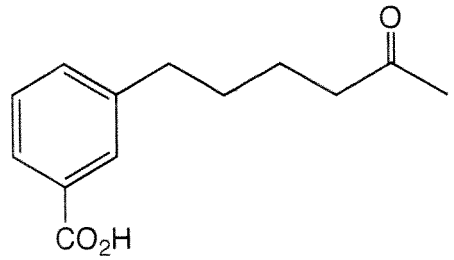
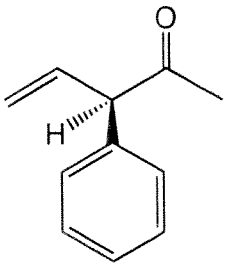
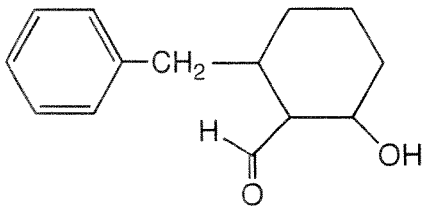
3332 Alt. EXAm 2

A. Nomenclature: (15 points)
Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the **stereochemistry** where appropriate.

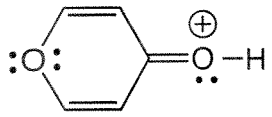
1. 

2. 

3. 

B. Facts: 17 points

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



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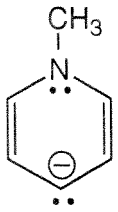

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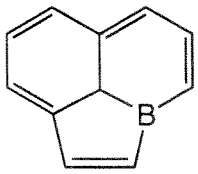

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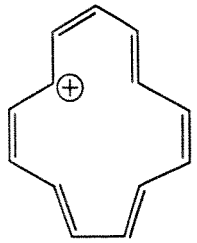

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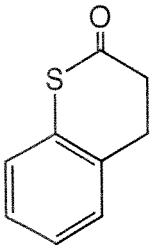
2. Rank the following substituted benzene compounds in order of increasing reactivity by electrophilic aromatic substitution with $Br_2/FeBr_3$. (1=least reactive, 3=most reactive) (3 pts.)



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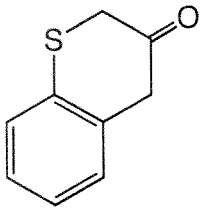

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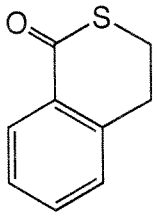

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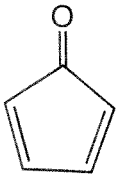
3. Rank the following compounds in order of increasing polarity. (1=least polar, 3=most polar) (3 pts.)



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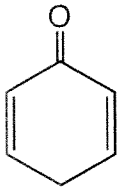

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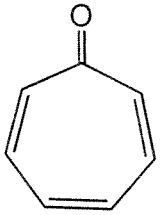

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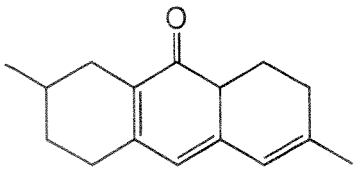
4. Rank the following compounds in order of increasing λ_{max} (wavelength) of the π to π^* transition in the UV spectrum. (1=shortest wavelength, 3=longest wavelength) (3 pts.)



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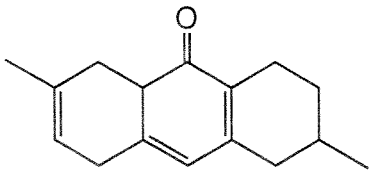

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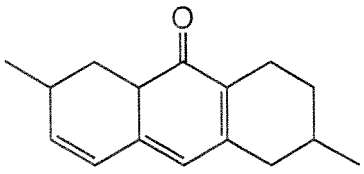

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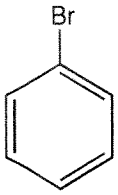
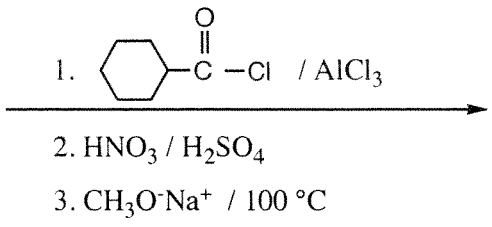
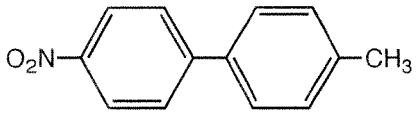
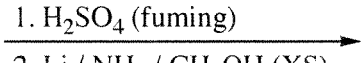
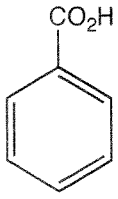
C. Reactions: Total = 36 points, 6 points each
Please provide the reagents or major product in the answer box. Indicate **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.

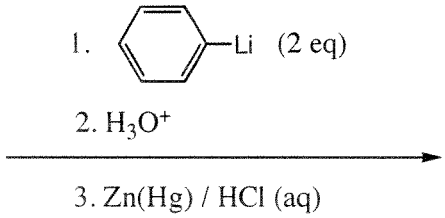
1. 



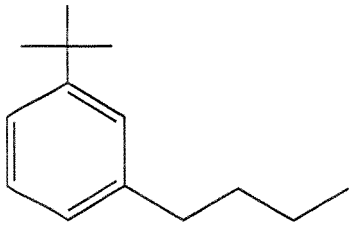
2. 



3. 

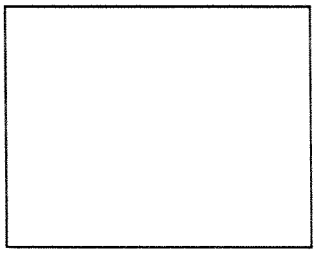


4.

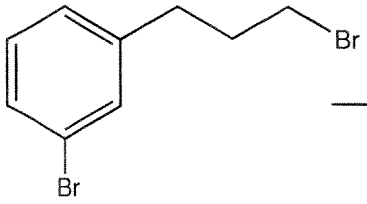


1. $(CH_3)_3C\text{-}Cl$ / $AlCl_3$

2. $Na_2Cr_2O_7$ / H_2SO_4 / 100°C

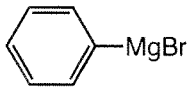


5.

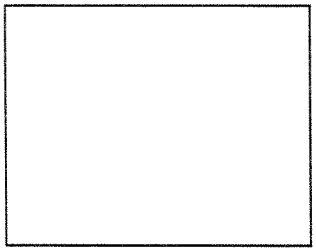


1. NaCN / acetone

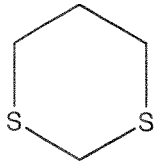
2.

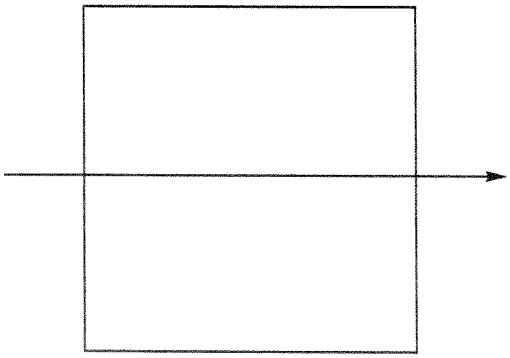


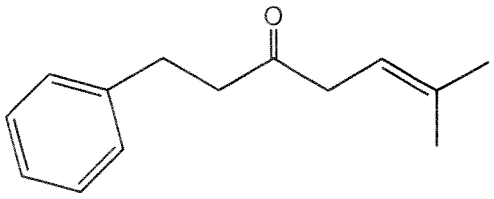
3. H_3O^+



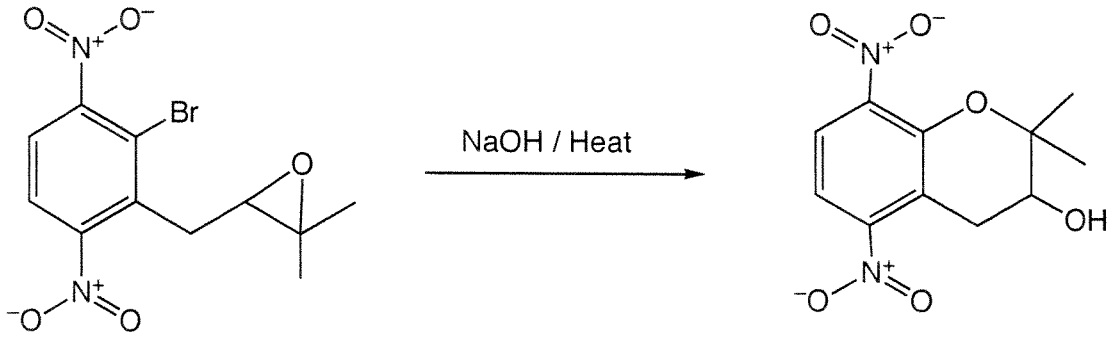
6.



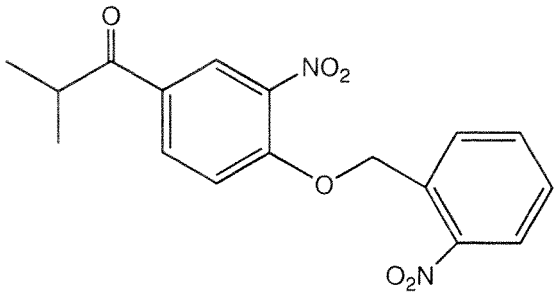




D. Mechanism: (11 points)
Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow". **Show all intermediates and all formal charges. When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.**



E. Synthesis: 11 Points
Synthesize the molecule below using **benzene**, **alcohols of four carbons or less**, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



F. Spectroscopy: 10 Points

A compound with the formula $C_9H_{10}O$ 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.