# Paths of analysis*

L5

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

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**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:** 76.25

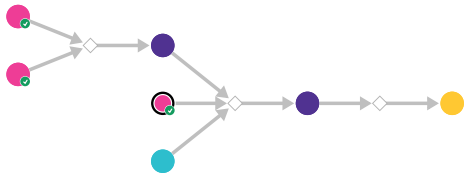
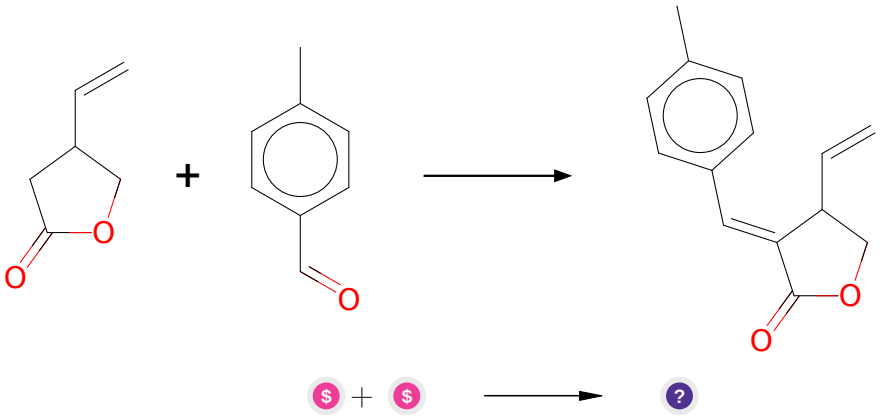


Figure 1: Outline of path 1

### 2.1.1 Condensation of esters with aldehydes




**Substrates:**

1. 4-ethenyloxolan-2-one - *available at Sigma-Aldrich*
2. p-Tolualdehyde - *available at Sigma-Aldrich*

**Products:**

1. C=CC1COC(=O)/C1=C/c1ccc(C)cc1

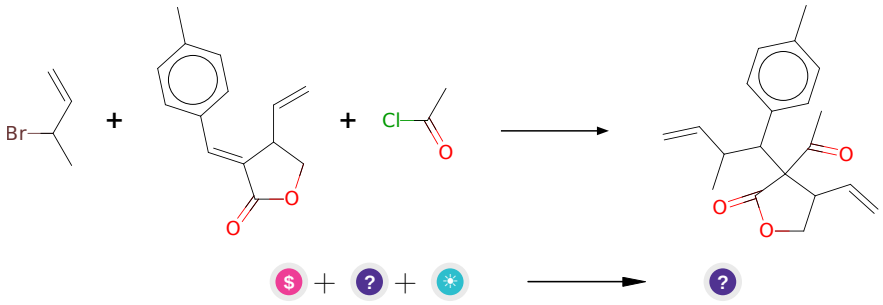
**Typical conditions:** 1.LDA.2RCHO

**Protections:** none

**Reference:** *10.1021/jo970387x* AND *10.1021/jo00076a051* AND *10.1016/S0040-4039(97)10827-9* AND *10.1055/s-2002-25767* AND *10.1039/P19920003277*

**Retrosynthesis ID:** 14981

### 2.1.2 Conjugated addition of organocuprate-acylation of enones and enoate esters




**Substrates:**

1. Acetyl chloride - *available at Sigma-Aldrich*
2. C=CC1COC(=O)/C1=C/c1ccc(C)cc1
3. 3-brom-but-1-en

**Products:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

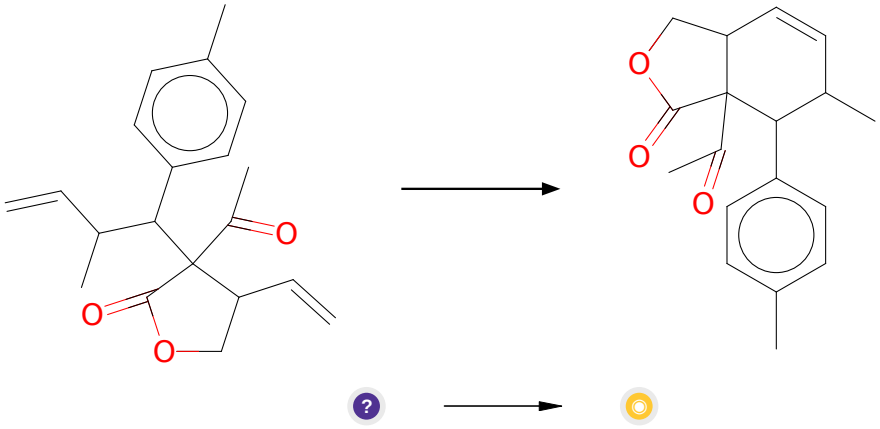
**Typical conditions:** 1.RCuLi.2.AcCl.HMPA

**Protections:** none

**Reference:** *10.3987/COM-99-S143* AND *10.1021/ja00148a023* AND *10.1016/S0040-4039(01)80891-1*

**Retrosynthesis ID:** 20523

### 2.1.3 Ring-Closing Metathesis




**Substrates:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

**Products:**

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

**Typical conditions:** catalyst e.g. Hoveyda-Grubbs . solvent e.g. CH2Cl2

**Protections:** none

**Reference:** DOI: *10.1002/anie.200800693* and *10.1021/acs.orglett.8b04003* and *10.1021/jo0264729* and *10.1021/ja072334v* and *10.1002/ejoc.201001102*

**Retrosynthesis ID:** 31014187

## 2.2 Path 2

**Score:** 76.25

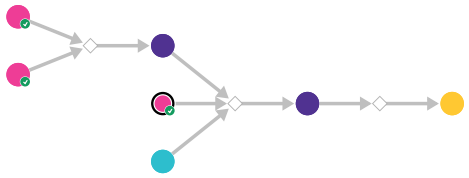
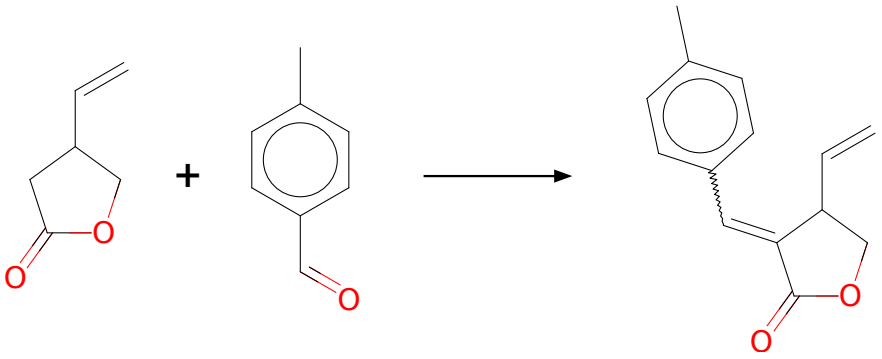


Figure 2: Outline of path 2

### 2.2.1 Condensation of esters with aldehydes/ketones



**Substrates:**

1. 4-ethenyloxolan-2-one - *available at Sigma-Aldrich*
2. p-Tolualdehyde - *available at Sigma-Aldrich*

**Products:**

1. C=CC1COC(=O)C1=Cc1ccc(C)cc1

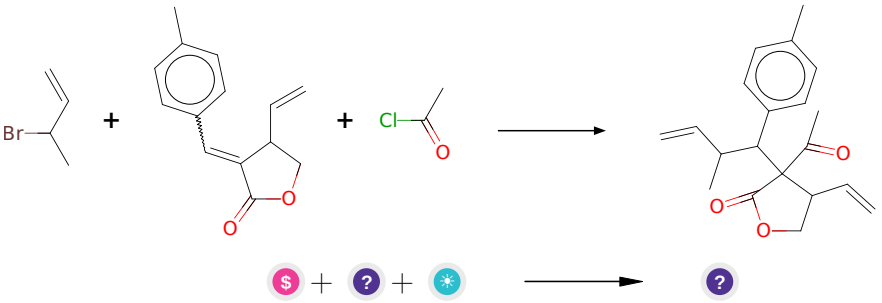
**Typical conditions:** LDA.THF

**Protections:** none

**Reference:** *10.1021/op040006z* AND *10.1016/j.bmcl.2005.10.104* AND

**Retrosynthesis ID:** 14983

### 2.2.2 Conjugated addition of organocuprate-acylation of enones and enoate esters



**Substrates:**

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

2. C=CC1COC(=O)C1=Cc1ccc(C)cc1
3. 3-brom-but-1-en

**Products:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

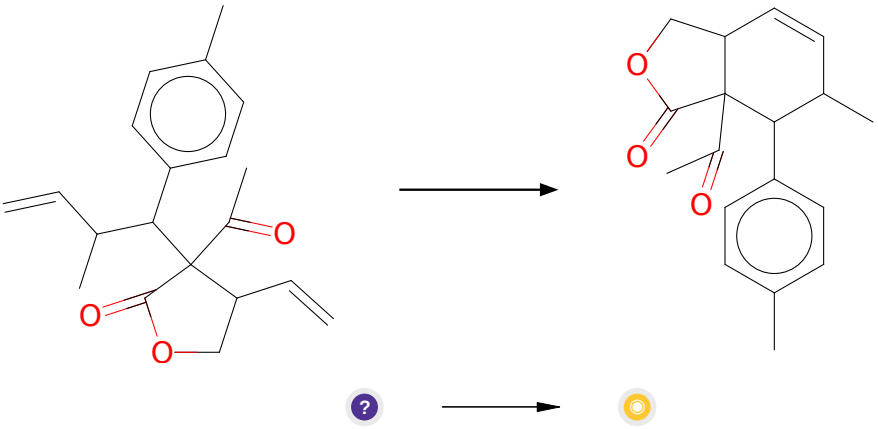
**Typical conditions:** 1.RCuLi.2.AcCl.HMPA

**Protections:** none

**Reference:** *10.3987/COM-99-S143* AND *10.1021/ja00148a023* AND *10.1016/S0040-4039(01)80891-1*

**Retrosynthesis ID:** 20527

### 2.2.3 Ring-Closing Metathesis




**Substrates:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

**Products:**

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

**Typical conditions:** catalyst e.g. Hoveyda-Grubbs . solvent e.g. CH2Cl2

**Protections:** none

**Reference:** DOI: *10.1002/anie.200800693* and *10.1021/acs.orglett.8b04003* and *10.1021/jo0264729* and *10.1021/ja072334v* and *10.1002/ejoc.201001102*

**Retrosynthesis ID:** 31014187

## 2.3 Path 3

**Score:** 76.25

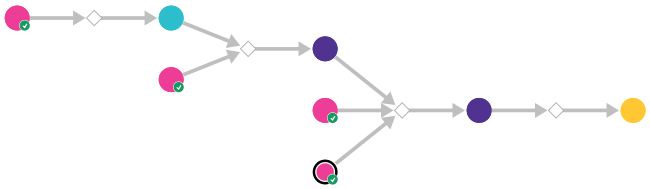
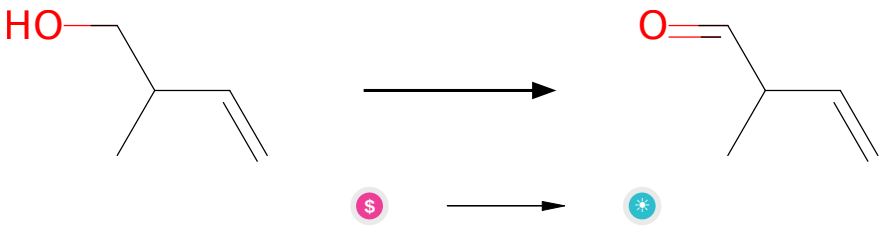


Figure 3: Outline of path 3

### 2.3.1 Oxidation of primary alcohols with DMP




**Substrates:**

1. 2-Methyl-3-buten-1-ol - *available at Sigma-Aldrich*

**Products:**

1. 2-methyl-but-3-enal

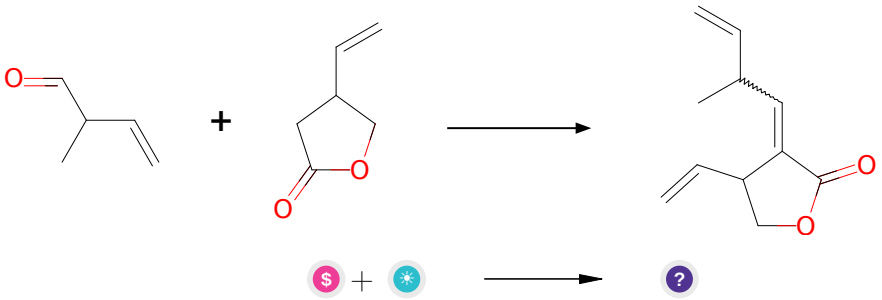
**Typical conditions:** DMP.DCM.0-25 C

**Protections:** none

**Reference:** *10.1016/j.bmc.2020.115469* p. 3, 9 and *10.1021/acs.jmedchem.8b01878* SI p. S43

**Retrosynthesis ID:** 50426

### 2.3.2 Condensation of esters with aldehydes/ketones



**Substrates:**

1. 4-ethenyloxolan-2-one - *available at Sigma-Aldrich*
2. 2-methyl-but-3-enal

**Products:**

1. C=CC(C)C=C1C(=O)OCC1C=C

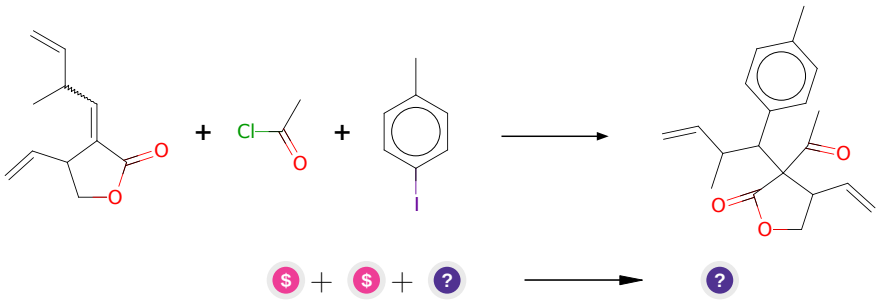
**Typical conditions:** LDA.THF

**Protections:** none

**Reference:** *10.1021/op040006z* AND *10.1016/j.bmcl.2005.10.104* AND

**Retrosynthesis ID:** 14983

### 2.3.3 Conjugated addition of organocuprate-acylation of enones and enoate esters



**Substrates:**

1. 4-Iodotoluene - *available at Sigma-Aldrich*
2. Acetyl chloride - *available at Sigma-Aldrich*
3. C=CC(C)C=C1C(=O)OCC1C=C

**Products:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

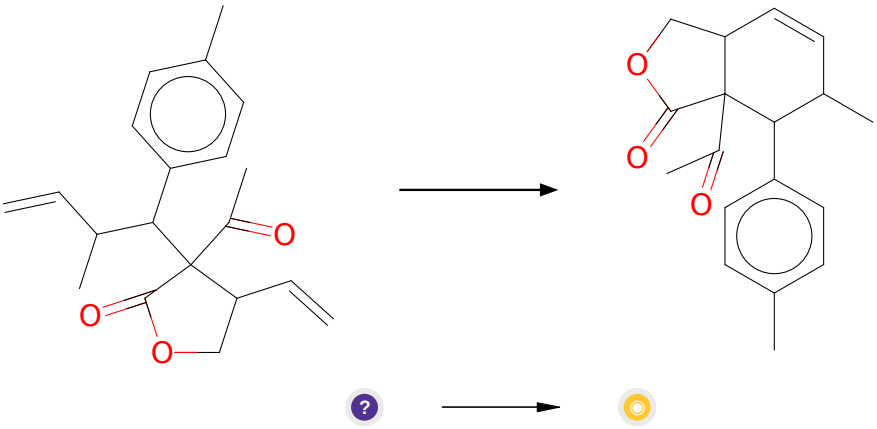
**Typical conditions:** 1.RCuLi.2.AcCl.HMPA

**Protections:** none

**Reference:** *10.3987/COM-99-S143* AND *10.1021/ja00148a023* AND *10.1016/S0040-4039(01)80891-1*

**Retrosynthesis ID:** 20528

### 2.3.4 Ring-Closing Metathesis




**Substrates:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

**Products:**

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

**Typical conditions:** catalyst e.g. Hoveyda-Grubbs . solvent e.g. CH2Cl2

**Protections:** none

**Reference:** DOI: *10.1002/anie.200800693* and *10.1021/acs.orglett.8b04003* and *10.1021/jo0264729* and *10.1021/ja072334v* and *10.1002/ejoc.201001102*

**Retrosynthesis ID:** 31014187

## 2.4 Path 4

**Score:** 76.25

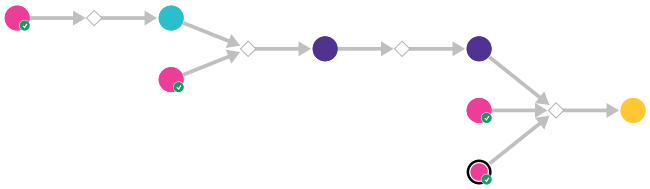
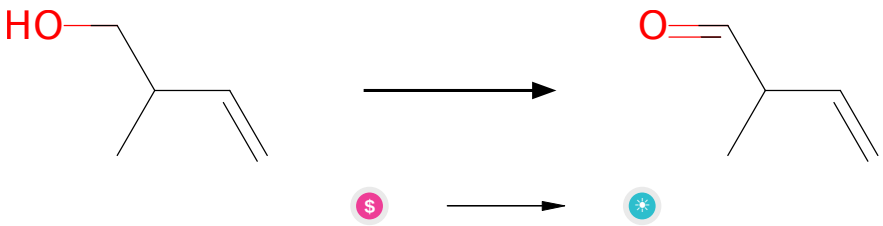


Figure 4: Outline of path 4

### 2.4.1 Oxidation of primary alcohols with DMP




**Substrates:**

1. 2-Methyl-3-buten-1-ol - *available at Sigma-Aldrich*

**Products:**

1. 2-methyl-but-3-enal

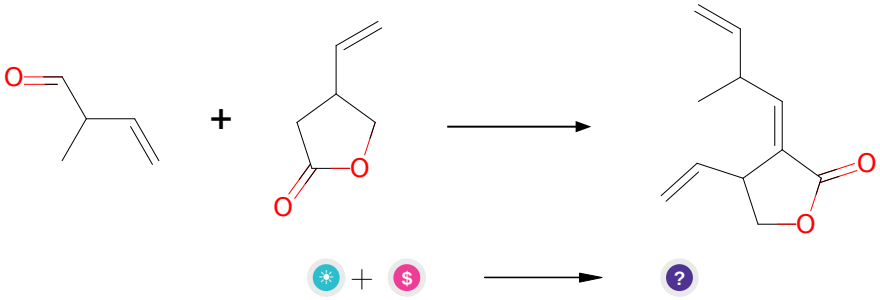
**Typical conditions:** DMP.DCM.0-25 C

**Protections:** none

**Reference:** *10.1016/j.bmc.2020.115469* p. 3, 9 and *10.1021/acs.jmedchem.8b01878* SI p. S43

**Retrosynthesis ID:** 50426

### 2.4.2 Condensation of esters with aldehydes



**Substrates:**

1. 2-methyl-but-3-enal
2. 4-ethenyloxolan-2-one - *available at Sigma-Aldrich*

**Products:**

1. C=CC(C)/C=C1/C(=O)OCC1C=C

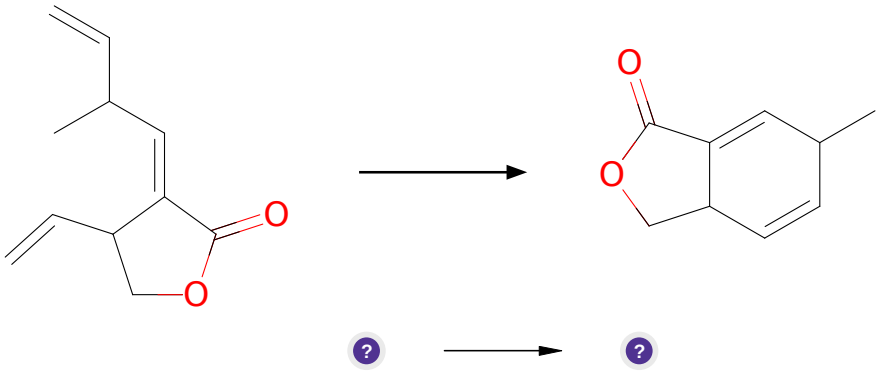
**Typical conditions:** 1.LDA.2RCHO

**Protections:** none

**Reference:** *10.1021/jo970387x* AND *10.1021/jo00076a051* AND *10.1016/S0040-4039(97)10827-9* AND *10.1055/s-2002-25767* AND *10.1039/P19920003277*

**Retrosynthesis ID:** 14981

### 2.4.3 Ring-Closing Metathesis



**Substrates:**

1. C=CC(C)/C=C1/C(=O)OCC1C=C

**Products:**

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

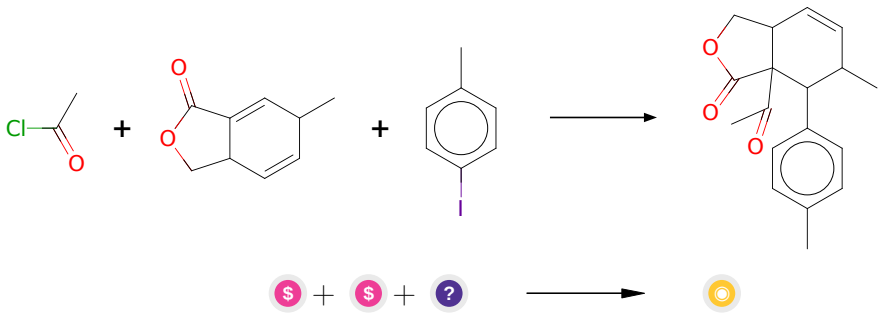
**Typical conditions:** catalyst e.g. Hoveyda-Grubbs . solvent e.g. CH2Cl2

**Protections:** none

**Reference:** DOI: *10.1002/anie.200800693* and *10.1021/acs.orglett.8b04003* and *10.1021/jo0264729* and *10.1021/ja072334v* and *10.1002/ejoc.201001102*

**Retrosynthesis ID:** 31014187

### 2.4.4 Conjugated addition of organocuprate-acylation of enones and enoate esters




**Substrates:**

1. 4-Iodotoluene - *available at Sigma-Aldrich*
2. Acetyl chloride - *available at Sigma-Aldrich*
3. CC1C=CC2COC(=O)C2=C1

**Products:**

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

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

**Protections:** none

**Reference:** *10.3987/COM-99-S143* AND *10.1021/ja00148a023* AND *10.1016/S0040-4039(01)80891-1*

**Retrosynthesis ID:** 12521

## 2.5 Path 5

**Score:** 84.06

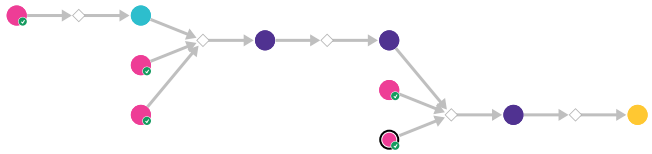
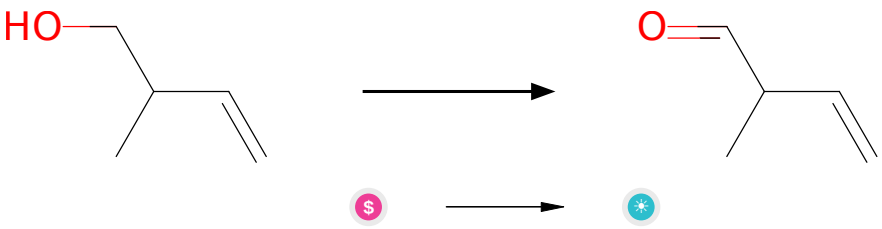


Figure 5: Outline of path 5

### 2.5.1 Oxidation of primary alcohols with DMP




**Substrates:**

1. 2-Methyl-3-buten-1-ol - *available at Sigma-Aldrich*

**Products:**

1. 2-methyl-but-3-enal

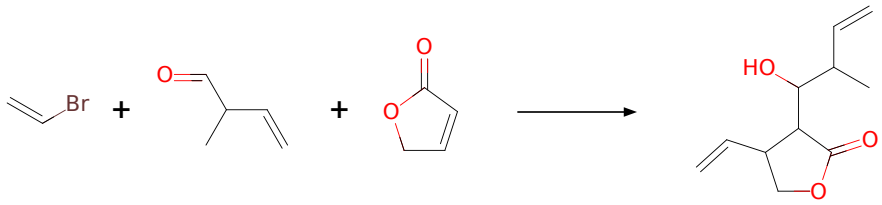
**Typical conditions:** DMP.DCM.0-25 C

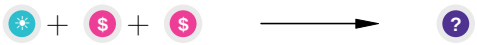
**Protections:** none

**Reference:** *10.1016/j.bmc.2020.115469* p. 3, 9 and *10.1021/acs.jmedchem.8b01878* SI p. S43

**Retrosynthesis ID:** 50426

### 2.5.2 Alkenylation-Aldol reaction of enones and enoate esters





**Substrates:**

1. 2-methyl-but-3-enal
2. 2(5H)-Furanone - *available at Sigma-Aldrich*
3. Bromoethylene - *available at Sigma-Aldrich*

**Products:**

1. C=CC(C)C(O)C1C(=O)OCC1C=C

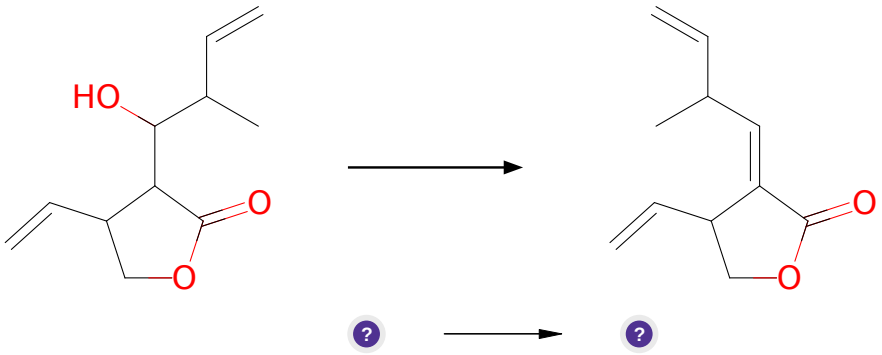
**Typical conditions:** 1.RCuLi.2.RCHO

**Protections:** none

**Reference:** *10.1021/jo2010186* AND *10.1021/jo101439h* AND *10.1021/ja906241w* AND *10.1016/S0040-4039(01)80891-1* AND *10.1016/S0040-4020(01)82115-3*

**Retrosynthesis ID:** 13048

### 2.5.3 Dehydration of Beta Hydroxy Carbonyl Compounds




**Substrates:**

1. C=CC(C)C(O)C1C(=O)OCC1C=C

**Products:**

1. C=CC(C)/C=C1/C(=O)OCC1C=C

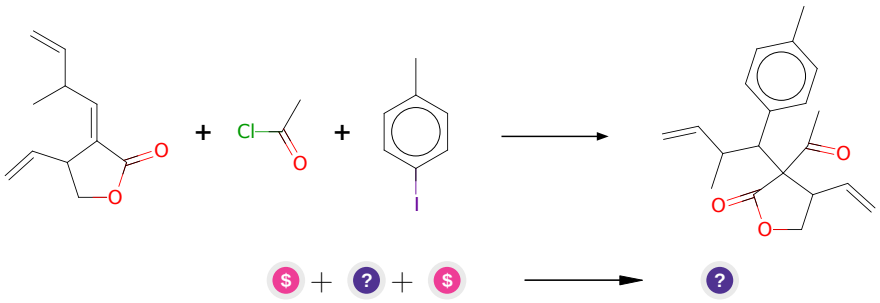
**Typical conditions:** TsOH

**Protections:** none

**Reference:** DOI:*10.1002/anie.201204977* AND *10.1021/ol062777o*

**Retrosynthesis ID:** 7732

### 2.5.4 Conjugated addition of organocuprate-acylation of enones and enoate esters



**Substrates:**

1. 4-Iodotoluene - *available at Sigma-Aldrich*
2. C=CC(C)/C=C1/C(=O)OCC1C=C
3. Acetyl chloride - *available at Sigma-Aldrich*

**Products:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

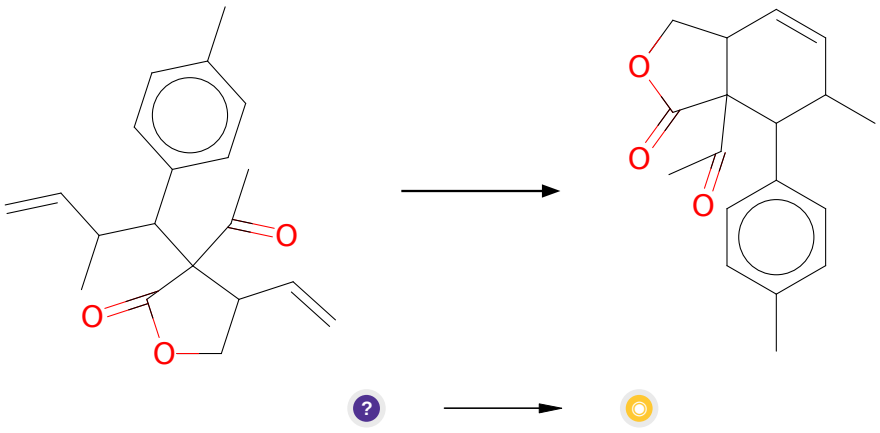
**Typical conditions:** 1.RCuLi.2.AcCl.HMPA

**Protections:** none

**Reference:** *10.3987/COM-99-S143* AND *10.1021/ja00148a023* AND *10.1016/S0040-4039(01)80891-1*

**Retrosynthesis ID:** 20524

### 2.5.5 Ring-Closing Metathesis



**Substrates:**

1. C=CC(C)C(c1ccc(C)cc1)C1(C(C)=O)C(=O)OCC1C=C

**Products:**

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

**Typical conditions:** catalyst e.g. Hoveyda-Grubbs . solvent e.g. CH2Cl2

**Protections:** none

**Reference:** DOI: *10.1002/anie.200800693* and *10.1021/acs.orglett.8b04003* and *10.1021/jo0264729* and *10.1021/ja072334v* and *10.1002/ejoc.201001102*

**Retrosynthesis ID:** 31014187