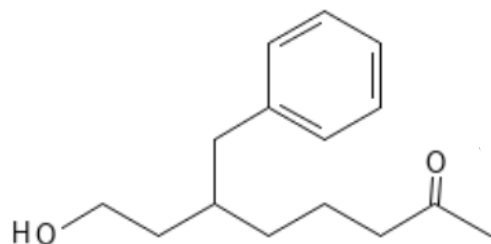


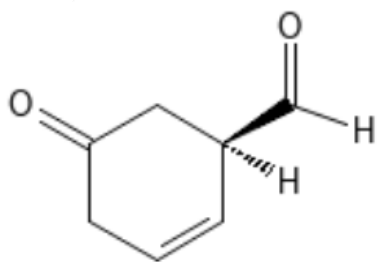
A. Nomenclature: (12 Points)

Give an acceptable IUPAC name for each of the following compounds in **1** and **2**. Draw the structure of the compound in **3**. Be sure to note **stereochemistry** where appropriate.

1.



2.

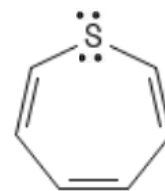
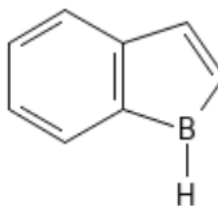
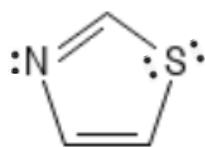
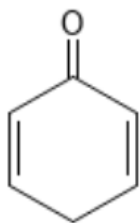


3.

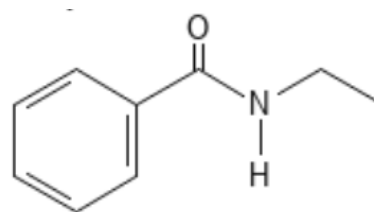
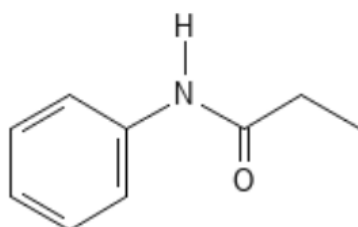
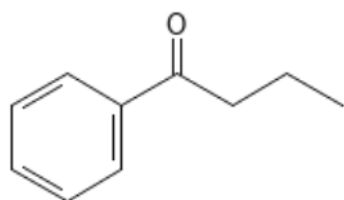
2-nitro-6-phenylanisole

B. Facts: (18 Points)

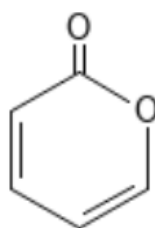
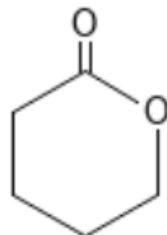
1. Label the molecules below as aromatic(**AR**), antiaromatic(**AA**), or nonaromatic(**NA**). Please assume all are planar. (8 pts.)



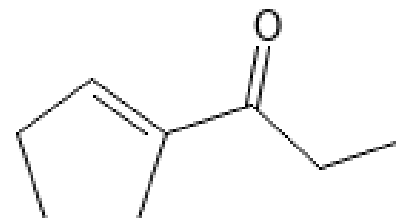
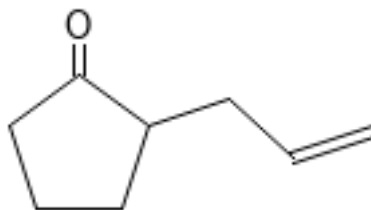
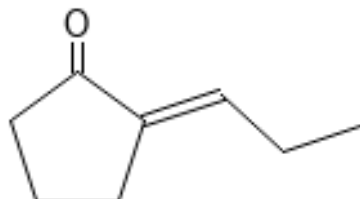
2. Rank the following substituted benzene compounds in order of increasing rate of reaction with a mixture of Br_2 and FeBr_3 (1=slowest rate, 3=fastest rate) (3 pts.)



3. Explain why compound **A** is more basic than compound **B**. Your answer must include structures to support the following.

**A****B**

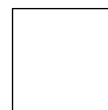
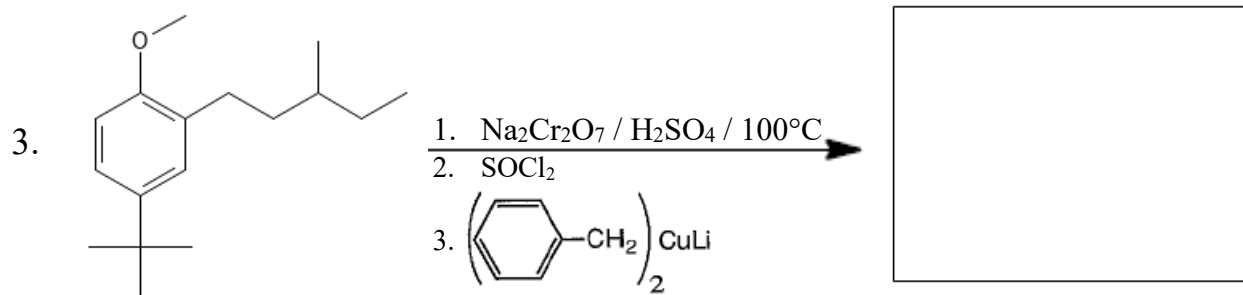
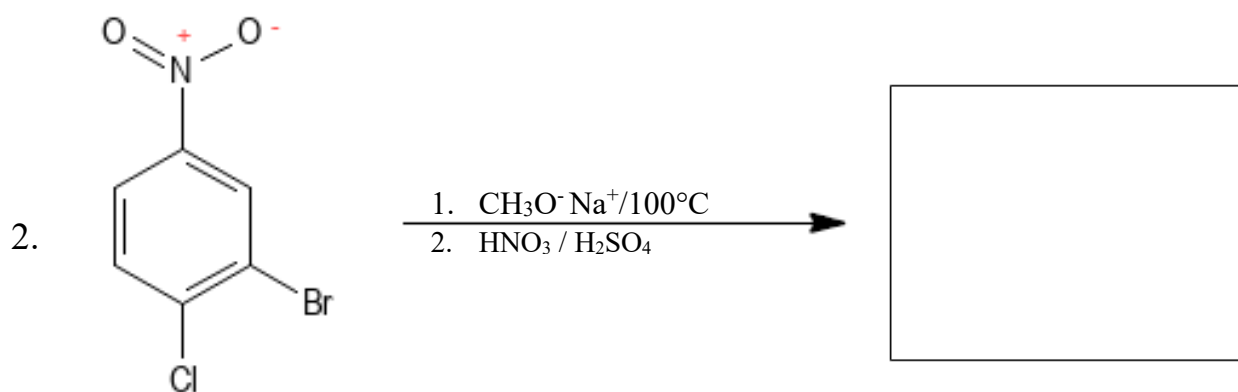
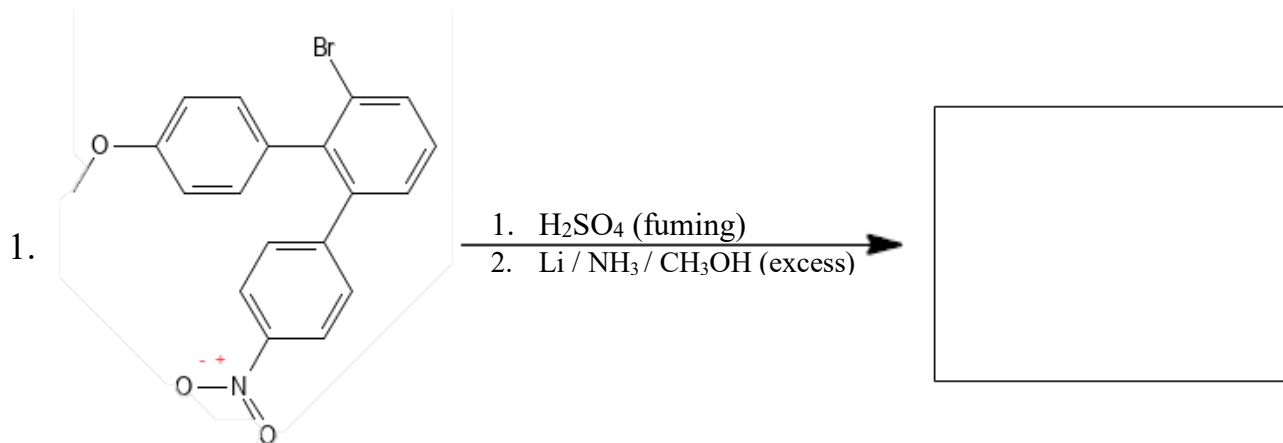
4. Place the following compounds in order of increasing frequency of the C=O stretch (1=lowest frequency, 3=high frequency) (3 pts.)



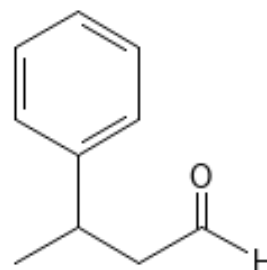
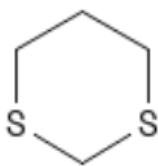
C. Reactions: Total = 36 points, 6 points each

Please provide the reagents or the major products in the answer box. Indicate **stereochemistry** if applicable. **Full credit is awarded only when the product of each step in a multi-step reaction is shown below the reaction**

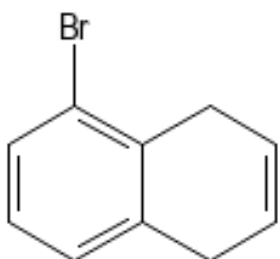
e



4.



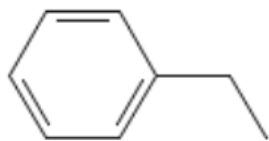
5.

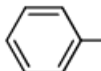


1. O_3
2. $(CH_3)_2S$
3. $Zn(Hg) / HCl$ (2 eq.)
4. $Br_2 / Light$ (2 eq)
5. $NaCN / acetone$ (2 eq)
6. CH_3CH_2MgBr (2 eq), then H_3O^+



6.

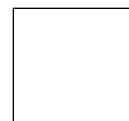
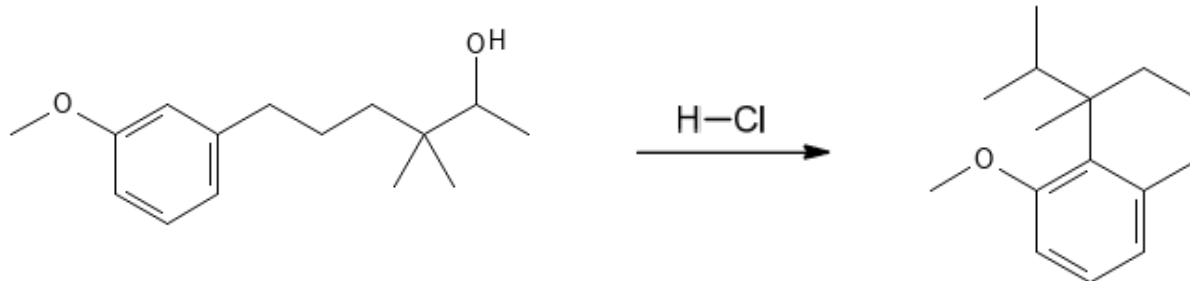


1. $HCl / CO / AlCl_3 / CuCl$
2. $CrO_3 / H_2SO_4 / H_2O / acetone / 0^\circ C$ (Jones')
3.  CH_2Li (2eq), then H_3O^+



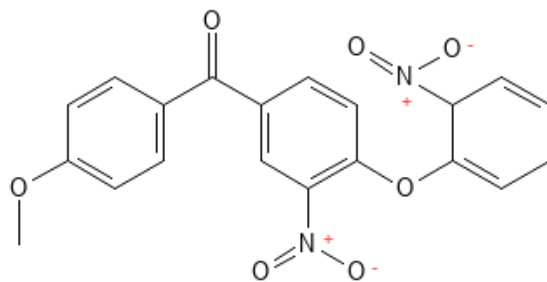
D. Mechanism: (12 points)

Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow." **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 **benzene, methanol**, any inorganic reagents, and any oxidizing or reducing agents.



F. Spectroscopy: 10 Points

A compound with the formula $C_{10}H_{12}O_2$ 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

