Paths of analysis*

PG2

Synthia

October 10, 2022

1 Analysis parameters

Analysis type: Automatic Retrosynthesis

Rules: none selected

Filters: Exclude Diastereoselecitve reactions, Tunnels, FGI, FGI with protections

Max. paths returned: 50

Max. iterations: 2000

Commercial:

1. Max. molecular weight - 1000 g/mol
2. Max. price - 1500 $/g

Published:

1. Max. molecular weight - 1000 g/mol
2. Popularity - 5

My Stockroom:

1. Max. molecular weight - 1000 g/mol

Reaction scoring formula: TUNNEL_COEF*FGI_COEF*STEP*20+1000000*(CONFLICT+NON_SELECTIVITY+FILTERS+PROTECT)

Chemical scoring formula: SMALLER^ 3,SMALLER^ 1.5

Min. search width: 400

Max. reactions per product: 60

*The results stated herein were generated using the proprietary platform owned and maintained by Grzybowski Scientific Inventions, Inc., a subsidiary of Merck KGaA, Darmstadt Germany. The results are provided on an as is basis, and shall be used solely in connection with the rights afforded in the license agreement and for no other purpose.

Strategies: none selected

FGI Coeff: 0

Tunnels Coeff: 0

JSON Parameters: {}

2 Paths

5 paths found. *Paths are sorted by score. Reactions are sorted in appearance order for each path.*

2.1 Path 1

Score: `45.00`

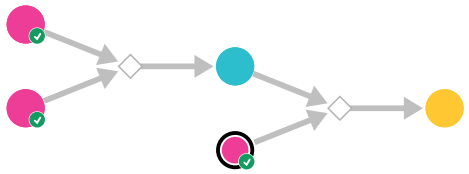
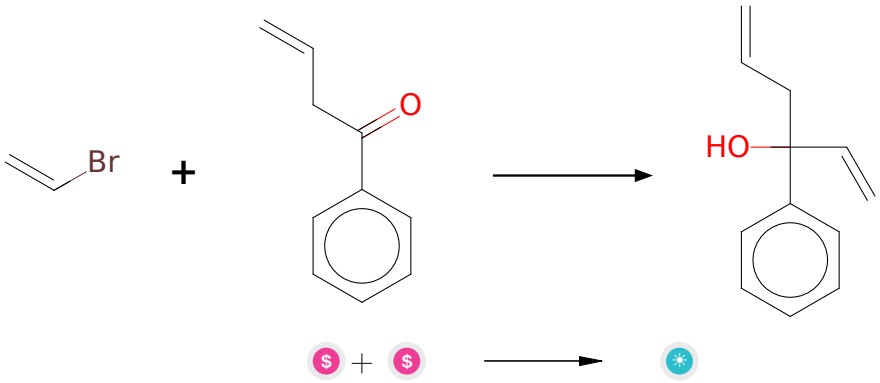


Figure 1: Outline of path 1

2.1.1 Grignard addition to ketone



Substrates:

1. 1-phenylbut-3-en-1-one - *available at Sigma-Aldrich*
2. Bromoethylene - *available at Sigma-Aldrich*

Products:

1. 3-phenyl-1,5-hexadien-3-ol

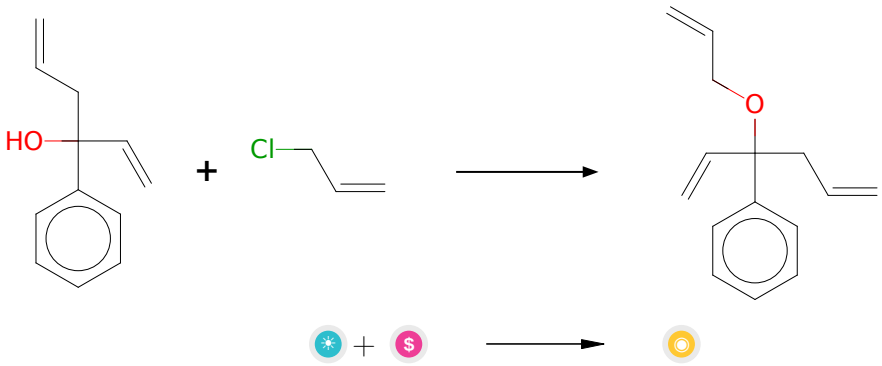
Typical conditions: Mg.THF.or.iPrMgClxLiCl

Protections: none

Reference: *10.3762/bjoc.9.175* and *10.1016/j.tetlet.2012.08.088* and *10.1002/anie.200504247* (supporting info)

Retrosynthesis ID: 18170

2.1.2 Alkylation of tertiary alcohols



Substrates:

1. 3-phenyl-1,5-hexadien-3-ol
2. Chlorallylene - *available at Sigma-Aldrich*

Products:

1. C=CCOC(C=C)(CC=C)c1ccccc1

Typical conditions: K2CO3.acetone.heat

Protections: none

Reference: *10.1016/S0022-1139(00)85021-6* and

Retrosynthesis ID: 31010936

2.2 Path 2

Score: 45.00

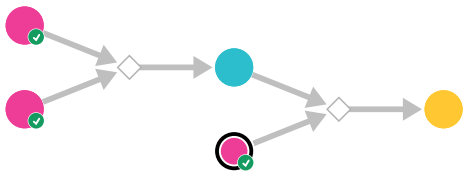
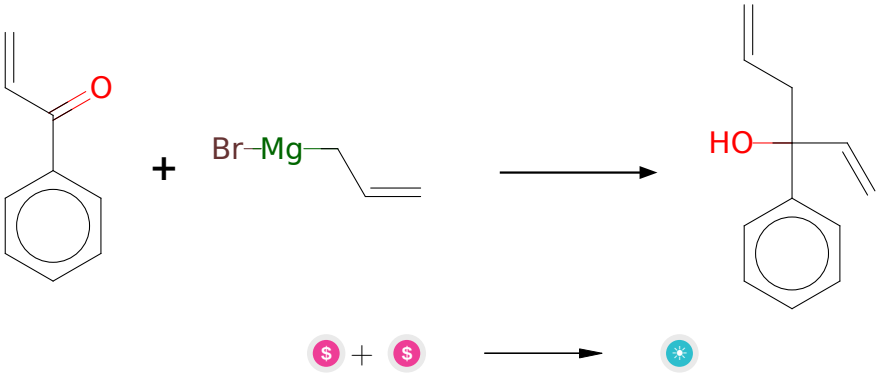


Figure 2: Outline of path 2

2.2.1 Grignard-Type Reaction



Substrates:

1. 1-Phenylprop-2-en-1-one - *available at Sigma-Aldrich*
2. Allylmagnesium bromide solution - *available at Sigma-Aldrich*

Products:

1. 3-phenyl-1,5-hexadien-3-ol

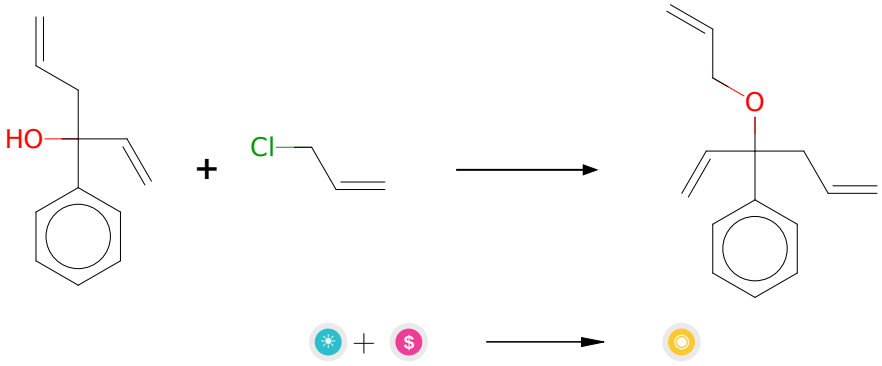
Typical conditions: Mg or Li.ether

Protections: none

Reference: *10.1021/jo010494y* or *10.1016/j.steroids.2015.09.009* or *10.1021/jo061349t* or *10.1021/ja056165v* (SI page 19)

Retrosynthesis ID: 25134

2.2.2 Alkylation of tertiary alcohols



Substrates:

1. 3-phenyl-1,5-hexadien-3-ol
2. Chlorallylene - *available at Sigma-Aldrich*

Products:

1. C=CCOC(C=C)(CC=C)c1ccccc1

Typical conditions: K2CO3.acetone.heat

Protections: none

Reference: *10.1016/S0022-1139(00)85021-6* and

Retrosynthesis ID: 31010936

2.3 Path 3

Score: `48.83`

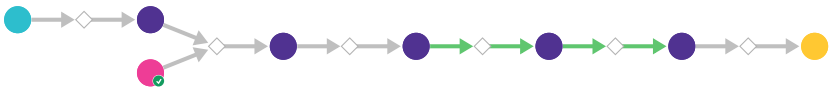
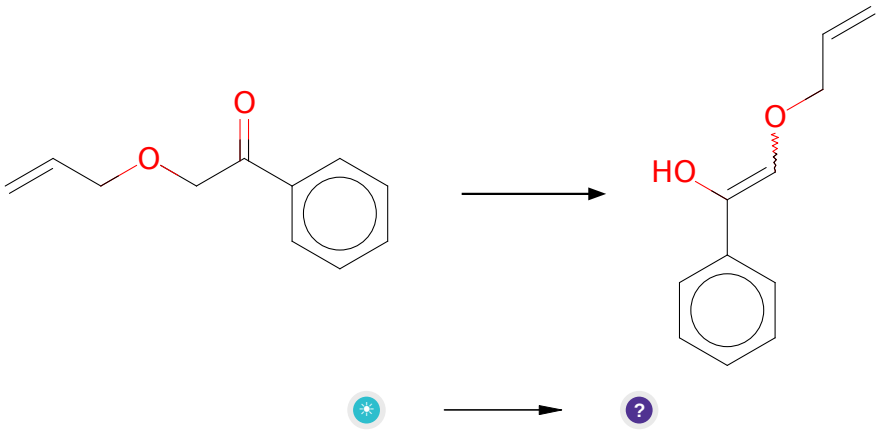


Figure 3: Outline of path 3

2.3.1 Keto-enol Tautomerism



Substrates:

1. allyl-phenacyl-ether

Products:

1. C=CCOC=C(O)c1ccccc1

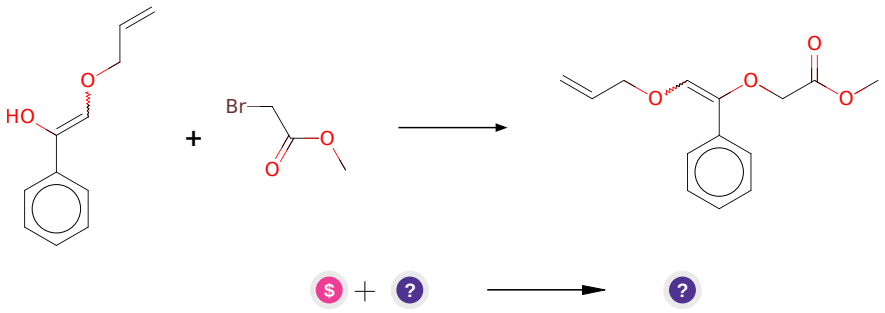
Typical conditions: solvent

Protections: none

Reference: *10.1021/ja01065a003* AND *10.1021/jo8012385*

Retrosynthesis ID: 7780

2.3.2 Enolate O-Alkylation



Substrates:

1. Methyl bromoacetate - *available at Sigma-Aldrich*
2. C=CCOC=C(O)c1ccccc1

Products:

1. C=CCOC=C(OCC(=O)OC)c1ccccc1

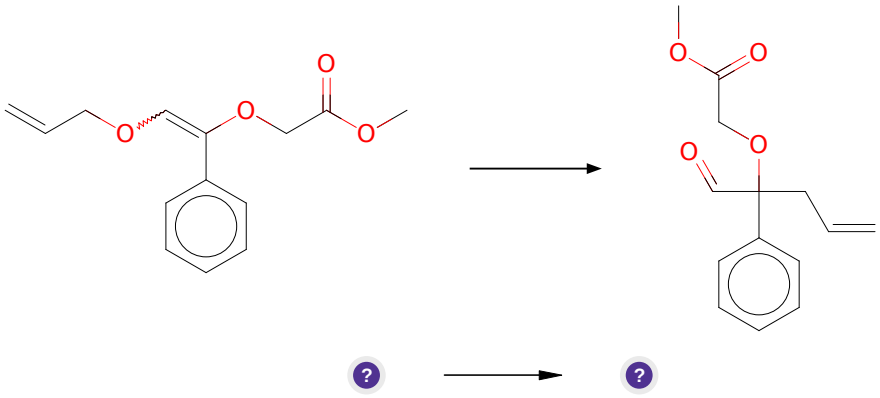
Typical conditions: Cs2CO3.DMF

Protections: none

Reference: *10.1016/j.bmcl.2012.05.070* and *10.1039/b612336h*

Retrosynthesis ID: 14841

2.3.3 Claisen Rearrangement



Substrates:

1. C=CCOC=C(OCC(=O)OC)c1ccccc1

Products:

1. C=CCC(C=O)(OCC(=O)OC)c1ccccc1

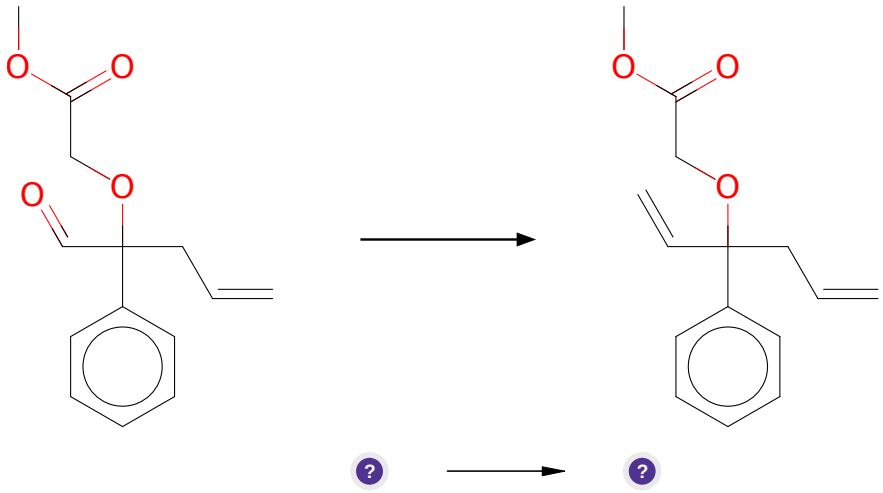
Typical conditions: heat

Protections: none

Reference: DOI: *10.1021/ja00206a017* and *10.1016/S0022-1139(98)00313-3*

Retrosynthesis ID: 1226

2.3.4 Tebbe Olefination



Substrates:

1. C=CCC(C=O)(OCC(=O)OC)c1ccccc1

Products:

1. C=CCC(C=C)(OCC(=O)OC)c1ccccc1

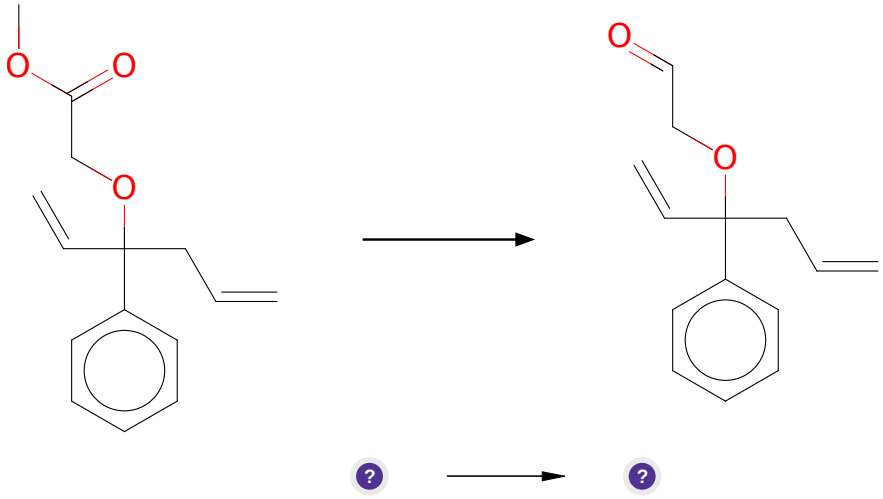
Typical conditions: Cp2TiCl2.AlMe3.toluene

Protections: none

Reference: *10.1016/j.tet.2007.03.015* and *10.1002/9780470638859.conrr617*

Retrosynthesis ID: 11714

2.3.5 Aldehyde Formation



Substrates:

1. C=CCC(C=C)(OCC(=O)OC)c1ccccc1

Products:

1. C=CCC(C=C)(OCC=O)c1ccccc1

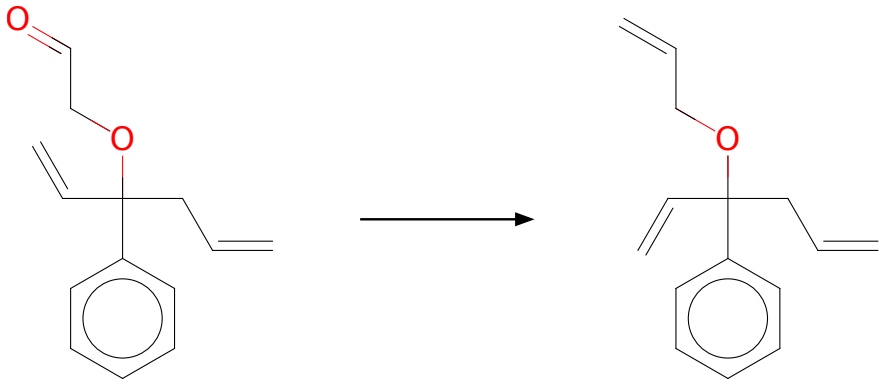
Typical conditions: DIBAL.solvent e.g. DCM

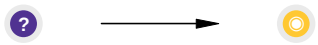
Protections: none

Reference: *10.1039/C39940000483* and *10.1039/C3CC47867J* and *10.1021/jo00222a054* and *10.1021/ja9934908* and *10.1021/jo902426z*

Retrosynthesis ID: 28551

2.3.6 Tebbe Olefination





Substrates:

1. C=CCC(C=C)(OCC=O)c1ccccc1

Products:

1. C=CCOC(C=C)(CC=C)c1ccccc1

Typical conditions: Cp2TiCl2.AlMe3.toluene

Protections: none

Reference: *10.1016/j.tet.2007.03.015* and *10.1002/9780470638859.conrr617*

Retrosynthesis ID: 11714

2.4 Path 4

Score: `51.25`

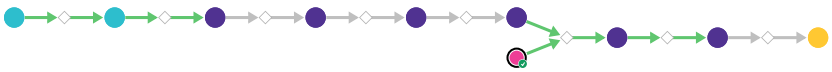
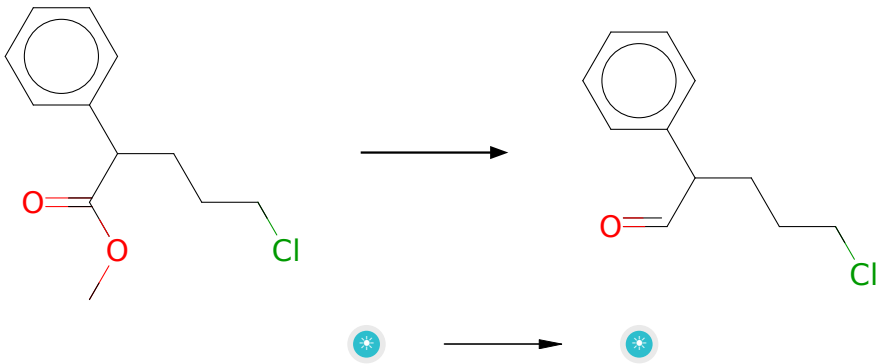


Figure 4: Outline of path 4

2.4.1 Aldehyde Formation



Substrates:

1. 5-chloro-2-phenylpentanoate methyl ester

Products:

1. C11H13ClO

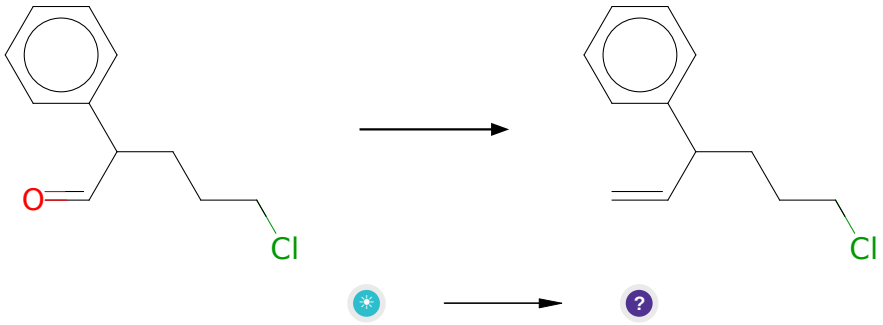
Typical conditions: DIBAL.solvent e.g. DCM

Protections: none

Reference: *10.1039/C39940000483* and *10.1039/C3CC47867J* and *10.1021/jo00222a054* and *10.1021/ja9934908* and *10.1021/jo902426z*

Retrosynthesis ID: 28551

2.4.2 Tebbe Olefination



Substrates:

1. C11H13ClO

Products:

1. C=CC(CCCCl)c1ccccc1

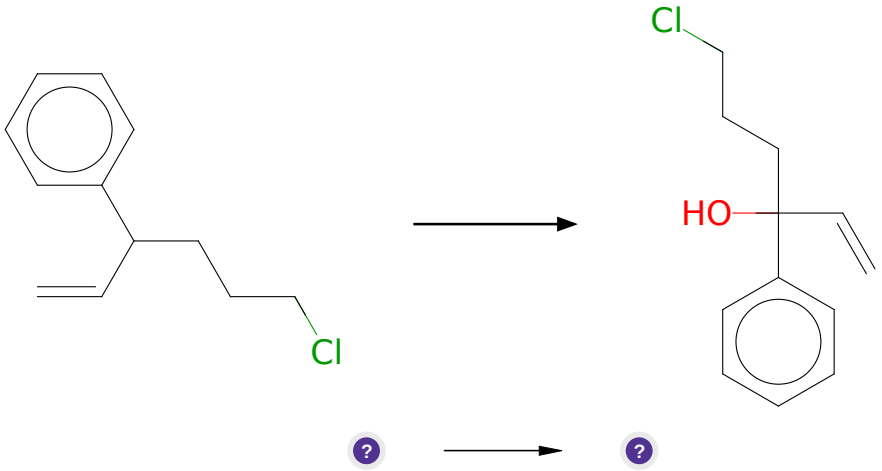
Typical conditions: Cp2TiCl2.AlMe3.toluene

Protections: none

Reference: *10.1016/j.tet.2007.03.015* and *10.1002/9780470638859.conrr617*

Retrosynthesis ID: 11714

2.4.3 Allylic oxidation to alcohol



Substrates:

1. C=CC(CCCCl)c1ccccc1

Products:

1. C=CC(O)(CCCCl)c1ccccc1

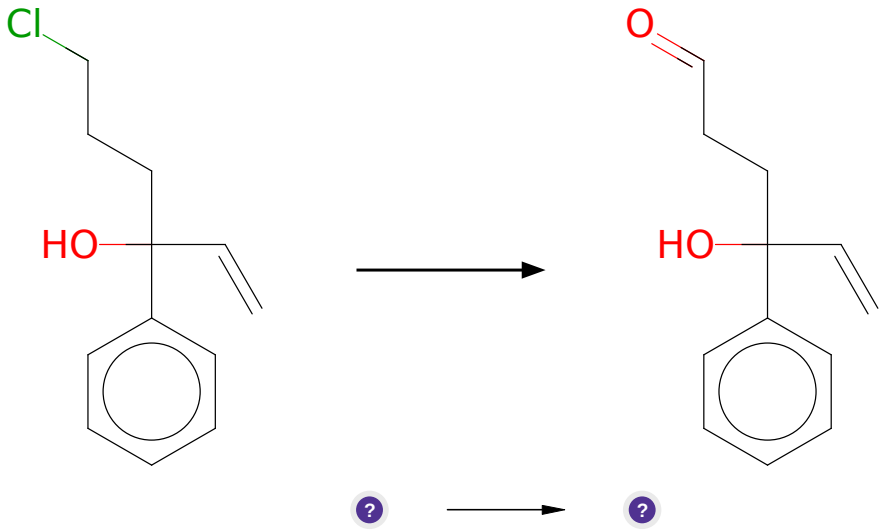
Typical conditions: ArCOOOH or t-BuOOOH

Protections: none

Reference: DOI: *10.1021/ja00458a072* AND *10.1016/j.tetlet.2013.03.046* AND *10.1039/b612423b*

Retrosynthesis ID: 7603

2.4.4 Kornblum Oxidation



Substrates:

1. C=CC(O)(CCCCl)c1ccccc1

Products:

1. C=CC(O)(CCC=O)c1ccccc1

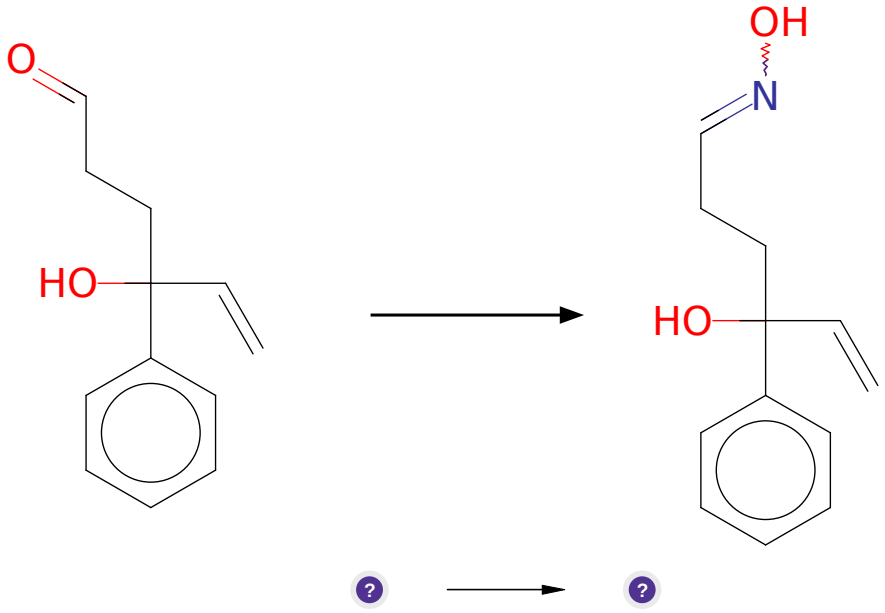
Typical conditions: DMSO.NEt3

Protections: none

Reference: *10.1080/00397918608056381* and *10.1002/9780470638859.conrr373*

Retrosynthesis ID: 11658

2.4.5 Synthesis of ketoximes



Substrates:

1. C=CC(O)(CCC=O)c1ccccc1

Products:

1. C=CC(O)(CCC=NO)c1ccccc1

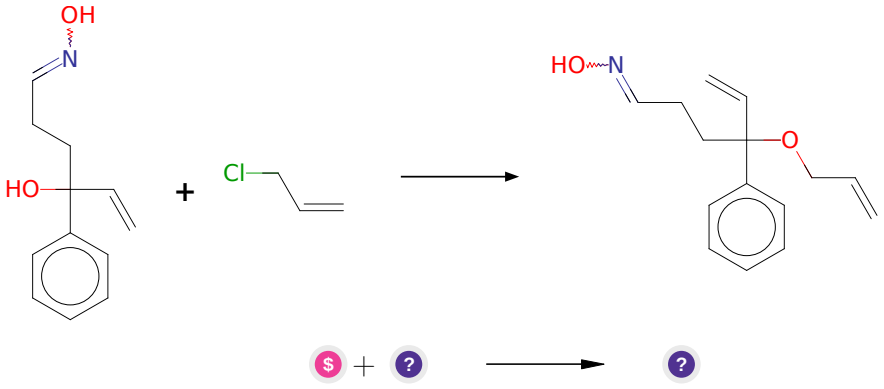
Typical conditions: [H+].MeOH

Protections: none

Reference: *10.15227/orgsyn.088.0033* AND *10.1021/ja405742y*

Retrosynthesis ID: 14702

2.4.6 Alkylation of tertiary alcohols



Substrates:

1. Chlorallylene - *available at Sigma-Aldrich*
2. C=CC(O)(CCC=NO)c1ccccc1

Products:

1. C=CCOC(C=C)(CCC=NO)c1ccccc1

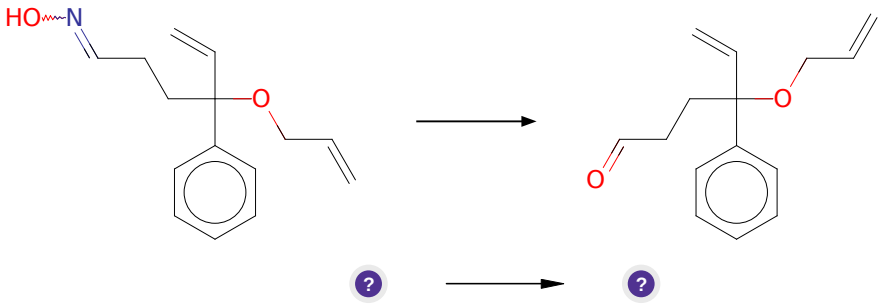
Typical conditions: K2CO3.acetone.heat

Protections: none

Reference: *10.1016/S0022-1139(00)85021-6* and

Retrosynthesis ID: 31010936

2.4.7 Oxidative cleavage of oximes



Substrates:

1. C=CCOC(C=C)(CCC=NO)c1ccccc1

Products:

1. C=CCOC(C=C)(CCC=O)c1ccccc1

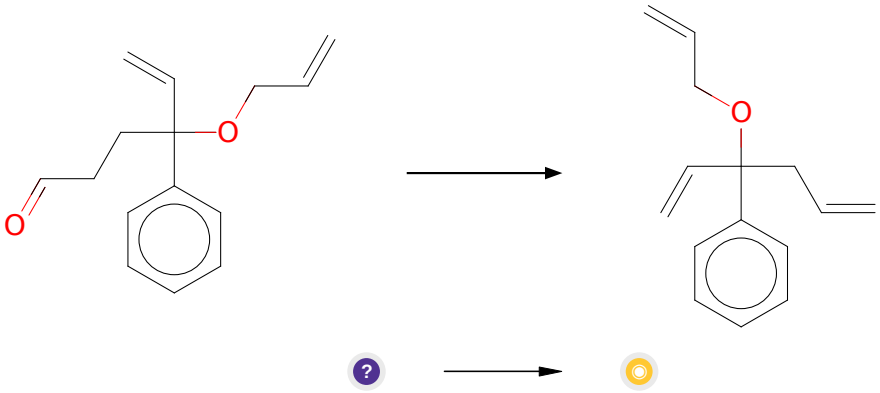
Typical conditions: IBX or Oxone or Ozone

Protections: none

Reference: *10.1055/s-1998-1835* and *10.1080/00397919708005905* and *10.1002/chem.201100605* (Scheme 2)

Retrosynthesis ID: 245558

2.4.8 Shapiro reaction



Substrates:

1. C=CCOC(C=C)(CCC=O)c1ccccc1

Products:

1. C=CCOC(C=C)(CC=C)c1ccccc1

Typical conditions: 1.TsNH2NH2.2.NaH.1,4-dioxane

Protections: none

Reference: *10.1246/cl.1996.211* and *10.1016/0040-4039(96)01991-0* and *10.1016/j.carres.2014.05.020*

Retrosynthesis ID: 9990395

2.5 Path 5

Score: 56.25

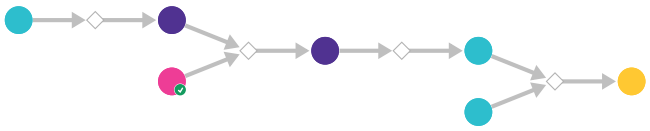
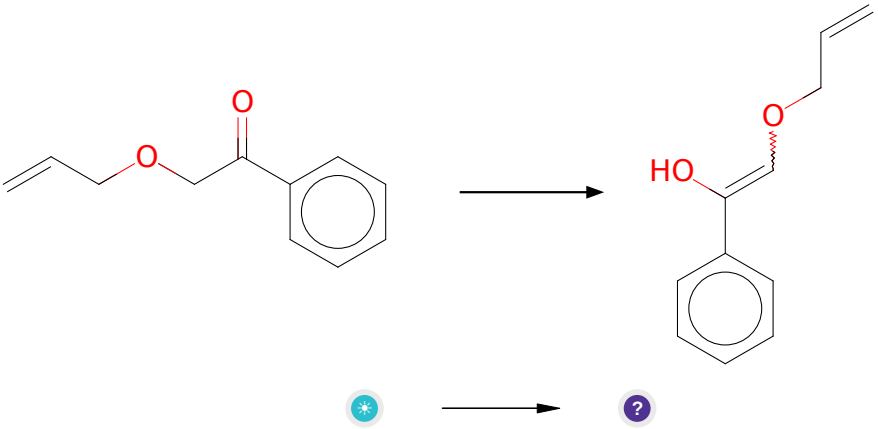


Figure 5: Outline of path 5

2.5.1 Keto-enol Tautomerism



Substrates:

1. allyl-phenacyl-ether

Products:

1. C=CCOC=C(O)c1ccccc1

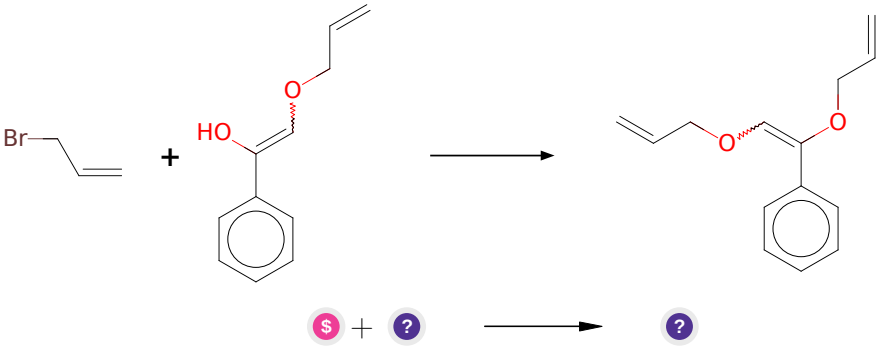
Typical conditions: solvent

Protections: none

Reference: *10.1021/ja01065a003* AND *10.1021/jo8012385*

Retrosynthesis ID: 7780

2.5.2 Enolate O-Alkylation



Substrates:

1. Allyl bromide - *available at Sigma-Aldrich*
2. C=CCOC=C(O)c1ccccc1

Products:

1. C=CCOC=C(OCC=C)c1ccccc1

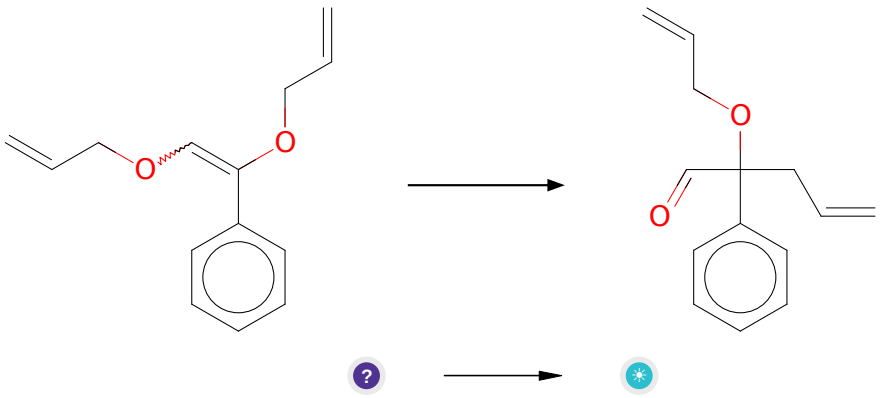
Typical conditions: Cs2CO3.DMF

Protections: none

Reference: *10.1016/j.bmcl.2012.05.070* and *10.1039/b612336h*

Retrosynthesis ID: 14841

2.5.3 Claisen Rearrangement



Substrates:

1. C=CCOC=C(OCC=C)c1ccccc1

Products:

1. rac-2-allyloxy-2-phenylpent-4-enal

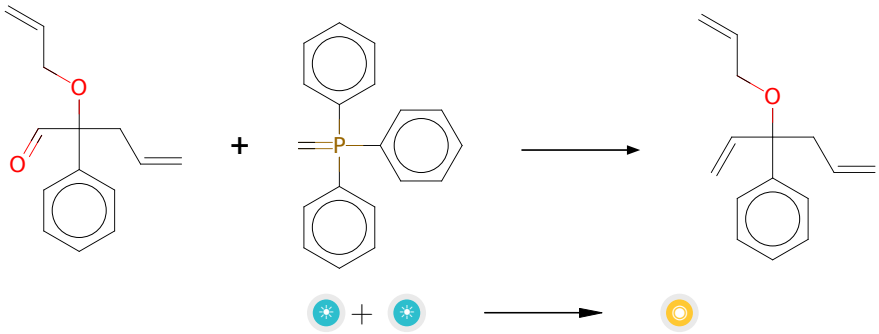
Typical conditions: heat

Protections: none

Reference: DOI: *10.1021/ja00206a017* and *10.1016/S0022-1139(98)00313-3*

Retrosynthesis ID: 1226

2.5.4 Wittig reaction



Substrates:

1. rac-2-allyloxy-2-phenylpent-4-enal
2. methylene-triphenyl-phosphorane

Products:

1. C=CCOC(C=C)(CC=C)c1ccccc1

Typical conditions: Et2O or THF.0 C

Protections: none

Reference: *10.1039/C5OB00515A* SI p. 4 and *10.1016/j.bmcl.2014.04.042* p. 2721, SI p. 2

Retrosynthesis ID: 5100