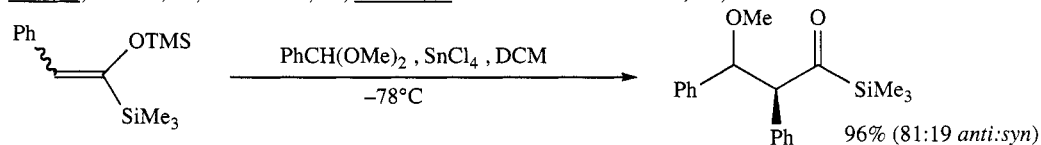
Buchanan, D.J.; Dixon, D.J.; Hernandez-Juan, F.A. *Org. Lett.* **2004**, *6*, 1357.



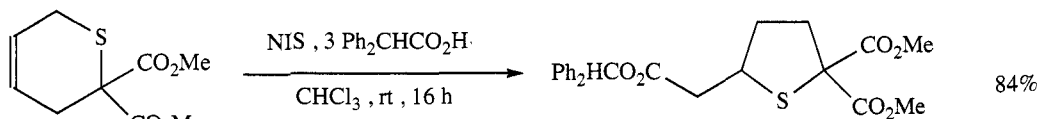
Daglard, J.E.; Rychnovsky, S.D. *Org. Lett.* **2004**, *6*, 2713.



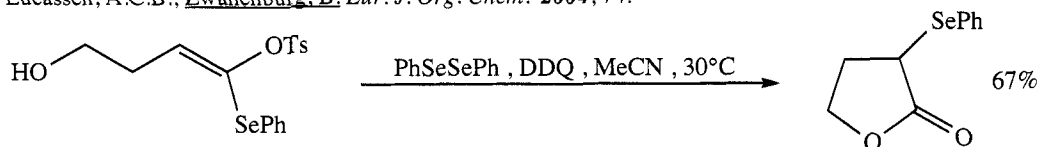
Aria, S.; Suzuki, Y.; Tokumaru, K.; Shioiri, T. *Tetrahedron Lett.* **2002**, *43*, 833.



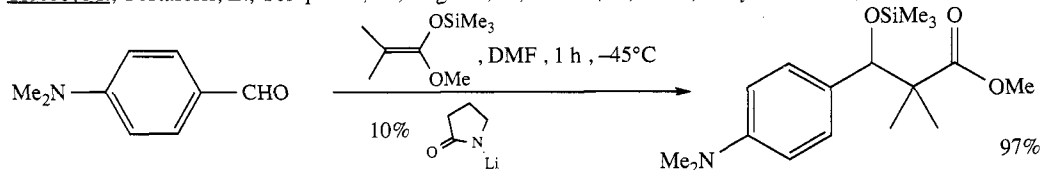
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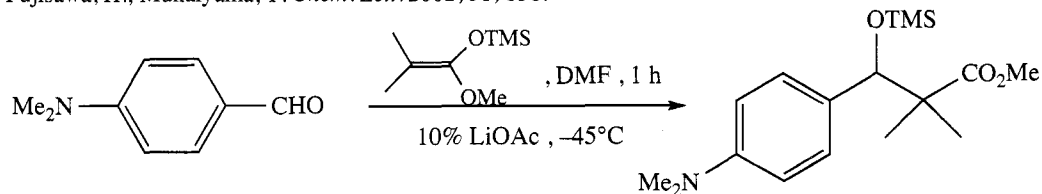
Lucassen, A.C.B.; Zwanenburg, B. *Eur. J. Org. Chem.* **2004**, 74.



Tiecco, M.; Testaferri, L.; Temperini, A.; Bagnoli, L.; Marini, F.; Santi, C. *Synlett* **2003**, 655.

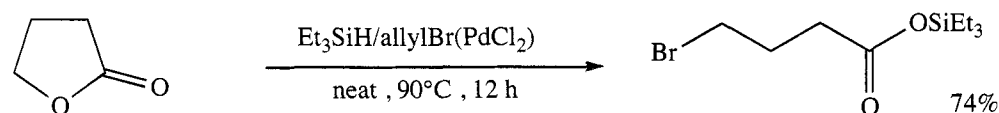


Fujisawa, H.; Mukaiyama, T. *Chem. Lett.* **2002**, 31, 858.

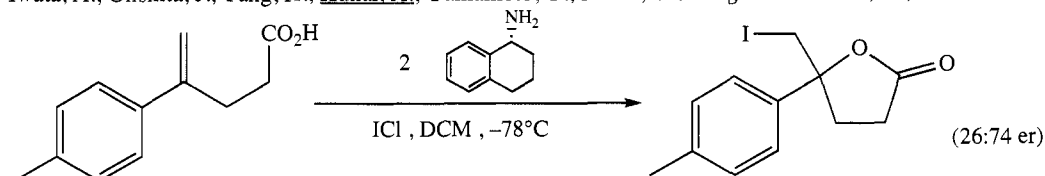


Nakagawa, T.; Fujisawa, H.; Nagata, Y.; Mukaiyama, T. *Bull. Chem. Soc. Jpn.* **2004**, 77, 1555.

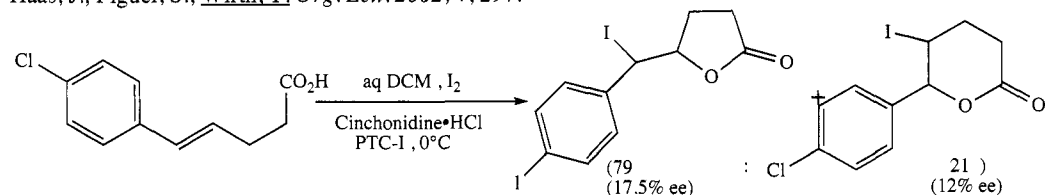
SECTION 359: ESTER - HALIDE, SULFONATE



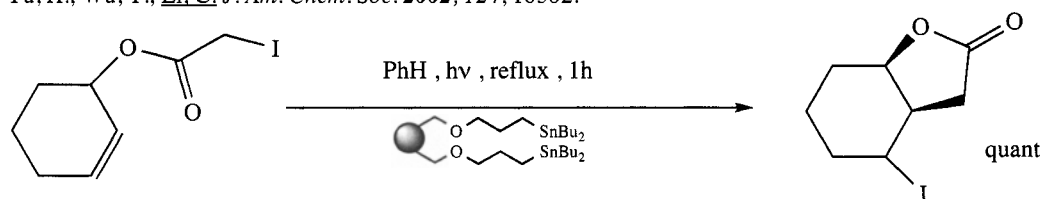
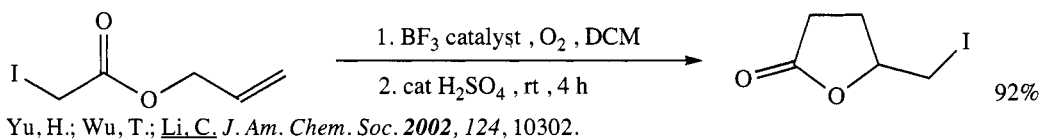
Iwata, A.; Ohshita, J.; Tang, H.; Kunai, A.; Yamamoto, Y.; Matui, C. *J. Org. Chem.* **2002**, 67, 3927.



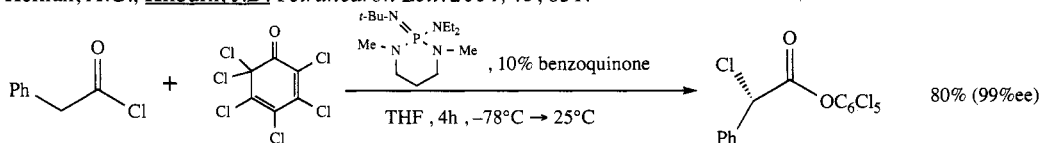
Haas, J.; Piguel, S.; Wirth, T. *Org. Lett.* **2002**, 4, 297.



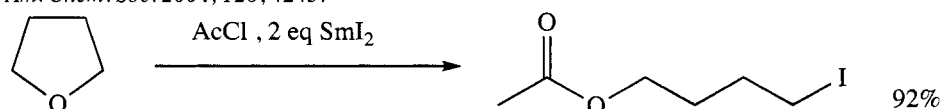
Wang, M.; Gao, L.X.; Mai, W.P.; Xia, A.X.; Wang, F.; Zhang, S.B. *J. Org. Chem.* **2004**, 69, 2874.



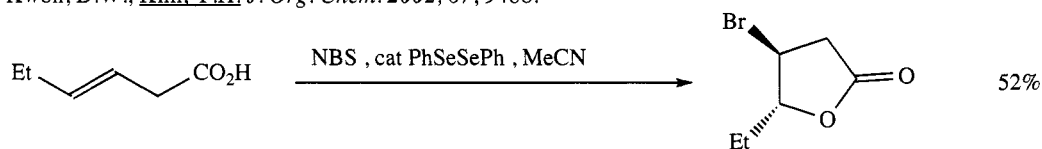
Hernán, A.G.; Kilburn, J.D., *Tetrahedron Lett.* **2004**, *45*, 831.



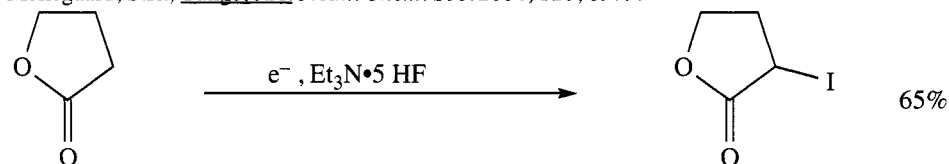
France, S.; Wack, H.; Taggi, A.E.; Hafez, A.M.; Waagerle, Ty.R.; Shah, M.H.; Susich, C.L.; Lectka, T., *J. Am. Chem. Soc.* **2004**, *126*, 4245.



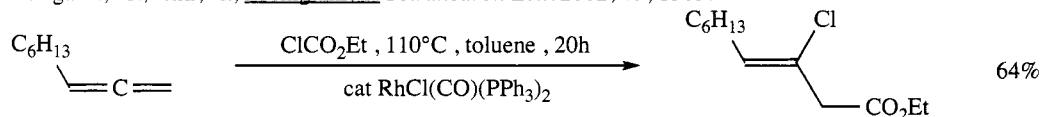
Kwon, D.W.; Kim, Y.H., *J. Org. Chem.* **2002**, *67*, 9488.



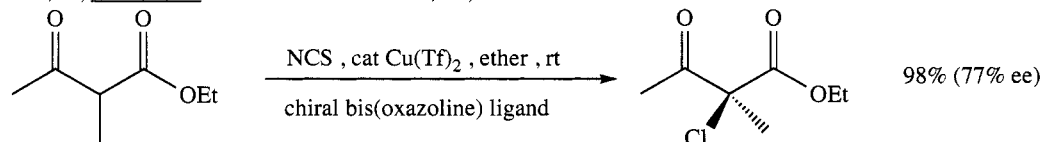
Mellegaard, S.R.; Tunge, J.A., *J. Am. Chem. Soc.* **2004**, *126*, 8979.



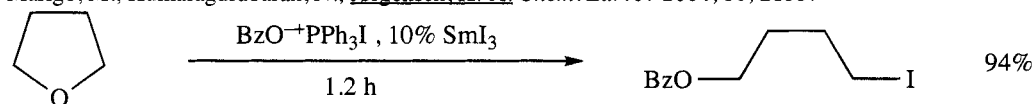
Hasegawa, M.; Ishii, H.; Fuchigami, T., *Tetrahedron Lett.* **2002**, *43*, 1503.



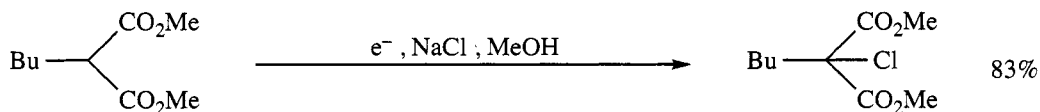
Hua, R.; Tanaka, M., *Tetrahedron Lett.* **2004**, *45*, 2367.



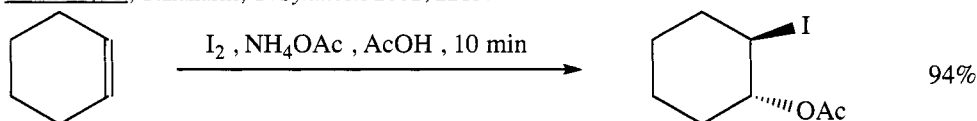
Marigo, M.; Kumaragurubaran, N.; Jørgensen, K.-A., *Chem. Eur. J.* **2004**, *10*, 2133.



Liu, Y.; Zhang, Y., *Org. Prep. Proceed. Int.* **2002**, *34*, 213.

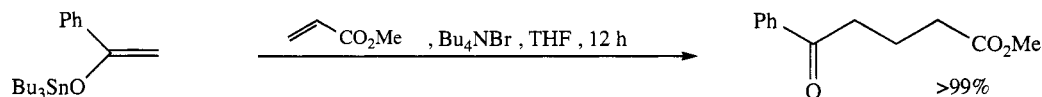


Okimoto, M.; Takahashi, Y. *Synthesis* **2002**, 2215.

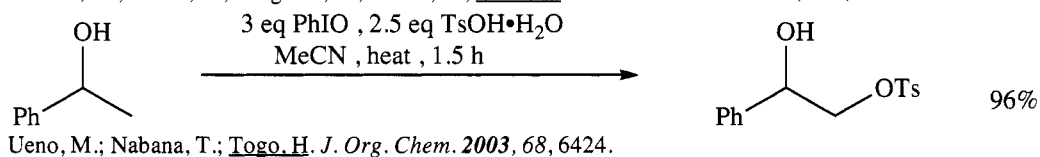


Myint, Y.Y.; Pasha, M.A. *Synth. Commun.* **2004**, 34, 4477.

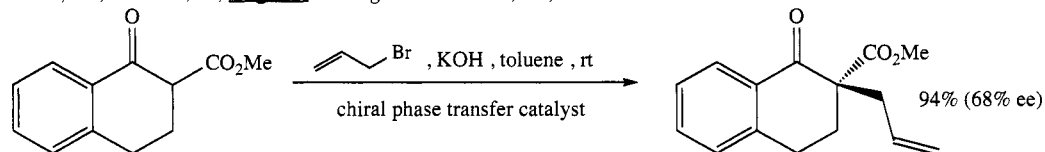
SECTION 360: ESTER - KETONE



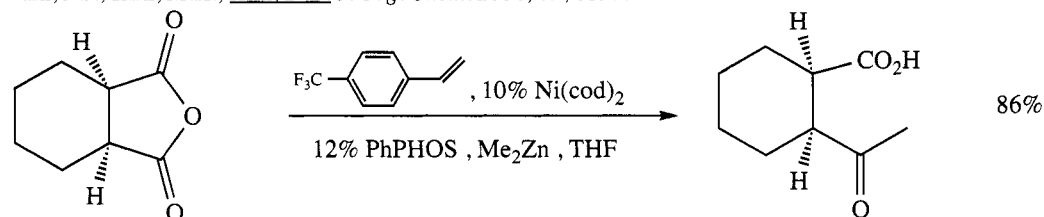
Yasuda, M.; Chiba, K.; Ohigashi, N.; Katoh, Y.; Baba, A. *J. Am. Chem. Soc.* **2003**, 125, 7291.



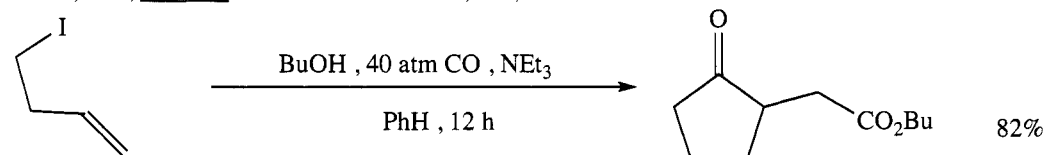
Ueno, M.; Nabana, T.; Togo, H. *J. Org. Chem.* **2003**, 68, 6424.



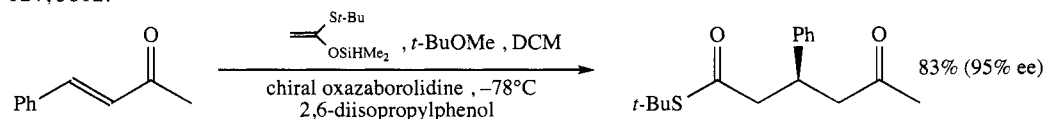
Park, E.J.; Kim, M.H.; Kim, D.Y. *J. Org. Chem.* **2004**, 69, 6897.



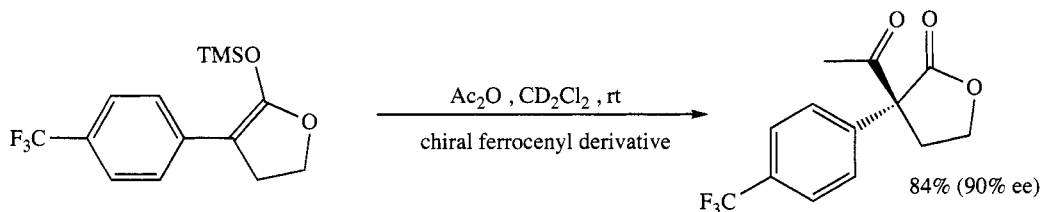
Bercot, E.A.; Rovis, T. *J. Am. Chem. Soc.* **2002**, 124, 174.



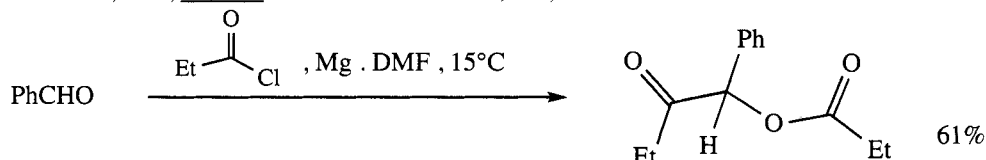
Ryu, I.; Kreimerman, S.; Araki, S.; Oderaotoshi, Y.; Minakata, S.; Komaatsu, M. *J. Am. Chem. Soc.* **2002**, 124, 3812.



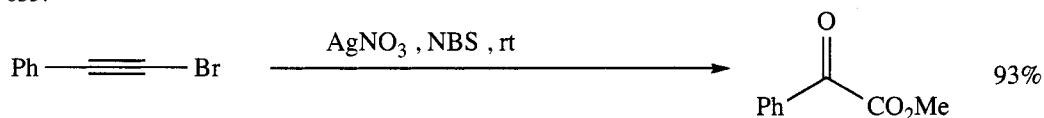
Harada, T.; Adachi, S.; Wang, X. *Org. Lett.* **2004**, 6, 4877.



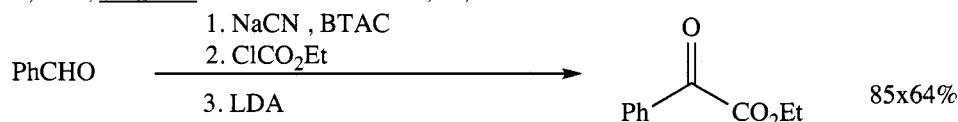
Mermerian, A.H.; Fu, G.C. *J. Am. Chem. Soc.* **2003**, 125, 4050.



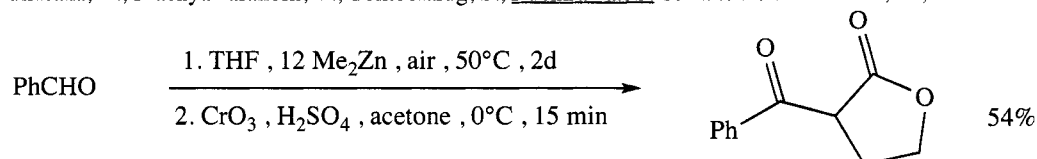
Nishiguchi, I.; Sakai, M.; Mackawa, H.; Ohno, T.; Yamamoto, Y.; Ishino, Y. *Tetrahedron Lett.* **2002**, 43, 635.



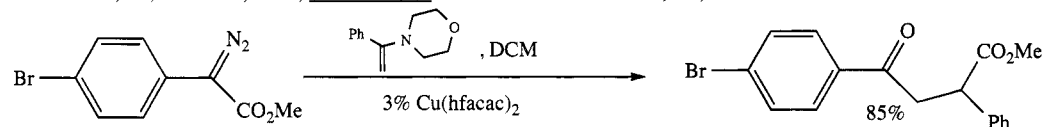
Li, L.-S.; Wu, Y.-L. *Tetrahedron Lett.* **2002**, 43, 2427.



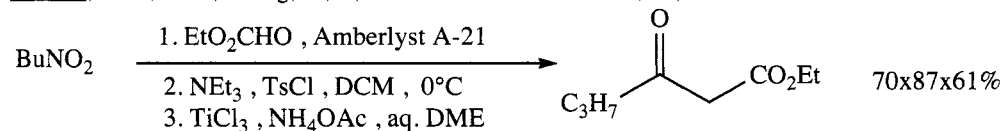
Thasana, N.; Prachyawarakorn, V.; Tontoolarug, S.; Ruchirawat, S. *Tetrahedron Lett.* **2003**, 44, 1019.



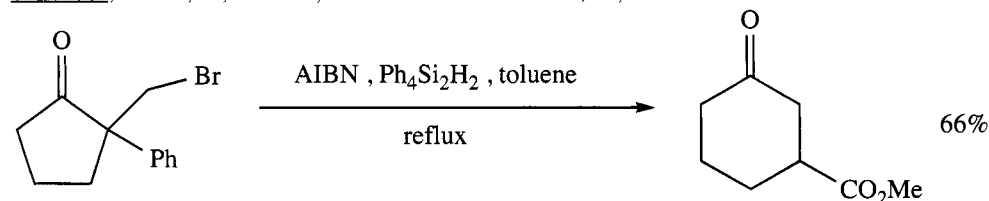
Yamamoto, Y.; Yamada, K.-i.; Tomioka, K. *Tetrahedron Lett.* **2004**, 45, 795.



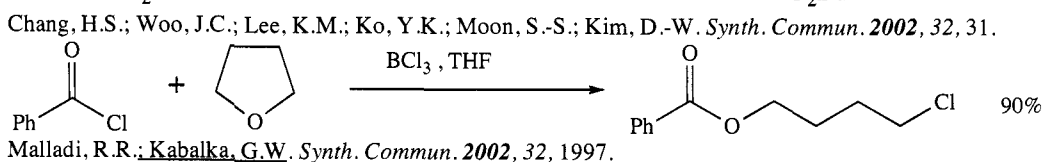
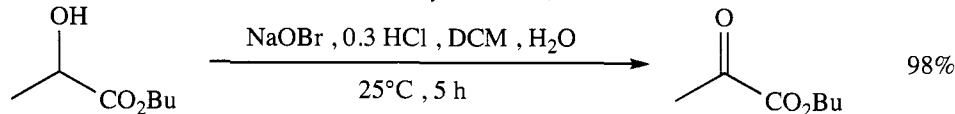
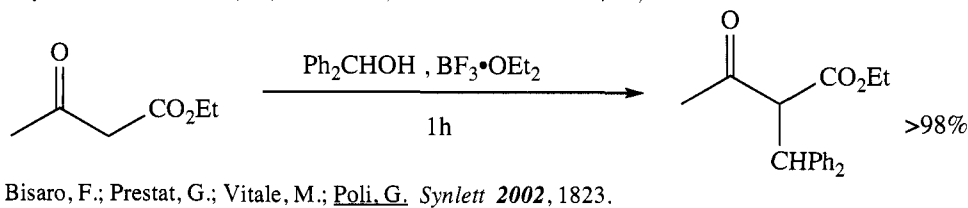
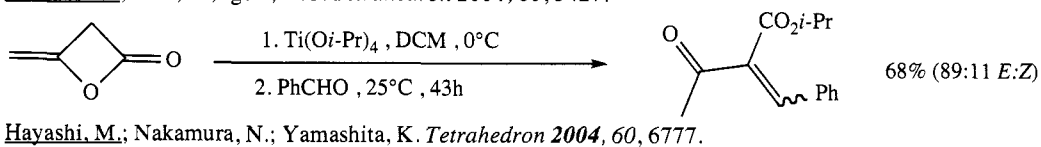
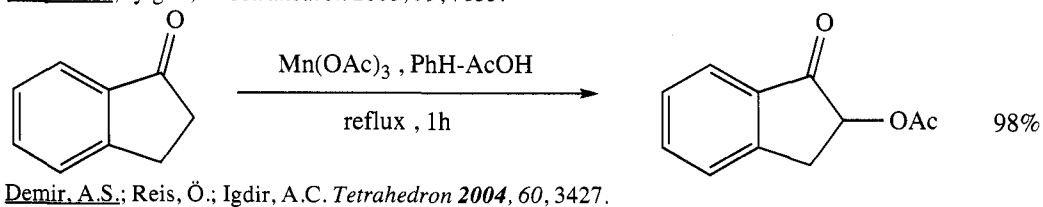
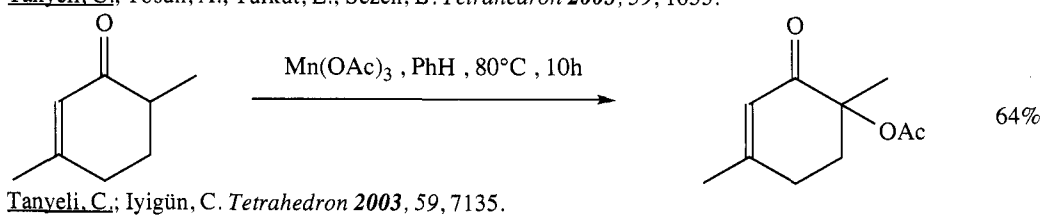
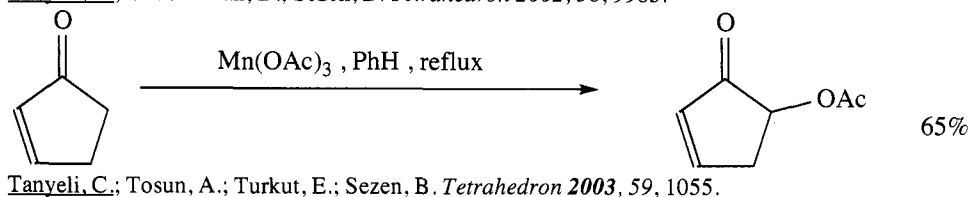
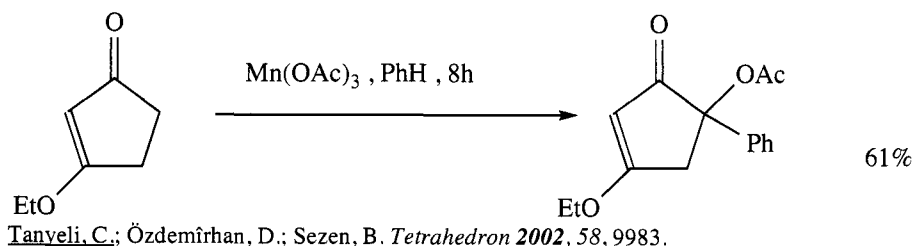
Yan, M.; Zhao, W.-J.; Huang, D.; Ji, S.-J. *Tetrahedron Lett.* **2004**, 45, 6365.

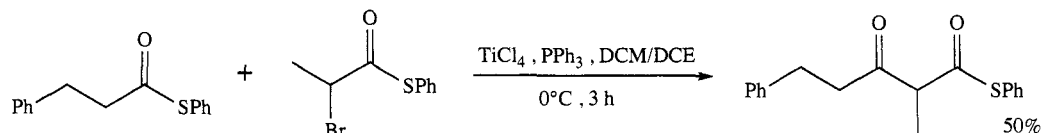


Ballini, R.; Fiorini, D.; Palmieri, A. *Tetrahedron Lett.* **2004**, 45, 7027.

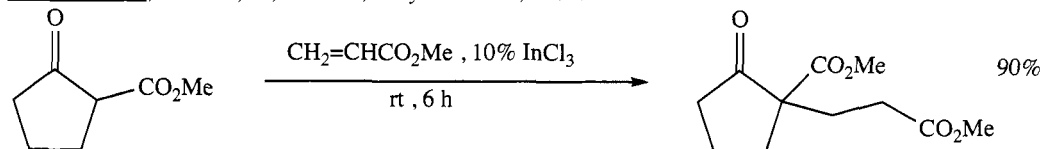


Sugi, M.; Togo, H. *Tetrahedron* **2002**, 58, 3171.

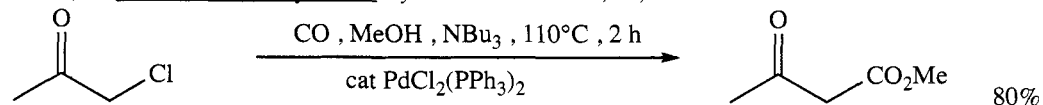




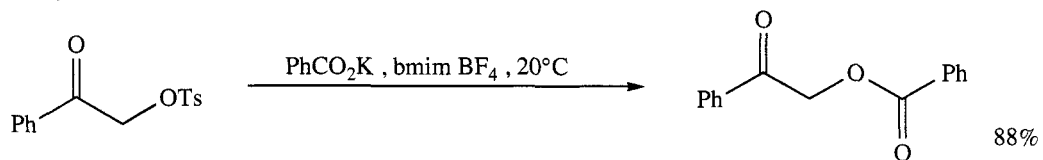
Hashimoto, Y.; Konishi, H.; Kikuchi, S. *Synlett* **2004**, 1264.



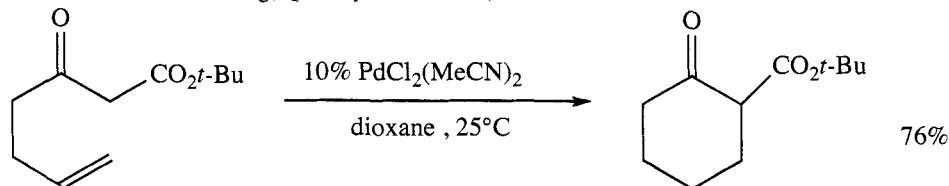
Yadav, J.S.; Geetha, V.; Reddy, B.V.S. *Synth. Commun.* **2002**, 32, 3519.



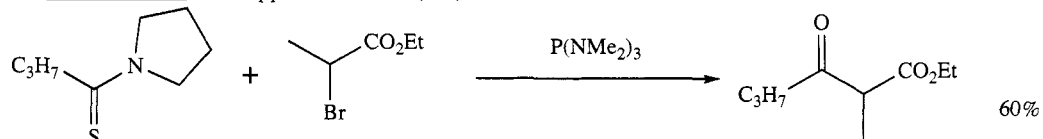
Lapidus, A.L.; Eliseev, O.L.; Bondarenko, T.N.; Sizan, O.E.; Ostaenko, A.G.; Beletskaya, I.P. *Synthesis* **2002**, 317.



Liu, Z.; Chen, Z.-C.; Zheng, Q.-G. *Synthesis* **2004**, 33.



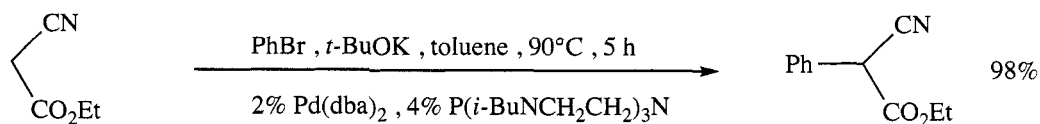
Widenhoefer, R.A. *Pure Appl. Chem.* **2004**, 76, 671.



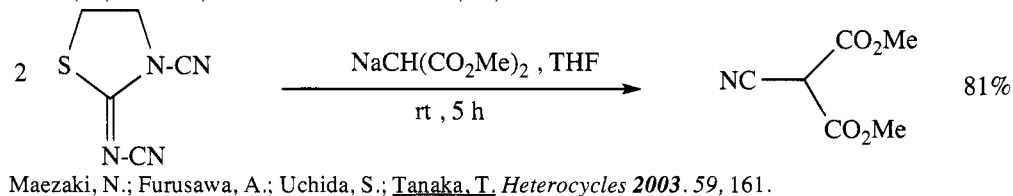
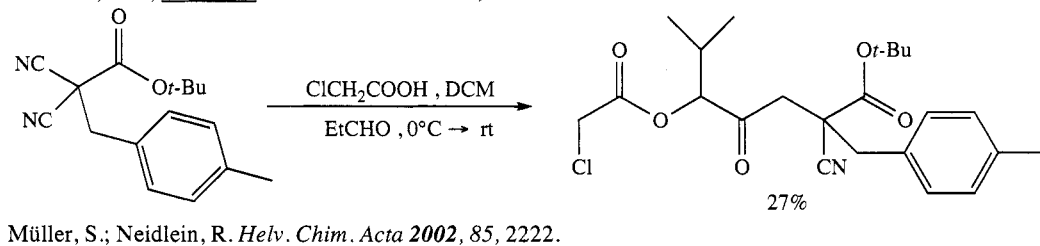
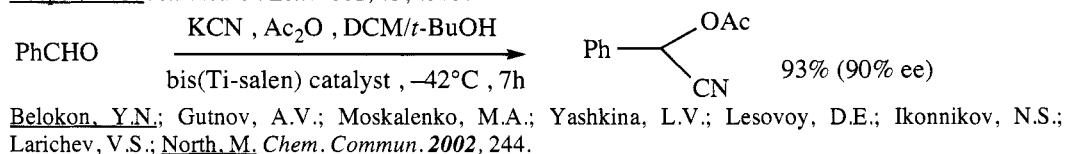
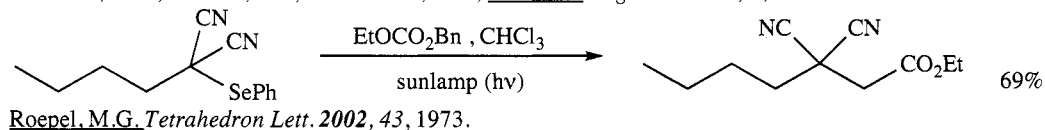
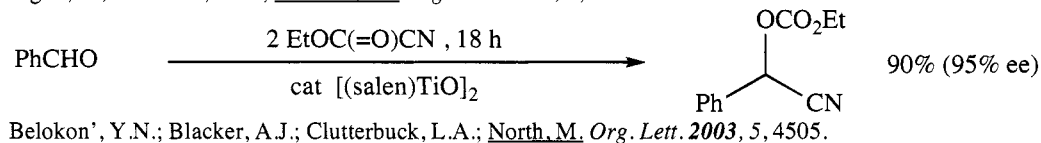
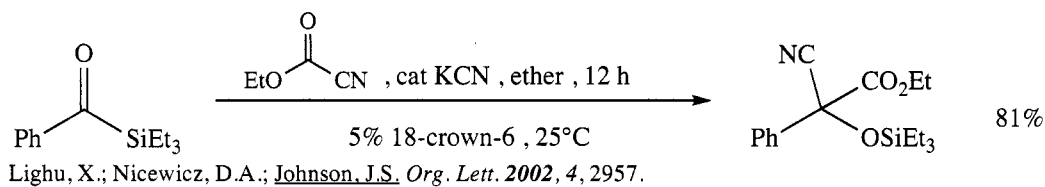
Bellee, C.; Gaurat, O. *Can. J. Chem.* **2004**, 82, 1289.

Also via Ketoacids Section 320 (Carboxylic Acid - Ketone)
Hydroxyketones Section 330 (Alcohol - Ketone)

SECTION 361: ESTER - NITRILE

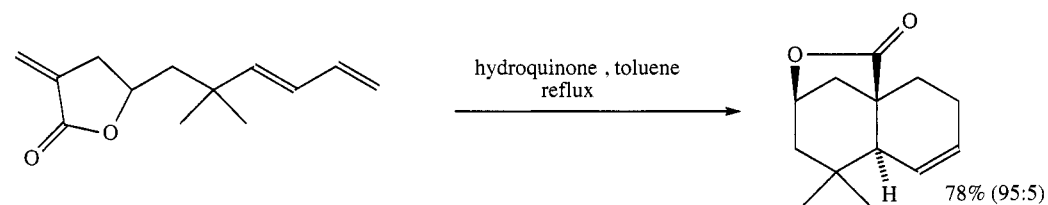


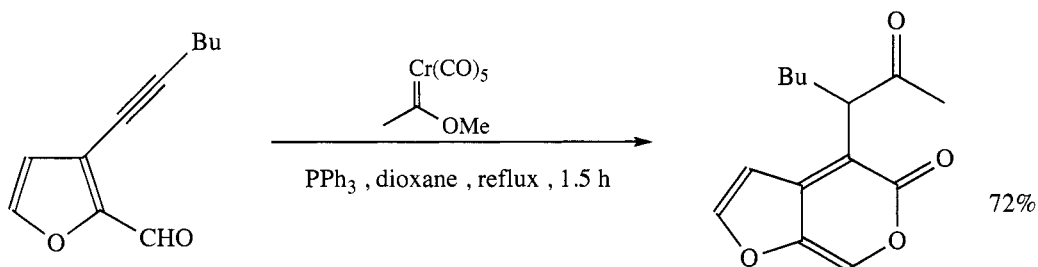
Yu, J.; Verkade, J.G. *J. Org. Chem.* **2003**, 68, 8003.



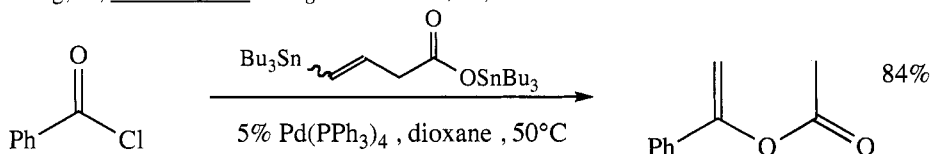
SECTION 362: ESTER - ALKENE

This section contains syntheses of enol esters and esters of unsaturated acids as well as ester molecules bearing a remote alkenyl unit.

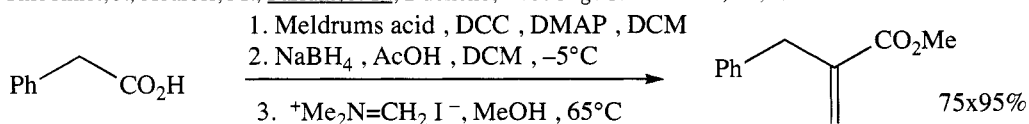




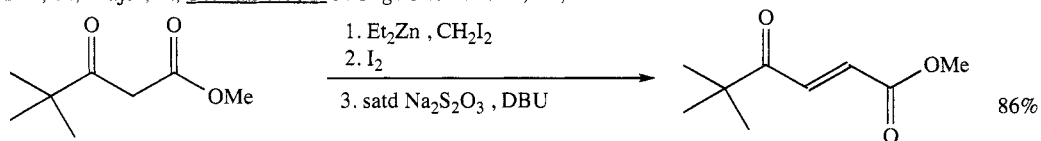
Zhang, Y.; Herndon, J.W. *J. Org. Chem.* **2002**, 67, 4177.



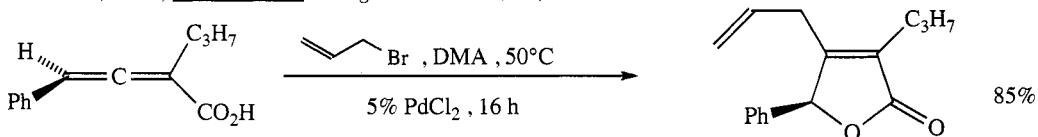
Thibonnet, J.; Abarbri, M.; Parrain, J.-L.; Duchêne, A. *J. Org. Chem.* **2002**, 67, 3941.



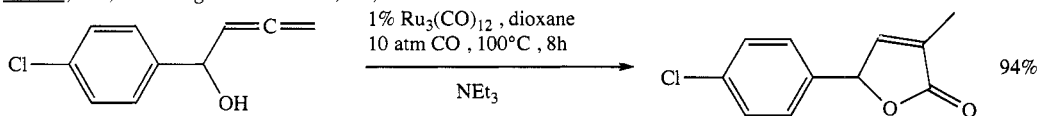
Hin, B.; Majer, P.; Tsukamoto, T. *J. Org. Chem.* **2002**, 67, 7365.



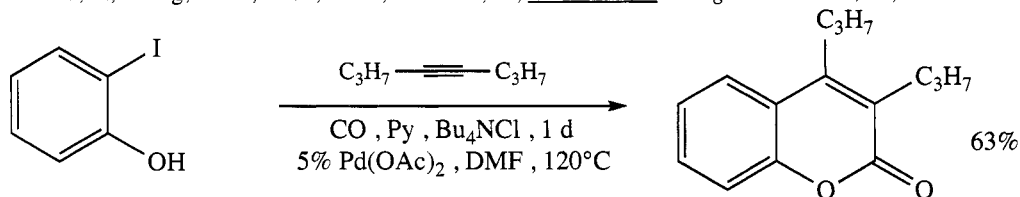
Ronsheim, M.D.; Zercher, C.K. *J. Org. Chem.* **2003**, 68, 4535.



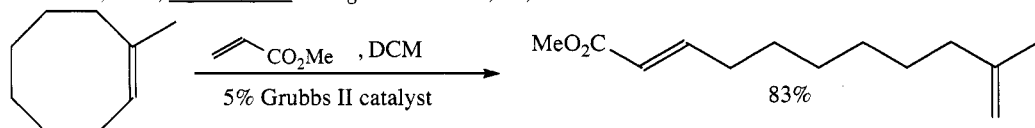
Ma, S.; Yu, Z. *J. Org. Chem.* **2003**, 68, 6149.



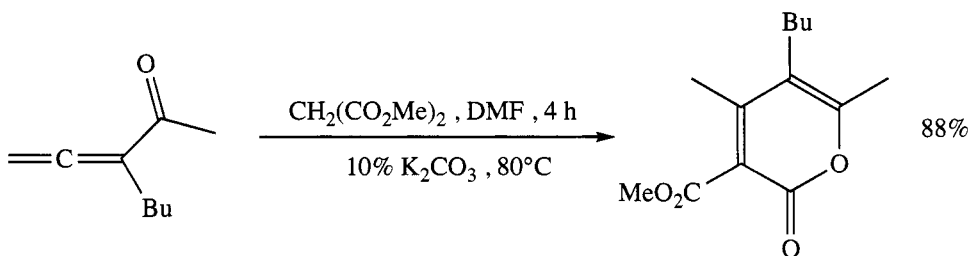
Yoneda, E.; Zhang, S.-W.; Zhou, D.-Y.; Onitsuka, K.; Takahashi, S. *J. Org. Chem.* **2003**, 68, 8571.



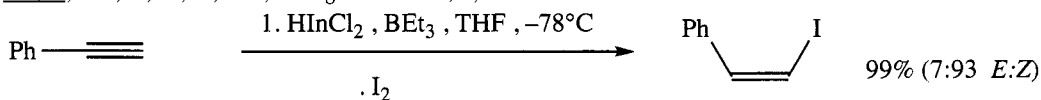
Kadnikov, D.V.; Larock, R.C. *J. Org. Chem.* **2003**, 68, 9423.



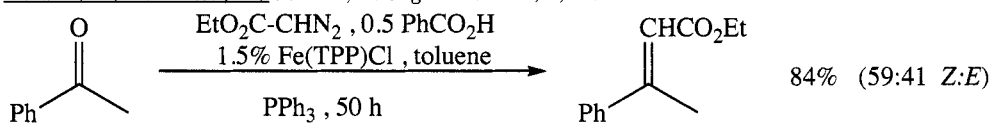
Morgan, J.P.; Morrill, C.; Grubbs, R.H. *Org. Lett.* **2002**, 4, 67.



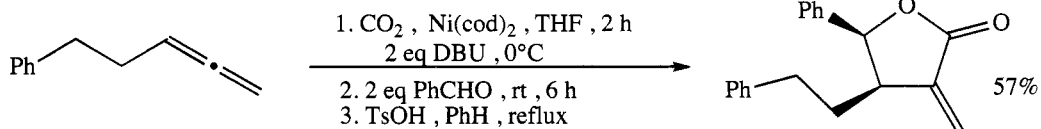
Ma, S.; Yin, S.; Li, L.; Tao, F. *Org. Lett.* **2002**, *4*, 505.



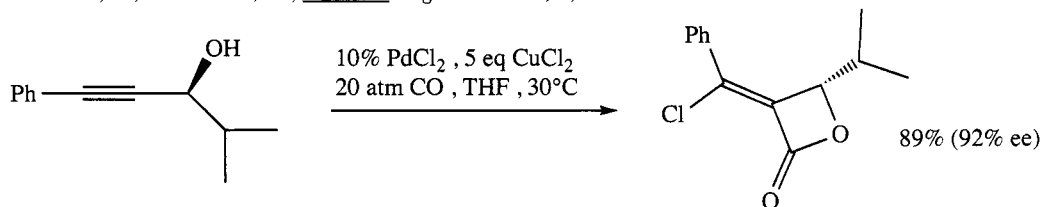
Takami, K.; Yorimitsu, H.; Oshima, K. *Org. Lett.* **2002**, *4*, 2993.



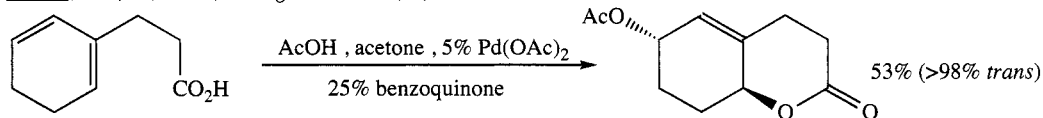
Chen Y.; Huang, L.; Zhang, X.P. *Org. Lett.* **2003**, *5*, 2493.



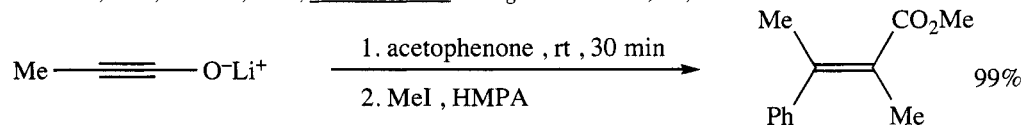
Takimoto, K.; Kawamura, M.; Mori, M. *Org. Lett.* **2003**, *5*, 2599.



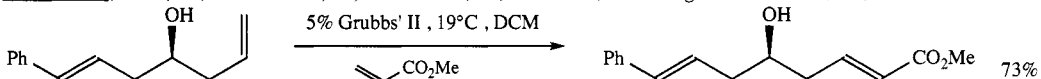
Ma, S.; Wu, B.; Zhao, S. *Org. Lett.* **2003**, *5*, 4429.



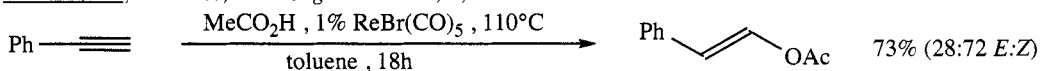
Verboom, R.C.; Persson, B.A.; Bäckvall, J.-E. *J. Org. Chem.* **2004**, *69*, 3102.



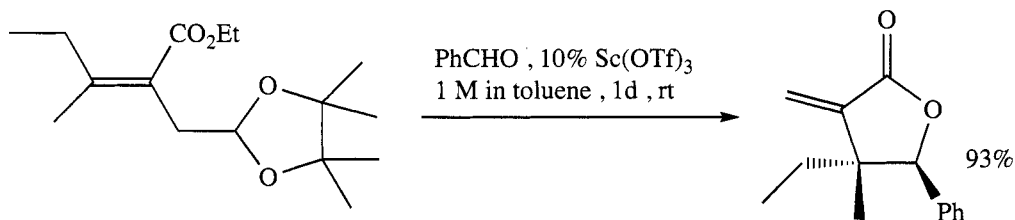
Shindo, M.; Sato, Y.; Yoshikawa, T.; Koretsune, R.; Shishido, K. *J. Org. Chem.* **2004**, *69*, 3912.



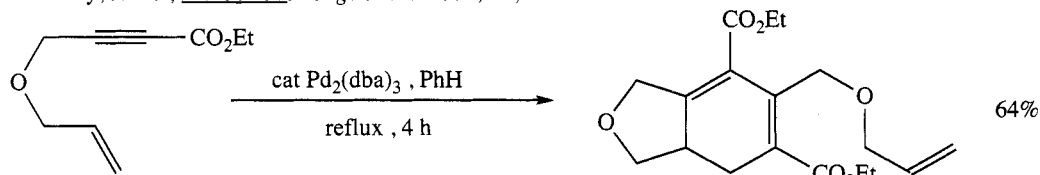
Lautens, M.; Maddess, M.L. *Org. Lett.* **2004**, *6*, 1883.



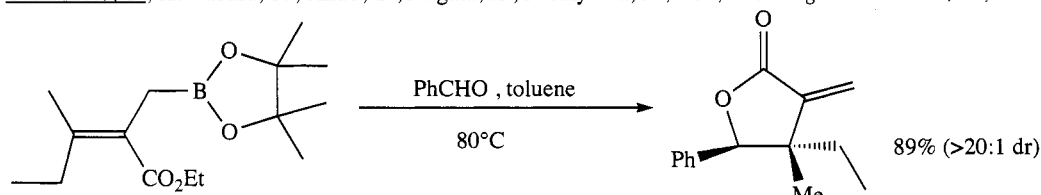
Hua, R.; Tian, X. *J. Org. Chem.* **2004**, *69*, 5782.



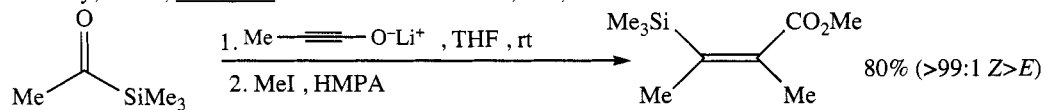
Kennedy, J.W.J.; Hall, D.G. *J. Org. Chem.* **2004**, 69, 4412.



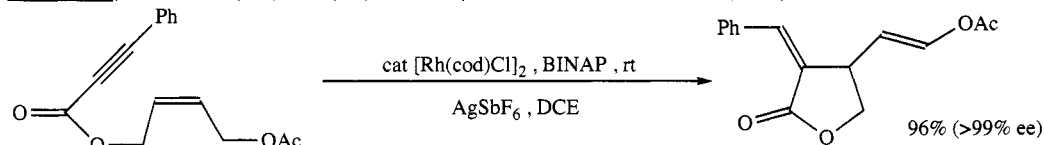
Yamamoto, Y.; Kuwabara, S.; Ando, Y.; Nagata, H.; Nishiyama, H.; Itoh, K. *J. Org. Chem.* **2004**, 69, 6697.



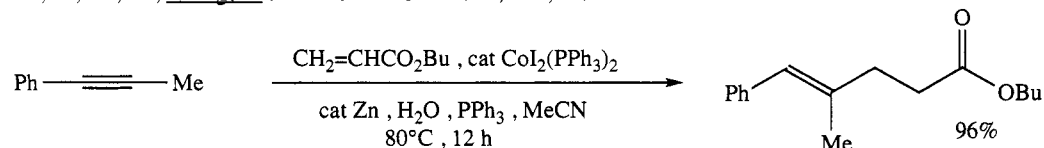
Kennedy, J.W.J.; Hall, D.G. *J. Am. Chem. Soc.* **2002**, 124, 898.



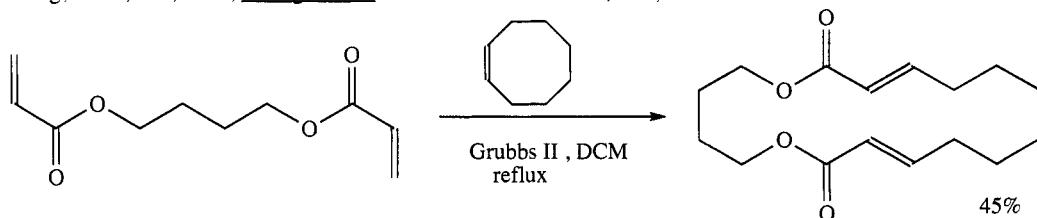
Shindo, M.; Matsumoto, K.; Mori, S.; Shishido, K. *J. Am. Chem. Soc.* **2002**, 124, 6840.



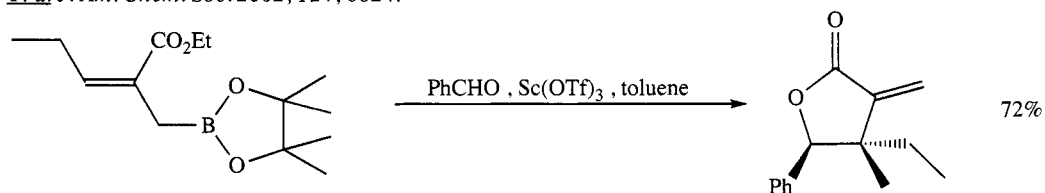
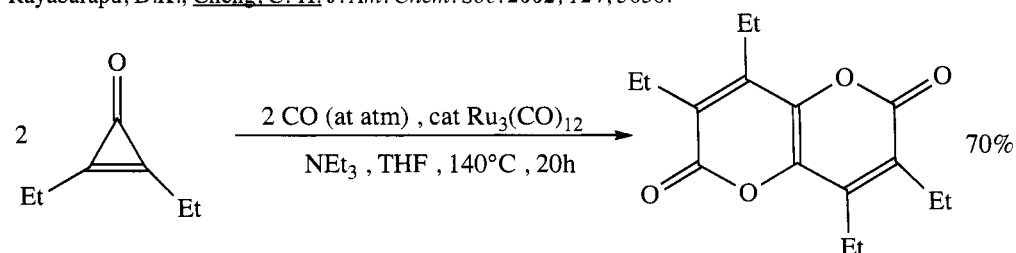
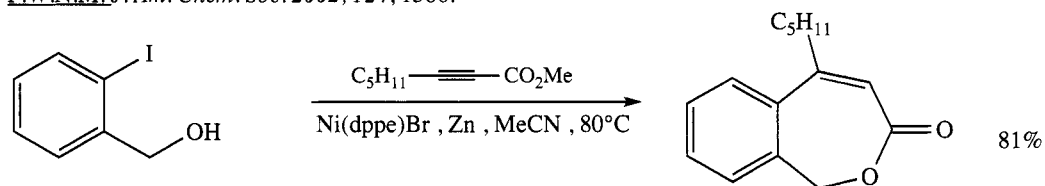
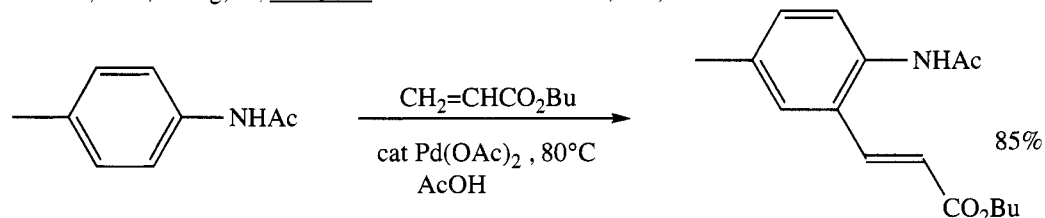
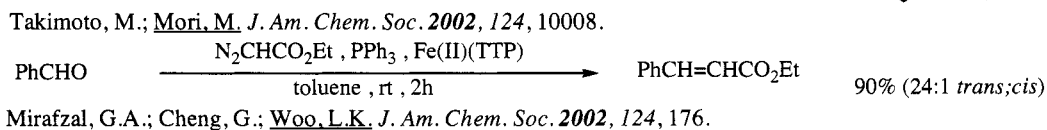
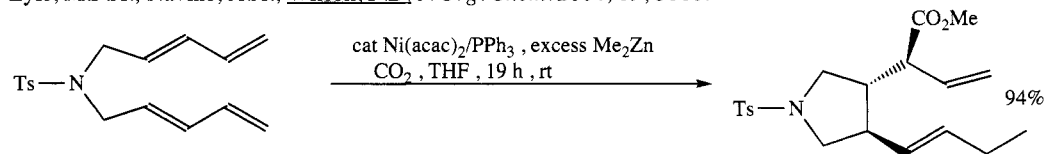
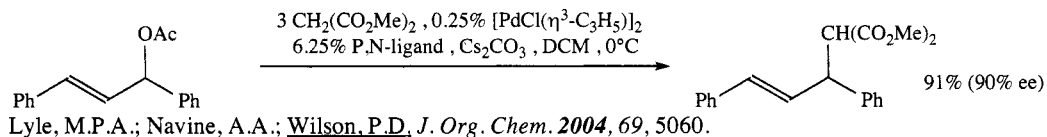
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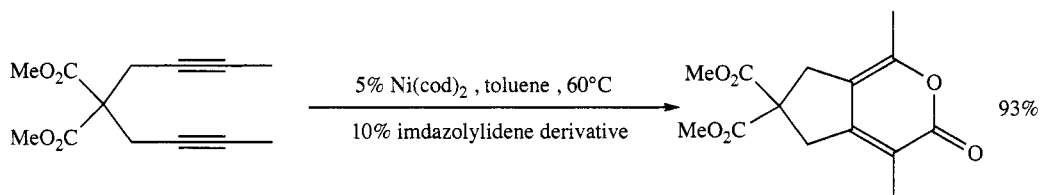


Wang, C.-C.; Lin, P.-S.; Cheng, C.-H. *J. Am. Chem. Soc.* **2002**, 124, 9696.

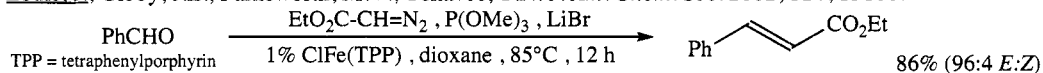


Lee, C.W.; Choi, T.-L.; Grubbs, R.H. *J. Am. Chem. Soc.* **2002**, 124, 3224.

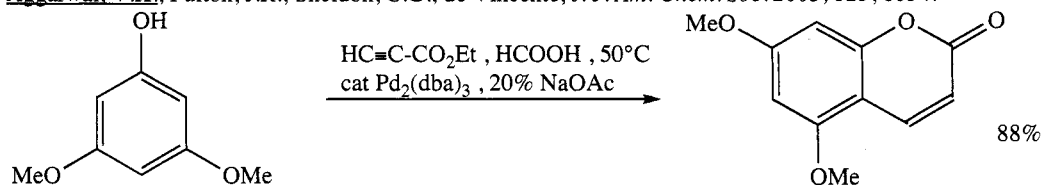




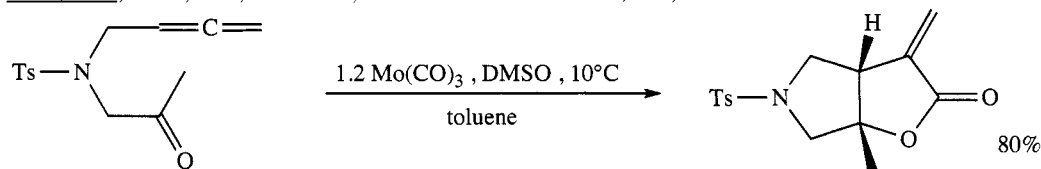
Louie, J.; Gibby, J.E.; Farnsworth, M.V.; Tekavec, T.N. *J. Am. Chem. Soc.* **2002**, *124*, 15188.



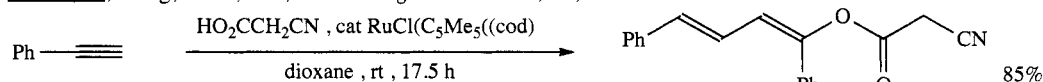
Aggarwal, V.K.; Fulton, J.R.; Sheldon, C.G.; de Vincente, J. *J. Am. Chem. Soc.* **2003**, *125*, 6034.



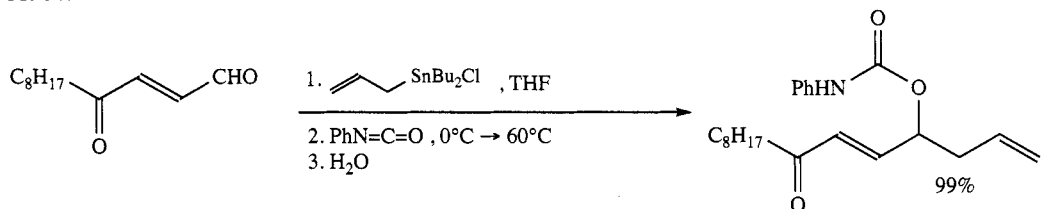
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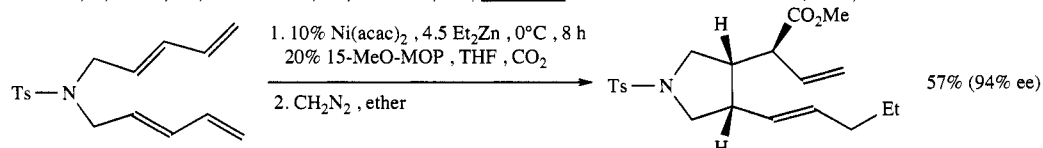
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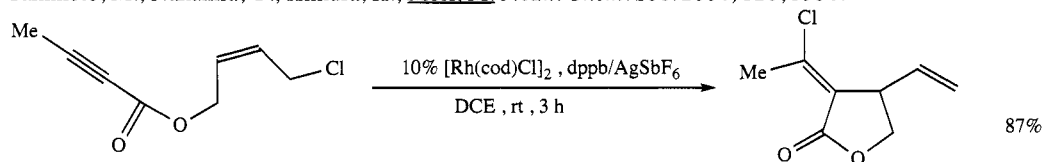
LePaih, J.; Monnier, F.; Dérien, S.; Dixneuf, P.H.; Clot, E.; Eisenstein, O. *J. Am. Chem. Soc.* **2003**, *125*, 11964.



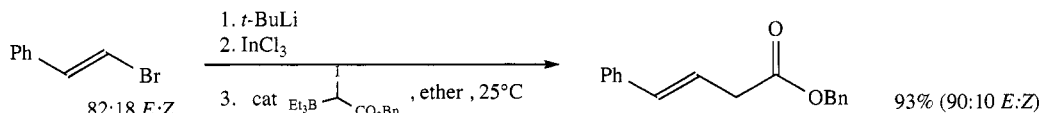
Shibata, I.; Kato, H.; Kanazawa, N.; Yasuda, M.; Baba, A. *J. Am. Chem. Soc.* **2004**, *126*, 466.



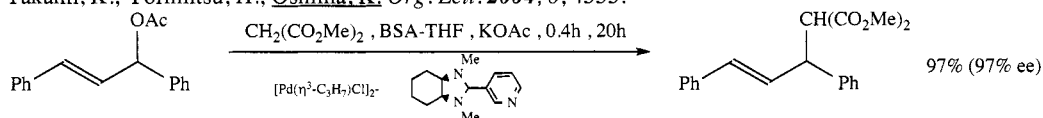
Takimoto, M.; Nakamra, Y.; Kimura, K.; Mori, M. *J. Am. Chem. Soc.* **2004**, *126*, 5956.



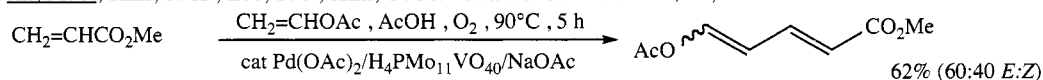
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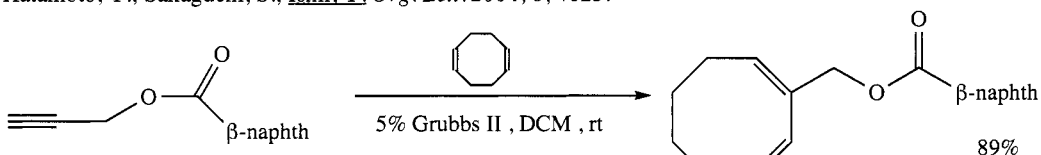
Takami, K.; Yorimitsu, H.; Oshima, K. *Org. Lett.* **2004**, *6*, 4555.



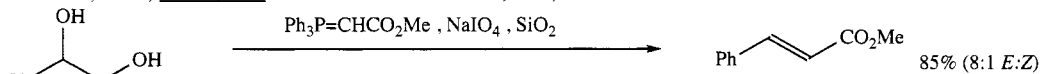
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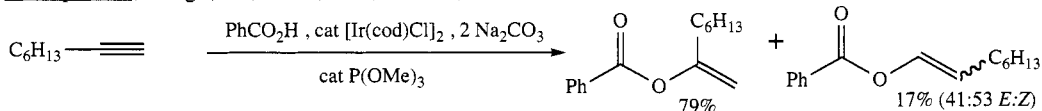
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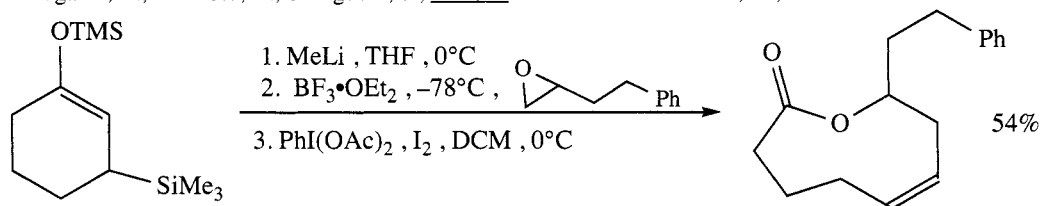
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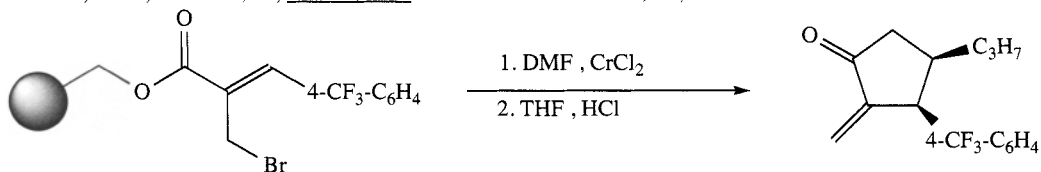
Dunlap, N.K.; Mergo, W.; Jones, J.M.; Carrick, J.D. *Tetrahedron Lett.* **2002**, *43*, 3923.



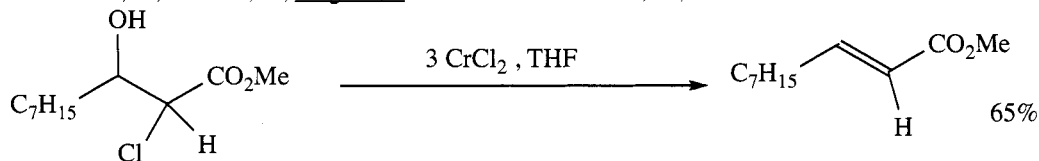
Nakagawa, H.; Okimoto, Y.; Sakaguchi, S.; Ishii, Y. *Tetrahedron Lett.* **2003**, *44*, 103.



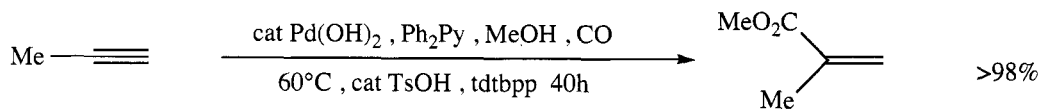
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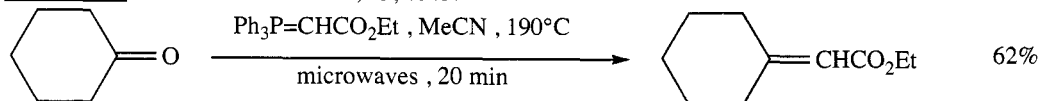
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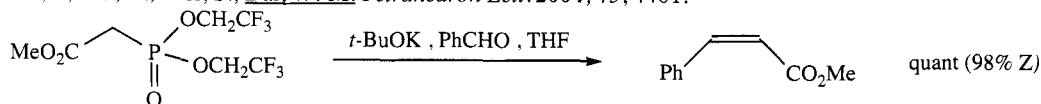
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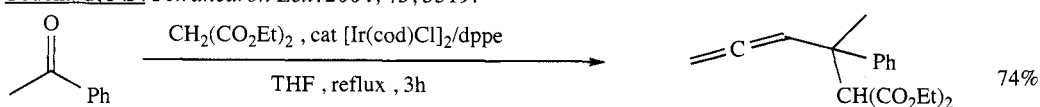
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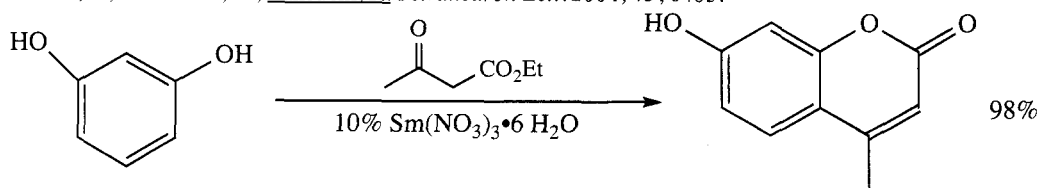
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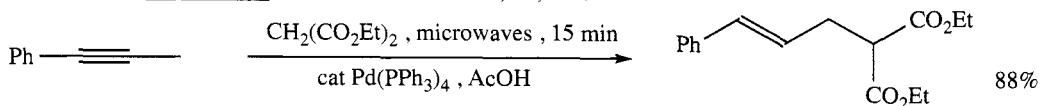
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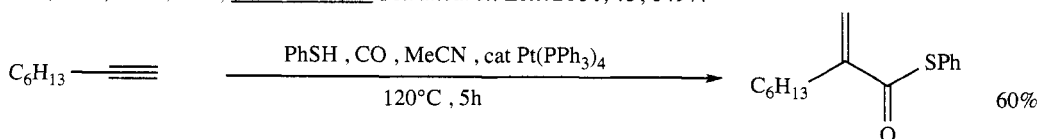
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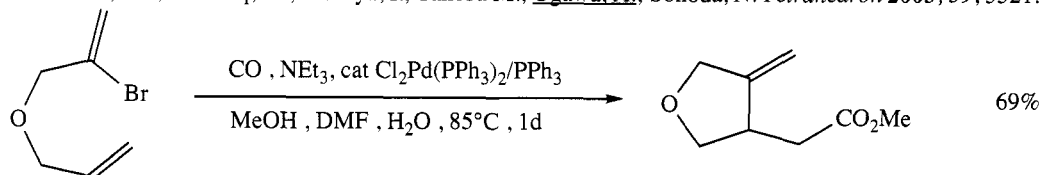
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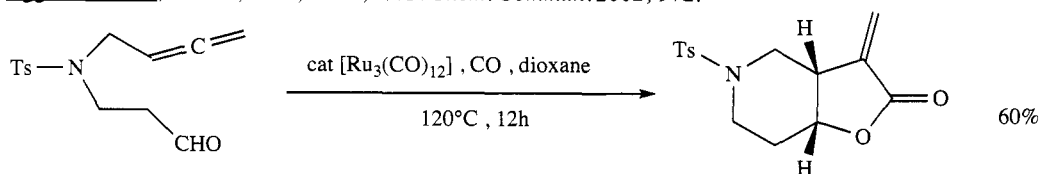
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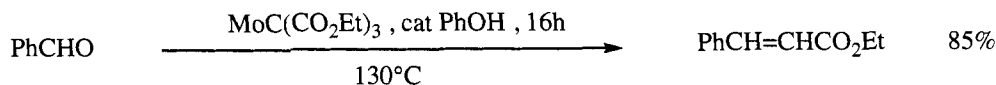
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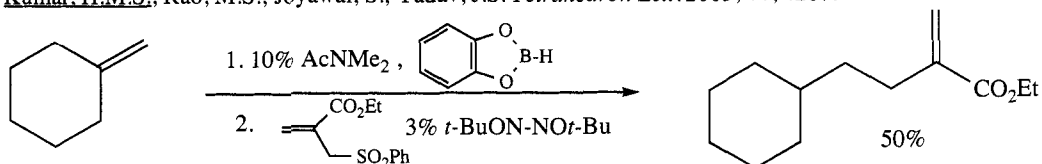
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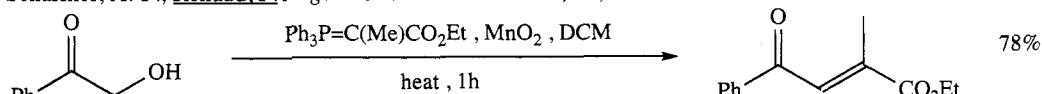
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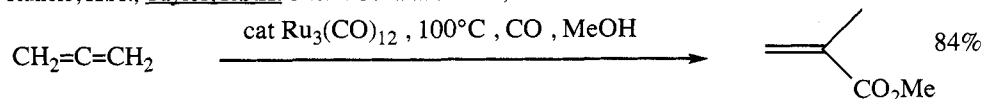
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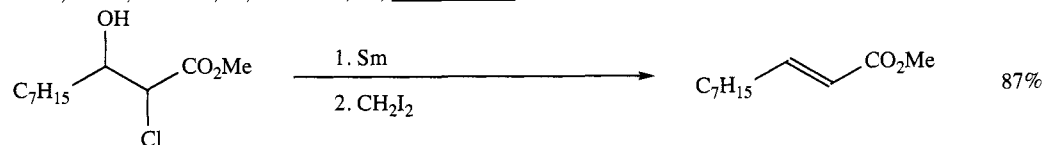
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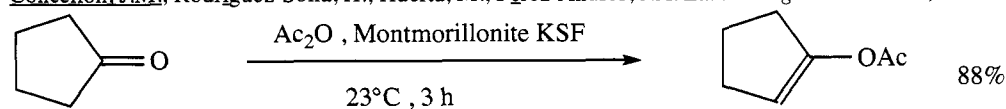
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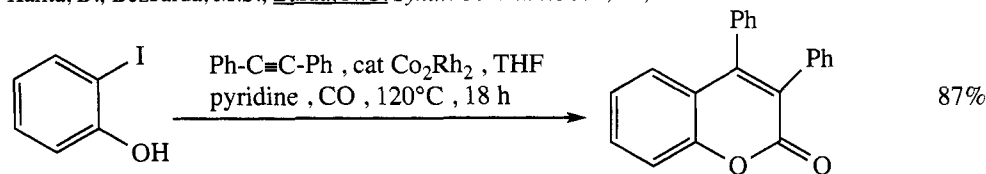
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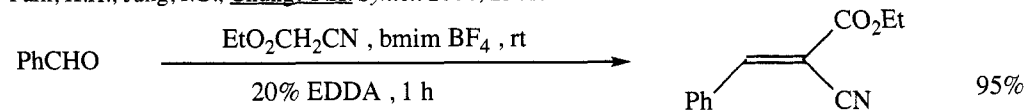
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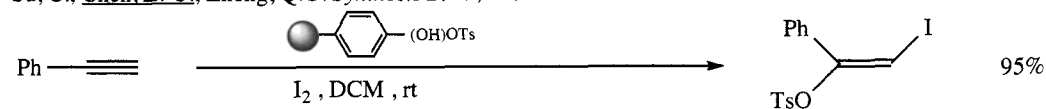
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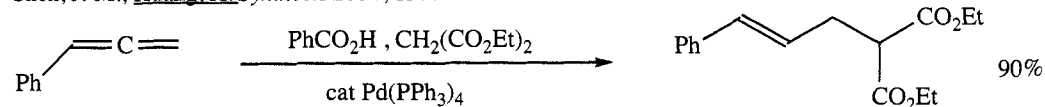
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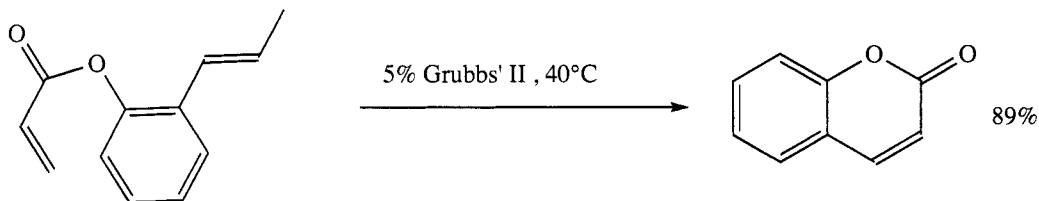
Su, C.; Chen, Z.-C.; Zheng, Q.G. *Synthesis* **2003**, 555.



Chen, J.-M.; Huang, X. *Synthesis* **2004**, 1577.



Patil, N.T.; Pahadi, N.K.; Yamamoto, Y. *Synthesis* **2004**, 2186.



Chatterjee, A.K.; Toste, F.D.; Goldberg, S.D.; Grubbs, R.H. *Pure Appl. Chem.* **2003**, 75, 421.

Related Methods:

Section 60A (Protection of Aldehydes)

Section 180A (Protection of Ketones)

Also via Acetylenic Esters:

Section 306 (Alkyne - Ester)

Alkenyl Acids:

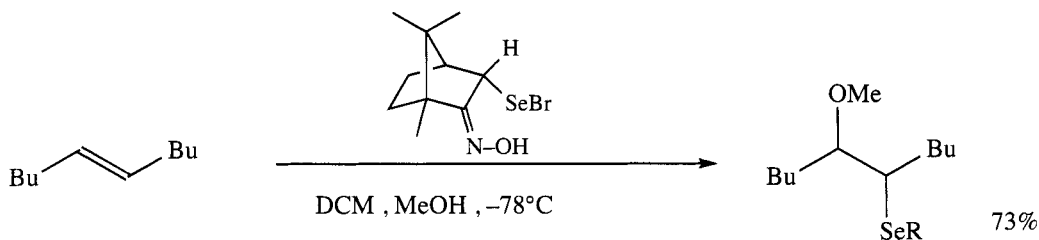
Section 322 (Carboxylic Acid - Alkene)

β -Hydroxy-esters:

Section 327 (Alcohol - Ester)

SECTION 363:

ETHER, EPOXIDE, THIOETHER - ETHER, EPOXIDE, THIOETHER

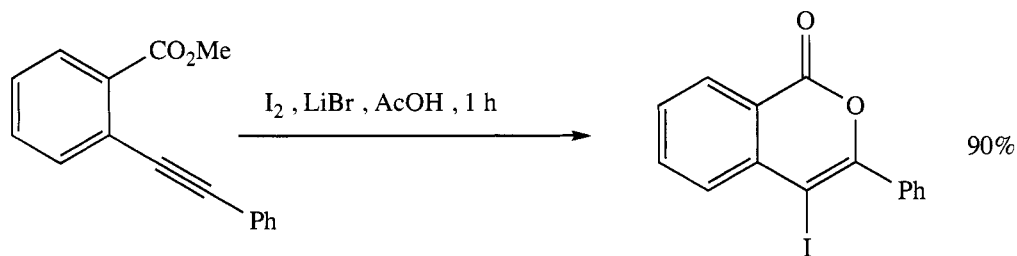


Back, T.G.; Moussa, Z.; Parvez, M. *J. Org. Chem.* **2002**, 67, 499.

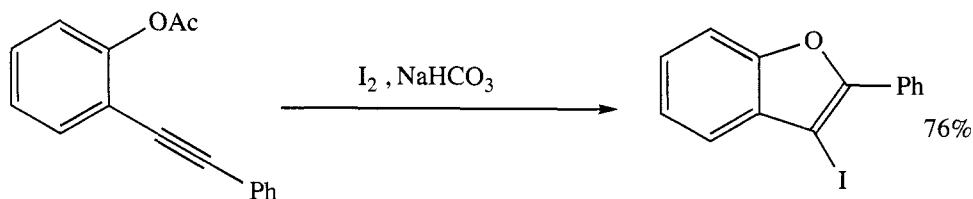
See Section 60A (Protection of Aldehydes) and Section 180A (Protection of Ketones) for reactions involving formation of acetals and ketals.

SECTION 364:

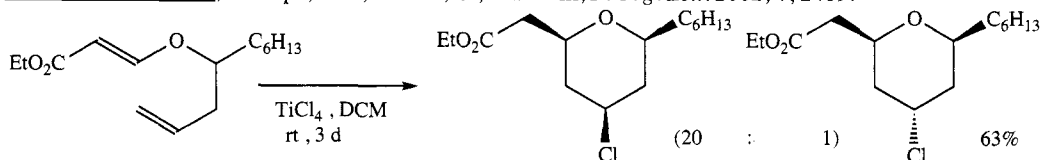
ETHER, EPOXIDE, THIOETHER - HALIDE, SULFONATE



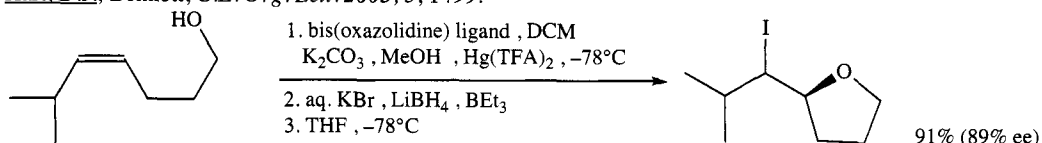
Yao, T.; Larock, R.C. *J. Org. Chem.* **2003**, 68, 5936.



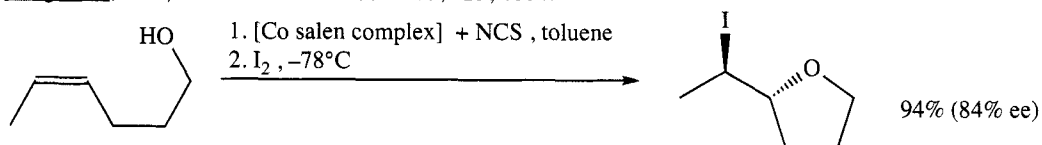
Arcadi, A.; Cacchi, S.; Giuseppe, S.D.; Fabrizi, G.; Marinelli, F. *Org. Lett.* **2002**, 4, 2409.



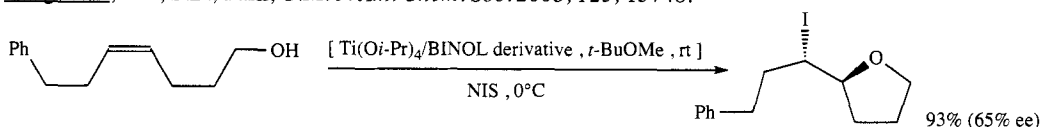
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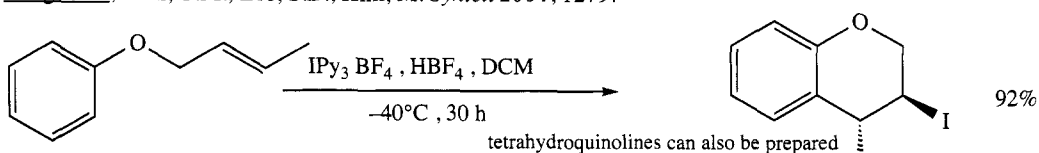
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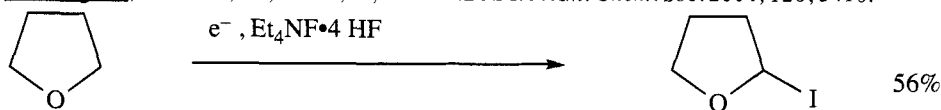
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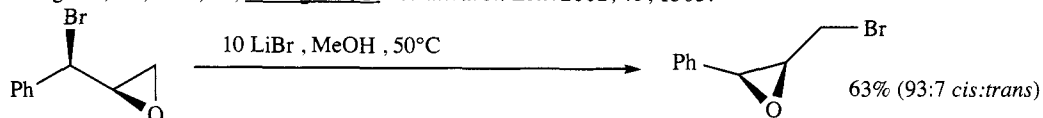
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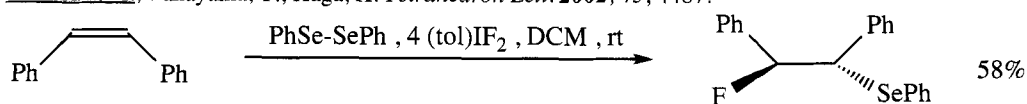
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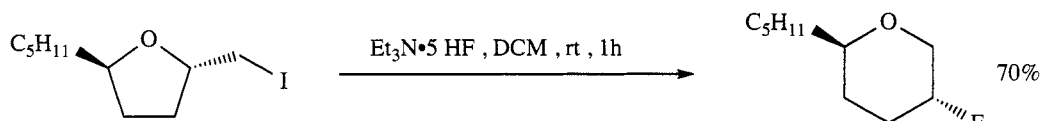
Hasegawa, M.; Ishii, H.; Fuchigami, T. *Tetrahedron Lett.* **2002**, 43, 1503.



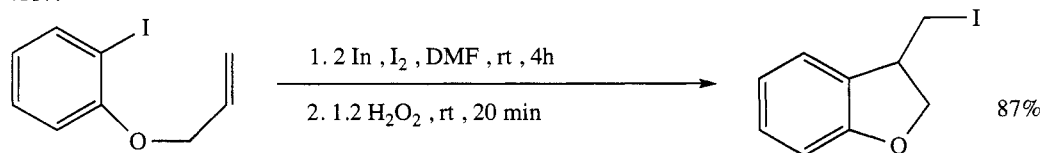
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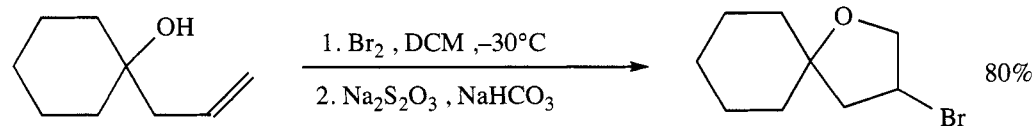
Panunzi, B.; Picardi, A.; Tingoli, M. *Synlett* **2004**, 2339.



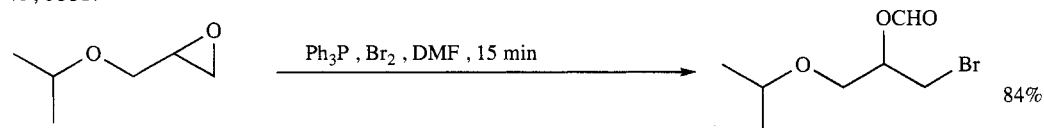
Inagaki, T.; Nakamura, Y.; Sawaguchi, M.; Yoneda, N.; Ayuba, S.; Hara, S. *Tetrahedron Lett.* **2003**, *44*, 4117.



Yanada, R.; Obika, S.; Nishimori, N.; Yamauchi, M.; Takemoto, Y. *Tetrahedron Lett.* **2004**, *45*, 2331.

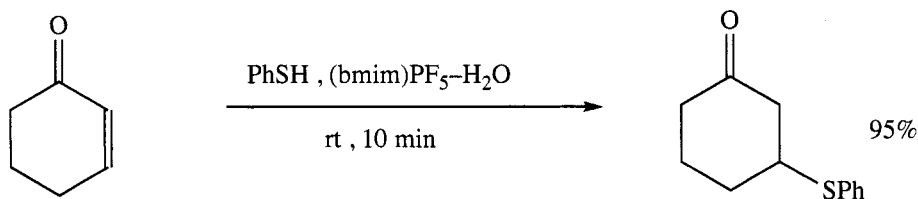


Chirskaya, M.V.; Vasil'ev, A.A.; Sergovskaya, N.L.; Shorshnev, SV.; Sviridov, S.I. *Tetrahedron Lett.* **2004**, *45*, 8811.

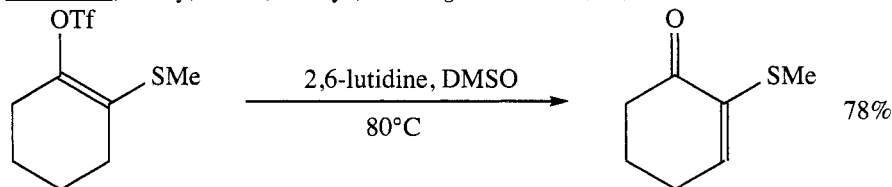


Iranpoor, N.; Firouzabadi, H.; Chitsazi, M.; Jafari, A.A. *Tetrahedron* **2002**, *58*, 7037.

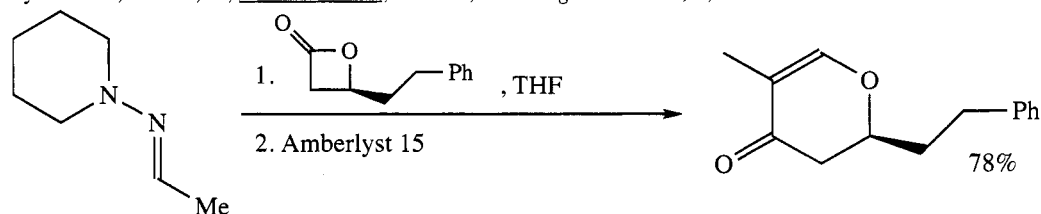
SECTION 365: ETHER, EPOXIDE, THIOETHER - KETONE



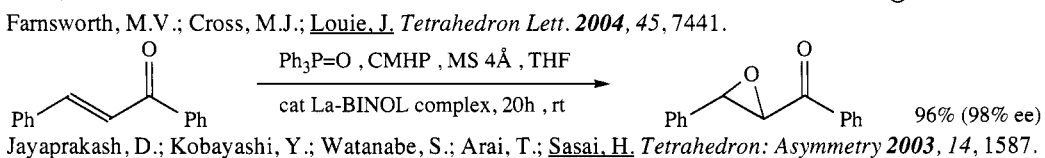
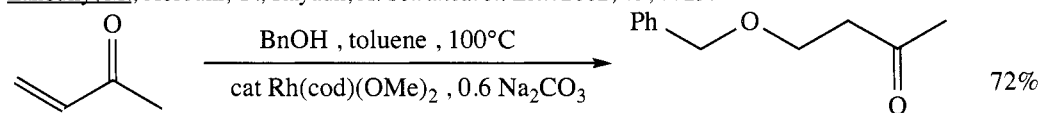
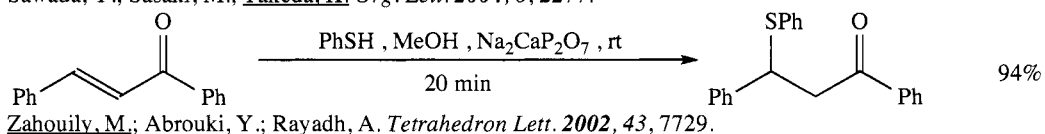
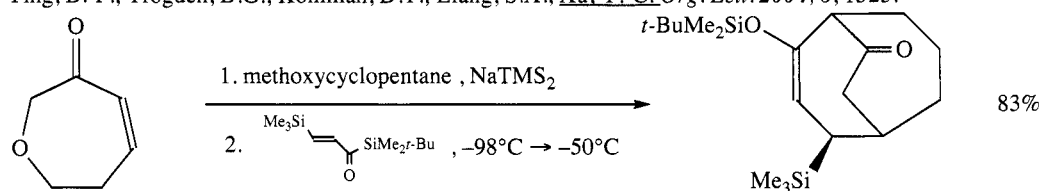
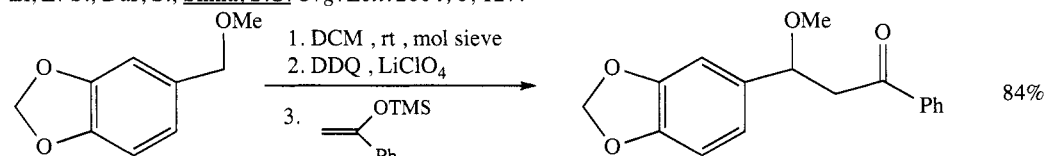
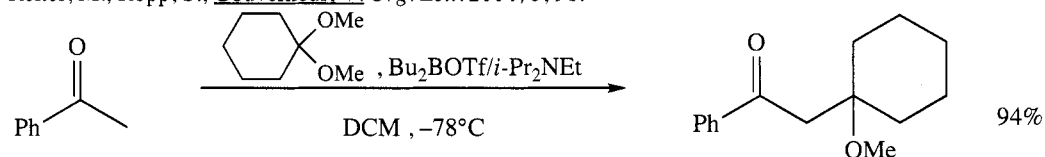
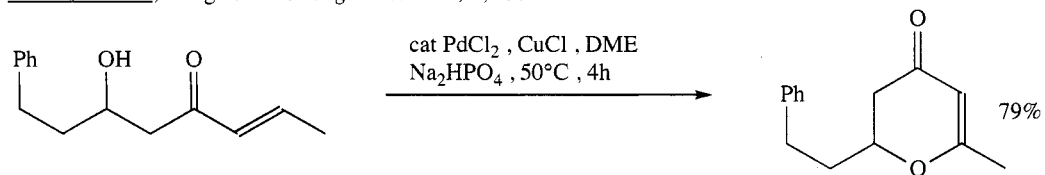
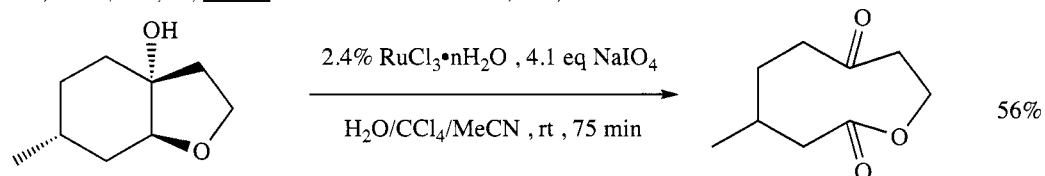
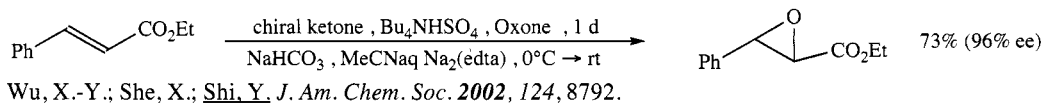
Yadav, J.S.; Reddy, B.V.S.; Baishya, G. *J. Org. Chem.* **2003**, *68*, 7098.

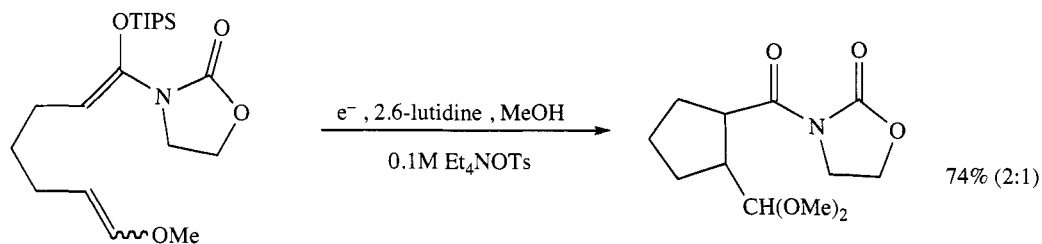


Hynes Jr. J.; Nasser, T.; Overman, L.E.; Watson, D.A. *Org. Lett.* **2002**, *4*, 929.

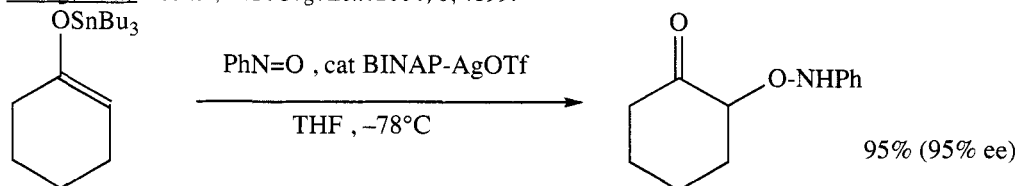


Zipp, G.G.; Hilfiker, M.A.; Nelson, S.G. *Org. Lett.* **2002**, *4*, 1823.

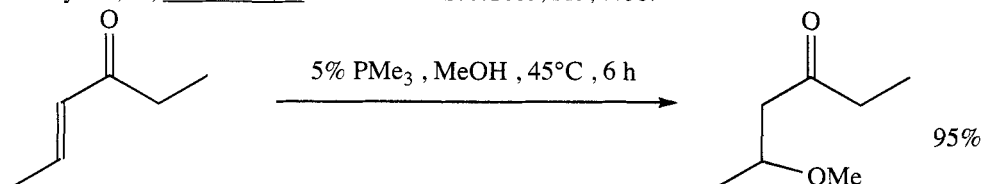




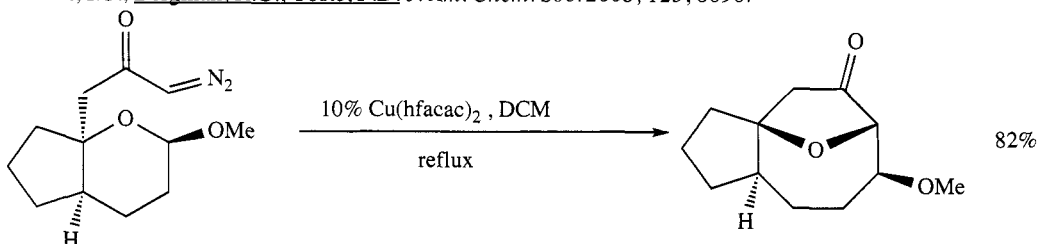
Huang, Y.-t.; Moeller, K.D. *Org. Lett.* **2004**, 6, 4199.



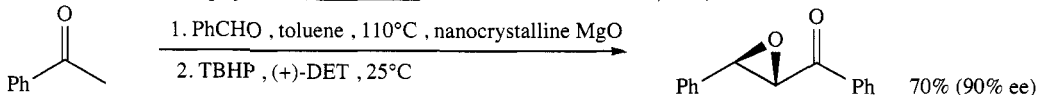
Momiyama, N.; Yamamoto, H. *J. Am. Chem. Soc.* **2003**, *125*, 6038.



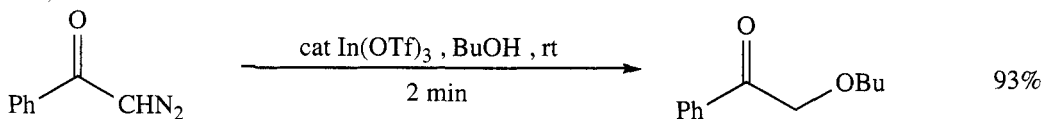
Stewart, I.C.; Bergman, R.G.; Toste, F.D. *J. Am. Chem. Soc.* **2003**, *125*, 8696.



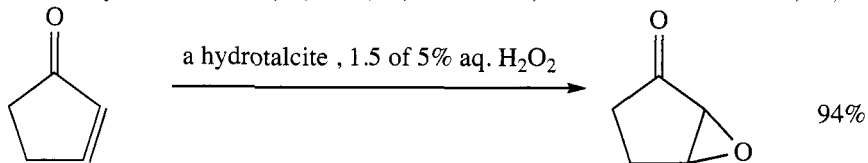
Marmsäter, F.P.; Murphy, G.K.; West, F.G. *J. Am. Chem. Soc.* **2003**, *125*, 14724.



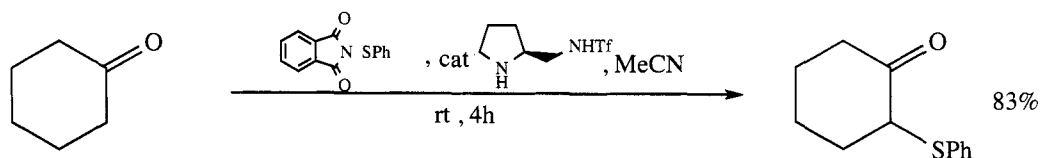
Choudary, B.M.; Kantam, M.L.; Ranganath, K.V.S.; Mahendar, K.; Shedhar, B. *J. Am. Chem. Soc.* **2004**, 126, 3396.



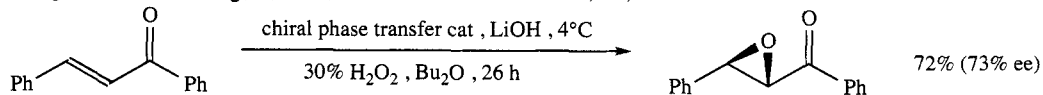
Muthusamy, S.; Arulananda, S.; Babu, A.; Gunanathan, C. *Tetrahedron Lett.* **2002**, 43, 3133.



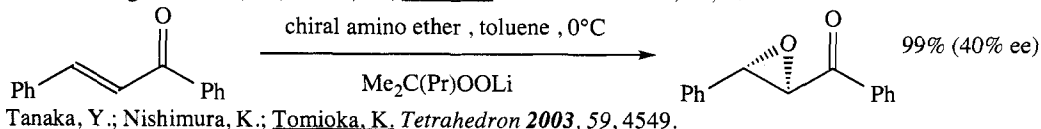
Honma, T.; Nakajo, M.; Mizugaki, T.; Ebitani, K.; Kaneda, K. *Tetrahedron Lett.* **2002**, 43, 6229.



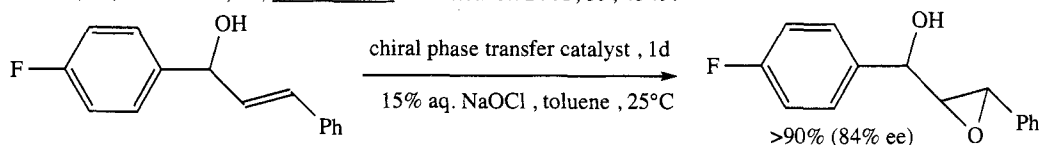
Wang, W.; Li, H.; Wang, J.; Liao, L. *Tetrahedron Lett.* **2004**, 45, 8229.



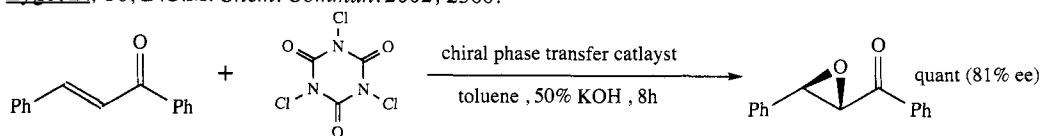
Arai, S.; Tsuge, H.; Oku, M.; Miura, M.; Shiori, T. *Tetrahedron* **2002**, 58, 1623.



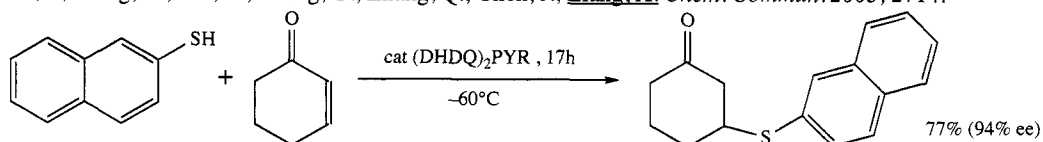
Tanaka, Y.; Nishimura, K.; Tomioka, K. *Tetrahedron* **2003**, 59, 4549.



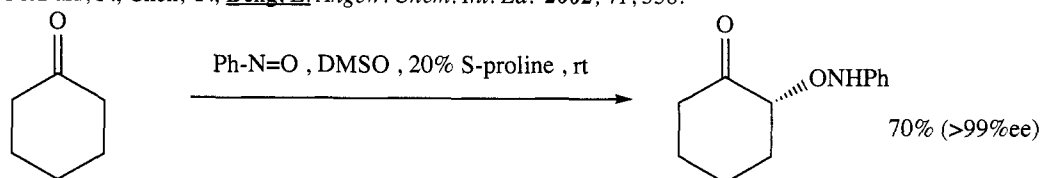
Lygo, B.; To, D.C.M. *Chem. Commun.* **2002**, 2360.



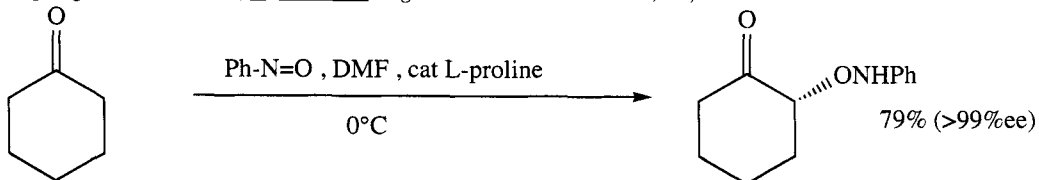
Ye, J.; Wang, Y.; Liu, R.; Zhang, G.; Zhang, Q.; Chen, J.; Liang, X. *Chem. Commun.* **2003**, 2714.



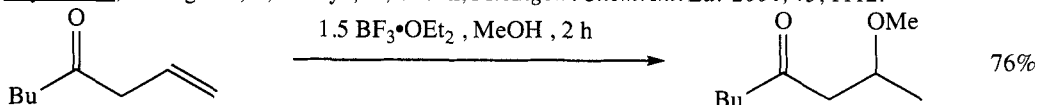
McDaid, P.; Chen, Y.; Deng, L. *Angew. Chem. Int. Ed.* **2002**, 41, 338.



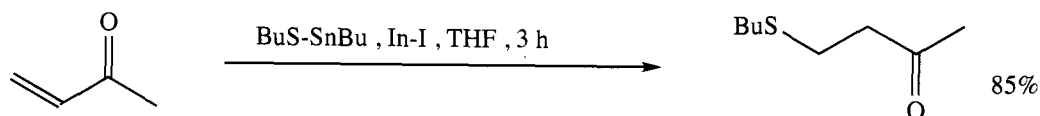
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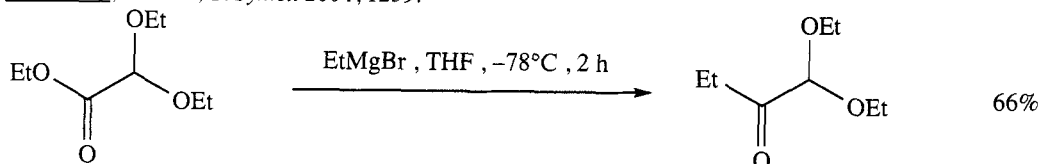
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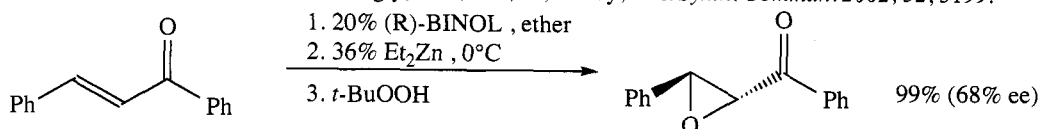
Lee, A.S.-Y.; Wang, S.-H.; Chang, Y.-T.; Chu, S.-F. *Synlett* **2003**, 2359.



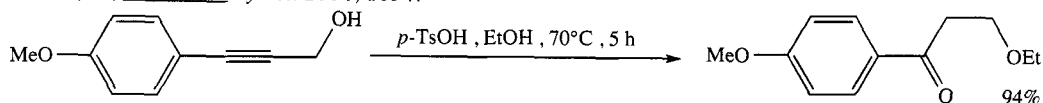
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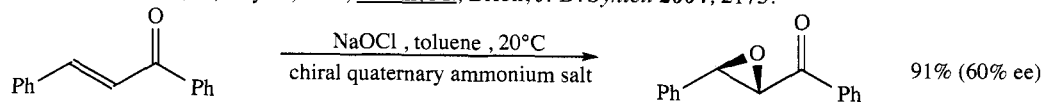
Adamczyk, M.; Johnson, D.D.; Mattingly, P.G.; Pan, Y.; Reddy, R.E. *Synth. Commun.* **2002**, 32, 3199.



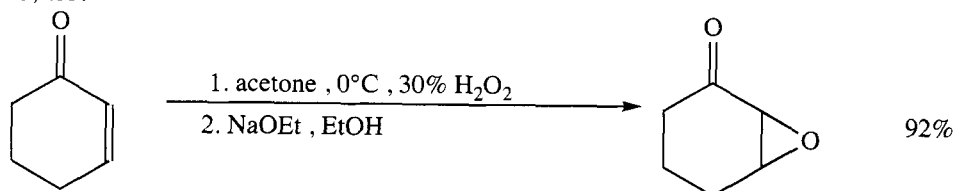
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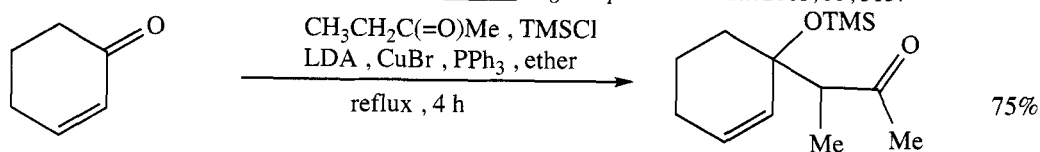
Olivi, N.; Thomas, E.; Reyrat, J.-F.; Alami, M.; Brion, J.-D. *Synlett* **2004**, 2175.



Kim, D.Y.; Choi, Y.J.; Park, H.Y.; Joung, C.U.; Koh, K.O.; Mang, J.Y.; Jung, K.-Y. *Synth. Commun.* **2003**, 33, 435.

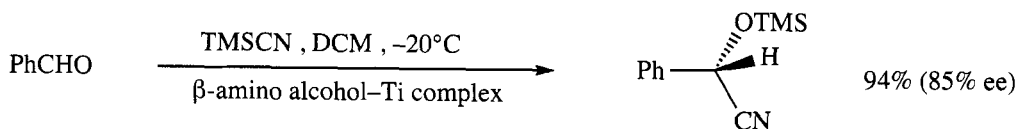


Patra, A.; Bandyopadhyay, M.; Ghorai, S.K.; Mal, D. *Org. Prep. Proceed. Int.* **2003**, 35, 515.

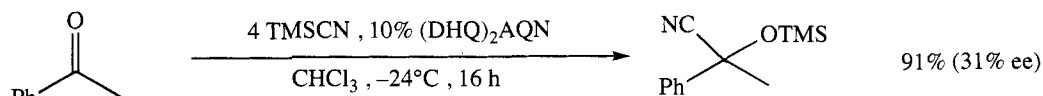


Mitani, M.; Ishimoto, K.; Koyam, R. *Chem. Lett.* **2002**, 31, 1142

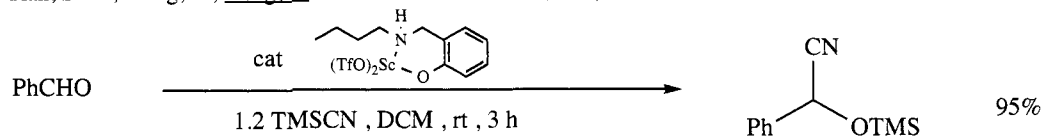
SECTION 366: ETHER, EPOXIDE, THIOETHER - NITRILE



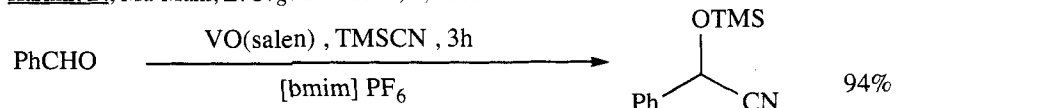
Li, Y.; He, B.; Qin, B.; Feng, X.; Zhang, G. *J. Org. Chem.* **2004**, 69, 7910.



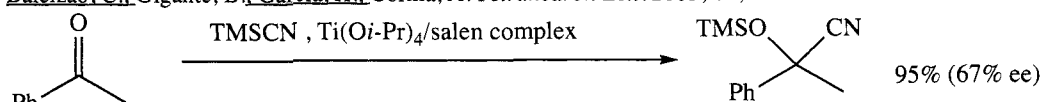
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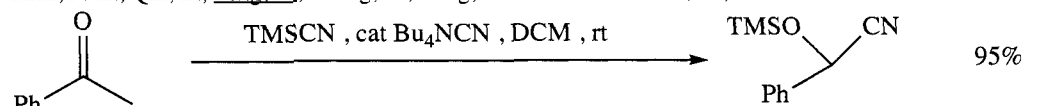
Karimi, B.; Ma'Mani, L. *Org. Lett.* **2004**, *6*, 4813.



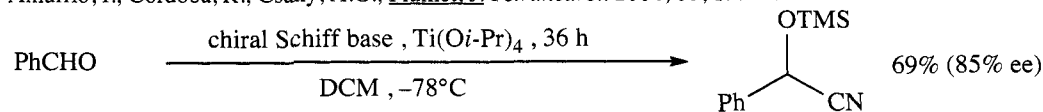
Baleizão, C.; Gigante, B.; Garcia, H.; Corma, A. *Tetrahedron Lett.* **2003**, *44*, 6813.



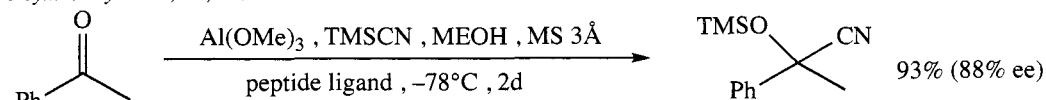
Chen, F.-X.; Qin, B.; Feng, X.; Zhang, G.; Jiang, Y. *Tetrahedron* **2004**, *60*, 10449.



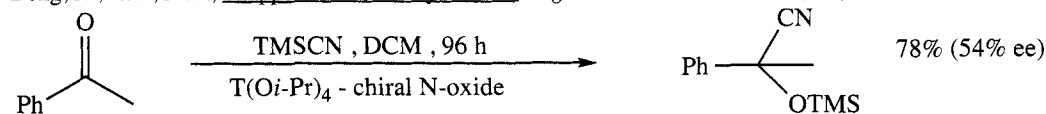
Amurrio, I.; Córdoba, R.; Csáky, A.G.; Plumet, J. *Tetrahedron* **2004**, *60*, 10521.



Gama, A.; Flores-López, L.-Z.; Aguirre, G.; Parra-Hake, M.; Somanathan, R.; Walsh, P.J. *Tetrahedron: Asymmetry* **2002**, *13*, 149.



Deng, H.; Isler, M.P.; Snapper, M.L.; Hoveyda, A.H. *Angew. Chem. Int. Ed.* **2002**, *41*, 1009.

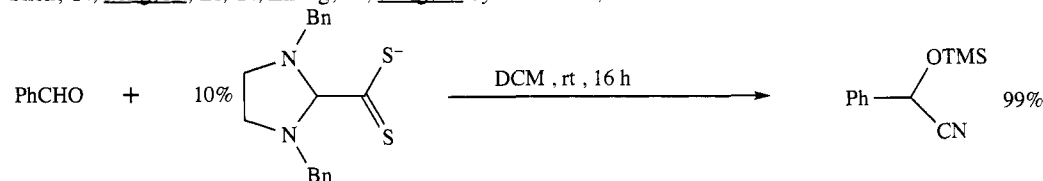


Shen, Y.; Feng, X.; Zhang, G.; Jiang, Y. *Synlett* **2002**, 1353.

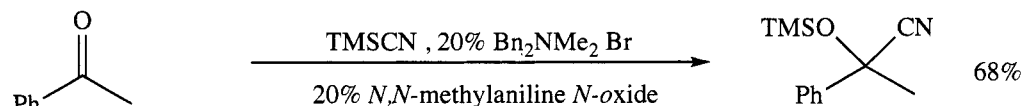
Shen, Y.; Feng, X.; Li, Y.; Zhang, G.; Jiang, Y. *Eur. J. Org. Chem.* **2004**, 129.

Shen, Y.; Feng, X.; Li, Y.; Zhang, G.; Jiang, Y. *Tetrahedron* **2003**, *59*, 5667.

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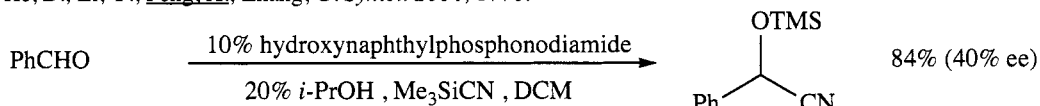
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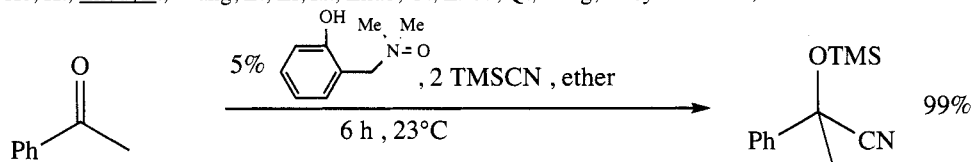
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Chen, F.; **Feng, X.**; Qin, B.; Zhang, G.; Jiang, Y. *Synlett* **2003**, 558.

He, B.; Li, Y.; Feng, X.; Zhang, G. *Synlett* **2004**, 1776.



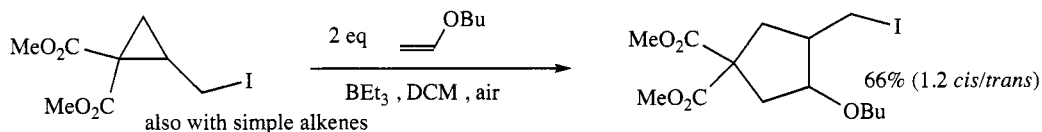
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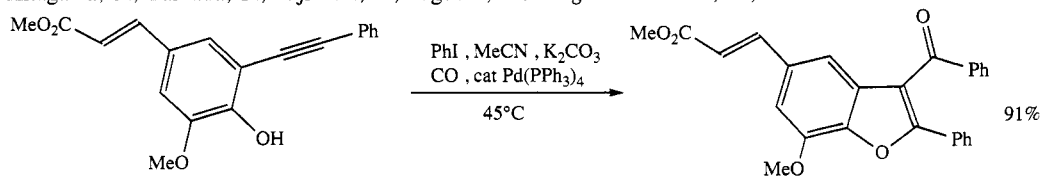
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SECTION 367: ETHER, EPOXIDE, THIOETHER - ALKENE

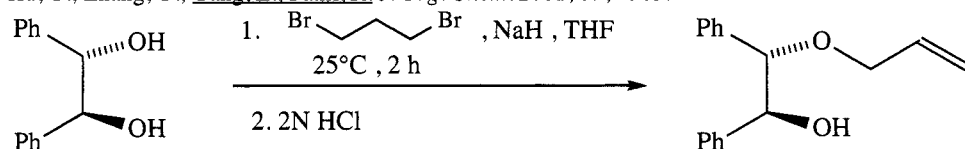
Enol ethers are found in this section as well as alkenyl ethers.



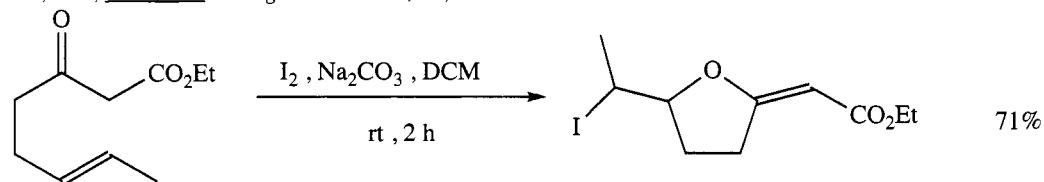
Kitagawa, O.; Yamada, Y.; Fujiwara, H.; Taguchi, T. *J. Org. Chem.* **2002**, *67*, 922.



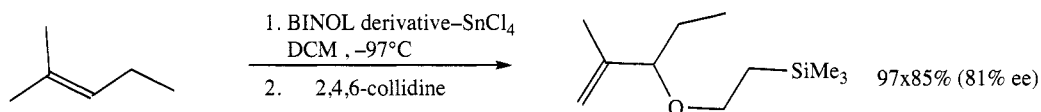
Hu, Y.; Zhang, Y.; Yang, Z.; Fathi, R. *J. Org. Chem.* **2002**, 67, 2365.



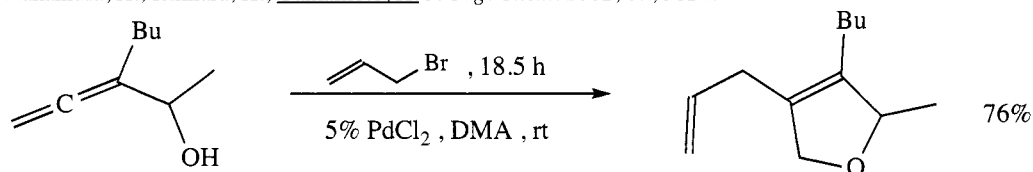
Jha, S.C.; Jeshi, N.N. *J. Org. Chem.* **2002**, *67*, 3897.



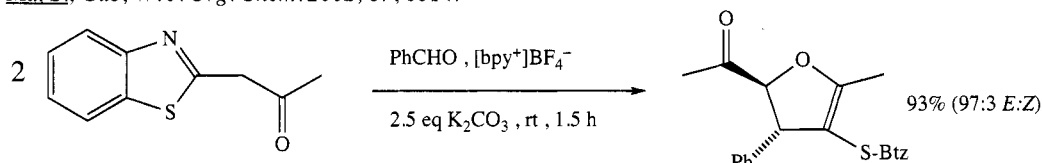
Ferraz, H.M.C.; Sano, M.K.; Nunes, M.R.S.; Bianco, G.G. *J. Org. Chem.* **2002**, *67*, 4122.



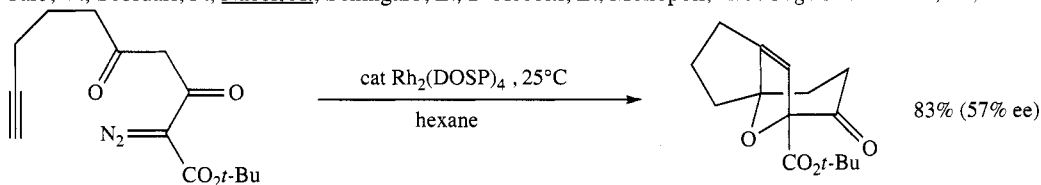
Nakamura, H.; Ishikara, K.; Yamamoto, H. *J. Org. Chem.* **2002**, 67, 5124.



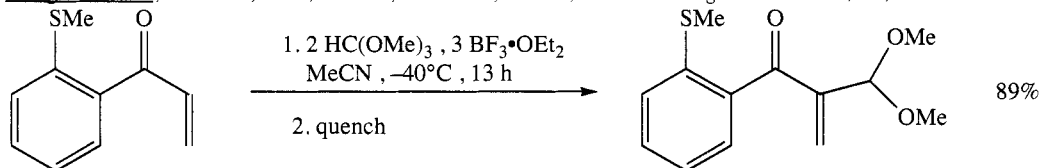
Ma, S.; Gao, W. *J. Org. Chem.* **2002**, 67, 6014.



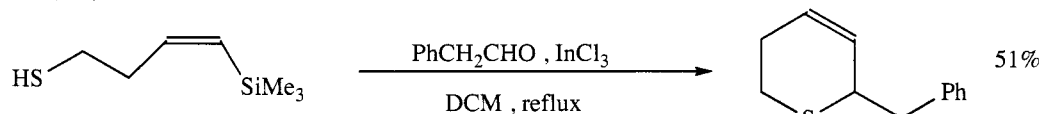
Calò, V.; Scordari, F.; Nacci, A.; Schingaro, E.; D'Accolti, L.; Monopoli, A. *J. Org. Chem.* **2003**, 68, 4406.



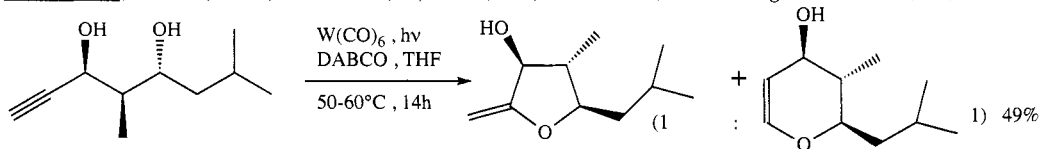
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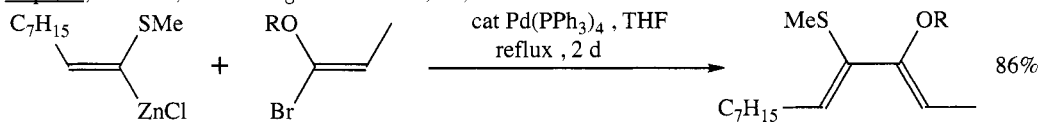
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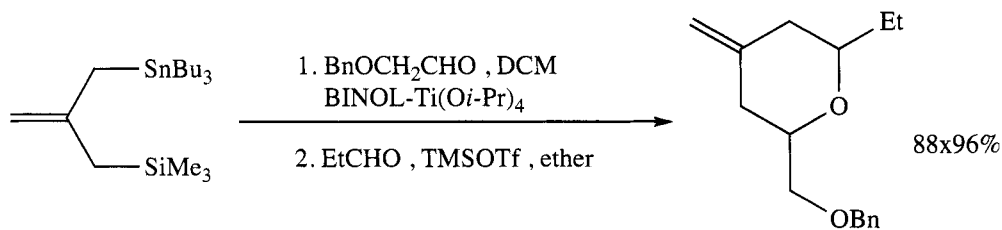
Dobbs, A.P.; Guesné, S.J.J.; Martinovic, S.; Coles, S.J.; Hursthouse, M.B. *J. Org. Chem.* **2003**, 68, 7880.



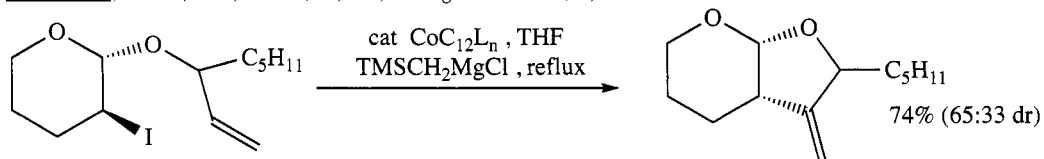
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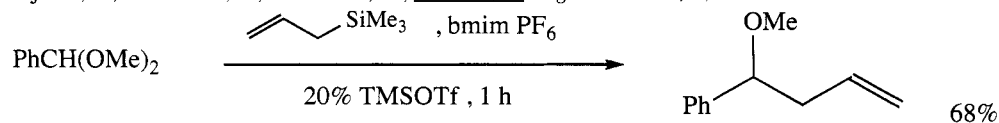
Su, M.; Kang, Y.; Yu, W.; Hua, Z.; Jin, Z. *Org. Lett.* **2002**, 4, 691.



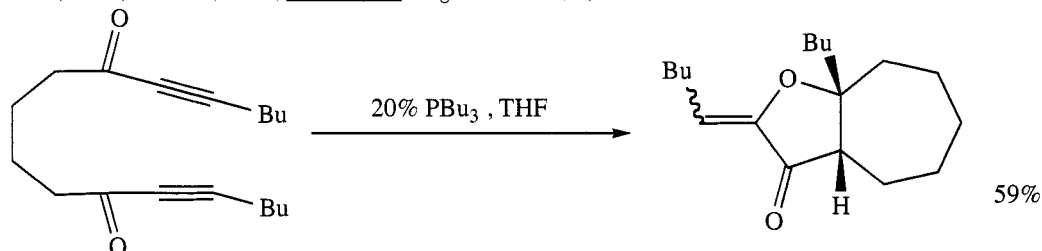
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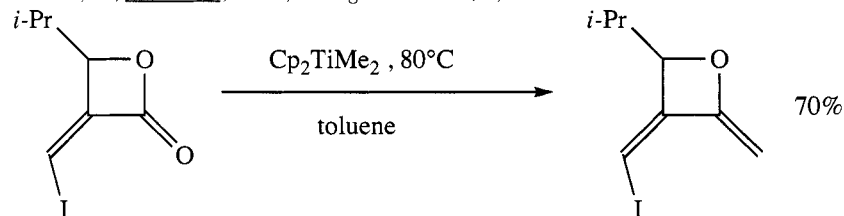
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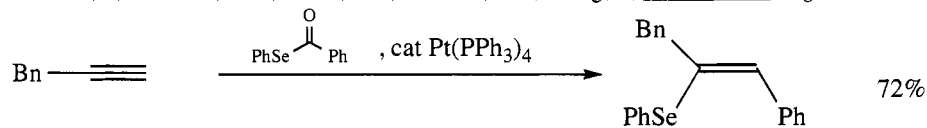
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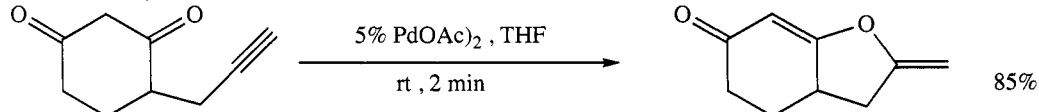
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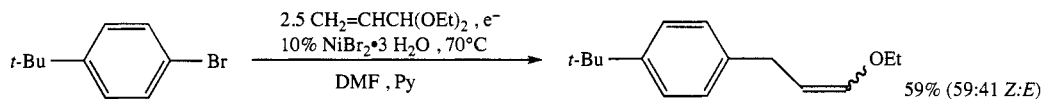
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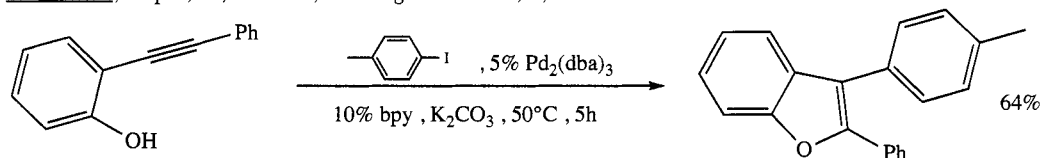
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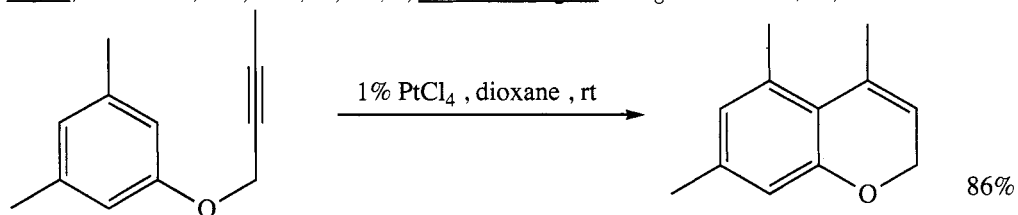
Gulías, M.; Rodríguez, J.R.; Castedo, L.; Mascareñas, J.L. *Org. Lett.* **2003**, *5*, 1975.



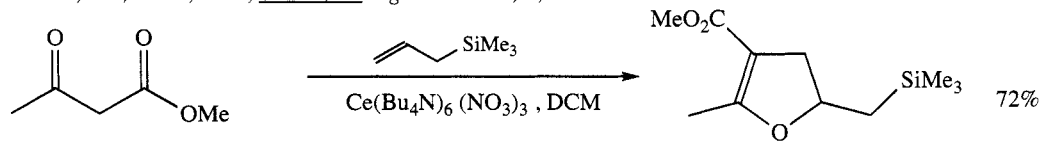
Condon, S.; Dupré, D.; Nédélec, J.Y. *Org. Lett.* **2003**, *5*, 4701.



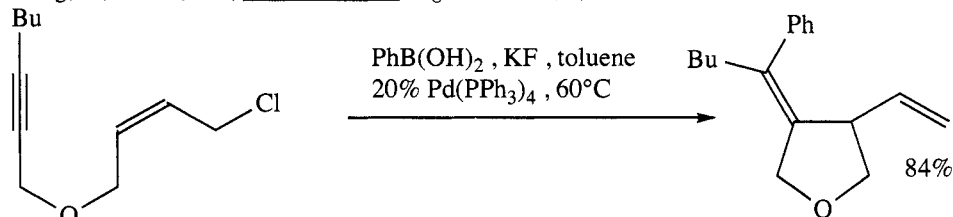
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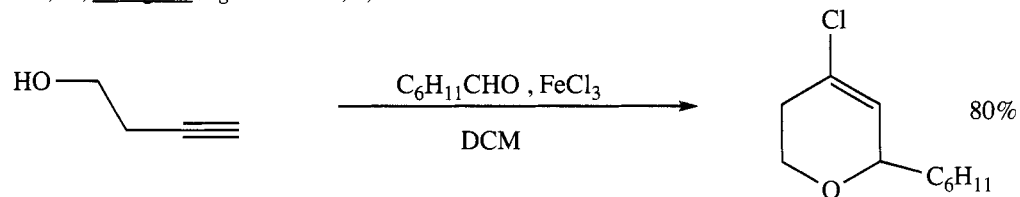
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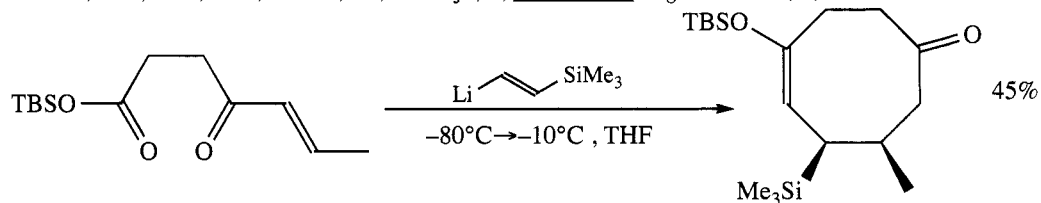
Zhang, Y.; Raines, A.J.; Flowers II, R.A. *Org. Lett.* **2003**, *5*, 2363.



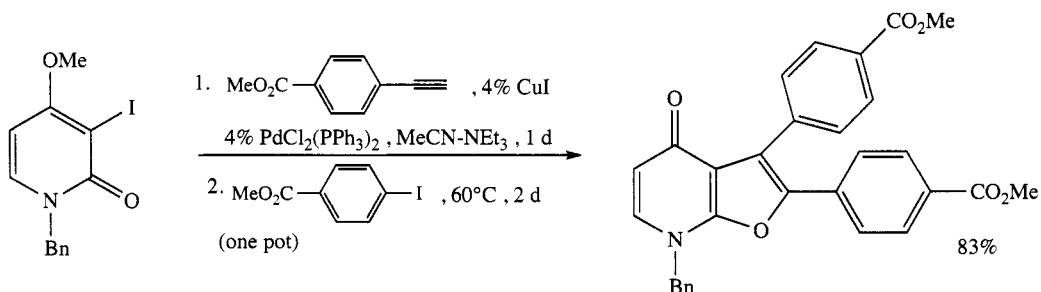
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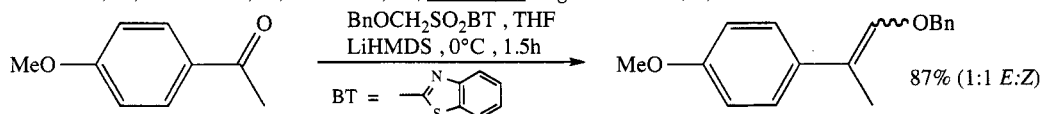
Miranda, P.O.; Díaz, D.D.; Padrón, J.I.; Bermejo, J.; Martín, V.S. *Org. Lett.* **2003**, *5*, 1979.



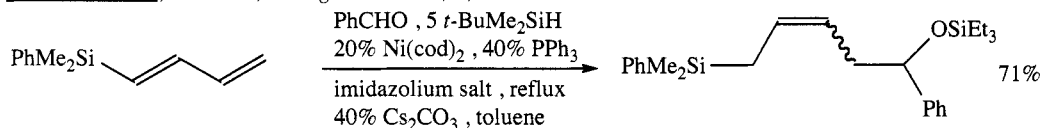
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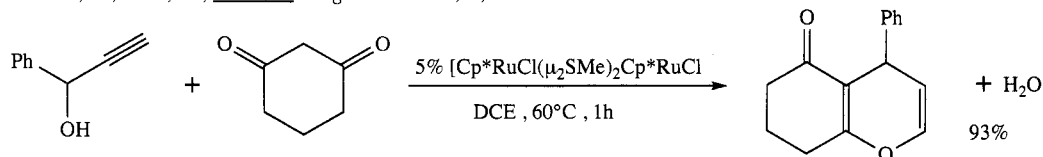
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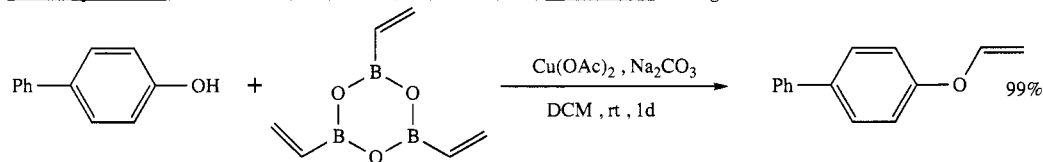
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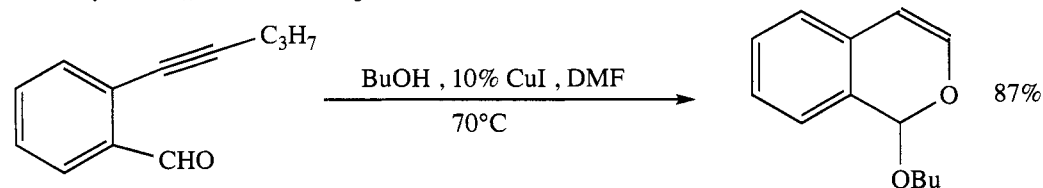
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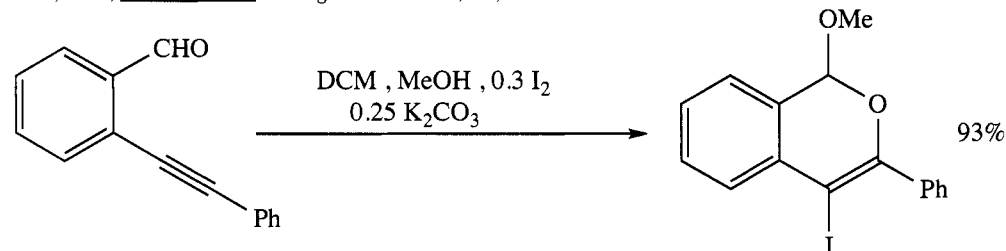
Nishibayashi, Y.; Yoshikawa, M.; Inada, Y.; Hidai, M.; Uemura, S. *J. Org. Chem.* **2004**, 69, 3408.



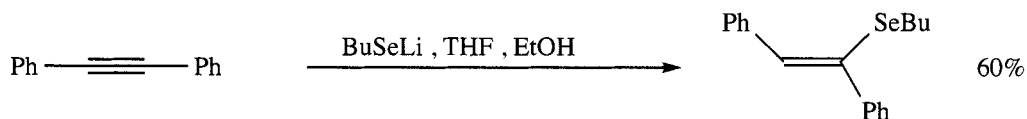
McKinley, N.F.; O'Shea, D.F. *J. Org. Chem.* **2004**, 69, 5087.



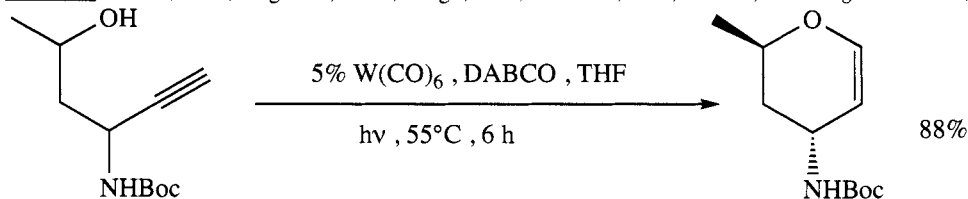
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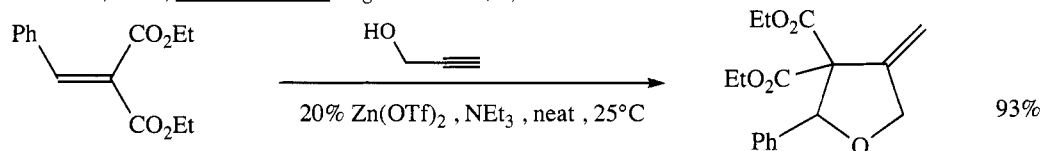
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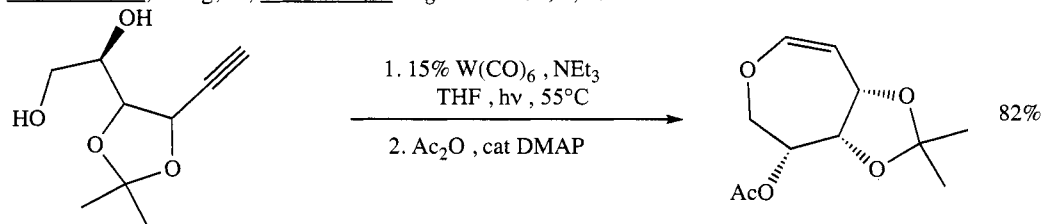
Zeni, G.; Stracke, M.P.; Nogueira, C.W.; Braga, A.L.; Menezes, P.H.; Stefani, H.A. *Org. Lett.* **2004**, 6, 1135.



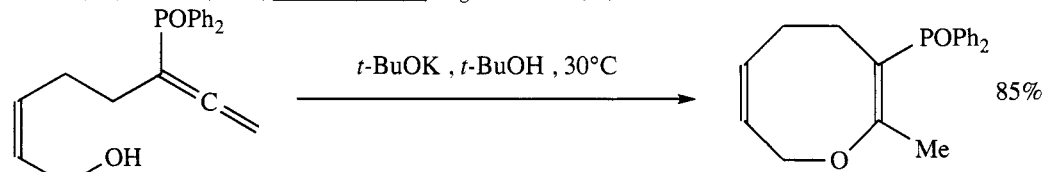
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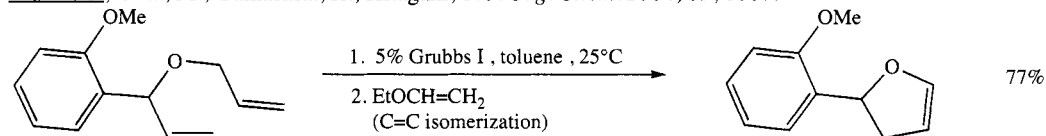
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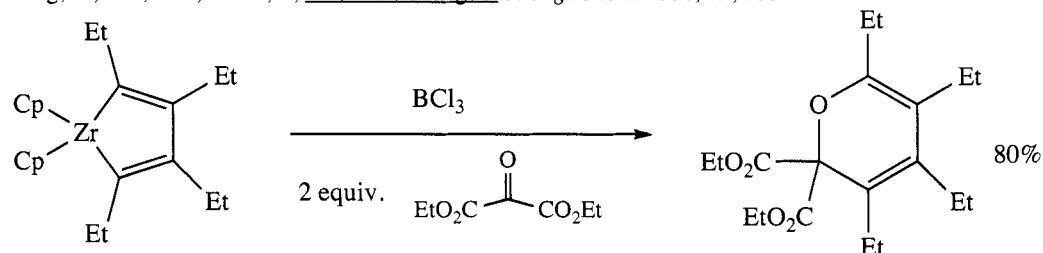
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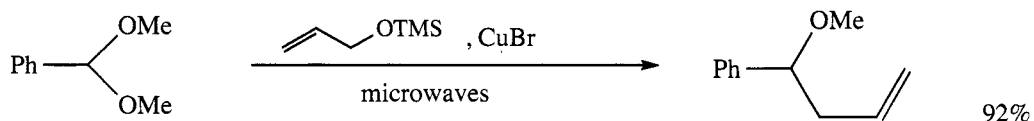
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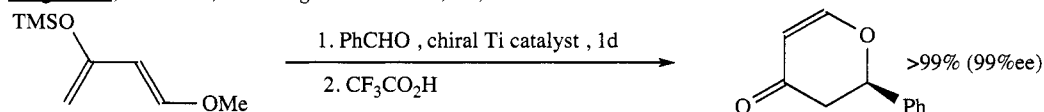
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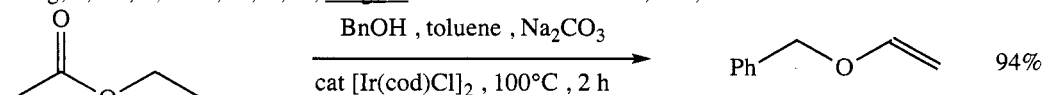
Takahashi, T.; Li, Y.; Ito, T.; Xu, F.; Nakajima, K.; Liu, Y. *J. Am. Chem. Soc.* **2002**, 124, 1144.



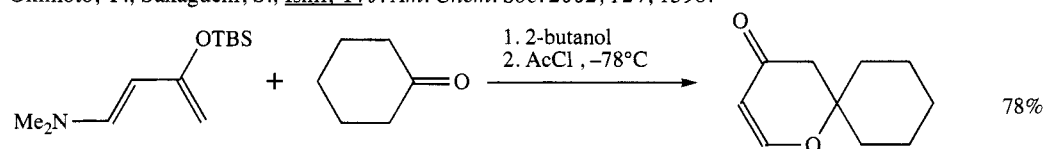
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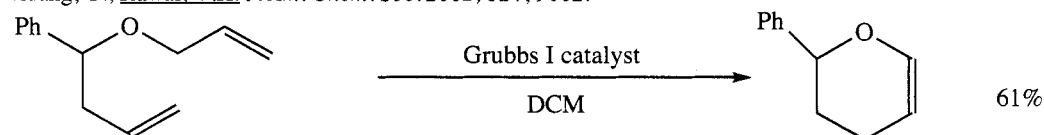
Long, J.; Hu, J.; Shen, X.; Ji, B.; Ding, K. *J. Am. Chem. Soc.* **2002**, 124, 10.



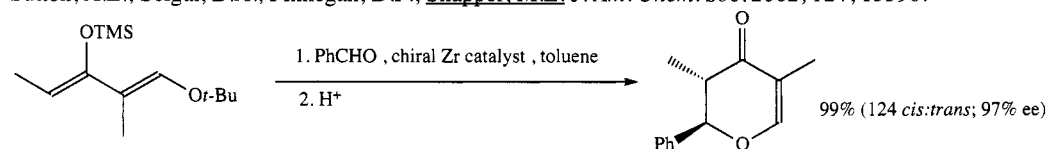
Okimoto, Y.; Sakaguchi, S.; Ishii, Y. *J. Am. Chem. Soc.* **2002**, 124, 1590.



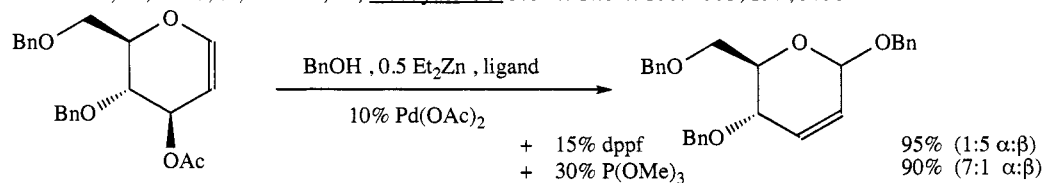
Huang, Y.; Rawal, V.H. *J. Am. Chem. Soc.* **2002**, 124, 9662.



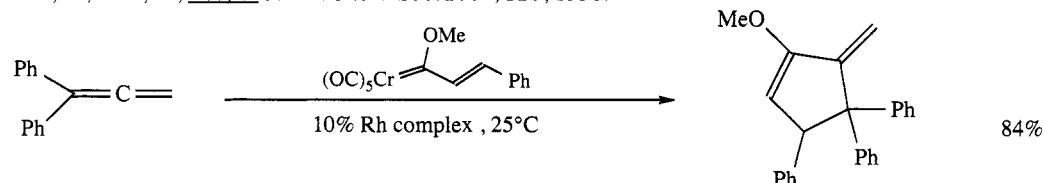
Sutton, A.E.; Seigal, B.A.; Finnegan, D.F.; Snapper, M.L. *J. Am. Chem. Soc.* **2002**, 124, 13390.



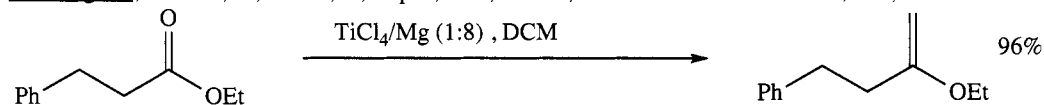
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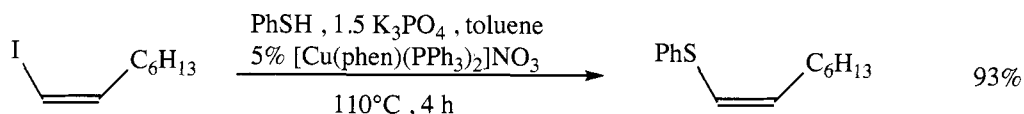
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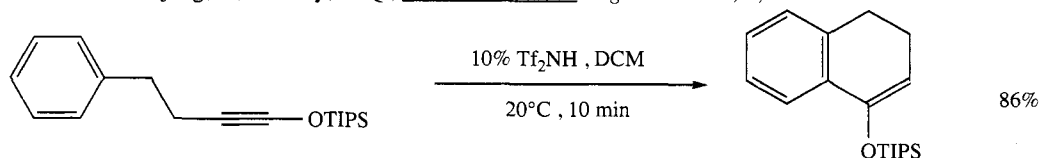
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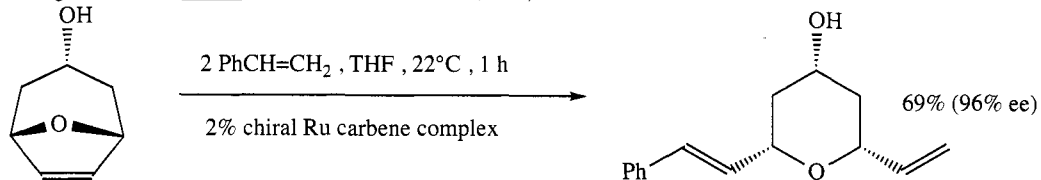
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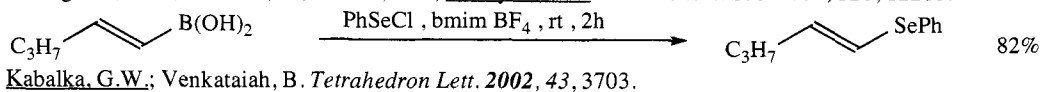
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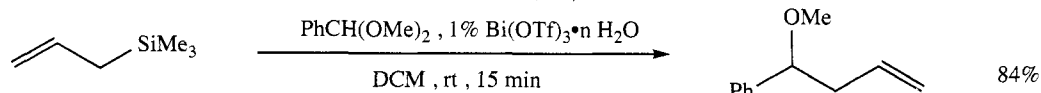
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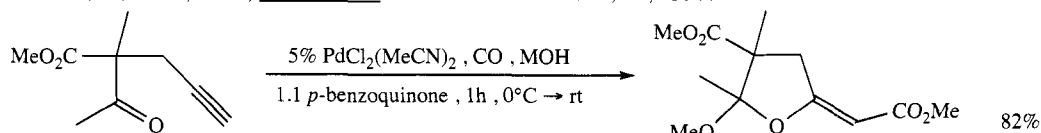
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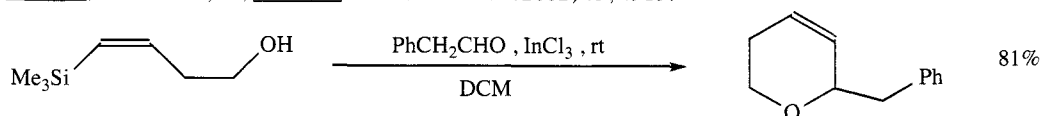
Kabalka, G.W.; Venkataiah, B. *Tetrahedron Lett.* **2002**, 43, 3703.



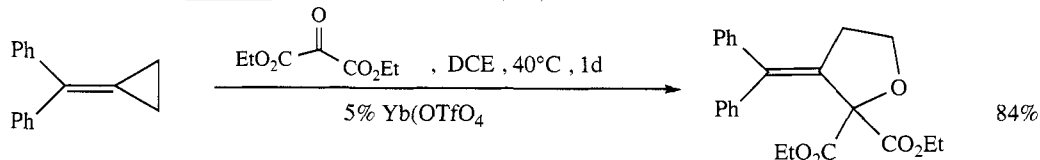
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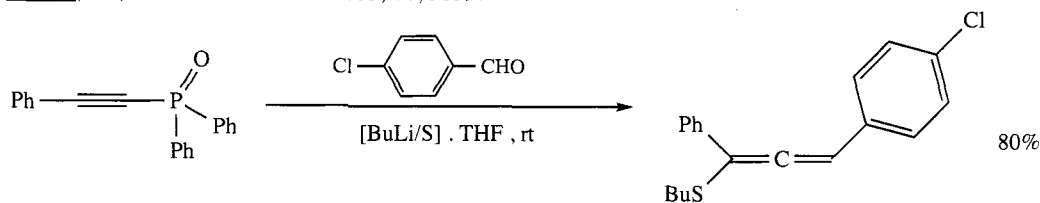
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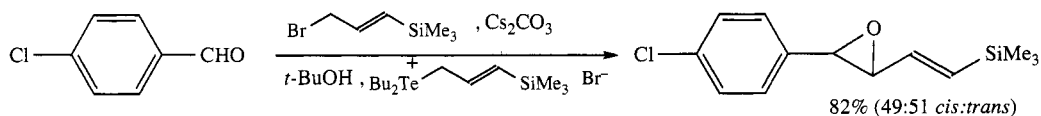
Dobbs, A.P.; Martinovic, S. *Tetrahedron Lett.* **2002**, 43, 7055.



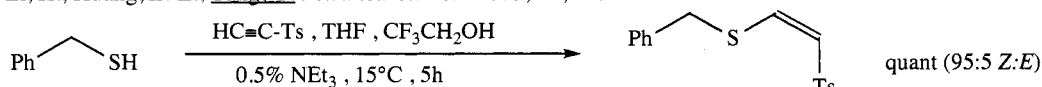
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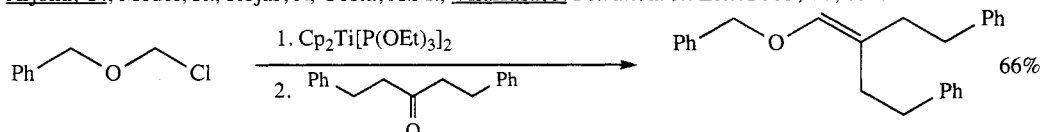
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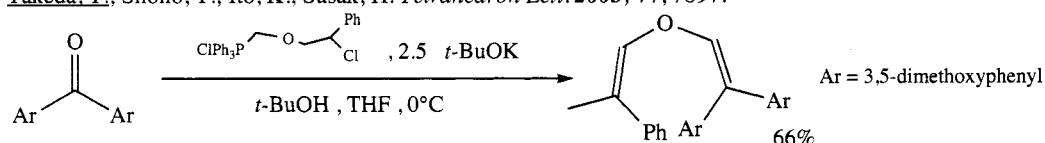
Li, K.; Huang, Z.-Z.; Tang, Y. *Tetrahedron Lett.* **2003**, *44*, 4137.



Arjona, O.; Medel, R.; Rojas, J.; Costa, A.M.; Vilarrasa, J. *Tetrahedron Lett.* **2003**, *44*, 6369.

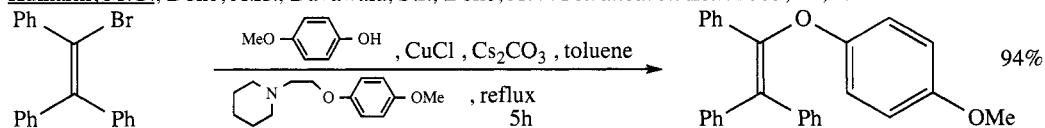


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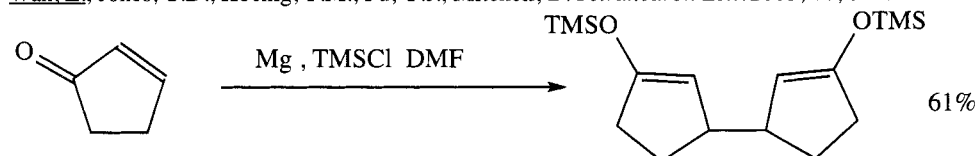


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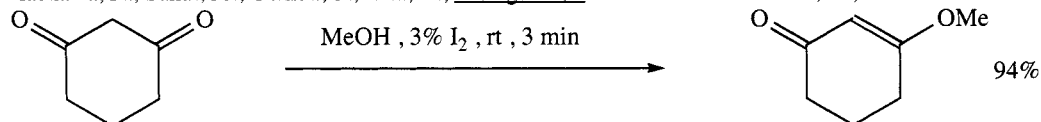
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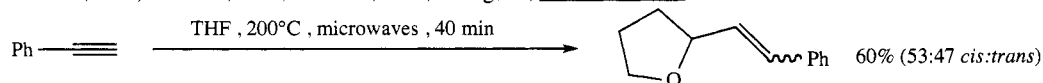
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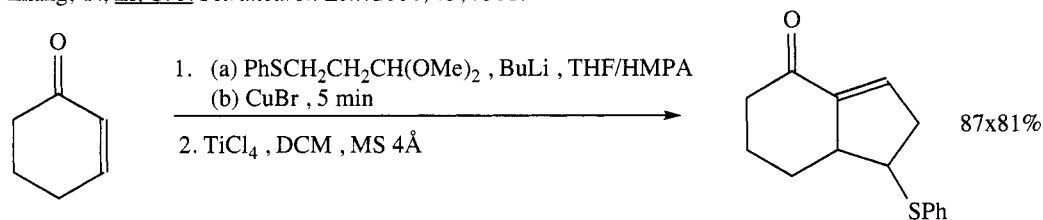
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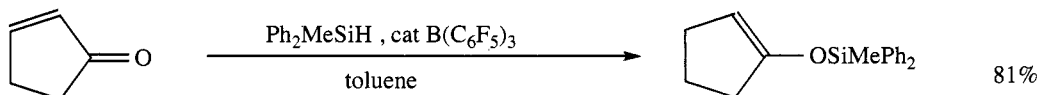
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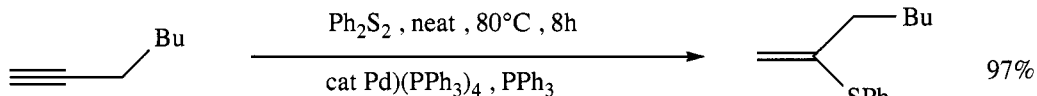
Zhang, Y.; Li, C.-J. *Tetrahedron Lett.* **2004**, *45*, 7581.



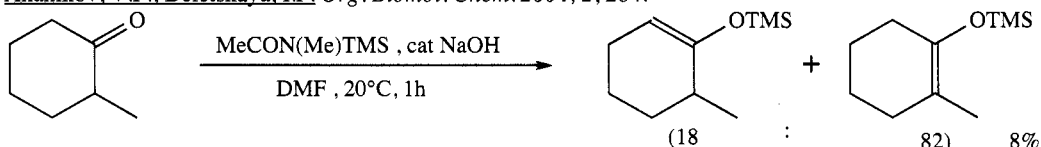
Ding, P.; Ghosez, L. *Tetrahedron* **2002**, *58*, 1565.



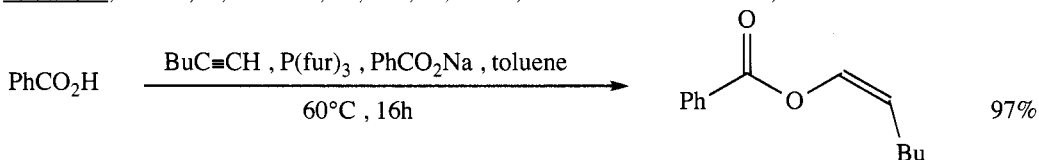
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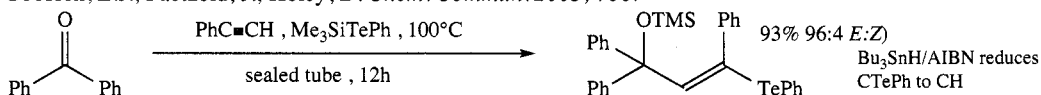
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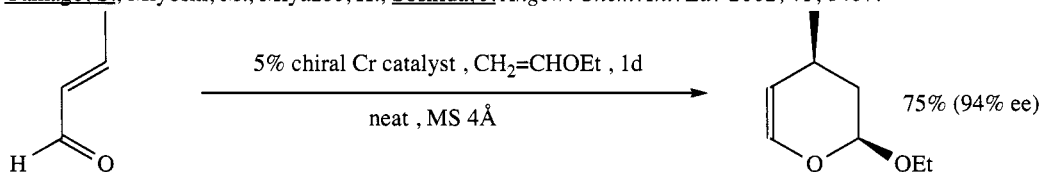
Tanabe, Y.; Misaki, T.; Kurihara, M.; Iida, A.; Nishii, Y. *Chem. Commun.* **2002**, 1628.



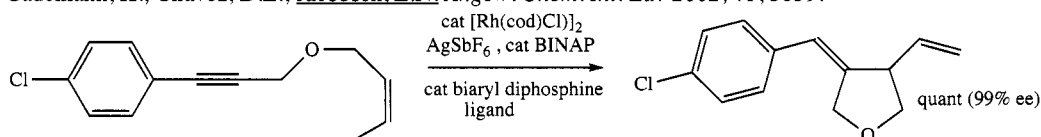
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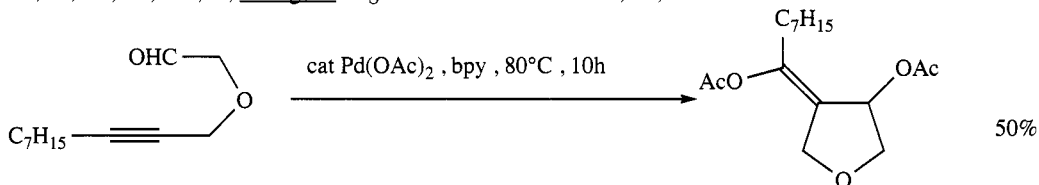
Yamago, S.; Miyoshi, M.; Miyazoe, H.; Soshida, J. *Angew. Chem. Int. Ed.* **2002**, 41, 1407.



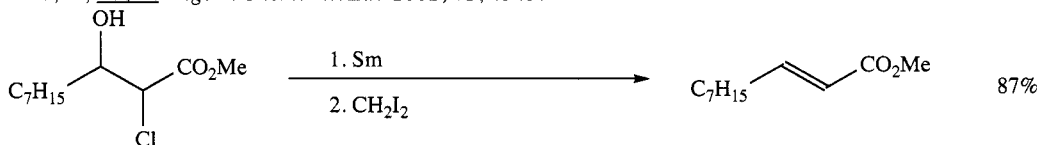
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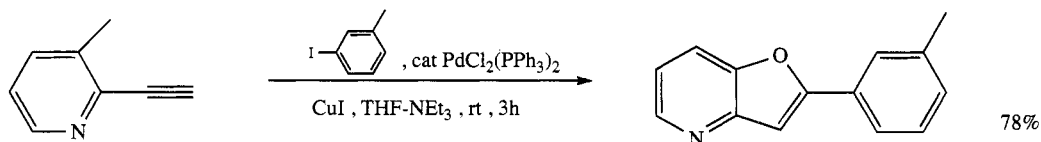
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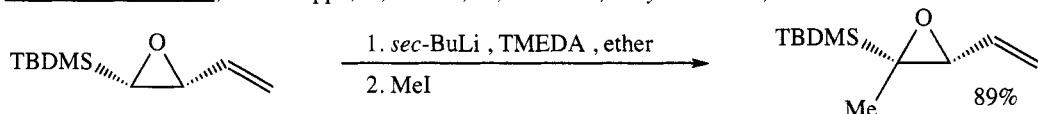
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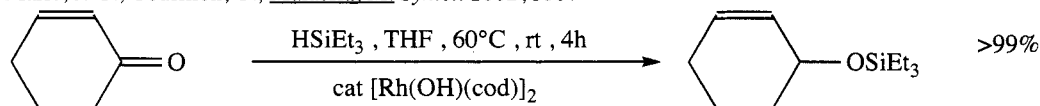
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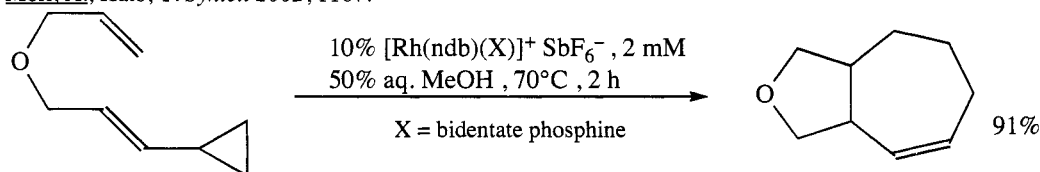
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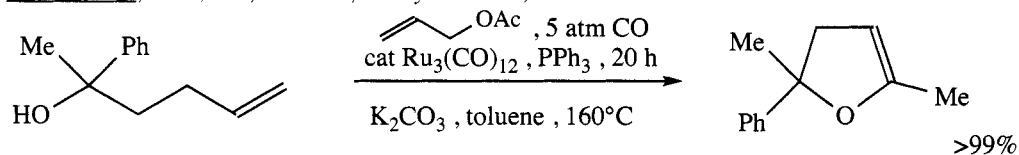
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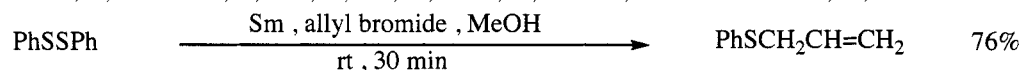
Mori, A.; Kato, T. *Synlett* **2002**, 1167.



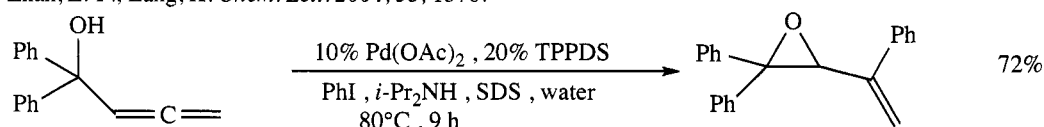
Wender, P.A.; Love, J.A.; Williams, T.J. *Synlett* **2003**, 1295.



Kondo, T.; Tsunawaki, F.; Sato, R.; Ura, Y.; Wada, K.; Mitsuda, T. *Chem. Lett.* **2003**, 32, 24.



Zhan, Z.-P.; Lang, K. *Chem. Lett.* **2004**, 33, 1370.



Yoshida, M.; Ishii, T.; Gotou, T.; Ihara, M. *Heterocycles* **2004**, 64, 41.

Related Method:

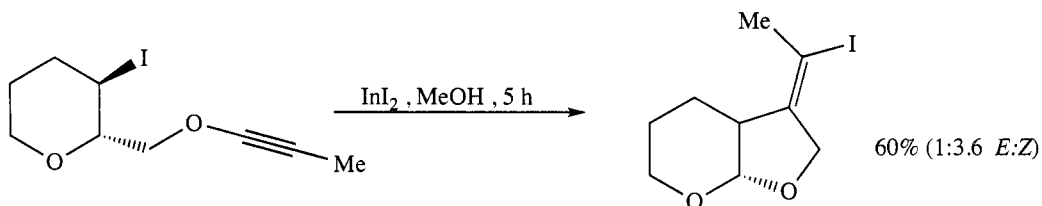
Section 180A (Protection of Ketones)

SECTION 368: HALIDE, SULFONATE - HALIDE, SULFONATE

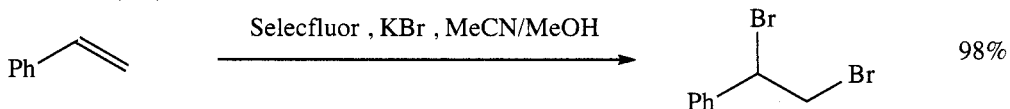
Halocyclopropanations are given in Section 74F (Cyclopropanations, including Halocyclopropanations).



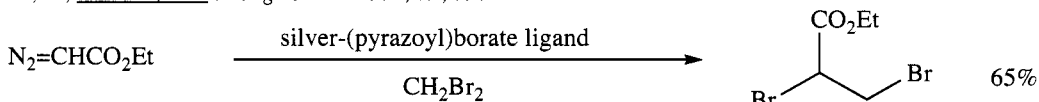
Zhang, W.; Haight, A.R.; Hsu, M.C. *Tetrahedron Lett.* **2002**, 43, 6575.



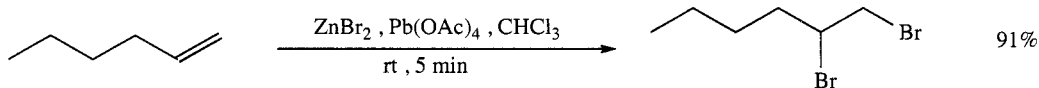
Yanada, R.; Koh, Y.; Nishimori, N.; Matsumura, A.; Obika, S.; Mitsuya, H.; Fujii, N.; Tekemoto, Y. *J. Org. Chem.* **2004**, 69, 2417.



Ye, C.; Shreeve, J.M. *J. Org. Chem.* **2004**, 69, 8561.

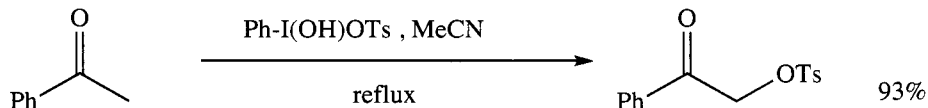


Dias, H.V.R.; Browning, R.G.; Polach, S.A.; Diyabalanage, H.V.K.; Lovely, C.J. *J. Am. Chem. Soc.* **2003**, 125, 9270.

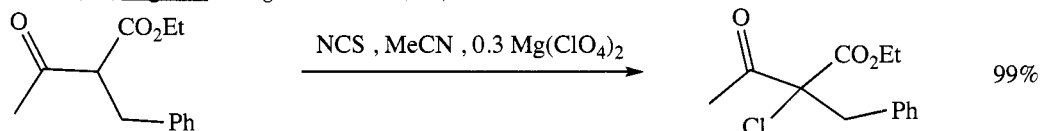


Muathen, H.A. *Synth. Commun.* **2004**, 34, 3545.

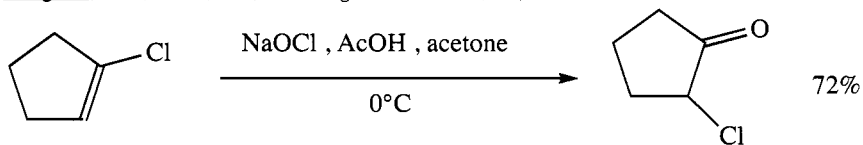
SECTION 369: HALIDE, SULFONATE - KETONE



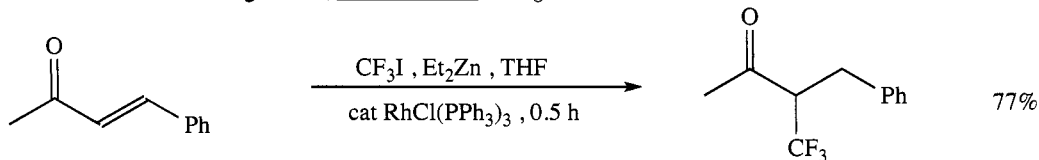
Nabana, T.; Togo, H. *J. Org. Chem.* **2002**, 67, 4362.



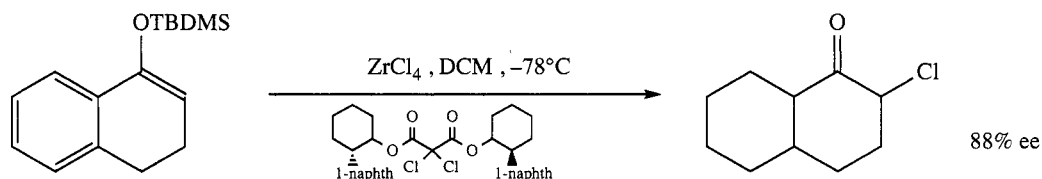
Yang, D.; Yan, Y.-L.; Lui, B. *J. Org. Chem.* **2002**, 67, 7429.



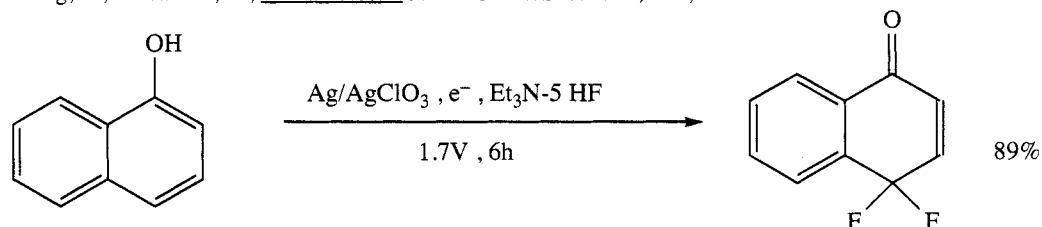
Van Brunt, M.P.; Ambenge, R.O.; Weinreb, S.M. *J. Org. Chem.* **2003**, 68, 3323.



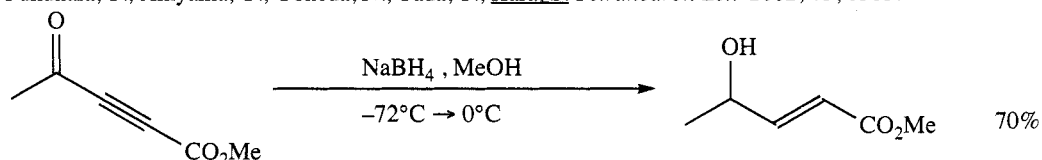
Sato, K.; Omote, M.; Ando, A.; Kumadaki, I. *Org. Lett.* **2004**, 6, 4359.



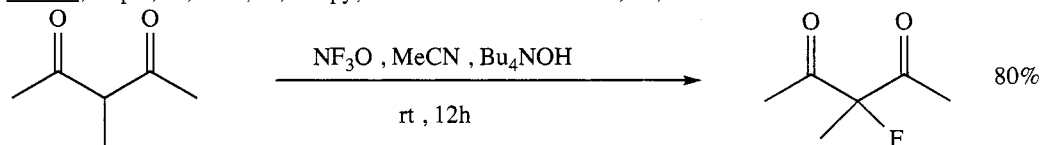
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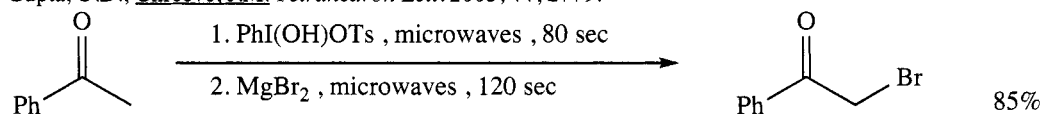
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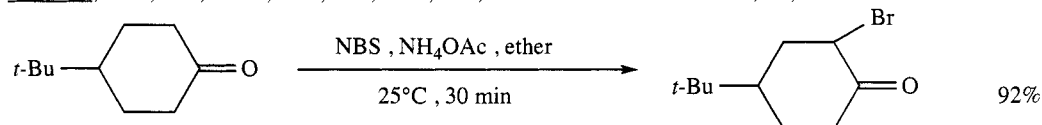
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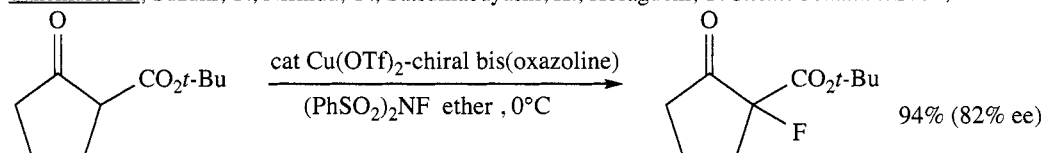
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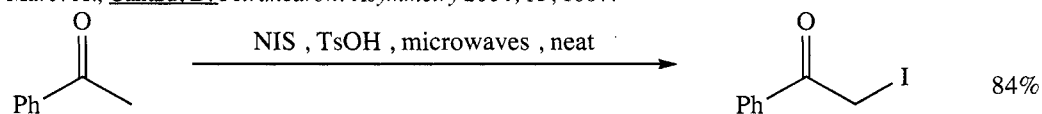
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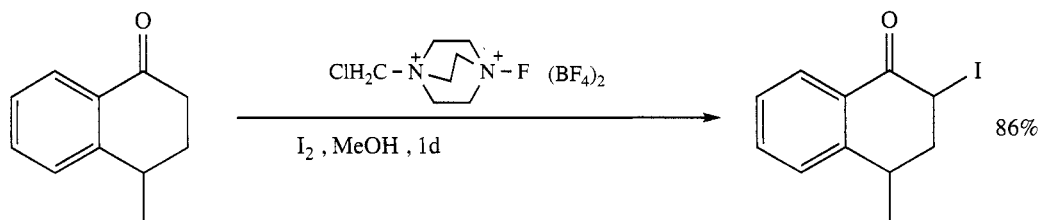
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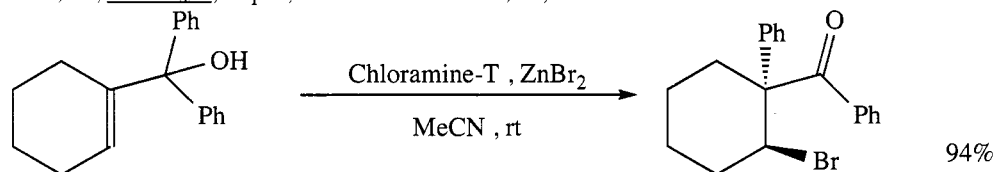
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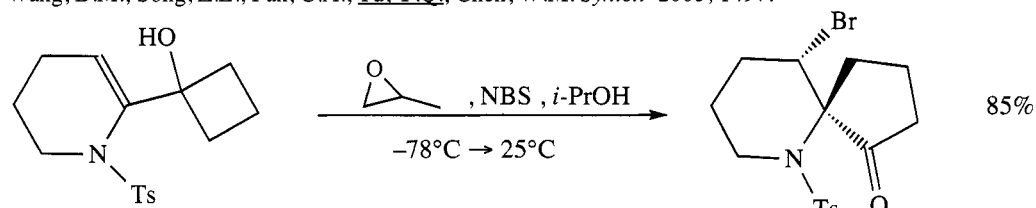
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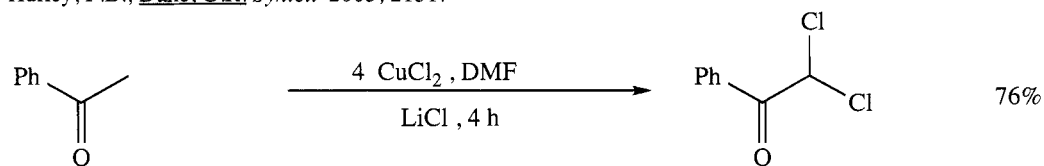
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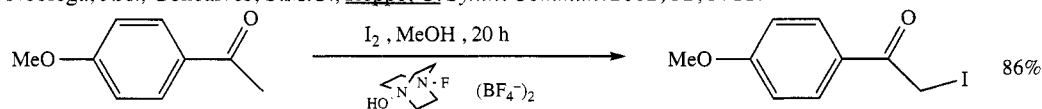
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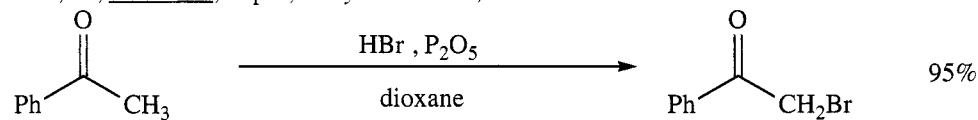
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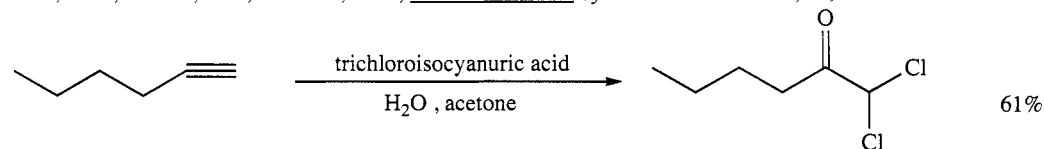
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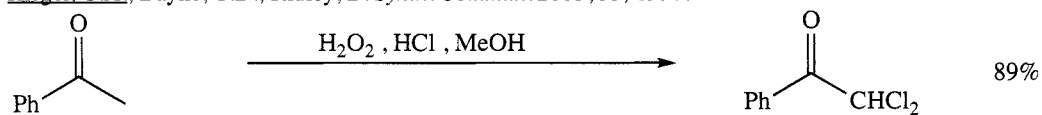
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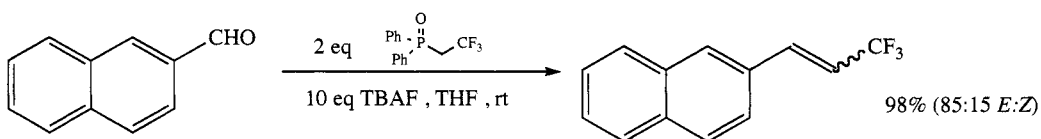
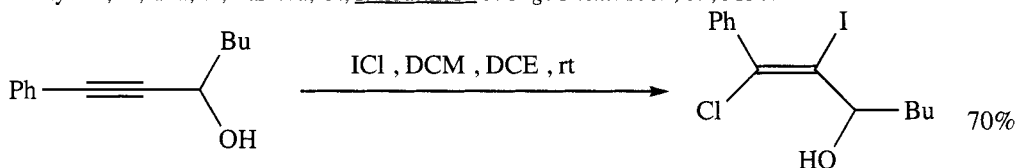
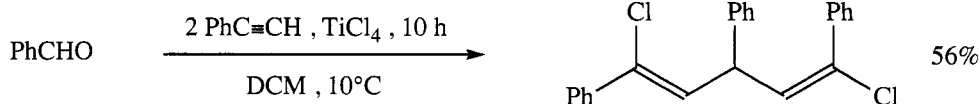
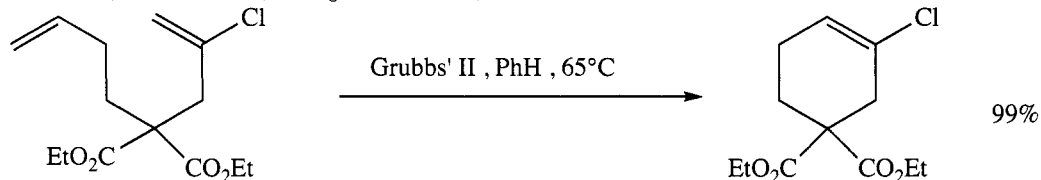
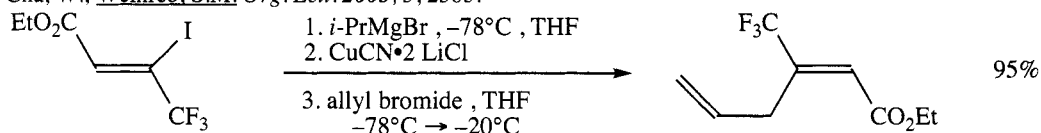
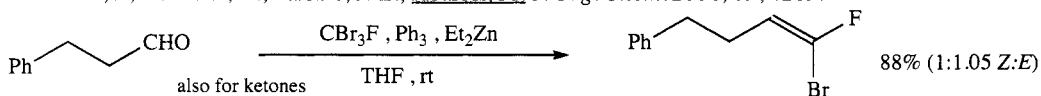
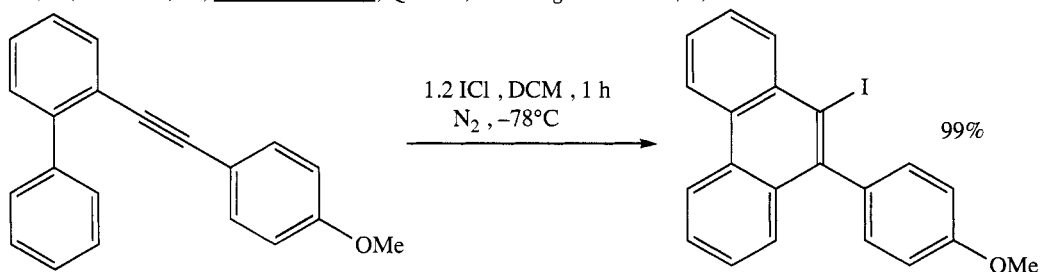
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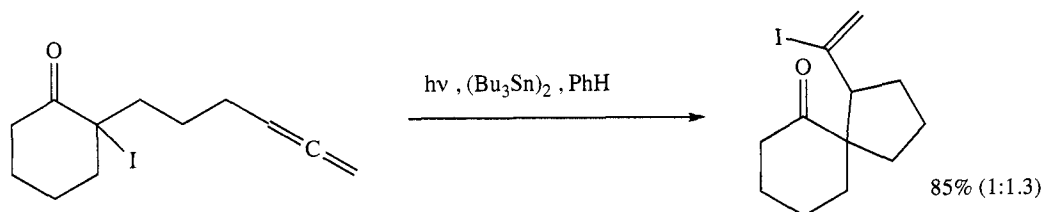


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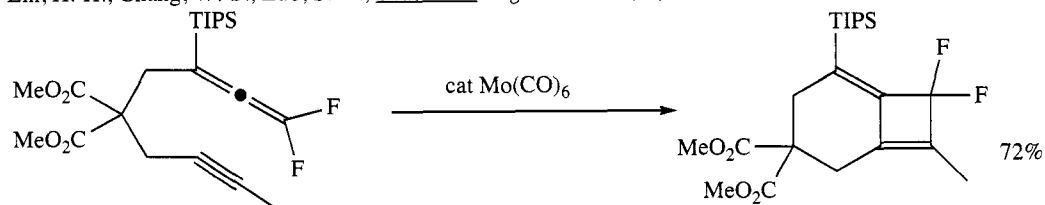
SECTION 370: HALIDE, SULFONATE - NITRILE

NO ADDITIONAL EXAMPLES

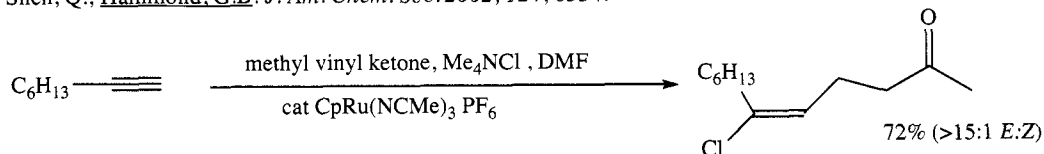
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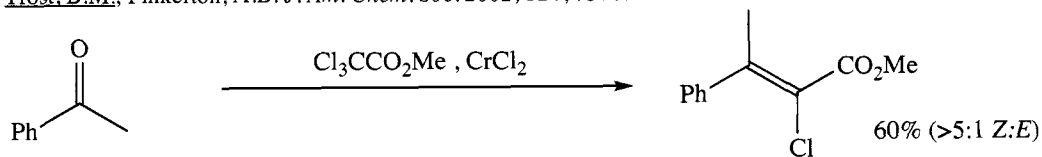
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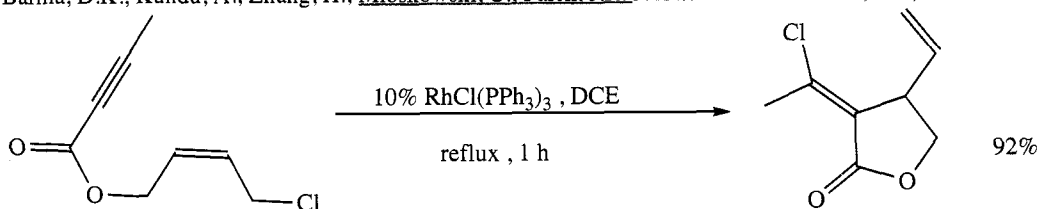
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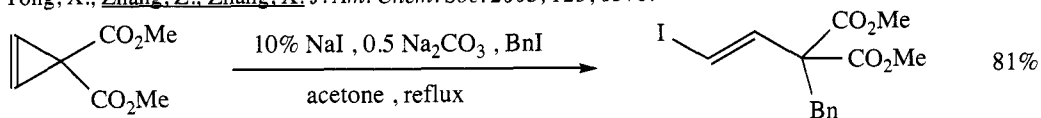
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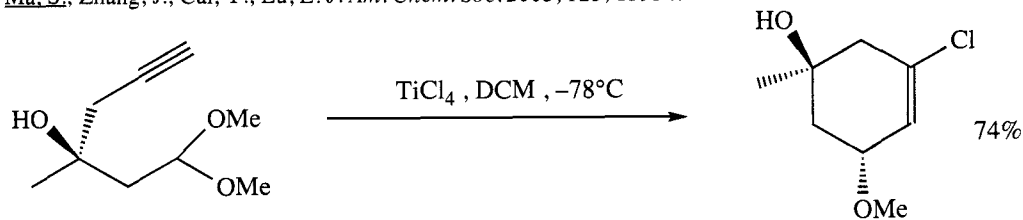
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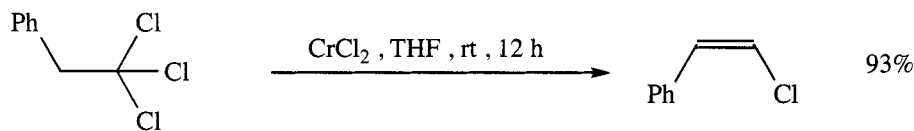
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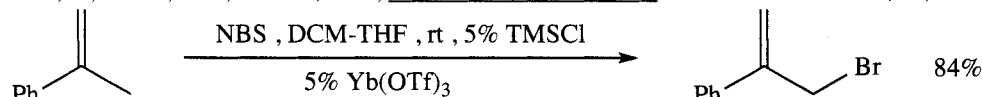
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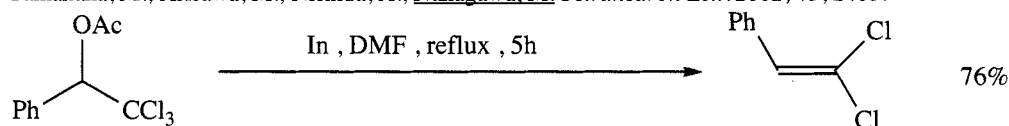
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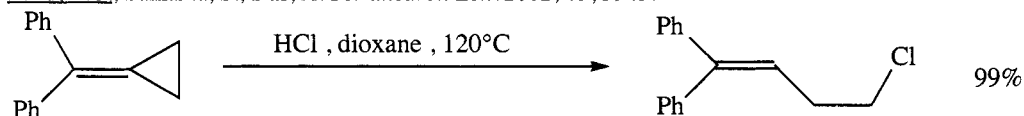
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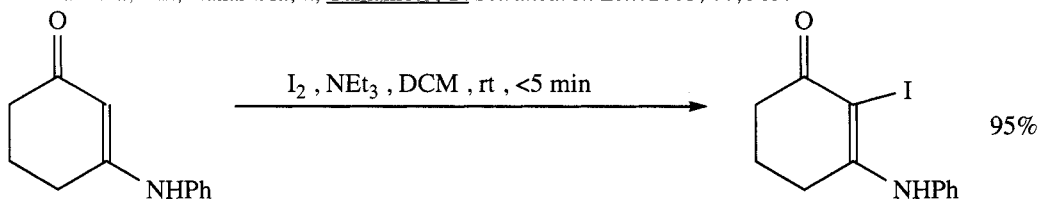
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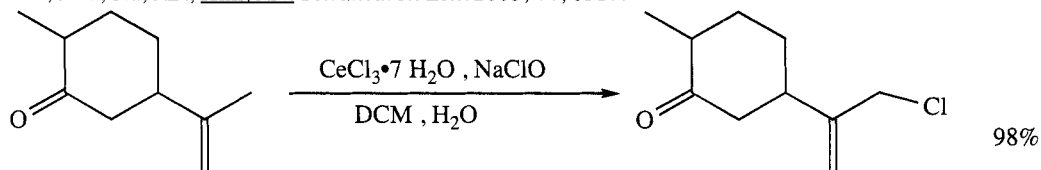
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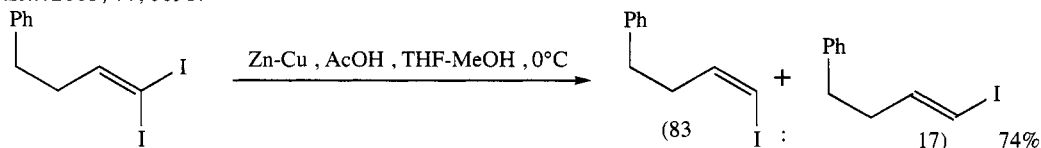
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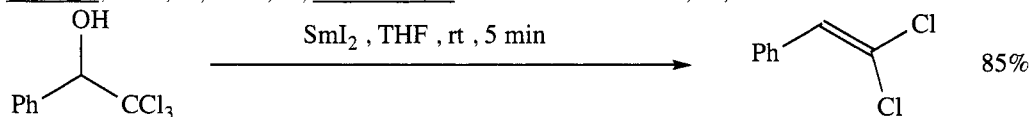
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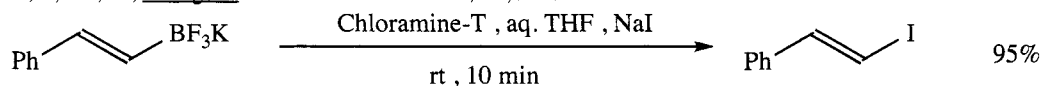
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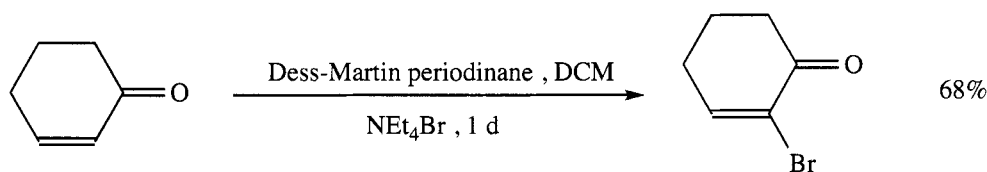
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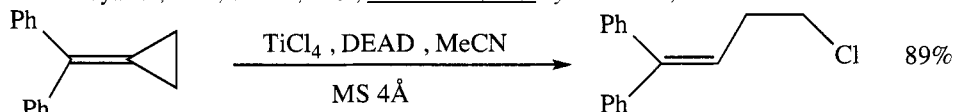
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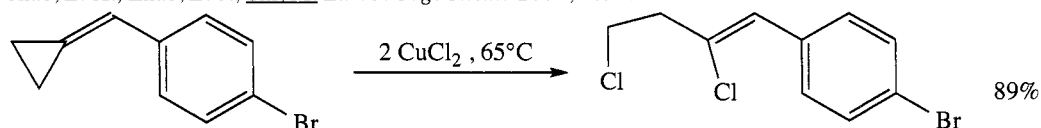
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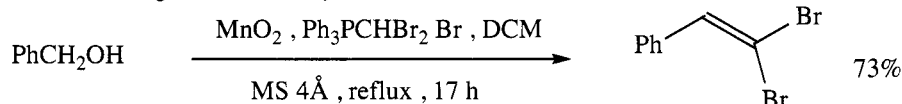
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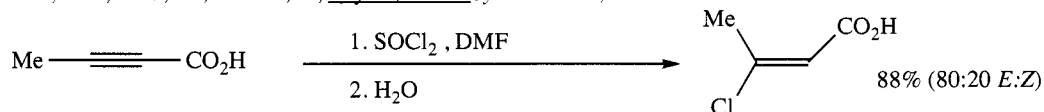
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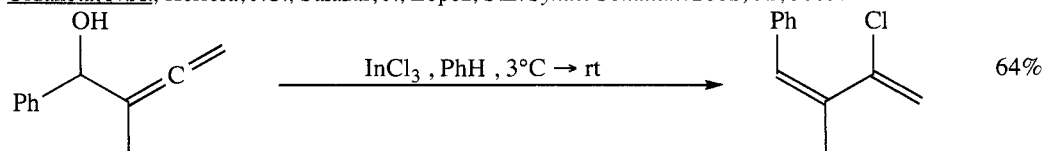
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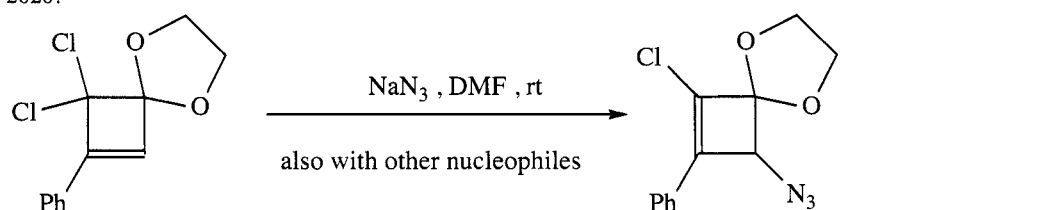
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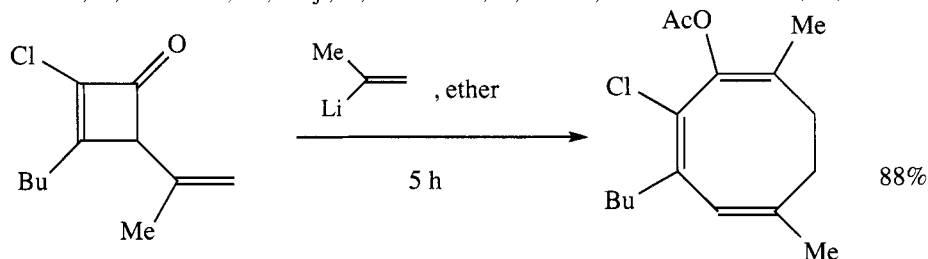
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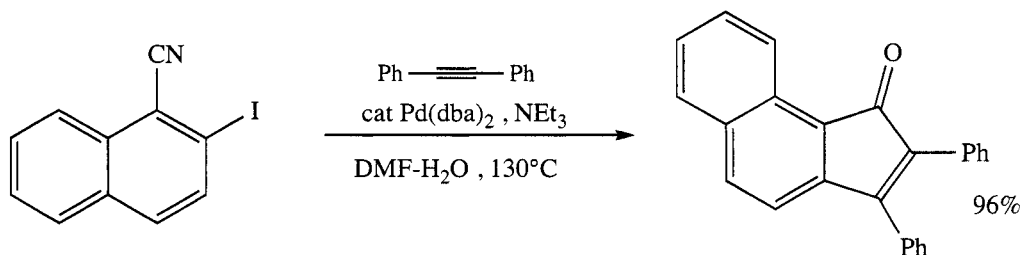


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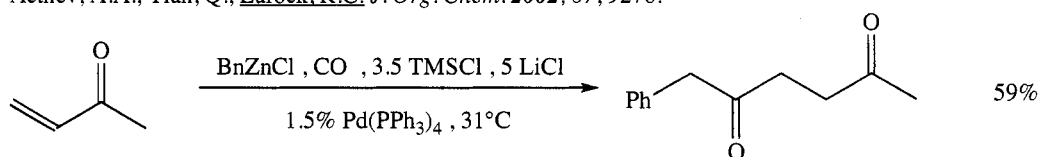


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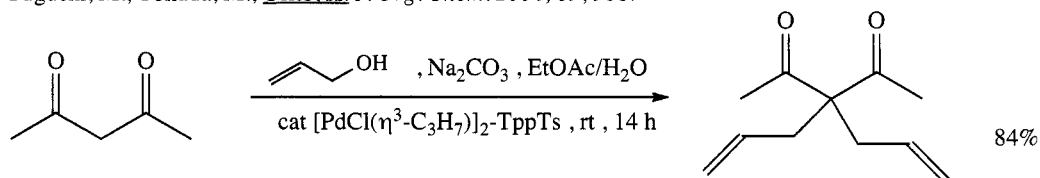
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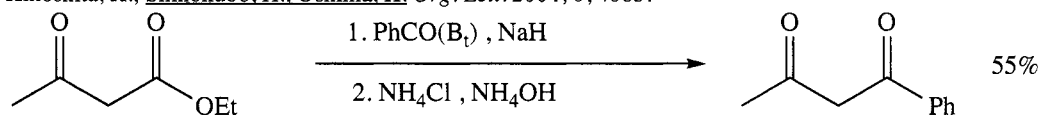
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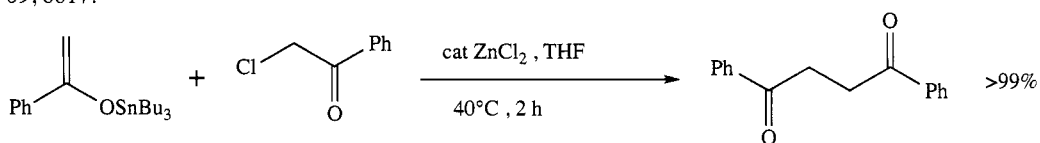
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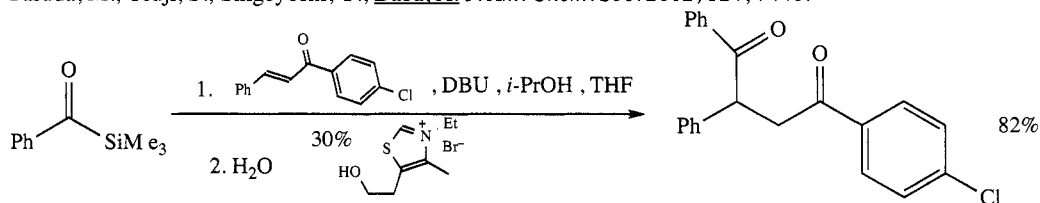
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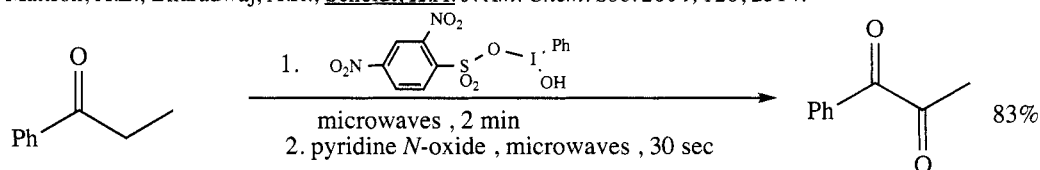
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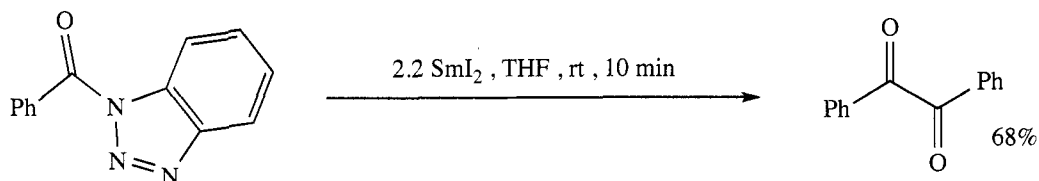
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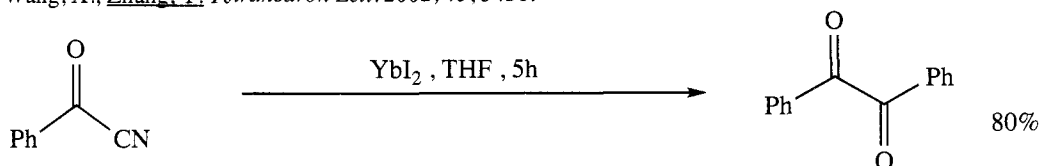
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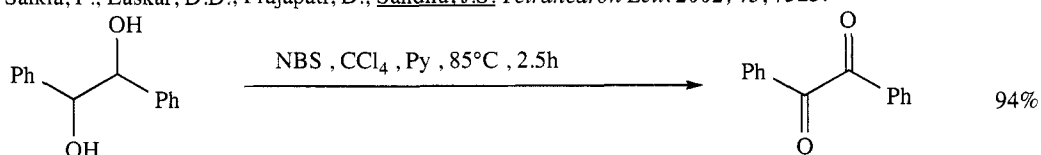
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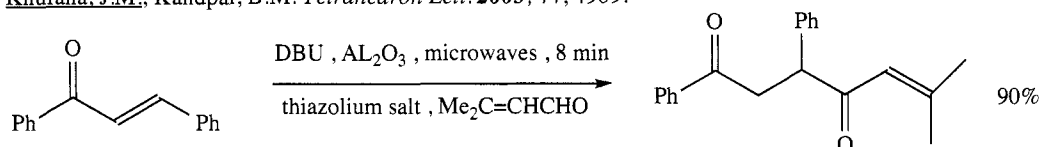
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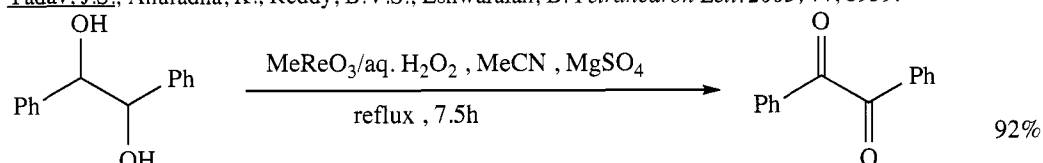
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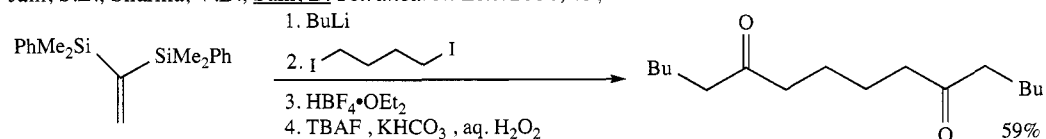
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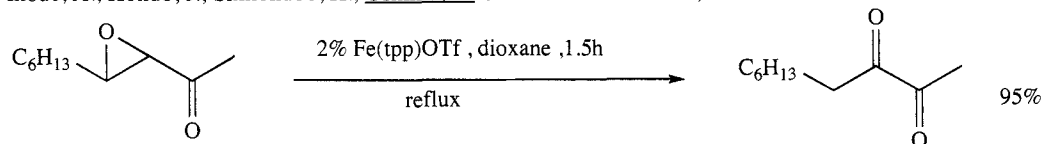
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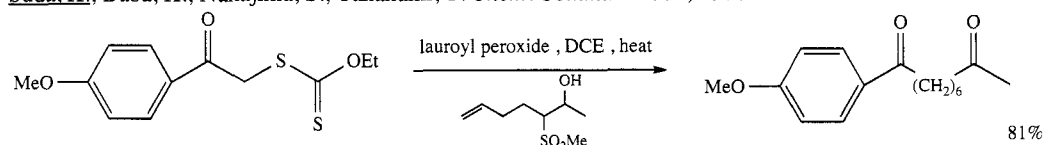
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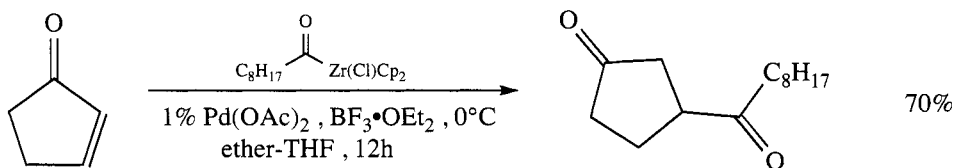
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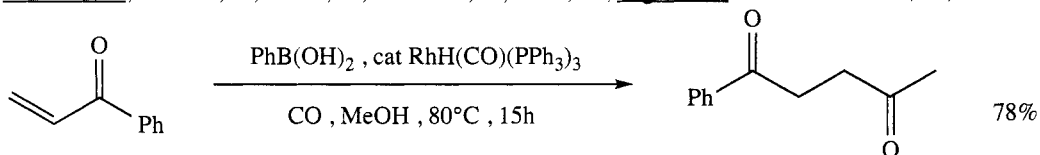
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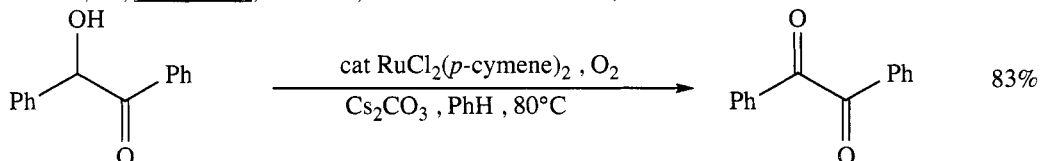
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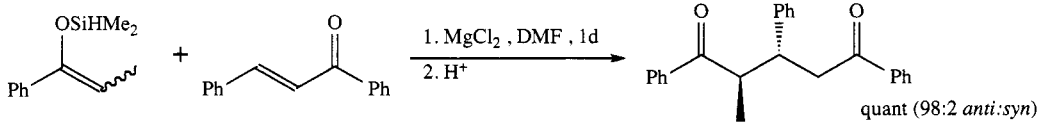
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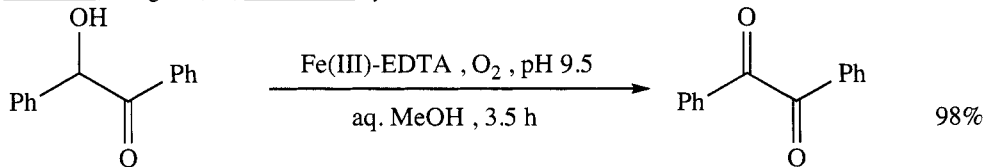
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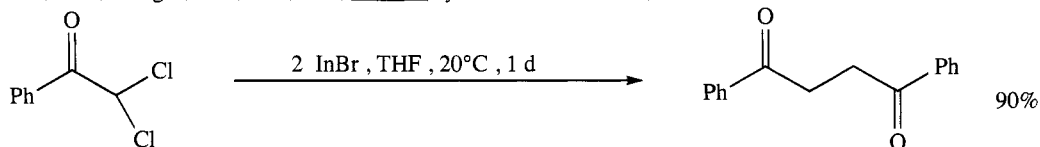
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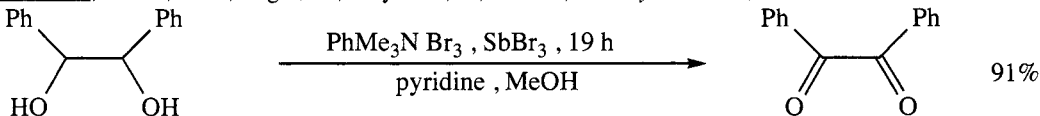
Rao, T.V.; Dongre, R.S.; Jain, S.L.; Sain, B. *Synth. Commun.* **2002**, 32, 2637.



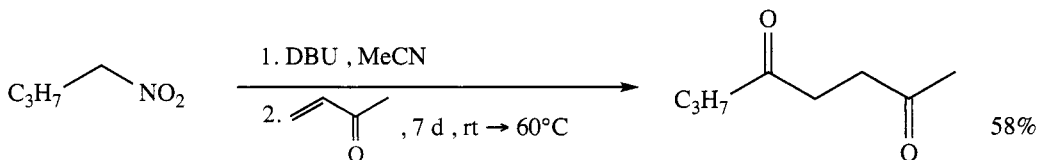
Peppe, C.; das Chagas, R.P. *Synlett* **2004**, 1187.



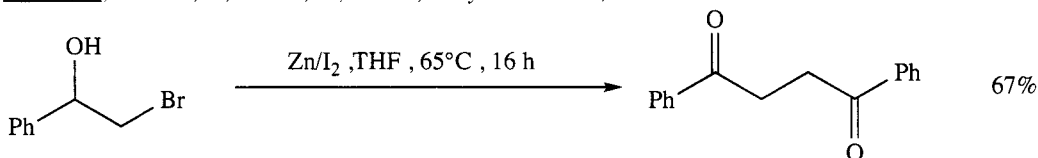
Rüedi, G.; Oberli, M.A.; Nagel, M.; Weymuth, C.; Hansen, H.-J. *Synlett* **2004**, 2315.



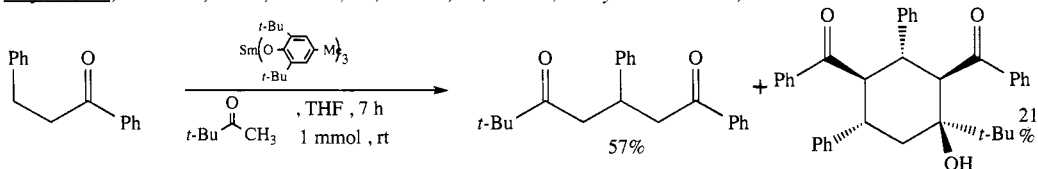
Sayama, S.; Onami, T. *Synlett* **2004**, 2369.



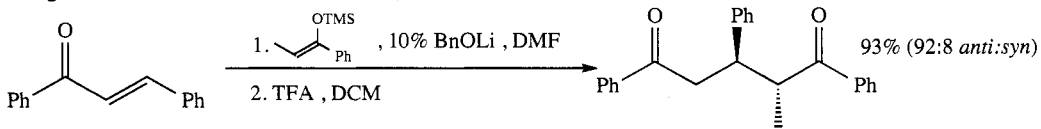
Ballini, R.; Barboni, L.; Boscia, G.; Fiorini, D. *Synthesis* **2002**, 2725.



Ceylan, M.; Gürdere, M.B.; Budak, Y.; Kazaz, C.; Secen, H. *Synthesis* **2004**, 1750.

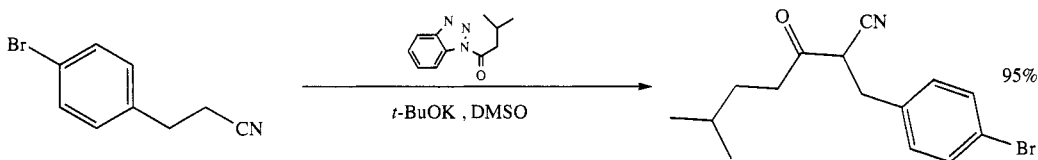


Katagiri, K.; Kameoka, M.; Nishiura, M.; Imamoto, T. *Chem. Lett.* **2002**, 31, 426.

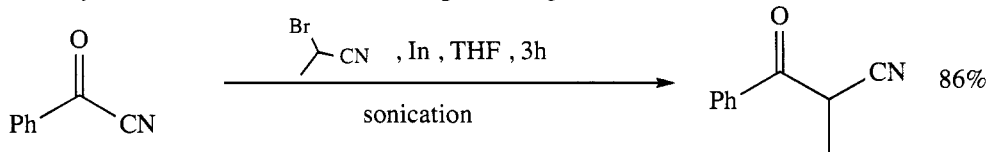


Mukaiyama, T.; Tozawa, T.; Fujisawa, H. *Chem. Lett.* **2004**, 33, 1410.

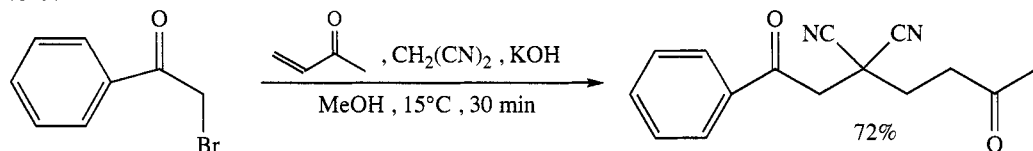
SECTION 373: KETONE - NITRILE



Katritzky, A.R.; Abdel-Fattach, A.A.A.; Wang, M. *J. Org. Chem.* **2003**, 68, 4932.



Yoo, B.W.; Hwang, S.K.; Kim, D.Y.; Choi, J.W.; Ko, J.J.; Choi, K.I.; Kim, J.H. *Tetrahedron Lett.* **2002**, 43, 4813.



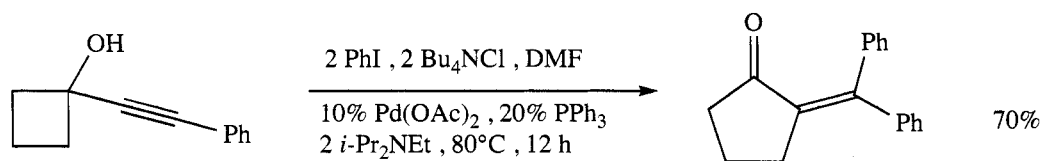
Saikia, A.; Chetia, A.; Bora, U.; Boruah, R.C. *Synlett* **2003**, 1506.

SECTION 374: KETONE - ALKENE

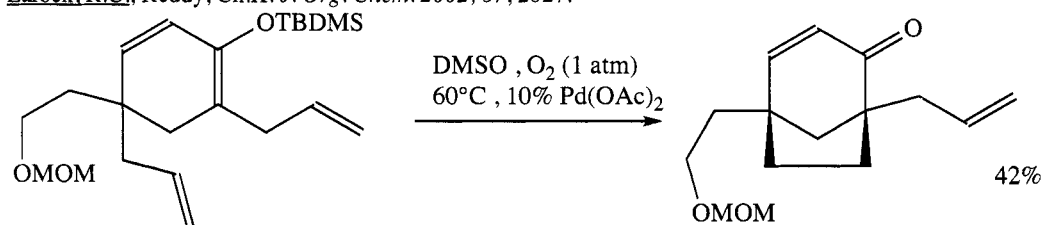
For the oxidation of allylic alcohols to alkene ketones, see Section 168 (Ketones from Alcohols and Phenols)

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

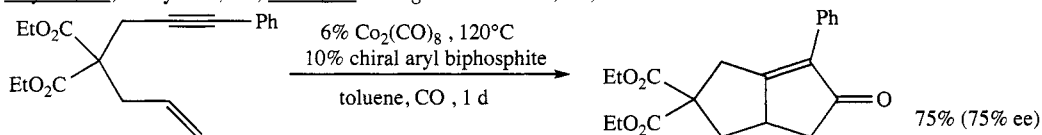
For the alkylation of alkene ketones, also see Section 177 (Ketones from Ketones), and for conjugate alkylations, see Section 74E (Conjugate Alkylations).



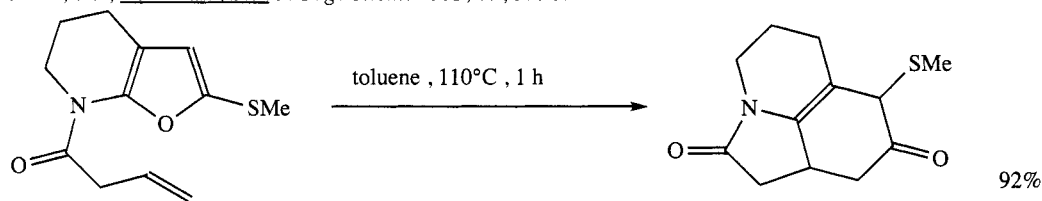
Larock, R.C.; Reddy, Ch.K. *J. Org. Chem.* **2002**, 67, 2027.



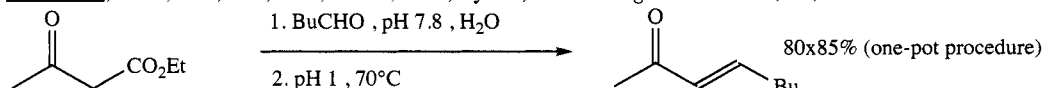
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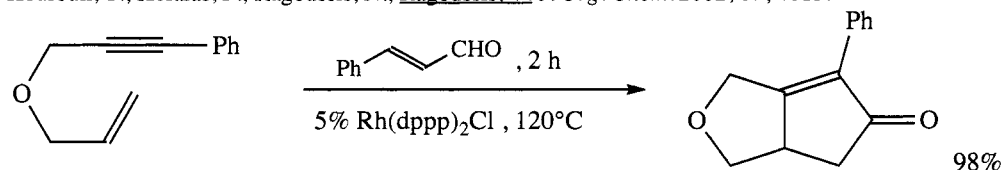
Sturla, S.J.; Buchwald, S.L. *J. Org. Chem.* **2002**, 67, 3398.



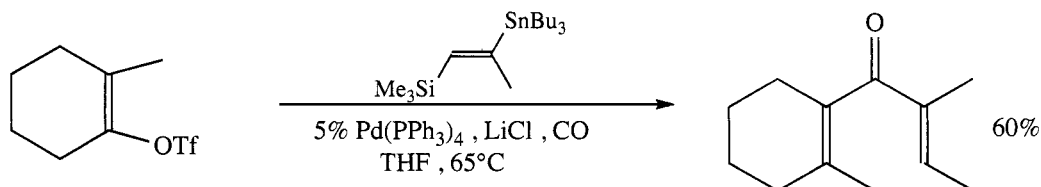
Padwa, A.; Ginn, J.D.; Bur, S.K.; Eidell, C.K.; Lynch, S.M. *J. Org. Chem.* **2002**, 67, 3412.



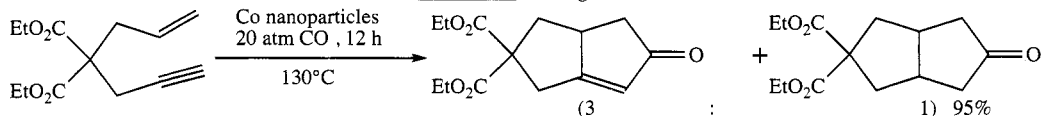
Kourouli, T.; Kefalas, P.; Ragoussis, N.; Ragoussis, V. *J. Org. Chem.* **2002**, 67, 4615.



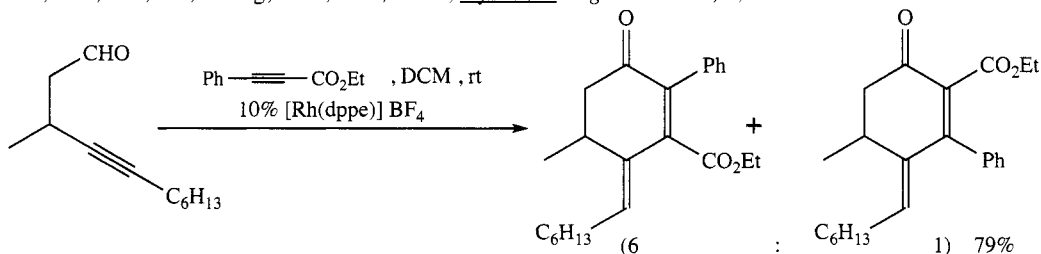
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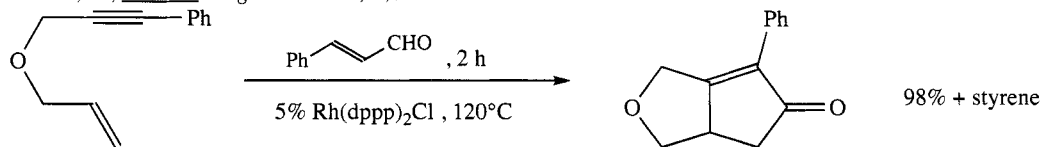
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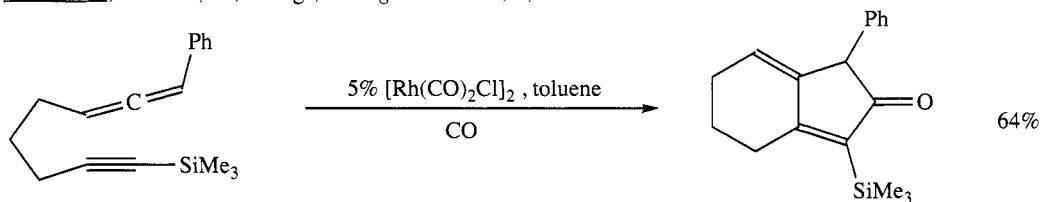
Son, S.U.; Lee, S.I.; Chung, Y.K.; Kim, S.-W.; Hyeon, T. *Org. Lett.* **2002**, *4*, 277.



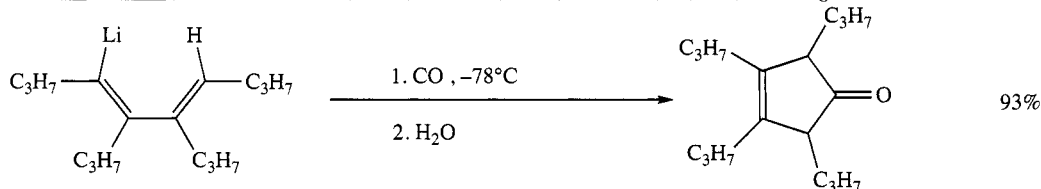
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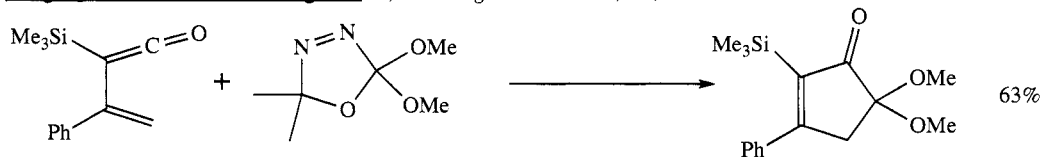
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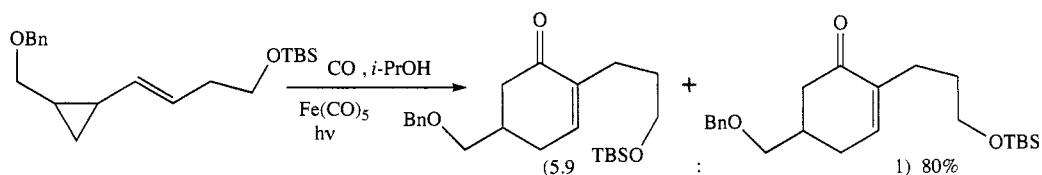
Brummond, K.M.; Chen, H.; Fisher, K.D.; Kerekes, A.D.; Rickards, B.; Sill, P.C. *Org. Lett.* **2002**, *4*, 1931.



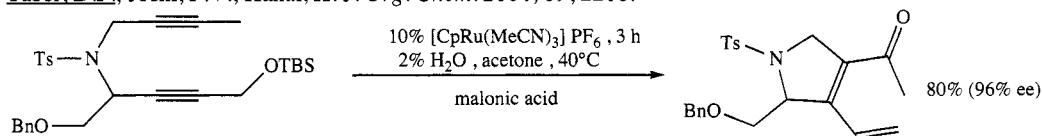
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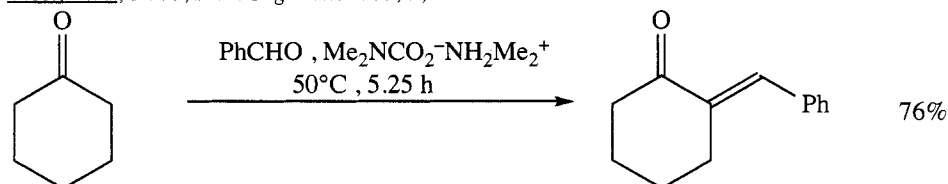
Rigby, J.H.; Wang, Z. *Org. Lett.* **2003**, *5*, 263.



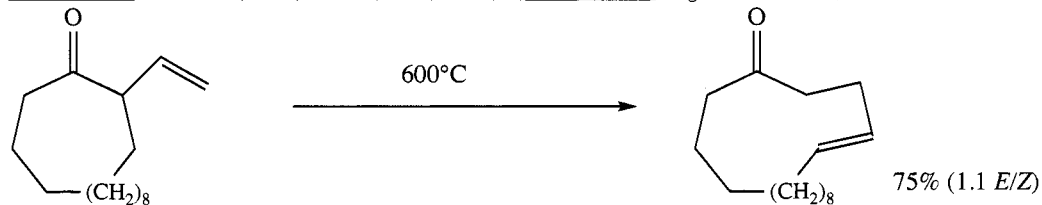
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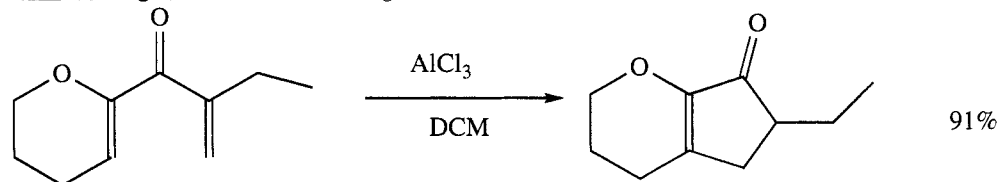
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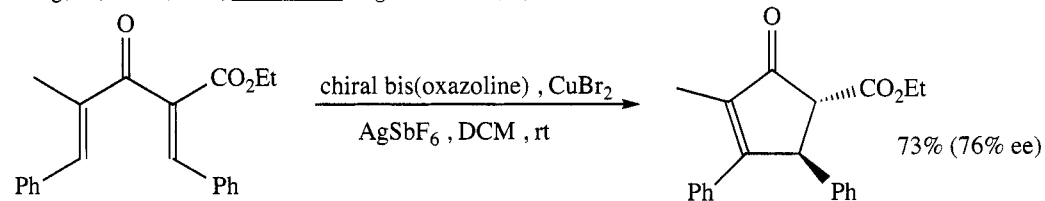
Kreher, U.P.; Rosamillia, A.E.; Raston, C.L.; Scott, J.; Strauss, C.R. *Org. Lett.* **2003**, *5*, 3107.



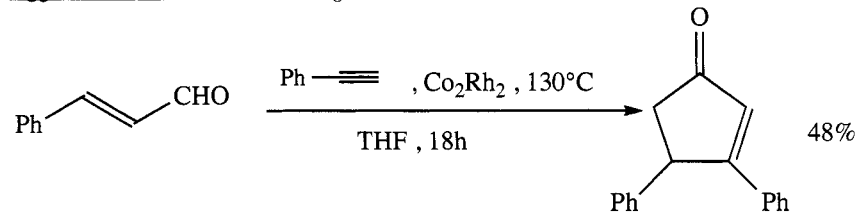
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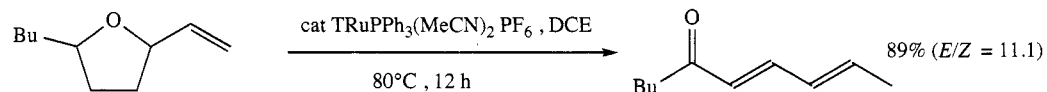
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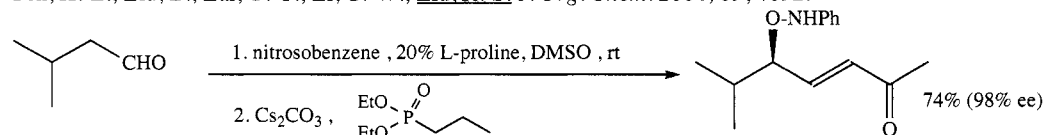
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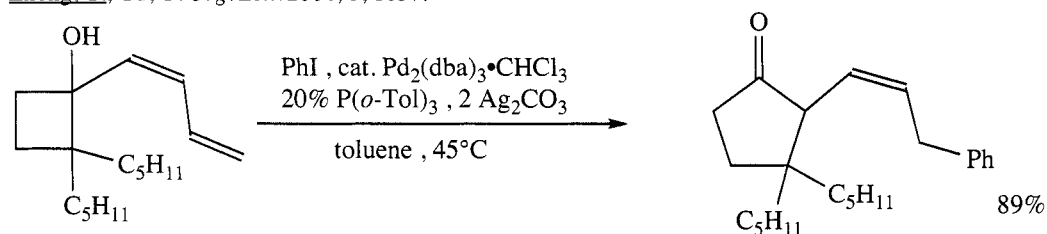
Park, K.H.; Jung, I.G.; Chung, Y.K. *Org. Lett.* **2004**, *6*, 1183.



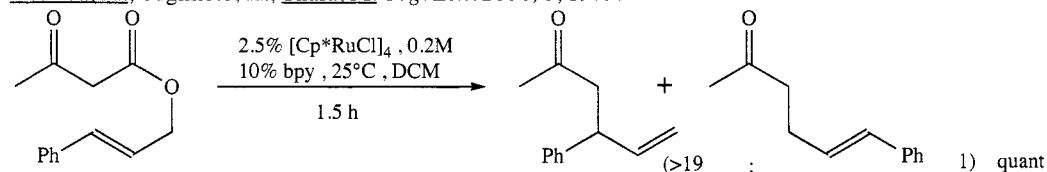
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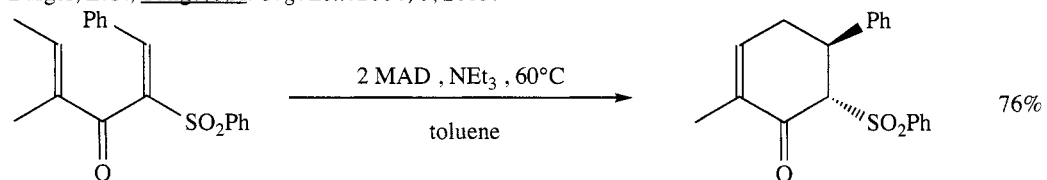
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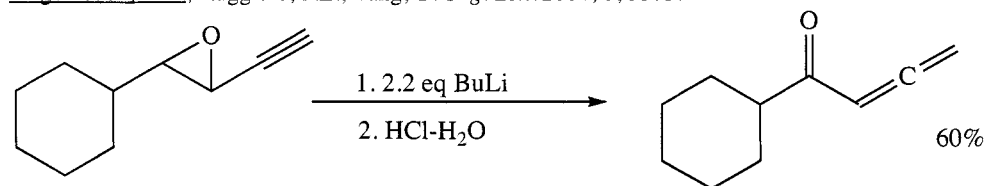
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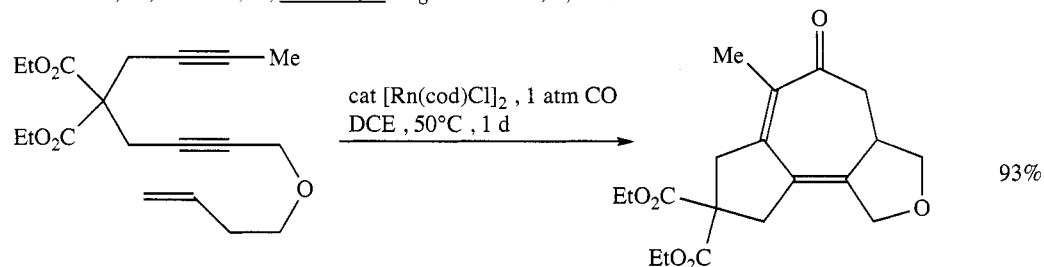
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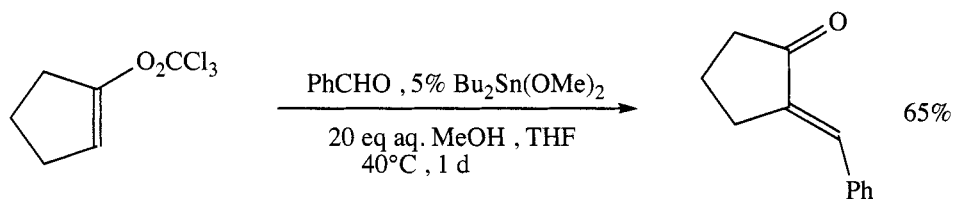
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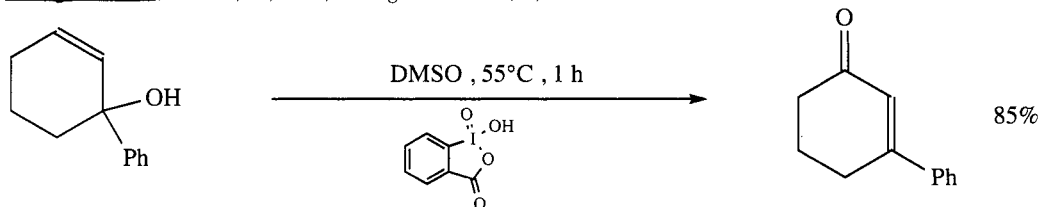
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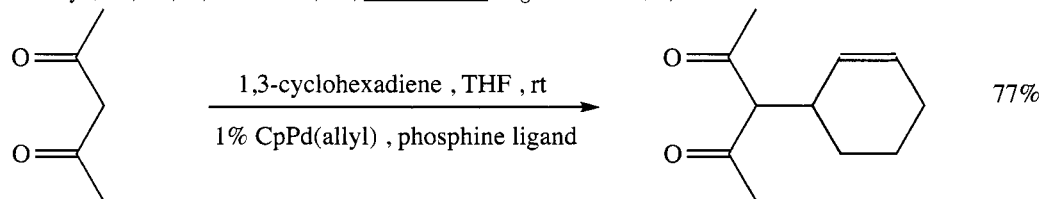
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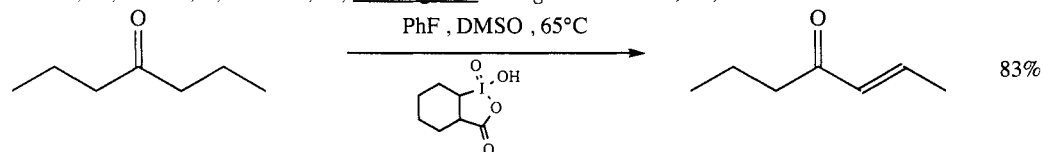
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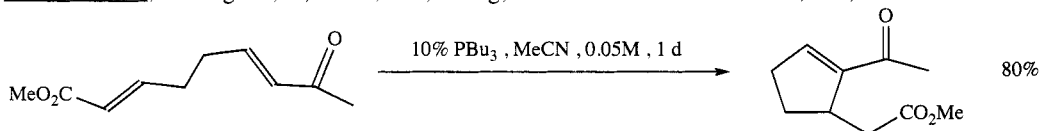
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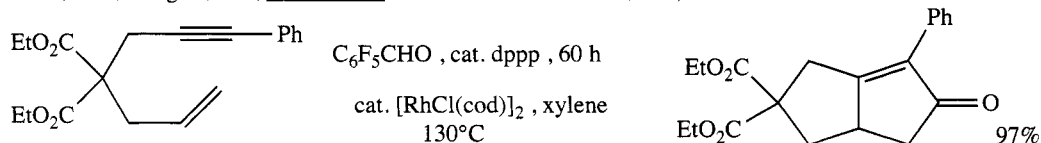
Leitner, A.; Larsen, J.; Steffens, C.; Hartwig, J.F. *J. Org. Chem.* **2004**, 69, 7552.



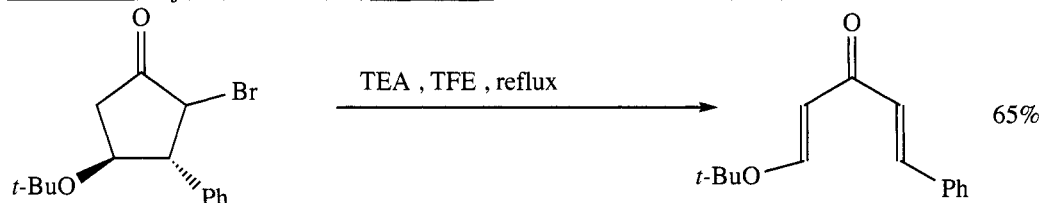
Nicolaou, K.C.; Montagnon, T.; Baran, P.S.; Zhong, Y.-L. *J. Am. Chem. Soc.* **2002**, 124, 2245.



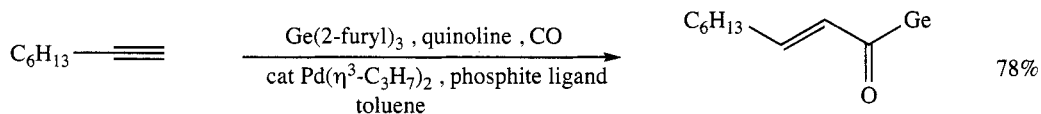
Frank, S.A.; Mergott, D.J.; Roush, W.R. *J. Am. Chem. Soc.* **2002**, 124, 2404.



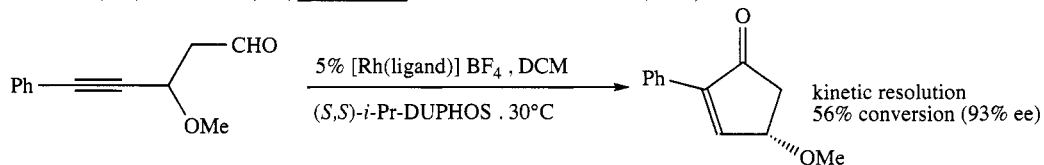
Morimoto, T.; Fuji, K.; Tsutsumi, K.; Kakiuchi, K. *J. Am. Chem. Soc.* **2002**, 124, 3806.



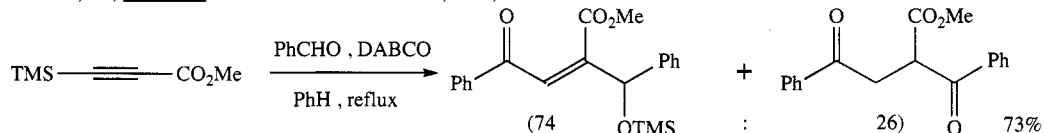
Harmata, M.; Lee, D.R. *J. Am. Chem. Soc.* **2002**, 124, 14328.



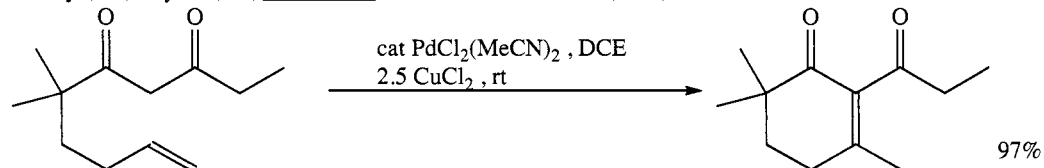
Kinoshita, H.; Shinokubo, H.; Oshima, K. *J. Am. Chem. Soc.* **2002**, *124*, 4220.



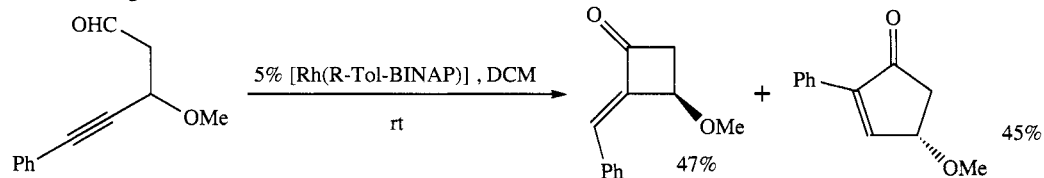
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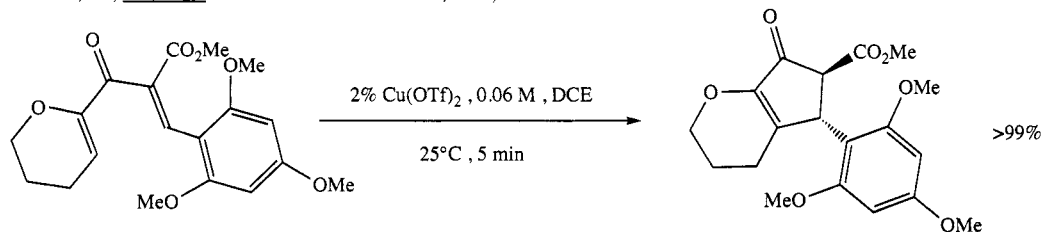
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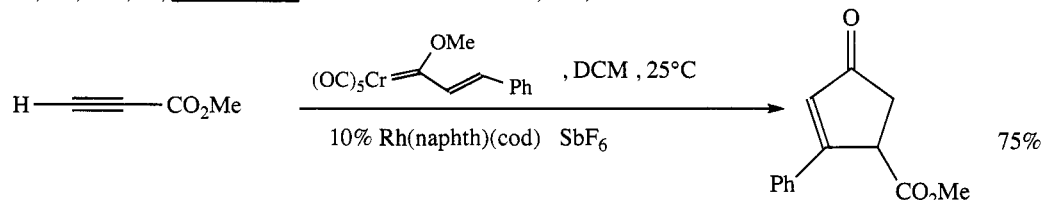
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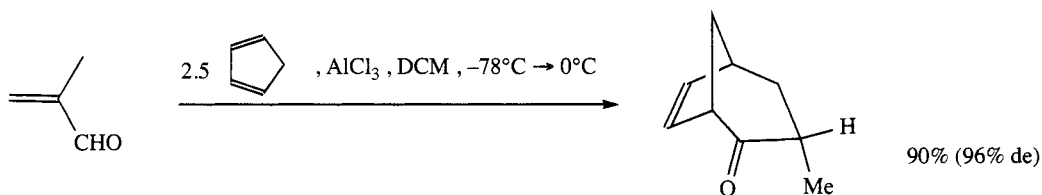
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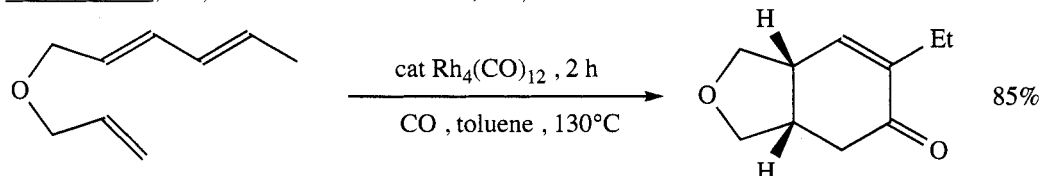
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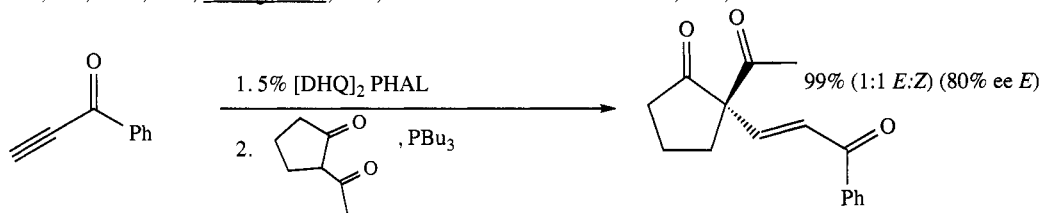
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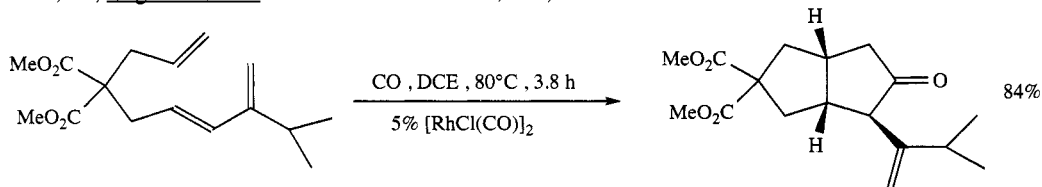
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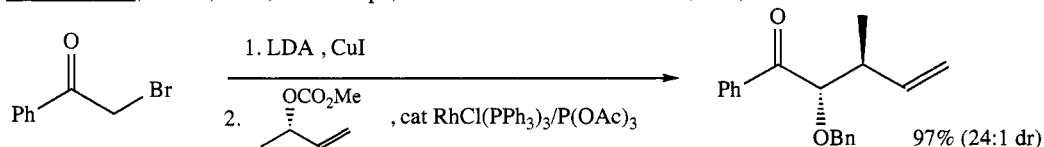
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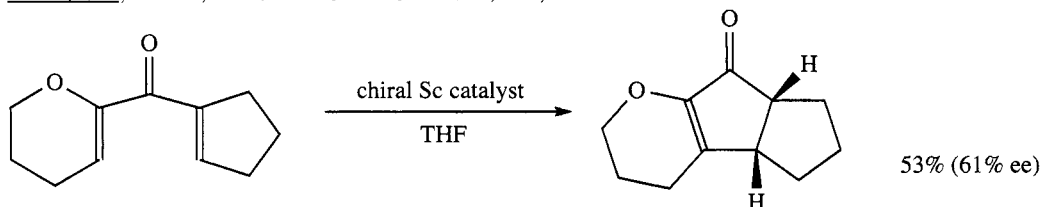
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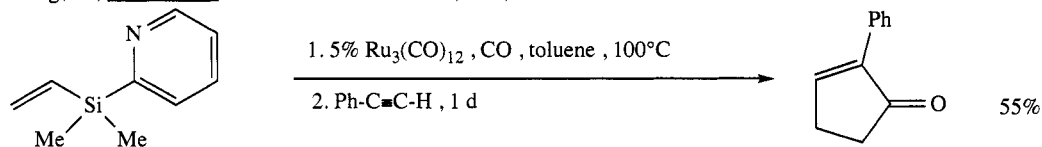
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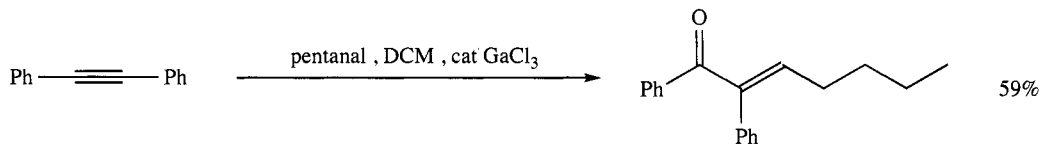
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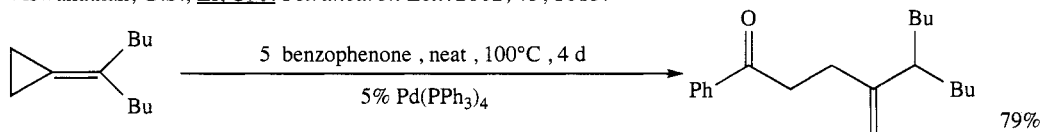
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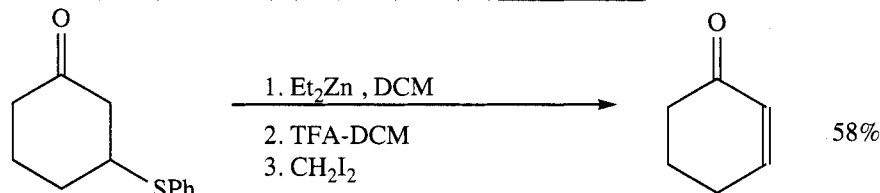
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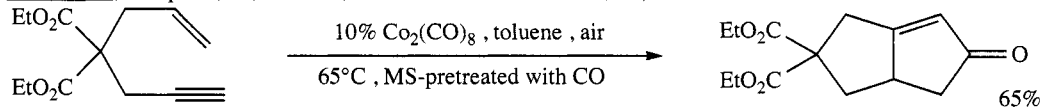
Viswanathan, G.S.; Li, C.-J. *Tetrahedron Lett.* **2002**, 43, 1613.



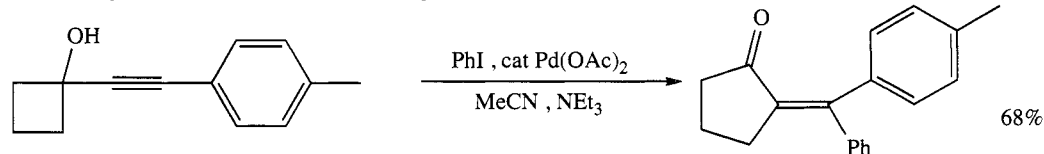
Camacho, D.H.; Nakamura, I.; Oh, B.H.; Saito, S.; Yamamoto, Y. *Tetrahedron Lett.* **2002**, 43, 2903.



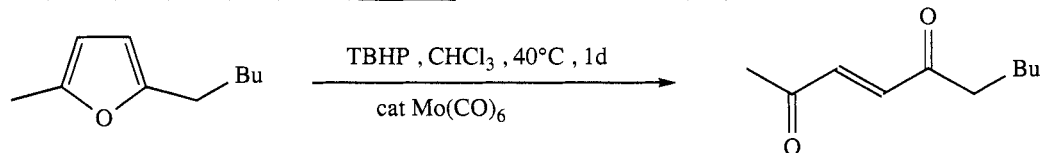
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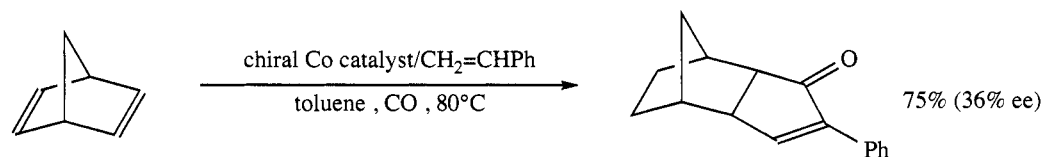
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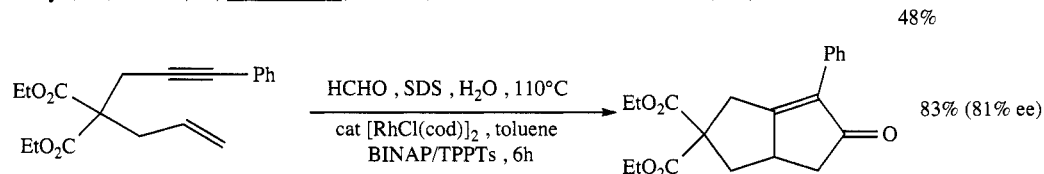
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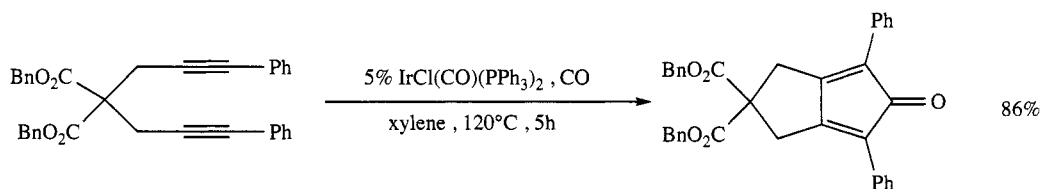
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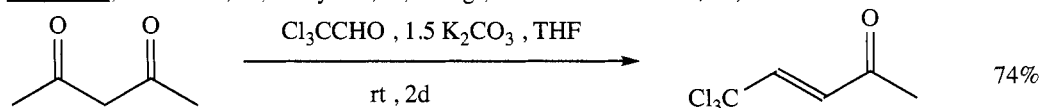
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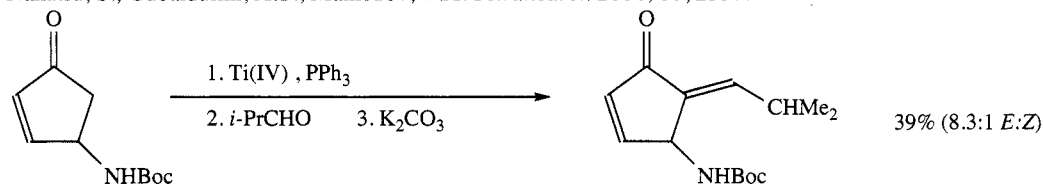
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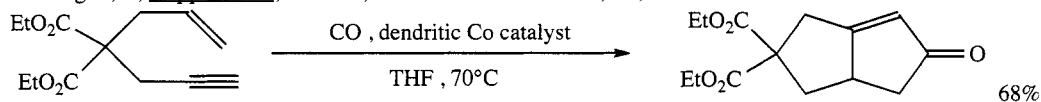
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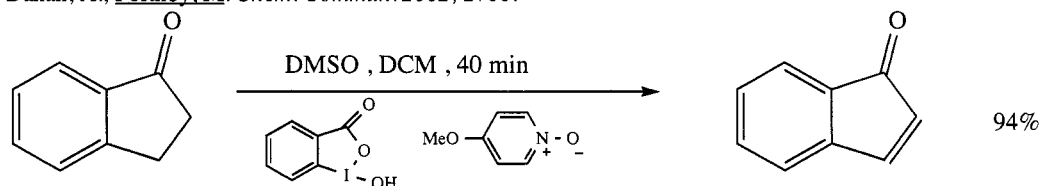
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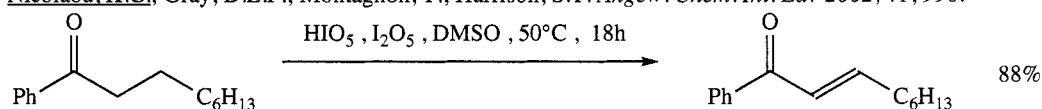
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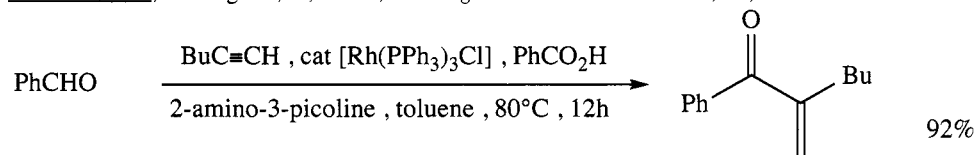
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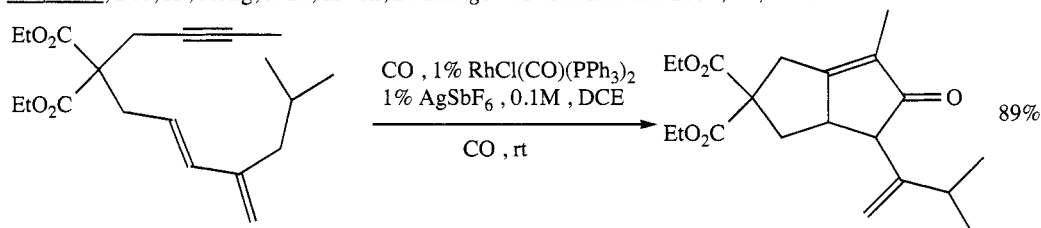
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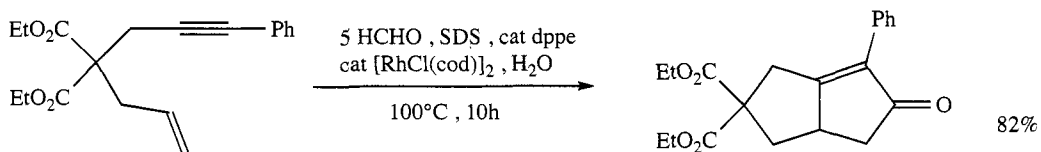
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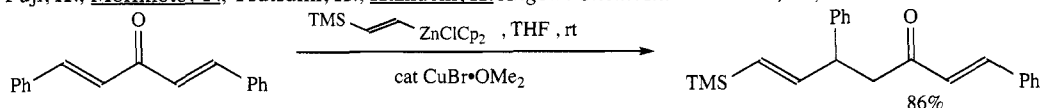
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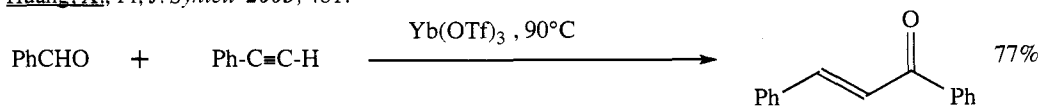
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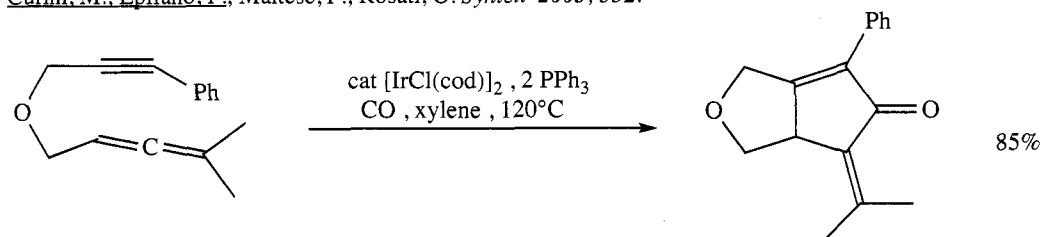
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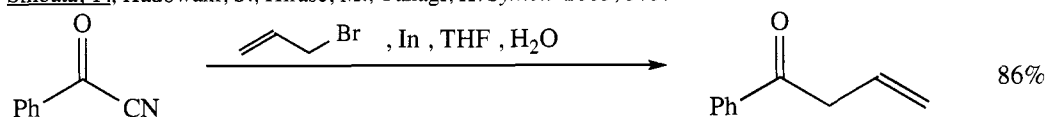
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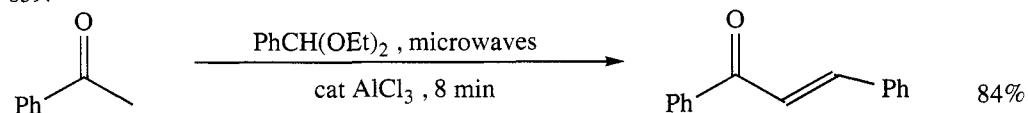
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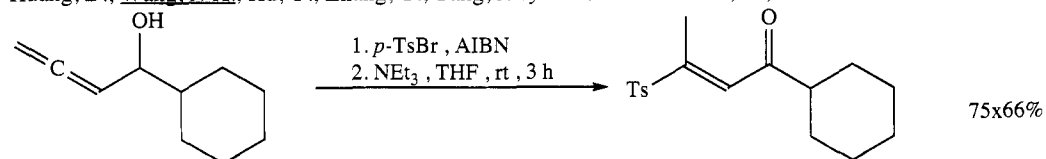
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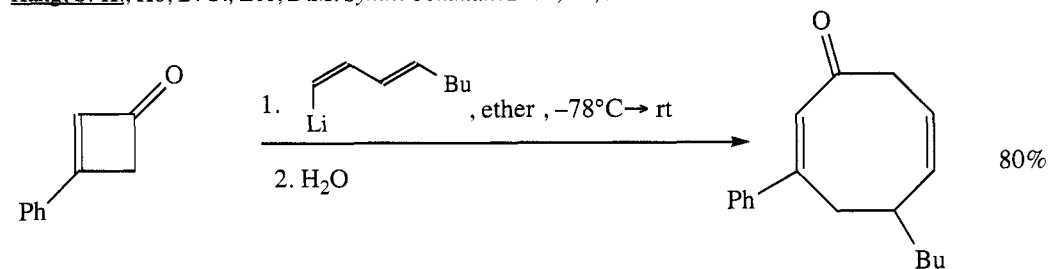
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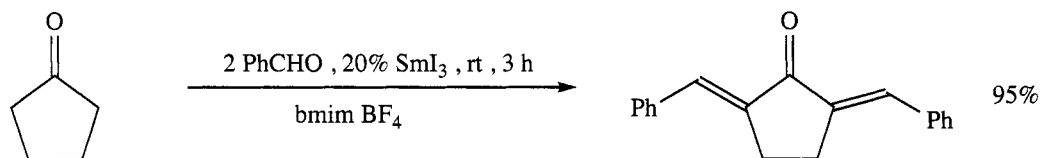
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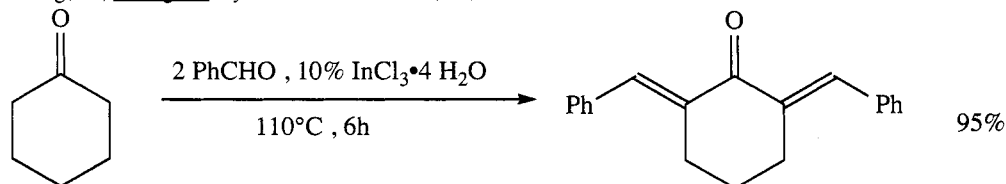
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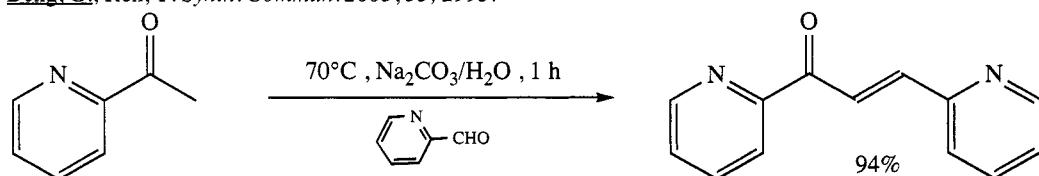
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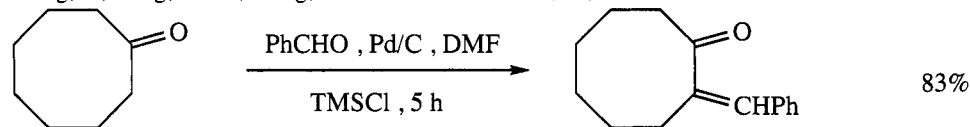
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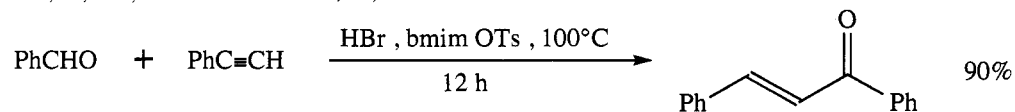
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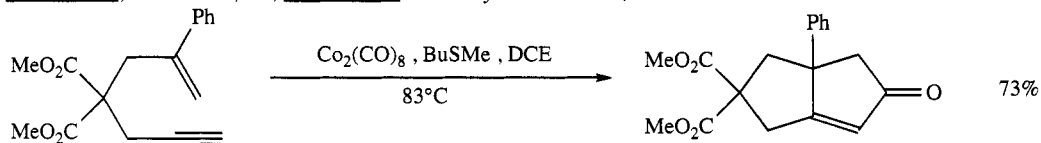
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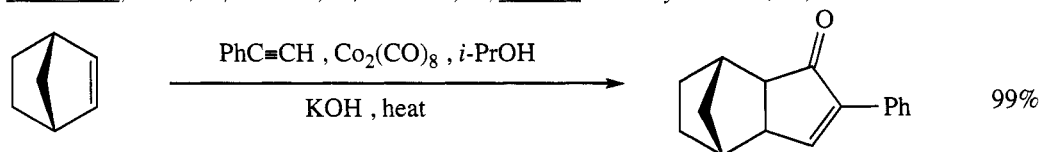
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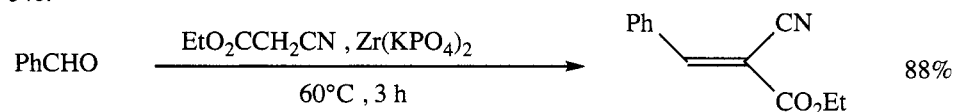
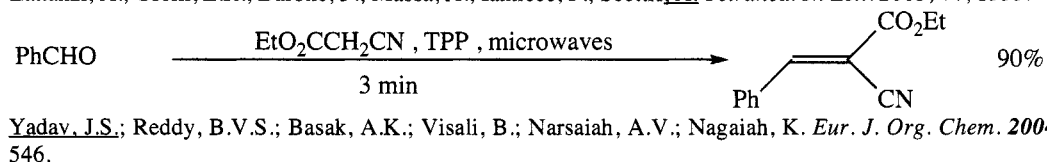
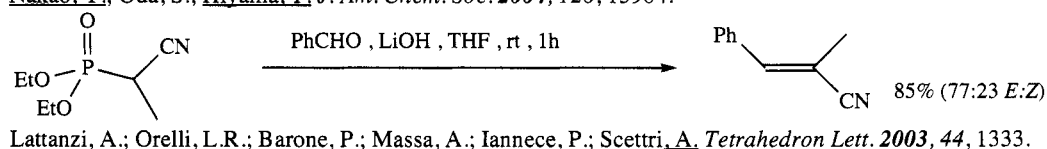
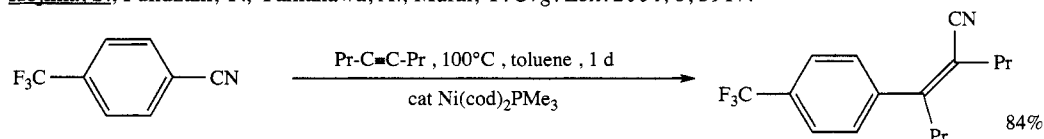
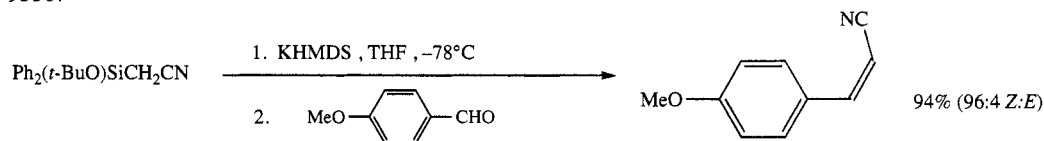
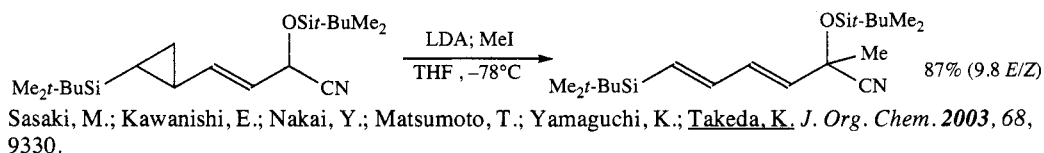
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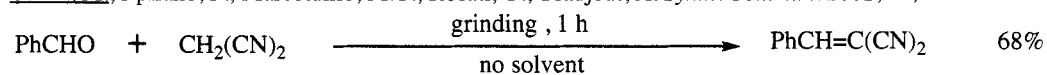
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NO ADDITIONAL EXAMPLES

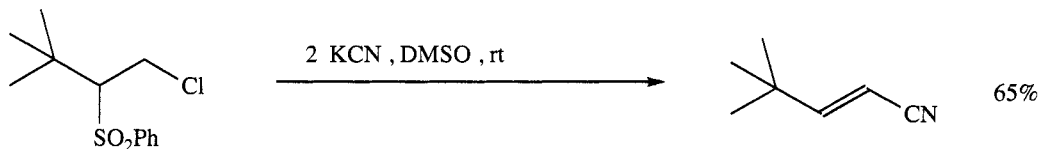
SECTION 376: NITRILE - ALKENE



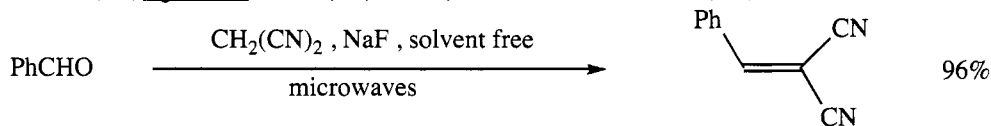
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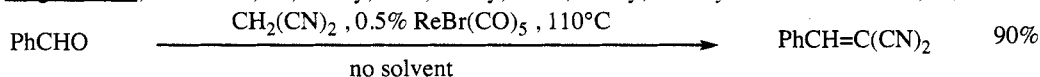
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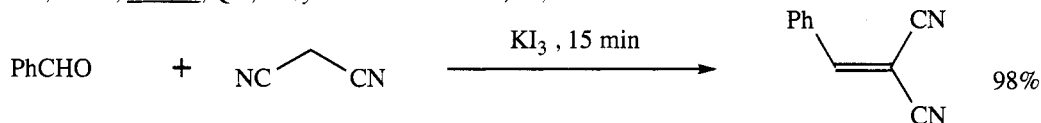
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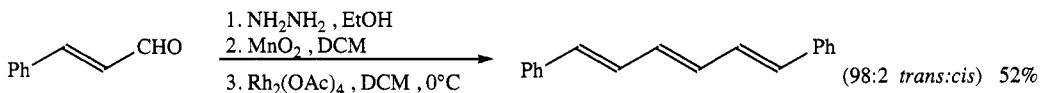


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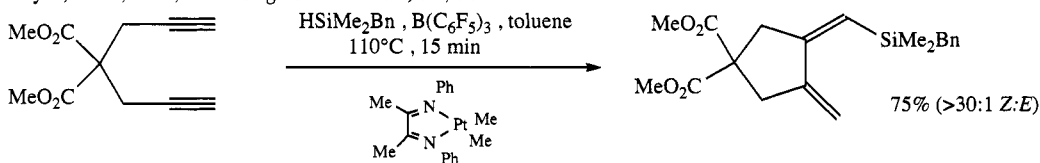


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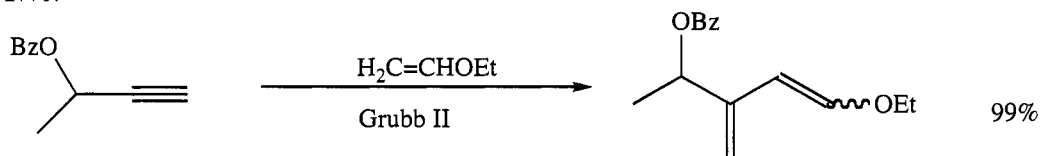
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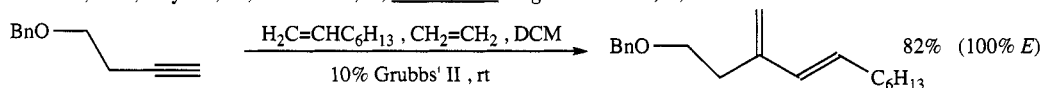
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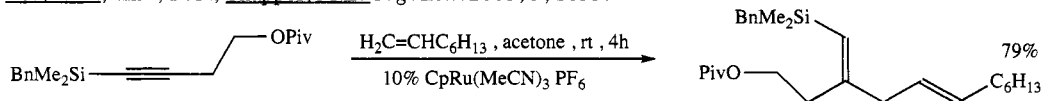
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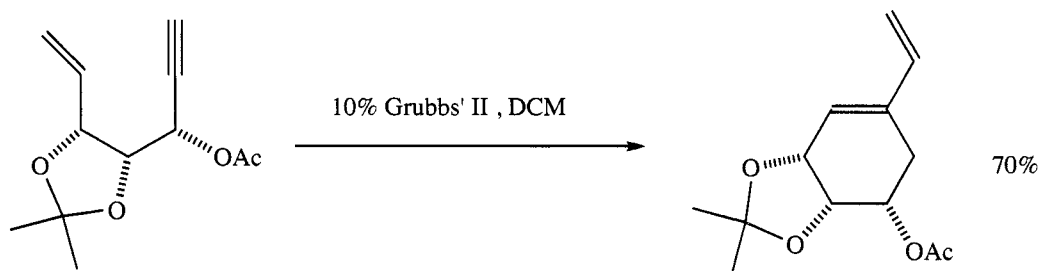
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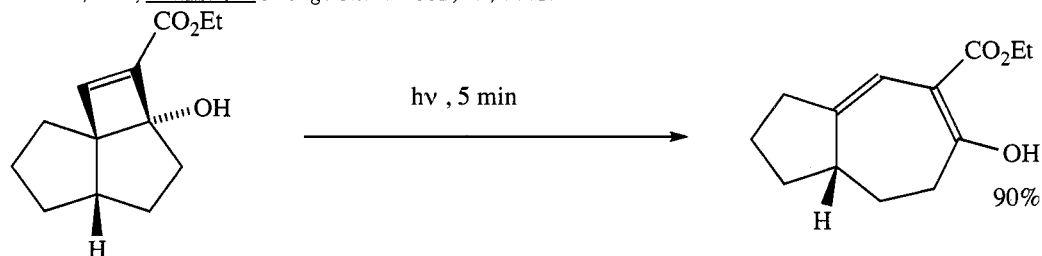
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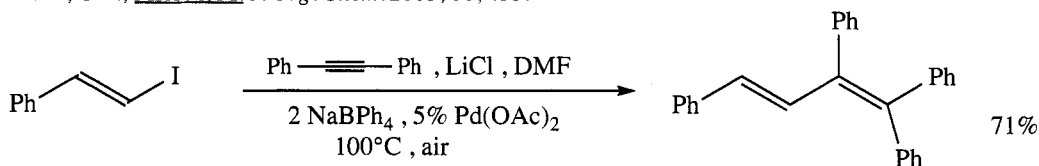
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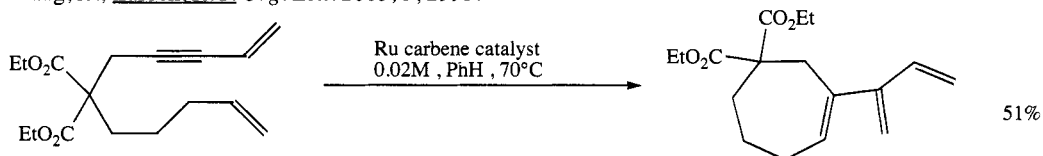
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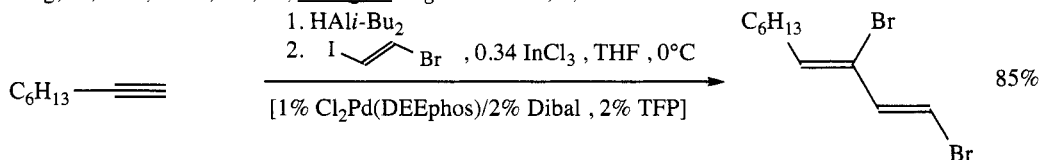
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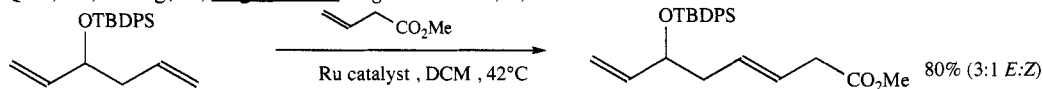
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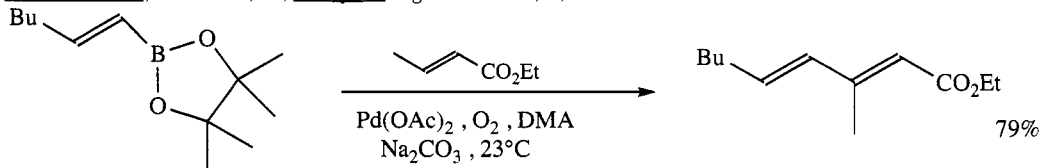
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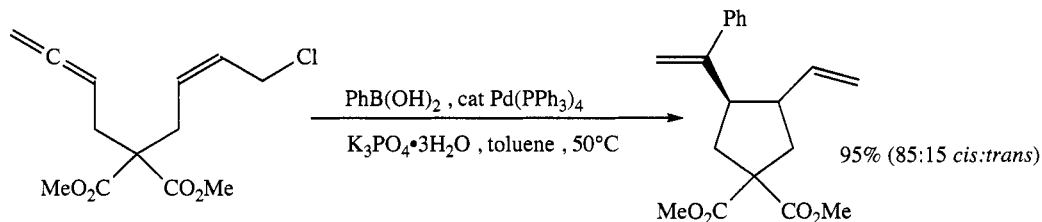
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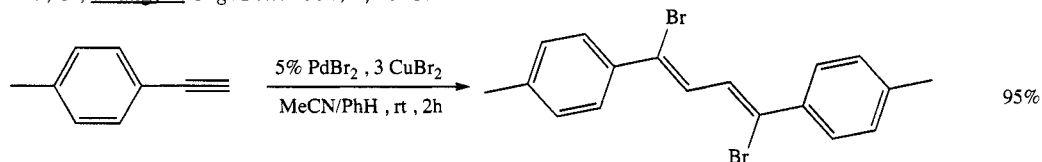
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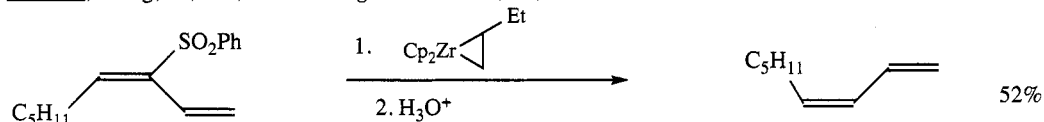
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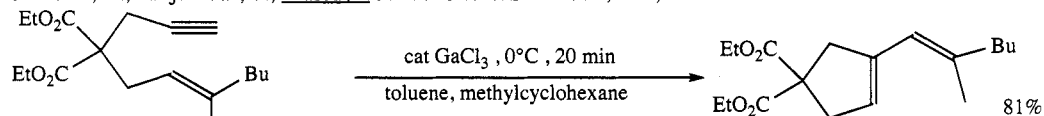
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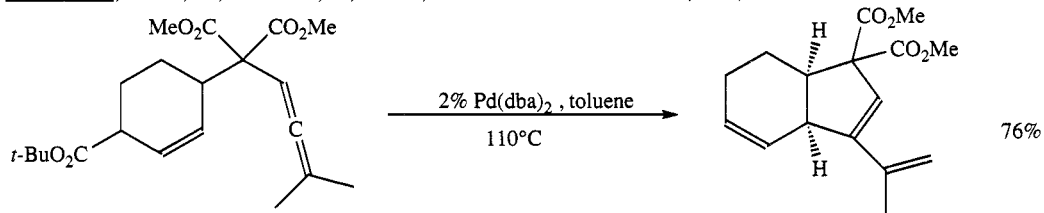
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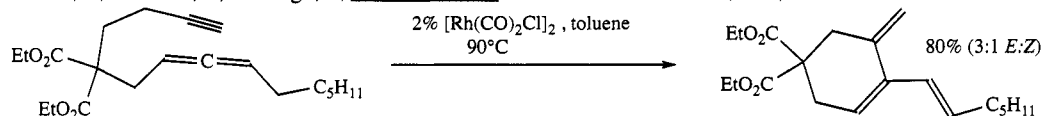
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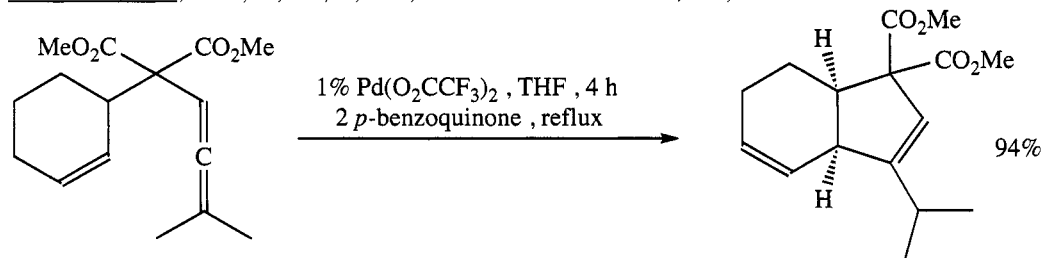
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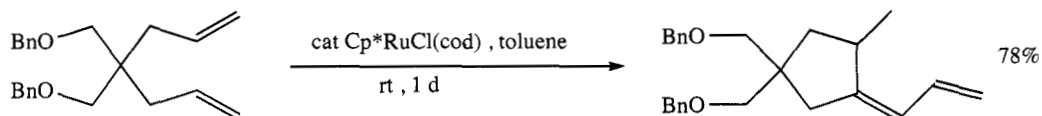
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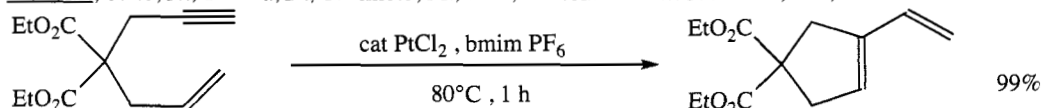
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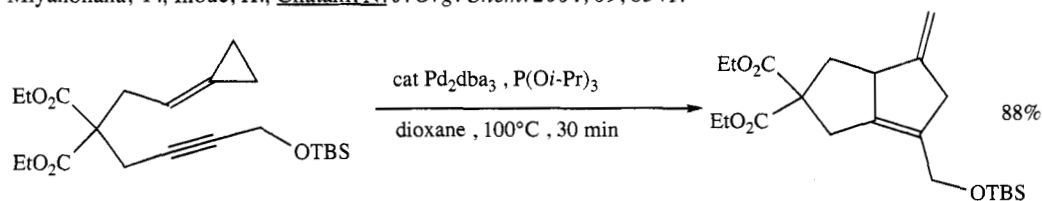
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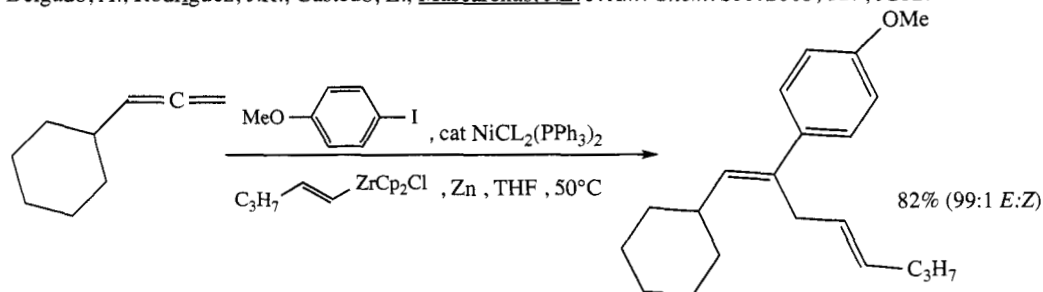
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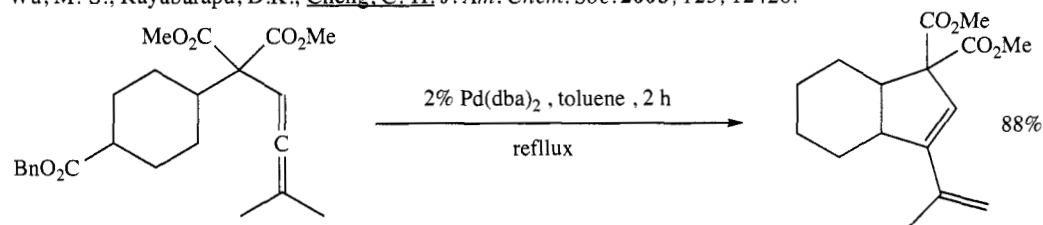
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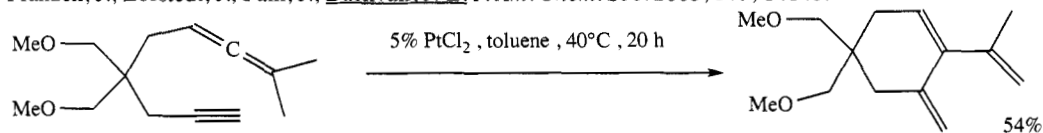
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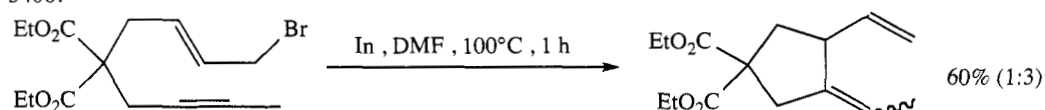
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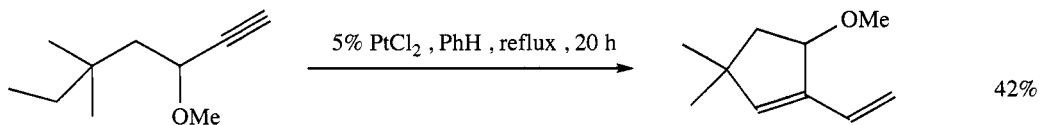
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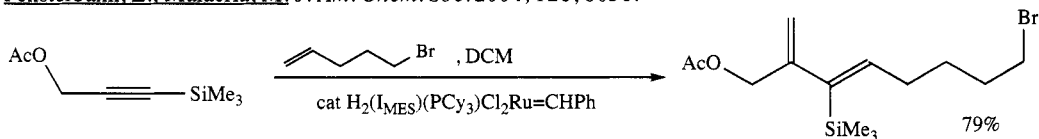
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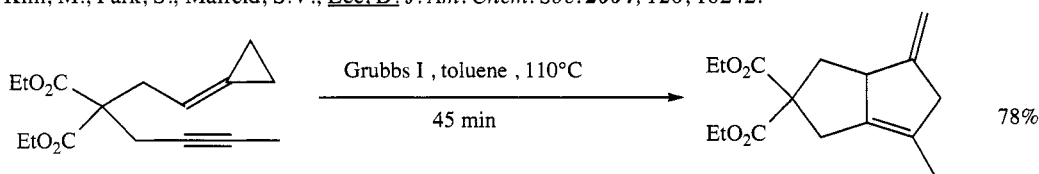
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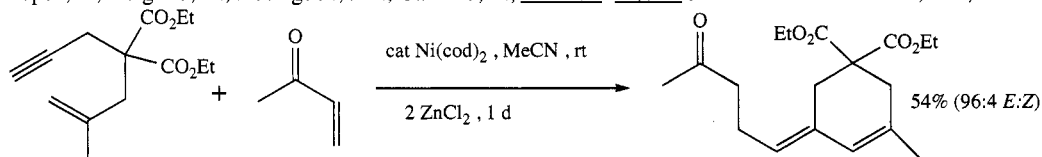
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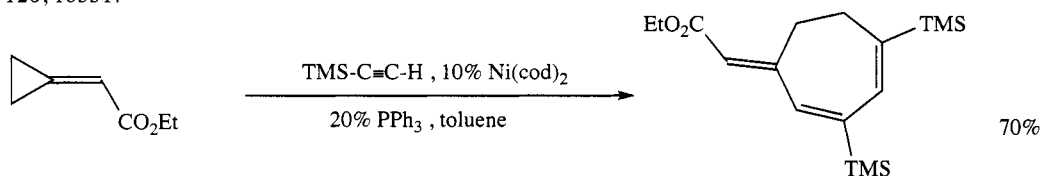
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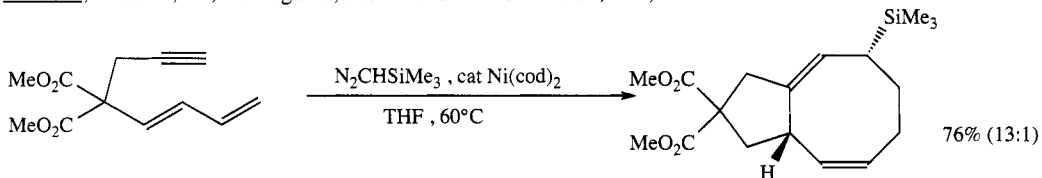
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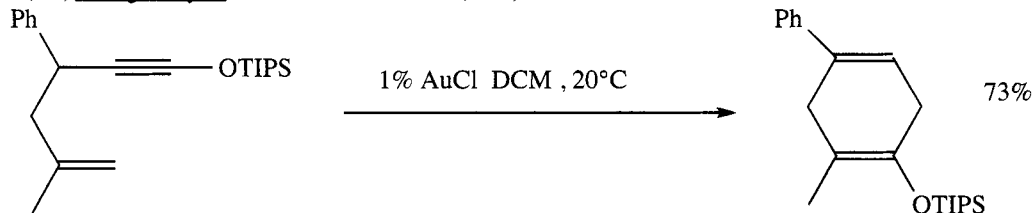
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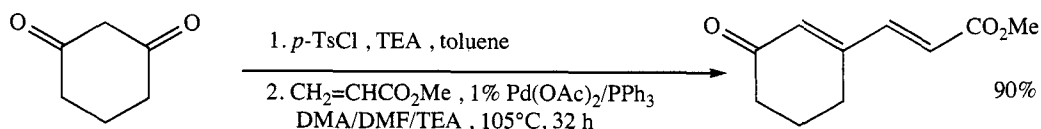
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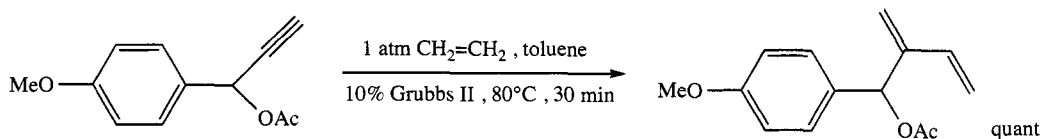
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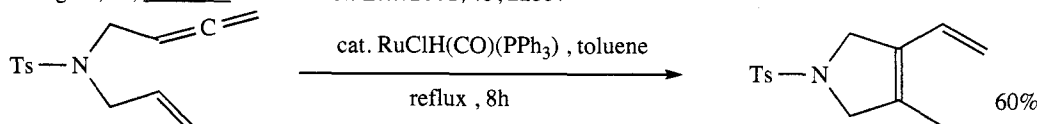
Zhang, L.; Kozmin, S.A. *J. Am. Chem. Soc.* **2004**, 126, 11806.



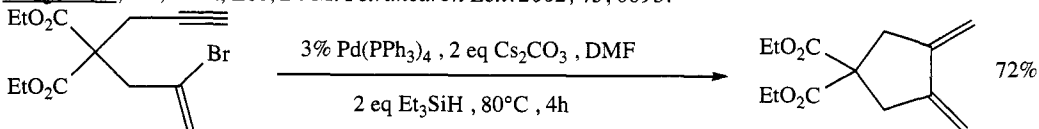
Fu, X.; Zhang, S.; Yin, J.; McAllister, T.L.; Jiang, S.A.; Tann, C.-H.; Thiruvengadam, T.K.; Zhang, F. *Tetrahedron Lett.* **2002**, 43, 573.



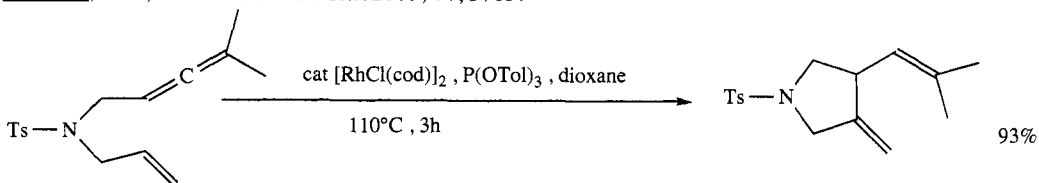
Tonogaki, K.; Mori, M. *Tetrahedron Lett.* **2002**, 43, 2235.



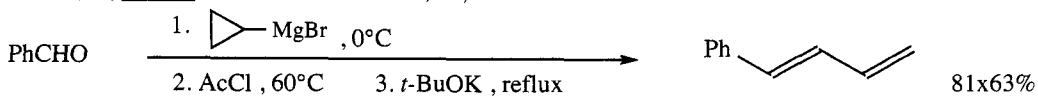
Kang, S.-K.; Ko, B.-S.; Lee, D.-M. *Tetrahedron Lett.* **2002**, 43, 6693.



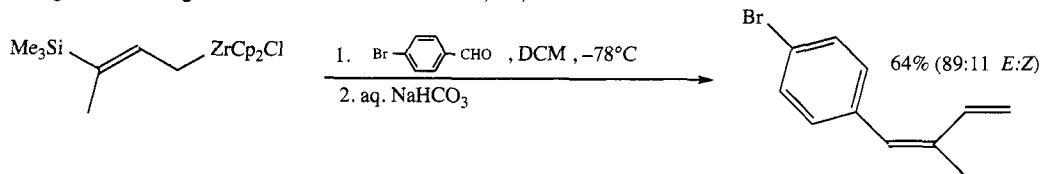
Oh, C.H.; Park, S.J. *Tetrahedron Lett.* **2003**, 44, 3785.



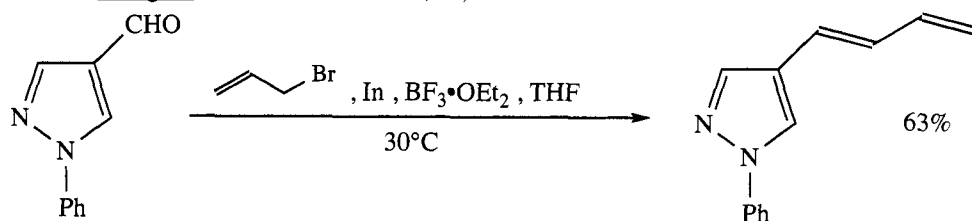
Makino, T.; Itoh, K. *Tetrahedron Lett.* **2003**, 44, 6335.



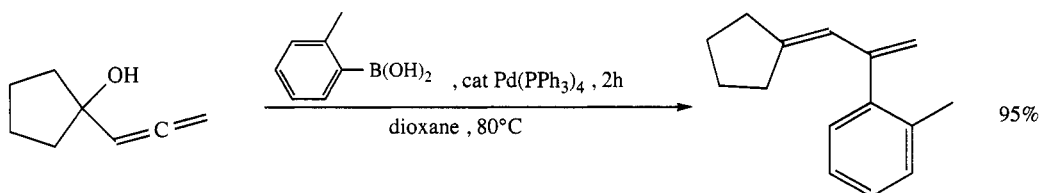
Wong, K.-T.; Hung, Y.-Y. *Tetrahedron Lett.* **2003**, 44, 8033.



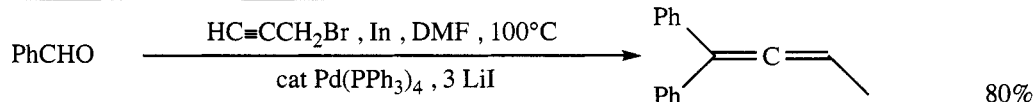
Pi, J.-H.; Huang, X. *Tetrahedron Lett.* **2004**, 45, 2215.



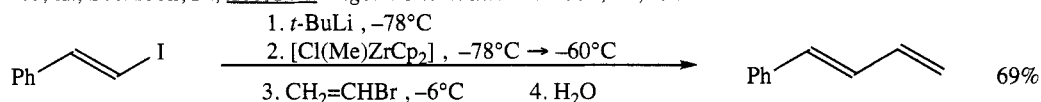
Kumar, V.; Chimni, S.S.; Kumar, S. *Tetrahedron Lett.* **2004**, 45, 3409.



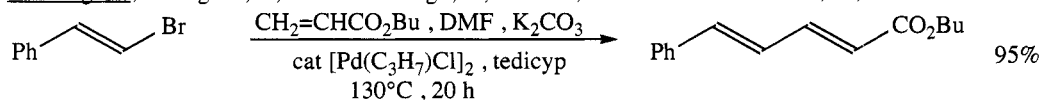
Yoshida, M.; Gotou, T.; Ihara, M. *Chem. Commun.* **2004**, 1124.



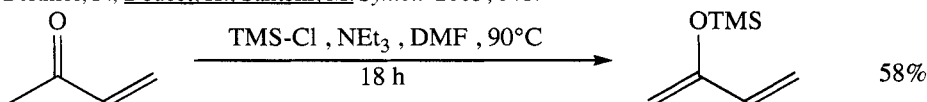
Lee, K.; Seomoon, D.; Lee, P.H. *Angew. Chem. Int. Ed.* **2002**, 41, 3901.



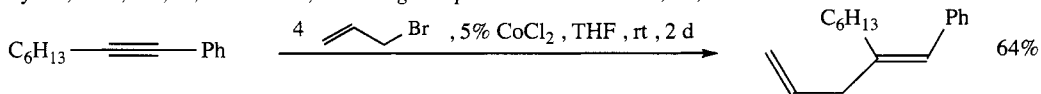
Barluenga, J.; Rodríguez, F.; Álvarez-Rodrigo, L.; Fañanás, F.J. *Chem. Eur. J.* **2004**, 10, 101.



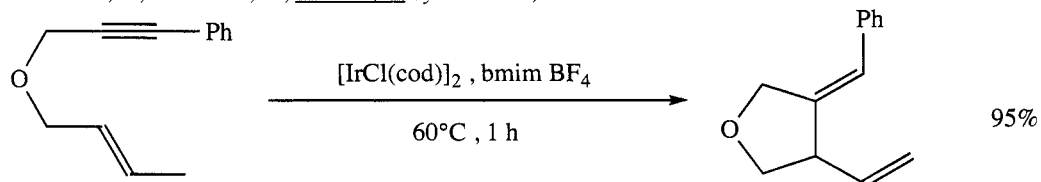
Berthiol, F.; Doucet, H.; Santelli, M. *Synlett* **2003**, 841.



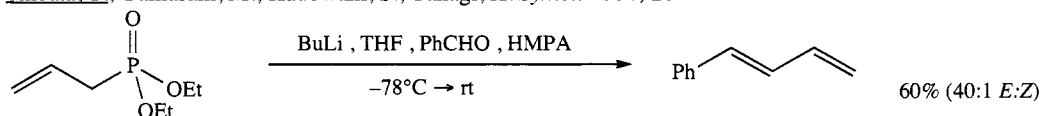
Uyeda, R.T.; Vu, P.; Holsworth, D.D. *Org. Prep. Proceed. Int.* **2002**, 34, 540.



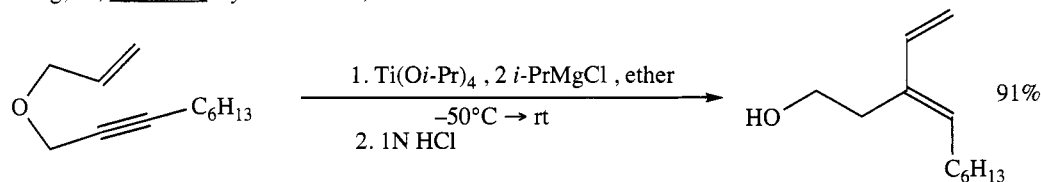
Nishikawa, T.; Yorimitsu, H.; Oshima, K. *Synlett* **2004**, 1573.



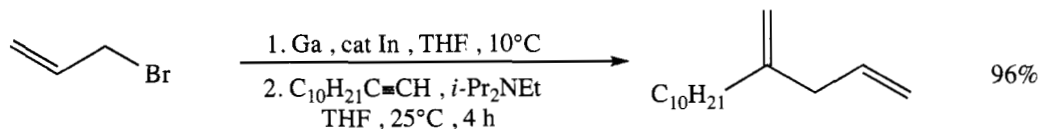
Shibata, T.; Yamasaki, M.; Kadowaki, S.; Takagi, K. *Synlett* **2004**, 2812.



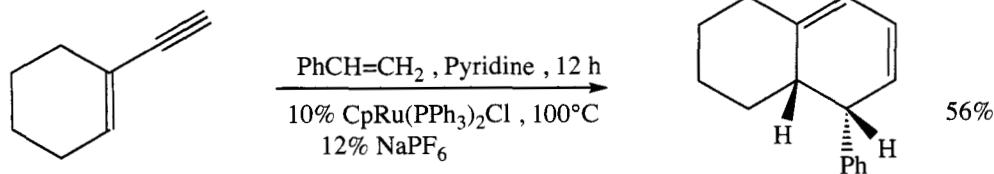
Wang, Y.; West, F.G. *Synthesis* **2002**, 99.



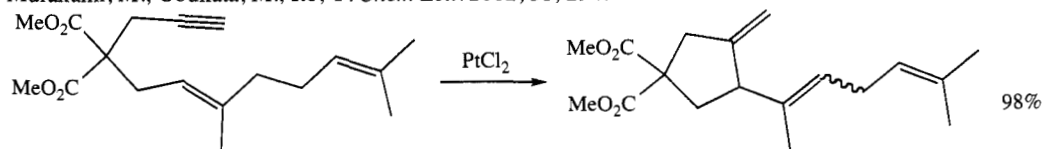
Nakajima, R.; Urabe, H.; Sato, F. *Chem. Lett.* **2002**, 4.



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Murakami, M.; Ubukata, M.; Ito, Y. *Chem Lett.* **2002**, 31, 294.



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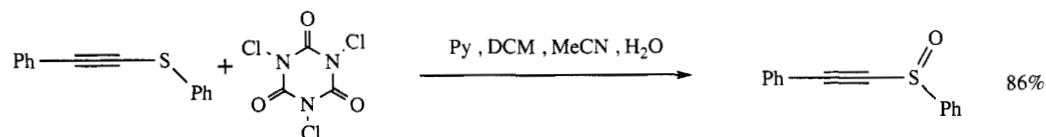
"The Reverse Cope Cyclisation: A Classical Reaction Goes Backwards"

Cooper, N.J.; Knight, D.W. *Tetrahedron* **2004**, 60, 243.

"The Mechanisms of the Stille Reaction"

Espinet, P.; Echavarren, A.M. *Angew. Chem. Int. Ed.* **2004**, 43, 4704.

SECTION 378: OXIDES - ALKYNES

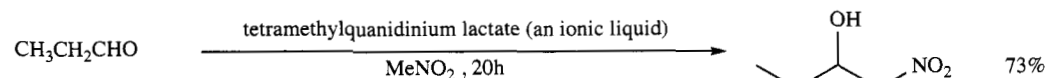


Zhong, P.; Guo, M.-P.; Huang, N.-P. *Synth. Commun.* **2002**, 32, 175.

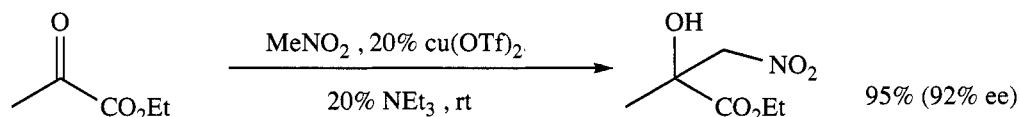
SECTION 379: OXIDES - ACID DERIVATIVES

NO ADDITIONAL EXAMPLES

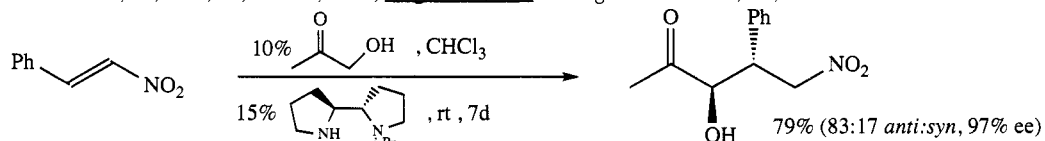
SECTION 380: OXIDES - ALCOHOLS, THIOLS



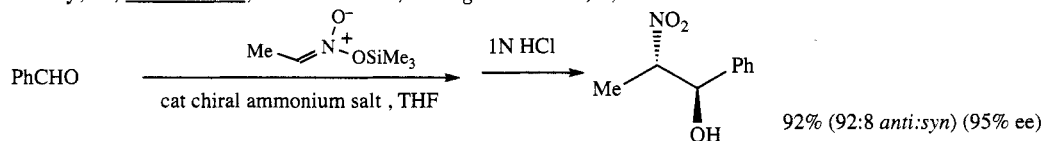
Jiang, T.; Gao, H.; Han, B.; Zhao, G.; Chang, Y.; Wu, W.; Gao, L.; Yang, G. *Tetrahedron Lett.* **2004**, 45, 2699.



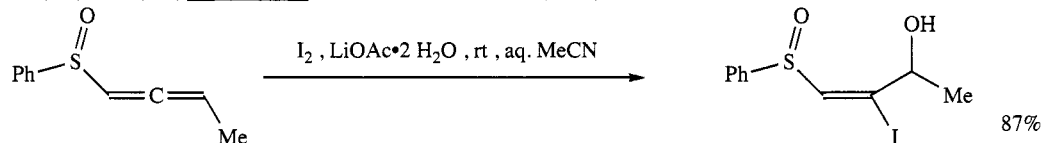
Christensen, C.; Juhl, K.; Hazell, R.G.; Jørgensen, K.A. *J. Org. Chem.* **2002**, 67, 4875.



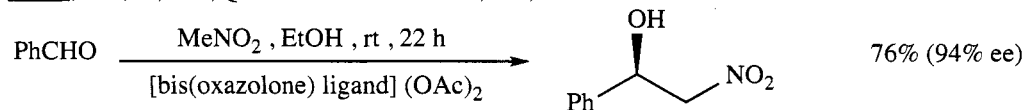
Andrey, O.; Alexakis, A.; Bernaardinelli, G. *Org. Lett.* **2003**, 5, 2555.



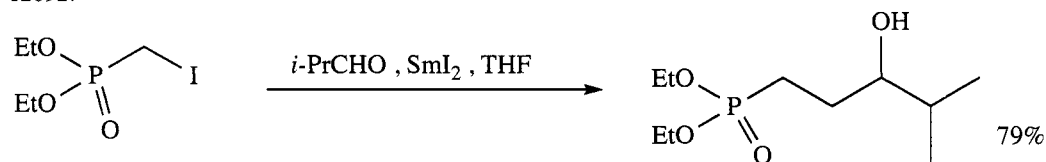
Ooi, T.; Doda, K.; Maruoka, K. *J. Am. Chem. Soc.* **2003**, 125, 2054.



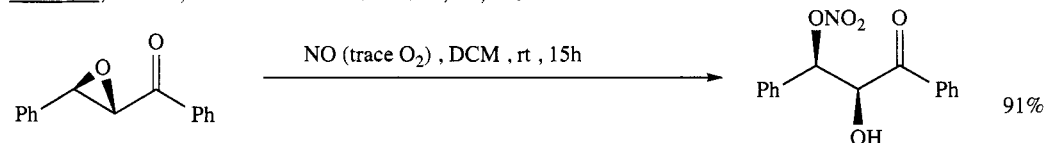
Ma, S.; Ren, H.; Wei, Q. *J. Am. Chem. Soc.* **2003**, 125, 4817.



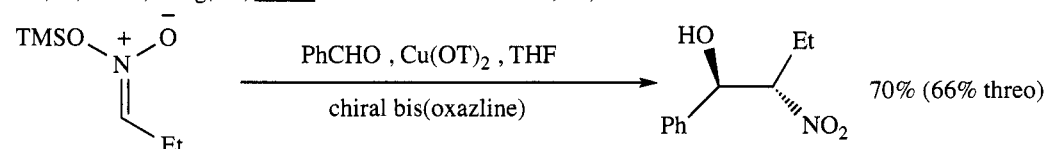
Evans, D.A.; Seidel, D.; Reuping, M.; Lam, H.W.; Shaw, J.T.; Downey, C.W. *J. Am. Chem. Soc.* **2003**, 125, 12692.



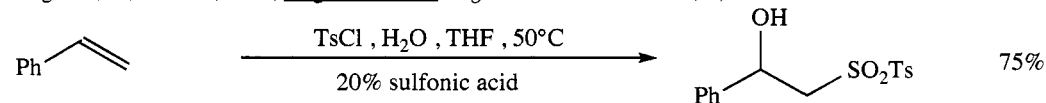
Orsini, F.; Caselli, A. *Tetrahedron Lett.* **2002**, 43, 7255.



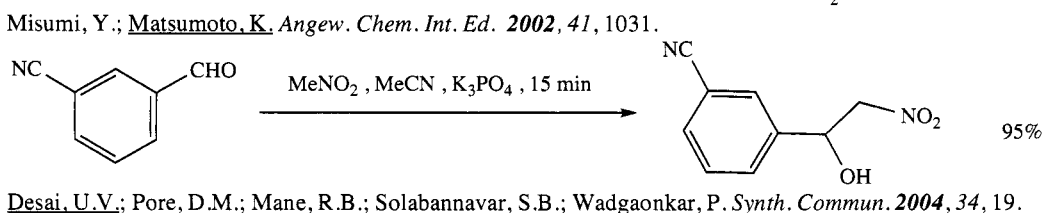
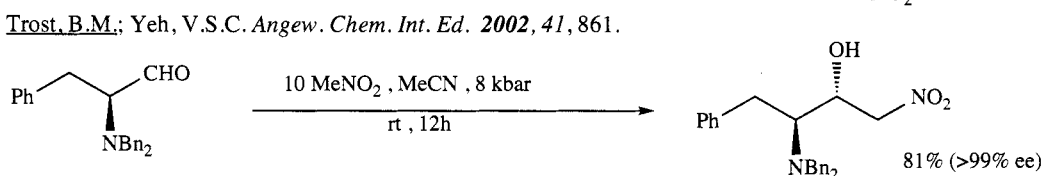
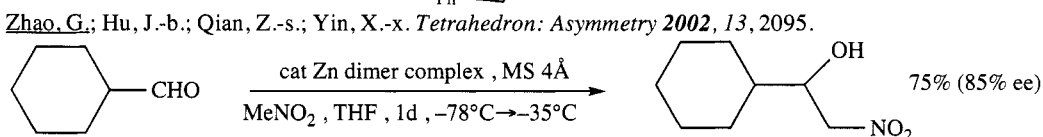
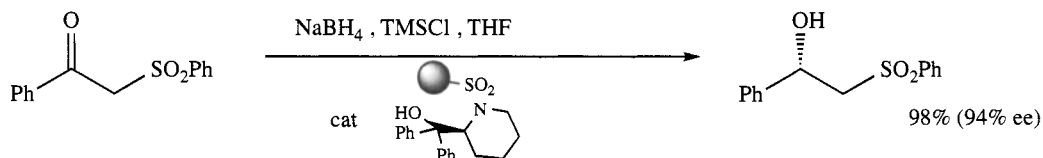
Liu, Z.; Li, R.; Yang, D.; Wu, L. *Tetrahedron Lett.* **2004**, 45, 1565.



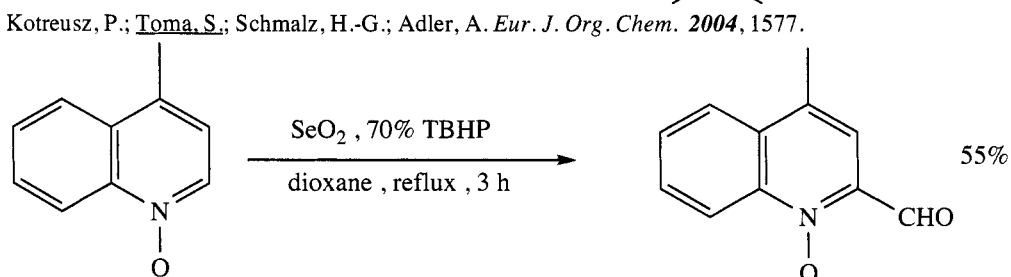
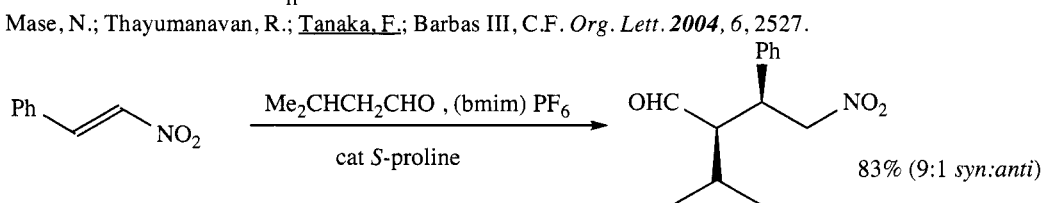
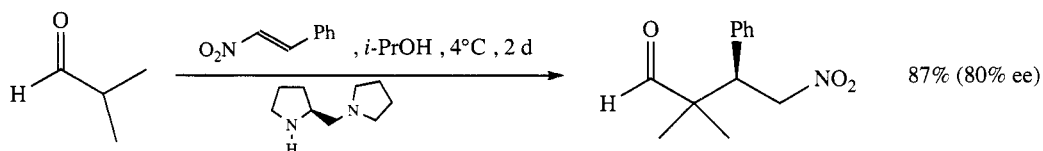
Risgaard, T.; Gothelf, K.V.; Jørgensen, K.A. *Org. Biomol. Chem.* **2003**, 1, 153.

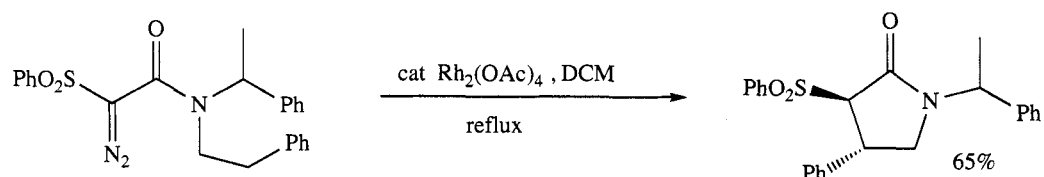


Xi, C.; Lai, C.; Chen, C.; Wang, R. *Synlett* **2004**, 1595.

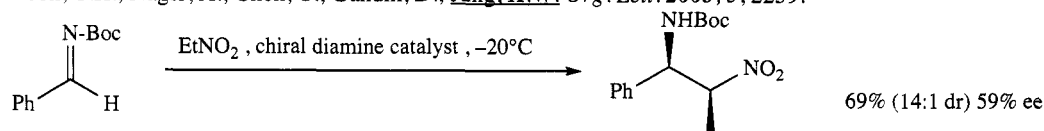


SECTION 381: OXIDES - ALDEHYDES

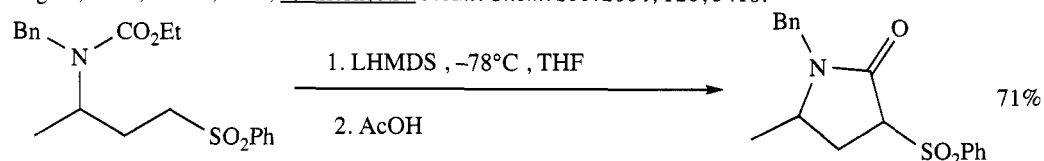


SECTION 382: OXIDES - AMIDES

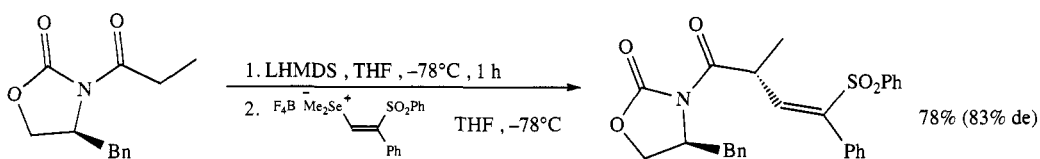
Yoon, C.H.; Nagle, A.; Chen, C.; Gandhi, D.; Jung, K.W. *Org. Lett.* **2003**, *5*, 2259.



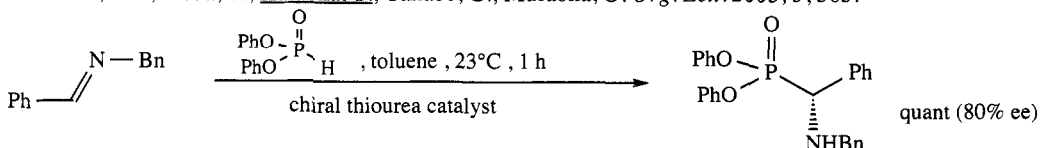
Nugent, B.M.; Yoder, R.A.; Johnston, J.N. *J. Am. Chem. Soc.* **2004**, *126*, 3418.



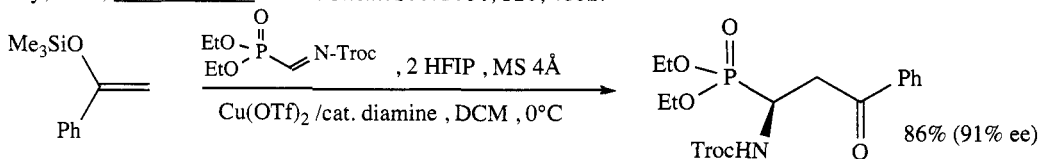
Hernandez, N.M.; Sedano, M.J.; Jacobs, H.K.; Gopalan, A.S. *Tetrahedron Lett.* **2003**, *44*, 4035.

SECTION 383: OXIDES - AMINES

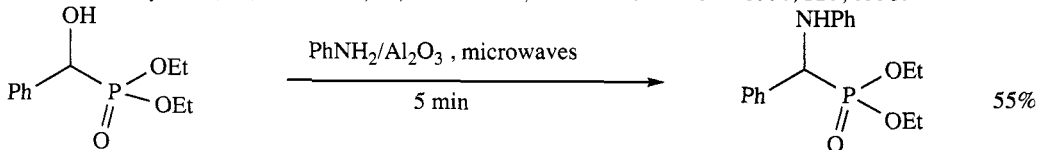
Watanabe, S.-i.; Ikeda, T.; Kataoka, T.; Tanabe, G.; Muraoka, O. *Org. Lett.* **2003**, *5*, 565.



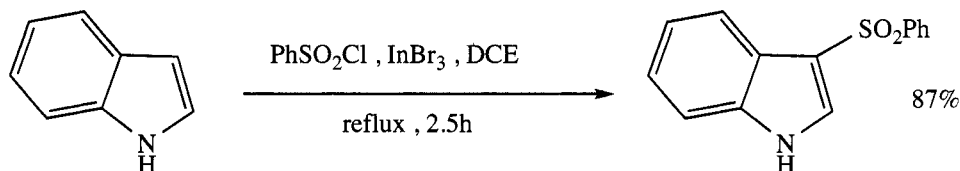
Joly, G.D.; Jacobsen, E.N. *J. Am. Chem. Soc.* **2004**, *126*, 4102.



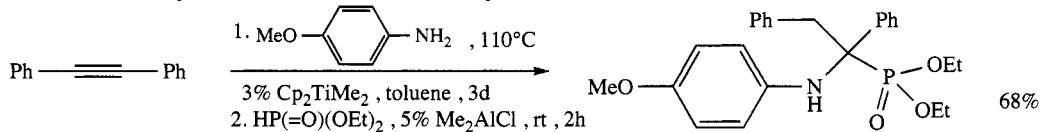
Kobashi, S.; Kiyohara, H.; Nakamura, Y.; Maatsubara, R. *J. Am. Chem. Soc.* **2004**, *126*, 6558.



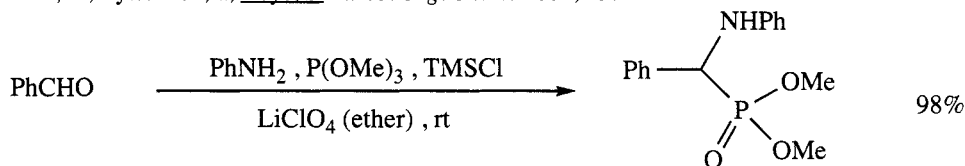
Koboudin, B. *Tetrahedron Lett.* **2003**, *44*, 1051.



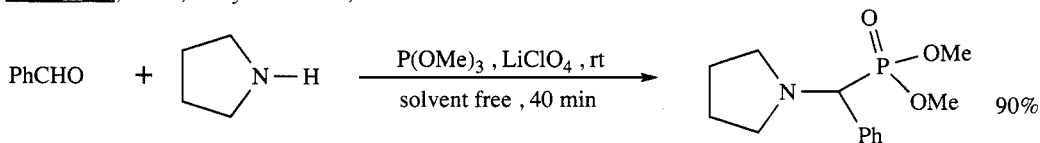
Yadav, J.S.; Reddy, B.V.S.; Krishna, A.D.; Swamy, T. *Tetrahedron Lett.* **2003**, 44, 6055.



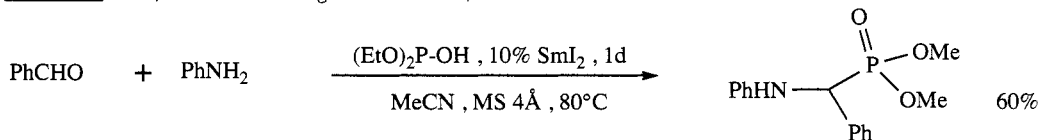
Haak, E.; Bytschkov, I.; Doye, S. *Eur. J. Org. Chem.* **2002**, 457.



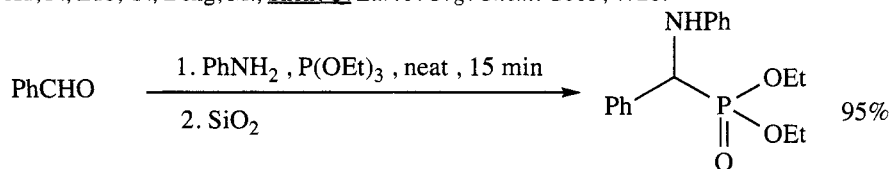
Saidi, M.R.; Azizi, N. *Synlett* **2002**, 1347.



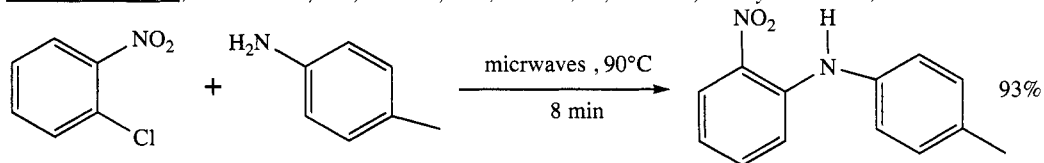
Azizi, N.; Saidi, M.R. *Eur. J. Org. Chem.* **2003**, 4630.



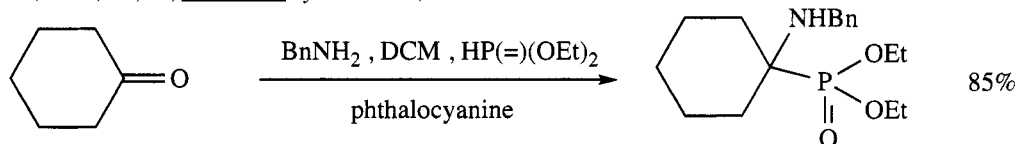
Xu, F.; Luo, Y.; Deng, M.; Shen, Q. *Eur. J. Org. Chem.* **2003**, 4728.



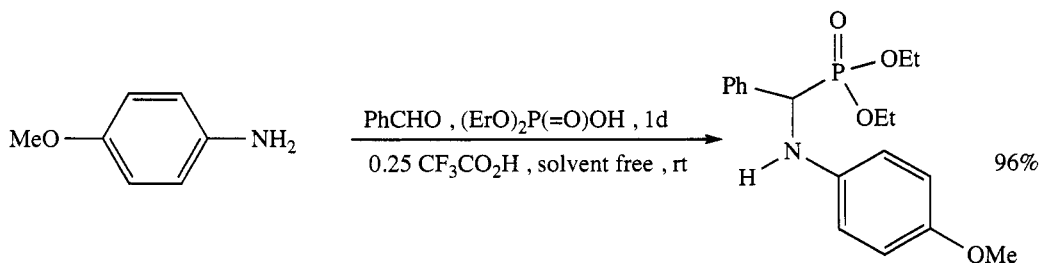
Chandrasekhar, S.; Narsihmulu, Ch.; Sultana, S.S.; Saritha, B.; Prakash, S.J. *Synlett* **2003**, 505.



Xu, Z.-B.; Lu, Y.; Guo, Z.-R. *Synlett* **2003**, 564.

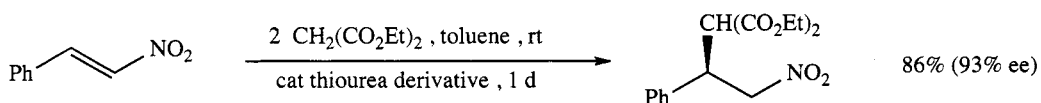


Maatveeva, E.D.; Podrugina, T.A.; Tishkoskaya, E.V.; Tomilova, L.G.; Zefirov, N.S. *Synlett* **2003**, 2321.

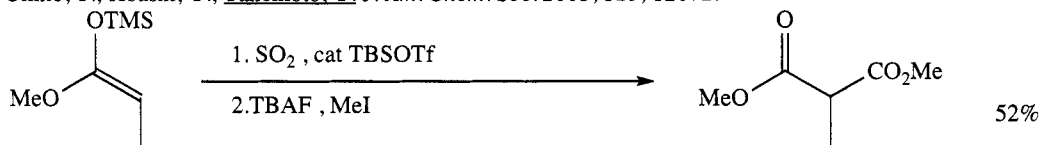


Akiyama, T.; Sanada, M.; Fuchibe, K. *Synlett* **2003**, 1463.

SECTION 384: OXIDES - ESTERS

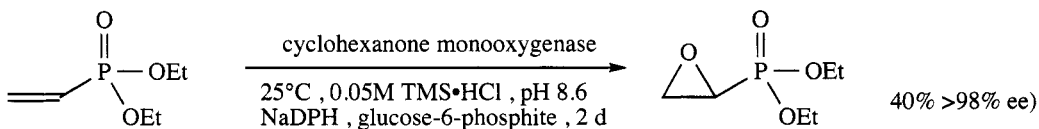


Okino, T.; Hoashi, Y.; Takemoto, Y. *J. Am. Chem. Soc.* **2003**, 125, 12672.

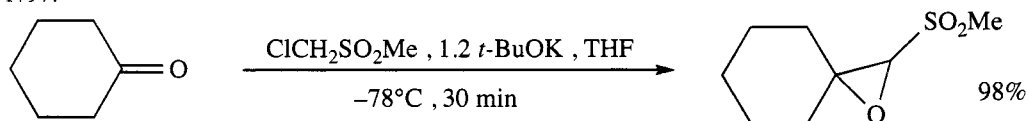


Bouchez, L.; Vogel, P. *Synthesis* **2002**, 225.

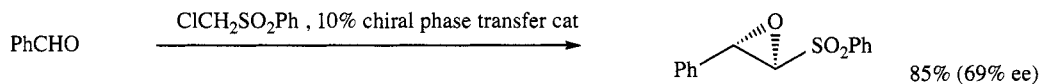
SECTION 385: OXIDES - ETHERS, EPOXIDES, THIOETHERS



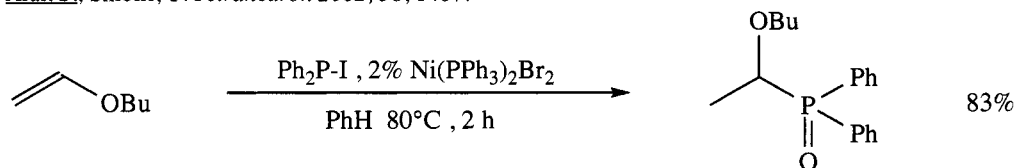
Colonna, S.; Gaggero, N.; Carrea, G.; Ottolina, G.; Pasta, P.; Zambianchi, F. *Tetrahedron Lett.* **2002**, 43, 1797.



Makosza, M.; Urbanska, N.; Chesnokov, A.A. *Tetrahedron Lett.* **2003**, 44, 1473.

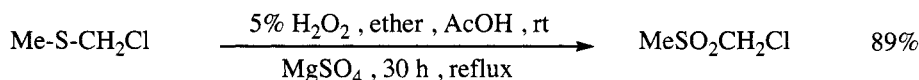


Arai, S.; Shioiri, T. *Tetrahedron* **2002**, 58, 1407.



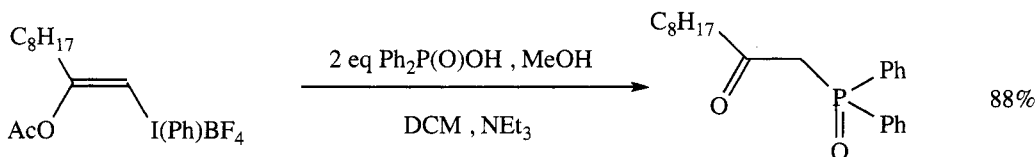
Kazankova, M.A.; Shulyupin, M.O.; Beletskaya, I.P. *Synlett* **2003**, 2155.

SECTION 386: OXIDES - HALIDES, SULFONATES

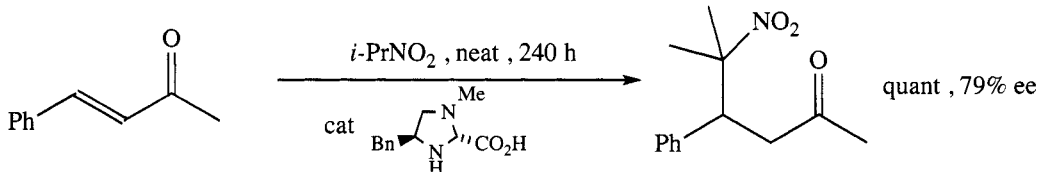


Makosza, M.; Surowiec, M. *Org. Prep. Proceed. Int.* **2003**, 35, 412.

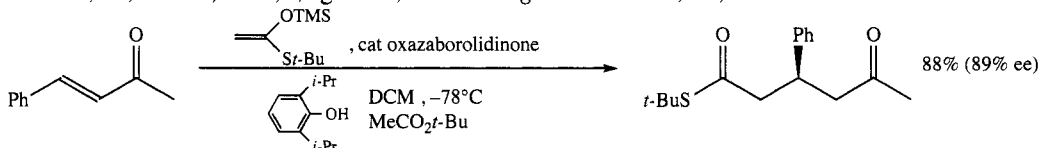
SECTION 387: OXIDES - KETONES



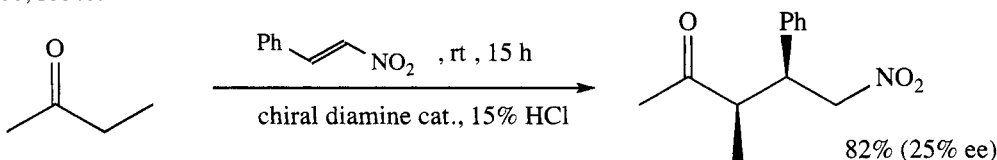
Ochiai, M.; Nishitani, J.; Nishi, Y. *J. Org. Chem.* **2002**, 67, 4407.



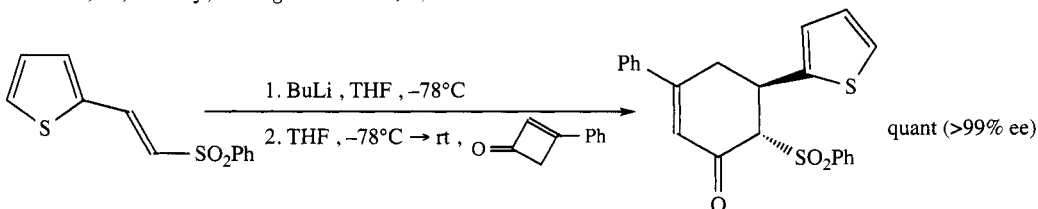
Halland, N.; Hazell, R.G.; Jørgensen, K.A. *J. Org. Chem.* **2002**, 67, 8331.



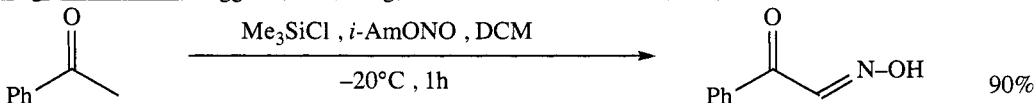
Wang, X.; Adachi, S.; Iwai, H.; Takatsuki, H.; Fujita, K.; Kubo, M.; Oku, A.; Harada, T. *J. Org. Chem.* **2003**, 68, 10046.



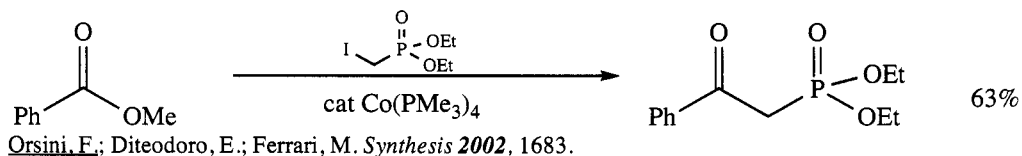
Alexakis, A.; Andrey, O. *Org. Lett.* **2002**, 4, 3611.



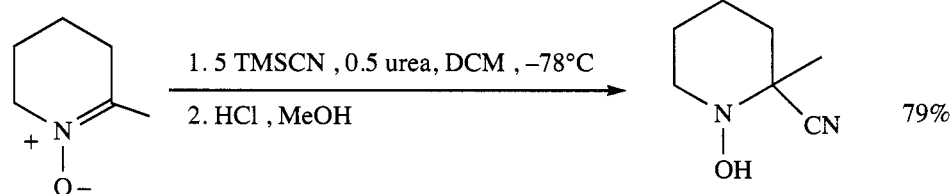
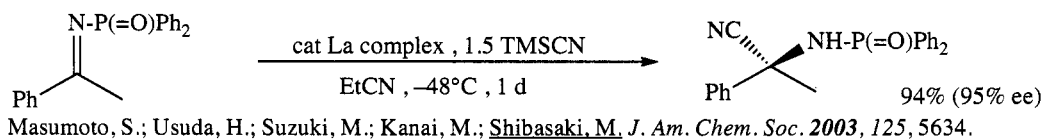
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Mohammed, A.H.A.; Nagendrappa, G. *Tetrahedron Lett.* **2003**, 44, 2753.

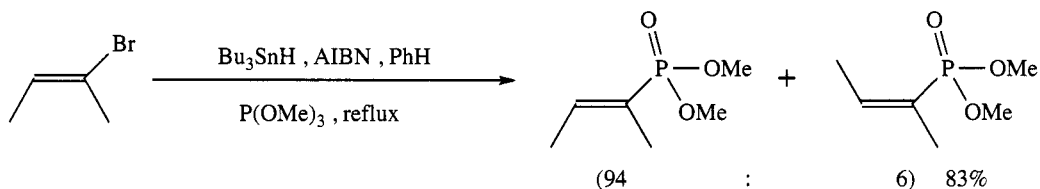


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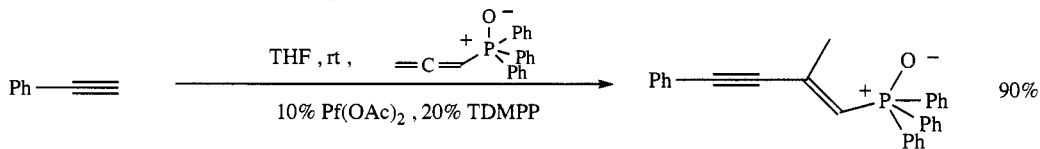


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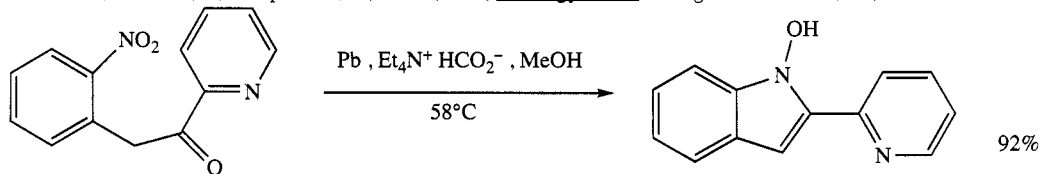
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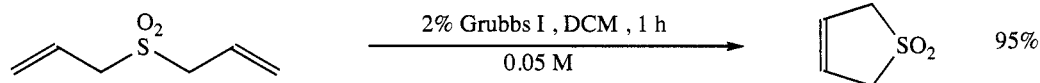
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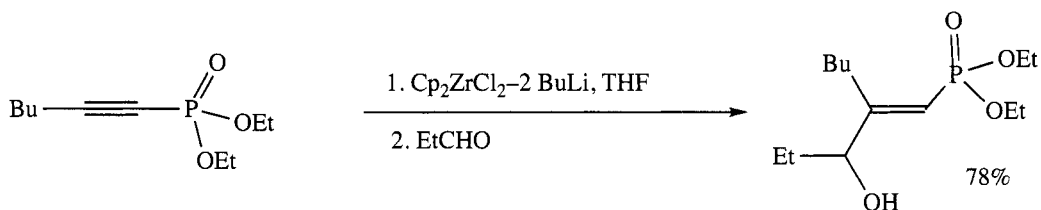
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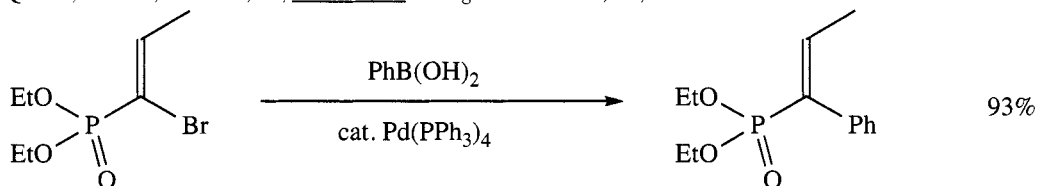
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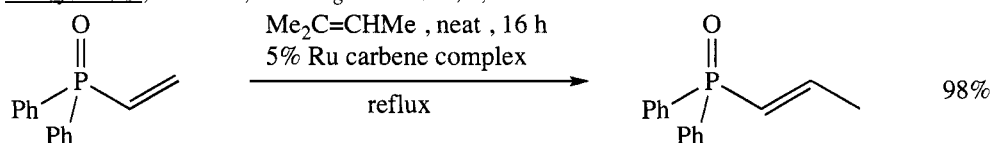
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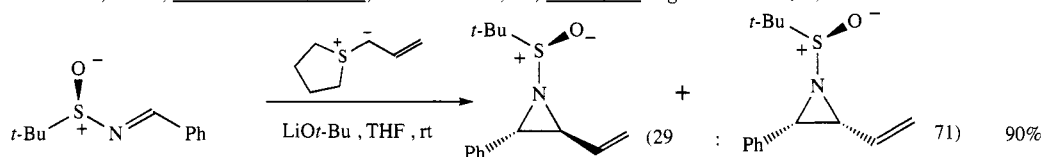
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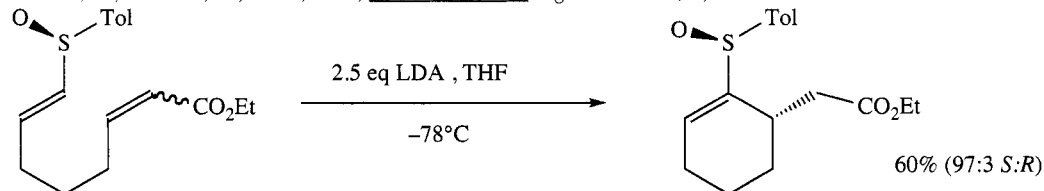
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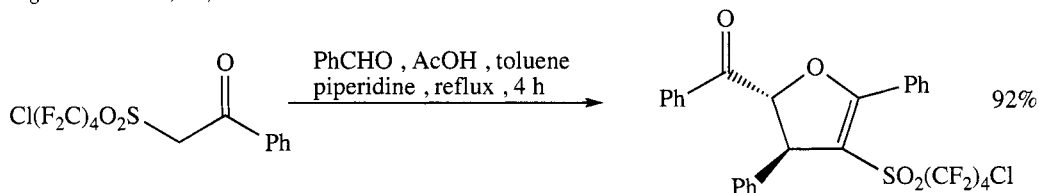
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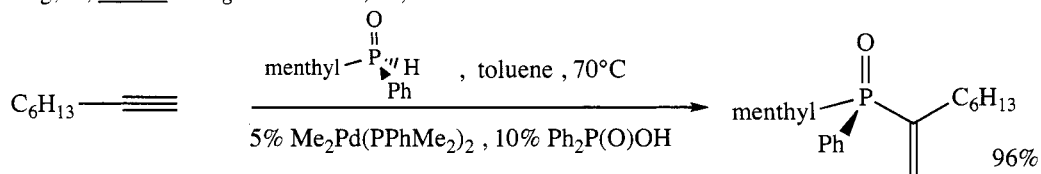
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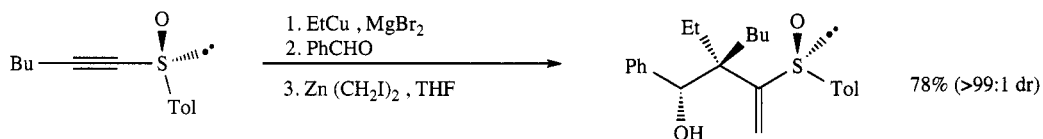
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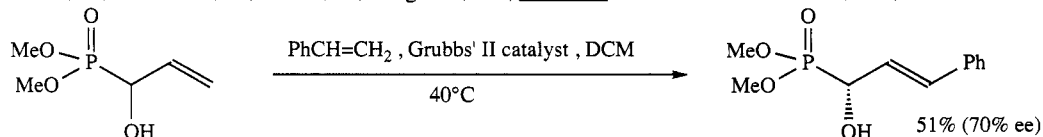
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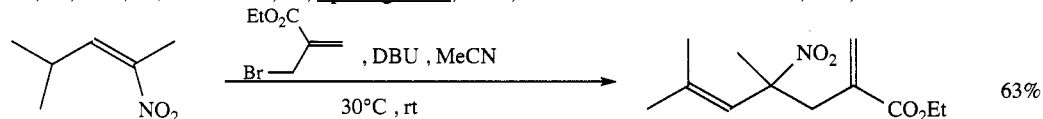
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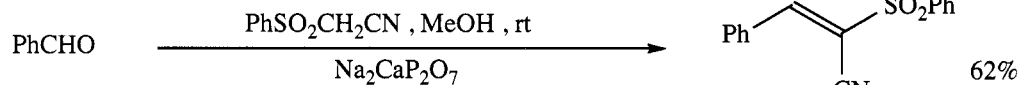
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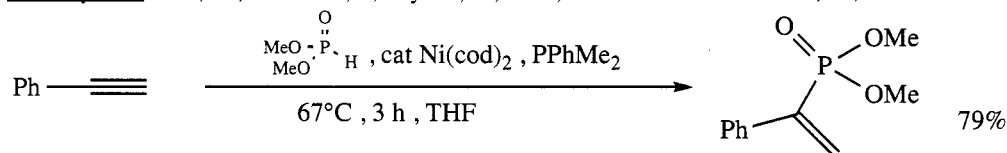
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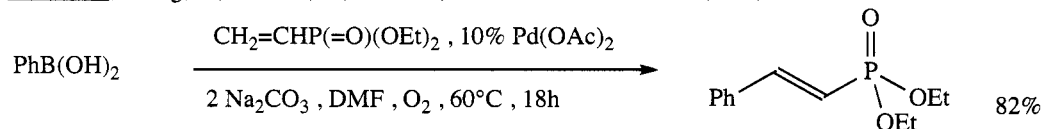
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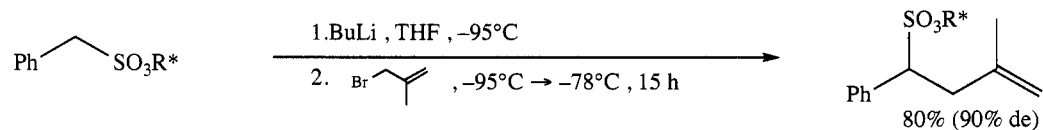
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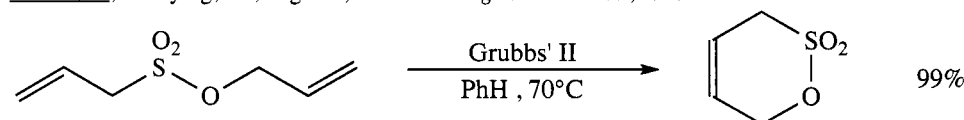
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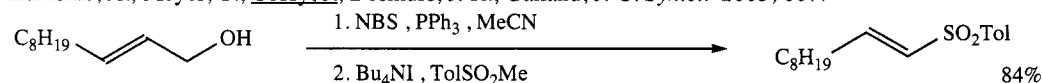
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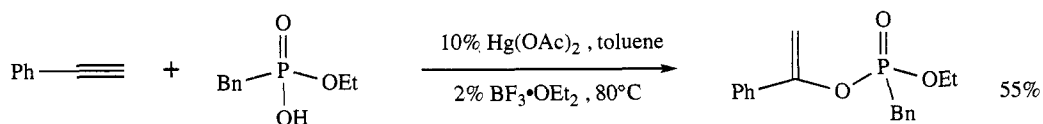
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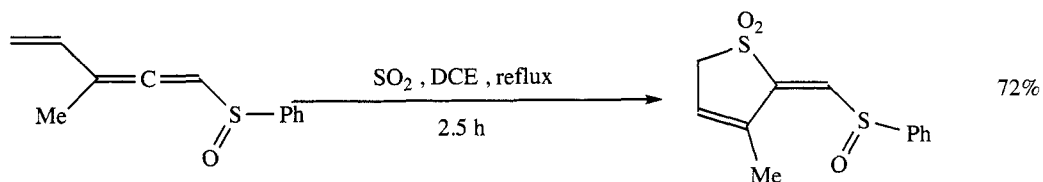


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