Paths of analysis*

PG8

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: 76.25

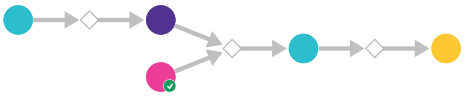
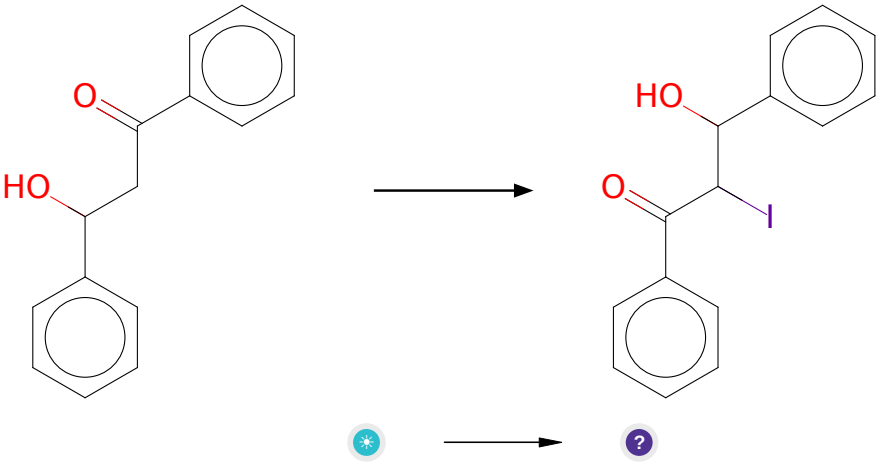


Figure 1: Outline of path 1

2.1.1 Synthesis of aryl a-iodoketones



Substrates:

1. 3-hydroxy-1,3-diphenyl-propan-1-one

Products:

1. O=C(c1ccccc1)C(I)C(O)c1ccccc1

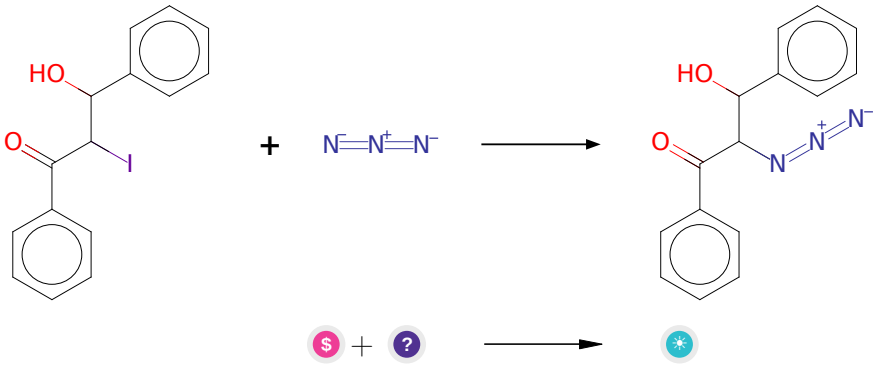
Typical conditions: I2.CuO.MeOH.reflux

Protections: none

Reference: *10.1055/s-2007-983880* or DOI: *10.1055/s-2003-38689*

Retrosynthesis ID: 10902

2.1.2 Nucleophilic substitution with azides



Substrates:

1. Potassium azide - *available at Sigma-Aldrich*
2. O=C(c1ccccc1)C(I)C(O)c1ccccc1

Products:

1. C15H13N3O2

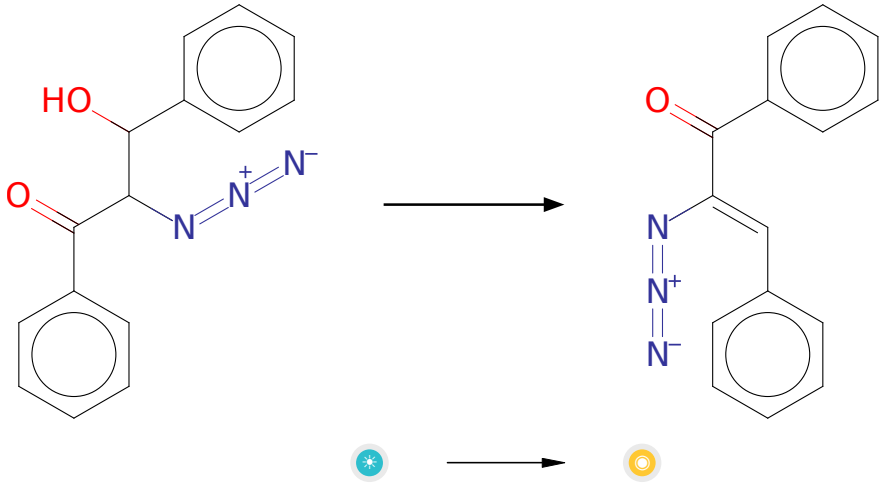
Typical conditions: DMF.heat

Protections: none

Reference: *10.1016/j.tet.2015.11.048* and *10.1016/j.steroids.2015.10.016* and *10.1016/j.carres.2014.02.022*

Retrosynthesis ID: 31011252

2.1.3 Dehydration of Beta Hydroxy Carbonyl Compounds



Substrates:

1. C15H13N3O2

Products:

1. a-azidochalcone

Typical conditions: TsOH

Protections: none

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

Retrosynthesis ID: 7732

2.2 Path 2

Score: `76.25`

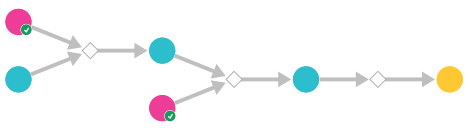
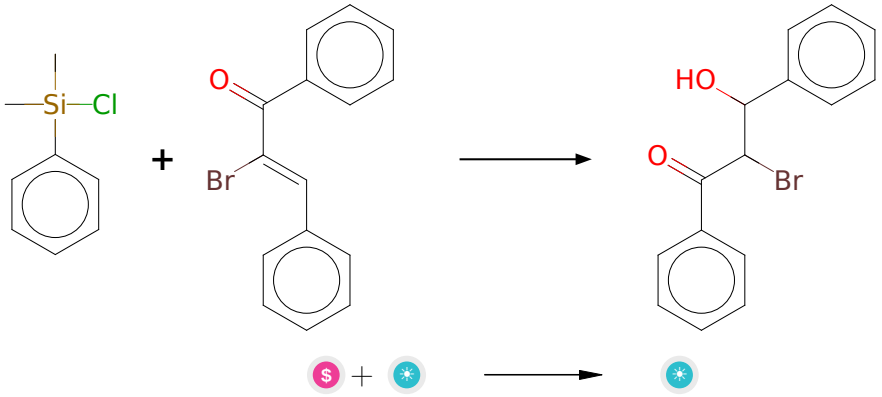


Figure 2: Outline of path 2

2.2.1 Addition of silanes to Michael acceptors followed by oxidation



Substrates:

1. DMPSCl - *available at Sigma-Aldrich*
2. a-bromo-trans-chalcone

Products:

1. 2-bromo-3-hydroxy-1,3-diphenyl-propan-1-one

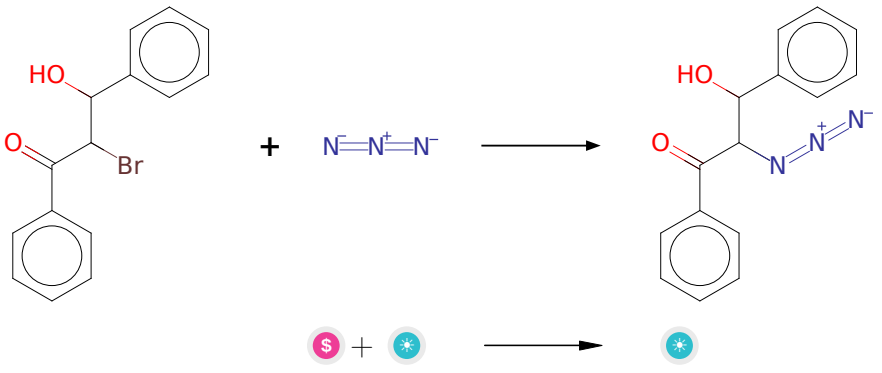
Typical conditions: 1.nBuLi.2.CuCN.3.electrophile.4.H2O2

Protections: none

Reference: *10.1021/ja058370g* AND (Oxidation) *10.1021/jo9905672* or *10.1021/ol300832f*

Retrosynthesis ID: 20295

2.2.2 Nucleophilic substitution with azides



Substrates:

1. Potassium azide - *available at Sigma-Aldrich*
2. 2-bromo-3-hydroxy-1,3-diphenyl-propan-1-one

Products:

1. C15H13N3O2

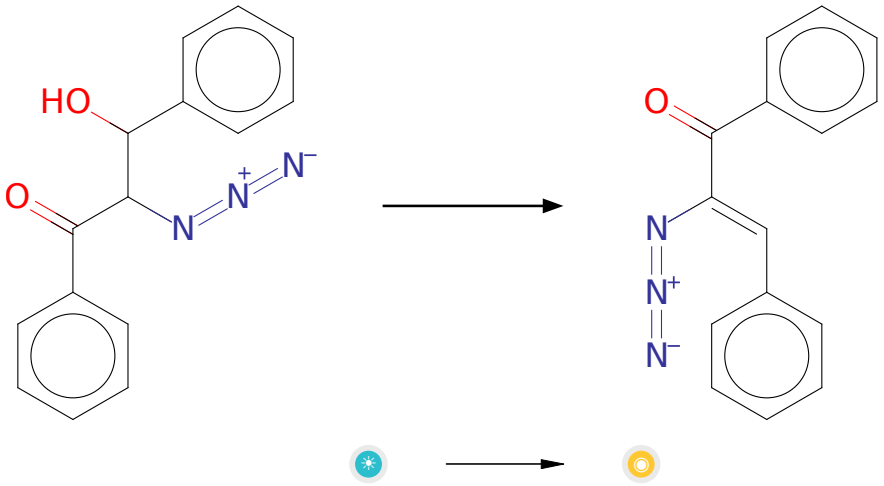
Typical conditions: DMF.heat

Protections: none

Reference: *10.1021/ol049369+* and *10.1016/S0040-4039(00)61343-6* and *10.1016/j.bmcl.2005.03.055*

Retrosynthesis ID: 31011250

2.2.3 Dehydration of Beta Hydroxy Carbonyl Compounds



Substrates:

1. C15H13N3O2

Products:

1. a-azidochalcone

Typical conditions: TsOH

Protections: none

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

Retrosynthesis ID: 7732

2.3 Path 3

Score: 76.25

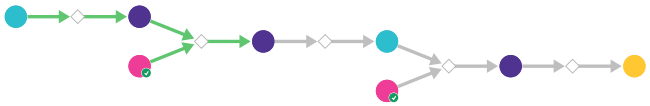
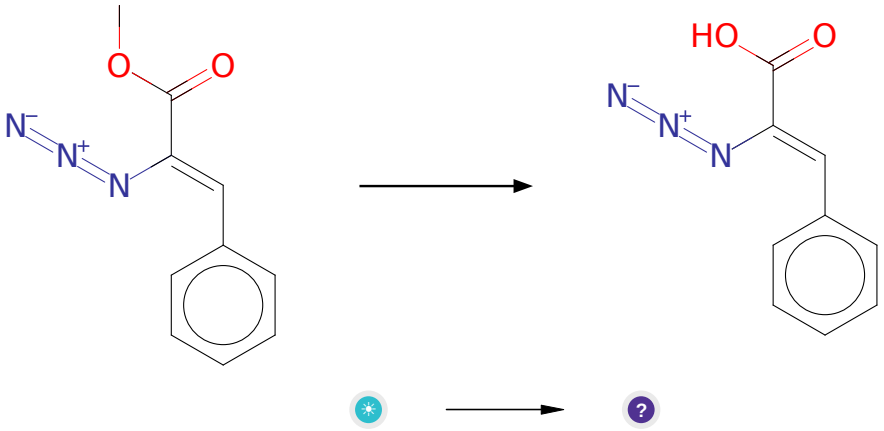


Figure 3: Outline of path 3

2.3.1 Synthesis of Carboxylic Acids via Ester Hydrolysis



Substrates:

1. a-azidozimtsaeure-methylester

Products:

1. [N-]=[N+]=N/C(=C\c1ccccc1)C(=O)O

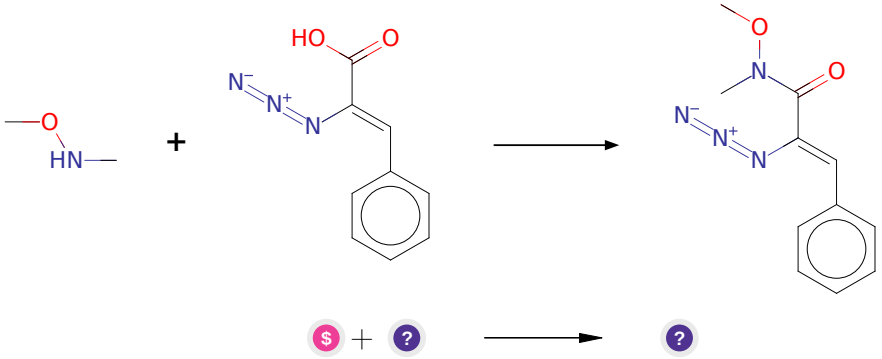
Typical conditions: water.base

Protections: none

Reference: DOI: *10.1016/j.phytochem.2012.08.001* and *10.1021/jm900803q* and *10.1002/anie.201303108* (SI page S14) and *10.1016/j.ejmech.2010.09.003*

Retrosynthesis ID: 9224

2.3.2 Synthesis of O-substituted N-substituted hydroxamic acids



Substrates:

1. n-methoxymethylamine - *available at Sigma-Aldrich*
2. [N-]=[N+]=N/C(=C\c1ccccc1)C(=O)O

Products:

1. CON(C)C(=O)/C(=C/c1ccccc1)N=[N+]=[N-]

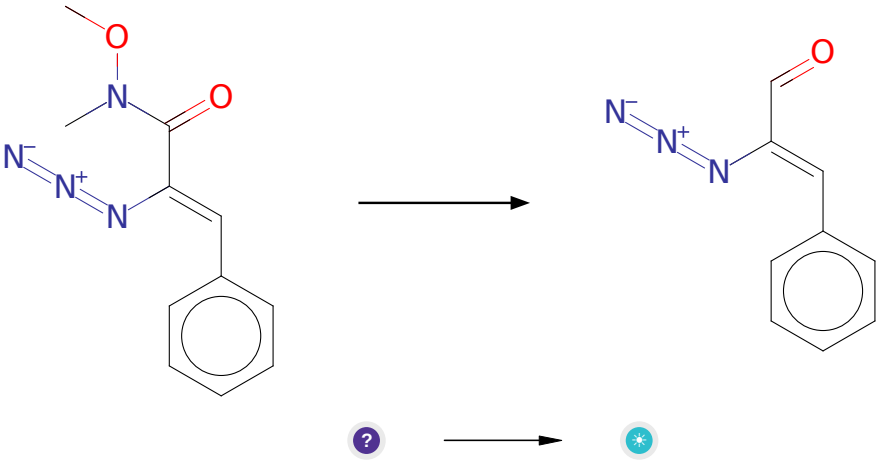
Typical conditions: DCC.DMAP or CDI.TEA.DCM

Protections: none

Reference: Patent: WO2007/67333A2, 2007 & *10.1016/j.bmcl.2008.09.100*

Retrosynthesis ID: 1152

2.3.3 Aldehyde Formation



Substrates:

1. CON(C)C(=O)/C(=C/c1ccccc1)N=[N+]=[N-]

Products:

1. C9H7N3O

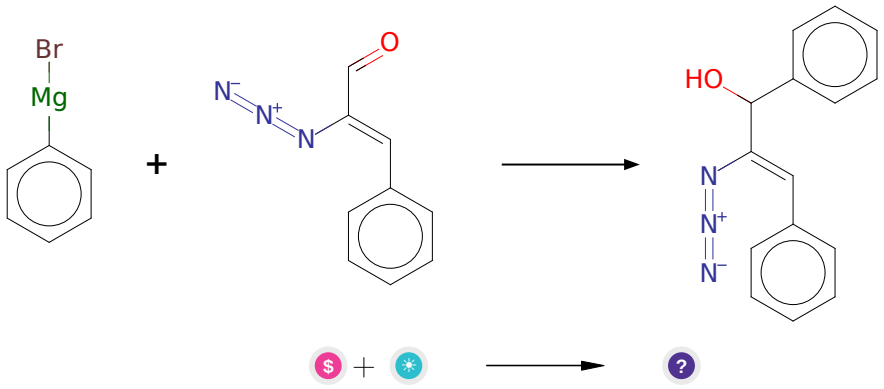
Typical conditions: DIBAL.toluene.CO

Protections: none

Reference: *10.1021/jo202652f*

Retrosynthesis ID: 11504

2.3.4 Grignard-Type Reaction



Substrates:

1. Phenylmagnesium bromide solution - *available at Sigma-Aldrich*
2. C9H7N3O

Products:

1. [N-]=[N+]=N/C(=C\c1ccccc1)C(O)c1ccccc1

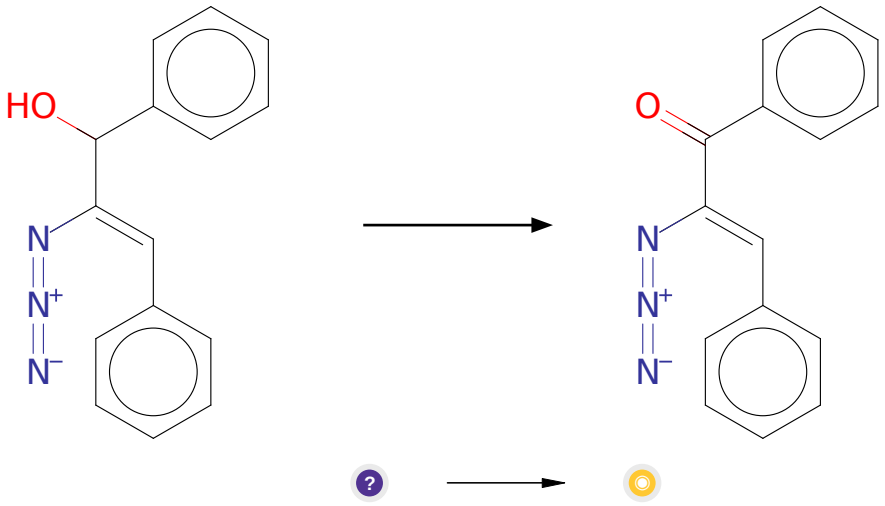
Typical conditions: Mg or Li.ether

Protections: none

Reference: *10.1055/s-0030-1260809* or *10.1021/jm061429p* or *10.1021/jo0621423* or *10.1021/ja00373a036* or *10.1016/S0040-4020(01)00457-4*

Retrosynthesis ID: 25123

2.3.5 Swern Oxidation



Substrates:

1. [N-]=[N+]=N/C(=C\c1ccccc1)C(O)c1ccccc1

Products:

1. a-azidochalcone

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

Protections: none

Reference: *10.1055/s-1990-27036*

Retrosynthesis ID: 11163

2.4 Path 4

Score: `84.06`

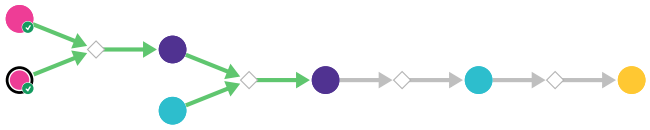
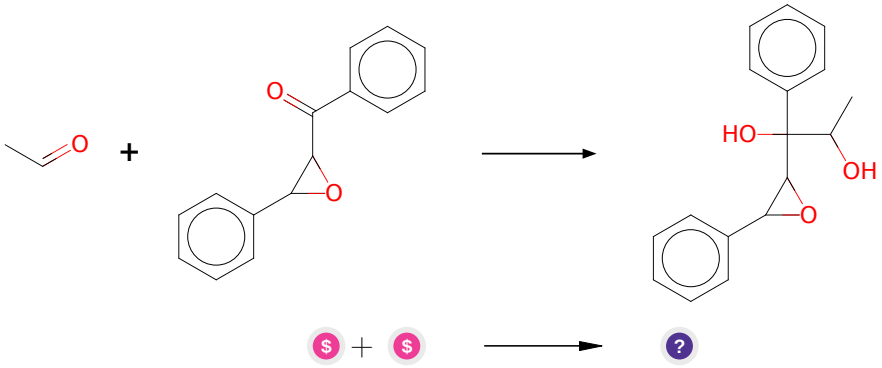


Figure 4: Outline of path 4

2.4.1 Pinacol Coupling Reaction



Substrates:

1. 2-Benzoyl-3-phenyloxirane - *available at Sigma-Aldrich*
2. Ethanal - *available at Sigma-Aldrich*

Products:

1. CC(O)C(O)(c1ccccc1)C1OC1c1ccccc1

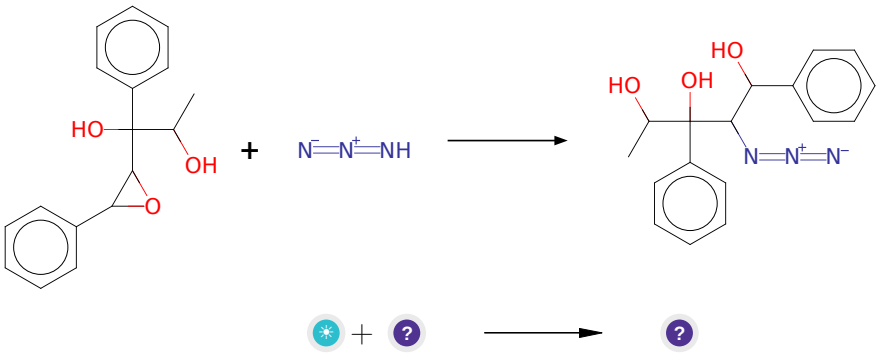
Typical conditions: Mg.NH4Cl.H2O or Mg.SmI2.TMSCl.THF.HMPA

Protections: none

Reference: *10.1021/jo982497p* p. 3234, 3236 and *10.1021/ol0506258* p. 2366, SI p. S12

Retrosynthesis ID: 10205

2.4.2 Ring-opening of epoxides or thiiranes with azides



Substrates:

1. hydrazoic acid
2. CC(O)C(O)(c1ccccc1)C1OC1c1ccccc1

Products:

1. CC(O)C(O)(c1ccccc1)C(N=[N+]=[N-])C(O)c1ccccc1

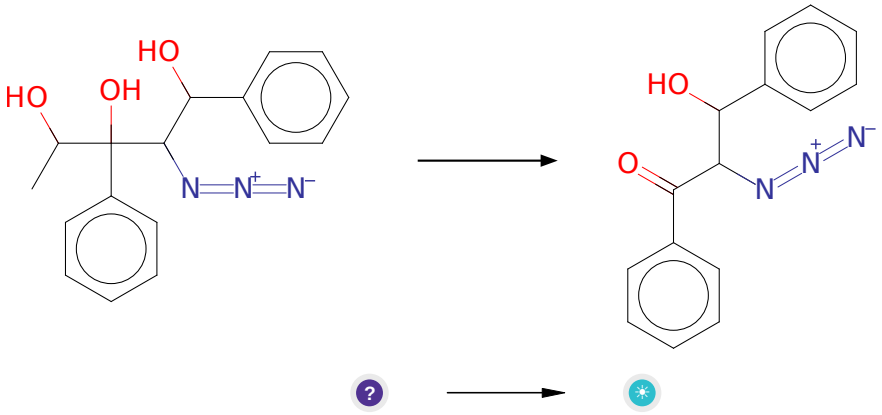
Typical conditions: NaN3.NH4Cl.MeOH.H2O.65 C

Protections: none

Reference: *10.1021/jm400529f* p. 4361, 4367 and *10.1021/ja003713q* p. 1590, 1594

Retrosynthesis ID: 858

2.4.3 Cleavage of 1,2-diols with NaIO4



Substrates:

1. CC(O)C(O)(c1ccccc1)C(N=[N+]=[N-])C(O)c1ccccc1

Products:

1. C15H13N3O2

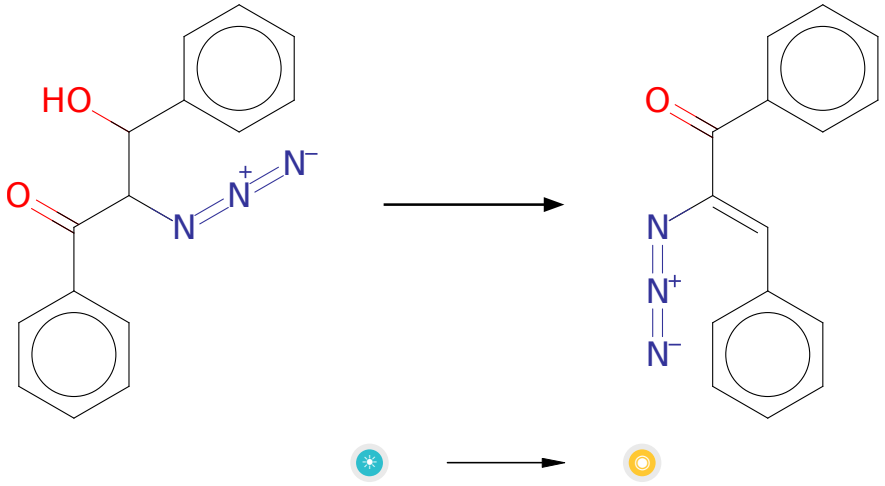
Typical conditions: NaIO4.solvent

Protections: none

Reference: *10.1039/C5OB00238A* and *10.1002/chem.201301371* and *10.1021/ol052106a*

Retrosynthesis ID: 31017508

2.4.4 Dehydration of Beta Hydroxy Carbonyl Compounds



Substrates:

1. C15H13N3O2

Products:

1. a-azidochalcone

Typical conditions: TsOH

Protections: none

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

Retrosynthesis ID: 7732

2.5 Path 5

Score: `84.06`

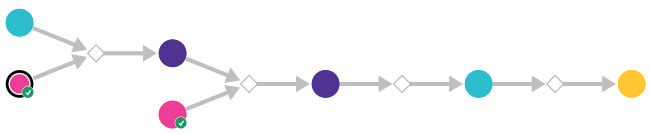
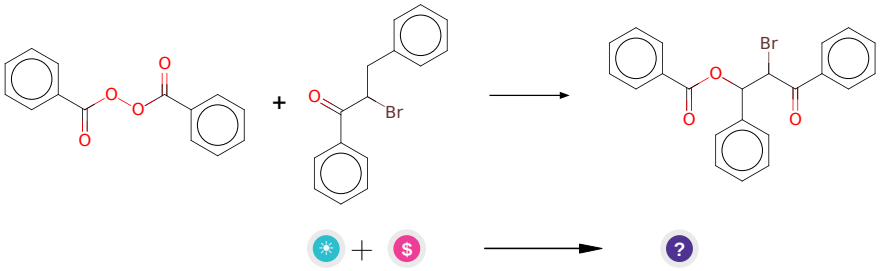


Figure 5: Outline of path 5

2.5.1 Free-radicals synthesis of benzoyl esters



Substrates:

1. 2-brom-1,3-diphenyl-propan-1-on
2. Luperox(r) A98 - *available at Sigma-Aldrich*

Products:

1. O=C(OC(c1ccccc1)C(Br)C(=O)c1ccccc1)c1ccccc1

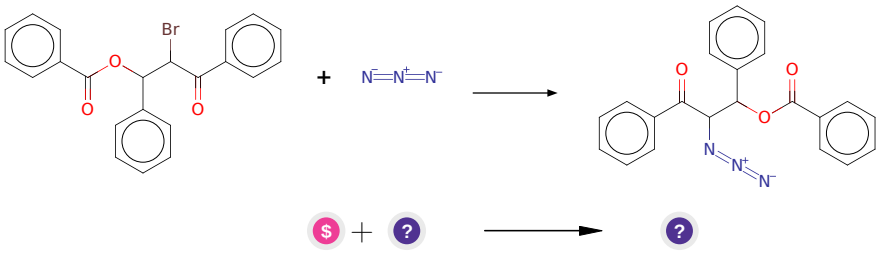
Typical conditions: CuBr

Protections: none

Reference: DOI: *10.1021/jo01265a066*

Retrosynthesis ID: 332

2.5.2 Nucleophilic substitution with azides



Substrates:

1. Potassium azide - *available at Sigma-Aldrich*
2. O=C(OC(c1ccccc1)C(Br)C(=O)c1ccccc1)c1ccccc1

Products:

1. [N-]=[N+]=NC(C(=O)c1ccccc1)C(OC(=O)c1ccccc1)c1ccccc1

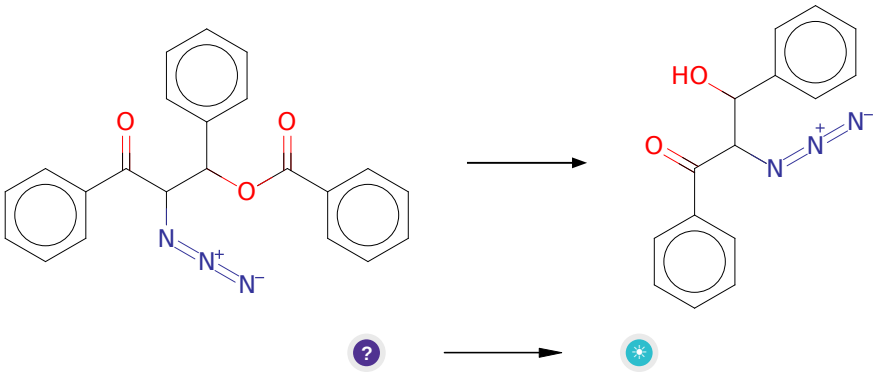
Typical conditions: DMF.heat

Protections: none

Reference: *10.1021/ol049369+* and *10.1016/S0040-4039(00)61343-6* and *10.1016/j.bmcl.2005.03.055*

Retrosynthesis ID: 31011251

2.5.3 Hydrolysis of benzoates



Substrates:

1. [N-]=[N+]=NC(C(=O)c1ccccc1)C(OC(=O)c1ccccc1)c1ccccc1

Products:

1. C15H13N3O2

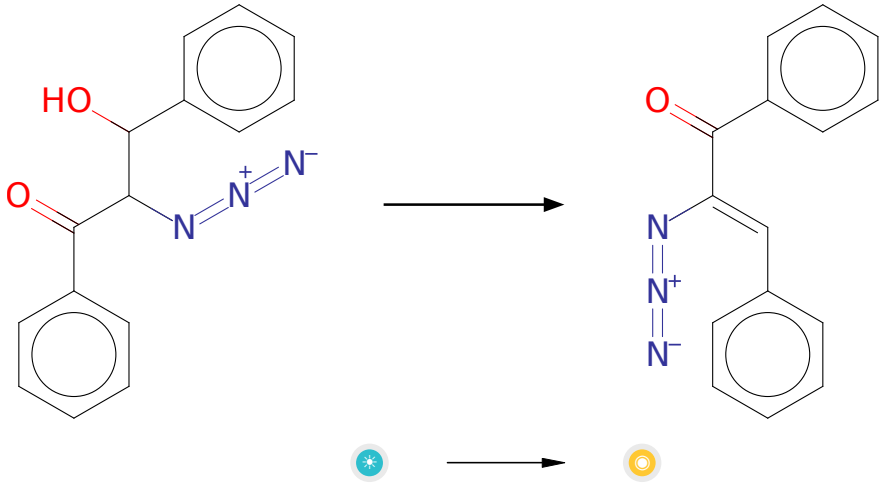
Typical conditions: LiOH/K2CO3/NH3.MeOH.H2O.THF

Protections: none

Reference: *10.1021/jm0502788* and *10.1016/j.tetlet.2008.09.165* and *10.1021/jm034098e* and *10.1021/jo049277y* and *10.1055/s-0033-1338657*

Retrosynthesis ID: 25136

2.5.4 Dehydration of Beta Hydroxy Carbonyl Compounds



Substrates:

1. C15H13N3O2

Products:

1. a-azidochalcone

Typical conditions: TsOH

Protections: none

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

Retrosynthesis ID: 7732