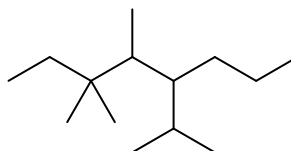
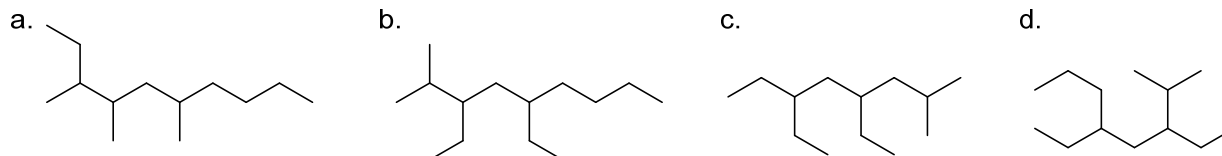


Name: \_\_\_\_\_

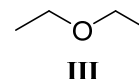
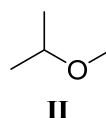
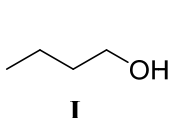
Circle the letter for the correct solution for each multiple-choice question. (2 points each)

1. Identify the correct IUPAC name for the following structure.

- a. 5-isopropyl-3,3,4-trimethyloctane
- b. 4-isopropyl-5,6,6-trimethyloctane
- c. 2,4,5,5-tetramethyl-3-propylheptane
- d. 3,3,4-trimethyloctane-5-isopropyloctane

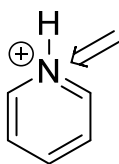
2. Identify the correct structure for the following IUPAC name: **3,5-diethyl-2-methyloctane**3. Rank the following isomers from **highest to lowest boiling point**.

- a. **I>II>III**
- b. **I>III>II**
- c. **III>II>I**
- d. **II>I>III**

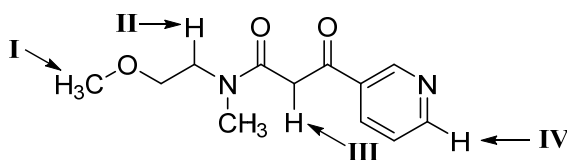


4. What is the hybridization and geometry for the indicated atom.

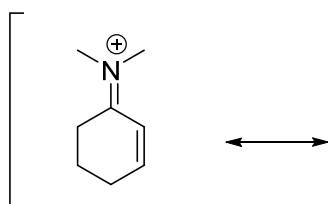
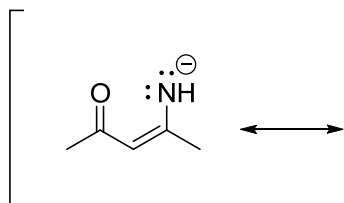
- a.  $sp^3$ , tetrahedral
- b.  $sp^3$ , trigonal pyramidal
- c.  $sp^2$ , trigonal planar
- d.  $sp^2$ , bent

5. Identify the **most acidic proton**.

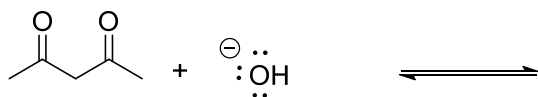
- a. I
- b. II
- c. III
- d. IV



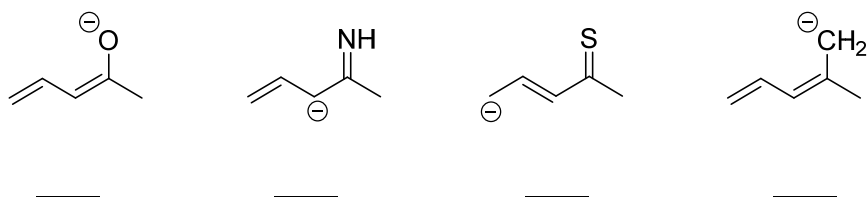
6. a. Draw as many reasonable resonance structures as you can for the following molecules using correct curved arrows to show electron movement.  
 b. For each, label the major resonance contributor and provide a **one phrase** explanation. (8 points)



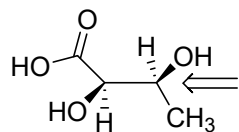
7. a. Provide products and curved arrows for the following acid base reaction.  
 b. Determine whether hydroxide is a **suitable base** for this reaction. Use **pK<sub>a</sub> values** to justify your answer. (6 points)



8. Rank the following bases from **MOST BASIC (1)** to **LEAST BASIC (4)**. (2 points)



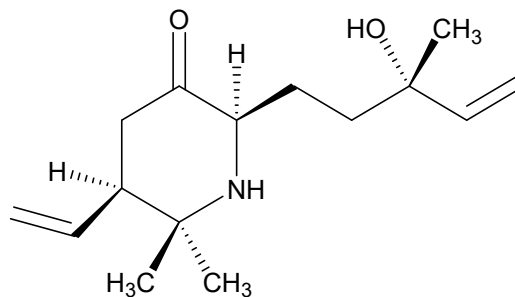
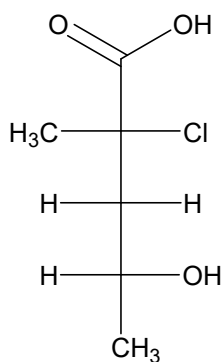
9. a. Draw the following bond line structure as a Newman projection looking down the indicated bond.  
 b. Draw the following bond line structure as a Fischer projection. (4 points)



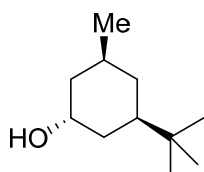
**Newman**

**Fischer**

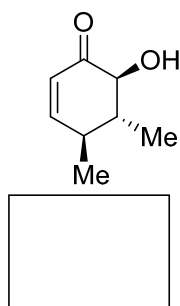
10. Assign R/S for each chiral center. Show your work by clearly labeling the priorities (1-4) around each chiral center (6 points)



11. a. Draw both chair conformers of the following molecule.  
 b. Identify the lower energy conformer and provide a brief explanation for your choice. (7 points)



12. a. How many stereoisomers exist for the following molecule?  
 b. Draw the enantiomer.  
 c. Draw one diastereomer. (3 points)



Number of isomers

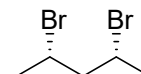
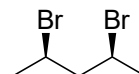
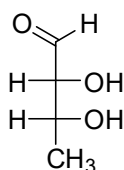
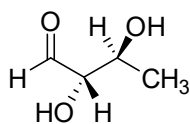
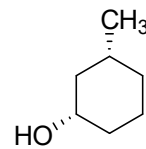
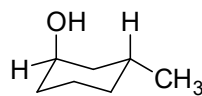
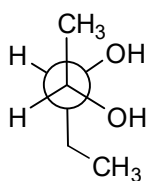
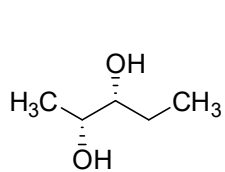


Enantiomer



Diastereomer

13. Identify the relationship between each pair of compounds as constitutional isomers (C), enantiomers (E), diastereomers (D) or the same. (4 points)



14. a. Circle the structure which corresponds to the following IR spectrum.  
b. Show your work by clearly annotating all identifiable functional groups in the diagnostic region.  
(5 points)

