Paths of analysis*

L2_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

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: `84.06`

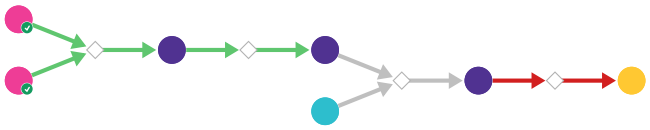
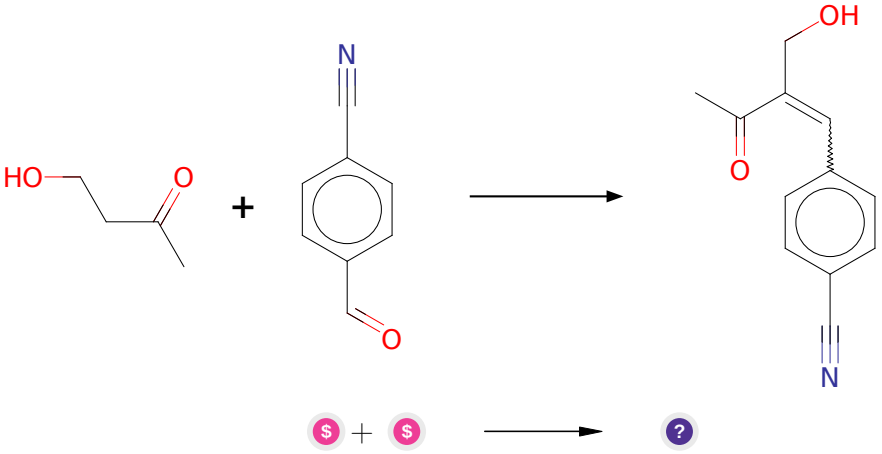


Figure 1: Outline of path 1

2.1.1 Aldol Condensation



Substrates:

1. 4-Cyanobenzaldehyde - *available at Sigma-Aldrich*
2. 4-Hydroxy-2-butanone - *available at Sigma-Aldrich*

Products:

1. CC(=O)C(=Cc1ccc(C#N)cc1)CO

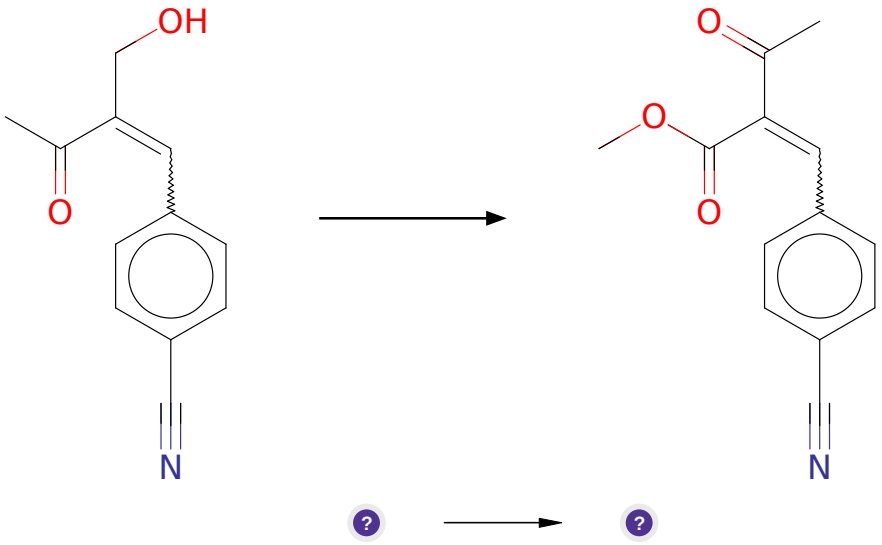
Typical conditions: NaOEt.base

Protections: none

Reference: *10.1080/00397911.2016.1206938*

Retrosynthesis ID: 10049

2.1.2 Tandem oxidation-esterification



Substrates:

1. CC(=O)C(=Cc1ccc(C#N)cc1)CO

Products:

1. COC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

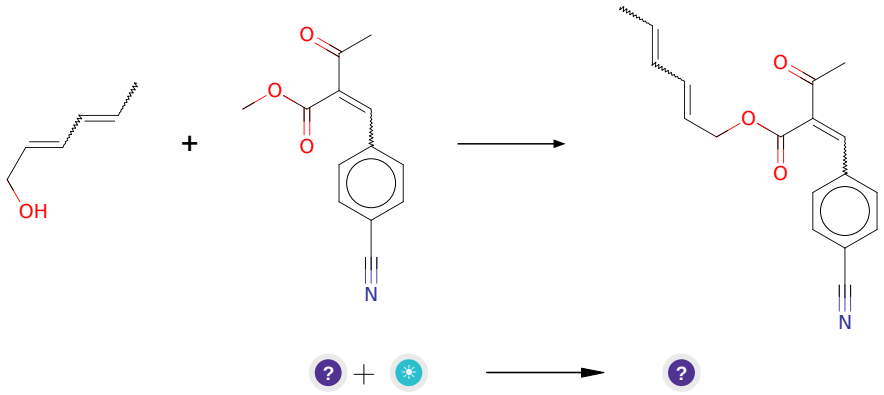
Typical conditions: Oxidant (eg. I2.K2CO3 or Ca(OCl)2).MeOH

Protections: none

Reference: *10.1016/S0040-4039(00)73550-7* and *10.1016/j.tet.2005.03.097* and *10.1021/ol062940f*

Retrosynthesis ID: 25234

2.1.3 Acid catalyzed transesterification



Substrates:

1. COC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O
2. sorbic alcohol

Products:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

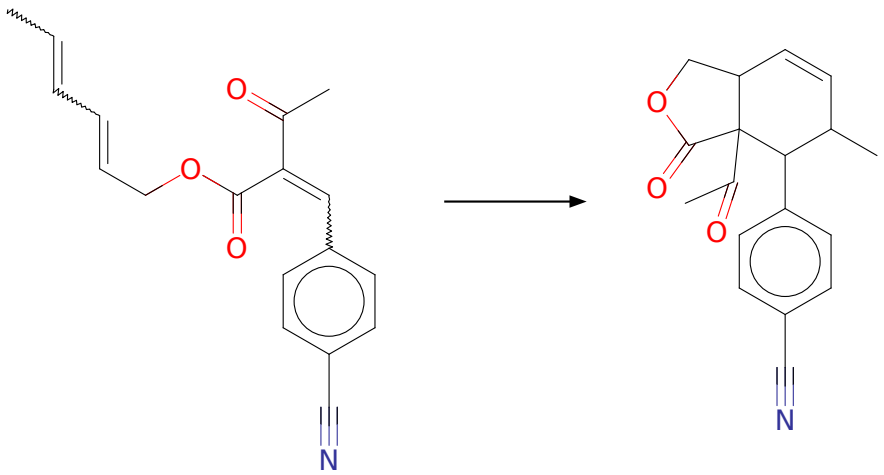
Typical conditions: H+

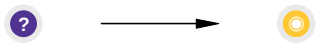
Protections: none

Reference: *10.1021/cr00020a004*

Retrosynthesis ID: 50438

2.1.4 Diels-Alder





Substrates:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2c1ccc(C#N)cc1

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 Path 2

Score: `84.06`

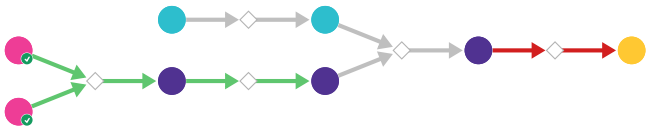
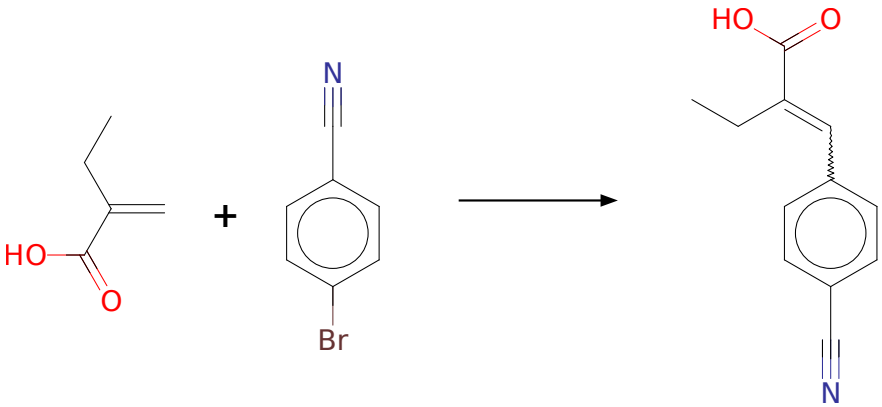
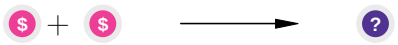


Figure 2: Outline of path 2

2.2.1 Heck Reaction





Substrates:

1. 2-Ethylacrylic acid - *available at Sigma-Aldrich*
2. 4-Bromobenzonitrile - *available at Sigma-Aldrich*

Products:

1. CCC(=Cc1ccc(C#N)cc1)C(=O)O

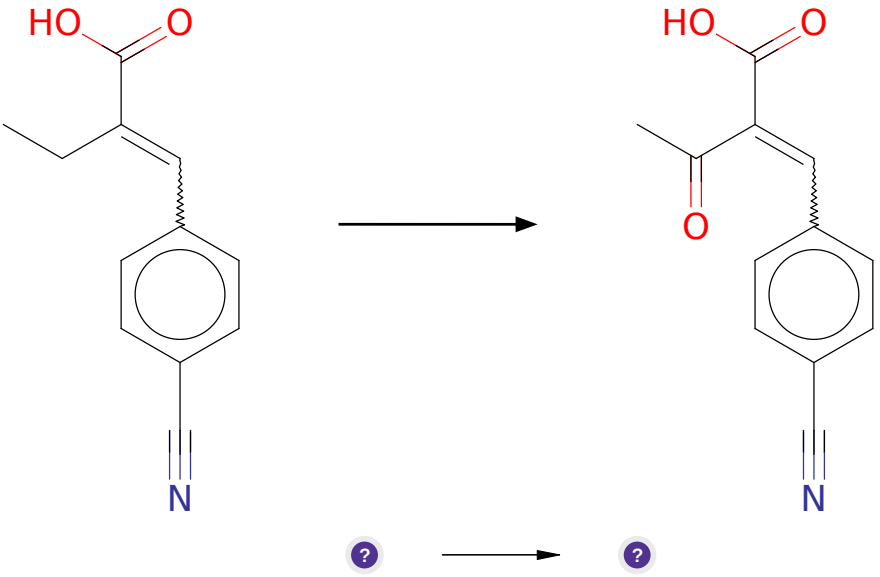
Typical conditions: Pd (cat). Ligand e.g. TXPTS. Base. Temp

Protections: none

Reference: *10.1039/C3GC40493E* *10.1021/ol0360288* or *10.1021/ol702755g* or *10.1055/s-0033-1340319* or *10.1016/j.tet.2004.10.049*

Retrosynthesis ID: 9177

2.2.2 Allylic Oxidation of Alkenes



Substrates:

1. CCC(=Cc1ccc(C#N)cc1)C(=O)O

Products:

1. CC(=O)C(=Cc1ccc(C#N)cc1)C(=O)O

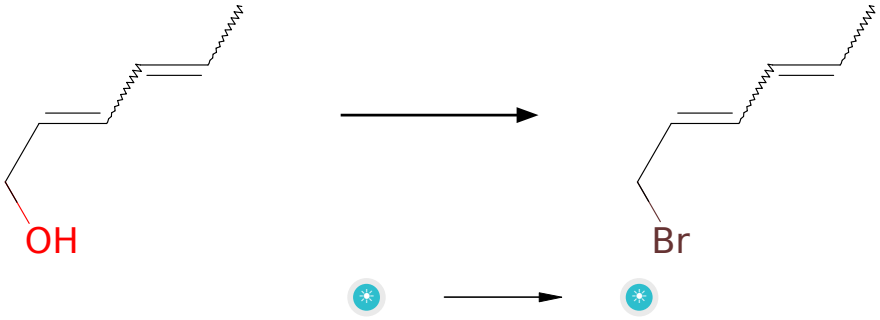
Typical conditions: tBuOOH.Pd(OH)2/C or PhI(OAc)2 or SeO2

Protections: none

Reference: *10.1021/ja0340735* and *10.1021/ol100603q* and *10.1016/j.tetlet.2016.05.063* (Scheme 2)

Retrosynthesis ID: 2583

2.2.3 Appel Reaction



Substrates:

1. sorbic alcohol

Products:

1. 1-brom-hexa-2,4-dien

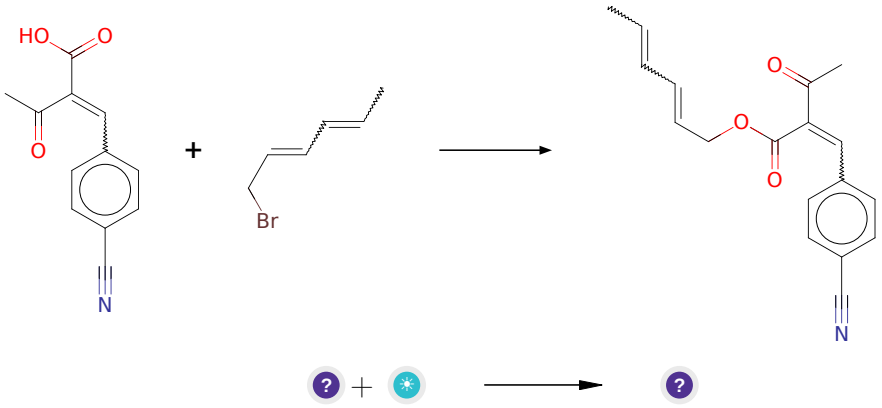
Typical conditions: PPh3.CBr4

Protections: none

Reference: *10.1021/ja800574m* and *10.1016/j.tet.2012.05.010* and *10.1016/j.tet.2004.09.021* (experimantal)

Retrosynthesis ID: 9990037

2.2.4 Synthesis of esters from alkyl chlorides and carboxylic acids or thioacids



Substrates:

1. CC(=O)C(=Cc1ccc(C#N)cc1)C(=O)O
2. 1-brom-hexa-2,4-dien

Products:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

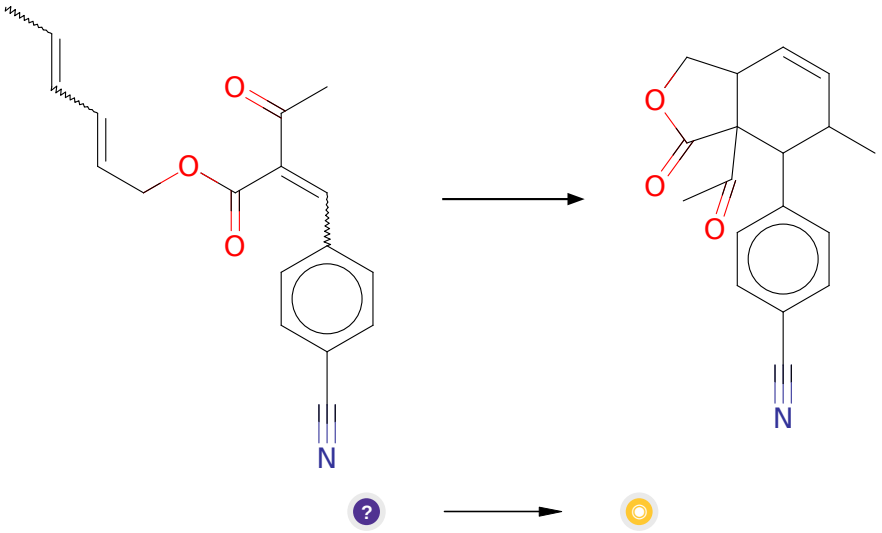
Typical conditions: K2CO3.DMF

Protections: none

Reference: *10.1016/j.bmcl.2005.08.026* AND *10.1021/ol034655r* (SI) AND *10.1039/C3RA41967C* AND *10.1016/j.bmcl.2012.03.093*

Retrosynthesis ID: 14685

2.2.5 Diels-Alder



Substrates:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2c1ccc(C#N)cc1

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 Path 3

Score: 84.06

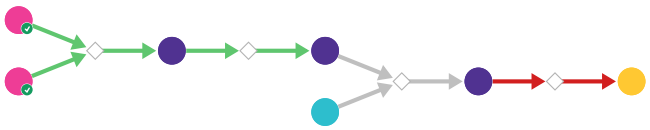
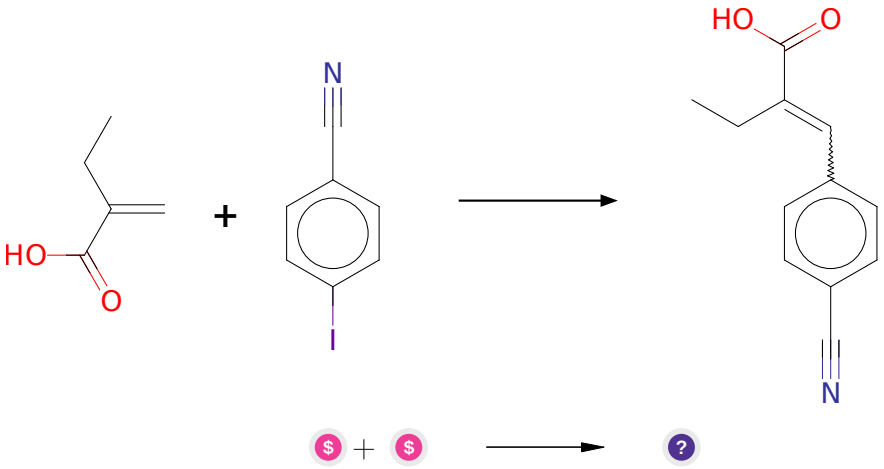


Figure 3: Outline of path 3

2.3.1 Heck Reaction



Substrates:

1. 2-Ethylacrylic acid - *available at Sigma-Aldrich*
2. 4-Iodobenzonitrile - *available at Sigma-Aldrich*

Products:

1. CCC(=Cc1ccc(C#N)cc1)C(=O)O

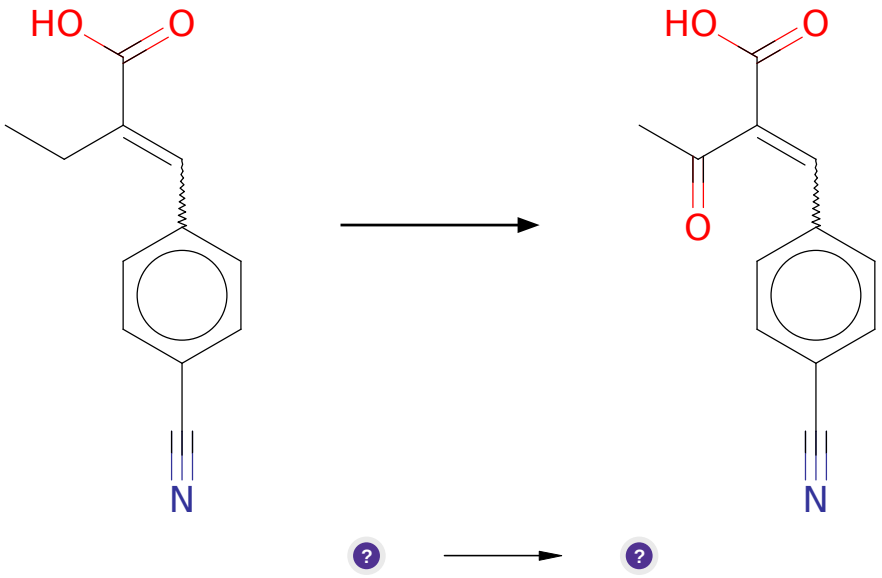
Typical conditions: Pd (cat). Ligand e.g. TXPTS. Base. Temp

Protections: none

Reference: *10.1016/j.tetlet.2010.08.057* or *10.1002/9780470716076* or *10.1021/op050106k* or *10.1021/ol0360288* or *10.1021/ol702755g* or *10.1055/s-0033-1340319* or *10.1016/j.tet.2004.10.049*

Retrosynthesis ID: 9193

2.3.2 Allylic Oxidation of Alkenes



Substrates:

1. CCC(=Cc1ccc(C#N)cc1)C(=O)O

Products:

1. CC(=O)C(=Cc1ccc(C#N)cc1)C(=O)O

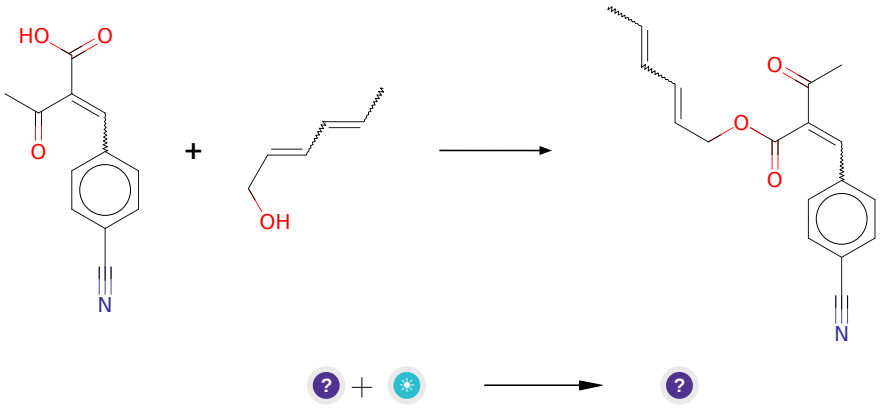
Typical conditions: tBuOOH.Pd(OH)2/C or PhI(OAc)2 or SeO2

Protections: none

Reference: *10.1021/ja0340735* and *10.1021/ol100603q* and *10.1016/j.tetlet.2016.05.063* (Scheme 2)

Retrosynthesis ID: 2583

2.3.3 Steglich Esterification



Substrates:

1. CC(=O)C(=Cc1ccc(C#N)cc1)C(=O)O
2. sorbic alcohol

Products:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

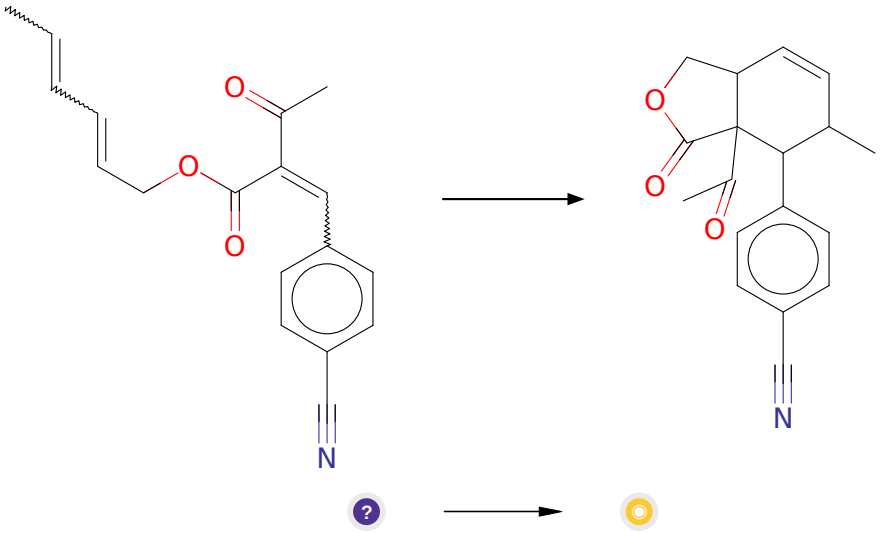
Typical conditions: alcohol.DCC.DMAP.DCM or thiol.DCC.DMAP.DCM

Protections: none

Reference: *10.1002/anie.197805221*

Retrosynthesis ID: 10171

2.3.4 Diels-Alder



Substrates:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2c1ccc(C#N)cc1

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

2.4 Path 4

Score: 84.06

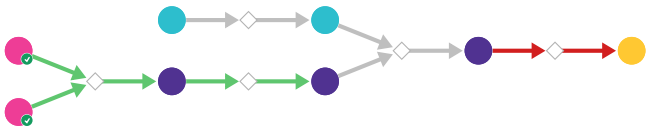
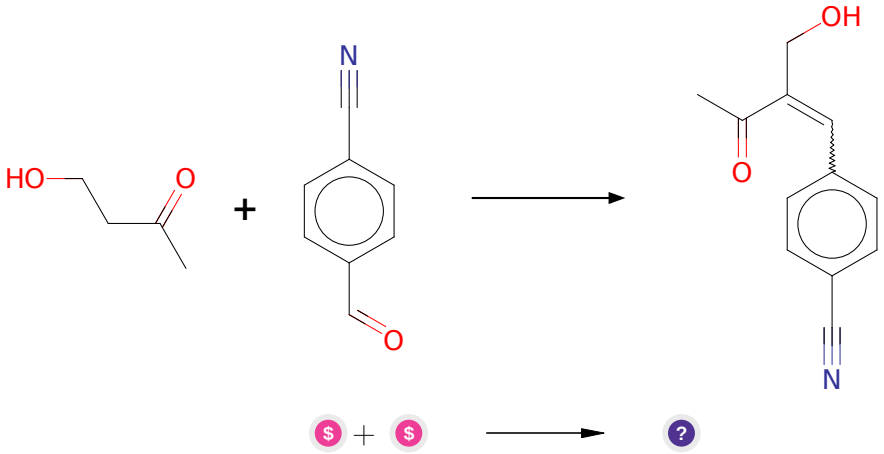


Figure 4: Outline of path 4

2.4.1 Aldol Condensation



Substrates:

1. 4-Cyanobenzaldehyde - *available at Sigma-Aldrich*
2. 4-Hydroxy-2-butanone - *available at Sigma-Aldrich*

Products:

1. CC(=O)C(=Cc1ccc(C#N)cc1)CO

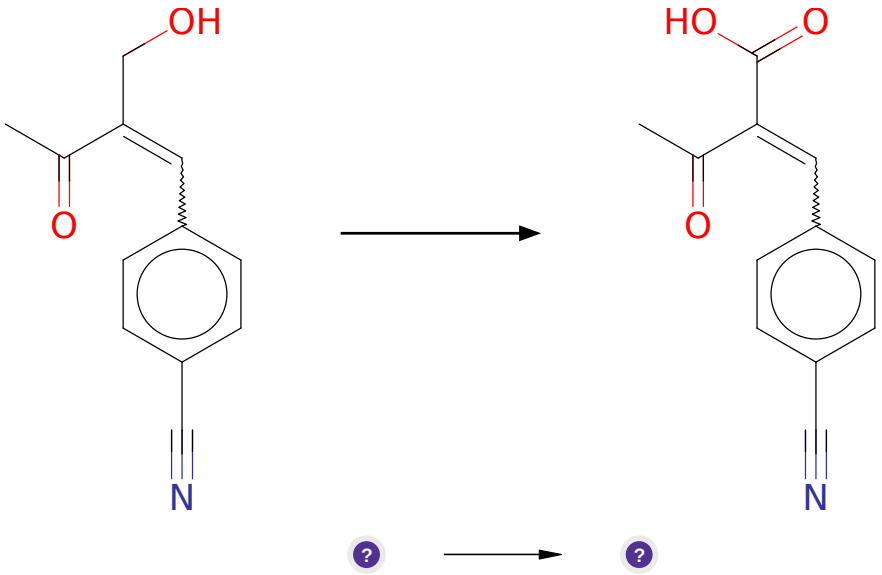
Typical conditions: NaOEt.base

Protections: none

Reference: *10.1080/00397911.2016.1206938*

Retrosynthesis ID: 10049

2.4.2 Jones Oxidation



Substrates:

1. CC(=O)C(=Cc1ccc(C#N)cc1)CO

Products:

1. CC(=O)C(=Cc1ccc(C#N)cc1)C(=O)O

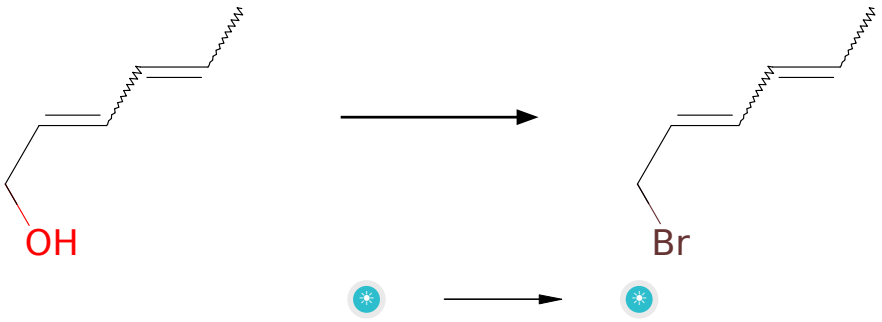
Typical conditions: cromate.sulfate.H2O.acetone

Protections: none

Reference: *10.1002/9780470638859.conrr349* and *10.1021/jm00270a004*

Retrosynthesis ID: 11160

2.4.3 Appel Reaction



Substrates:

1. sorbic alcohol

Products:

1. 1-brom-hexa-2,4-dien

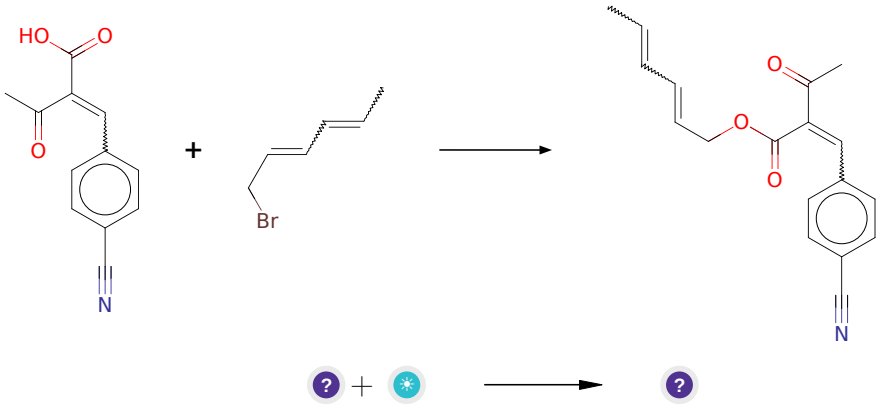
Typical conditions: PPh3.CBr4

Protections: none

Reference: *10.1021/ja800574m* and *10.1016/j.tet.2012.05.010* and *10.1016/j.tet.2004.09.021* (experimantal)

Retrosynthesis ID: 9990037

2.4.4 Synthesis of esters from alkyl chlorides and carboxylic acids or thioacids



Substrates:

1. CC(=O)C(=Cc1ccc(C#N)cc1)C(=O)O
2. 1-brom-hexa-2,4-dien

Products:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

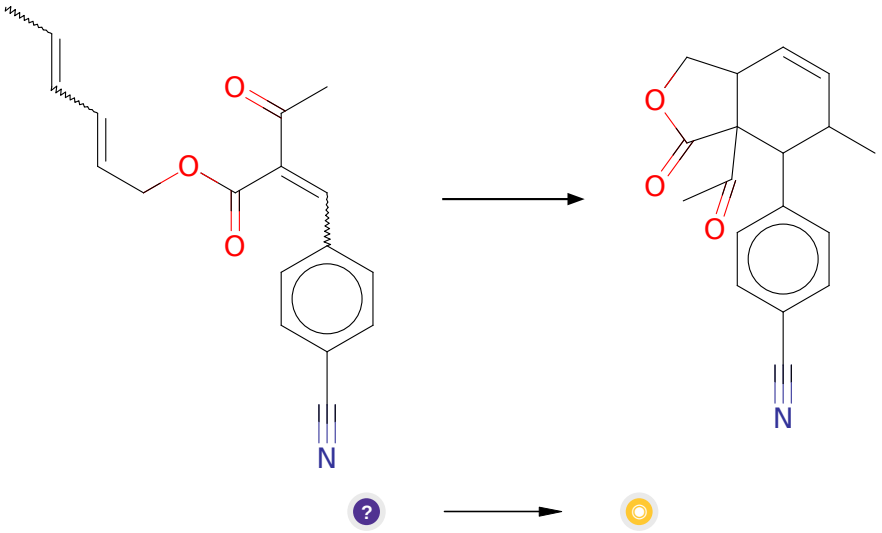
Typical conditions: K2CO3.DMF

Protections: none

Reference: *10.1016/j.bmcl.2005.08.026* AND *10.1021/ol034655r* (SI) AND *10.1039/C3RA41967C* AND *10.1016/j.bmcl.2012.03.093*

Retrosynthesis ID: 14685

2.4.5 Diels-Alder



Substrates:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2c1ccc(C#N)cc1

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 Path 5

Score: 84.06

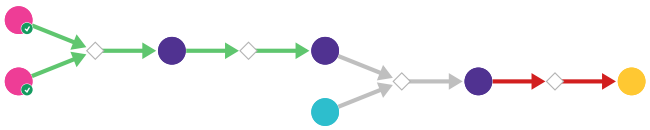
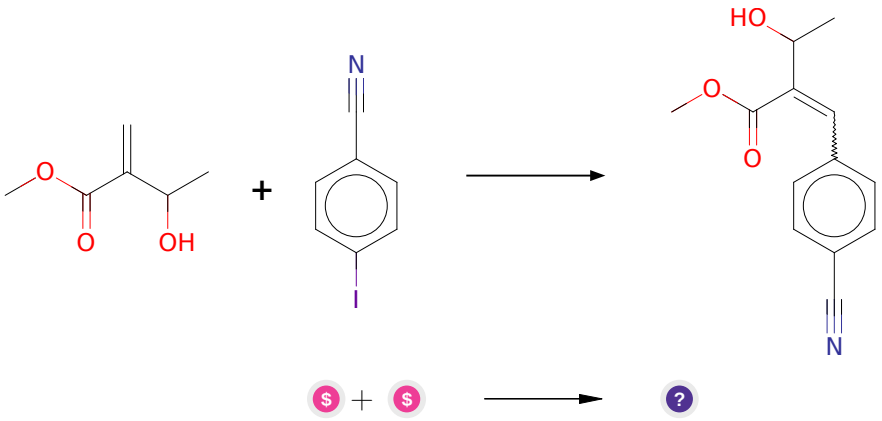


Figure 5: Outline of path 5

2.5.1 Heck Reaction



Substrates:

1. 4-Iodobenzonitrile - *available at Sigma-Aldrich*
2. Methyl 2-(1-hydroxyethyl)acrylate - *available at Sigma-Aldrich*

Products:

1. COC(=O)C(=Cc1ccc(C#N)cc1)C(C)O

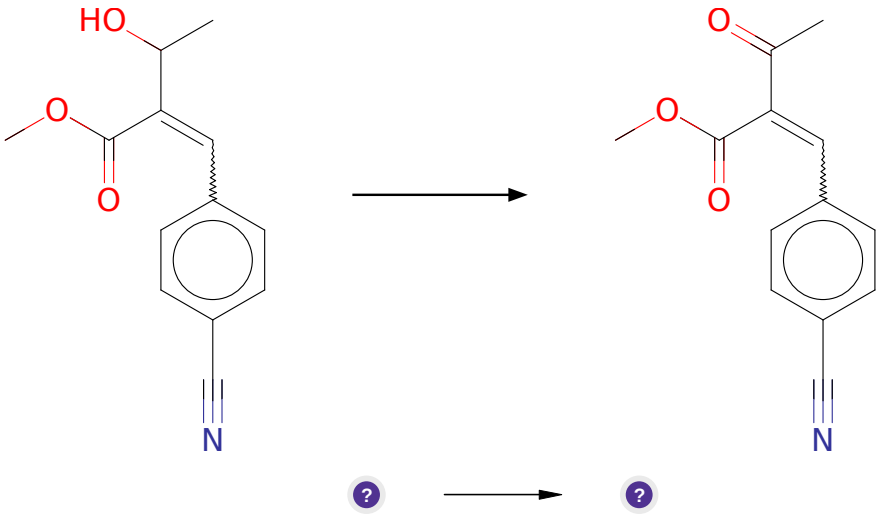
Typical conditions: Pd (cat). Ligand e.g. TXPTS. Base. Temp

Protections: none

Reference: *10.1016/j.tetlet.2010.08.057* or *10.1002/9780470716076* or *10.1021/op050106k* or *10.1021/ol0360288* or *10.1021/ol702755g* or *10.1055/s-0033-1340319* or *10.1016/j.tet.2004.10.049*

Retrosynthesis ID: 9193

2.5.2 Swern Oxidation



Substrates:

1. COC(=O)C(=Cc1ccc(C#N)cc1)C(C)O

Products:

1. COC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

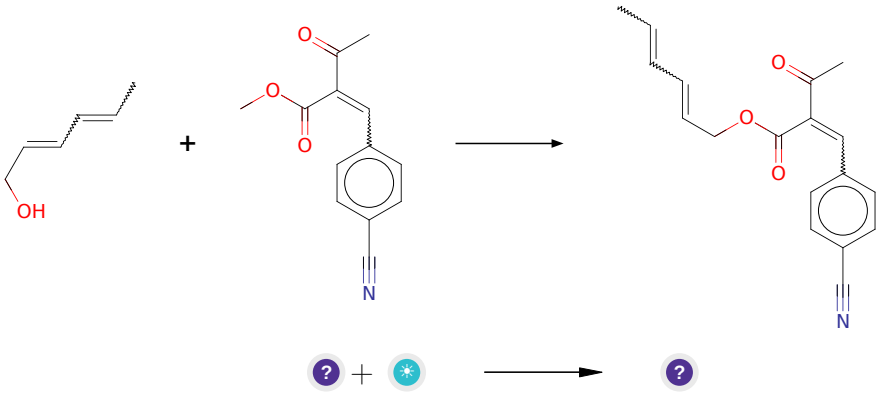
Typical conditions: oxalyl chloride.DMSO.DCM.NMe3.-40C

Protections: none

Reference: *10.1055/s-1990-27036*

Retrosynthesis ID: 11163

2.5.3 Acid catalyzed transesterification



Substrates:

1. COC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O
2. sorbic alcohol

Products:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

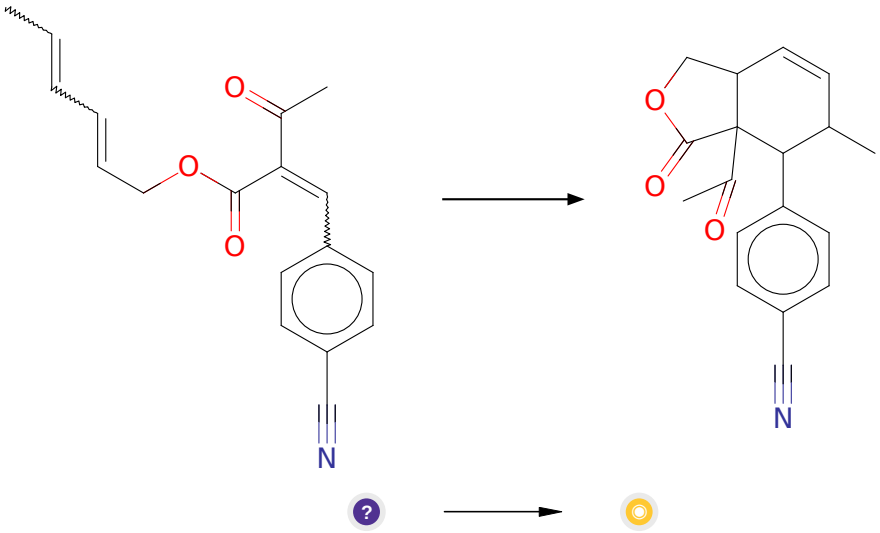
Typical conditions: H+

Protections: none

Reference: *10.1021/cr00020a004*

Retrosynthesis ID: 50438

2.5.4 Diels-Alder



Substrates:

1. CC=CC=CCOC(=O)C(=Cc1ccc(C#N)cc1)C(C)=O

Products:

1. CC(=O)C12C(=O)OCC1C=CC(C)C2c1ccc(C#N)cc1

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