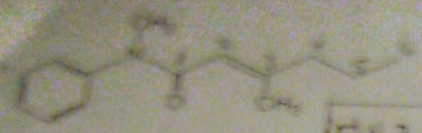
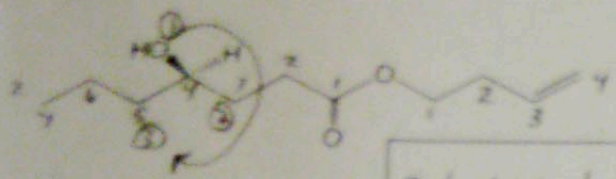
EXAM 3, Sp '08

1. Nomenclature: (15 points)
Give an acceptable I.U.P.A.C. name for each of the following compounds. Be sure to indicate the stereochemistry where appropriate.

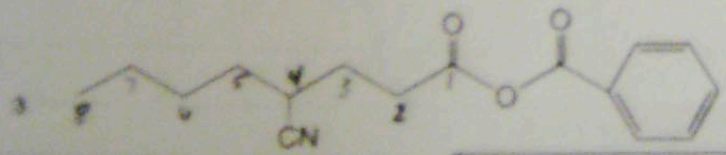


(E)-N,3-dimethyl-N-phenyl-2-hexenamide

(2E)



3-butenyl (R)-4-hydroxyheptanoate



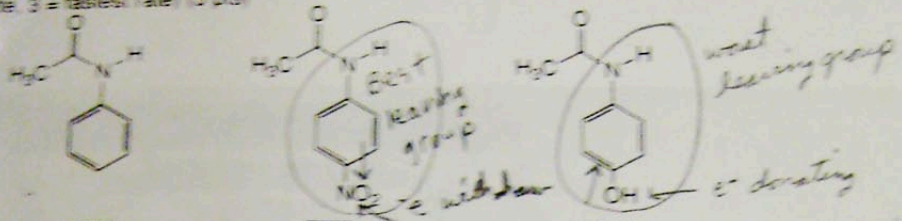
benzoic 4-cyanooctanoic anhydride

2

Facts: 12 points
Rank the following compounds in order of increasing reactivity with H_2O (1 = slowest

B. Facts: 12 points

1. Rank the following compounds in order of increasing reactivity with H_2O. (1 = slowest rate, 3 = fastest rate) (3 pts)

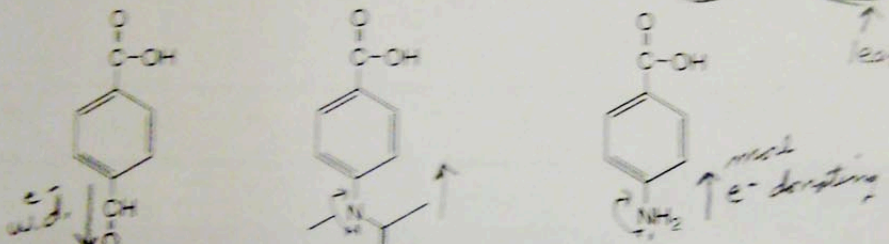


2 | 3 | 1

2. Rank the following compounds in order of increasing pKa. (1=lowest pKa, 3=highest pKa) (3 pts)

most acidic

least acidic

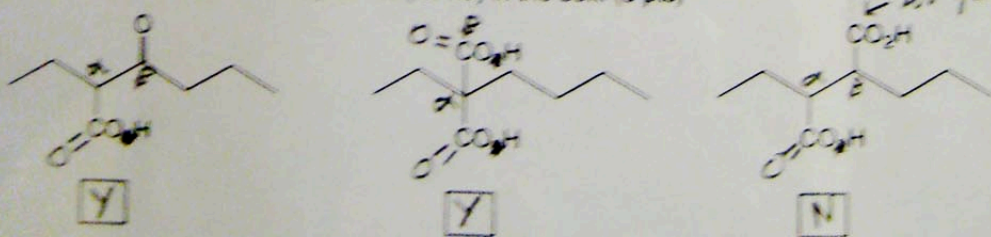


1 | 2 | 3

3. Rank the following compounds in order of increasing pKa. (1=lowest pKa, 3=highest pKa) (3 pts)

2 | 1 | 3

4. Consider the decarboxylation at 180 °C of the following carboxylic acids. If decarboxylation is possible, place **Y** (for yes) in the box. If not, place **N** (for no) in the box. (3 pts)

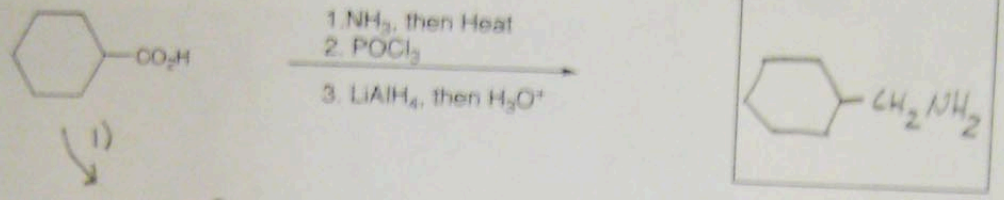


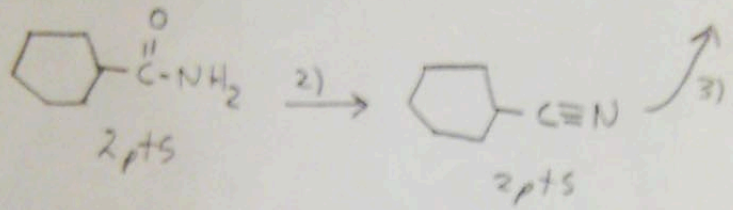
Y | Y | N

β-Keto acids necessary

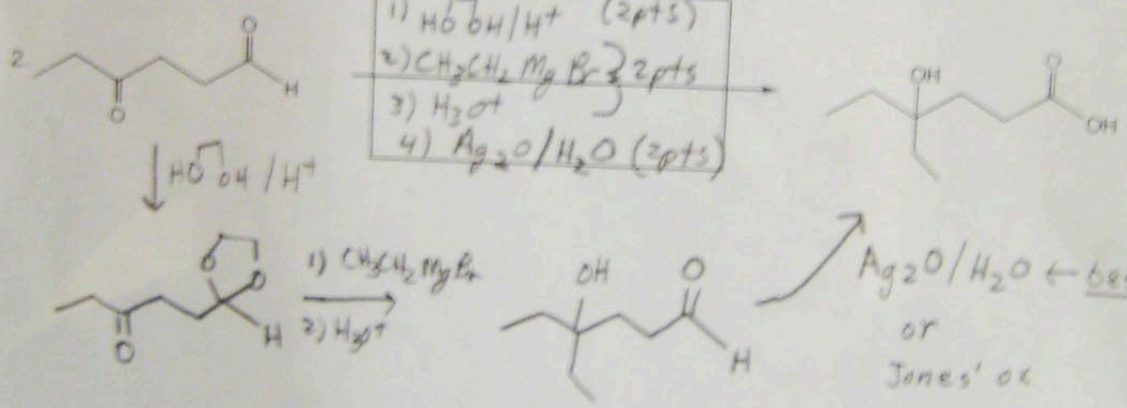
C. Reactions: Total = 36 points, 6 points each
Please provide the starting material, reagents or major product in the answer box. Be sure your drawing indicates **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.

1.

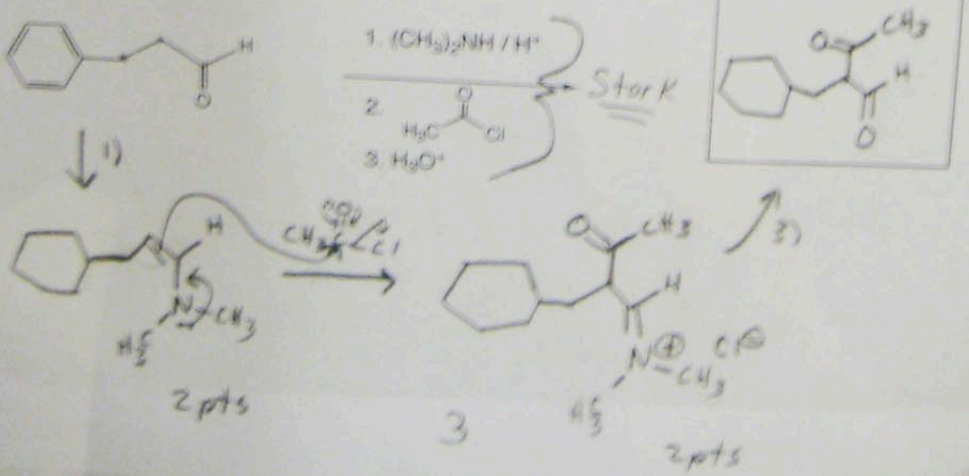




2



3.



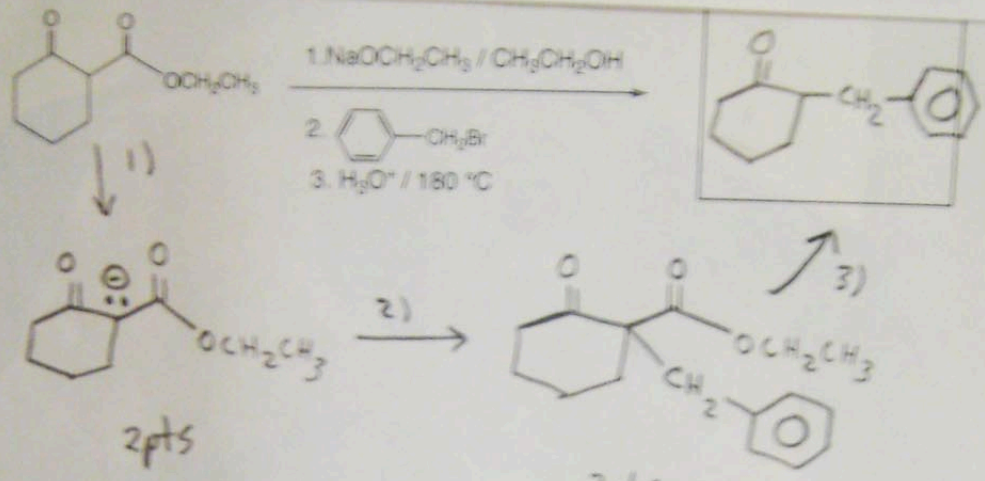
3

2pts

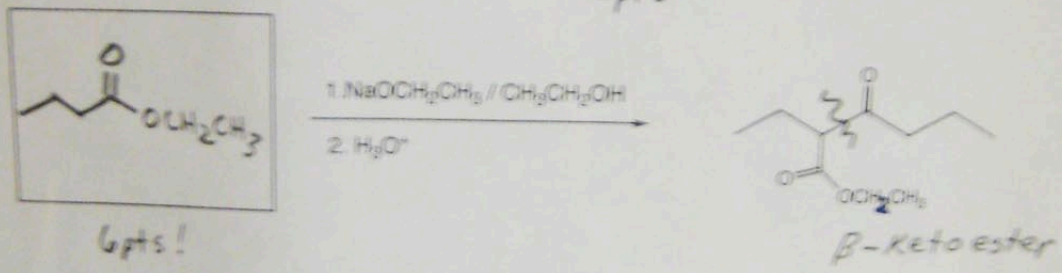
3

2pts

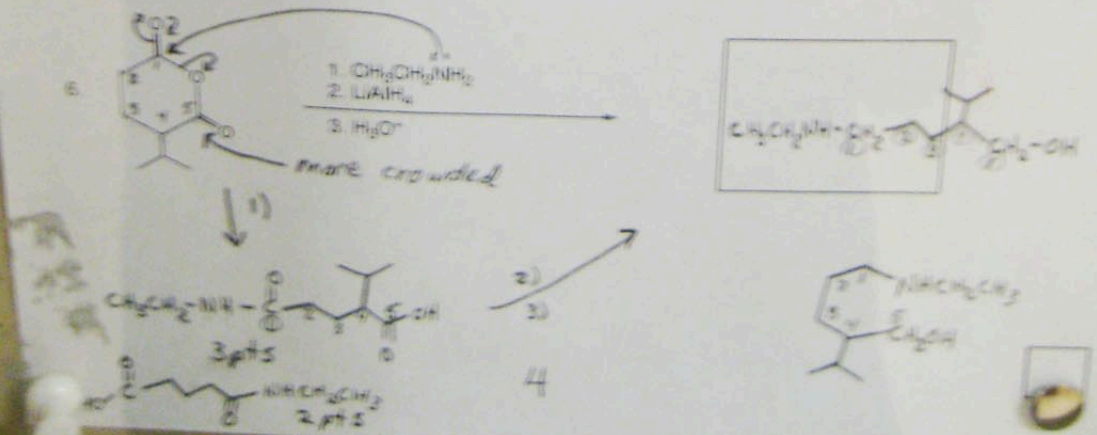
4



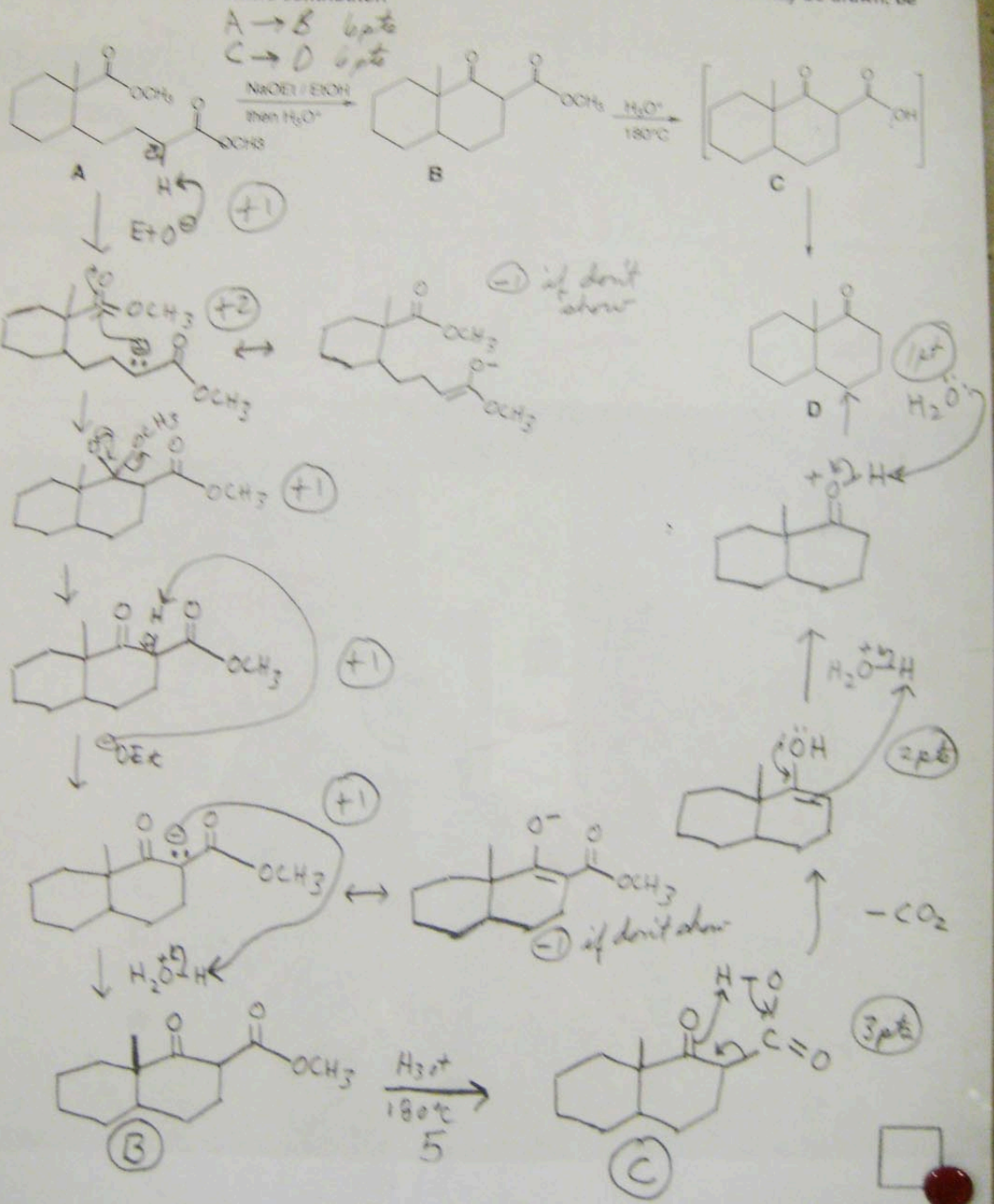
5



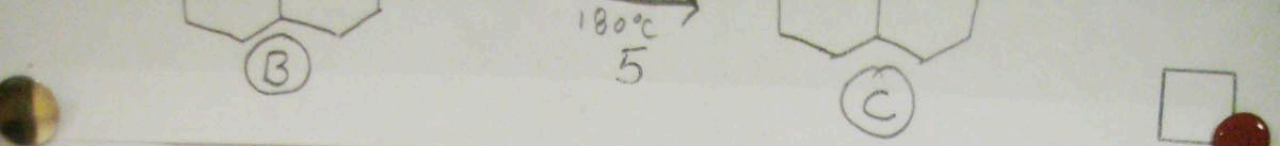
6



D. Mechanism: (12 points)
Provide a clear mechanism to explain the formation of the series of products below. **Do not** *show the transformation of* **B** *to* **C**. *Remember to show only one step at a time (NO SHORTCUTS!).* **Show all intermediates and all formal charges. When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.**

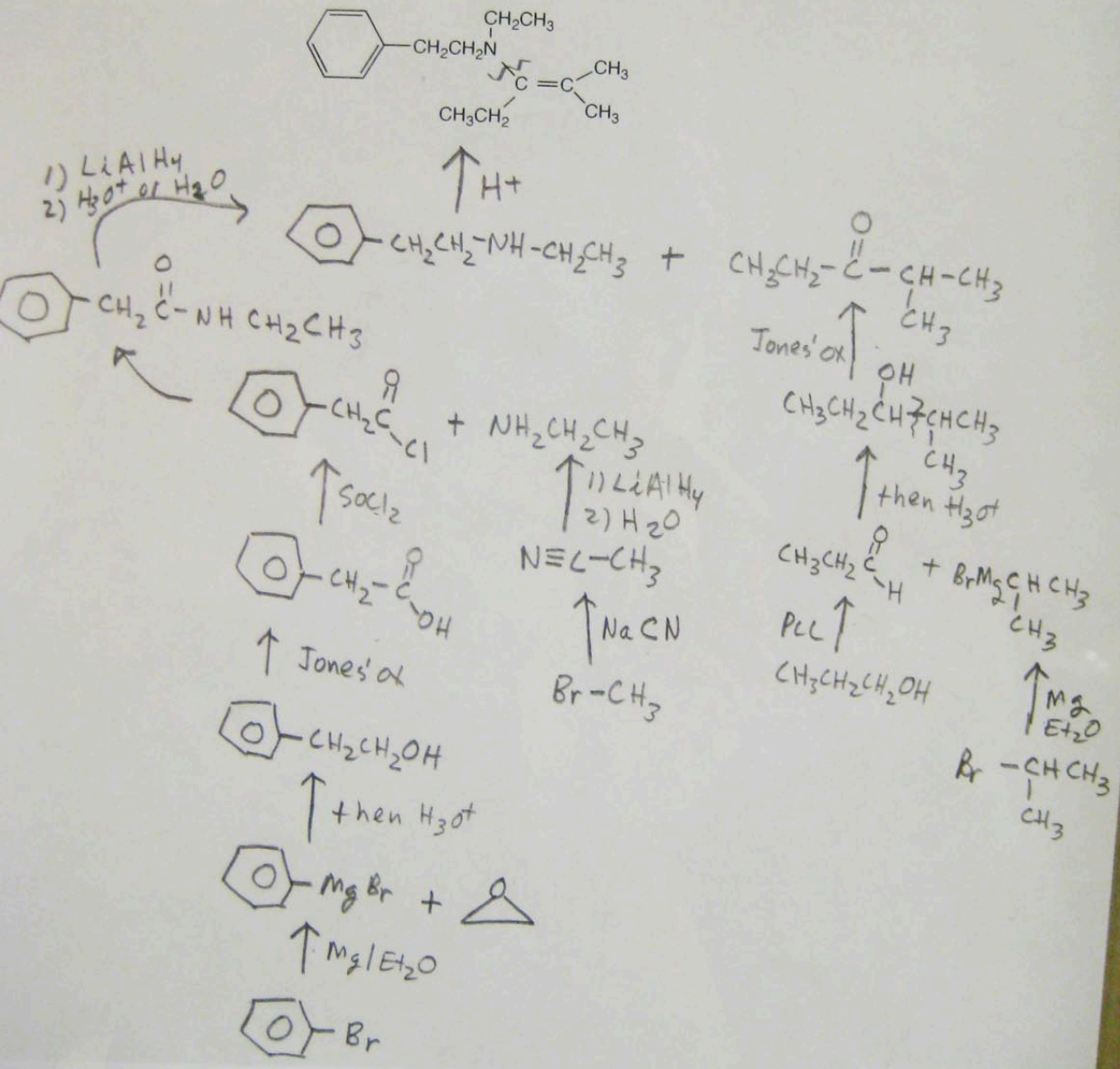


E. Synthesis: 13 Points
Synthesize the molecule below using any of the following reagents: benzene, bromobenzene, any alkenes, alcohols, or alkyl halides of **three carbons** or less; ethylene oxide, any inorganic reagents, oxidizing or



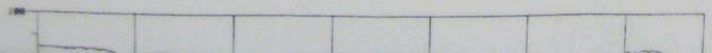
E. Synthesis: 13 Points

Synthesize the molecule below using any of the following reagents: benzene, bromobenzene; any alkenes, alcohols, or alkyl halides of **three carbons** or less; ethylene oxide; any inorganic reagents, oxidizing or reducing agents, and any peroxyacids.



F. Spectroscopy: 12 Points

A compound with the formula $C_6H_{13}NO$ 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.



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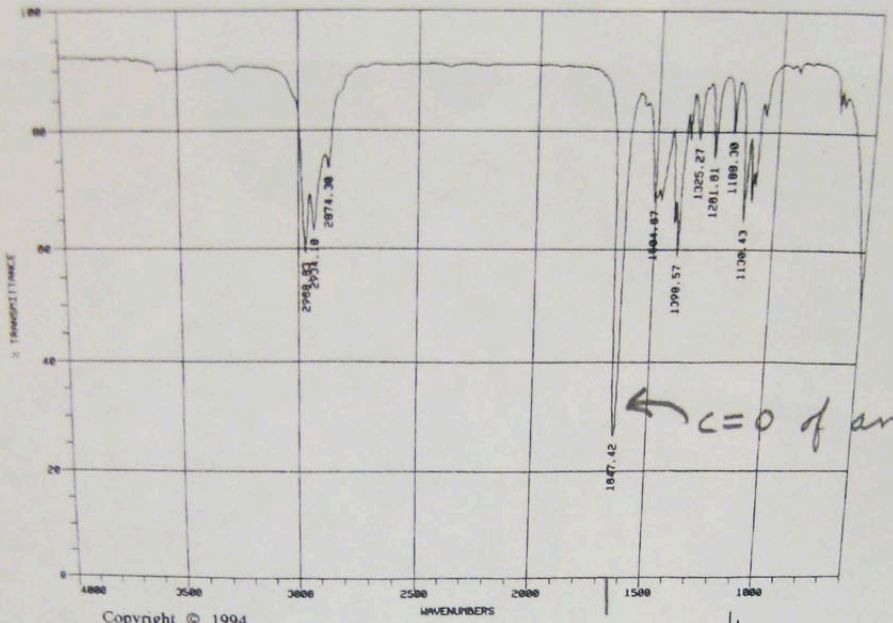
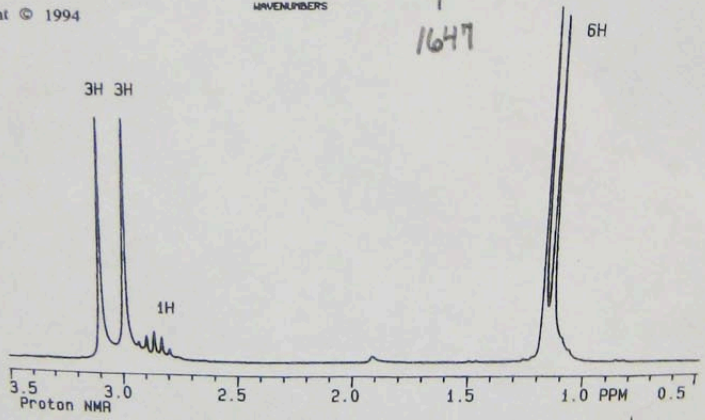
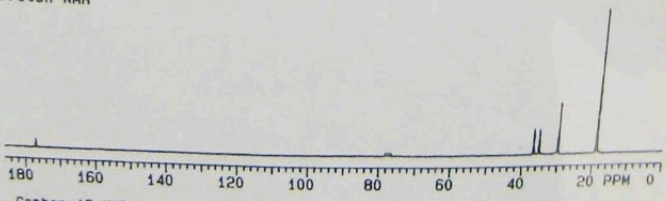


1647





partial credit:

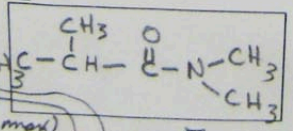
amide: 3pts

isolated CH_3's: 1pt each (2 max)

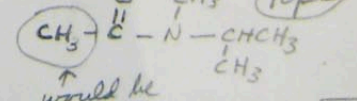
isopropyl: 3pts

1H adj. to nitrogen: 2pts

CH_3 adj. to 1H: 1pt each (2 max)



ONLY if NO isopropyl



would be around 2.1δ

10pts