

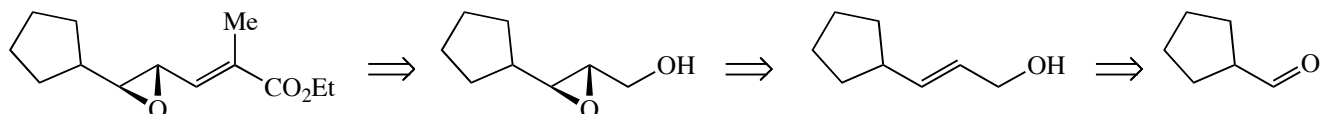
CHE 535, SPRING 2006

Problem Set 4

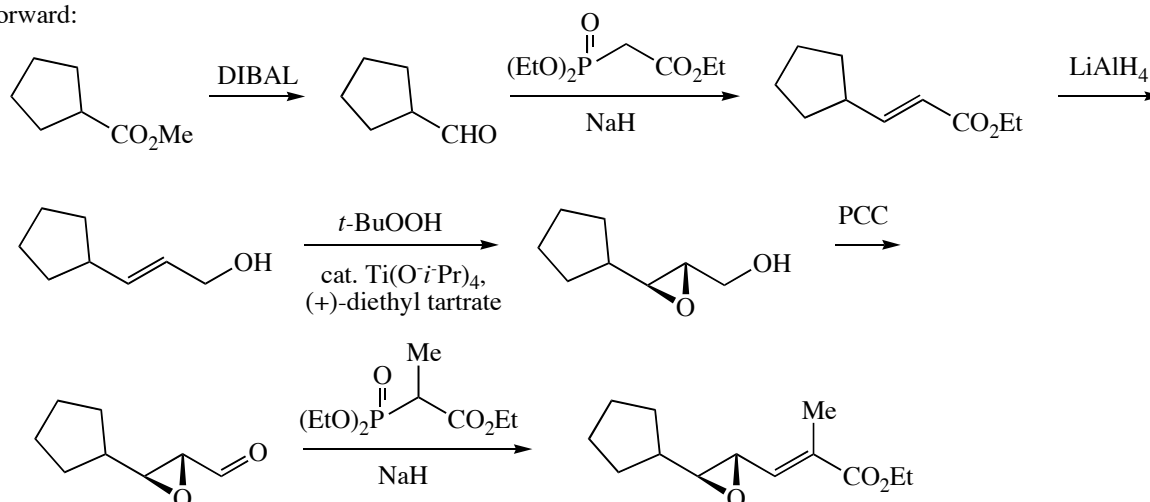
Design stereoselective syntheses of each of the following compounds from starting materials that are offered for sale by Lancaster or any other commercial supplier. *Show BOTH your retrosynthetic analysis AND your synthesis in the forward direction.* (If that means you have to draw some structures twice (gasp!), so be it.) Offer literature references for all but the most obvious steps.

- (a) The best way to make enantiopure epoxides is by Sharpless epoxidation, which requires an allylic alcohol as substrate.

Retrosynthesis:

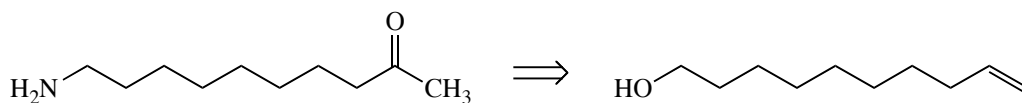


Forward:

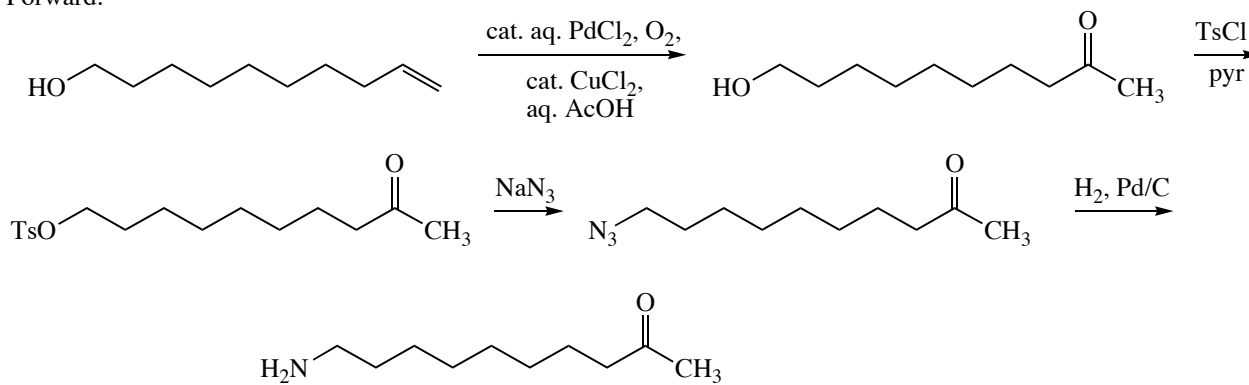


- (b) Methyl ketone is a retron for the Wacker oxidation. 9-Decen-1-ol is commercial, so don't need to make any C–C bonds. Primary amine made by substitution of pseudohalide with azide.

Retrosynthesis:



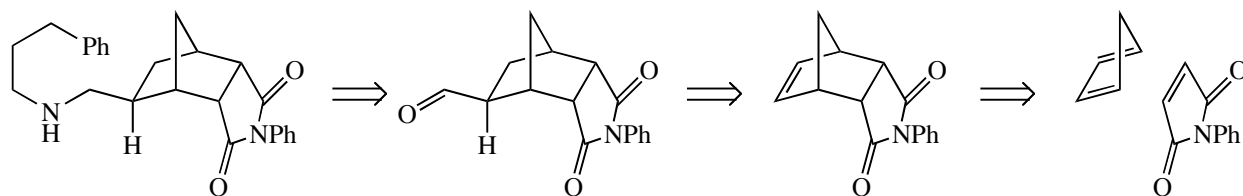
Forward:



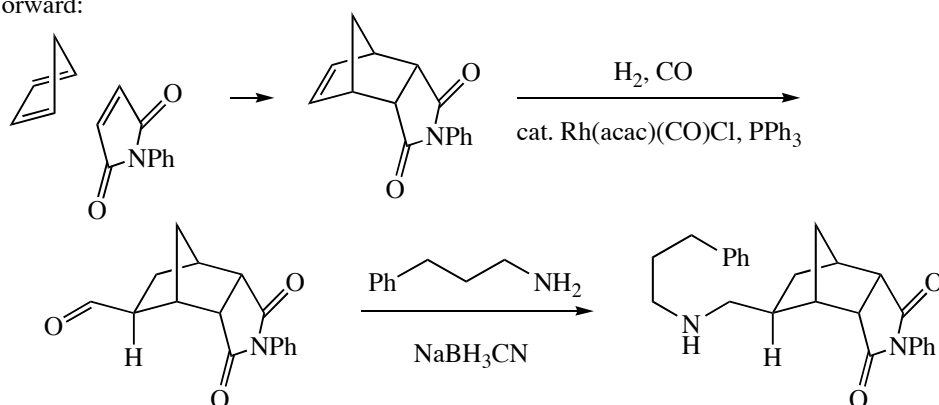
- (c) The amine is best made by reductive amination of an aldehyde. A Diels–Alder approach to the tricyclic ring system is best, but monosubstituted cyclopentadienes don't give clean D–A adducts

because the double bonds migrate around the ring. Instead, first do a D–A with unsubstituted cyclopentadiene, then add the extra C.

Retrosynthesis:

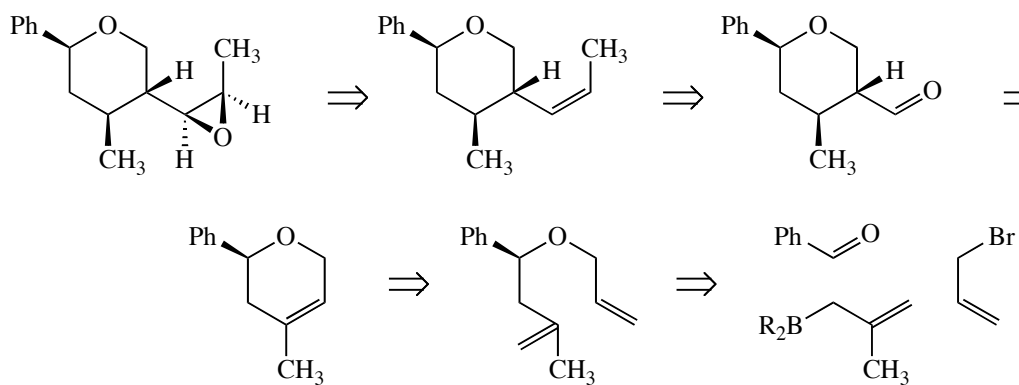


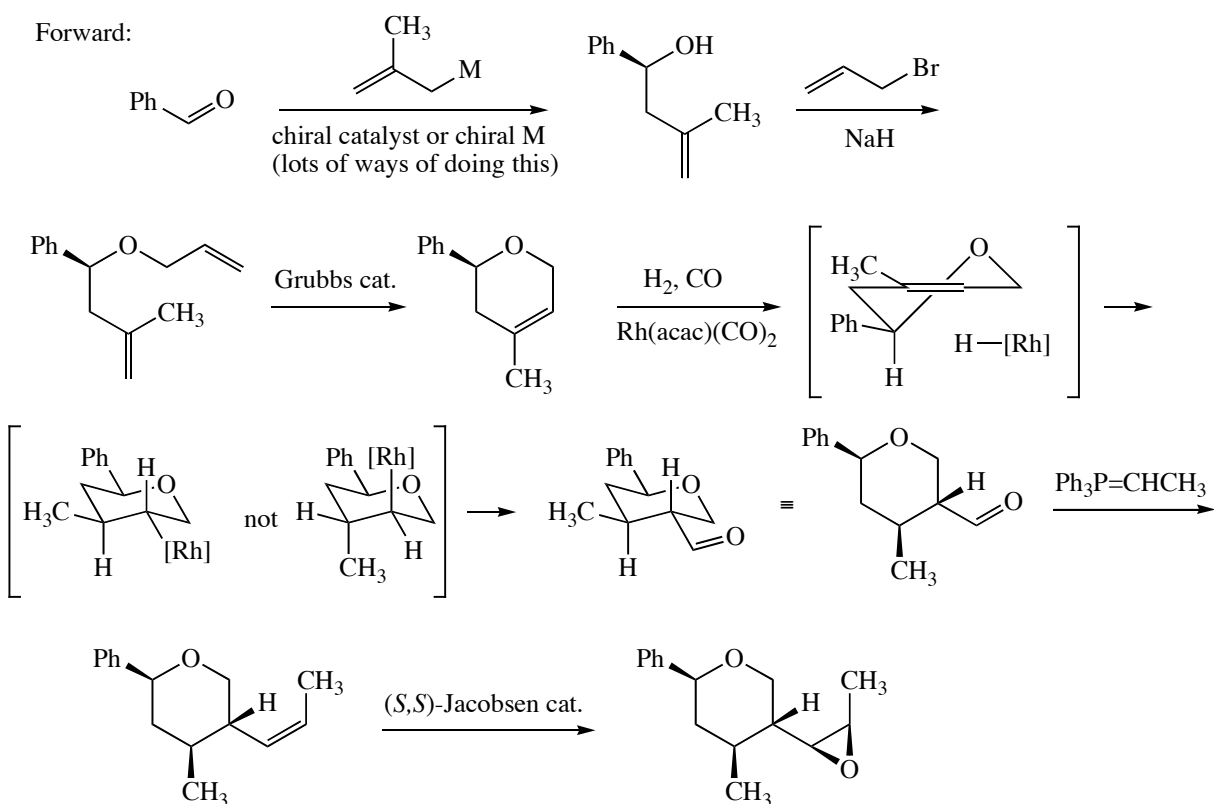
Forward:



- (d) The cis epoxide is best made by Jacobsen epoxidation of a cis alkene, which is best made from an aldehyde. The aldehyde can be made by hydroformylation of a cyclic alkene, which can be made by RCM.

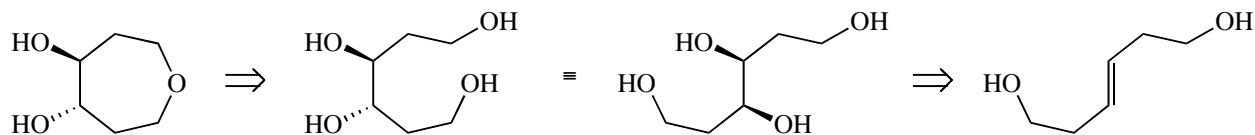
Retrosynthesis:





(e) Cleave the ring, then rotate around the central C–C bond to get a syn 1,2-diol that can be made by asymmetric dihydroxylation.

Retrosynthesis:



Forward:

