Paths of analysis*

AS3

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

Strategies: none selected

FGI Coeff: 0

Tunnels Coeff: 0

JSON Parameters: {}

2 Paths

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

2.1 Path 1

Score: 250.23

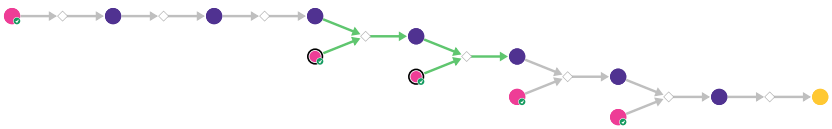
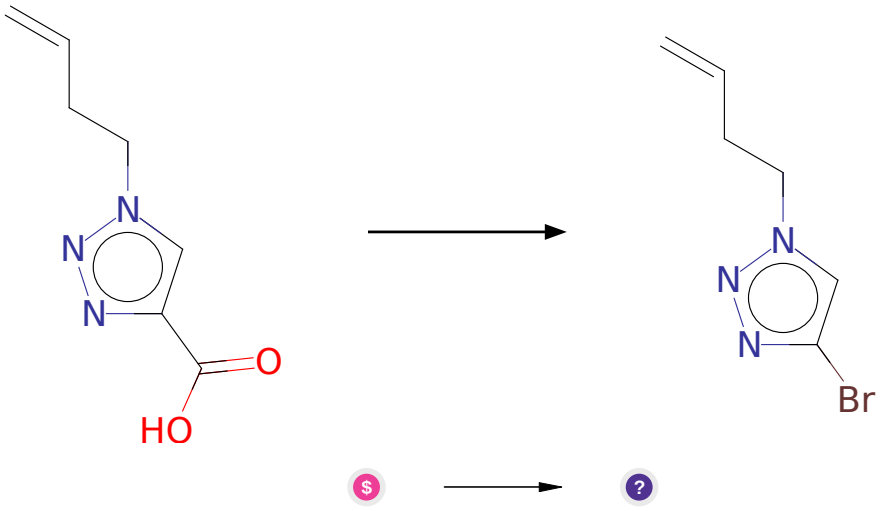


Figure 1: Outline of path 1

2.1.1 Decarboxylative Bromination of Aromatic Carboxylic Acids



Substrates:

1. 1-(but-3-en-1-yl)-1H-1,2,3-triazole-4-carboxylic acid - *available at Sigma-Aldrich*

Products:

1. C=CCCn1cc(Br)nn1

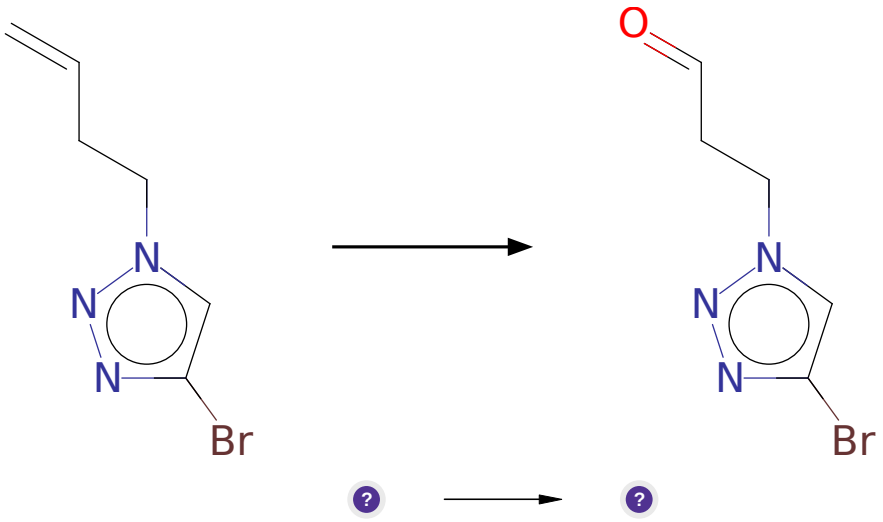
Typical conditions: N-hydroxy-2-thiopyridone.AIBN.Trichlorobromomethane.toluene.light.heat

Protections: none

Reference: *10.1055/s-0037-1610188* and *10.1016/S0040-4039(00)98266-2* and *10.1016/S0040-4020(01)90307-2*

Retrosynthesis ID: 31021104

2.1.2 Ozonolysis



Substrates:

1. C=CCCn1cc(Br)nn1

Products:

1. O=CCCn1cc(Br)nn1

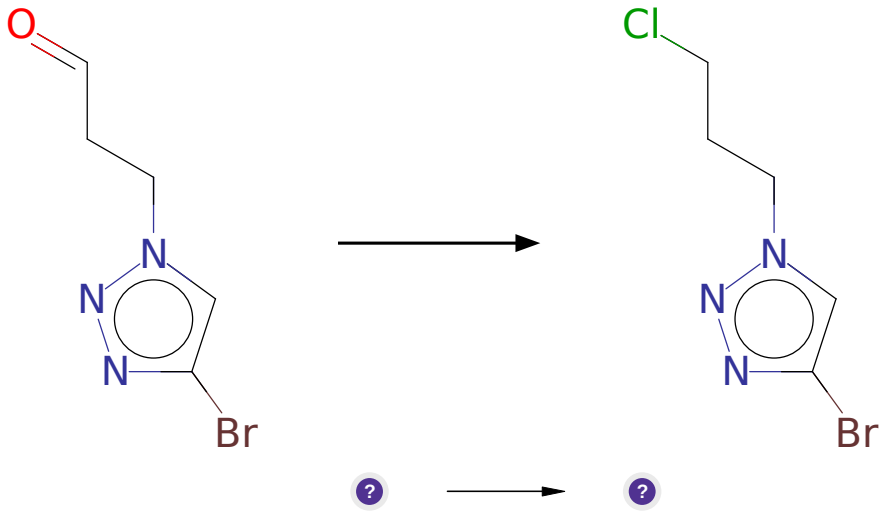
Typical conditions: O3.MeOH.CH2Cl2.PPh3 or Me2S.low temperature

Protections: none

Reference: *10.1016/j.tet.2017.03.039*

Retrosynthesis ID: 5074

2.1.3 In(III) OH-catalyzed halogenation of aldehydes



Substrates:

1. O=CCCn1cc(Br)nn1

Products:

1. ClCCCn1cc(Br)nn1

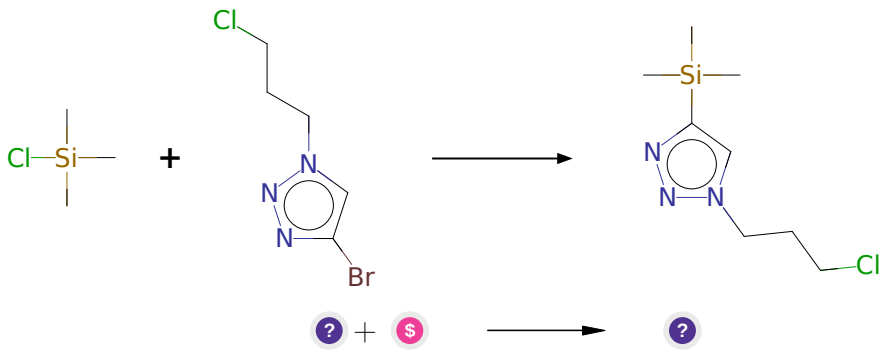
Typical conditions: InO3.chloroform.SiMe2Cl

Protections: none

Reference: DOI: *10.1021/ja0283246*

Retrosynthesis ID: 10477

2.1.4 Synthesis of arylsilanes



Substrates:

1. ClCCCn1cc(Br)nn1
2. TMSCl - *available at Sigma-Aldrich*

Products:

1. C[Si](C)(C)c1cn(CCCCl)nn1

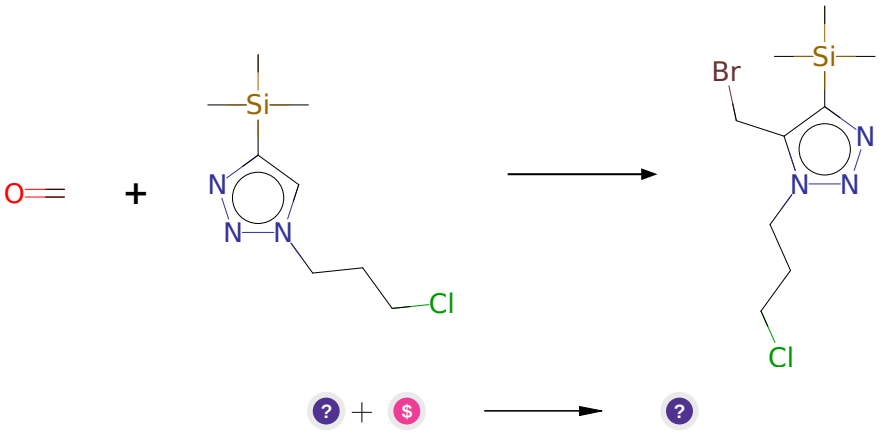
Typical conditions: 1.nBuLi.2.ClSnR3

Protections: none

Reference: *10.1071/CH9851147*.

Retrosynthesis ID: 5370

2.1.5 Blanc bromomethylation



Substrates:

1. C[Si](C)(C)c1cn(CCCCl)nn1
2. Formalin - *available at Sigma-Aldrich*

Products:

1. C[Si](C)(C)c1nnn(CCCCl)c1CBr

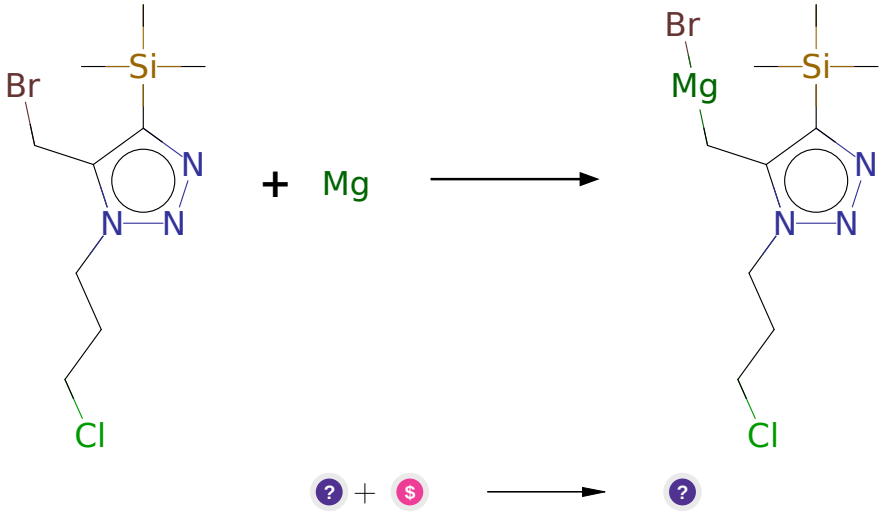
Typical conditions: HBr.heat

Protections: none

Reference: *10.1021/ja011493q* and *10.1021/ma012195g* and *10.1016/S0040-4039(02)01769-0* and *10.1021/ja002069c*

Retrosynthesis ID: 31010730

2.1.6 Synthesis of alkyl Grignard reagents



Substrates:

1. C[Si](C)(C)c1nnn(CCCCl)c1CBr
2. Magnesium - *available at Sigma-Aldrich*

Products:

1. C[Si](C)(C)c1nnn(CCCCl)c1C[Mg]Br

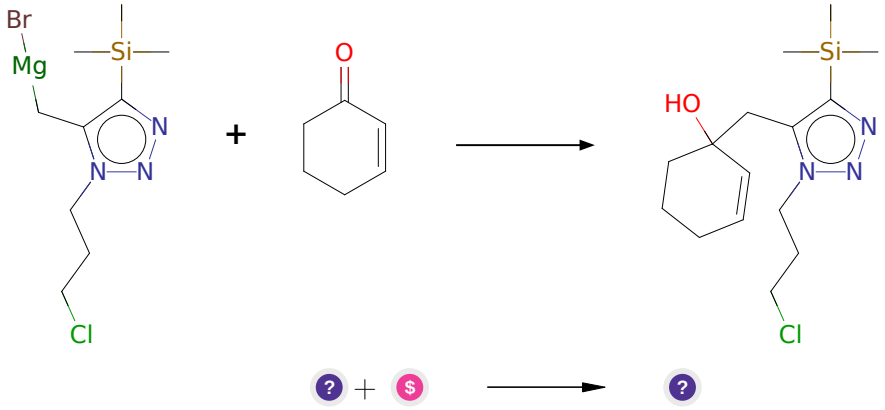
Typical conditions: Mg.THF or iPrMgBr

Protections: none

Reference: DOI: *10.1021/jo00002a039* and *10.1021/jo047877r* and *10.1021/ol006618v*

Retrosynthesis ID: 10011828

2.1.7 Grignard-Type Reaction



Substrates:

1. C[Si](C)(C)c1nnn(CCCCl)c1C[Mg]Br
2. 2-Cyclohexen-1-one - *available at Sigma-Aldrich*

Products:

1. C[Si](C)(C)c1nnn(CCCCl)c1CC1(O)C=CCCC1

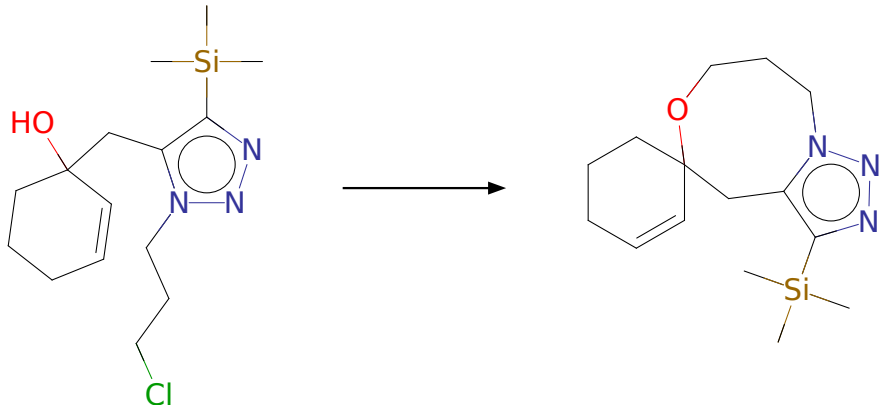
Typical conditions: Mg or Li.ether

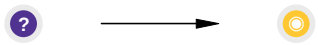
Protections: none

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

2.1.8 Alkylation of tertiary alcohols





Substrates:

1. C[Si](C)(C)c1nnn(CCCCl)c1CC1(O)C=CCCC1

Products:

1. C[Si](C)(C)c1nnn2c1CC1(C=CCCC1)OCCC2

Typical conditions: K2CO3.acetone.heat

Protections: none

Reference: *10.1016/S0040-4020(01)90106-1* and *10.1021/acs.analchem.5b04461* and *10.3390/molecules24091643*

Retrosynthesis ID: 31010930

2.2 Path 2

Score: 310.82

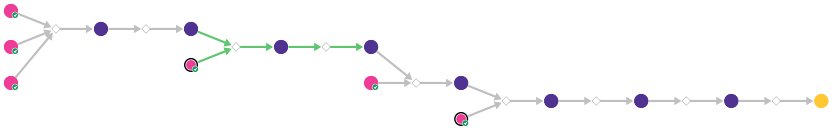
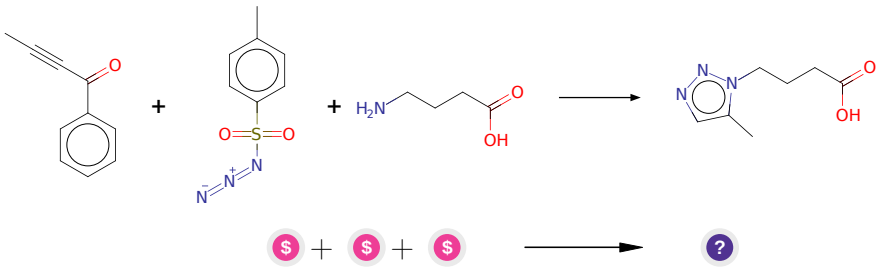


Figure 2: Outline of path 2

2.2.1 Metal-free multicomponent synthesis of triazoles



Substrates:

1. Tosyl azide solution - *available at Sigma-Aldrich*
2. 1-phenyl-but-2-in-1-on - *available at Sigma-Aldrich*

3. Piperidic acid - *available at Sigma-Aldrich*

Products:

1. Cc1cnnn1CCCC(=O)O

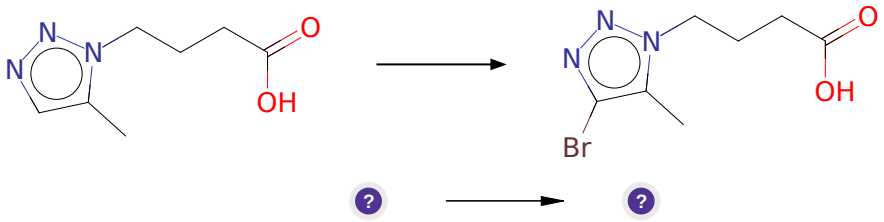
Typical conditions: 1. toluene.80C 2. LiOtBu.RT

Protections: none

Reference: DOI: *10.1002/anie.201307499*

Retrosynthesis ID: 6001

2.2.2 Bromination of aromatic compounds



Substrates:

1. Cc1cnnn1CCCC(=O)O

Products:

1. Cc1c(Br)nnn1CCCC(=O)O

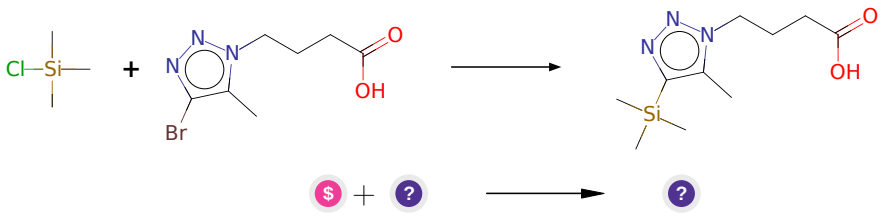
Typical conditions: Br2.Fe

Protections: none

Reference: *10.1021/acs.accounts.6b00120*

Retrosynthesis ID: 7777000

2.2.3 Synthesis of silanes,stannanes and germanes from Grignard reagents



Substrates:

1. TMSCl - *available at Sigma-Aldrich*
2. Cc1c(Br)nnn1CCCC(=O)O

Products:

1. Cc1c([Si](C)(C)C)nnn1CCCC(=O)O

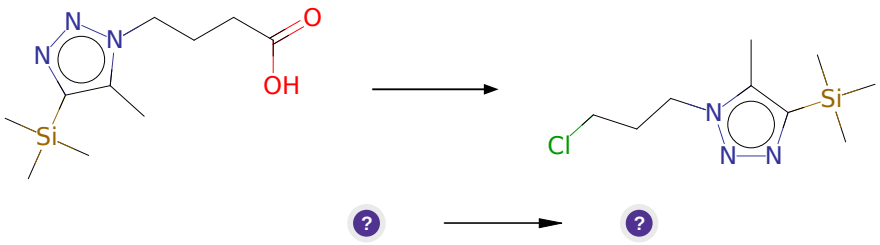
Typical conditions: 1.nBuLi.or.Mg.THF.-78C.2.Si-Cl.to.rt

Protections: none

Reference: *10.1021/jo802433t* AND *10.1021/ja01108a009*

Retrosynthesis ID: 5402

2.2.4 Synthesis of alkyl chlorides from carboxylic acids



Substrates:

1. Cc1c([Si](C)(C)C)nnn1CCCC(=O)O

Products:

1. Cc1c([Si](C)(C)C)nnn1CCCCl

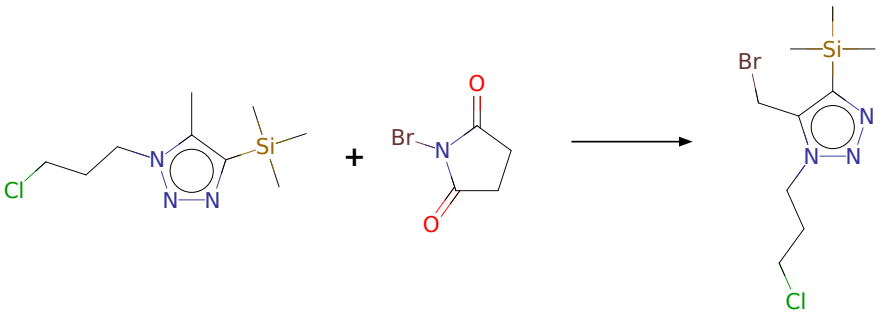
Typical conditions: Ag(Phen)2OTf.OtBu.Cl.acetonitrile.RT

Protections: none

Reference: DOI: *10.1021/ja210361z*

Retrosynthesis ID: 11619

2.2.5 Wohl-Ziegler Bromination



Substrates:

1. N-Bromosuccinimide - *available at Sigma-Aldrich*
2. Cc1c([Si](C)(C)C)nnn1CCCCl

Products:

1. C[Si](C)(C)c1nnn(CCCCl)c1CBr

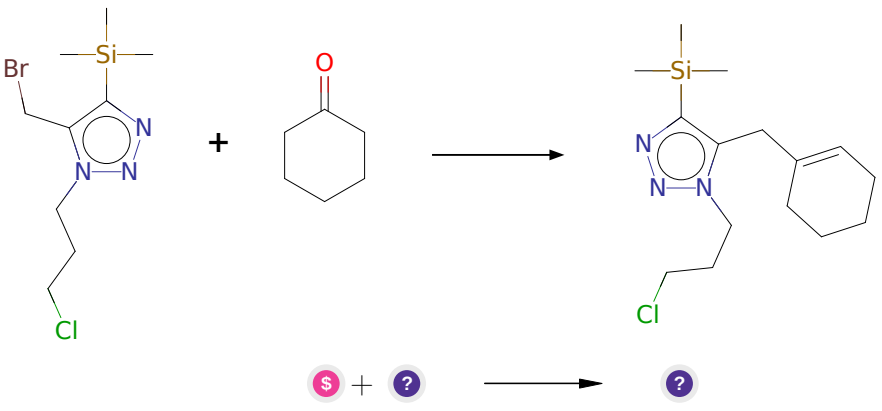
Typical conditions: NBS.AIBN or (BzO)2 or heat

Protections: none

Reference: *10.1021/acs.organomet.2c00053* (Scheme S1 p. S4) and *10.1021/acs.jafc.0c07237* (Scheme 1) and *10.1002/cbic.201402000*

Retrosynthesis ID: 245552

2.2.6 Shapiro reaction followed by alkyl bromide addition



Substrates:

1. Cyclohexanone - *available at Sigma-Aldrich*
2. C[Si](C)(C)c1nnn(CCCCl)c1CBr

Products:

1. C[Si](C)(C)c1nnn(CCCCl)c1CC1=CCCCC1

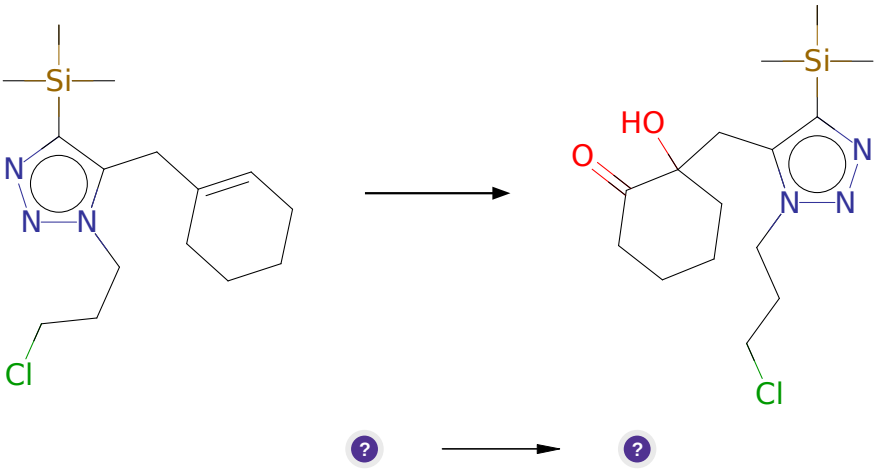
Typical conditions: 1.TsNH2NH2.2.Mes2Mg.LiCl.THF.heating then alkyl bromide.cooling

Protections: none

Reference: *10.1016/S0040-4039(00)75263-4* and *10.1021/ol300652k* and *10.1021/ja00299a037*

Retrosynthesis ID: 9990463

2.2.7 Oxohydroxylation of unsymmetric alkenes



Substrates:

1. C[Si](C)(C)c1nnn(CCCCl)c1CC1=CCCCC1

Products:

1. C[Si](C)(C)c1nnn(CCCCl)c1CC1(O)CCCCC1=O

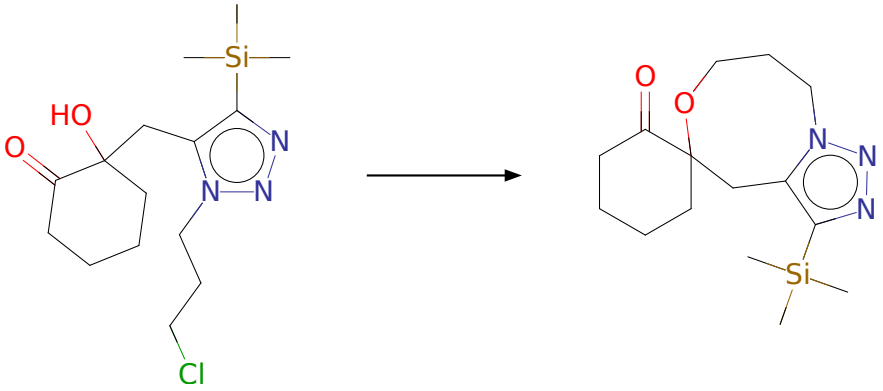
Typical conditions: KMnO4.Acetone/H2O.-10 deg C

Protections: none

Reference: *10.1016/j.tetlet.2015.12.042* and *10.1021/jacs.5b05792*

Retrosynthesis ID: 10037547

2.2.8 Alkylation of tertiary alcohols



Substrates:

1. C[Si](C)(C)c1nnn(CCCCl)c1CC1(O)CCCCC1=O

Products:

1. C[Si](C)(C)c1nnn2c1CC1(CCCCC1=O)OCCC2

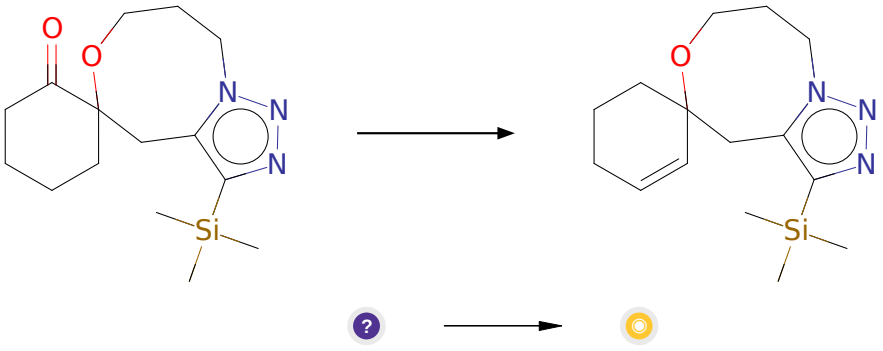
Typical conditions: K2CO3.acetone.heat

Protections: none

Reference: *10.1016/S0040-4020(01)90106-1* and *10.1021/acs.analchem.5b04461* and *10.3390/molecules24091643*

Retrosynthesis ID: 31010930

2.2.9 Shapiro reaction



Substrates:

1. C[Si](C)(C)c1nnn2c1CC1(CCCCC1=O)OCCC2

Products:

1. C[Si](C)(C)c1nnn2c1CC1(C=CCCC1)OCCC2

Typical conditions: 1.TsNH2NH2.2.N-BuLi

Protections: none

Reference: *10.1021/jm4008517* and *10.1016/j.bmc.2009.08.038* and *10.1021/jo00350a003*

Retrosynthesis ID: 9990398

2.3 Path 3

Score: `323.01`

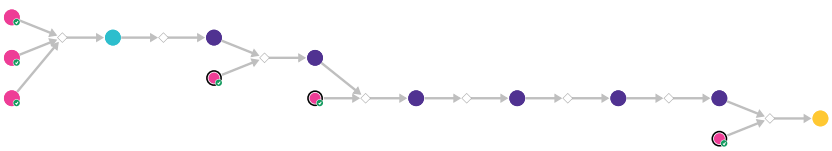
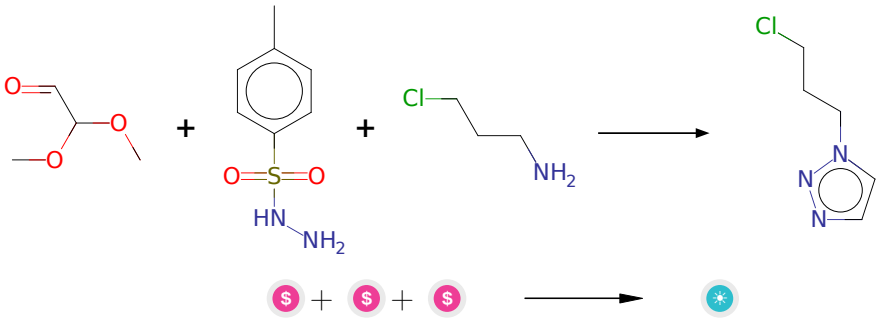


Figure 3: Outline of path 3

2.3.1 An azide and acetylene free synthesis of 1-substituted 1,2,3-triazoles



Substrates:

1. Glyoxal dimethyl acetal - *available at Sigma-Aldrich*
2. Tosylhydrazide - *available at Sigma-Aldrich*

3. 3-Chloropropylamine hydrochloride - *available at Sigma-Aldrich*

Products:

1. C5H8ClN3

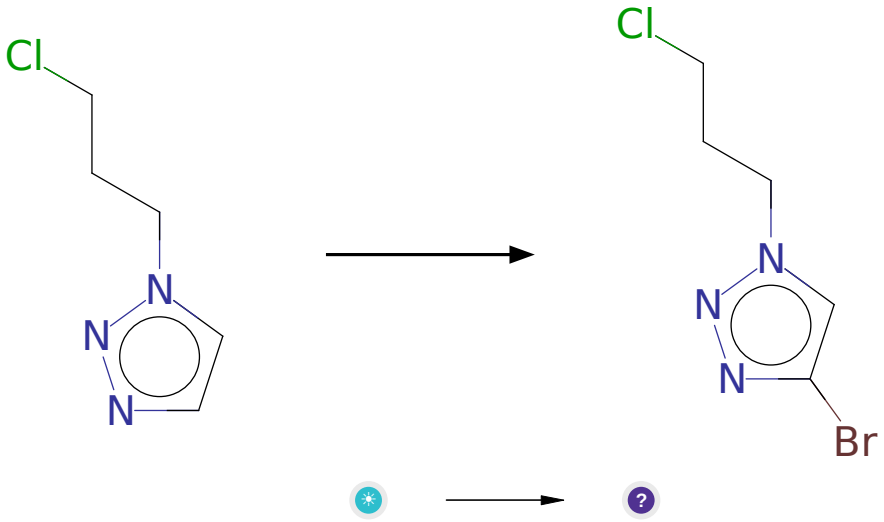
Typical conditions: 1.TsNHNH2.MeOH.rt 2.Amine.AcOH.heat

Protections: none

Reference: *10.1016/j.tetlet.2020.152483*

Retrosynthesis ID: 31020968

2.3.2 Bromination of aromatic compounds



Substrates:

1. C5H8ClN3

Products:

1. ClCCCn1cc(Br)nn1

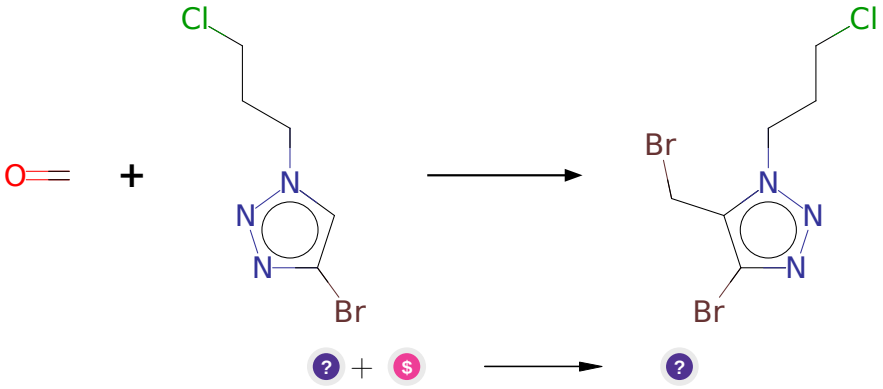
Typical conditions: Br2.Fe

Protections: none

Reference: *10.1021/acs.accounts.6b00120*

Retrosynthesis ID: 7777000

2.3.3 Blanc bromomethylation



Substrates:

1. ClCCCn1cc(Br)nn1
2. Formalin - *available at Sigma-Aldrich*

Products:

1. ClCCCn1nnc(Br)c1CBr

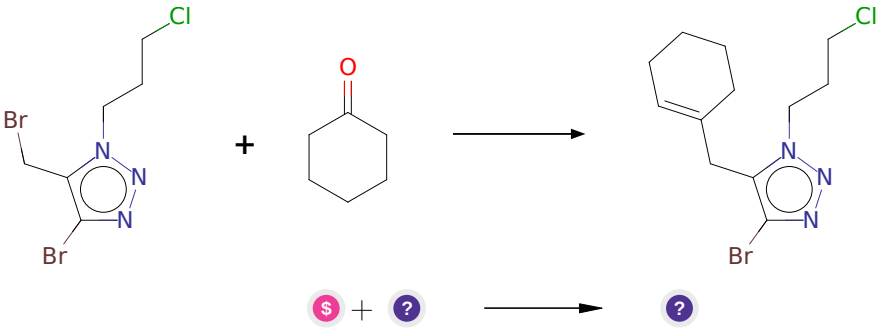
Typical conditions: HBr.heat

Protections: none

Reference: *10.1021/ja011493q* and *10.1021/ma012195g* and *10.1016/S0040-4039(02)01769-0* and *10.1021/ja002069c*

Retrosynthesis ID: 31010730

2.3.4 Shapiro reaction followed by alkyl bromide addition



Substrates:

1. Cyclohexanone - *available at Sigma-Aldrich*

2. ClCCCn1nnc(Br)c1CBr

Products:

1. ClCCCn1nnc(Br)c1CC1=CCCCC1

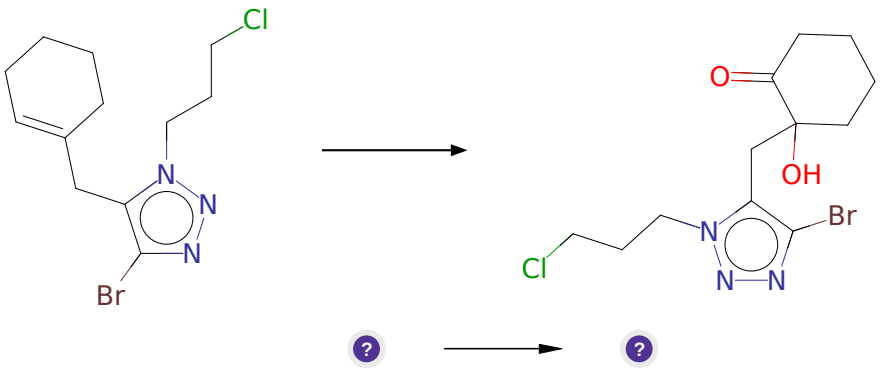
Typical conditions: 1.TsNH2NH2.2.Mes2Mg.LiCl.THF.heating then alkyl bromide.cooling

Protections: none

Reference: *10.1016/S0040-4039(00)75263-4* and *10.1021/ol300652k* and *10.1021/ja00299a037*

Retrosynthesis ID: 9990463

2.3.5 Oxohydroxylation of unsymmetric alkenes



Substrates:

1. ClCCCn1nnc(Br)c1CC1=CCCCC1

Products:

1. O=C1CCCCC1(O)Cc1c(Br)nnn1CCCCl

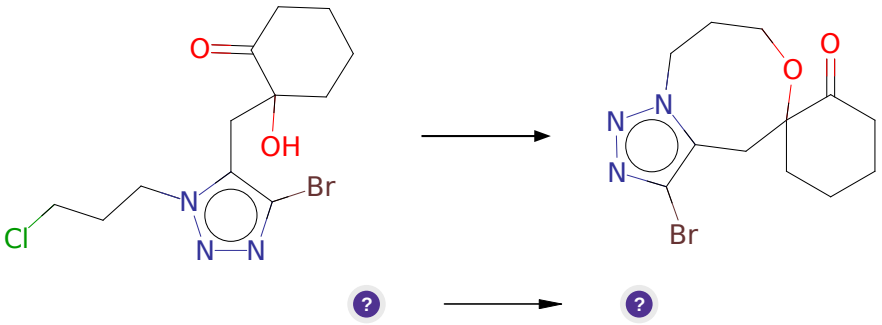
Typical conditions: KMnO4.Acetone/H2O.-10 deg C

Protections: none

Reference: *10.1016/j.tetlet.2015.12.042* and *10.1021/jacs.5b05792*

Retrosynthesis ID: 10037547

2.3.6 Alkylation of tertiary alcohols



Substrates:

1. O=C1CCCCC1(O)Cc1c(Br)nnn1CCCCl

Products:

1. O=C1CCCCC12Cc1c(Br)nnn1CCCO2

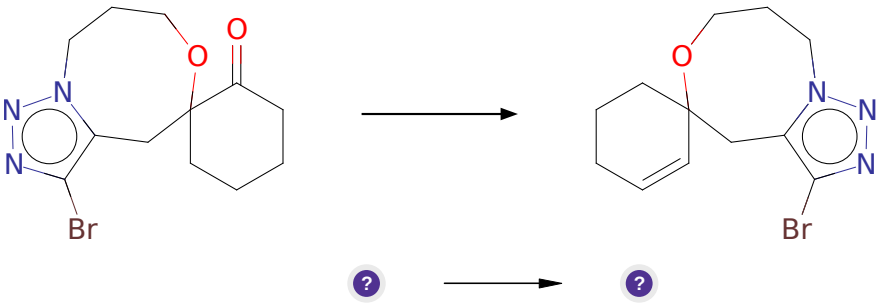
Typical conditions: K2CO3.acetone.heat

Protections: none

Reference: *10.1016/S0040-4020(01)90106-1* and *10.1021/acs.analchem.5b04461* and *10.3390/molecules24091643*

Retrosynthesis ID: 31010930

2.3.7 Shapiro reaction



Substrates:

1. O=C1CCCCC12Cc1c(Br)nnn1CCCO2

Products:

1. Brc1nnn2c1CC1(C=CCCC1)OCCC2

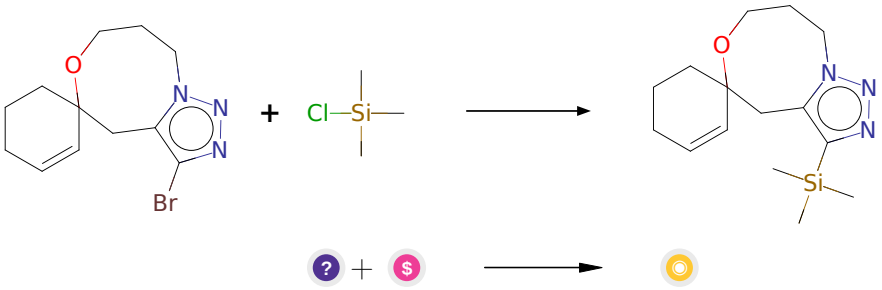
Typical conditions: 1.TsNH2NH2.2.N-BuLi

Protections: none

Reference: *10.1021/jm4008517* and *10.1016/j.bmc.2009.08.038* and *10.1021/jo00350a003*

Retrosynthesis ID: 9990398

2.3.8 Synthesis of arylsilanes



Substrates:

1. Brc1nnn2c1CC1(C=CCCC1)OCCC2
2. TMSCl - *available at Sigma-Aldrich*

Products:

1. C[Si](C)(C)c1nnn2c1CC1(C=CCCC1)OCCC2

Typical conditions: 1.nBuLi.2.ClSnR3

Protections: none

Reference: *10.1071/CH9851147*.

Retrosynthesis ID: 5370