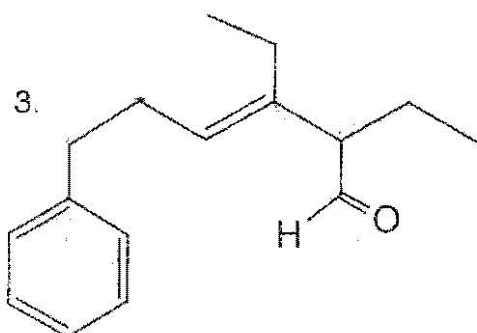
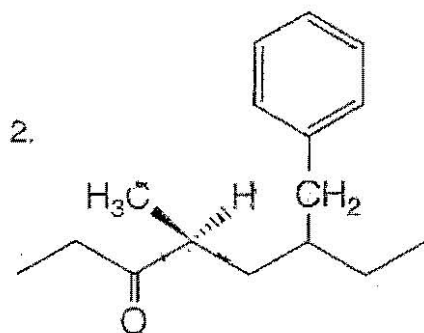
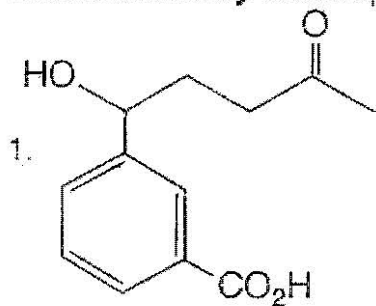


E2, 5p'05

A. Nomenclature: (12 points)

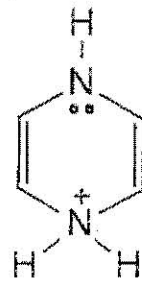
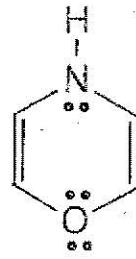
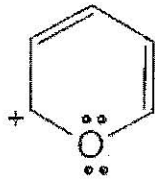
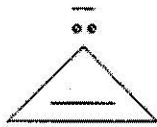
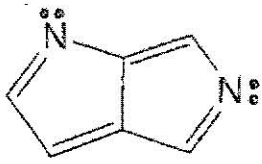
Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the stereochemistry where appropriate.



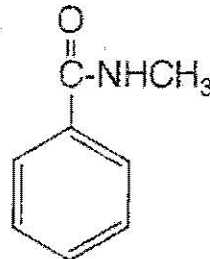
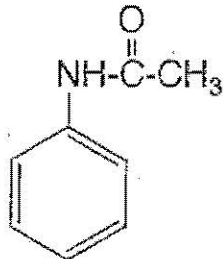
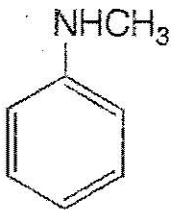
2 pts / box

B. Facts: 22 points

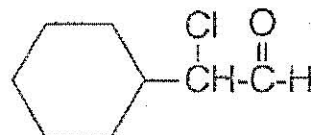
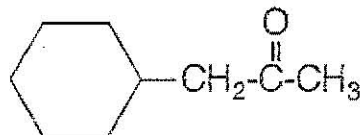
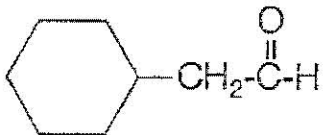
1. Label the molecules below as aromatic, antiaromatic, or nonaromatic. You may assume all are planar. (10 pts.)



2. Rank the following substituted benzene compounds in order of increasing reactivity with an electrophile. (1=least reactive, 3=most reactive) (6 pts.)

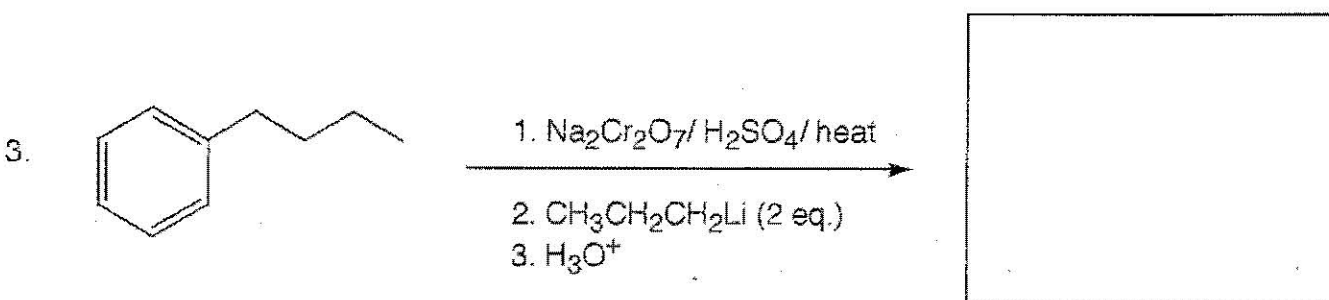
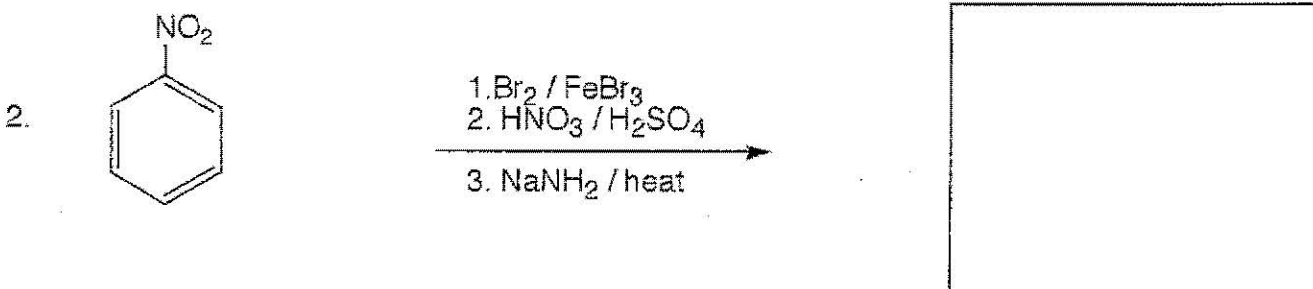
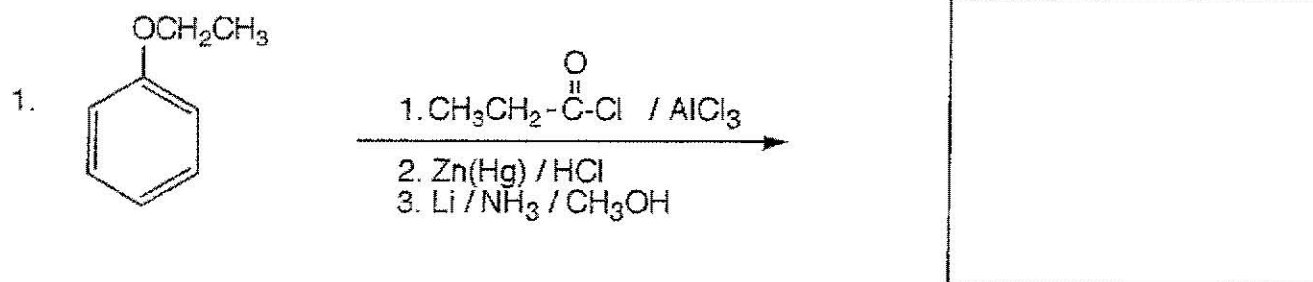


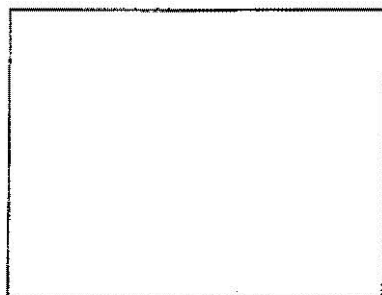
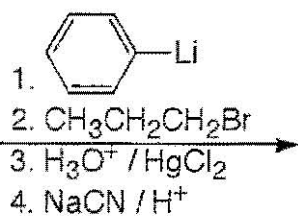
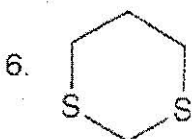
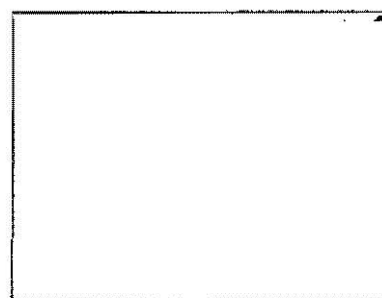
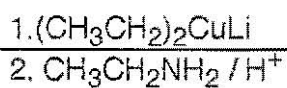
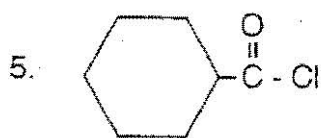
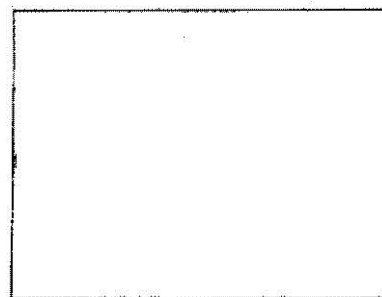
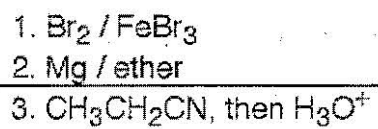
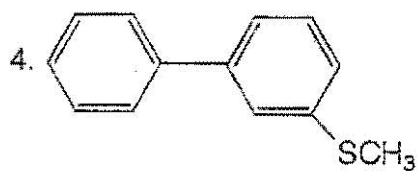
3. Rank the following compounds in order of increasing reactivity with a nucleophile. (1=least reactive, 3=most reactive) (6 pts.)



**C. Reactions:** Total = 30 points, 5 points each

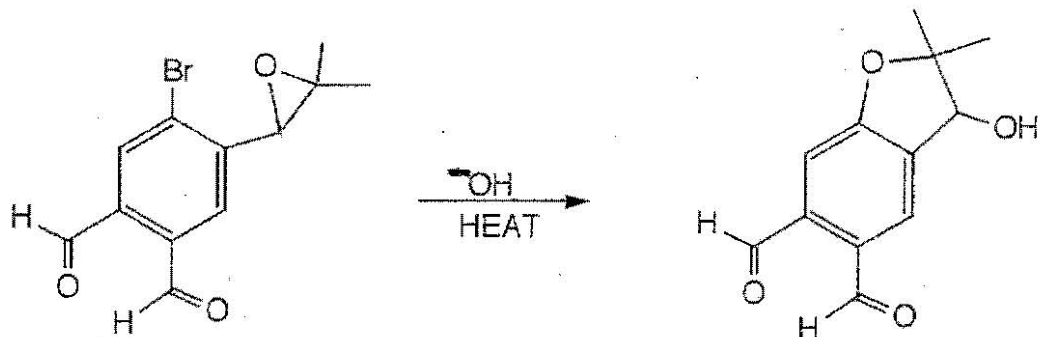
Please provide the major product in the answer box. Be sure your drawing indicates **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.





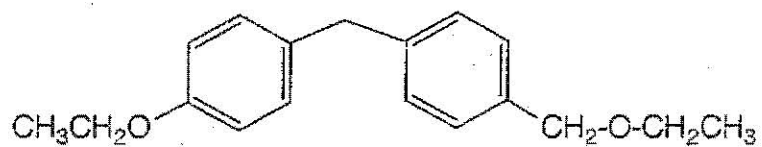
**D. Mechanism:** (12 points)

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**. When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.



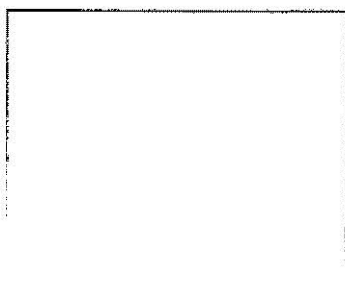
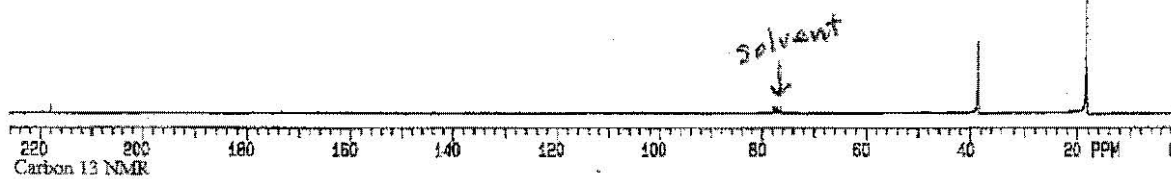
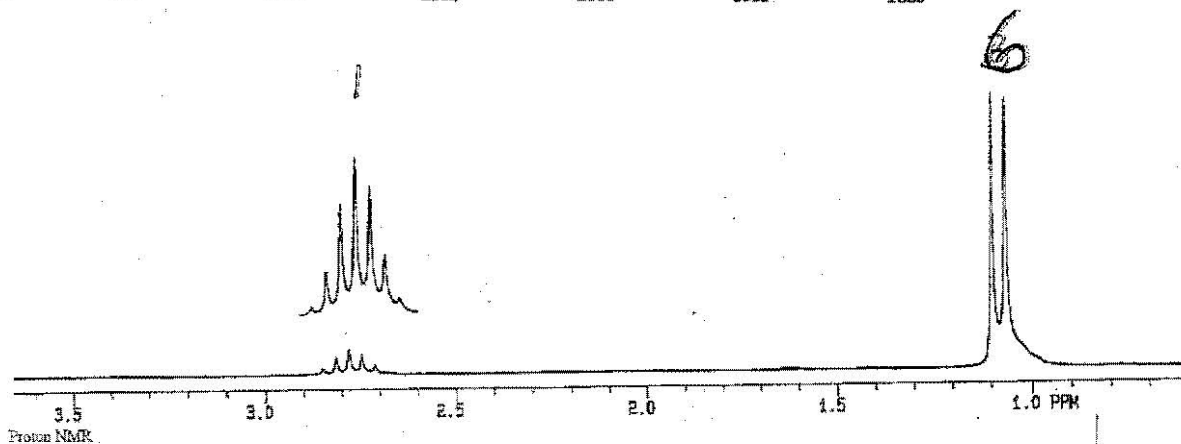
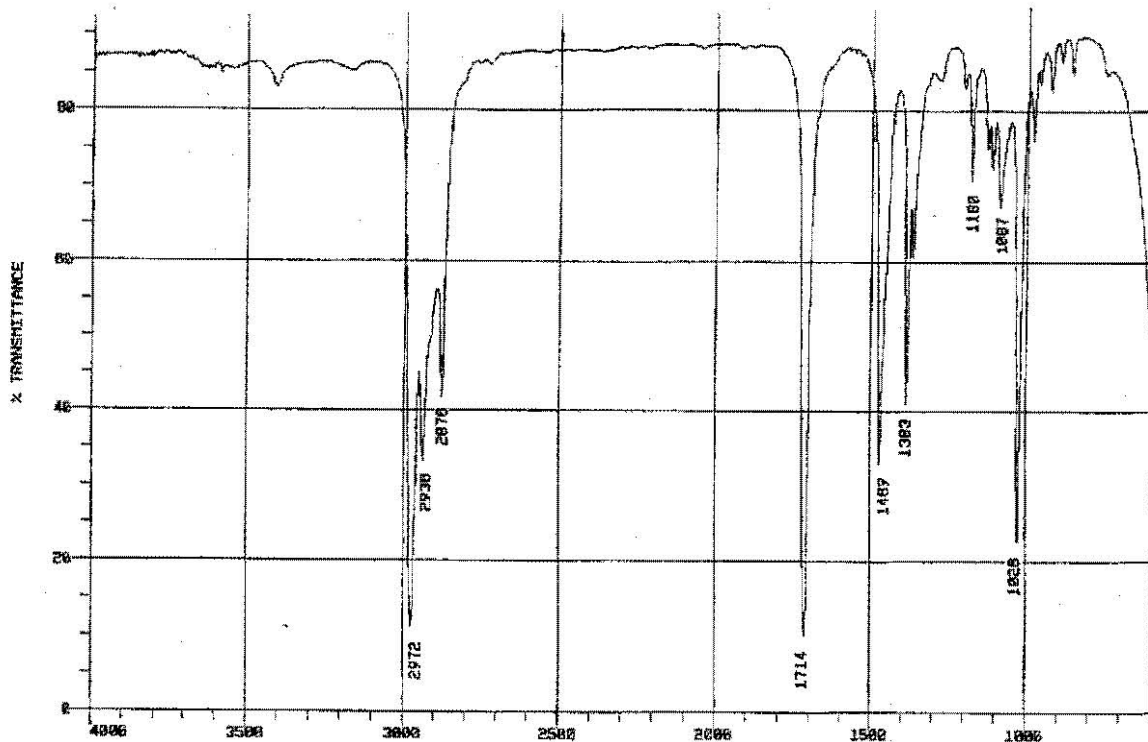
**E. Synthesis:** 12 Points

Synthesize the molecule below using any of the following reagents: benzene, alcohols of **two carbons or less**, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



### F. Spectroscopy: 12 Points

A compound with the formula  $C_7H_{14}O$  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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