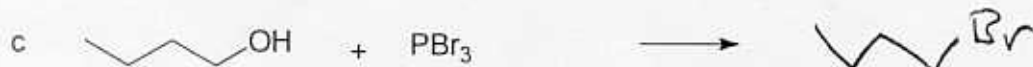
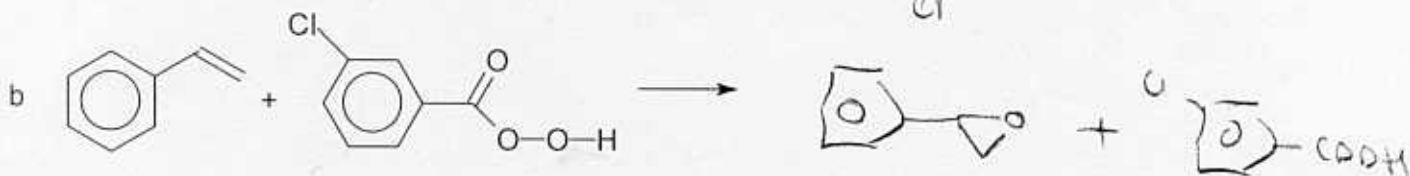
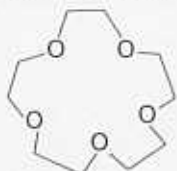


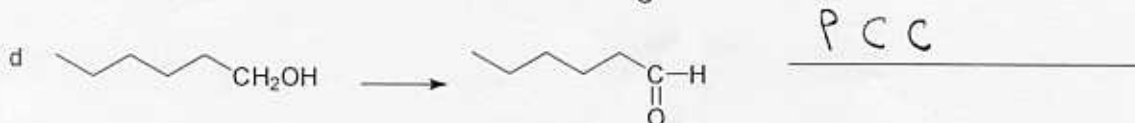
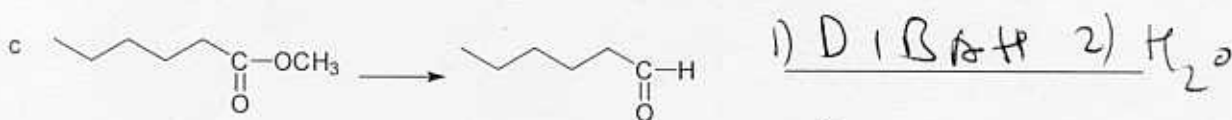
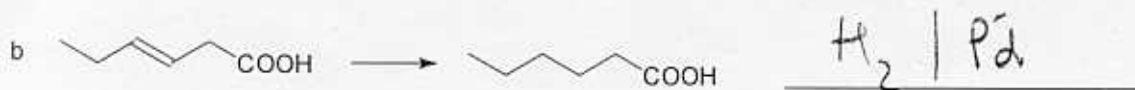
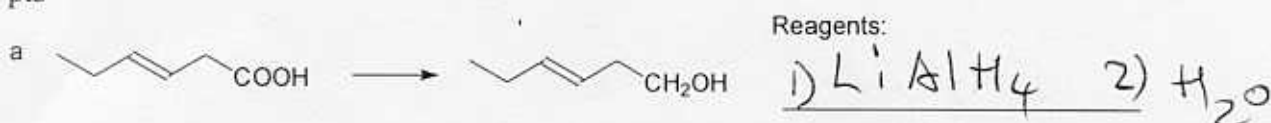
1. Show the major products of the following reactions. (10 pts)



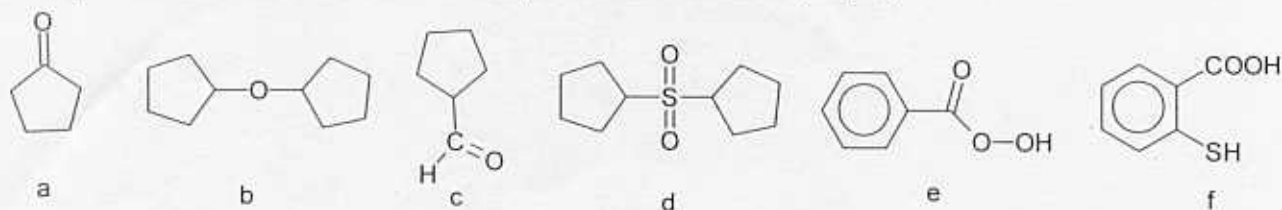
2. Propose a reasonable name for the crown ether shown below! (4 pts)



15-crown-5 ether

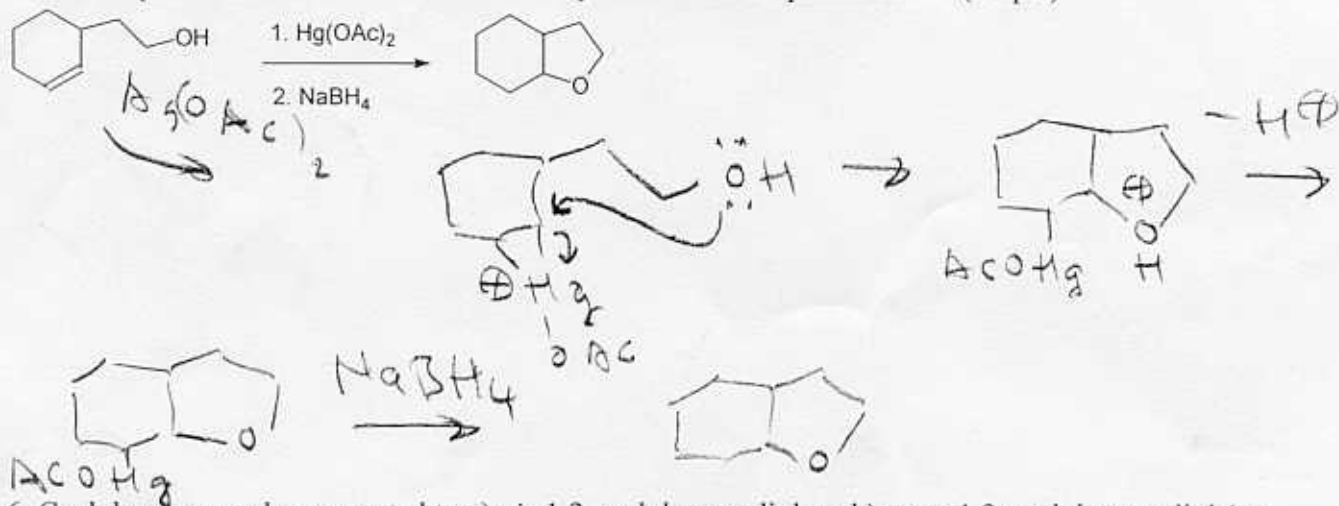
3. Suggest suitable reagents for the following transformations! Be brief (e.g. 1. HgSO₄, 2. H₂O) 8 pts

4. Propose reasonable names for the compounds shown below (12 pts)

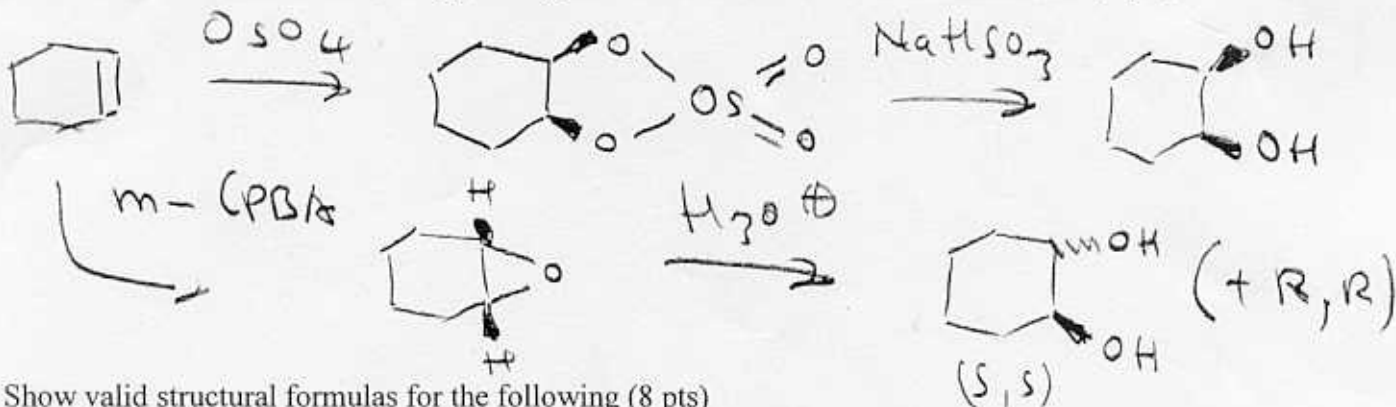


a cyclopentanone b dicyclopentyl ether
 c cyclopentane carb-: - aldehyde d dicyclopentyl sulfone
 e peroxybenzoic acid f 2-mercaptobenzoic acid

5. Show a plausible mechanism for the alkoxymercuration sequence below (10 pts)

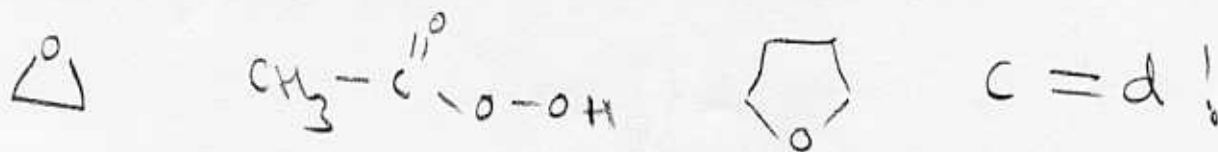


6. Cyclohexene can be converted to a) *cis*-1,2-cyclohexanediol, or b) *trans*-1,2-cyclohexanediol (as racemic mixture of enantiomers). Suggest reagents/conditions for both transformations! (8 pts)

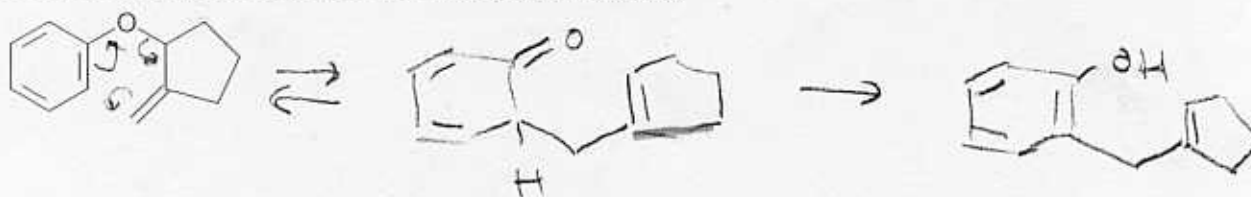


7. Show valid structural formulas for the following (8 pts)

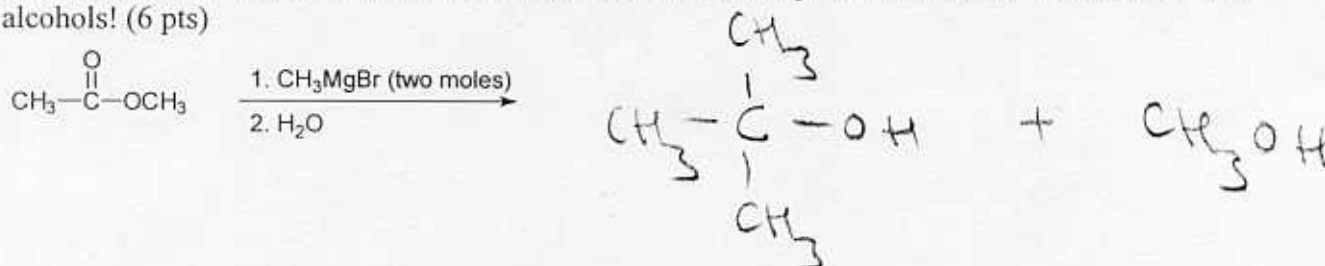
a) oxirane b) peroxyacetic acid c) oxolane d) tetrahydrofuran



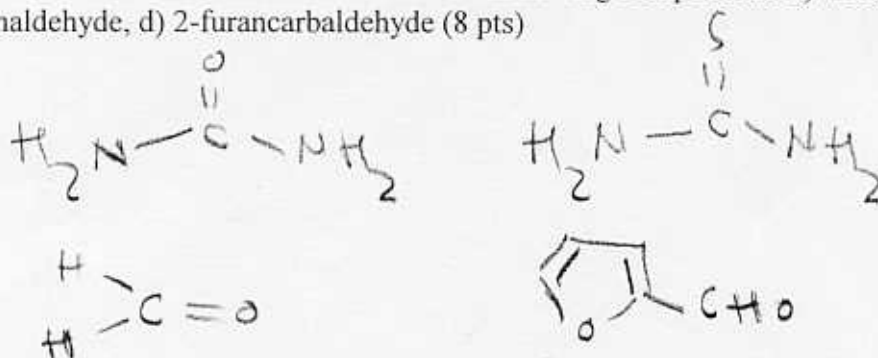
8. Show a mechanism for the Claisen rearrangement of the ether below. Clearly indicate the flow of electrons and the structure of the final product! (6 pts)



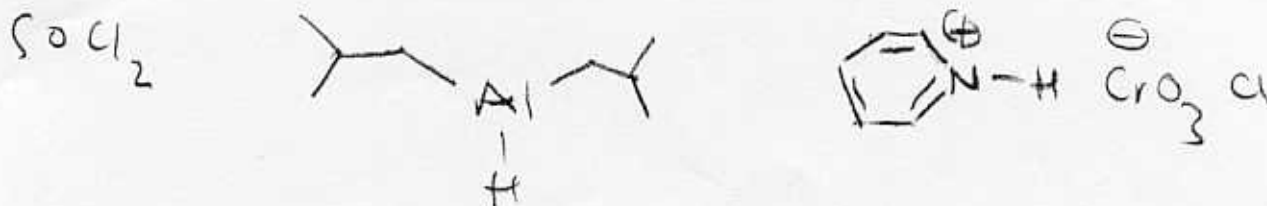
9. The reaction of methyl acetate with two moles of methylmagnesium bromide, followed by aqueous workup, results in the formation of two alcohols. Propose structural formulas for the two alcohols! (6 pts)



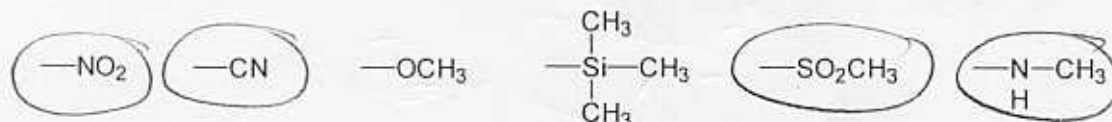
10. Show valid structural formulas for the following compounds: a) urea, b) thiourea, c) formaldehyde, d) 2-furancarbaldehyde (8 pts)



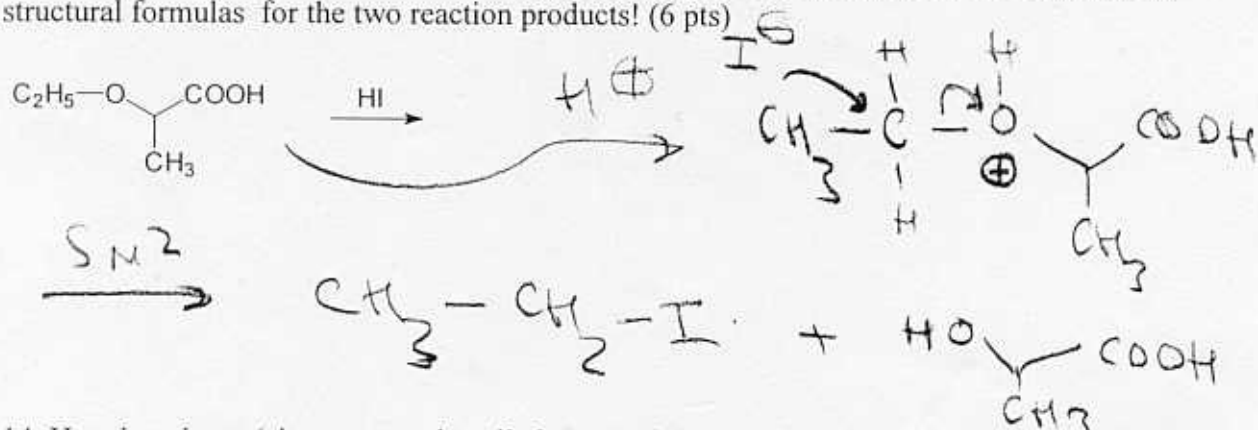
11. Show valid formulas (structural or other) for the following compounds: a) thionyl chloride, b) DIBAL, c) PCC (pyridinium chlorochromate) (6 pts)



12. Circle all functional groups that are incompatible with Grignard reagents! (6 pts)



13. The ether below can be cleaved with hydroiodic acid. Show a plausible mechanism and structural formulas for the two reaction products! (6 pts)



14. How is oxirane (also commonly called epoxyethane or ethylene oxide) manufactured in industry? (2 pts)

