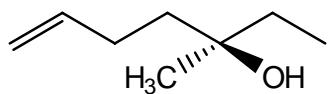


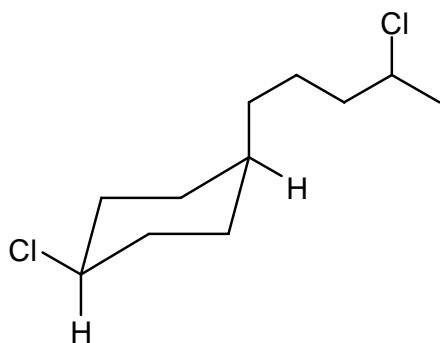
A. Nomenclature: (12 points, 3 pts. each)

Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the **stereochemistry** where appropriate.

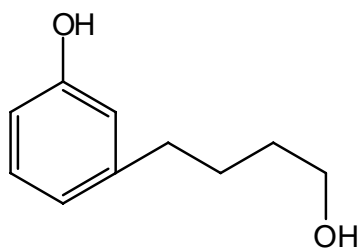
1.



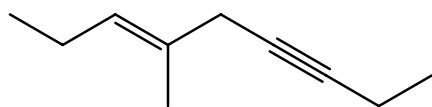
2.



3.

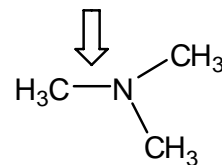
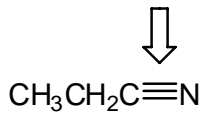
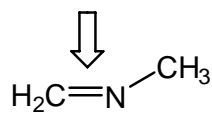


4.

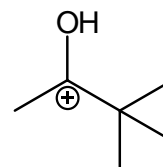
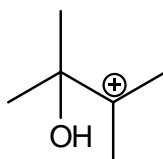
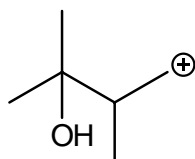


B. Facts: (18 points)

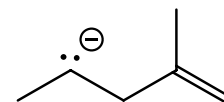
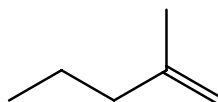
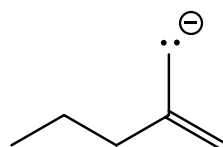
1. Place the following compounds in order of increasing frequency of the indicated carbon – nitrogen bond stretching vibration. (1 = lowest frequency, 3 = highest frequency) (3 pts.)



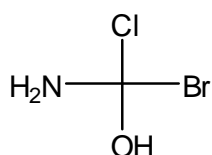
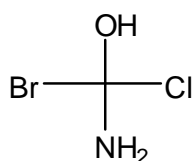
2. Place the following carbocations in order of increasing stability. (1=least stable, 3=most stable) (3 pts.)



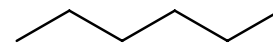
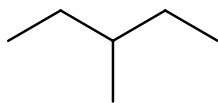
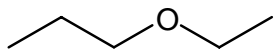
3. Place the following carbanions in order of increasing stability. (1=least stable, 3=most stable) (3 pts.)



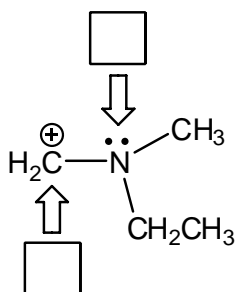
4. Label the pair of molecules as identical, enantiomers, diastereomers, or structural isomers. (2 pts)



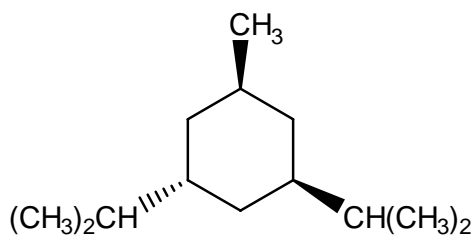
5. Place the following compounds in order of increasing boiling point. (1=lowest, 3=highest) (3 pts.)



6. For the molecule below determine the hybridization of the indicated atoms and place the answers in the boxes provided. (2 pts.)

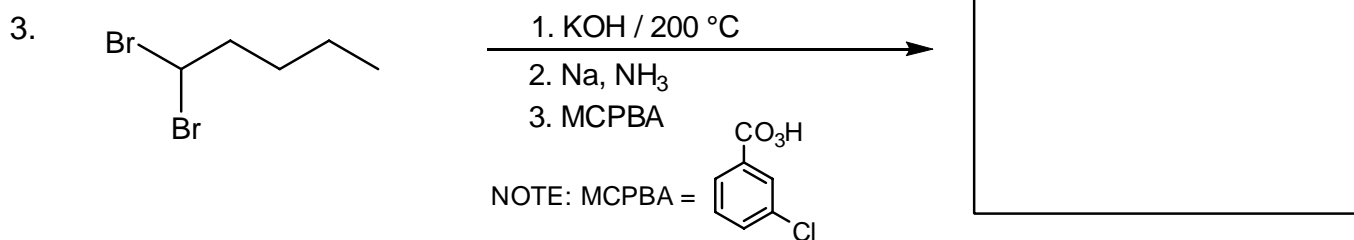
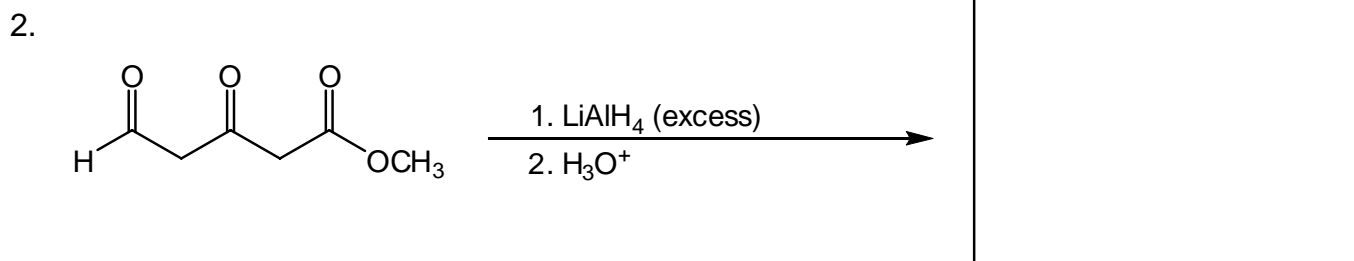
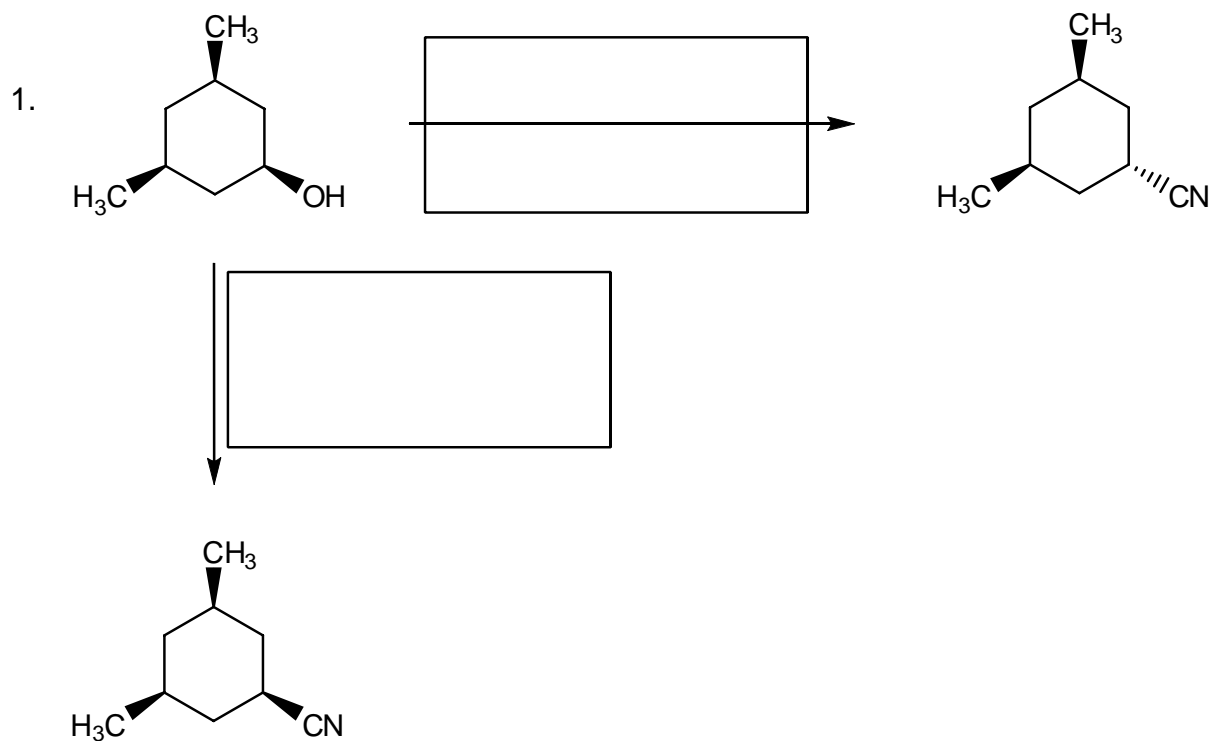


7. Draw the most stable conformation of the compound below in the box provided. (2 pts.)

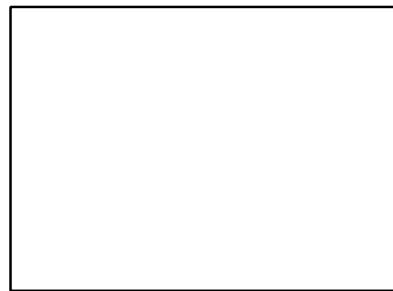
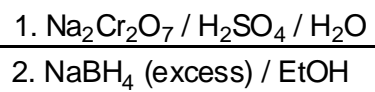
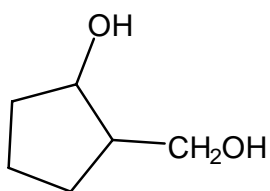


C. Reactions: (40 points, 4 pts. each)

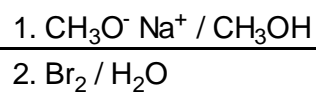
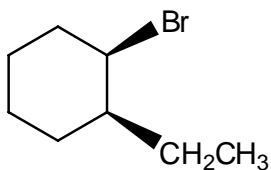
Please give the **final** major product unless otherwise indicated or the reagents for each of the following reactions in the box provided. Be sure your answers indicate **stereochemistry** where appropriate. Intermediate products may be placed below the reaction for partial credit but not in the answer box.



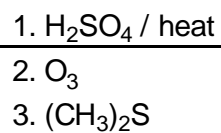
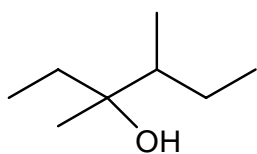
4,



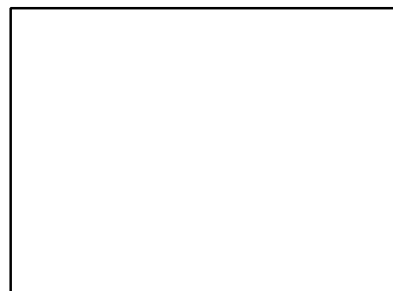
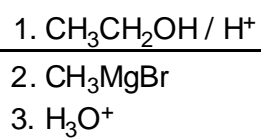
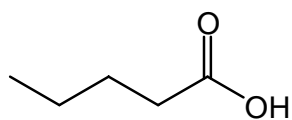
5.



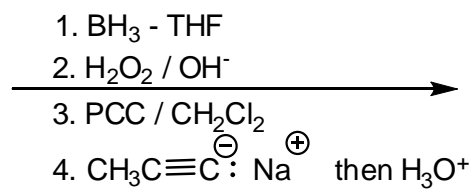
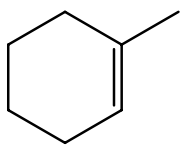
6.



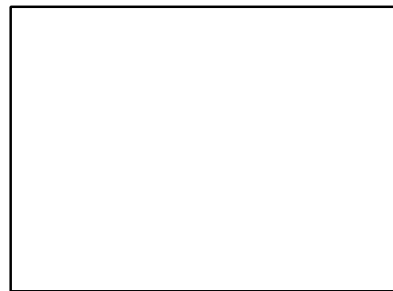
7.



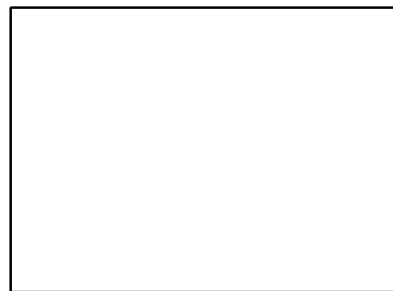
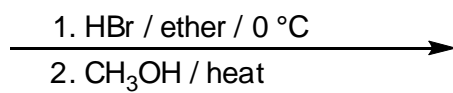
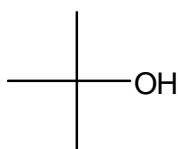
8.



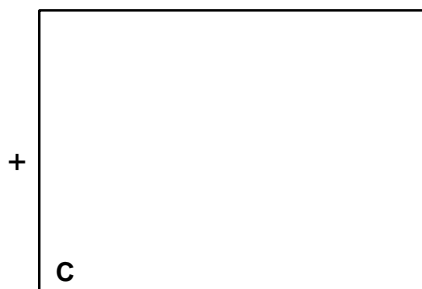
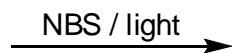
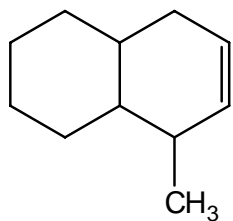
Note: PCC = pyridinium chlorochromate



9.



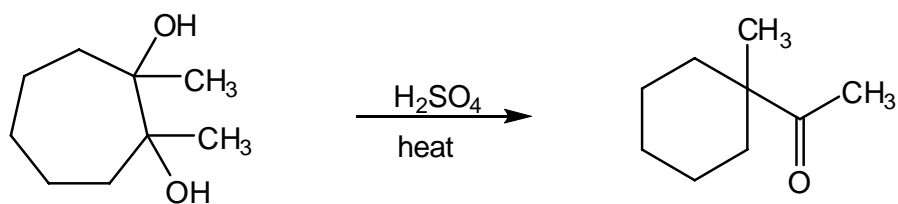
10.



Note: Ignore stereochemistry. **A**, **B**, **C**, and **D** are structural isomers

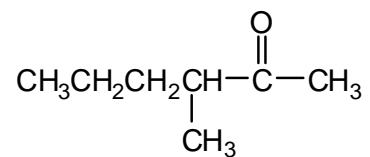
D. Mechanisms: (10 points)

The following reaction yields a mixture of products. Provide a clear mechanism for the formation of the product shown. Use curved arrow notation to indicate "electron flow," and show all intermediates and formal charges.



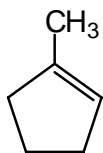
E. Synthesis: (10 Points)

From alcohols of three carbons or less, any oxidizing or reducing agents and any inorganic reagents, synthesize the compound below.

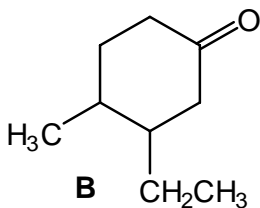


F. Spectroscopy: 10 Points

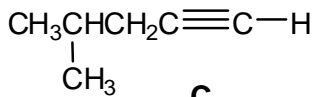
Carefully examine the five infrared spectra and the seven compounds below. Place the letter of the compound in the box beside its spectrum.



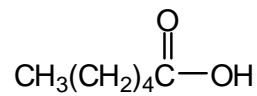
A



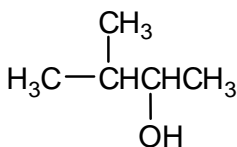
B



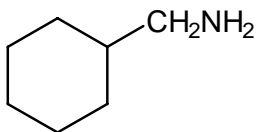
C



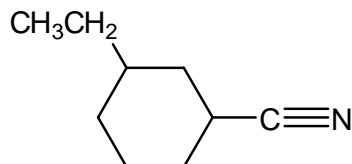
D



E



F



G

