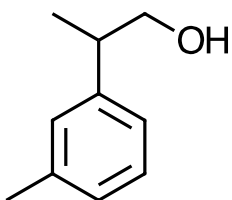
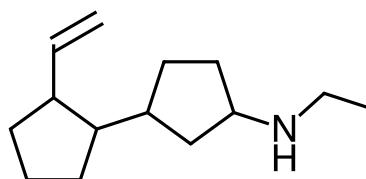


- 1) [20pts] Fill in the table with the expected results* of the simple chemical tests for compounds A-D

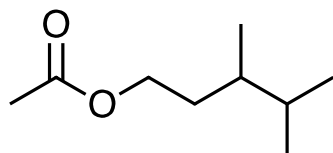
| Test\Compound | A | B | C | D |
|-----------------------------------------------|---|---|---|---|
| soluble in water | | | | |
| sol in conc H ₂ SO ₄ | | | | |
| sol in dil aq HCl | | | | |
| sol in dil. aq NaOH | | | | |
| bubbles in aq NaHCO ₃ | | | | |
| decolorizes Br ₂ /CCl ₄ | | | | |



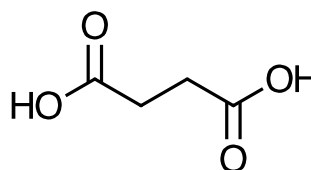
A



B



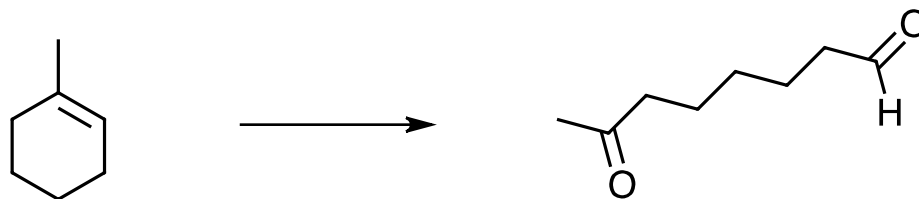
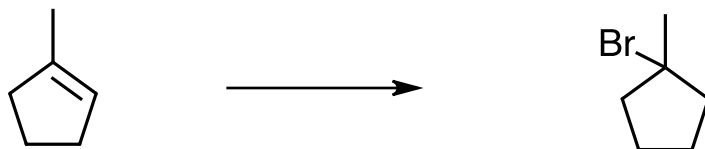
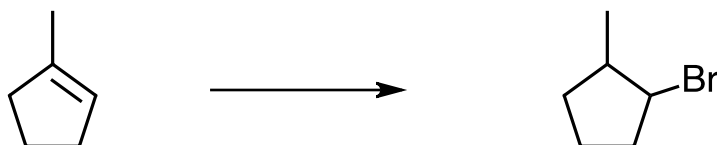
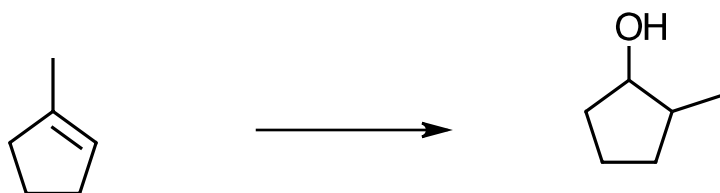
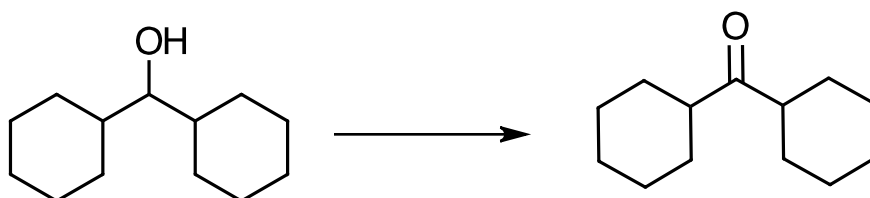
C



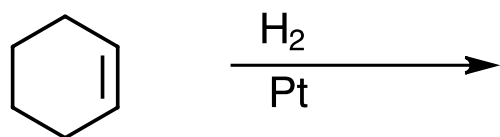
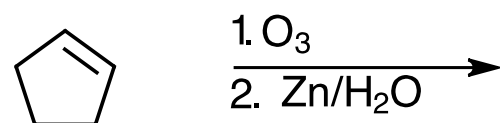
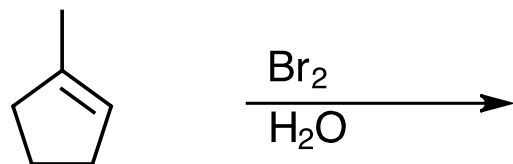
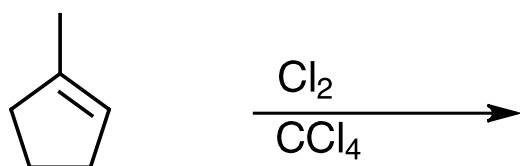
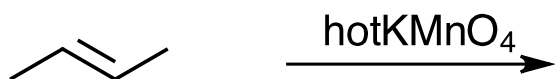
D

*Note: A zero for the solubility tests means the compound is insoluble in that reagent; a plus means the compound is soluble. A plus for Br₂/CCl₄ means the orange bromine color is discharged; a zero means the color remains. A zero for NaHCO₃ means no CO₂ bubbles are produced; a plus means CO₂ is evolved.

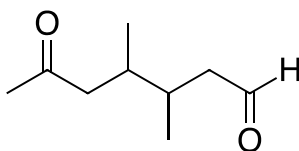
- 2) [40 pts] Place the appropriate reagents over the arrows for the following reactions:



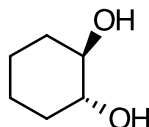
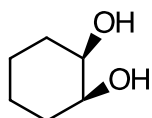
3) [40 pts] Show the expected major organic products:



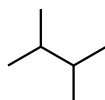
- 4) [20 pts] Ozonolysis of an alkene gave the product below. What was the alkene?



- 5) [10 pts] List three things that a carbocation can do:
- 6) [10 points] Beginning with cyclohexene, show how you would synthesize each of the following:

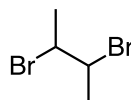


- 7) [20 points] Below each structure state the number of different protons and the number of different carbons::



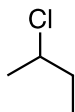
protons =

carbons =



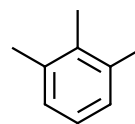
protons =

carbons =



protons =

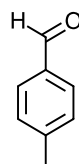
carbons =



protons =

carbons =

- 8) [20 points] Sketch the expected proton NMR and C-13 spectra for the following structure:



9) [20 points] Provide structures consistent with the provided information:

a) $C_4H_8O_2$ δ 1.2 triplet 3 H
 δ 2.1 singlet 3 H
 δ 4.1 quartet 2 H
 strong IR absorption at $\sim 1740\text{ cm}^{-1}$

b) $C_5H_8Br_4$ δ 3.6 singlet 8 H