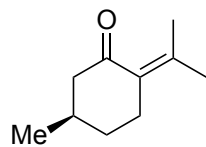


A 16-Step Synthesis of the Isoryanodane Diterpene (+)-Perseanol

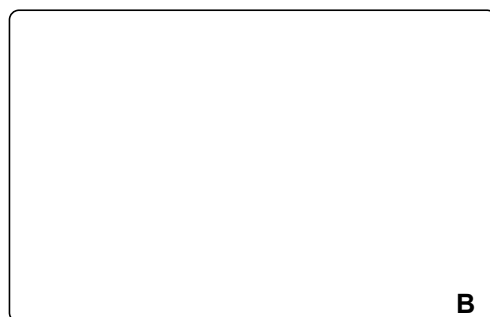
Han, A; Tao, Y.; Reisman, S. E.; *Nature* **2019**, *573*, 563–567.



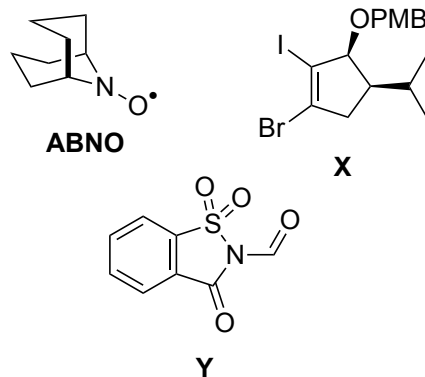
1-6



7-13



- 1) Br₂, NaHCO₃ then NaOMe, MeOH, 55 °C
- 2) KHMDS then O₂, P(OMe)₃
- 3) *m*-CPBA
- 4) Et₂Al(TMP)
- 5) PhCH(OMe)₂, CSA, then DIBAL
- 6) Cu^{(MeO)bpy}OTf (5 mol%), ABNO (1 mol%), NMI (10 mol%), O₂



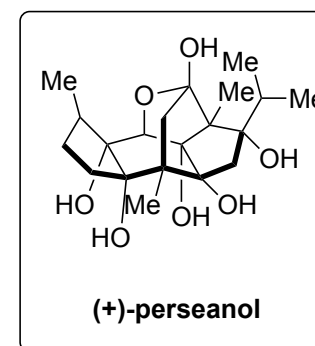
- 7) X, *n*-BuLi
- 8) Pd(PPh₃)₄ (50 mol%), Y, KF, NEt₃, 100 °C
- 9) DDQ
- 10) DMDO, Na₂SO₄
- 11) MeMgCl, CeCl₃ · LiCl
- 12) TFA, 0 °C
- 13) SeO₂

1) Name of starting material?
Name reaction?

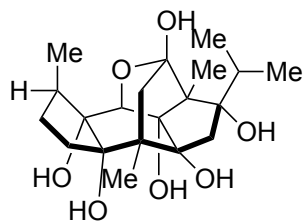
6) Please provide a mechanism for the transformation

Hint: in step 8) two rings are closed

13) Name reaction?



14-16



(+)-perseanol

- 14) $\text{VO}(\text{O}i\text{-Pr})_3$, TBHP
15) LiPhNap
16) $\text{Pd}(\text{OH})_2$, H_2

15) Propose a mechanism