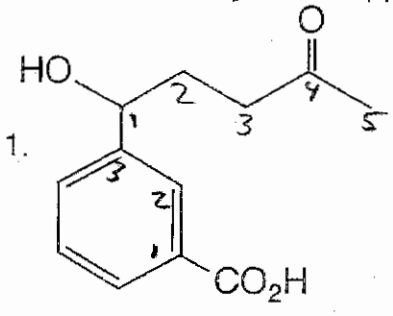


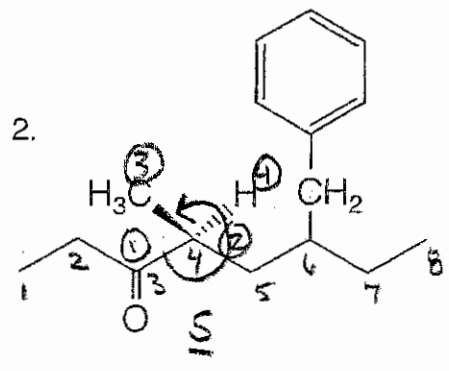
E2, 5p'05

A. Nomenclature: (12 points) 4 pts each

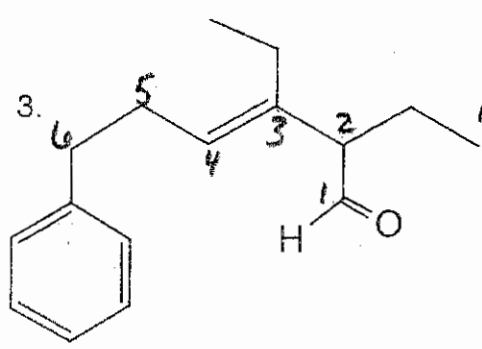
Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the stereochemistry where appropriate.



m-
3- (1-hydroxy-4-oxopentyl) benzoic acid



(4S)-
OR
(S)-6-benzyl-4-methyloctan-3-one



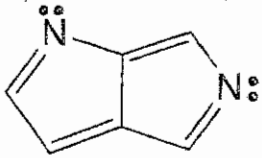
(3E)-
OR
(E)-2,3-diethyl-6-phenyl-3-hexenal

2 pts / box

B. Facts: 22 points

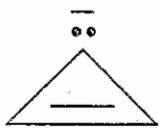
1. Label the molecules below as aromatic, antiaromatic, or nonaromatic. You may assume all are planar. (10 pts.)

8 $\pi e^- \rightarrow 4n$ rule

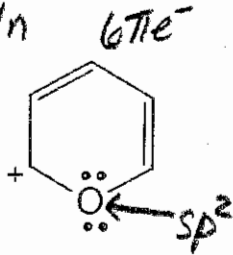


anti

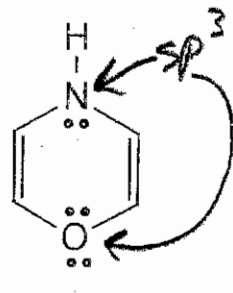
4 $\pi e^- \rightarrow 4n$



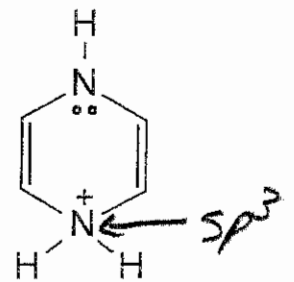
anti



aro.

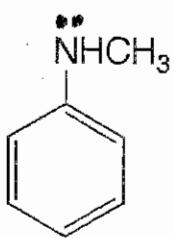


non

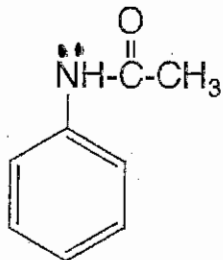


non

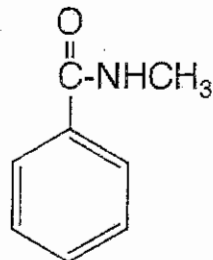
2. Rank the following substituted benzene compounds in order of increasing reactivity with an electrophile. (1=least reactive, 3=most reactive) (6 pts.)



3

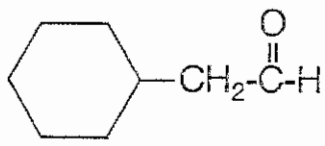


2

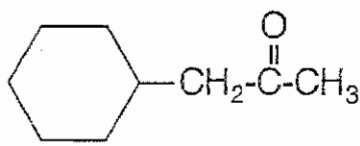


1

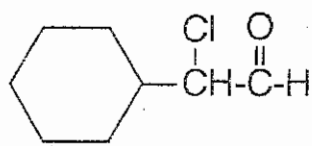
3. Rank the following compounds in order of increasing reactivity with a nucleophile. (1=least reactive, 3=most reactive) (6 pts.)



2



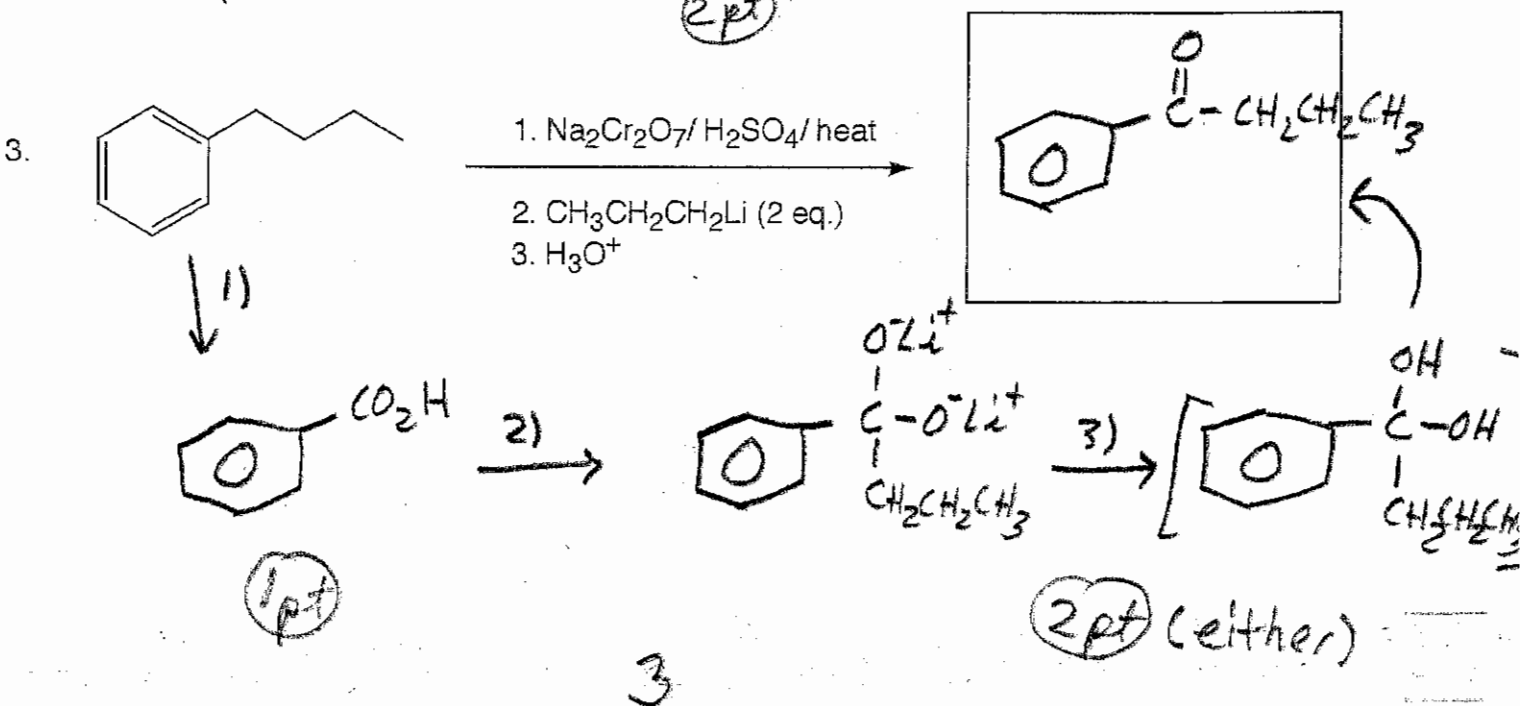
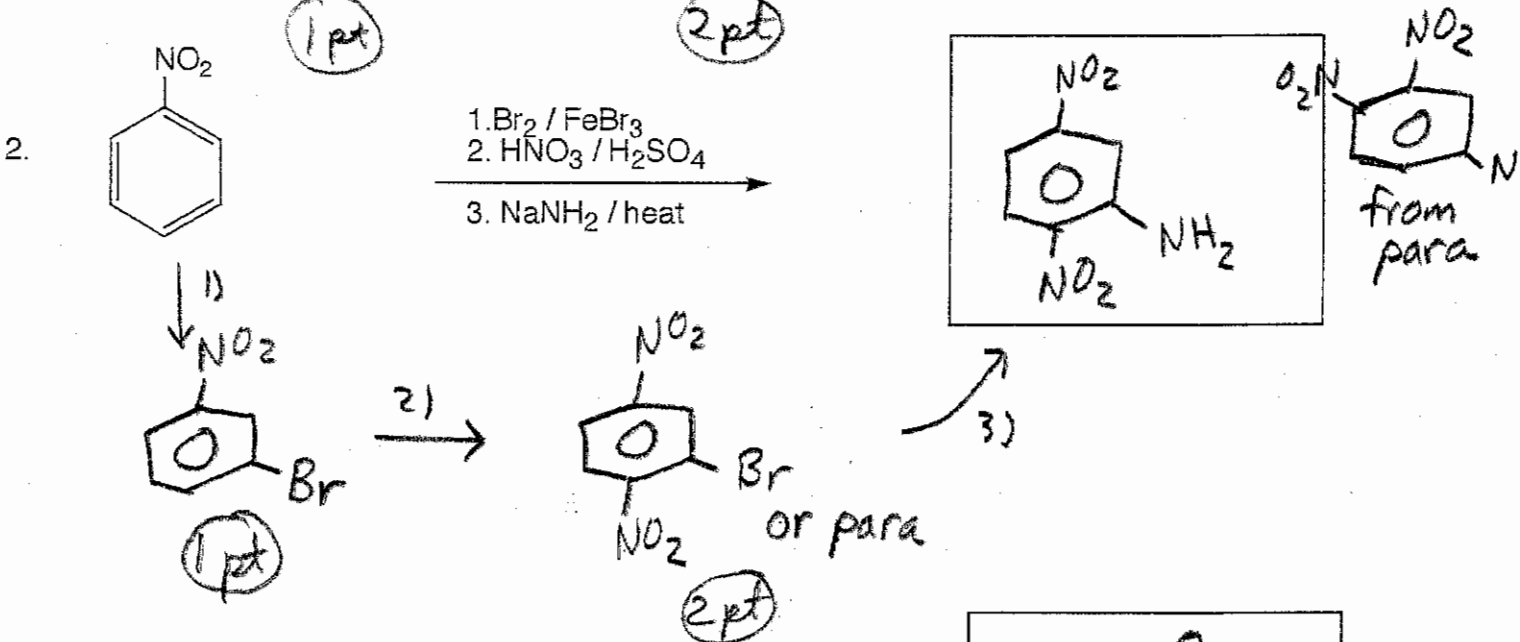
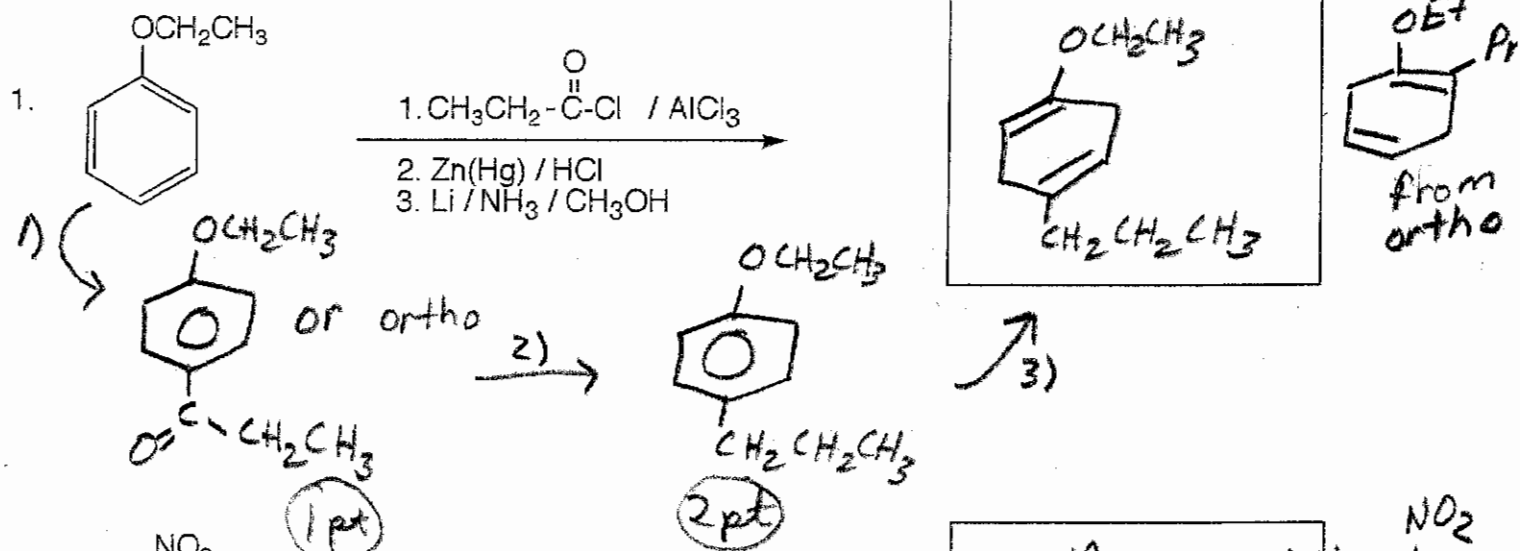
1

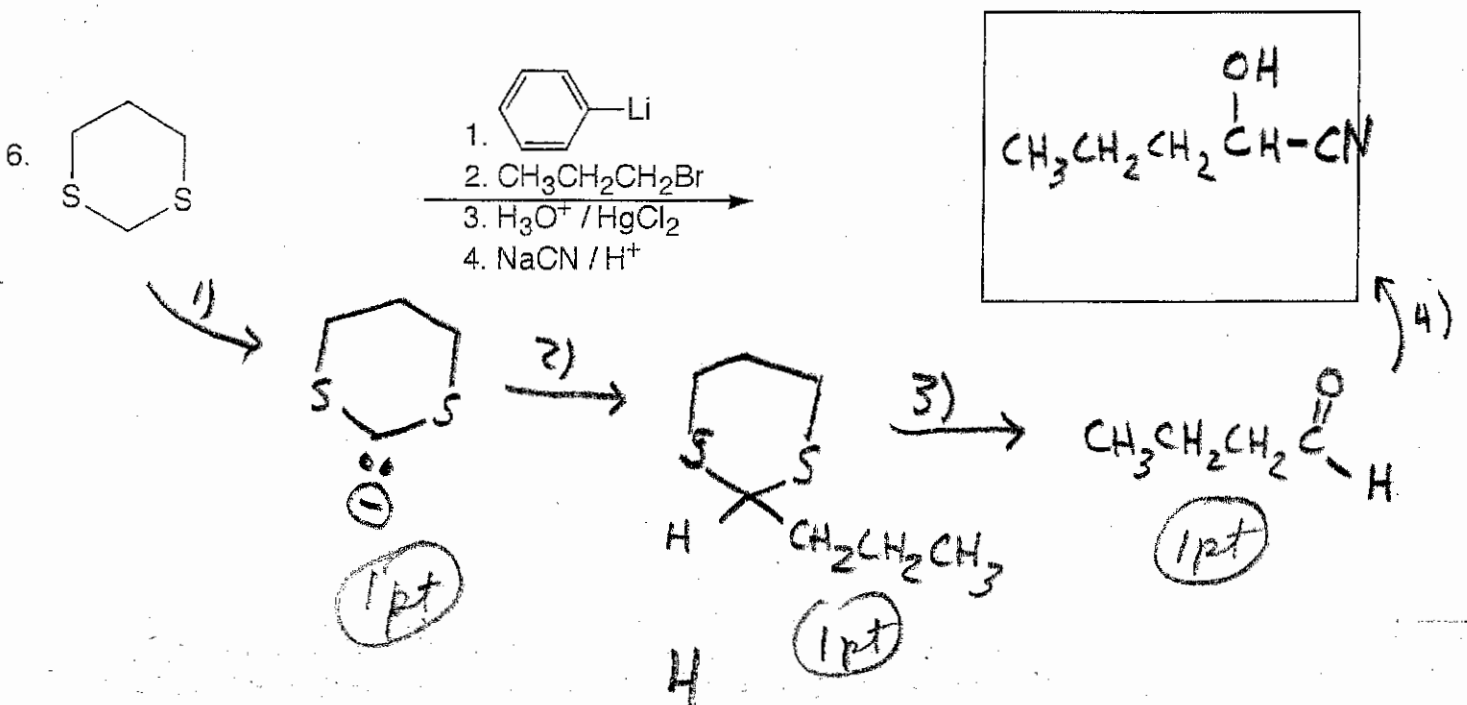
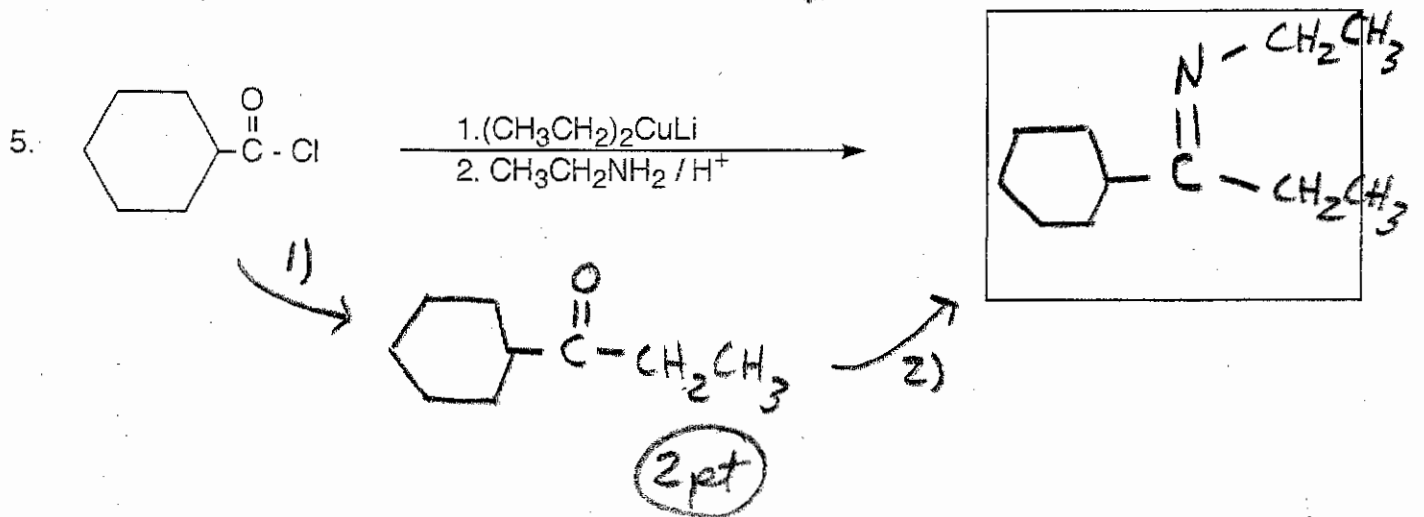
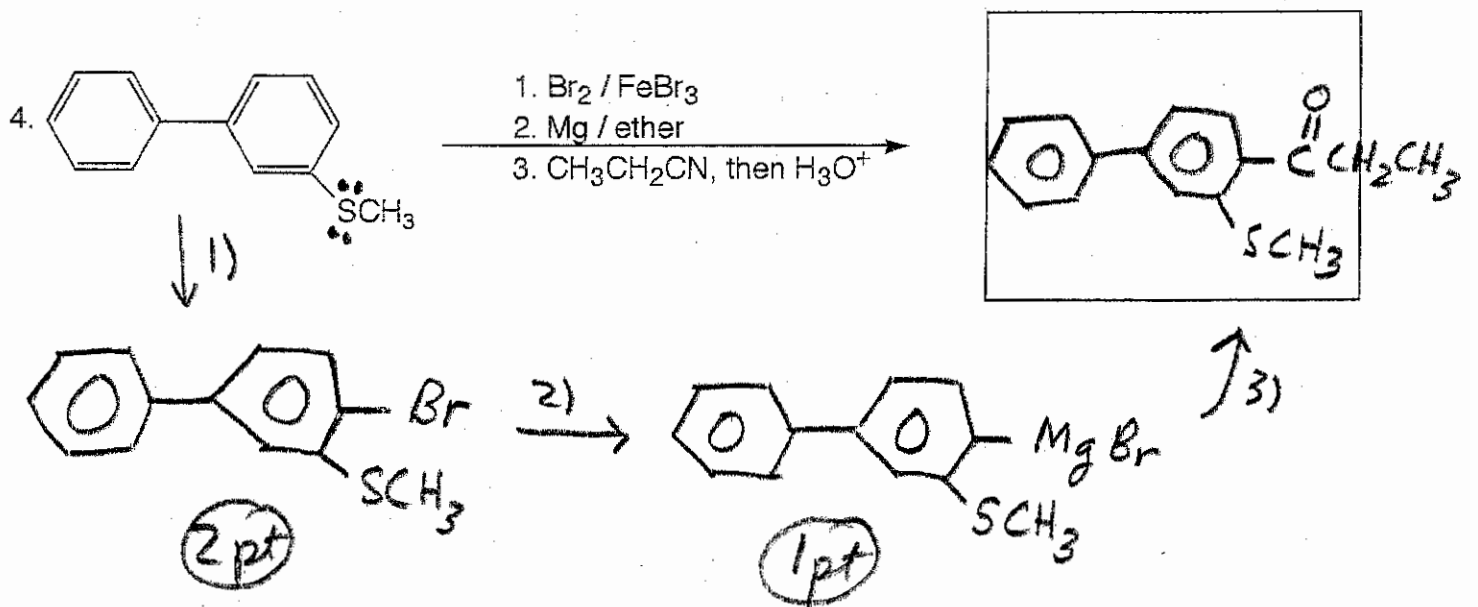


3

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

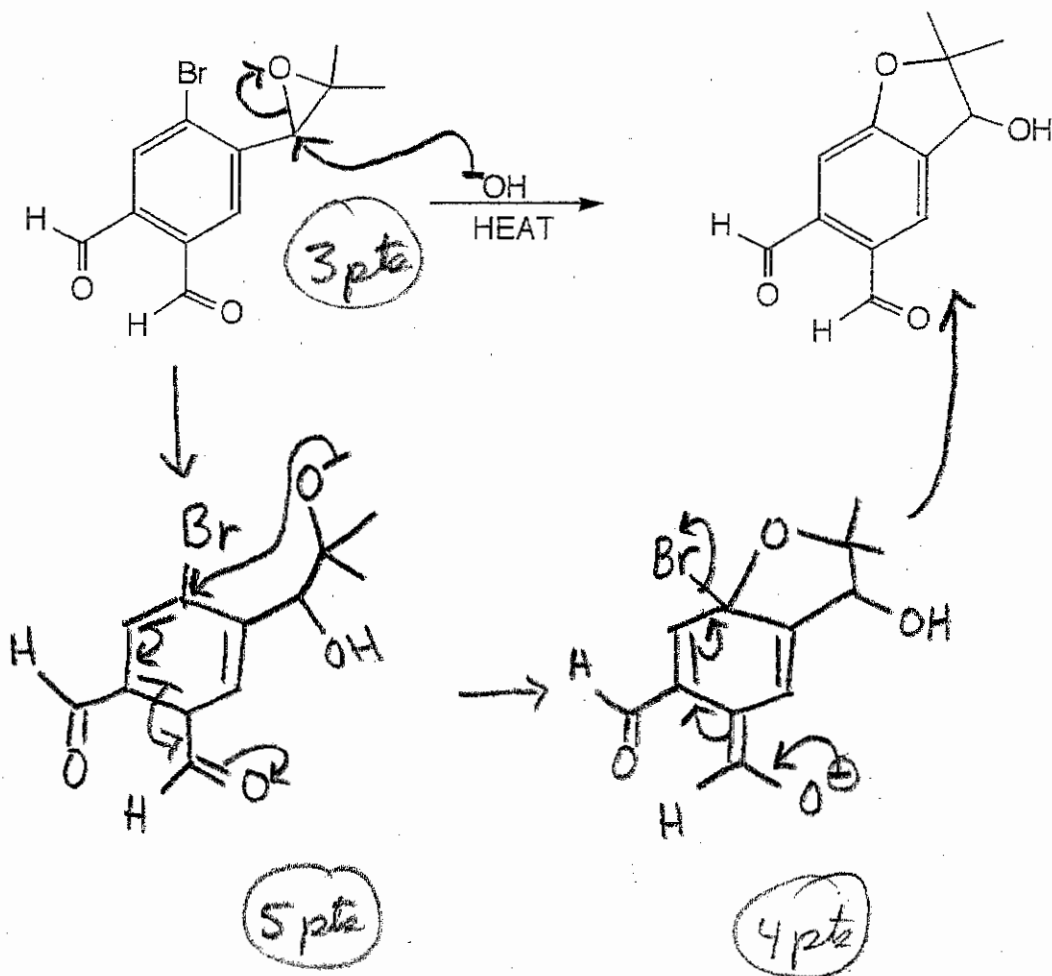
Please provide the major product in the answer box. Be sure your drawing indicates **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.





D. Mechanism: (12 points)

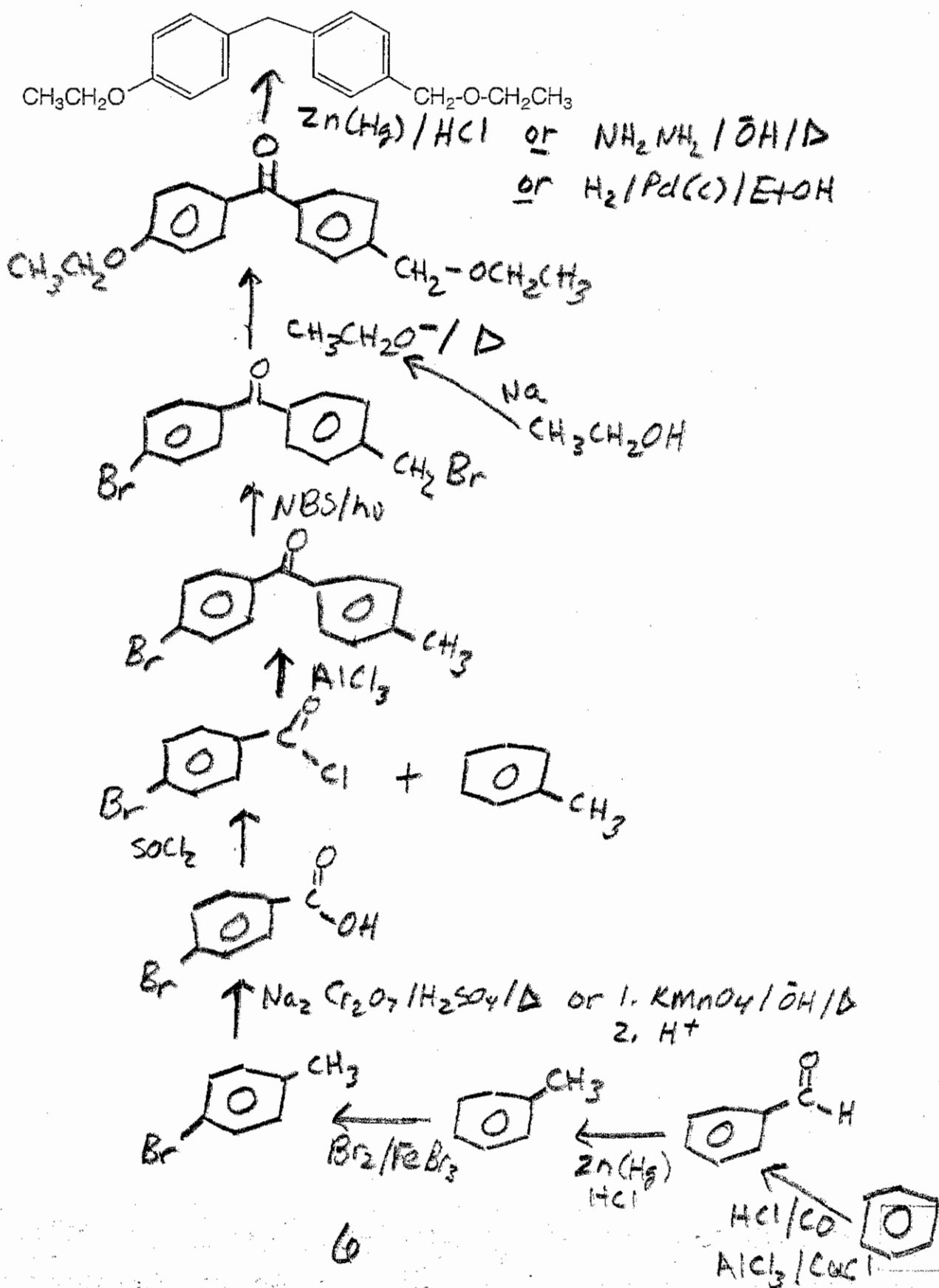
Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. Show all intermediates and all formal charges. When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.



only 2 pts
if less stable
res. contributor only

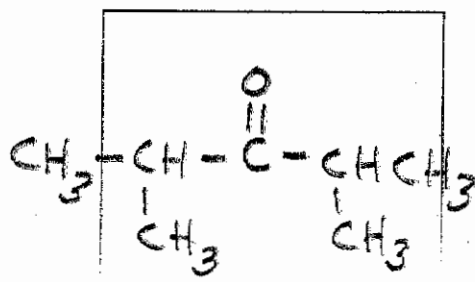
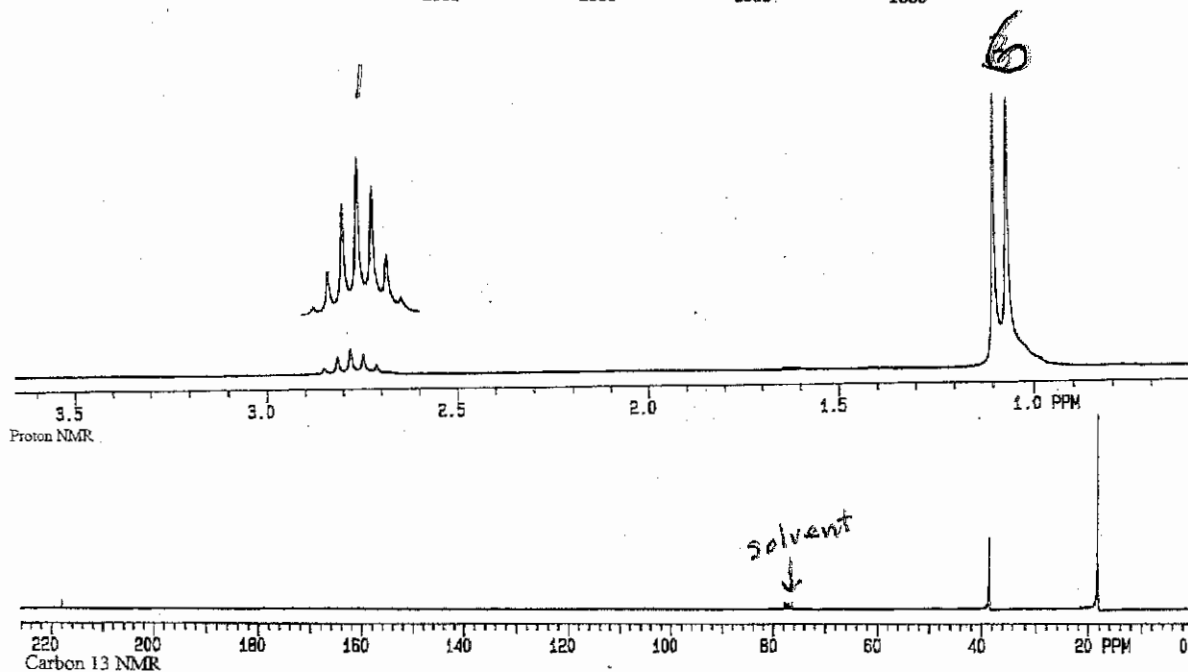
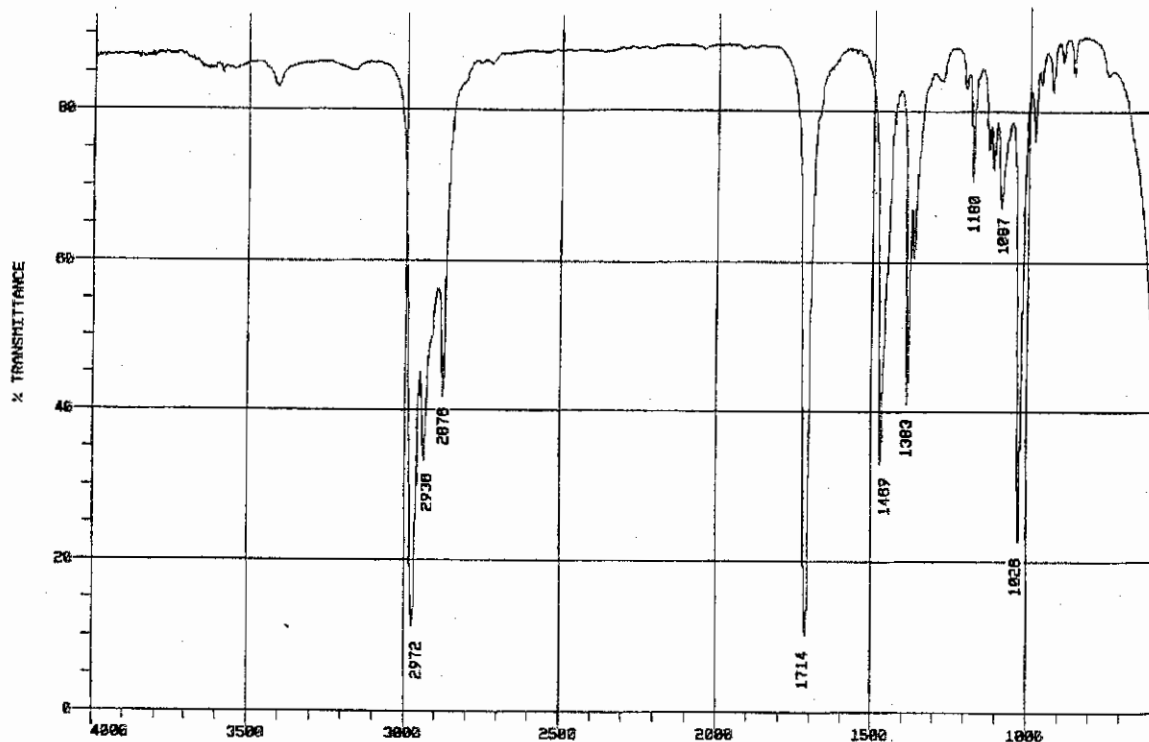
E. Synthesis: 12 Points

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.



7

partial credit:

isopropyl - 6 pts

CH_3 adj. to H - 3 pts

$\text{C}=\text{O}$ (ketone) - 2 pts

$\text{C}=\text{O}$ (aldehyde) - 1 pt