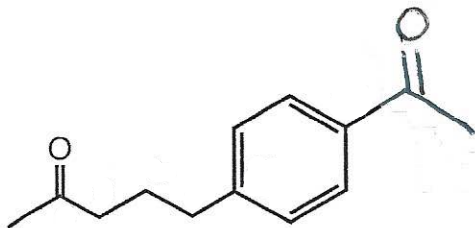


# Exam 2, Sp 22

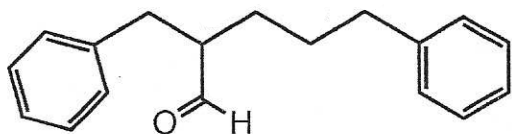
## A. Nomenclature: (12 points)

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

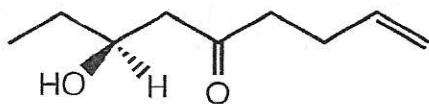
1.



2.

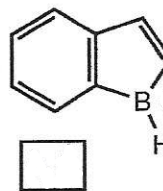
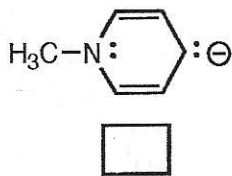
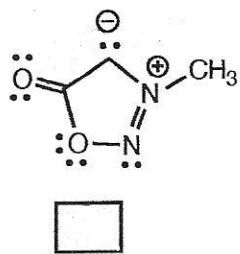
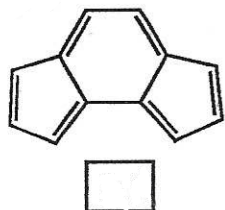


3.

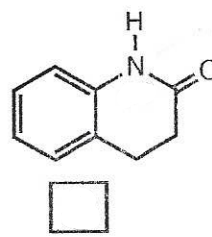
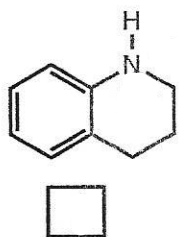
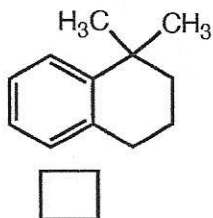


**B. Facts: 20 points**

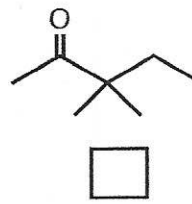
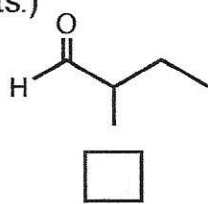
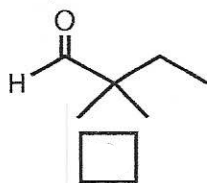
1. Label the molecules below as aromatic(**AR**), antiaromatic(**AA**), or nonaromatic(**NA**). Please assume all are planar. (8 pts.)



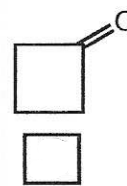
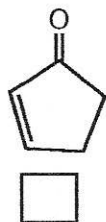
2. Rank the following substituted benzene compounds in order of increasing rate in the reaction with  $\text{CH}_3\text{Cl}$  and  $\text{AlCl}_3$ . (1=slowest rate, 3=fastest rate) (3 pts.)



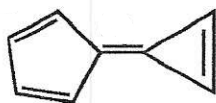
3. Rank the compounds in order of increasing reactivity in a nucleophilic addition reaction. (1= least reactive, 3=most reactive) (3 pts.)



4. Place the following compounds in order of increasing frequency of the  $\text{C}=\text{O}$  stretch in their IR spectra. (1=lowest frequency, 3=highest) (3 pts.)

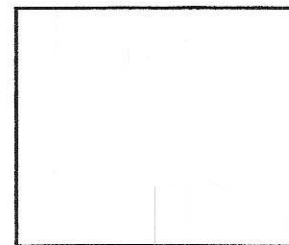
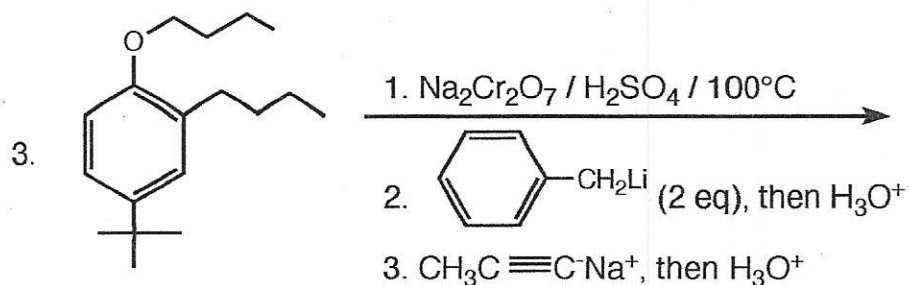
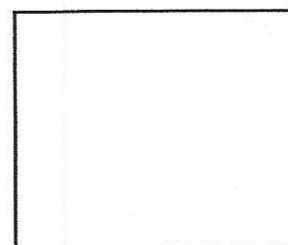
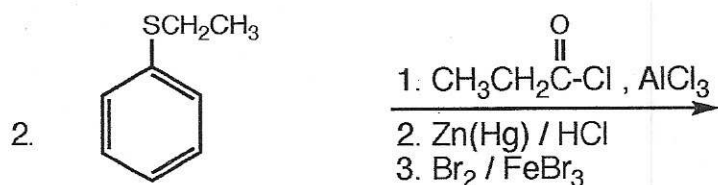
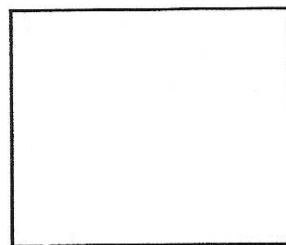
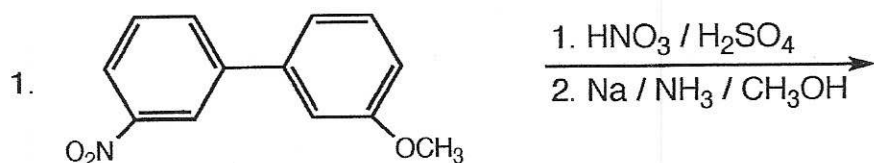


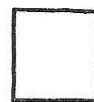
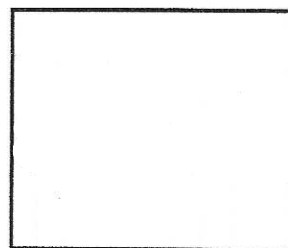
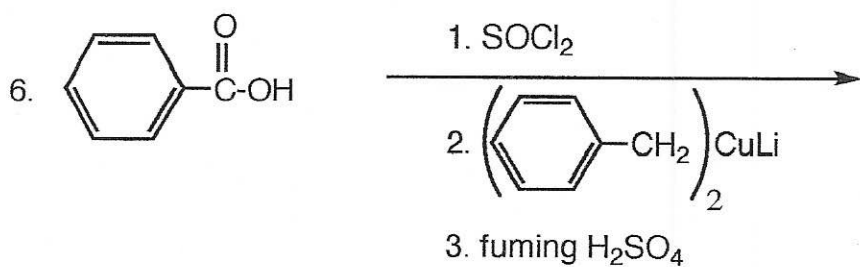
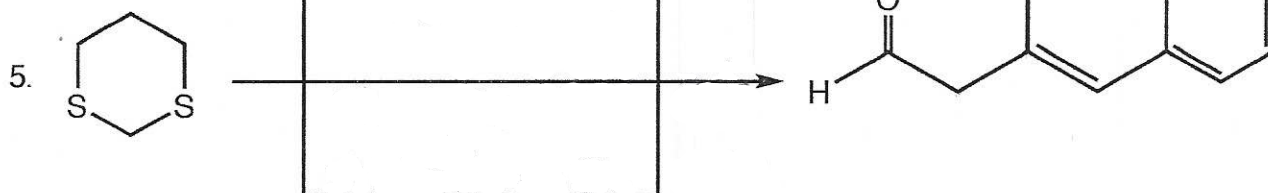
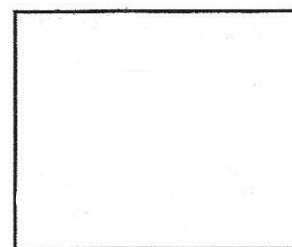
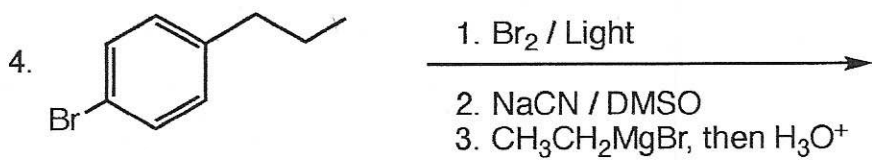
5. Calicene (shown below) has an unusually large dipole moment. Explain why. Your answer must include a relevant structure. (3 pts.)



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

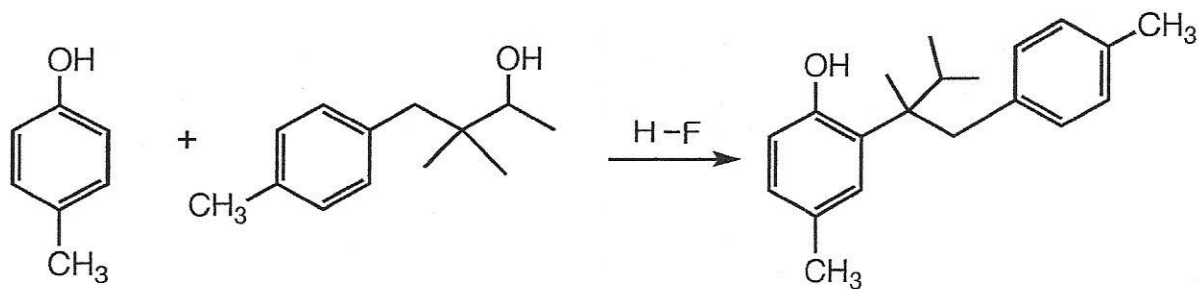
Please provide the reagents or the major product in the answer box. Indicate **stereochemistry** if applicable. **Full credit is awarded only when the product of each step in a multi-step reaction is shown below the reaction.**





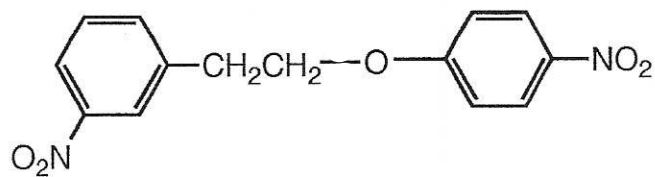
**D. Mechanism:** (11 points)

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: 11 Points**

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



**F. Spectroscopy: 10 Points**

A compound with the formula  $C_{11}H_{14}O_2$  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.

