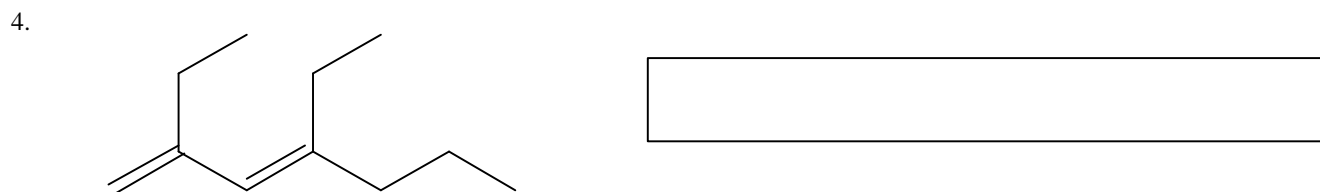
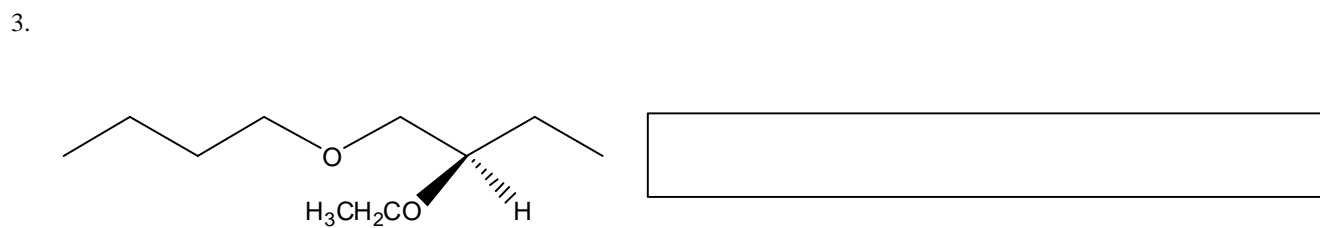
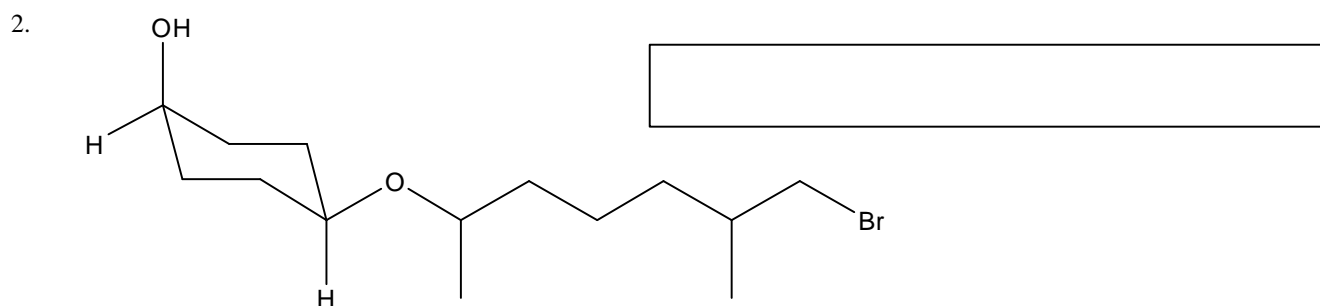
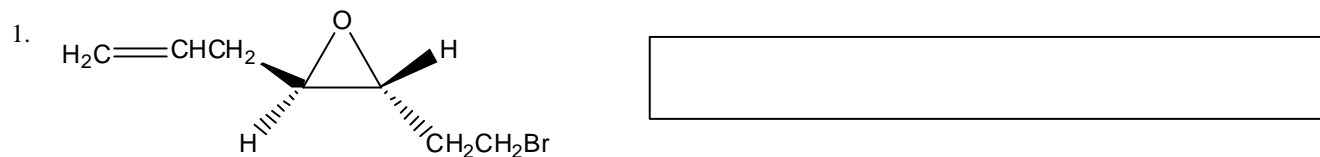


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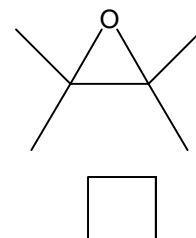
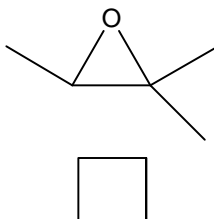
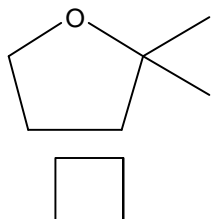
A. Nomenclature: (16 points)

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

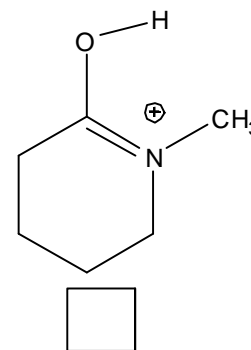
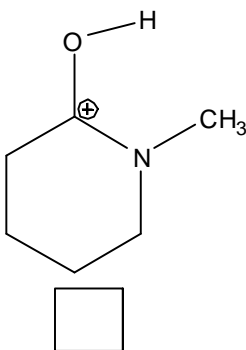
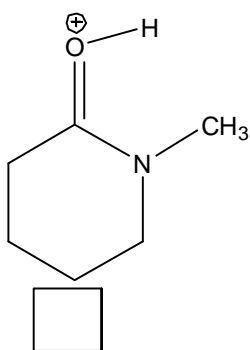


B. Facts: Total points = 15

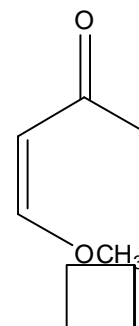
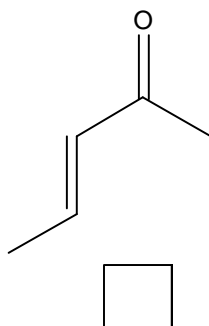
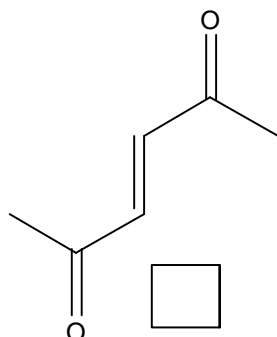
1. Place the following compounds in order of increasing reactivity with $\text{CH}_3\text{CH}_2\text{NH}_2$. (1=least reactive, 3=most reactive) (3 pts)



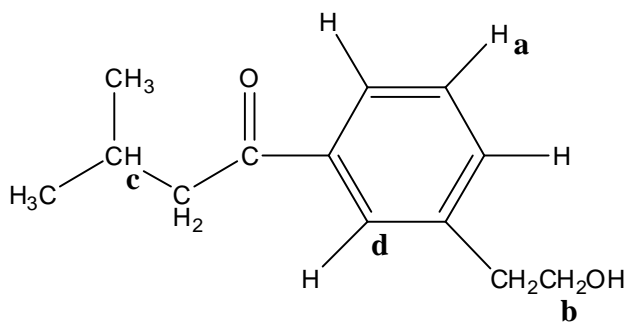
2. Place the following resonance contributors in order of increasing stability. (1=least reactive, 3=most reactive) (3 pts)



3. Place the following molecules in order of increasing reactivity in a Diels-Alder reaction. (1=least reactive, 3=most reactive) (3 pts)



4. Answer the following questions for the molecule below and place the answers in the appropriate boxes. (i) How many distinct types of protons are present in the molecule? (ii) How many distinct carbons are present? (iii), (iv) & (v) What are the theoretically predicted multiplicities (splitting patterns) of the signal for protons **a**, **b**, and **c**? (vi) What is the multiplicity of carbon **d** in the proton coupled ^{13}C NMR? (6 pts)



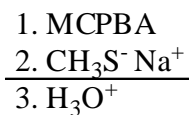
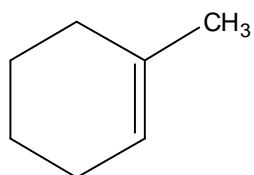
- | | | |
|-------|--------------------------|--------------------------|
| (i) | # of proton types | <input type="checkbox"/> |
| (ii) | # of carbon types | <input type="checkbox"/> |
| (iii) | Multiplicity of a | <input type="checkbox"/> |
| (iv) | Multiplicity of b | <input type="checkbox"/> |
| (v) | Multiplicity of c | <input type="checkbox"/> |
| (vi) | Multiplicity of d | <input type="checkbox"/> |



C. Reactions: Total = 30 pts, 6 points each

Please provide the reagents or major product in the answer box unless indicated otherwise. Indicate **stereochemistry** with wedges and dashes if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.

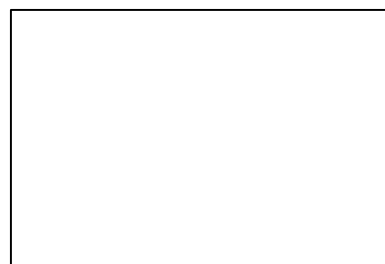
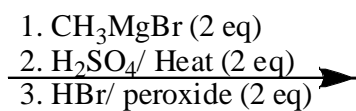
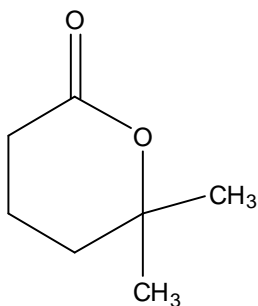
1.



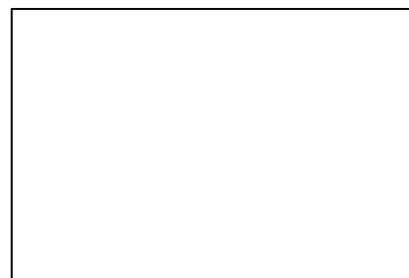
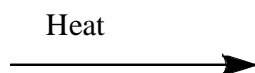
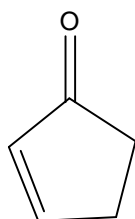
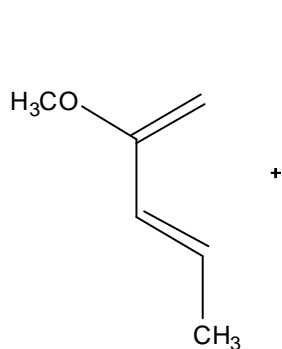
Note: MCPBA= m-chloroperbenzoic acid



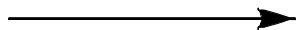
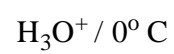
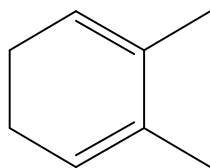
2.



3.



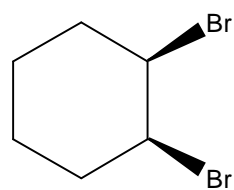
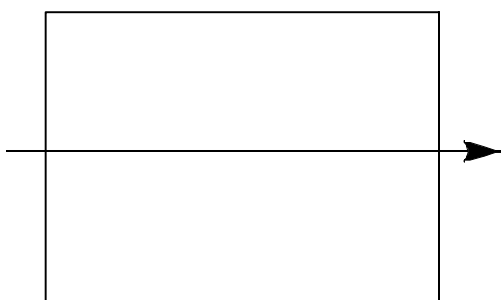
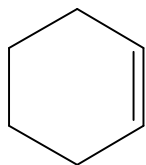
4.



+

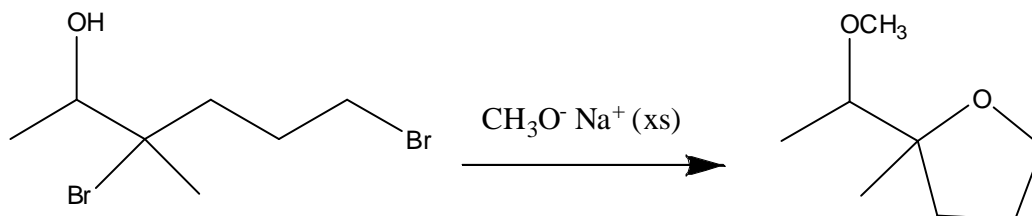


5.



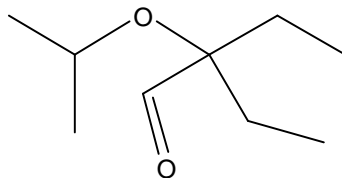
D. Mechanism: (13 points)

Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow." Remember to show only one step at a time. **Show all intermediates and all formal charges.** **Do not show transition states**



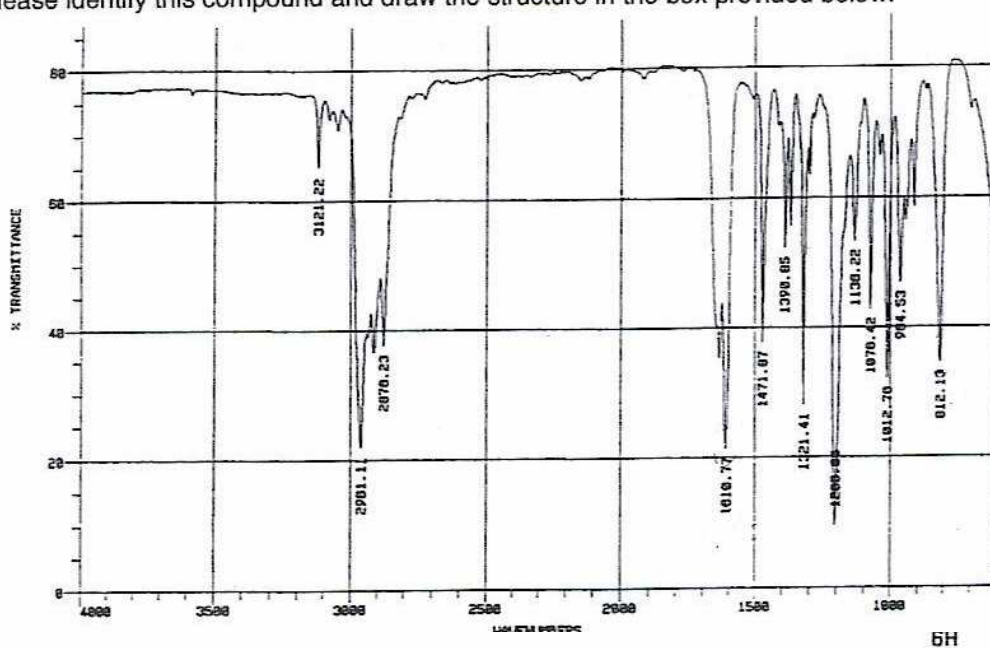
E. Synthesis: (13 points)

Synthesize the molecule below using any of the following reagents: alcohols, alkanes, alkenes, and/or alkynes of **three carbons or less**, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.

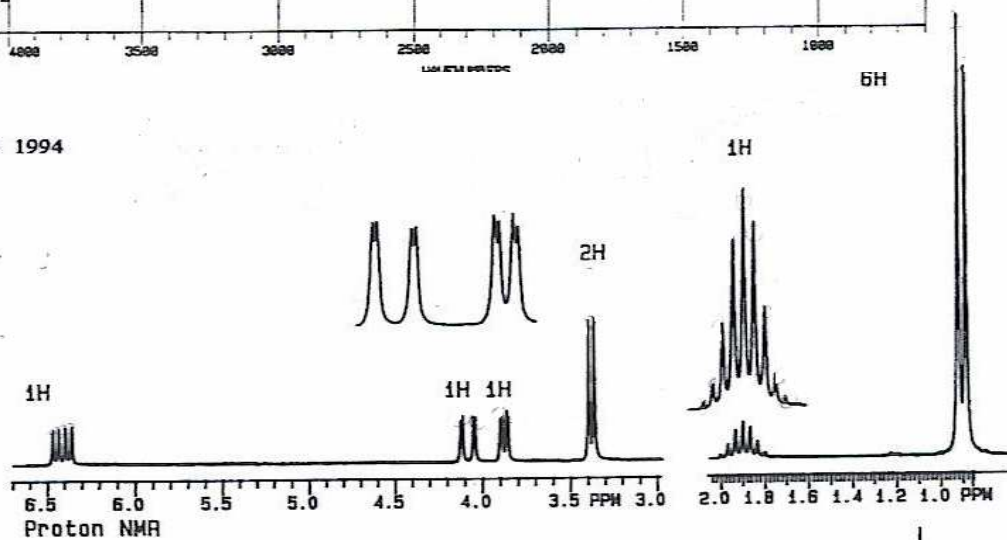


F. Spectroscopy: 13 Points

A compound with the formula $C_6H_{12}O$ exhibits the IR, 1H NMR and proton decoupled ^{13}C NMR spectra shown below. Please identify this compound and draw the structure in the box provided below.



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Carbon 13 NMR

