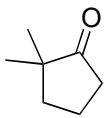
Enantioselective Total Synthesis of (+)-Psiguadial B

L. M. Chapman, J. C. Beck, L. Wu, S. E. Reisman, *J. Am. Chem. Soc.* **2016,** *138,* 9803-9806.



1) ethyl formate, NaH
2) TsN_3, NEt_3

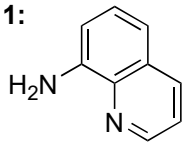
A

3) *hν* (254 nm)
1, **2**

B

S-Enantiomer

1:



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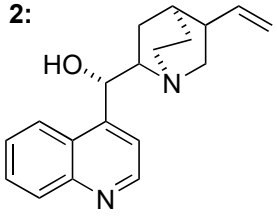
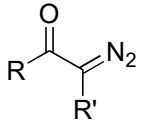
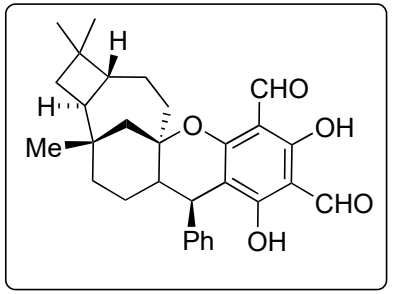


provide a Mechanism for step 2

Name the reaction in step 3 (first part), provide the two competing mechanisms on a general substrate, name every heterocycle and explain which mechanism is taking place in step 3



general substrate



4) $Pd(OAc)_2$, Ag_2CO_3, **3**
5) DBU
6) ethylene glycol $CH(OMe)_3$, *p*-TsOH
7) Cp_2ZrHCl then $PhP{=}CH_2$ then 5 M HCl

4') $Pd(OAc)_2$, Ag_2CO_3, **4**
5') Cp_2ZrHCl
6') KOH, MeOH
7') $PhP{=}CH_2$ then 5 M HCl

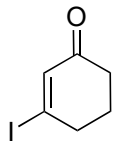
C

D

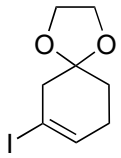
8) $CuTC$, $AlMe_3$, **5**
9) KOH, **6**
10) vinylLi (2:1 d.r.)
11) HG-II, 1,4-BQ
12) Crabtree's cat, H_2 (34 bar)

E

3:



4:



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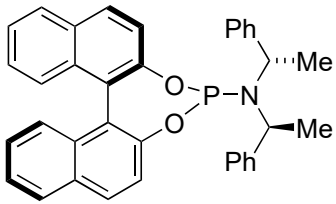
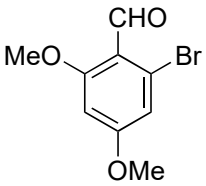
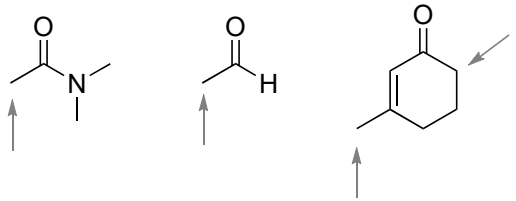


6:



pK_a

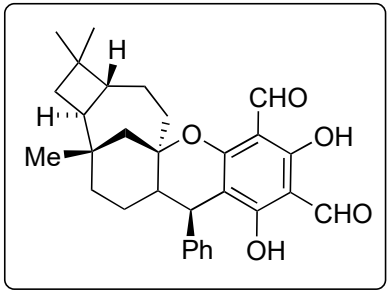


C and **D** are enantiomers, explain which sequence 4-7 or 4'-7' forms the desired enantiomer

8) ligand class?

10) Hint: continue with the *S*-enantiomer

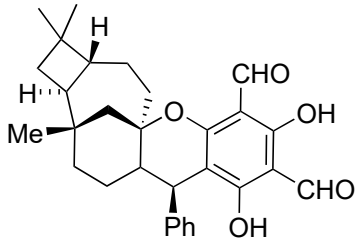
12) Structure of Crabtree's catalyst?



13) CuI, 2,2'-bipy, KO*t*Bu
14) DDQ, $EtO(CH_2)_2OH$
15) $Ph_2Cu(CN)Li_2$,
BF_3 • OEt

F

16) pyr • HCl
17) $MeOCHCl_2$, $TiCl_4$



(+)-Psiguadial B

13) Name the reaction and draw the ligand

17) Name the reaction