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Communication

Total Syntheses of Scabrolide A and Nominal Scabrolide B

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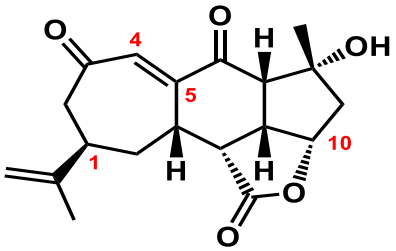
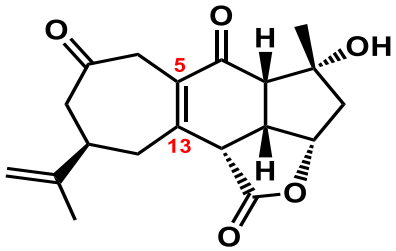
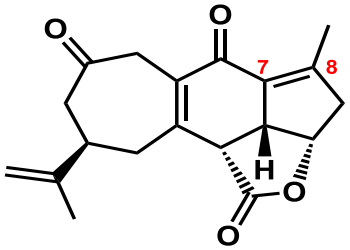


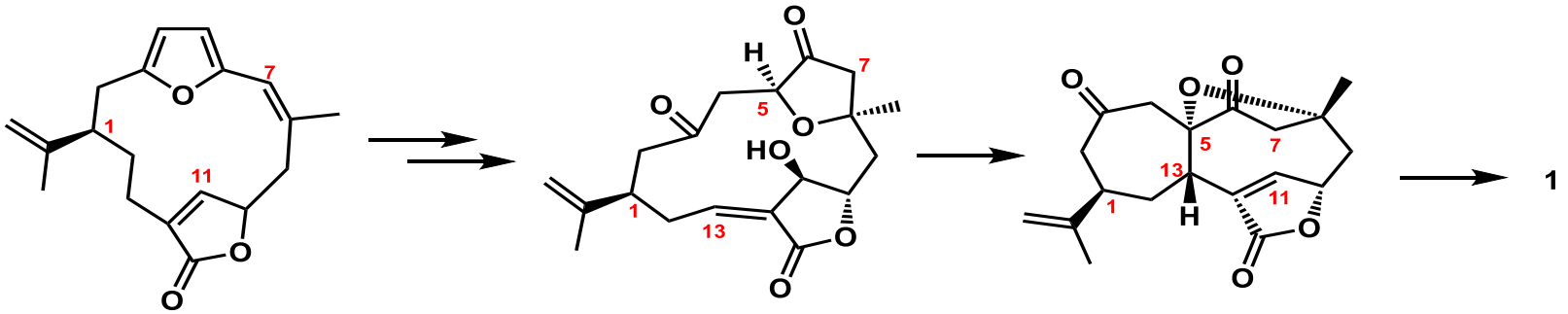
[nominal] Scabrolide B (**1**)



Scabrolide A (**2**)



Yonarolide (**3**)



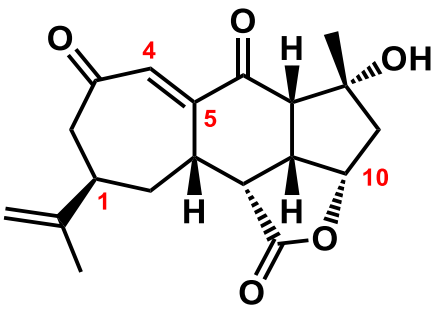
4

5-episinuleptolide (**5**)

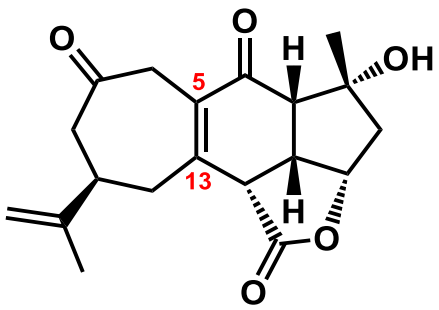
6

1

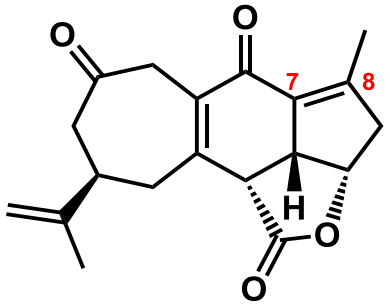
J. Am. Chem. Soc. **2022**, *144*, 1528.



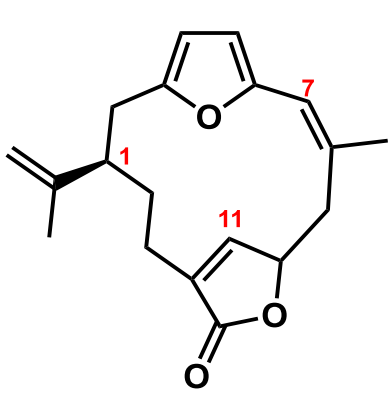
[nominal] Scabrolide B (**1**)



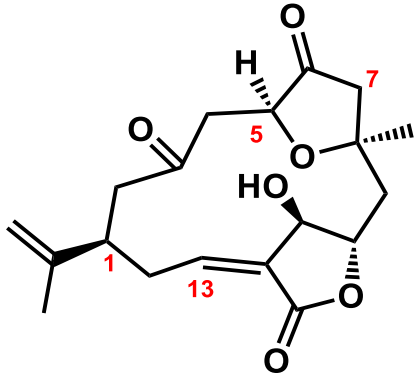
Scabrolide A (**2**)



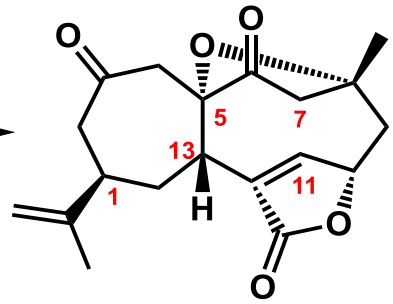
Yonarolide (**3**)



4

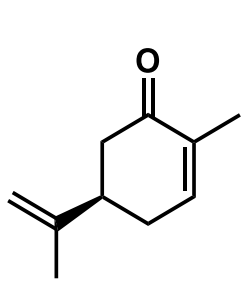


5-episinuleptolide (**5**)



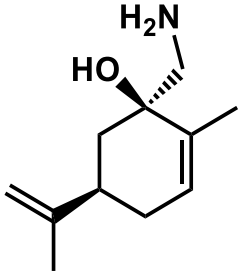
6

1



7

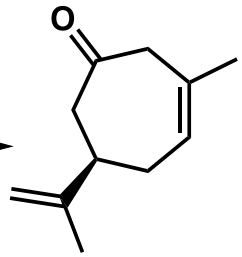
1. TMSCN, NMO
2. $LiAlH_4$



8

3. $NaNO_2$, aq. HOAc

71% (over 3 steps)

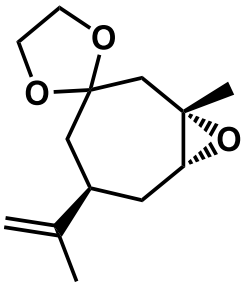


9

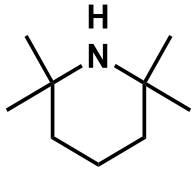
4. $(TMSOCH_2)_2$
TMSOTf (1 mol %)

5. *m*CPBA

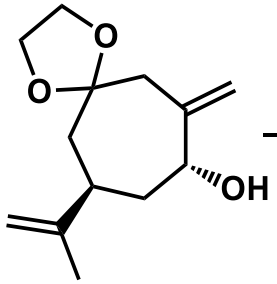
77% (over 2 steps)



10



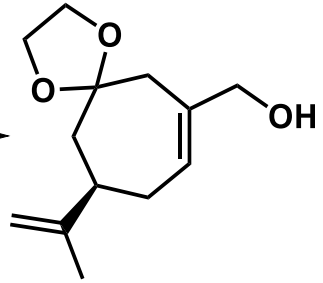
6. *n*BuLi, Et_2AlCl
quant.



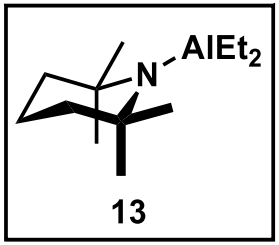
11

7. (i) MsCl, Et_3N

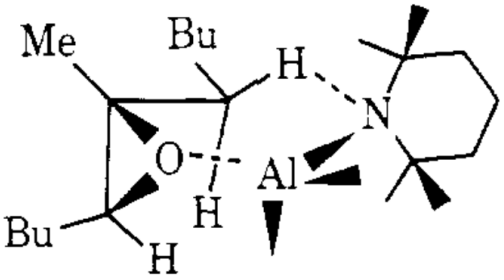
(ii) aq. $NaHCO_3$, 44%

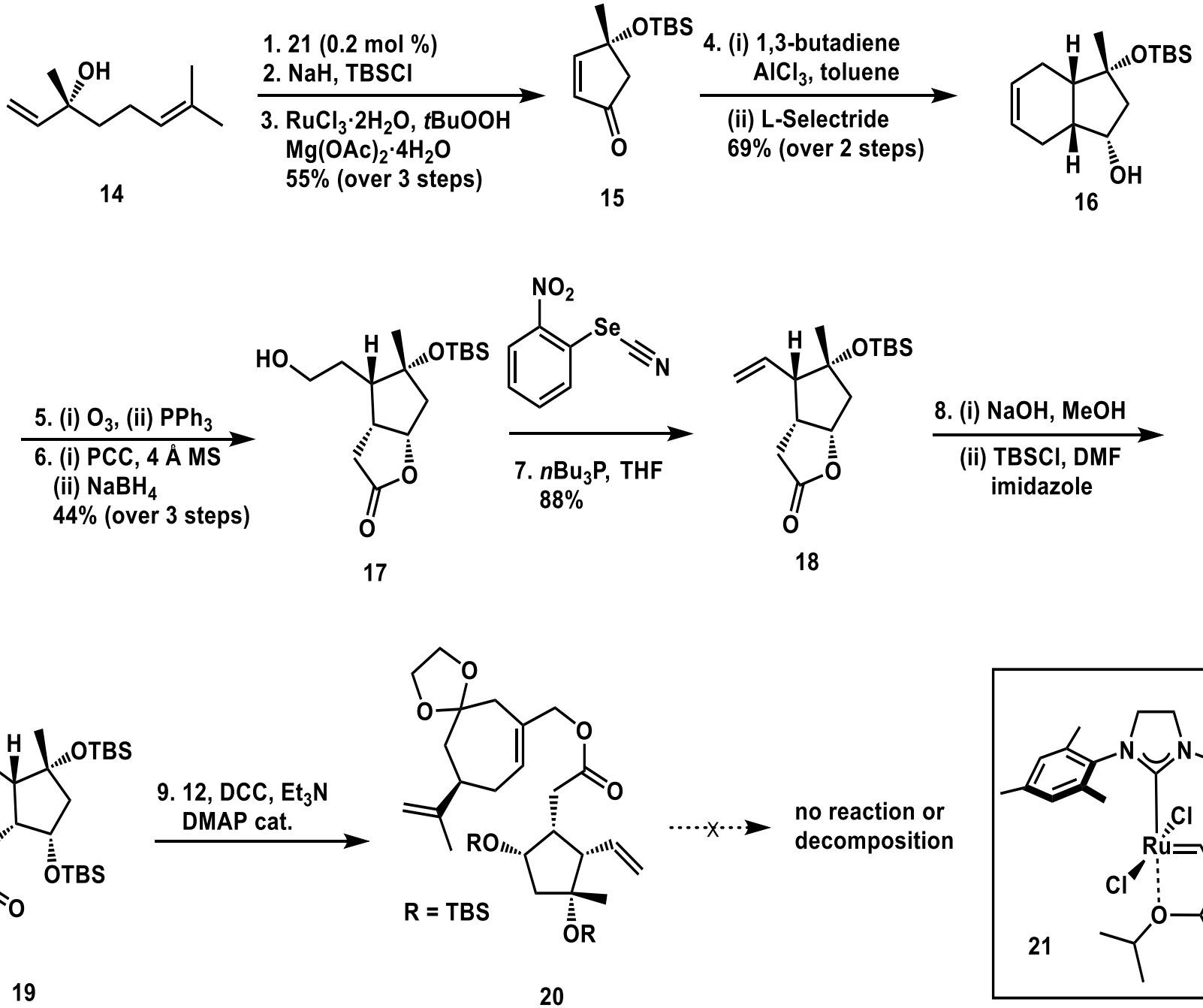


12



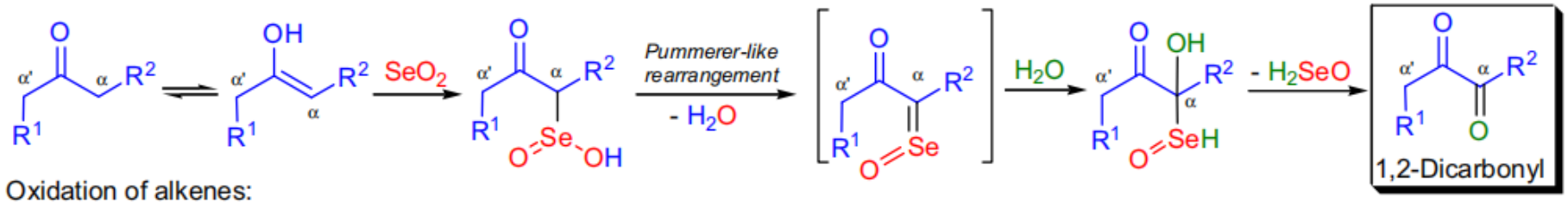
13



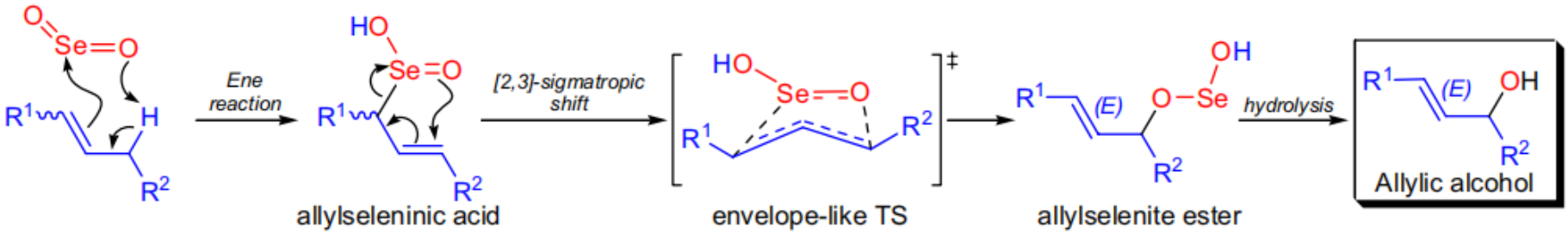

OH
14
1. 21 (0.2 mol %)
2. NaH, TBSCl
3. RuCl3·2H2O, tBuOOH
Mg(OAc)2·4H2O
55% (over 3 steps)
OTBS
O
15
4. (i) 1,3-butadiene
AlCl3, toluene
(ii) L-Selectride
69% (over 2 steps)
H
OTBS
H
OH
16
5. (i) O3, (ii) PPh3
6. (i) PCC, 4 Å MS
(ii) NaBH4
44% (over 3 steps)
HO
H
OTBS
O
O
17
NO2
Se
N
7. nBu3P, THF
88%
H
OTBS
O
O
18
8. (i) NaOH, MeOH
(ii) TBSCl, DMF
imidazole
H
OTBS
OTBS
HO
O
19
9. 12, DCC, Et3N
DMAP cat.
O
O
O
O
RO
OR
R = TBS
20
no reaction or
decomposition
N
N
Cl
Ru
Cl
O
21

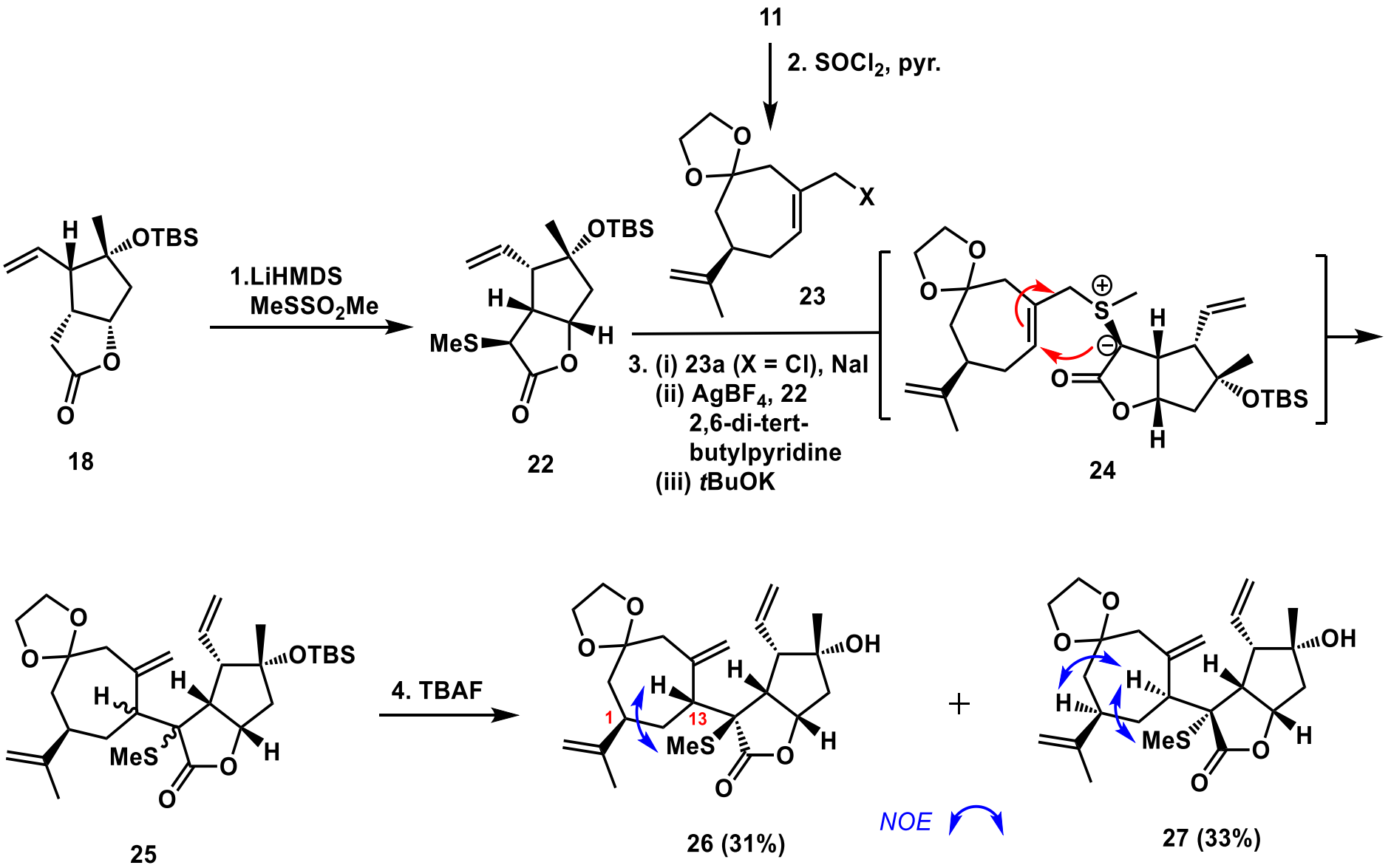
Mechanism: [24-41]

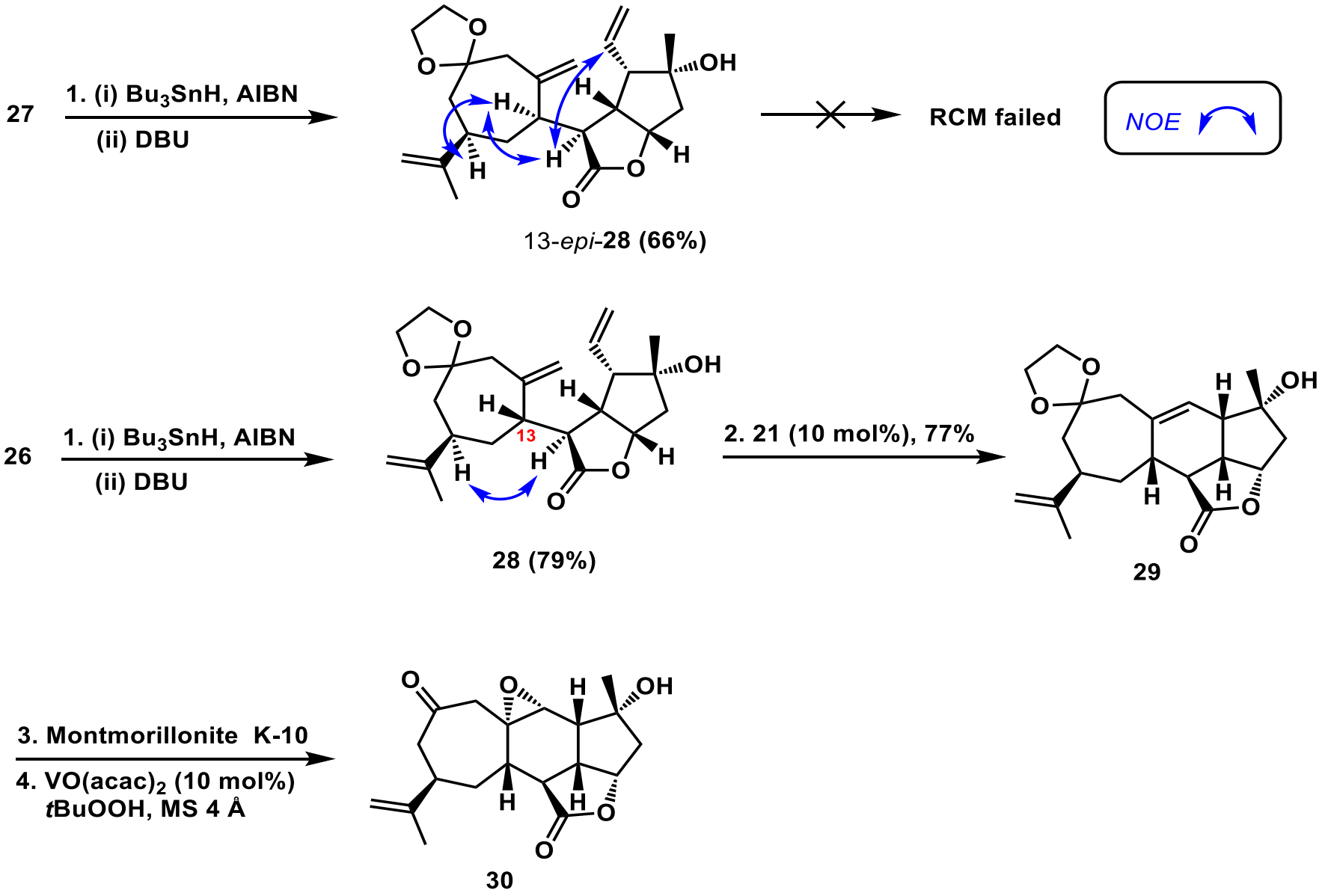
Oxidation of carbonyl compounds:



Oxidation of alkenes:

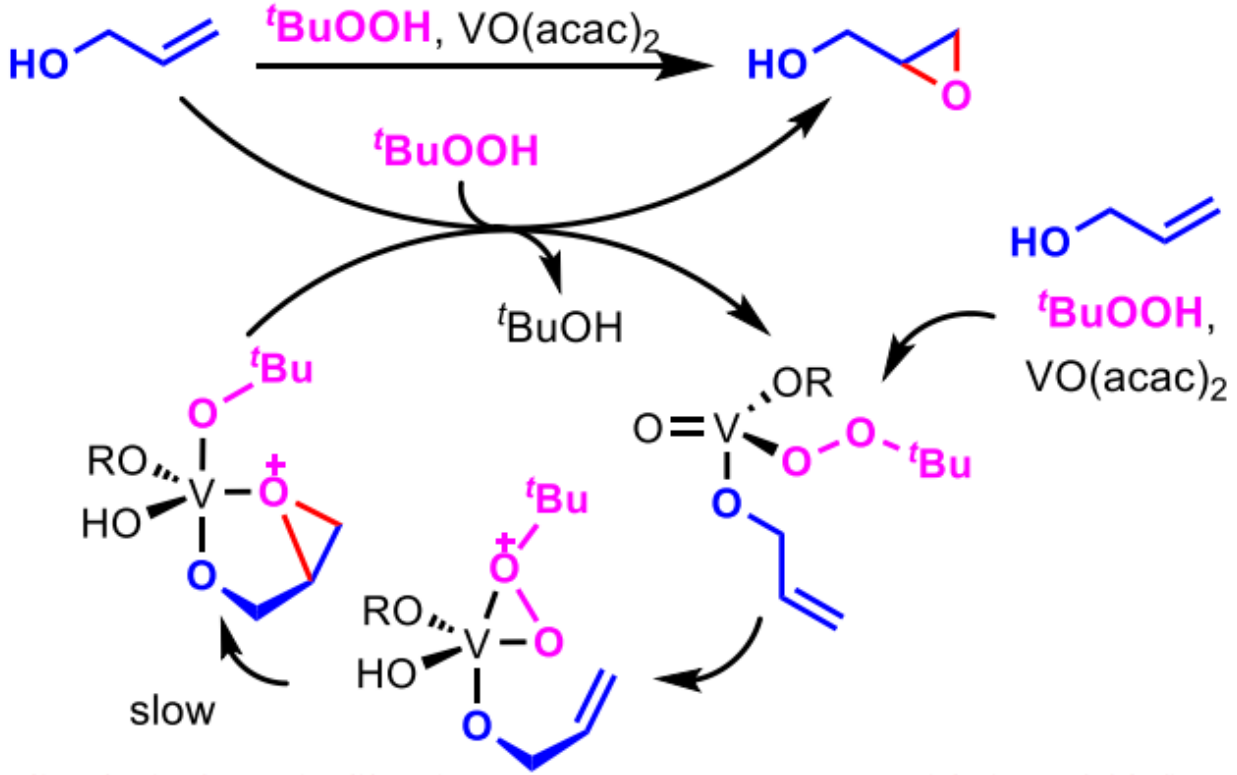


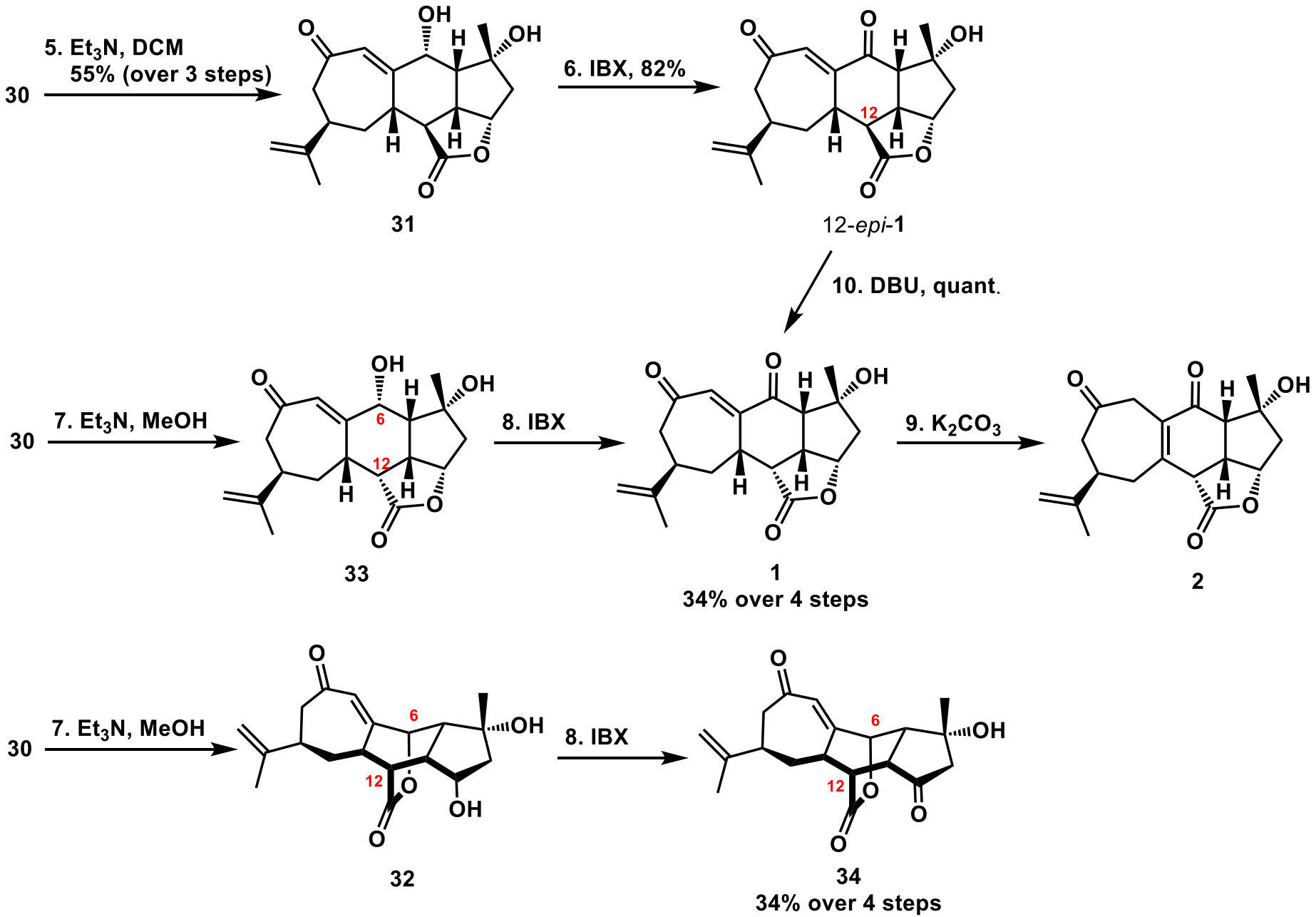

11
2. SOCl2, pyr.
1.LiHMDS
MeSSO2Me
3. (i) 23a (X = Cl), NaI
(ii) AgBF4, 22
2,6-di-tert-
butylpyridine
(iii) tBuOK
4. TBAF
NOE
18
22
23
24
25
26 (31%)
27 (33%)


27
1. (i) Bu3SnH, AIBN
(ii) DBU
OH
H
O
13-epi-28 (66%)
RCM failed
NOE
26
1. (i) Bu3SnH, AIBN
(ii) DBU
13
28 (79%)
2. 21 (10 mol%), 77%
29
3. Montmorillonite K-10
4. VO(acac)2 (10 mol%)
tBuOOH, MS 4 Å
30

The Sharpless Epoxidation

- Reviews: *Org. React.* **1996**, *48*, 1-299.
- Catalysts: $VO(acac)_2$, $Mo(CO)_6$, $Ti(O\textit{i}\text{-}Pr)_4$;
- Oxidants: *t*-BuOOH, $PhC(CH_3)_2OOH$;
- Regioselective epoxidation of allylic and homo-allylic alcohols;
- Will not epoxidize isolated double bonds;
- Epoxidation occurs stereoselectively with respect to the alcohol.




30
5. Et3N, DCM
55% (over 3 steps)
31
6. IBX, 82%
12-epi-1
10. DBU, quant.
30
7. Et3N, MeOH
33
8. IBX
1
34% over 4 steps
9. K2CO3
2
30
7. Et3N, MeOH
32
8. IBX
34
34% over 4 steps