

Quiz 9

2 points of extra credit

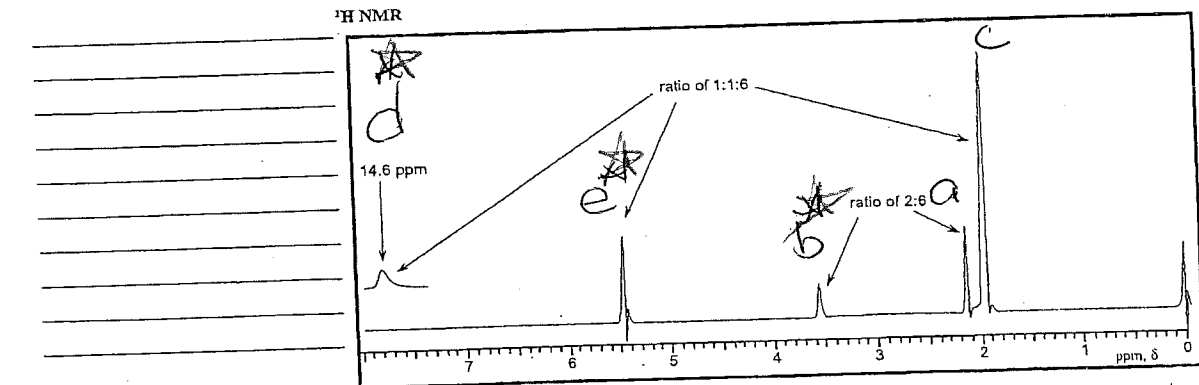
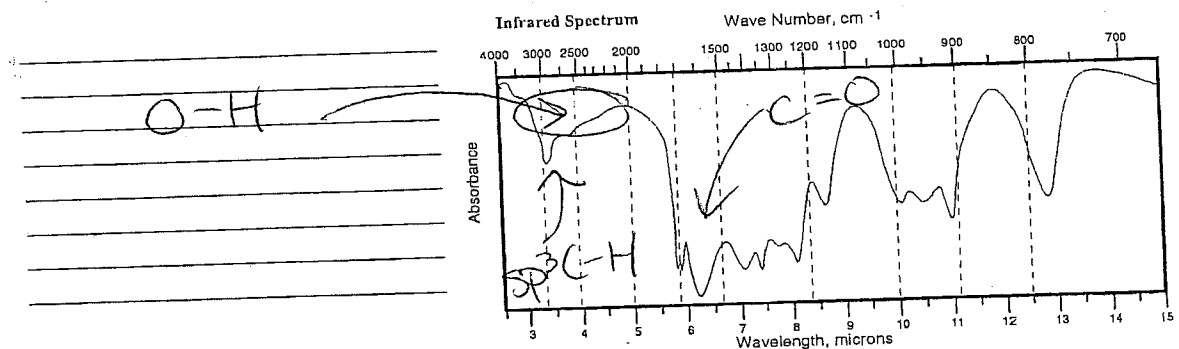
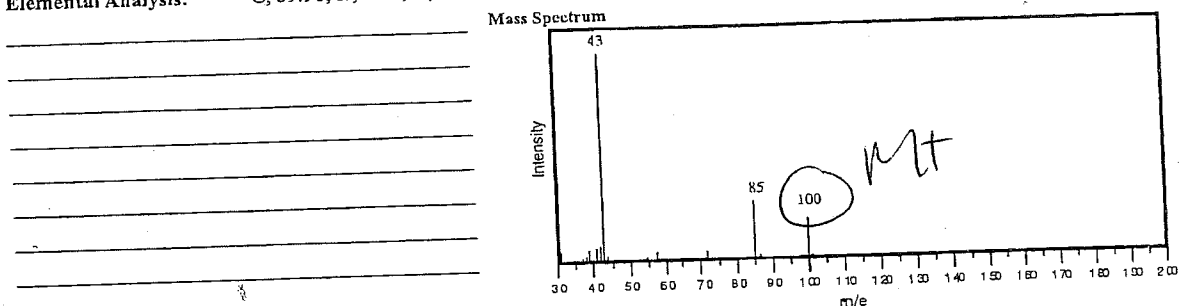
1. Propose bond-line structures for the enol-keto tautomers that produce that following spectroscopic data. Make sure to clearly circle and label the molecular ion, indicate the source of all significant IR absorption bands, show which hydrogen atoms create the corresponding signals in the ¹H NMR spectrum, and show which carbon atoms create the corresponding signals in the ¹³C NMR spectrum. Remember that there are two compounds creating the data below. (6 pts)

that each

Put a star by each signal in the ¹H NMR spectrum that would disappear when D₂O is allowed to equilibrate with the sample. (1 pt)

Compound 94 is a liquid (boiling point 140° C) that reacts with I₂ in aqueous base to give a yellow precipitate of CHI₃ (the iodoform test). The Mass, IR, and ¹H NMR spectra, along with ¹³C NMR data, are given below. The ¹H NMR spectrum shows the parent compound in equilibrium with a major tautomeric isomer and the peaks corresponding to both forms are indicated on the spectrum. Elemental Analysis: C, 59.98; H, 8.05; O, 31.96.

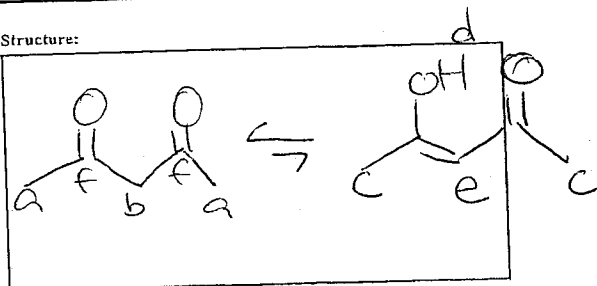
~~1 pt~~



¹³C Spectral Data:

f _____
 singlet, 207.1 ppm;
 b _____
 triplet, 56.3 ppm;
 a _____
 quartet, 24.3 ppm
 (data for keto
 tautomer)

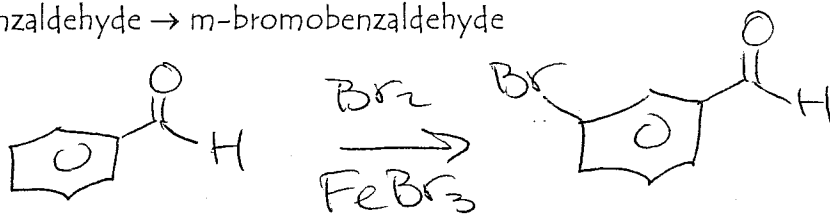
Structure:



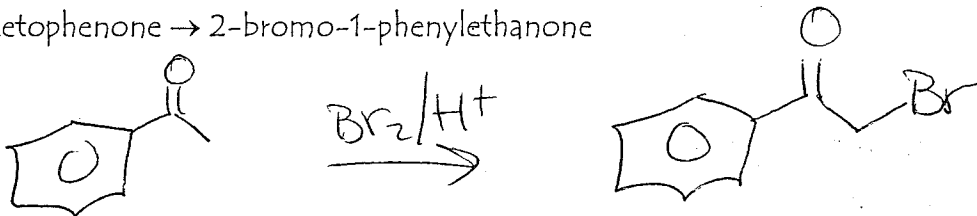
2. Specify the reagents to perform the following chemical transformations.
Both old and new "friends" appear below.

(5 pts)

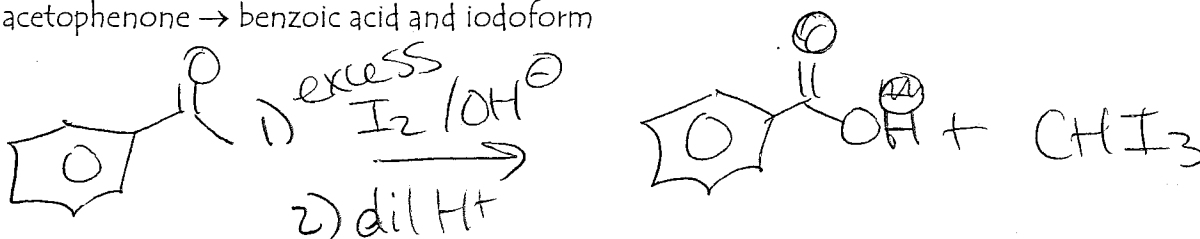
a) benzaldehyde \rightarrow m-bromobenzaldehyde



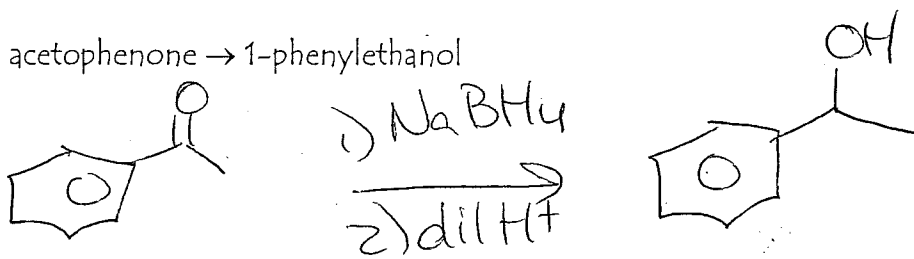
b) acetophenone \rightarrow 2-bromo-1-phenylethanone



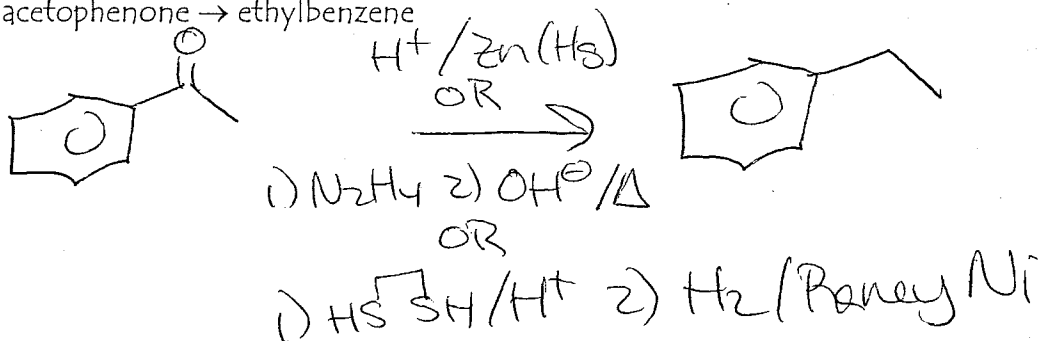
c) acetophenone \rightarrow benzoic acid and iodoform



d) acetophenone \rightarrow 1-phenylethanol



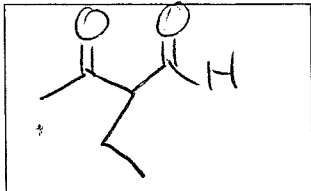
e) acetophenone \rightarrow ethylbenzene





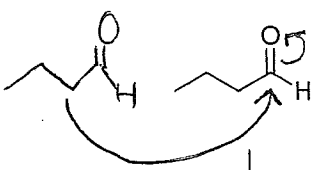
Quiz 10
Re-grades will be available.

1. Complete the reaction maps by predicting the major product or specifying the necessary reagents. More than one step may be required when specifying reagents. (5 pts)

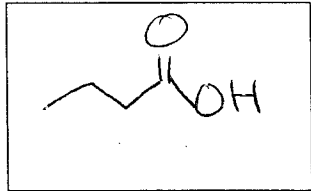
a)



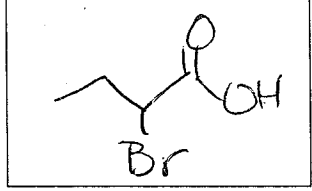
- 3) excess H₂O / H⁺
- 2) 
- 1)  / cat. H⁺



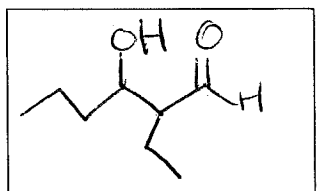
Br₂ / H₃O⁺



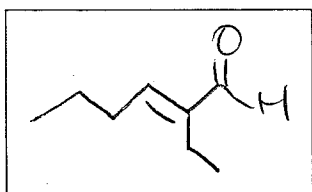
1) PBr₃ / Br₂
2) H₂O



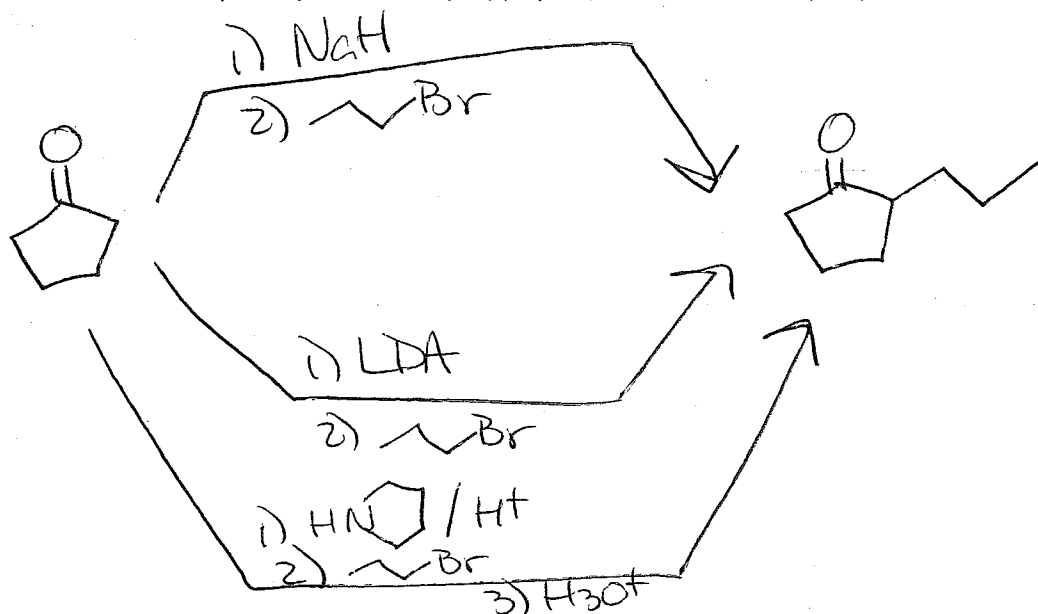
NaOH



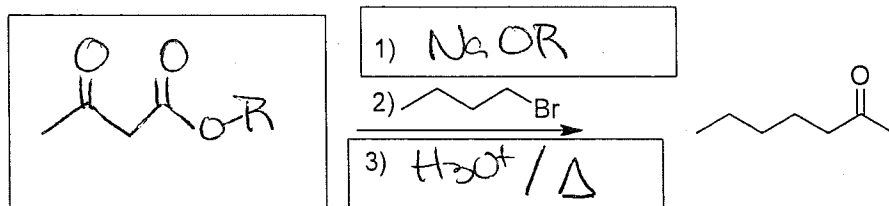
heat



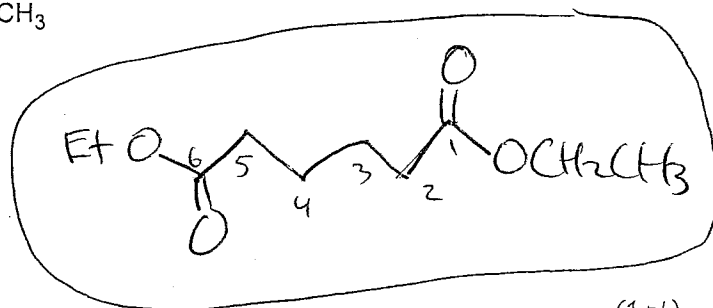
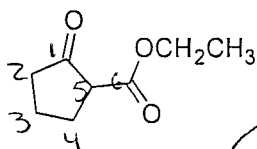
2. Show two different ways to synthesize 2-propylcyclopentanone from cyclopentanone. (2 pts)



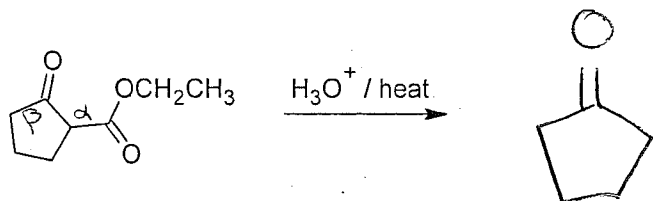
3. Use the acetoacetic ester synthesis to complete the reaction below. (1 pt)



4. Draw the bond-line structure of the compound that forms the compound below via the Dieckman Condensation reaction (intra-molecular Claisen condensation). (1 pt)

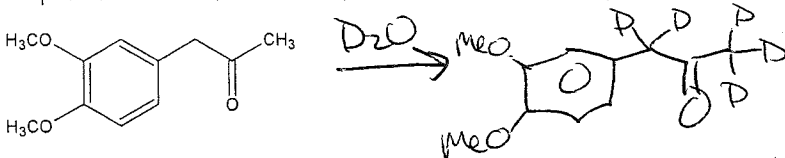


5. Predict the product(s). (1 pt)



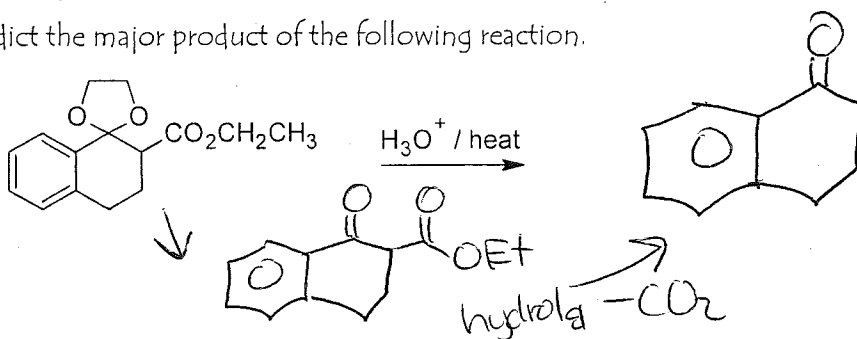
Take Home - due by the end of our next lecture session.

1. After the compound below was heated in D_2O containing K_2CO_3 at $70^\circ C$, the only signals that could be found in its 1H NMR spectrum were at δ 3.9 (6H) and δ 6.7 - 6.9 (3H). Explain what happened? Your explanation needs to include a reaction or chemical structure combined with written words. (2 pts)

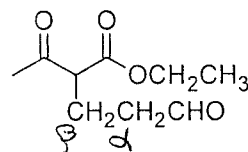
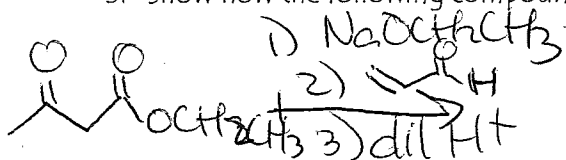


The α -H's are exchanged w/ deuterium so those H signals disappear

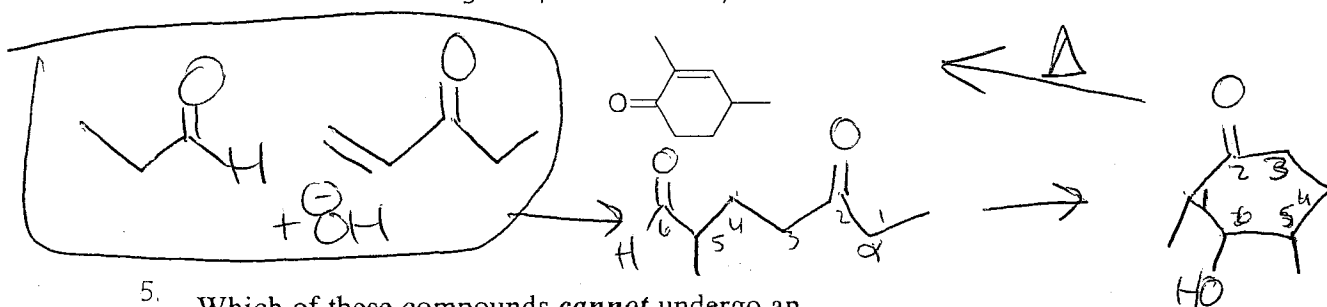
2. Predict the major product of the following reaction. (2 pts)



3. Show how the following compound can be synthesized from a Michael Addition reaction. (2 pts)

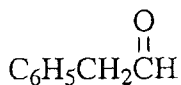


4. Show how the following compound can be synthesized from a Robinson Annulation reaction. (2 pts)

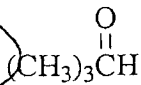


5. Which of these compounds **cannot** undergo an aldol reaction in the presence of dilute base?

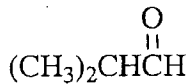
(A)



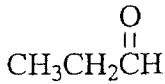
(B)



(C)



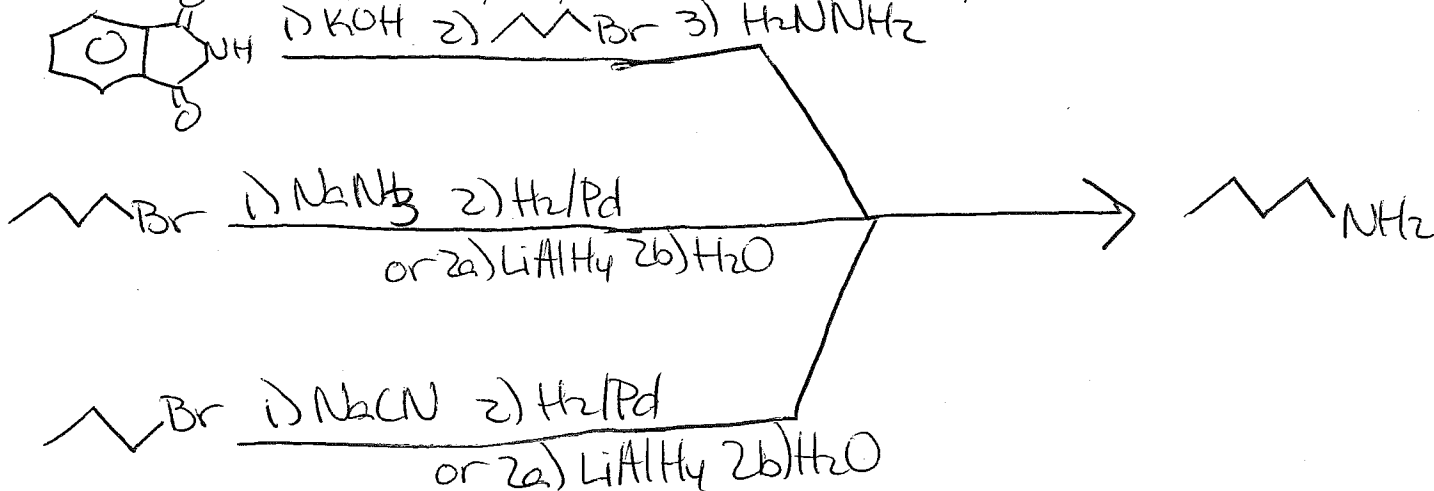
(D)



(2 pts)

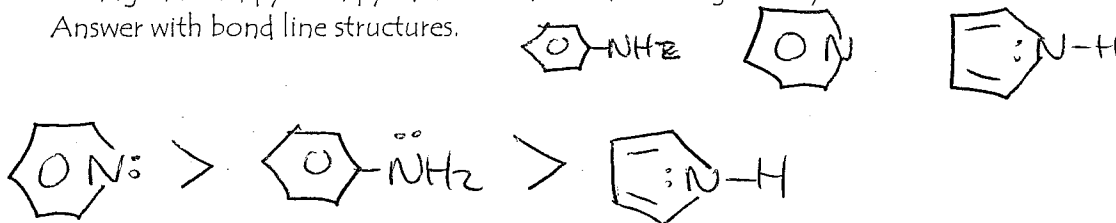
Bonus Quiz
Re-grades Available

1. Show three different ways to synthesize 1-butanamine from alkyl halides. (3 pts)



2. Arrange aniline, pyrrole, pyridine in order of decreasing basicity. (3 pts)

Answer with bond line structures.



3. Specify the reagents to perform the following chemical transformations. (4 pts)

