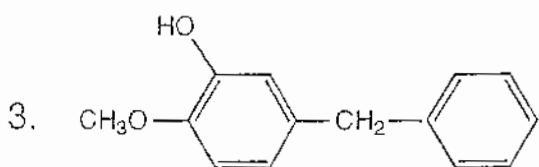
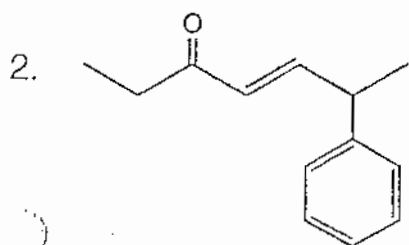
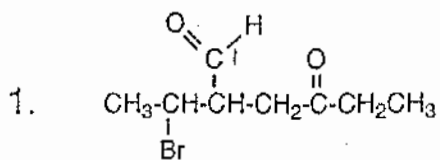


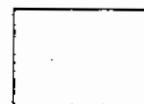
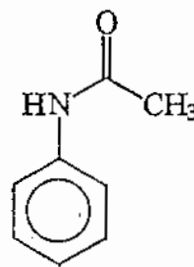
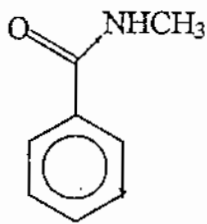
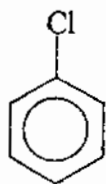
A. Nomenclature: 9 points, 3 points each

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

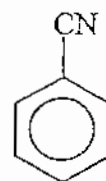
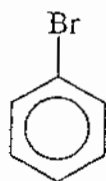
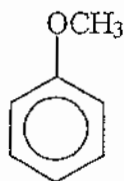


B. Facts (total 18 points, 3 points each)

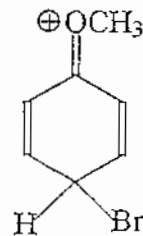
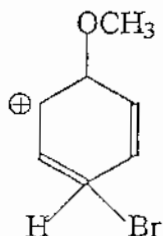
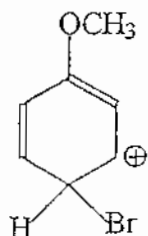
1. Rank the following compounds in order of their decreasing relative reactivity with E^+ (1 = most reactive, 3 = least reactive):



2. Circle the compound which will NOT undergo Friedel Craft's reaction.



3. Circle the INCORRECT resonance structure in the bromination of anisole with Br₂/FeBr₃.



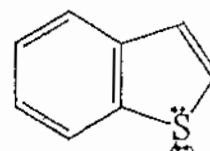
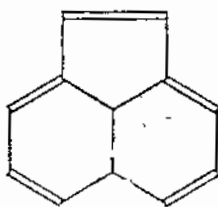
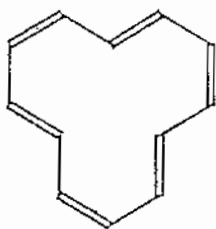
2E2



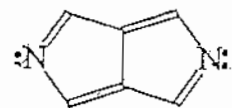
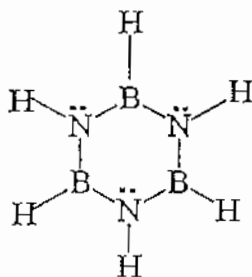
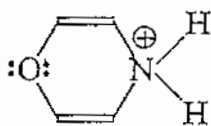
4. Circle the reaction or series of reactions which will NOT lead to 1,3-cyclohexadiene.

- a) Acid-catalyzed isomerization of 1,4-cyclohexadiene.
- b) Reaction of cyclohexene with NBS, followed by KOH/CH₃CH₂OH.
- c) Reaction of 1,3-butadiene with acetylene.

5. For the following molecules (assume [12]annulene is planar), classify each as aromatic, antiaromatic or non-aromatic (please write in the box provided for each).



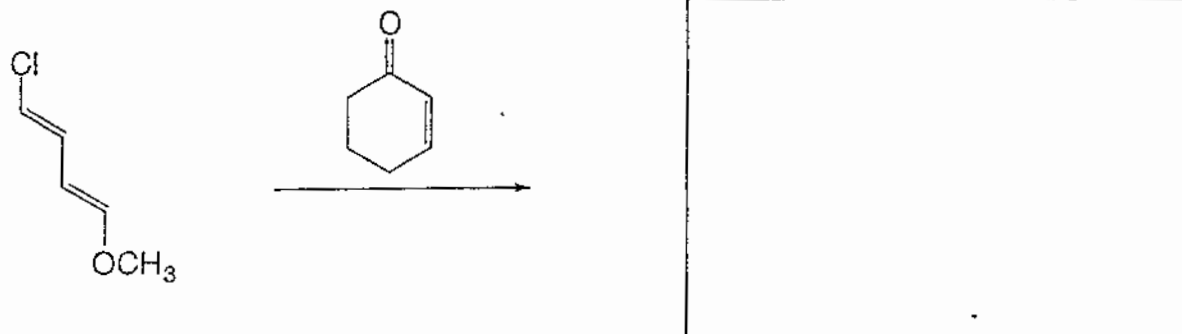
6. Classify the following molecules or ions as aromatic, antiaromatic or non-aromatic (please write in the box provided for each).



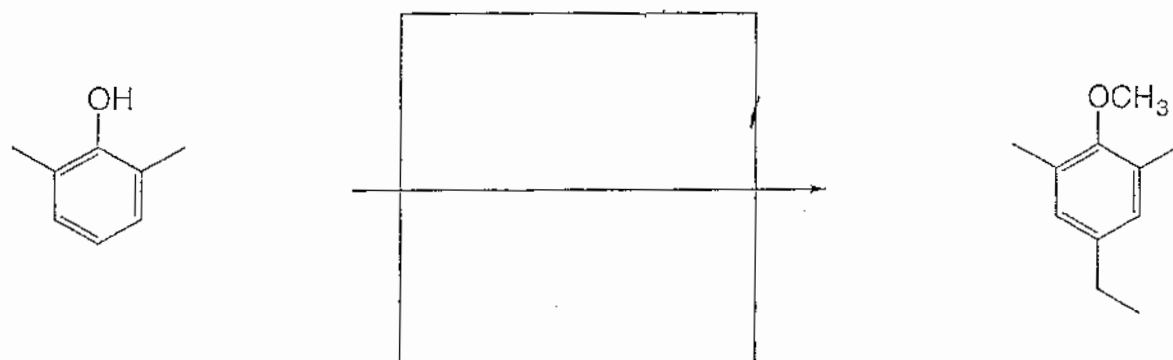
C. Reactions (5 points each problem; 30 points total)

Please provide the **major product**, or **necessary reagents**, or **starting material** in the box provided below. Be sure your drawing indicates stereochemistry if applicable.

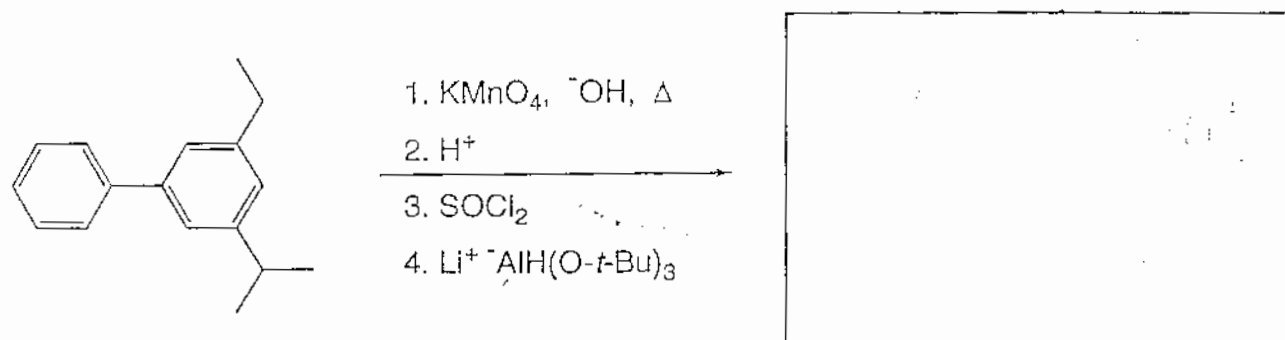
1.



2.



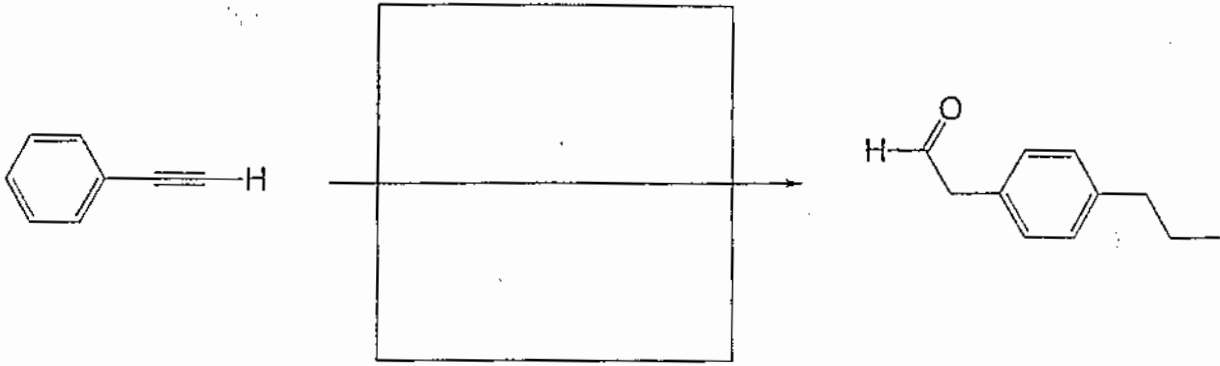
3.



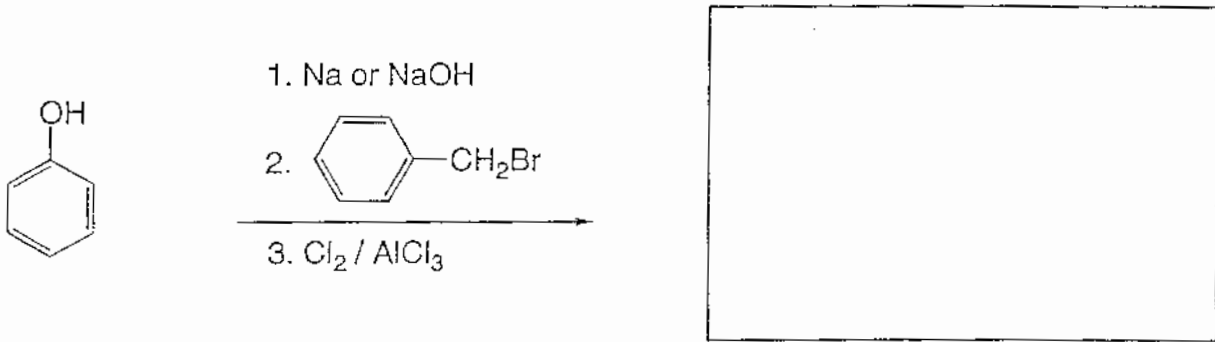
4 E2



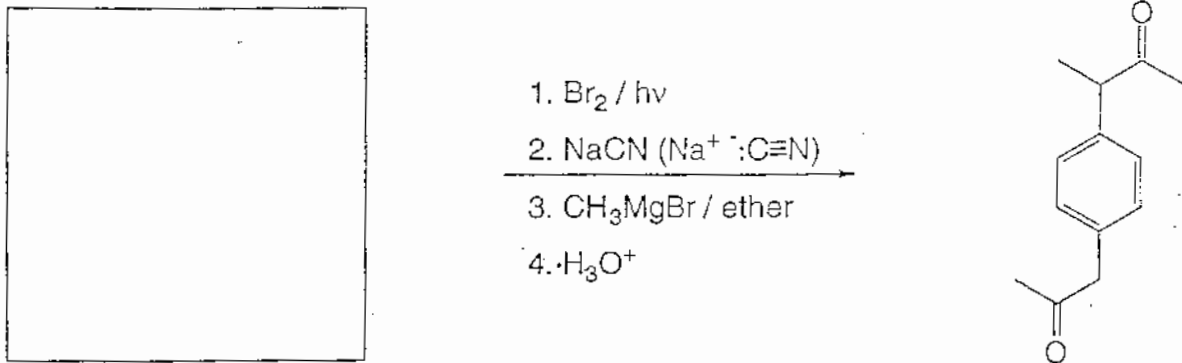
4.



5.



6.



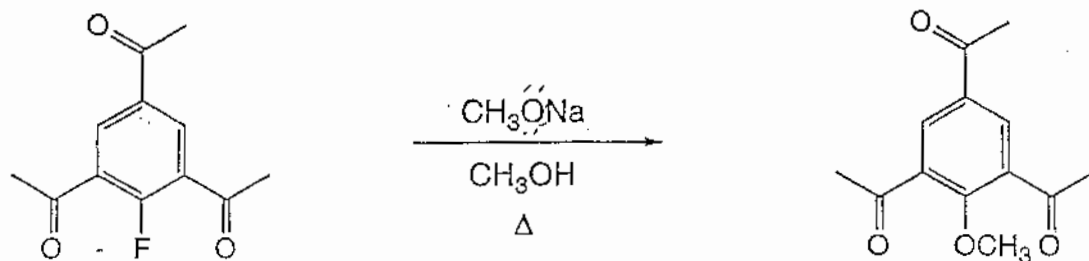
5 E2



D. Mechanisms: (10 pts each)

Provide clear mechanisms for reactions 1 and 2. Use curved arrow notation to indicate "electron flow". Show all intermediates and all formal charges. If there is more than one resonance structure, you must show the "best" (i.e. lowest energy) structure.

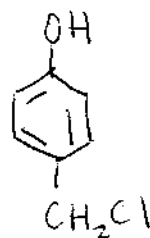
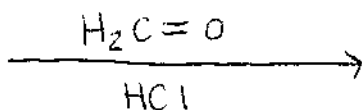
1.



6 E2



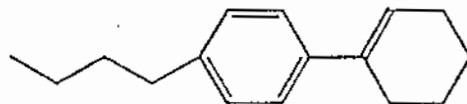
2.7



7 E2

E. Synthesis: 13 points

Outline an efficient synthesis for the molecule shown below using any of the following reagents: alcohol, alkene, and/or alkynes of *two carbons or less*, benzene, and any inorganic reagents, any oxidizing or reducing agents and any peroxy acid.

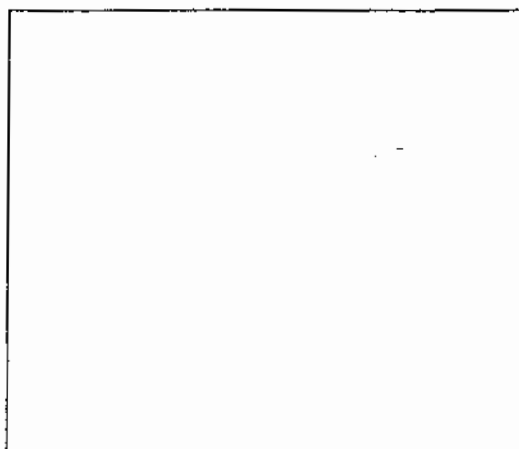


8 E2



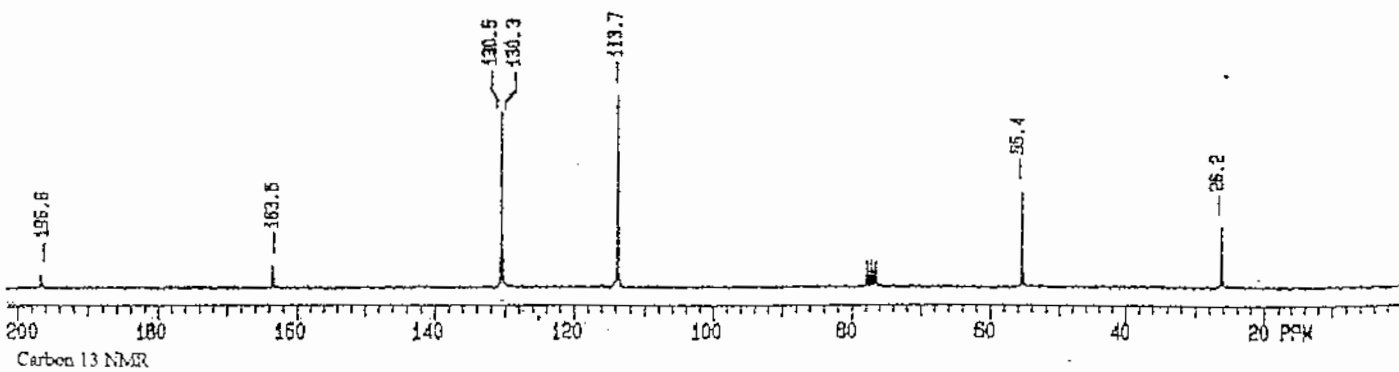
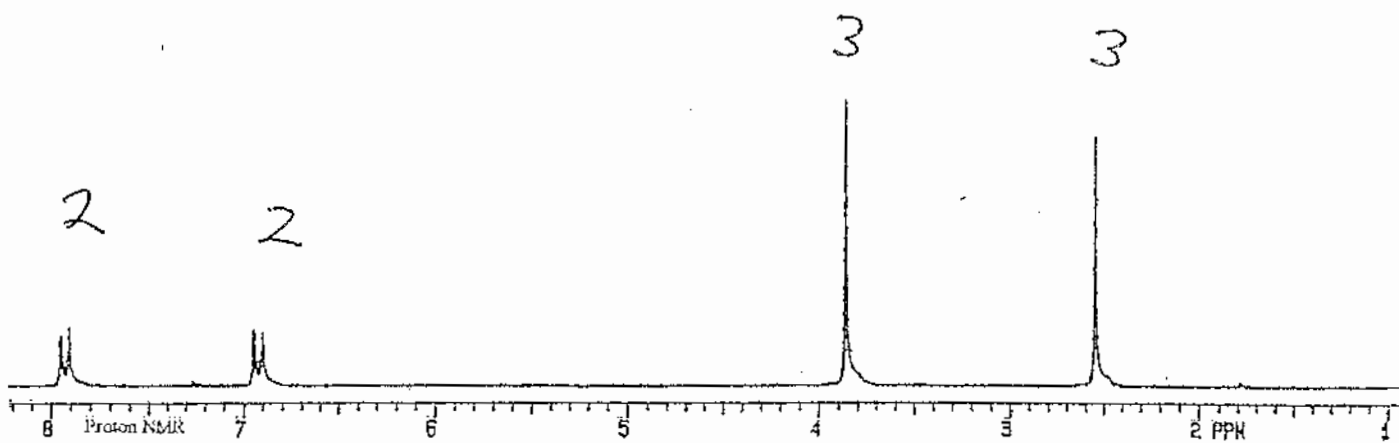
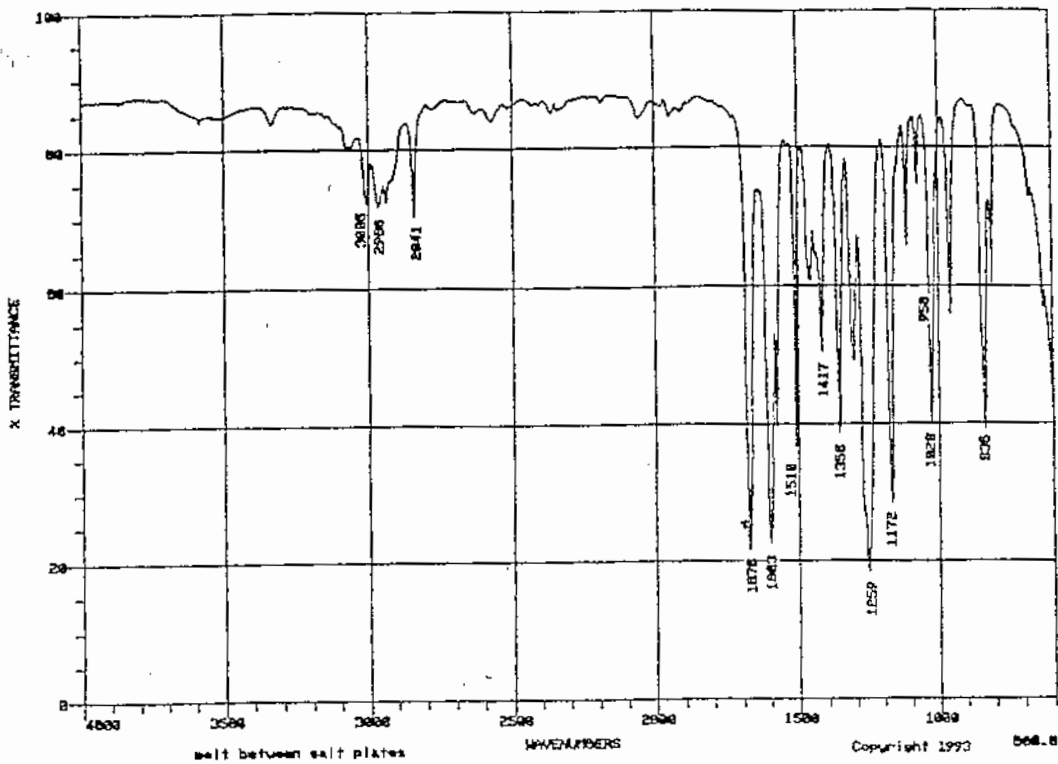
F. Spectroscopy, 10 points

A compound with the formula $C_9H_{10}O_2$ exhibits the IR, 1H NMR and ^{13}C NMR (proton spin decoupled) spectra shown on the following page. Please identify the compound and draw the structure in the box provided below.



9 E2





10 E2