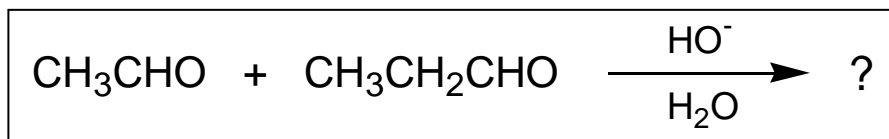


1. Multiple Choice Questions. Clearly circle your chosen answer. (30 points; 3 apiece)

a) How many products are formed in the following aldol addition reaction?



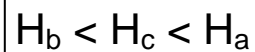
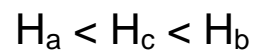
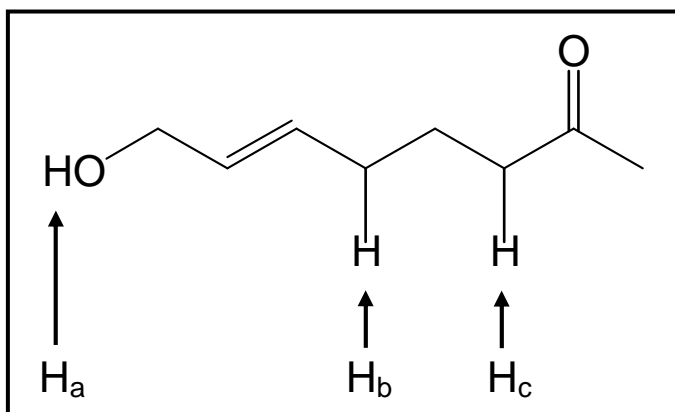
4

3

2

1

b) Rank the labeled protons in order of increasing acidity. (Problem 23.31e, p 910)



c) Which base gives the kinetic enolate on reaction with 2-methylcyclohexanone?

NaOH

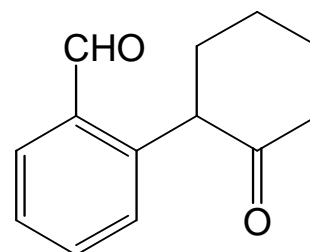
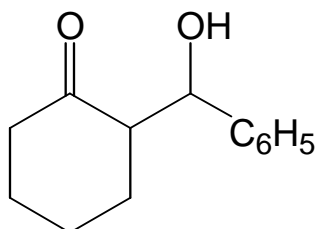
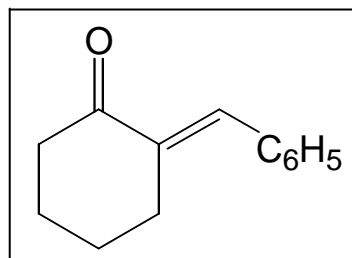
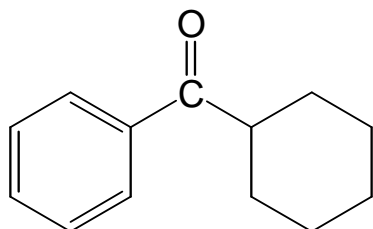
Li_2CO_3

LDA

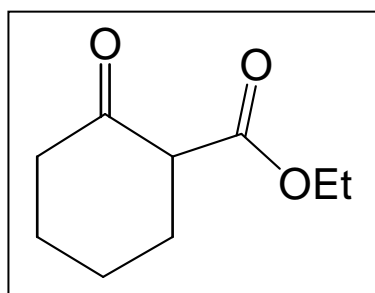
KO-*t*-Bu

Name: **KEY**

- d) What is the major product when $\text{C}_6\text{H}_5\text{CHO}$ and cyclohexanone are reacted in aqueous HO^- ? (Problem 24.6c, p 923)



- e) What diester gives the product in the box by a Dieckmann reaction?



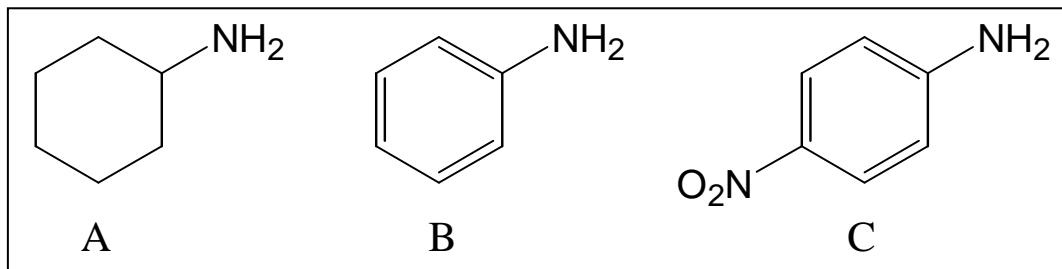
diethyl adipate

diethyl hexanedioate

diethyl glutarate

diethyl heptanedioate

f) Rank the compounds in the box in order of increasing basicity. (Problem 25.25b, p 971)



A < B < C

B < C < A

C < B < A

C < A < B

g) Which alkyl halide is used to prepare 3-ethyl-2-pentanone by an acetoacetic ester synthesis? (Problem 23.26b, p 907)

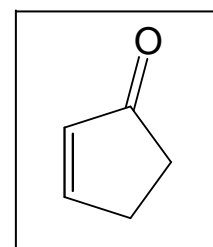
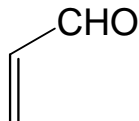
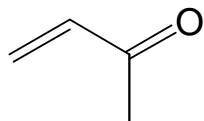
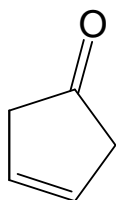
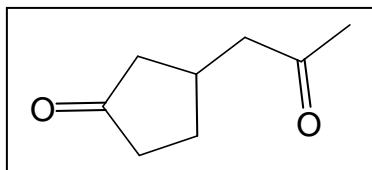
CH₃CH₂CH₂Br

CH₃I

CH₃CH₂Br

CH₃COCH₂Br

h) Which compound serves as a Michael acceptor to form the compound in the box? (Problem 24.23, p 935)



Name: **KEY**

- i) Which reagent is used when converting $C_6H_5CH_2CH_2CHO$ into $C_6H_5CH_2CH_2CH_2NH_2$?
(Problem 25.53e, p 995)

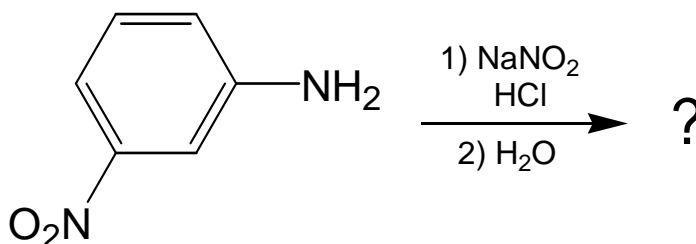
NaH

DIBAL-H

LiAlH₄

NaCNBH₃

- j) What is the product of the following reaction? (Problem 25.37b, p 986)



nitrobenzene

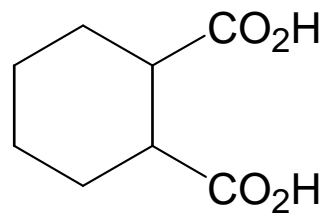
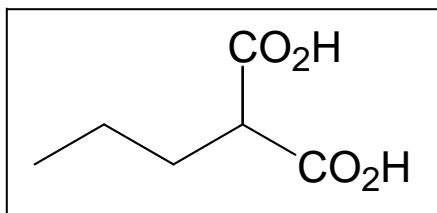
p-chloronitrobenzene

m-nitrophenol

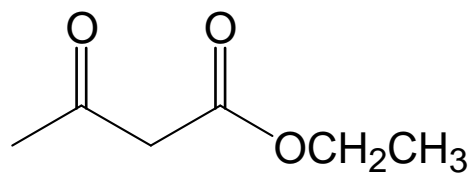
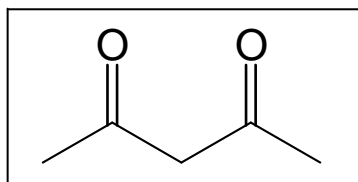
p-nitrophenol

2. Comparison Questions. Clearly circle your chosen answer. (14 points; 2 apiece)

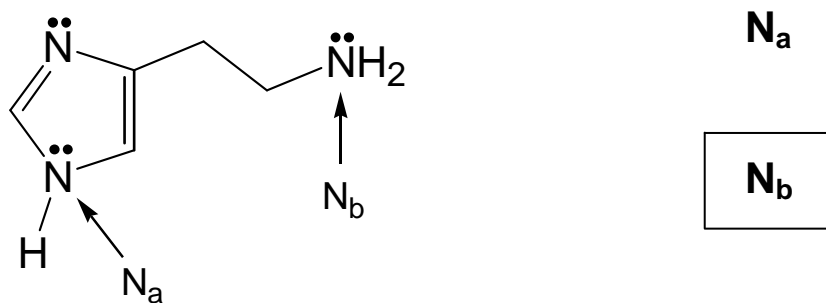
- a) Which compound readily loses CO₂ when heated? (Problem 23.20a and b, p 903)



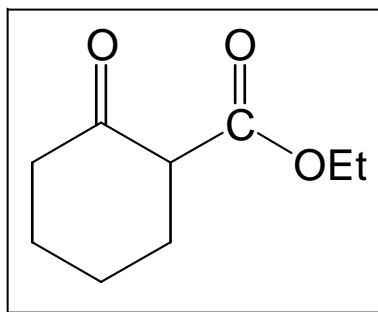
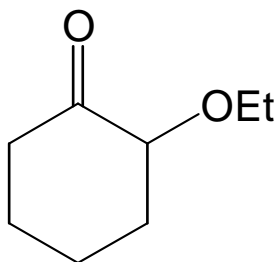
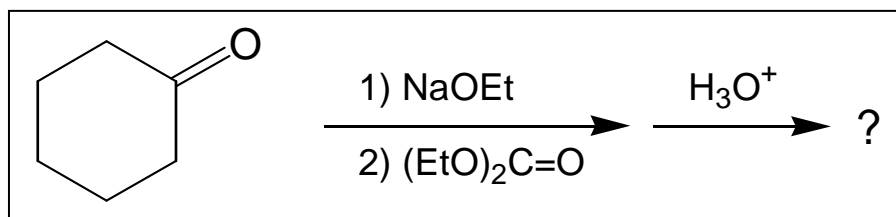
- b) Which compound has a higher percentage of enol tautomer at equilibrium? (Problem 23.3, p 885)



- c) Which nitrogen in histamine is more basic? (Problem 25.29, p 975)



- d) What is the product of the following reaction? (Problem 24.18a, p 932)



Name: **KEY**

- e) Which of the following loses optical activity when treated with NaOH in H₂O?
(Problem 23.12, p 894)

(R)-2-methylcyclohexanone

(R)-3-methylcyclohexanone

- f) Which compound serves only as the electrophile in a crossed Claisen reaction?

ethyl acetate

diethyl carbonate

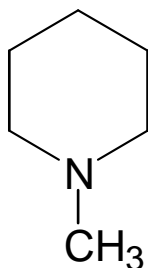
- g) Which subject is totally rad?

Organic Chemistry 2

Organic Chemistry II

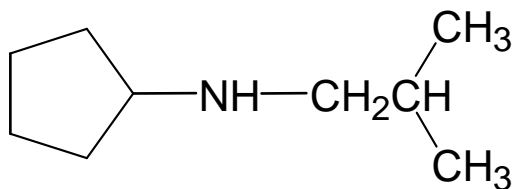
3. Draw the structure or provide the name of the following compounds. (8 points; 4 apiece)

- a) Name the following compound. (Problem 25.6d, p 953)



N-methylpiperidine

b) Draw the structure of *N*-isobutylcyclopentylamine. (Problem 25.45b, p 994)

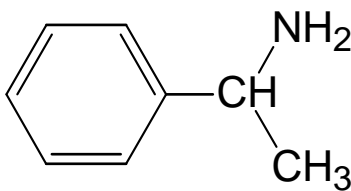
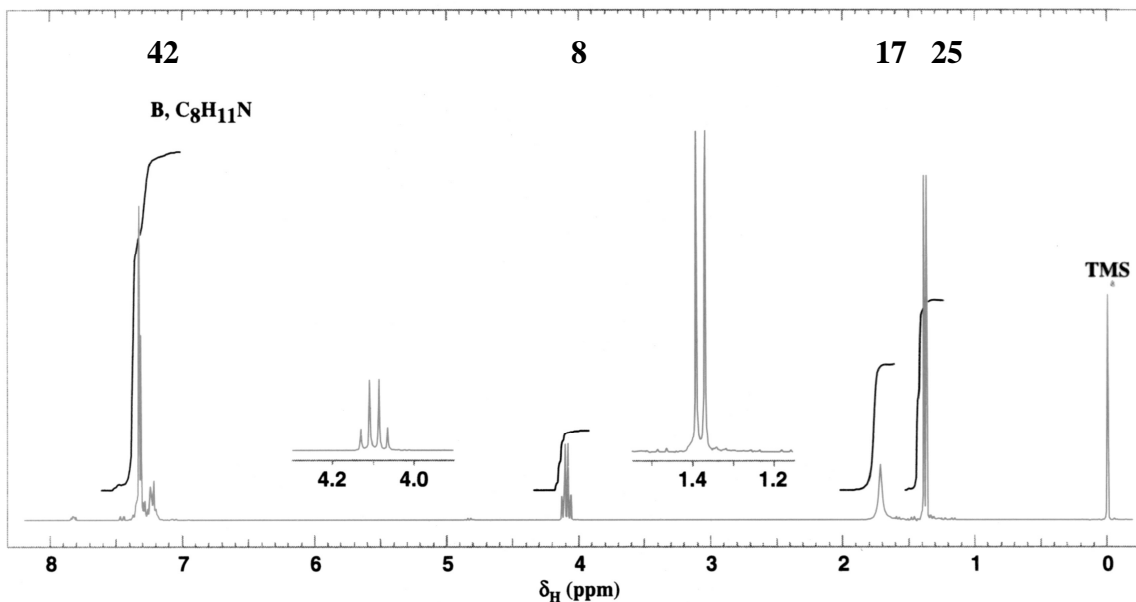


4. Structures from Spectroscopic Data (8 points; 4 apiece)

a) What is the structure of an amine that shows a molecular ion in its mass spectrum at $m/z = 59$ and has one peak in its IR spectrum at $\sim 3300 \text{ cm}^{-1}$? (Problem 25.8, p 955)



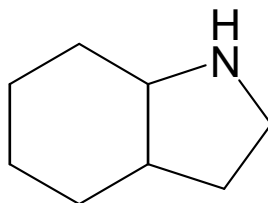
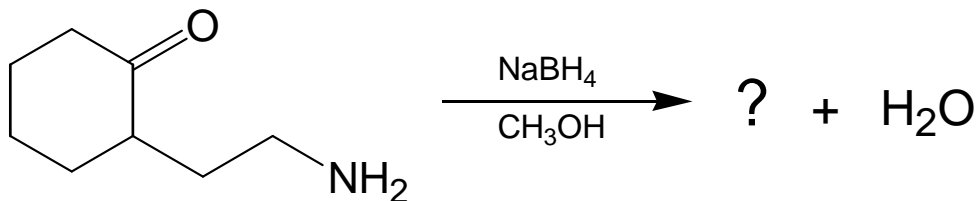
b) What is the structure of a compound $\text{C}_8\text{H}_{11}\text{N}$ that gives NMR spectrum below?



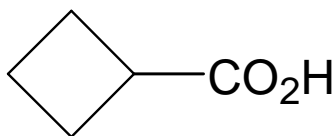
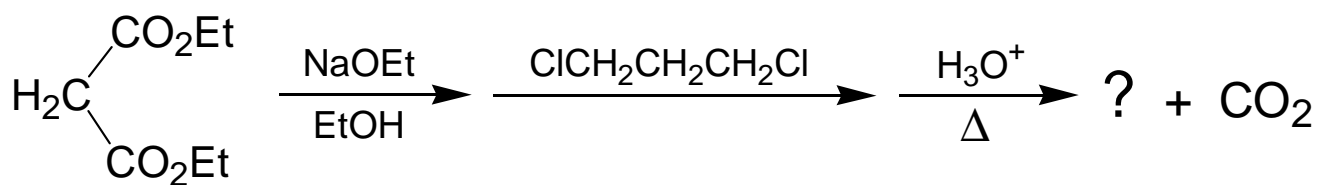
Name: **KEY**

5. Provide the missing products or reactants for the following reactions. If more than one product is formed, indicate which is the major and which the minor product. If multiple steps are required, clearly show reagents for each step. (32 points; 4 apiece)

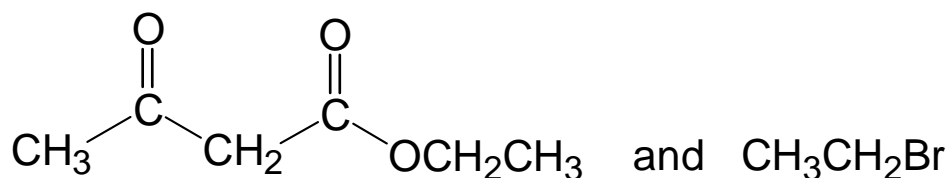
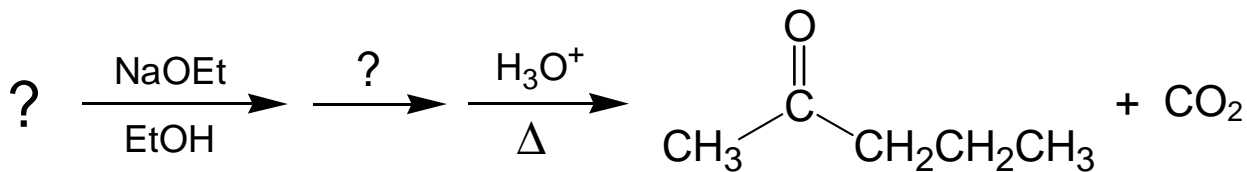
a) Problem 25.69b, p 998



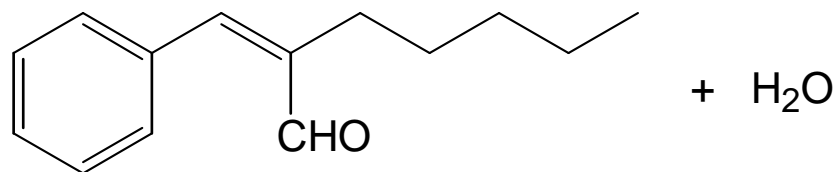
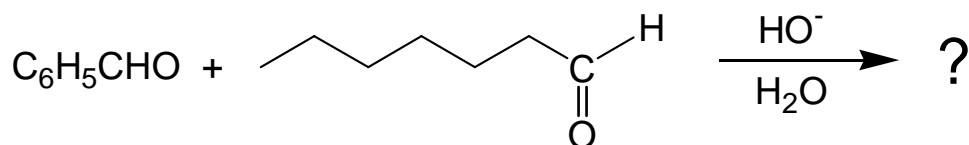
b) Problem 23.22a, p 904



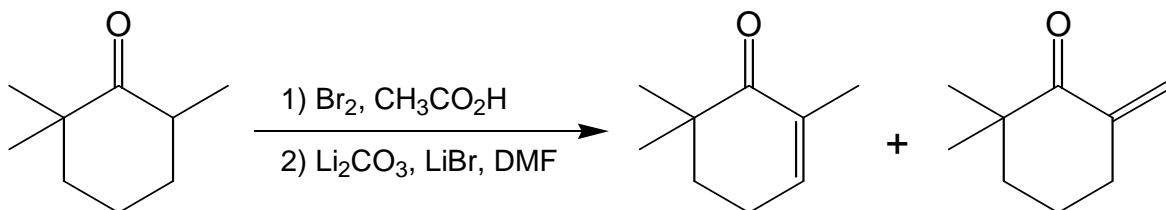
c) Identify the missing reagents denoted by '?'s. (Problem 23.26a, p 907)



d) Problem 24.5, p 923

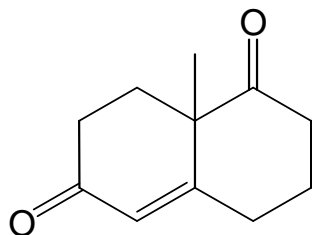
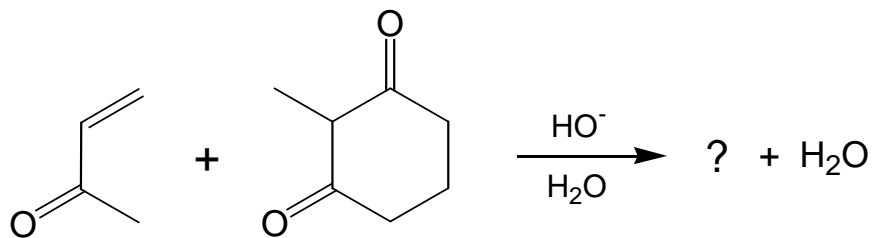


e) Problem 23.47f, p 912

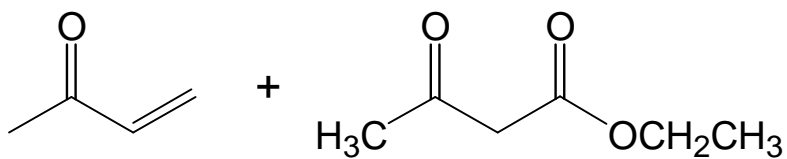
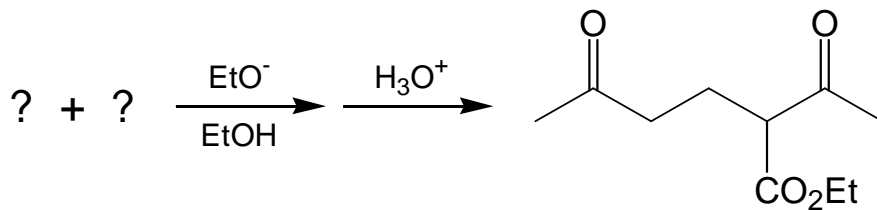


Name: **KEY**

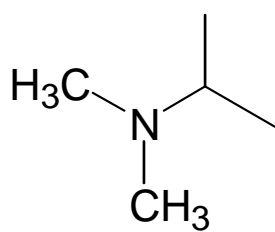
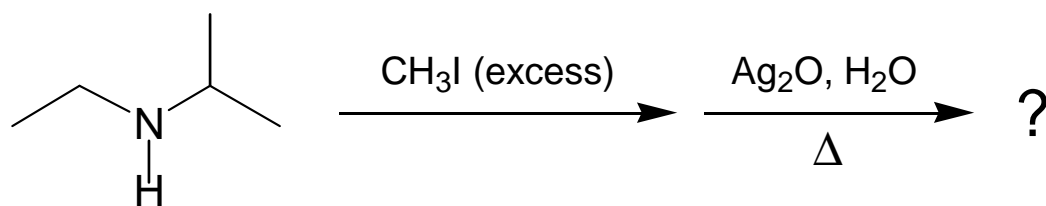
f) Problem 24.41a, p 943



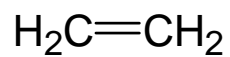
g) Problem 24.23a, p 935 (Michael reaction)



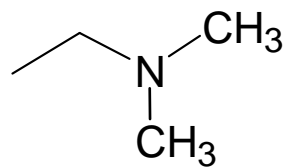
h) Problem 25.62e, p 996



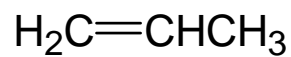
+



major



+



minor

6. Devise a synthesis of the molecule below from aniline ($C_6H_5NH_2$) as starting material.
(Problem 25.75d, p 998; 8 points)

