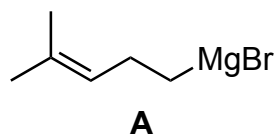
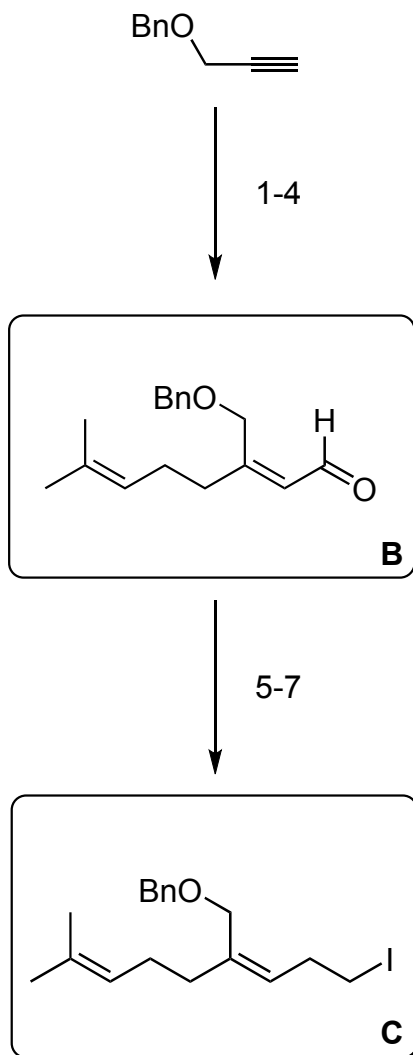


Total Synthesis of (±)-Bukittingine

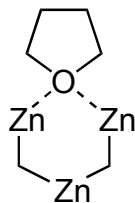
Jeffrey A. Stafford, Clayton H. Heathcock and David L. Clark *J. Org. Chem.* **1992**, *57*, 2575–2585



- 1) *n*-BuLi, ClCO_2Et
- 2) TMEDA, **A**, CuI, -78°C
- 3) LiAlH_4
- 4) Swern

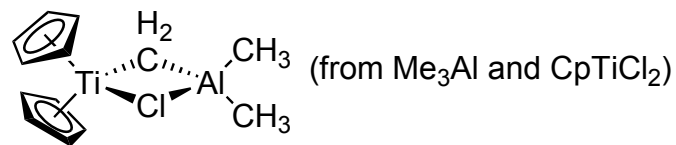
- 5) $\text{CH}_3\text{PPh}_3\text{Br}$, PhLi
- 6) Disiamylborane, H_2O_2 , NaOH
- 7) PPh_3 , I_2 , Imidazole

Nysted Reagent + TiCl_4

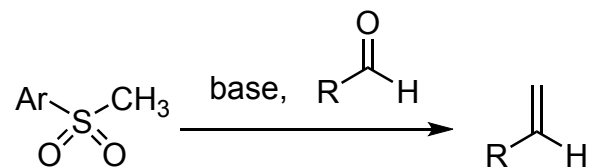


Provide two alternatives for methylenation in step 5

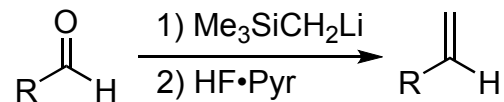
Tebbe's reagent:

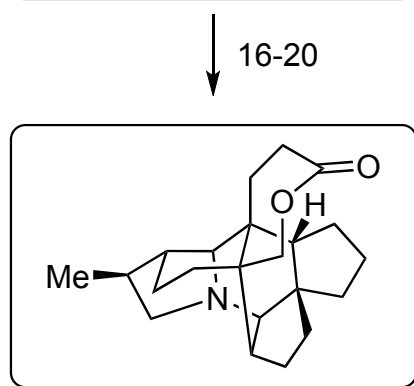
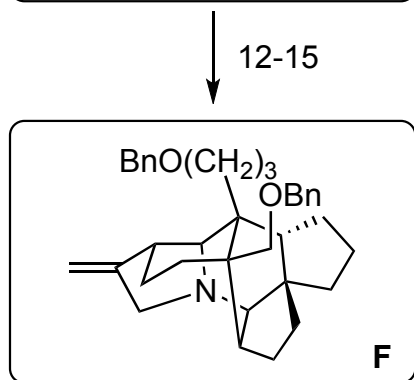
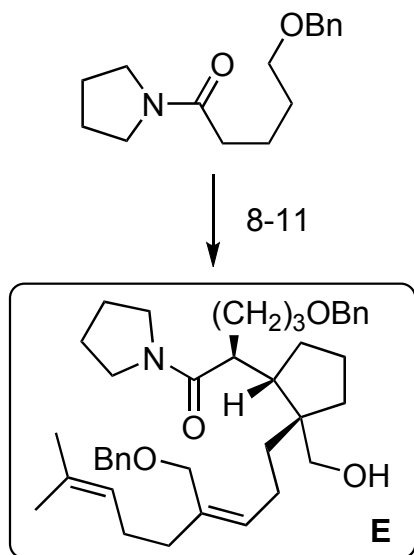


Julia olefination and its modifications



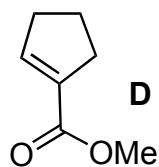
Peterson olefination





(±)-Bukittingine

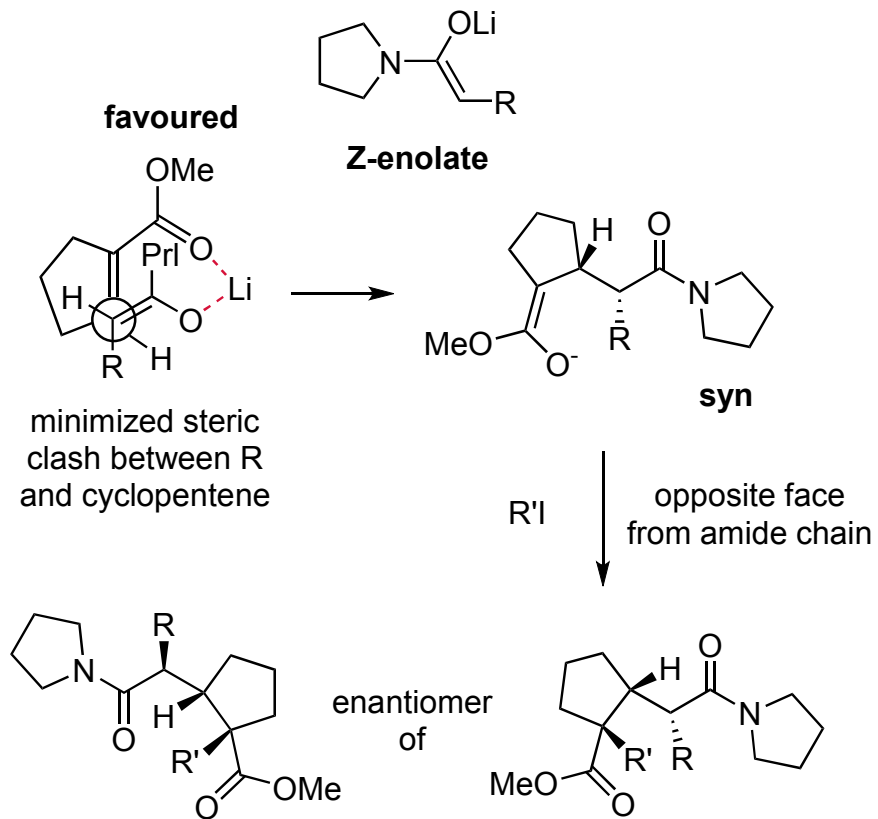
- 8) LDA, -78 °C, **D**, then **C**
- 9) DIBAL
- 10) KOH, H₃O⁺
- 11) LiAlH₄



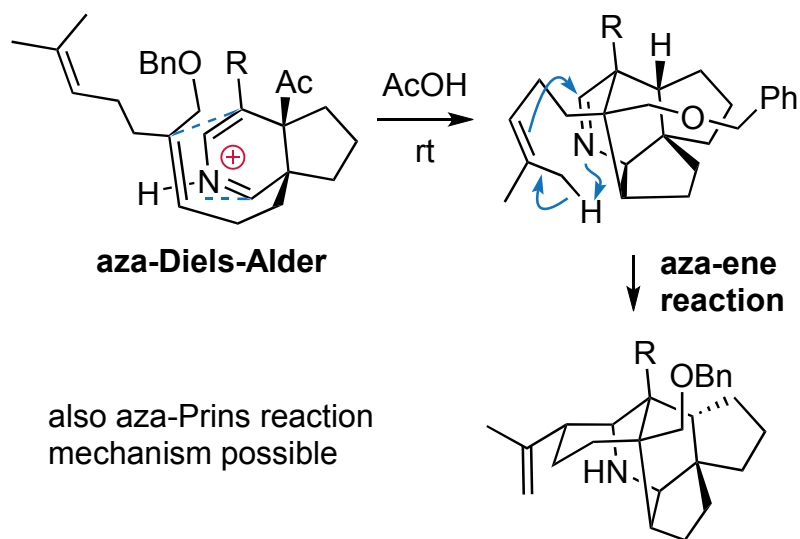
- 12) Swern (exhaustive)
- 13) NH₃
- 14) AcOH, 75 °C
- 15) Pd(CF₃COO)₂, quinone, PPh₃

- 16) BH₃, NaH₂BO₄
- 17) TsCl
- 18) LiEt₃BH
- 19) NH₃, Na
- 20) Ag₂CO₃ in celite

Explain the stereochemistry of step 8, show 2 possible cyclic transition states for the addition to **D**.



Explain the mechanism of 14

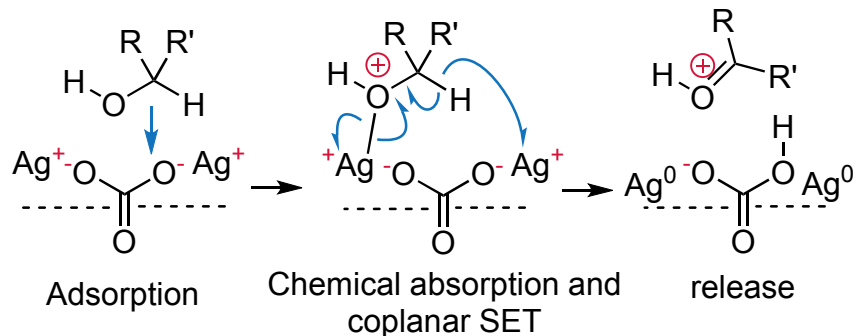


What are the advantages of sodium perborate?

Inexpensive, stable and easily handled. Allows for quench of the borane at room temperature without the need of additional base.

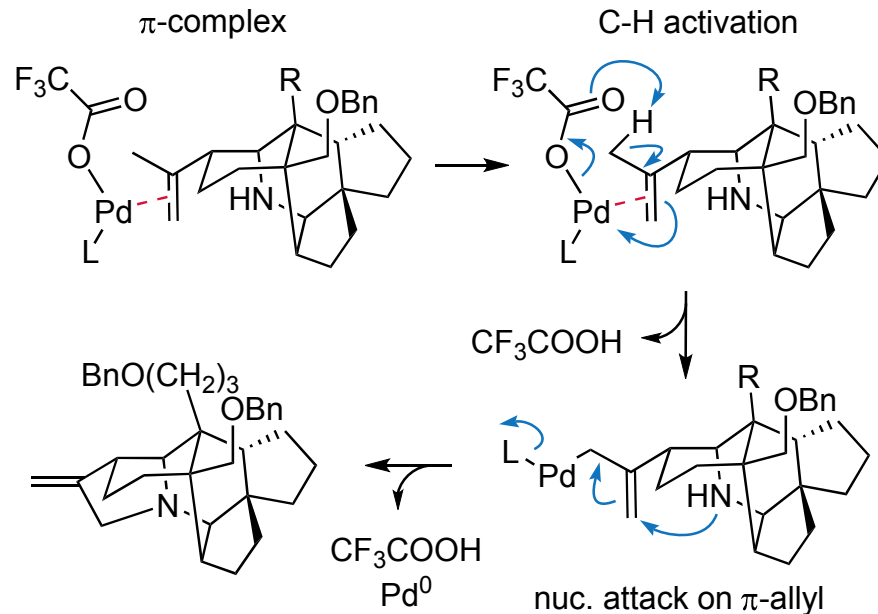
Provide a reaction mechanism and reagent name for 20

Fétizon reagent



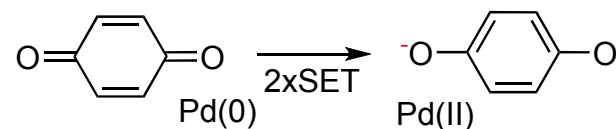
Then lactol formation and oxidation to lactone

15: Mechanism and role of each additive



$\text{Pd}(0)$ is reoxidized by the quinone

Also acts as base restoring trifluoroacetate ligands and as an alternate ligand for Pd



PPh_3 minimizes $\text{Pd}(0)$ precipitation, also as ligand for $\text{Pd}(II)$

Explain the mechanism of 18

