

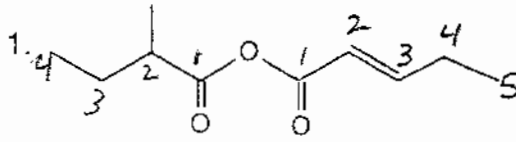
# EXAM 3, Sp '04

167

D

## A. Nomenclature: (12 points, 4 points each)

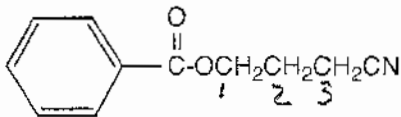
Please provide an acceptable name for each of the following compounds. Be sure to note stereochemistry where appropriate.



2-methylbutanoic anhydride trans-2-pentenoic

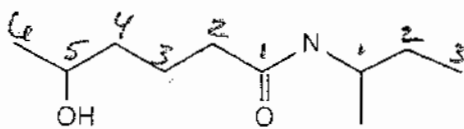
OR (E)

2.



3-cyanopropyl benzoate

3.



N-(1-methylpropyl)-5-hydroxyhexanamide

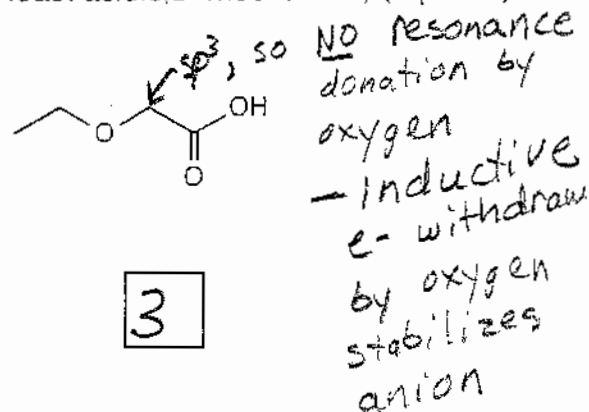
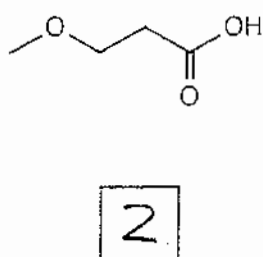
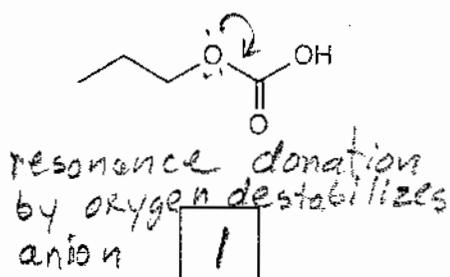
OR  
N-sec-butyl-5-hydroxyhexanamide



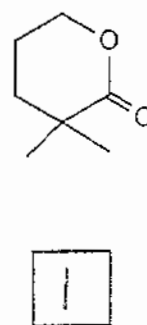
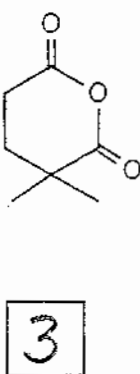
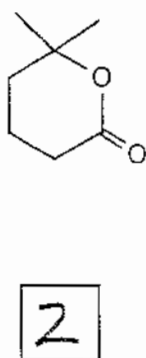
2 pts each box

B. Facts: Total = 18 points

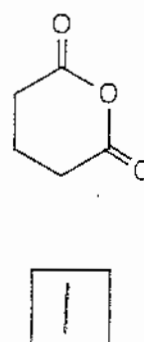
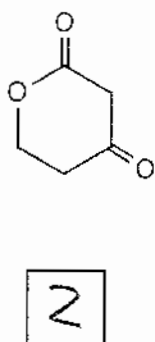
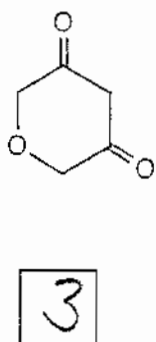
1. Place the following compounds in order of increasing acidity. (1=least acidic, 3=most acidic) (6 points)



2. Place the following compounds in order of increasing reactivity by nucleophilic acyl substitution. (1=least reactive, 3=most reactive) (6 points)

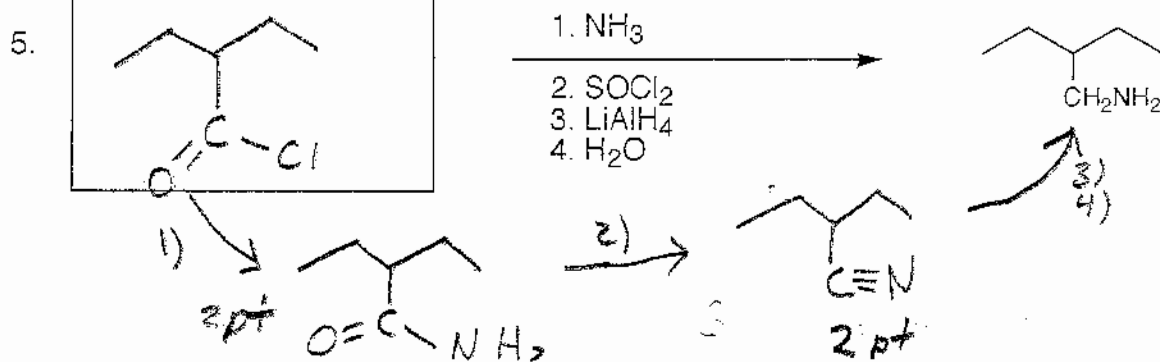
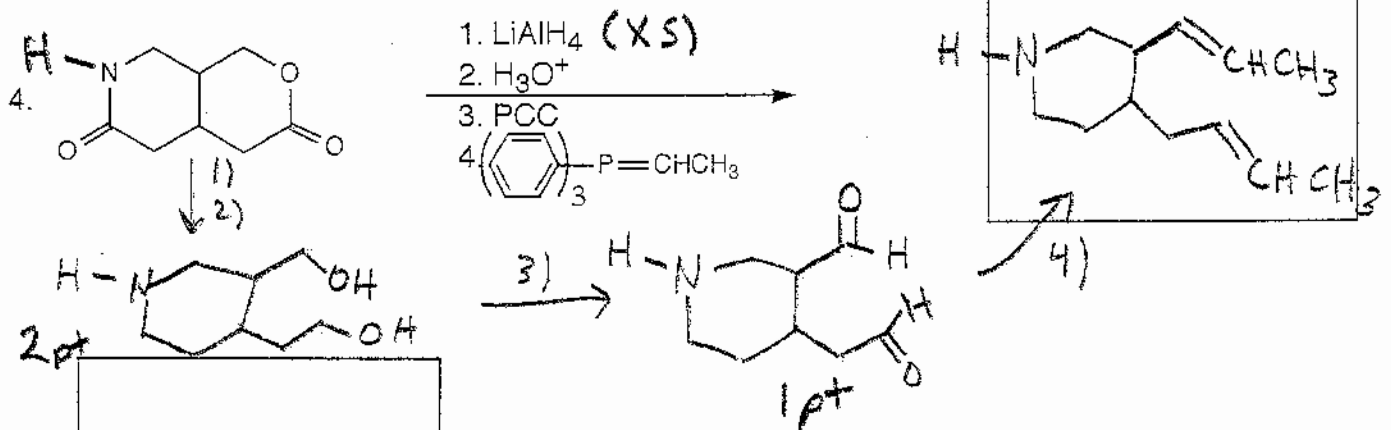
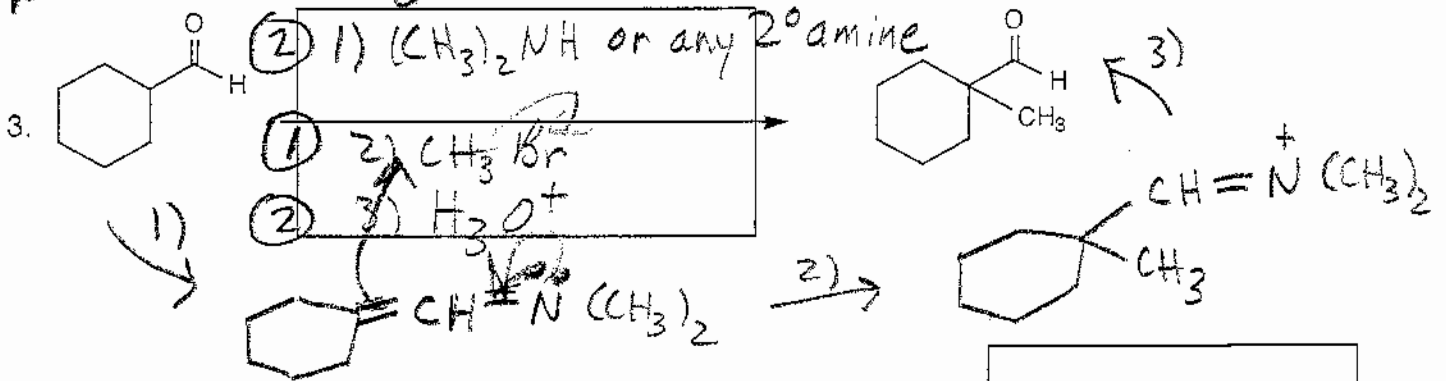
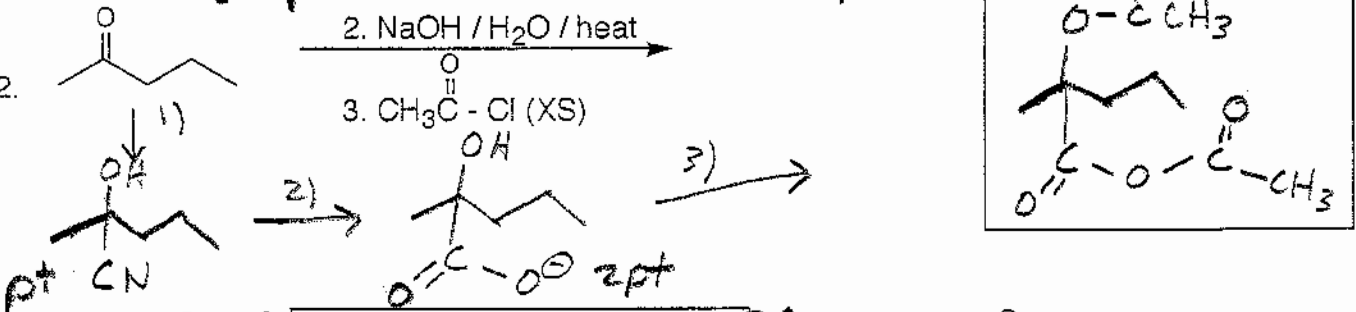
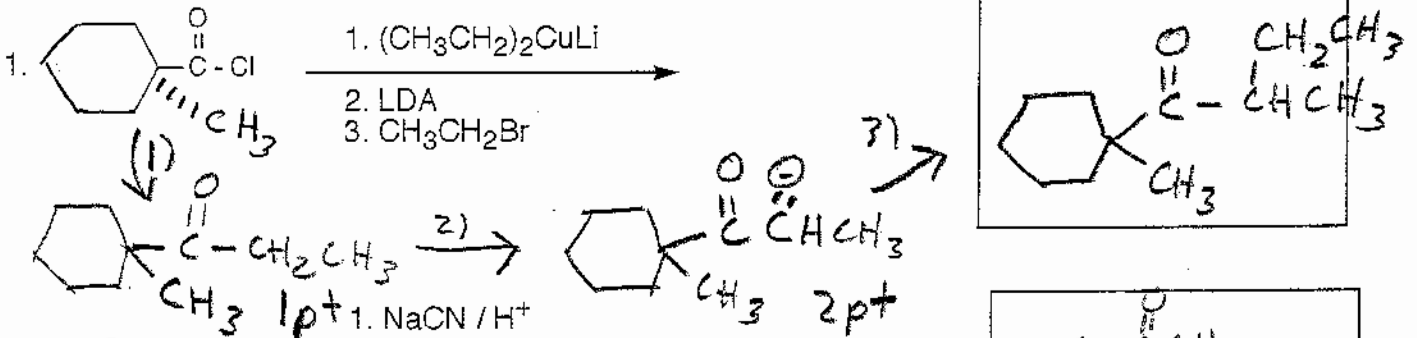


3. Place the following compounds in order of increasing acidity. (1=least acidic, 3=most acidic) (6 points)



**C. Reactions:** Total = 25 points, 5 points each

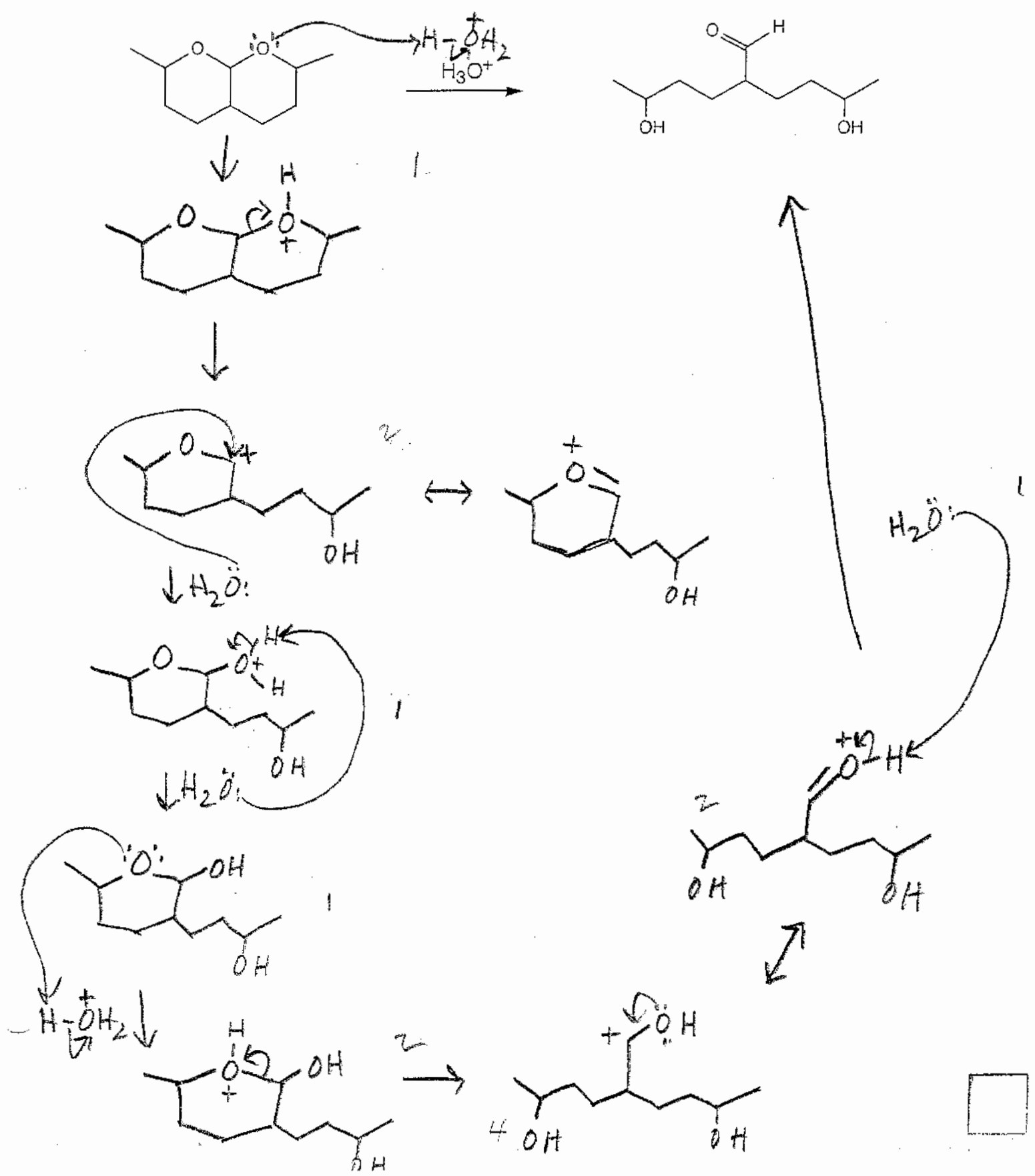
Please provide the starting material, reagents, or major product in the answer box. Be sure your drawing indicates stereochemistry if applicable. Partial credit is awarded only when intermediate products are shown below the reaction.



7 steps

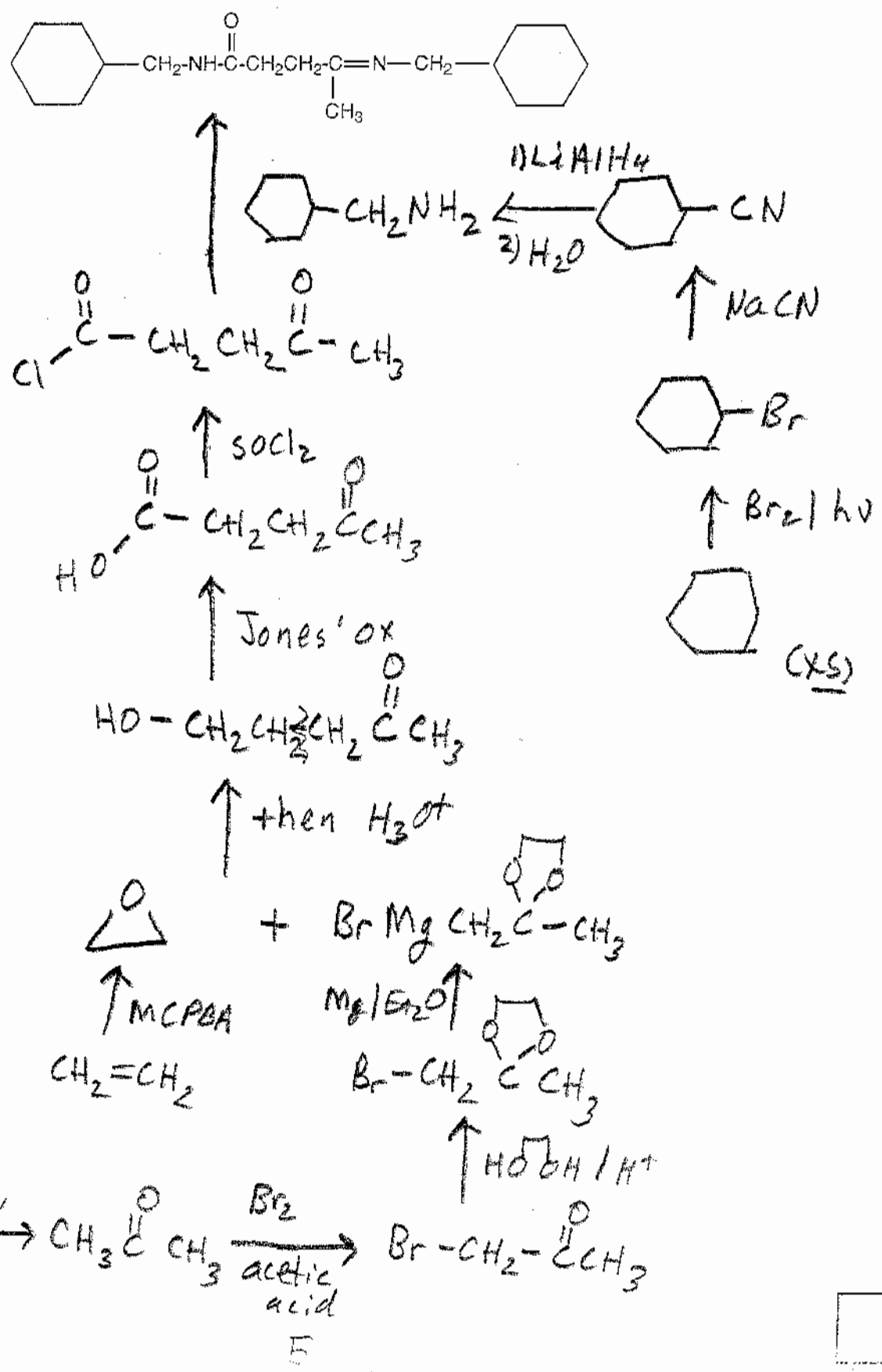
**D. Mechanism:** 15 points

Please provide a clear mechanism for the reaction below. 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.



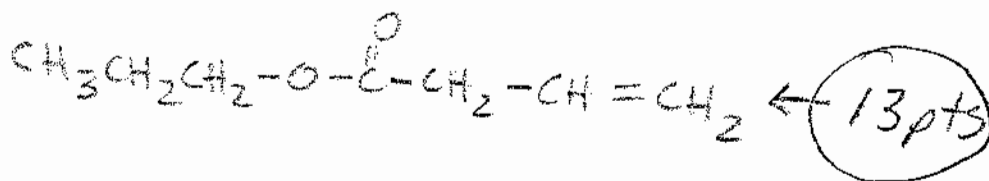
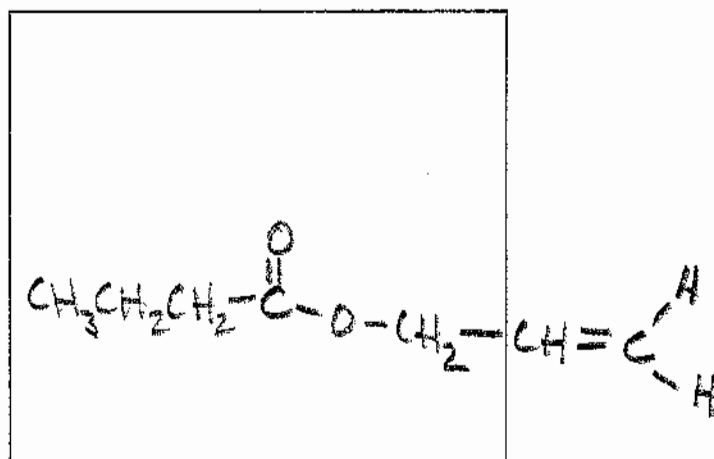
E. Synthesis: (15 points)

Synthesize the compound below using any of the following reagents: cyclohexane, alkanes, alkenes, alkynes or alcohols of **three carbons or less**, any oxidizing or reducing agents, any peroxyacids, and any inorganic reagents.



F. Spectroscopy: 15 Points

A compound with the formula  $C_7H_{12}O_2$  exhibits the IR,  $^1H$  NMR, and proton-decoupled  $^{13}C$  NMR shown on the following page. Please identify this compound and draw the structure in the box provided below.



partial credit:

2 ester

2 alkene

1 terminal alkene

1  $CH_2$  adj. to  $CH$

1  $CH_2$  between  $O$  and  $CH$

1  $CH_3$  adj. to  $CH_2$

1  $CH_2$  adj. to  $CH_2$

1  $CH_2$  between nonequivalent H sets

6



