Paths of analysis*

L7_DIA

Synthia

October 11, 2022

1 Analysis parameters

Analysis type: Automatic Retrosynthesis

Rules: none selected

Filters: 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

Strategies: none selected

*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.

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: `90.31`

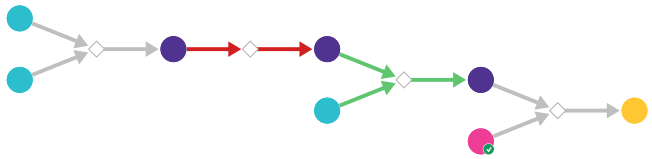
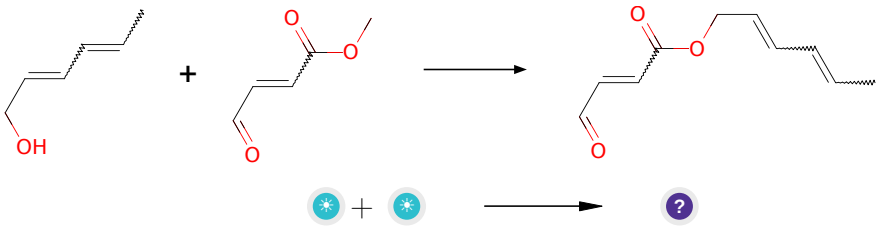


Figure 1: Outline of path 1

2.1.1 Acid catalyzed transesterification



Substrates:

1. sorbic alcohol
2. 4-oxobutenoate methyl ester

Products:

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

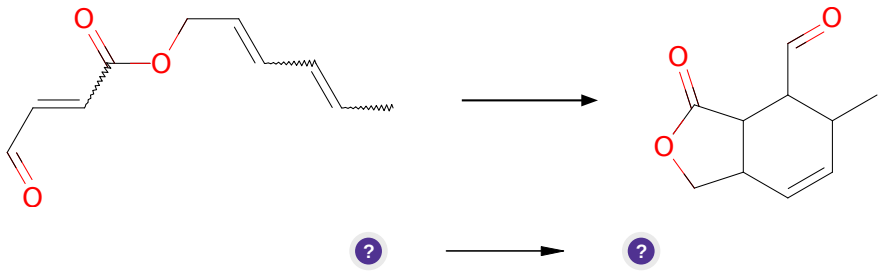
Typical conditions: H+

Protections: none

Reference: *10.1021/cr00020a004*

Retrosynthesis ID: 50438

2.1.2 Diels-Alder



Substrates:

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

Products:

1. CC1C=CC2COC(=O)C2C1C=O

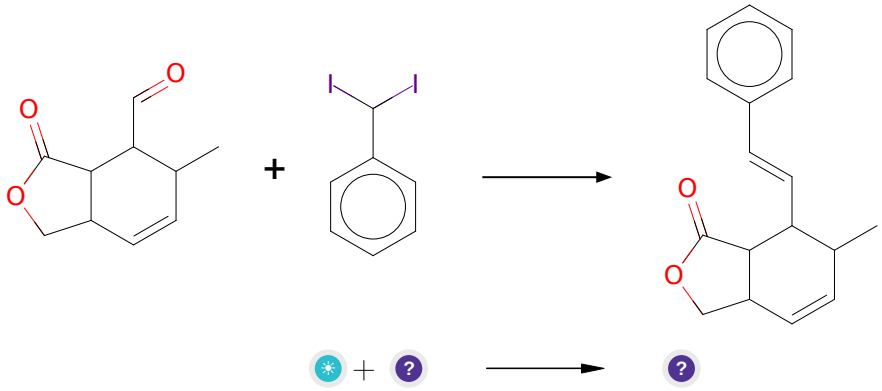
Typical conditions: Lewis acid or chiral Lewis acid. Solvent.

Protections: none

Reference: DOI: *10.1002/1521-3773(20020517)41:10<1668::AID-ANIE1668>3.0.CO;2-Z* AND *10.1021/ja062508t*

Retrosynthesis ID: 18116

2.1.3 Takai olefination



Substrates:

1. a,a-diiodotoluene
2. CC1C=CC2COC(=O)C2C1C=O

Products:

1. CC1C=CC2COC(=O)C2C1/C=C/c1ccccc1

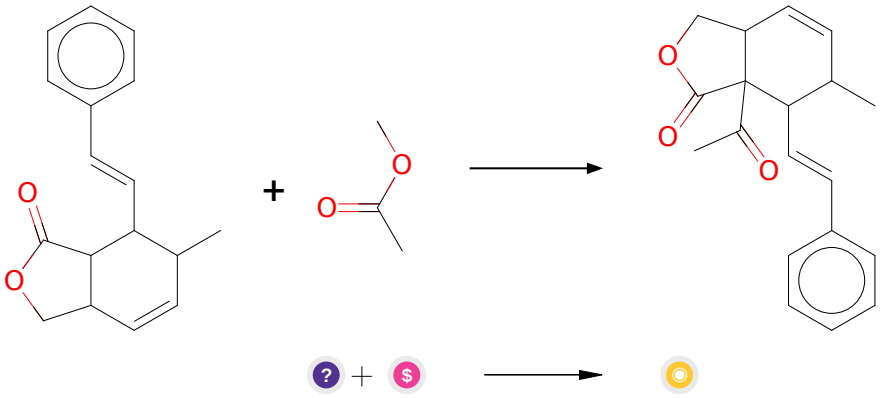
Typical conditions: CrCl2.THF.DMF

Protections: none

Reference: *10.1021/ja00283a046* and *10.1021/ja00237a081*

Retrosynthesis ID: 10942

2.1.4 Claisen Condensation



Substrates:

1. CC1C=CC2COC(=O)C2C1/C=C/c1ccccc1
2. Methyl acetate - *available at Sigma-Aldrich*

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2/C=C/c1ccccc1

Typical conditions: Base.Solvent

Protections: none

Reference: *10.1021/cr020703u* and *10.1021/cr60088a002*

Retrosynthesis ID: 5015

2.2 Path 2

Score: 90.31

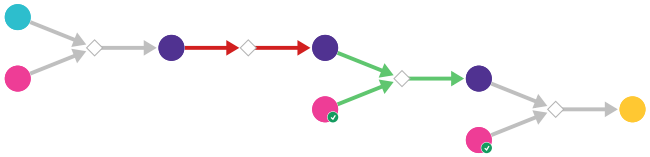
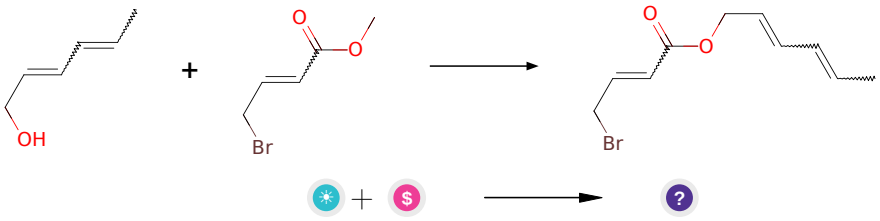


Figure 2: Outline of path 2

2.2.1 Acid catalyzed transesterification



Substrates:

1. sorbic alcohol
2. methyl 4-bromobut-2-enoate - *SYNTHONIXCORPORATION*

Products:

1. CC=CC=CCOC(=O)C=CCBr

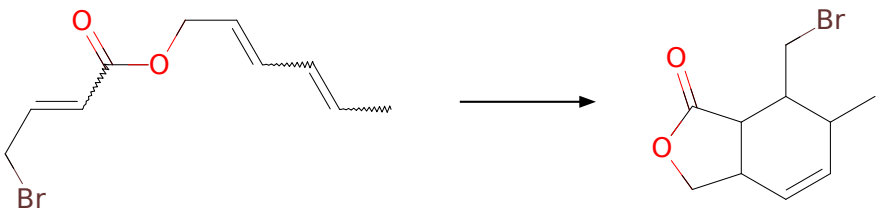
Typical conditions: H+

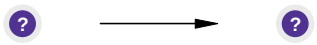
Protections: none

Reference: *10.1021/cr00020a004*

Retrosynthesis ID: 50438

2.2.2 Diels-Alder





Substrates:

1. CC=CC=CCOC(=O)C=CCBr

Products:

1. CC1C=CC2COC(=O)C2C1CBr

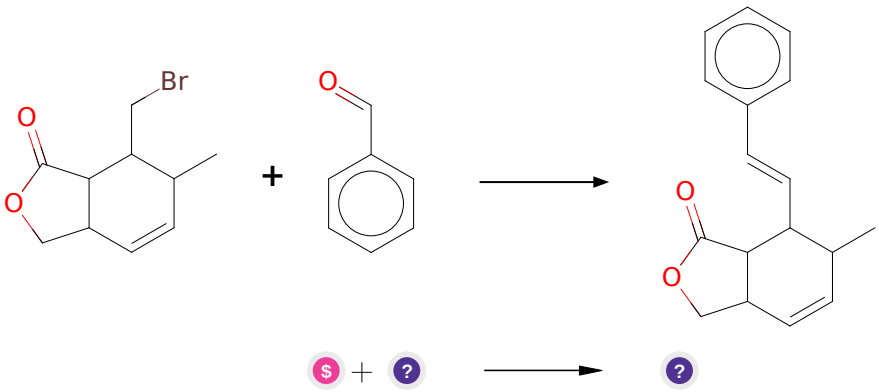
Typical conditions: Lewis acid or chiral Lewis acid. Solvent.

Protections: none

Reference: DOI: *10.1002/1521-3773(20020517)41:10<1668::AID-ANIE1668>3.0.CO;2-Z* AND *10.1021/ja062508t*

Retrosynthesis ID: 18116

2.2.3 Wittig-Schlosser olefination



Substrates:

1. Benzaldehyde - *available at Sigma-Aldrich*
2. CC1C=CC2COC(=O)C2C1CBr

Products:

1. CC1C=CC2COC(=O)C2C1/C=C/c1ccccc1

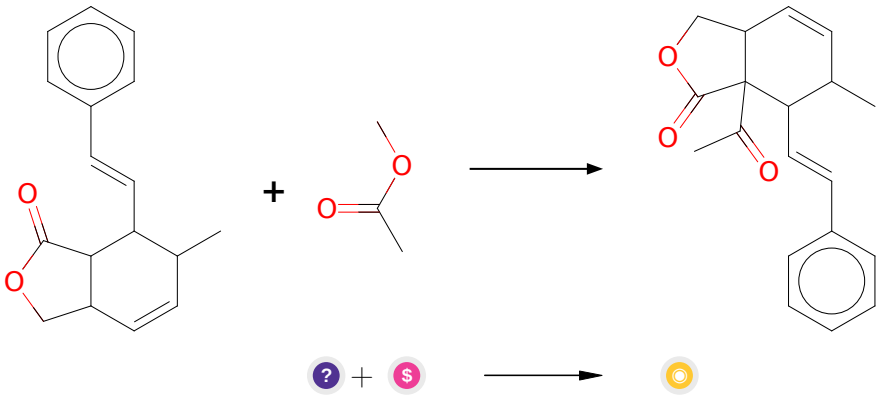
Typical conditions: 1.PPh3 or trialkylphosphite.2.base.aldehyde.3.base

Protections: none

Reference: *10.1021/ol049701h* and *10.1021/ja00535a063* and Kurti and Czako; Strategic Applications of Named Reactions in Organic Synthesis. 1st edn., 488-489.

Retrosynthesis ID: 9546

2.2.4 Claisen Condensation



Substrates:

1. CC1C=CC2COC(=O)C2C1/C=C/c1ccccc1
2. Methyl acetate - *available at Sigma-Aldrich*

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2/C=C/c1ccccc1

Typical conditions: Base.Solvent

Protections: none

Reference: *10.1021/cr020703u* and *10.1021/cr60088a002*

Retrosynthesis ID: 5015

2.3 Path 3

Score: `90.31`

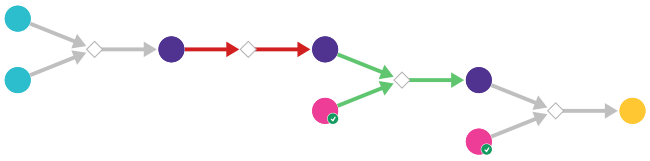
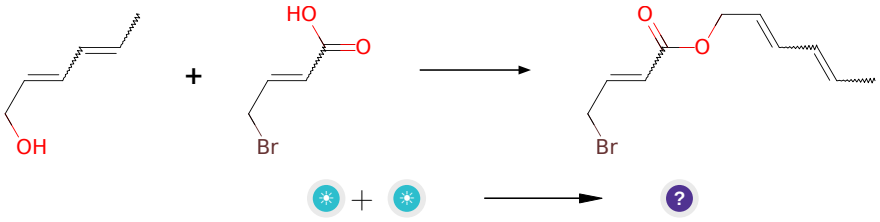


Figure 3: Outline of path 3

2.3.1 Acylation of primary alcohols



Substrates:

1. sorbic alcohol
2. g-bromocrotonic acid

Products:

1. CC=CC=CCOC(=O)C=CCBr

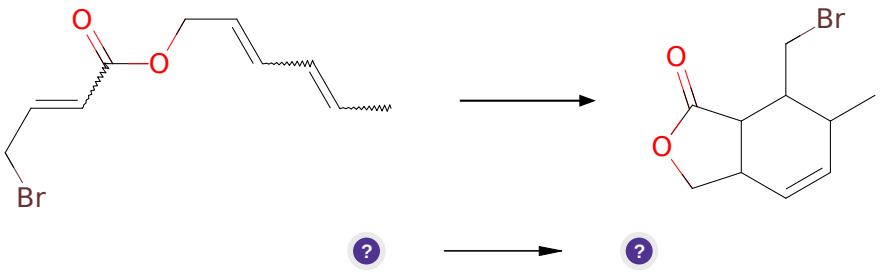
Typical conditions: DCC.DMAP.DCM

Protections: none

Reference: *10.1016/j.molstruc.2016.10.087* and *10.1016/j.bmc.2014.12.043* and *10.1016/j.steroids.2013.03.004* and *10.3390/molecules21091123*

Retrosynthesis ID: 9998689

2.3.2 Diels-Alder



Substrates:

1. CC=CC=CCOC(=O)C=CCBr

Products:

1. CC1C=CC2COC(=O)C2C1CBr

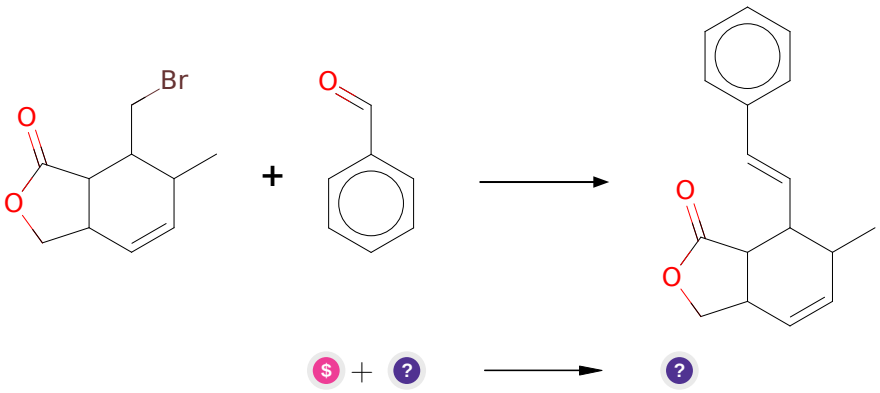
Typical conditions: Lewis acid or chiral Lewis acid. Solvent.

Protections: none

Reference: DOI: *10.1002/1521-3773(20020517)41:10<1668::AID-ANIE1668>3.0.CO;2-Z* AND *10.1021/ja062508t*

Retrosynthesis ID: 18116

2.3.3 Wittig-Schlosser olefination



Substrates:

1. Benzaldehyde - *available at Sigma-Aldrich*
2. CC1C=CC2COC(=O)C2C1CBr

Products:

1. CC1C=CC2COC(=O)C2C1/C=C/c1ccccc1

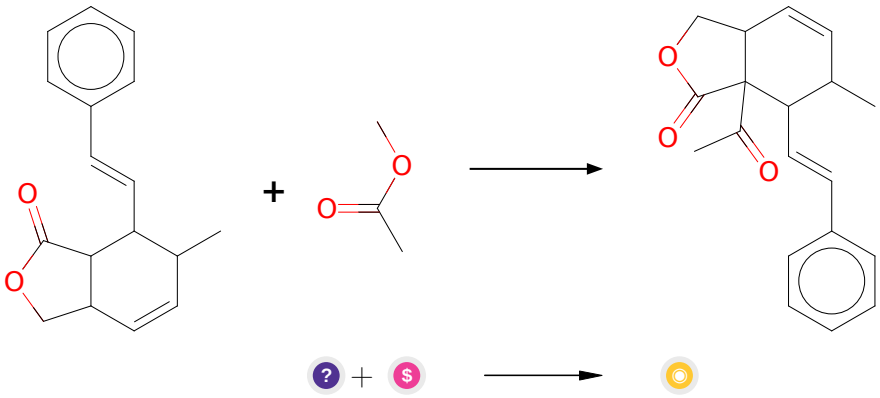
Typical conditions: 1.PPh3 or trialkylphosphite.2.base.aldehyde.3.base

Protections: none

Reference: *10.1021/ol049701h* and *10.1021/ja00535a063* and Kurti and Czako; Strategic Applications of Named Reactions in Organic Synthesis. 1st edn., 488-489.

Retrosynthesis ID: 9546

2.3.4 Claisen Condensation



Substrates:

1. CC1C=CC2COC(=O)C2C1/C=C/c1ccccc1
2. Methyl acetate - *available at Sigma-Aldrich*

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2/C=C/c1ccccc1

Typical conditions: Base.Solvent

Protections: none

Reference: *10.1021/cr020703u* and *10.1021/cr60088a002*

Retrosynthesis ID: 5015

2.4 Path 4

Score: 93.83

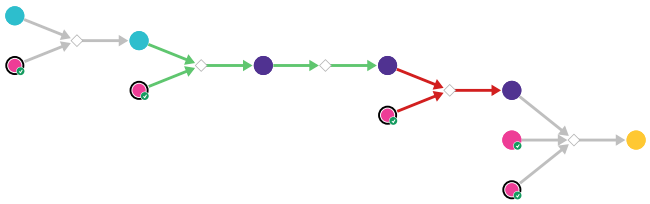
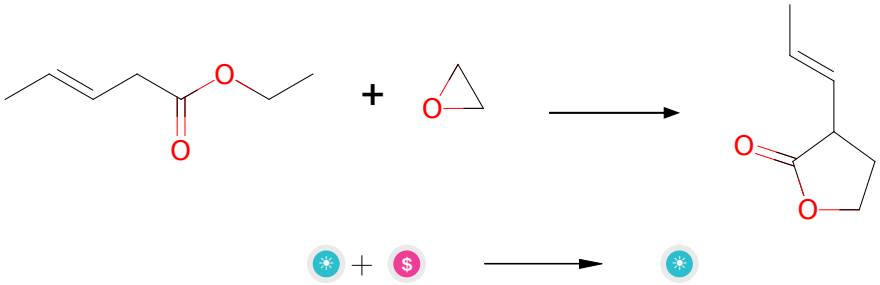


Figure 4: Outline of path 4

2.4.1 Synthesis of lactones from epoxides



Substrates:

1. pent-3t()-enoic acid ethyl ester
2. Oxirane - *available at Sigma-Aldrich*

Products:

1. 3-(1-propenyl)-tetrahydro-2-furanone

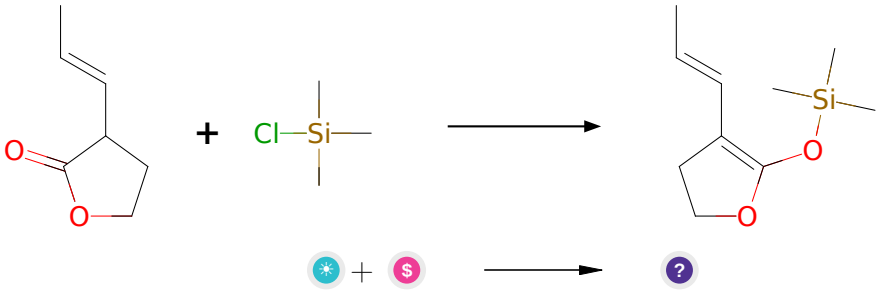
Typical conditions: EtONa.EtOH.rt

Protections: none

Reference: *10.1021/ja9049959* and *10.1016/j.tetlet.2014.12.024* and *10.1021/jo00077a012* and *10.1016/0040-4039(96)00494-7* and *10.1002/chem.201403294*

Retrosynthesis ID: 21258

2.4.2 Enol esters and ethers synthesis



Substrates:

1. 3-(1-propenyl)-tetrahydro-2-furanone
2. TMSCl - *available at Sigma-Aldrich*

Products:

1. C/C=C/C1=C(O[Si](C)(C)C)OCC1

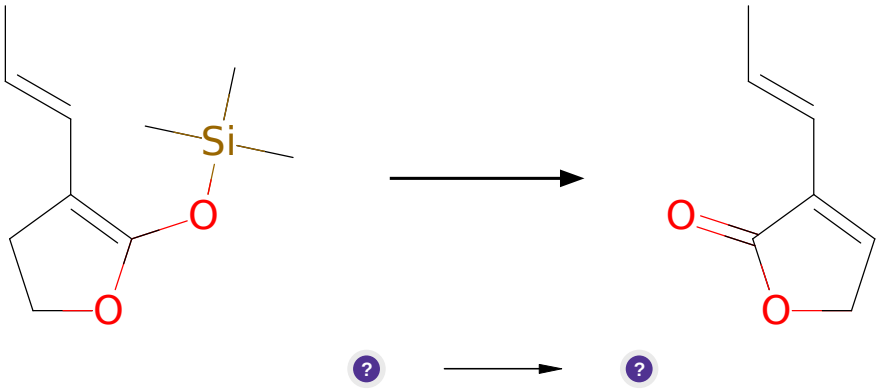
Typical conditions: 1. Et3N.Electrophile

Protections: none

Reference: *10.1016/S0040-4020(03)00977-3* AND *10.1021/ja00056a002*

Retrosynthesis ID: 7799

2.4.3 Dehydrogenation of silyl enol ethers



Substrates:

1. C/C=C/C1=C(O[Si](C)(C)C)OCC1

Products:

1. C/C=C/C1=CCOC1=O

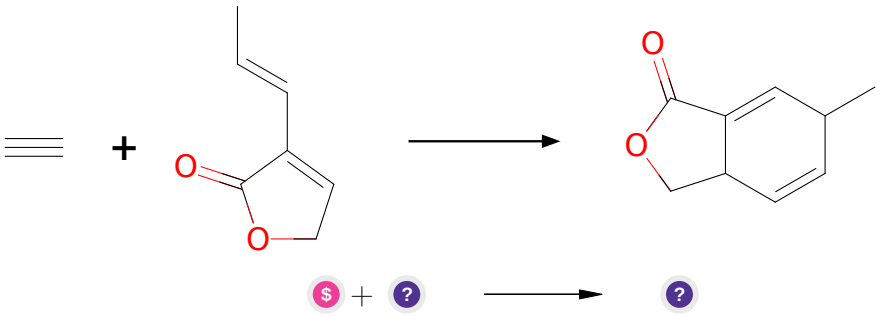
Typical conditions: Pd(OAc)2.Cu(OAc)2.O2.MeCN

Protections: none

Reference: *10.1271/bbb.60.405* and *10.1039/C3CC46778C* and US2015284405 p.40 and *10.1016/S0040-4039(01)81518-5* and US2010204477 p. 15-16 and *10.1016/0040-4039(95)00694-8* and *10.1021/jo00089a034* and *10.1016/S0040-4020(01)90587-3* and *10.1080/00397919008052802* and *10.1021/ja00218a060*

Retrosynthesis ID: 9999877

2.4.4 Diels-Alder



Substrates:

1. Calcium carbide - *available at Sigma-Aldrich*
2. C/C=C/C1=CCOC1=O

Products:

1. CC1C=CC2COC(=O)C2=C1

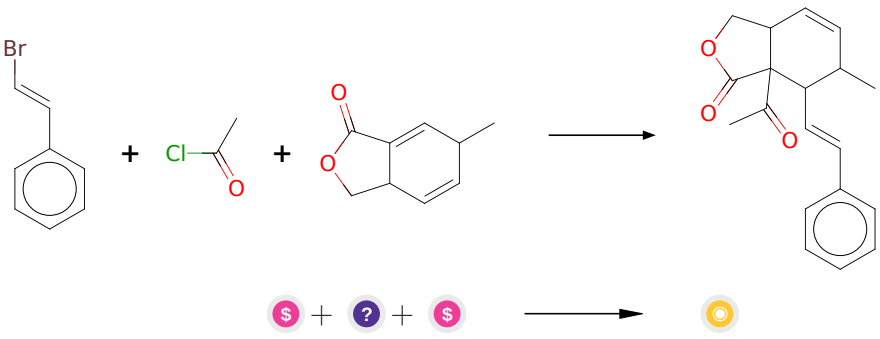
Typical conditions: H2O.MeOH.EtOH.isooctane

Protections: none

Reference: *10.1002/1521-3773(20020517)41:10<1668::AID-ANIE1668>3.0.CO;2-Z*

Retrosynthesis ID: 10557

2.4.5 Alkenylation-Acylation of enones and enoate esters



Substrates:

1. b-Bromostyrene - *available at Sigma-Aldrich*
2. CC1C=CC2COC(=O)C2=C1

3. Acetyl chloride - *available at Sigma-Aldrich*

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2/C=C/c1ccccc1

Typical conditions: 1.RCuLi.2.AcCl.HMPA

Protections: none

Reference: *10.1246/cl.1989.1063* AND *10.1248/cpb.33.1815* AND *10.1021/ja0320018* AND *10.1016/S0040-4039(01)80891-1* AND *10.1016/S0040-4020(01)82115-3*

Retrosynthesis ID: 13033

2.5 Path 5

Score: 95.31

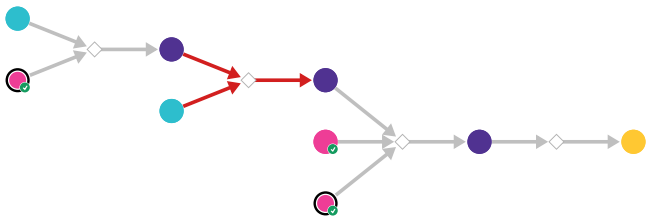
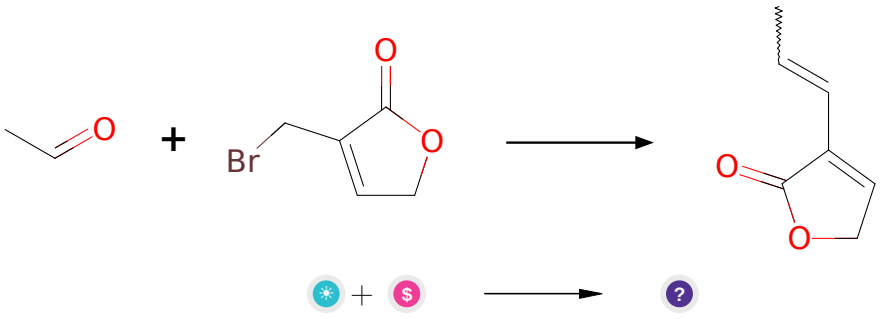


Figure 5: Outline of path 5

2.5.1 Wittig olefination



Substrates:

1. 3-bromomethyl-5h-furan-2-one
2. Ethanal - *available at Sigma-Aldrich*

Products:

1. CC=CC1=CCOC1=O

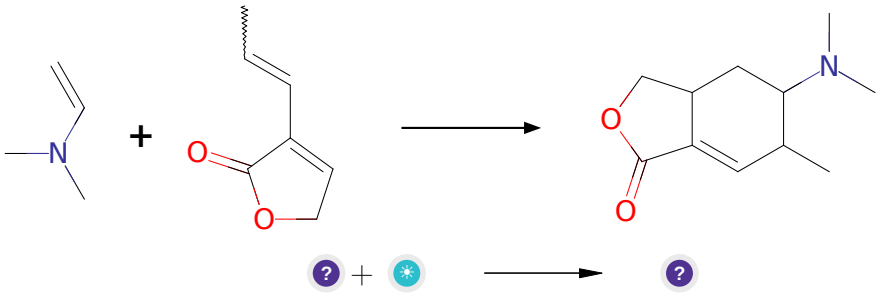
Typical conditions: 1.PPh3 or trialkylphosphite.2.base.aldehyde

Protections: none

Reference: *10.1021/ja0015287* and *10.1021/ja404673s* and *10.1021/ol901979x*

Retrosynthesis ID: 9545

2.5.2 Diels-Alder



Substrates:

1. CC=CC1=CCOC1=O
2. dimethyl-vinyl-amine

Products:

1. CC1C=C2C(=O)OCC2CC1N(C)C

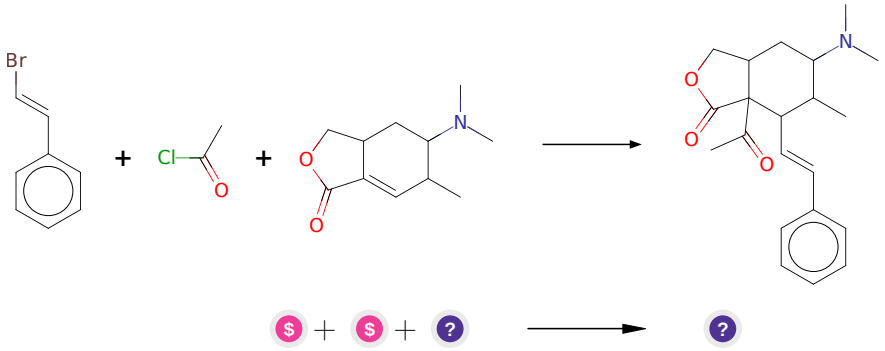
Typical conditions: Lewis acid or chiral Lewis acid. Solvent.

Protections: none

Reference: DOI: *10.1002/1521-3773(20020517)41:10<1668::AID-ANIE1668>3.0.CO;2-Z* AND *10.1021/ja062508t*

Retrosynthesis ID: 18116

2.5.3 Alkenylation-Acylation of enones and enoate esters



Substrates:

1. b-Bromostyrene - *available at Sigma-Aldrich*
2. Acetyl chloride - *available at Sigma-Aldrich*
3. CC1C=C2C(=O)OCC2CC1N(C)C

Products:

1. CC(=O)C12C(=O)OCC1CC(N(C)C)C(C)C2/C=C/c1ccccc1

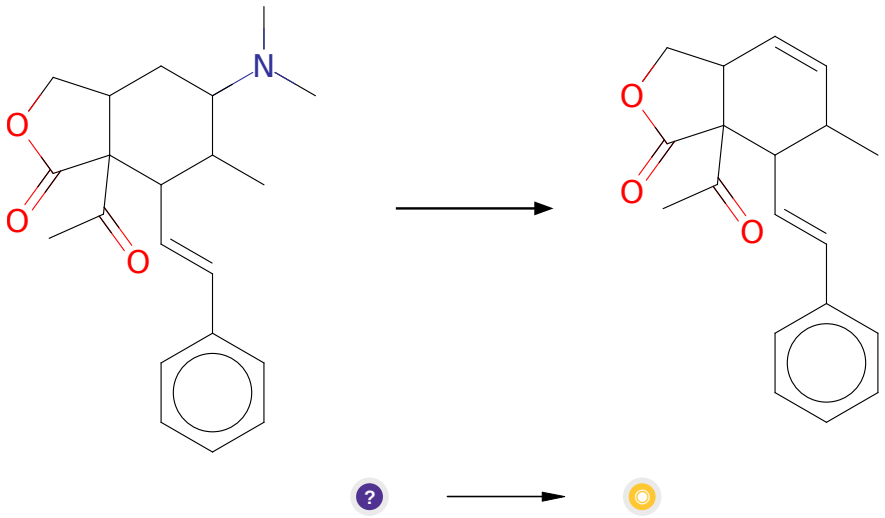
Typical conditions: 1.RCuLi.2.AcCl.HMPA

Protections: none

Reference: *10.1246/cl.1989.1063* AND *10.1248/cpb.33.1815* AND *10.1021/ja0320018* AND *10.1016/S0040-4039(01)80891-1* AND *10.1016/S0040-4020(01)82115-3*

Retrosynthesis ID: 13033

2.5.4 Hofmann Elimination



Substrates:

1. CC(=O)C12C(=O)OCC1CC(N(C)C)C(C)C2/C=C/c1ccccc1

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2/C=C/c1ccccc1

Typical conditions: 1. MeI 2. Ag2O or NaOMe.heat

Protections: none

Reference: *10.1021/ja00023a034* and *10.1021/jo00301a036* and *10.1021/ja00716a066*

Retrosynthesis ID: 31010847