CH 310N
Fall 2006
Anslyn

December 13th, 2006
Final Exam

Please **PRINT** the first three letters of your last name in the three boxes.

K	E	y

PRINT Name_____ **UT-EID**_____

1) _____ (8 pts)

2) _____ (47 pts)

3) _____ (7 pts)

4) _____ (6 pts)

5) _____ (21 pts)

6) _____ (18 pts)

7) _____ (7 pts)

8) _____ (7 pts)

9) _____ (7 pts)

10) _____ (7 pts)

11) _____ (7 pts)

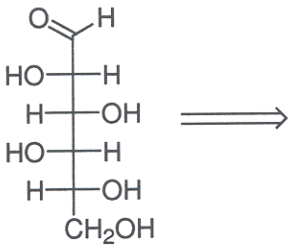
12) _____ (8 pts)

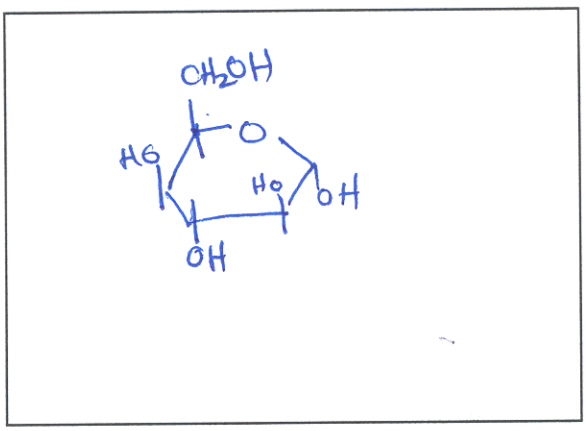
Total score _____ (150pts)

1)

a)

Draw the Haworth projection of the sugar shown below in the box provided.

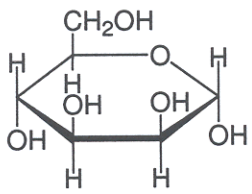


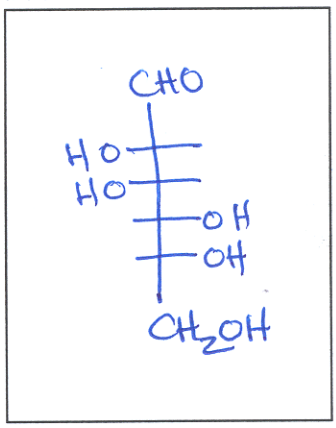


2

b)

Draw the Fischer Projection of the structure shown below in the box provided.

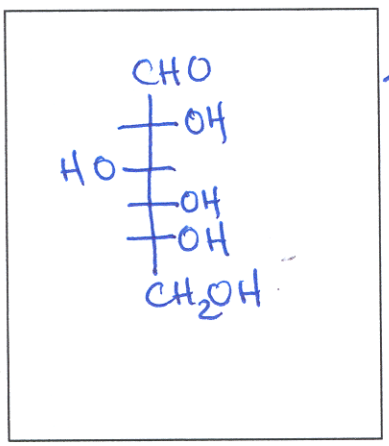




2

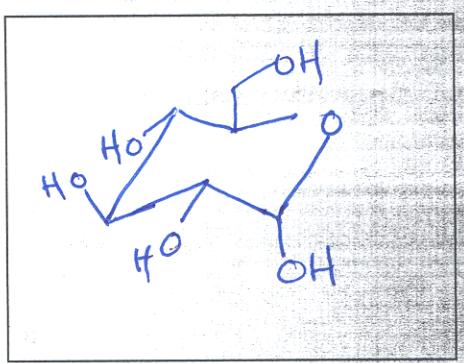
c)

Draw the Fischer Projection of D-Glucose



2

Draw the alpha pyranose form of D-glucose in a chair conformation

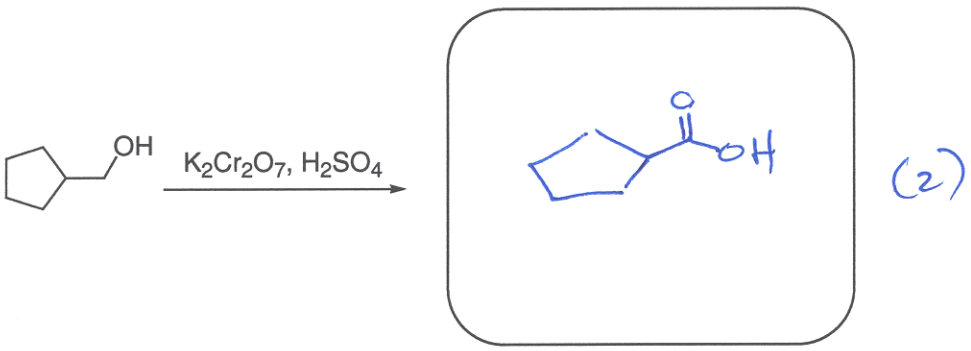


2

Note: Diff. ways to draw this.

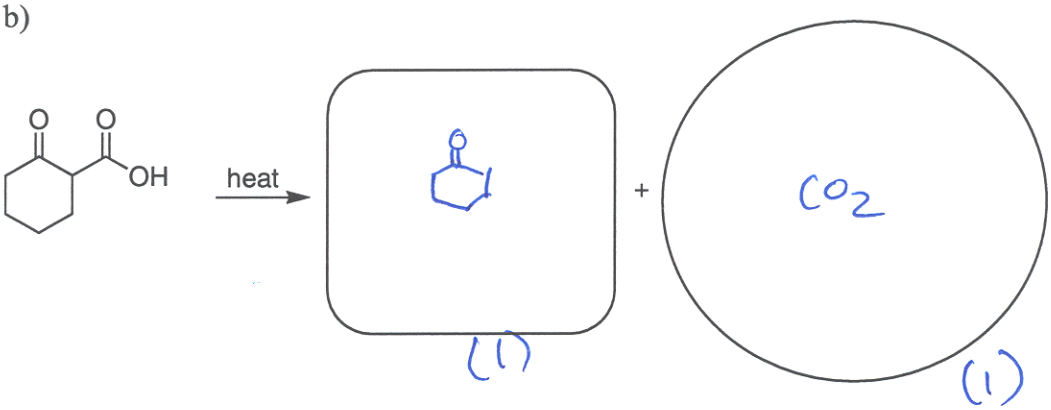
2) Fill in the geometric shapes with the correct reactants, products, or reagents necessary. (47 points)

a) From homework, problem 17.18



(2)

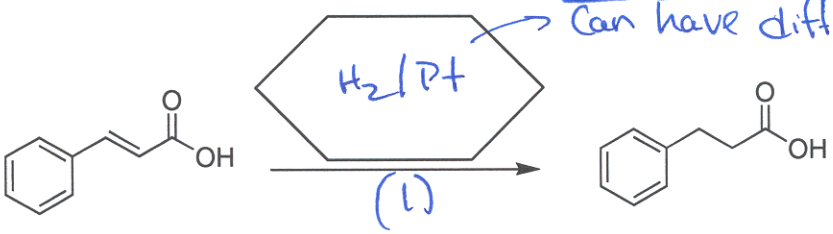
b)



(1) (1)

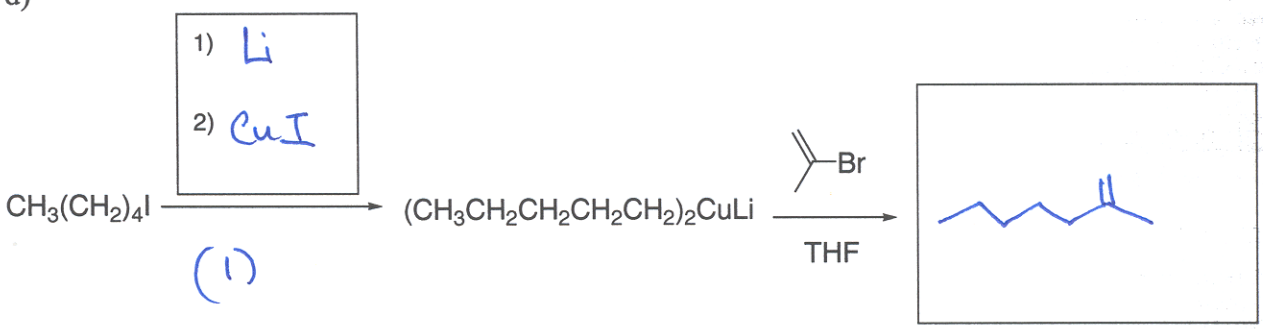
c) From homework, problem 17.33

Note: Can have diff. answers.



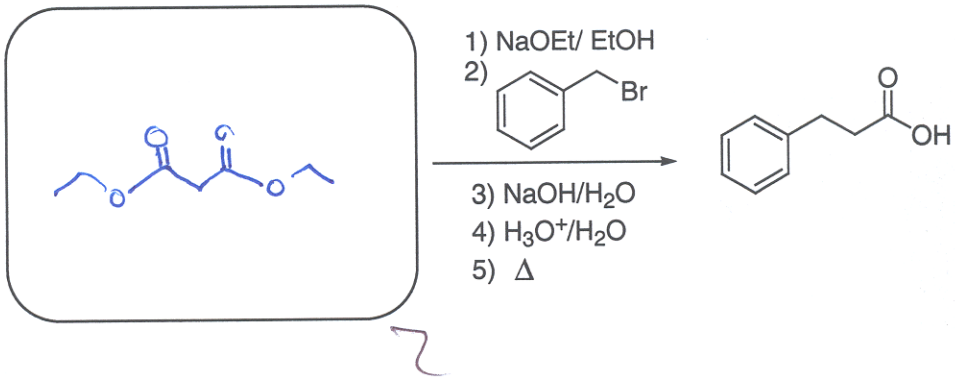
(1)

d)



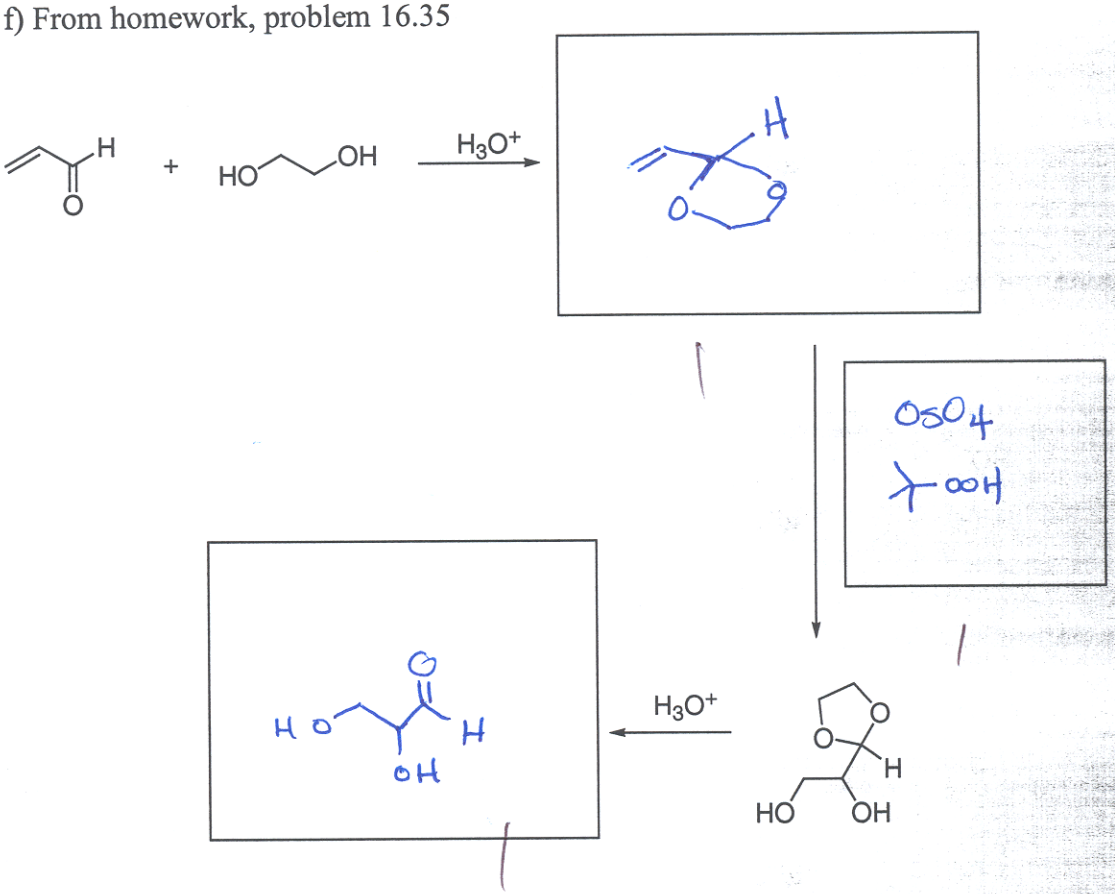
(1) (2)

e)



7

f) From homework, problem 16.35

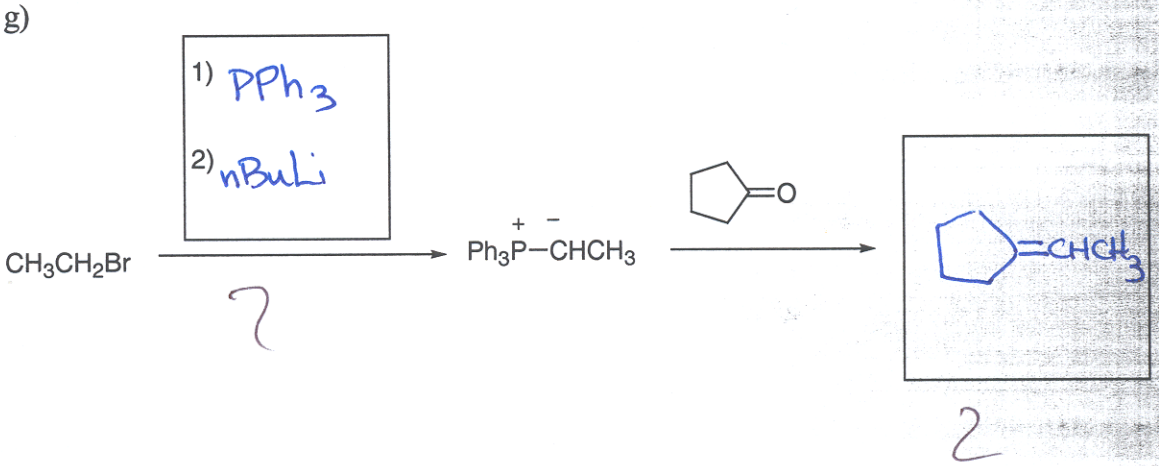


1

1

1

g)

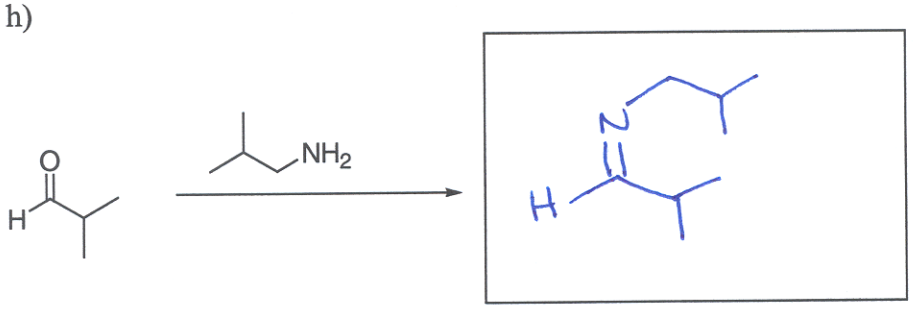


7

2

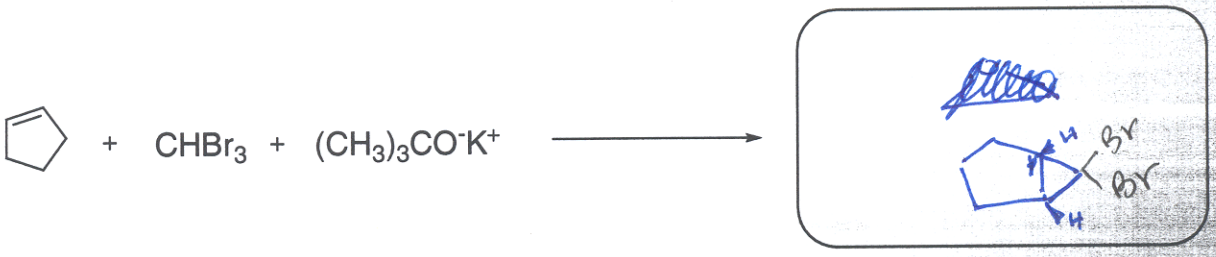
9

h)



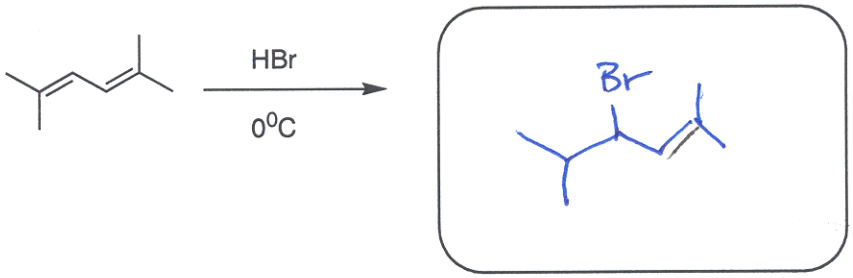
2

i) From homework, problem 15.12 c



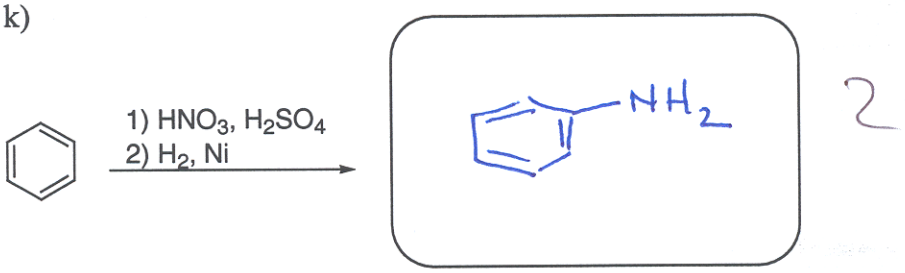
2

j)
Hint: Looking for kinetic product



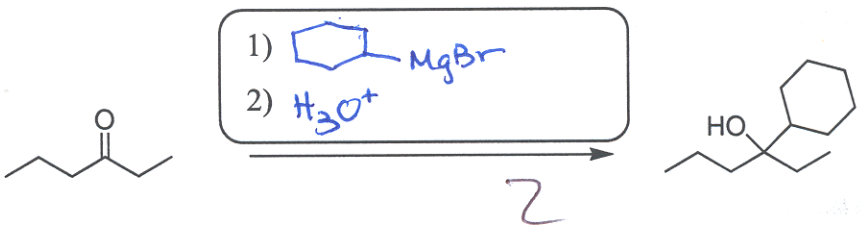
2

k)



2

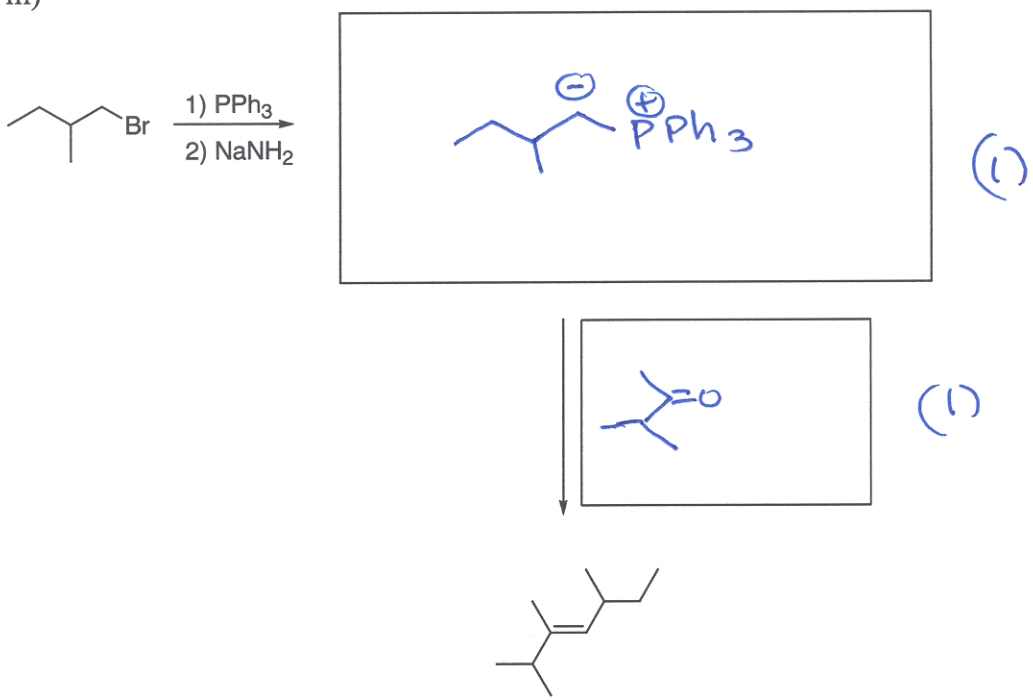
l) From homework, problem 15.17



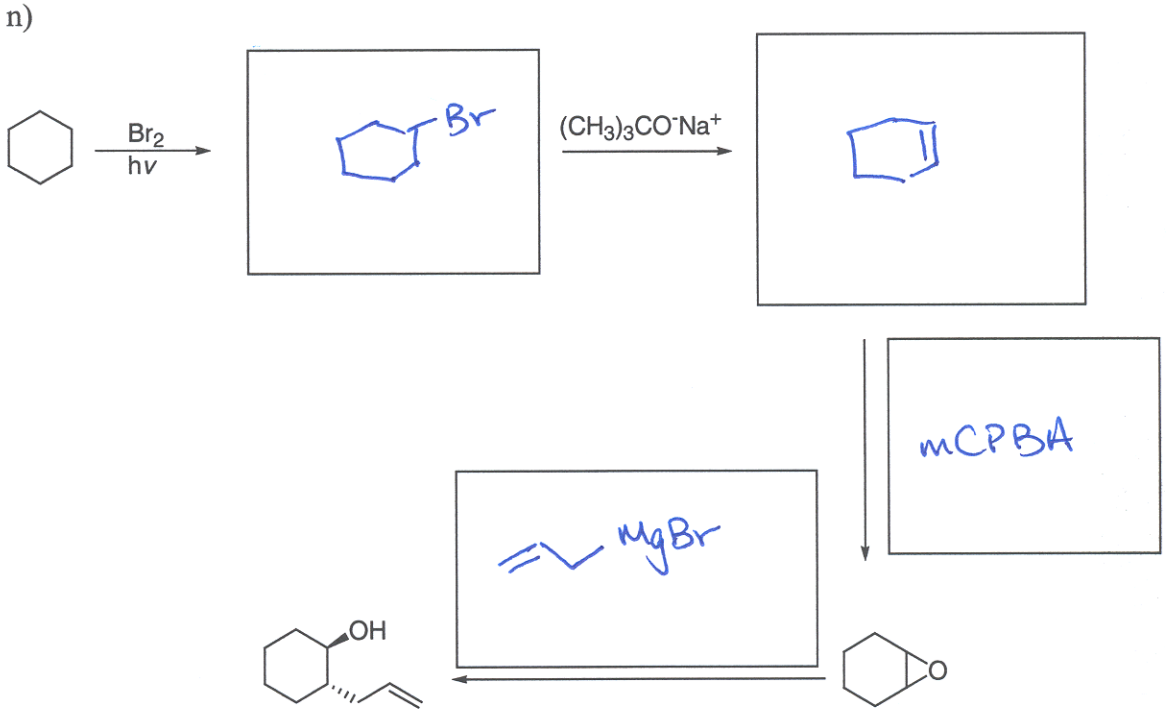
2

10

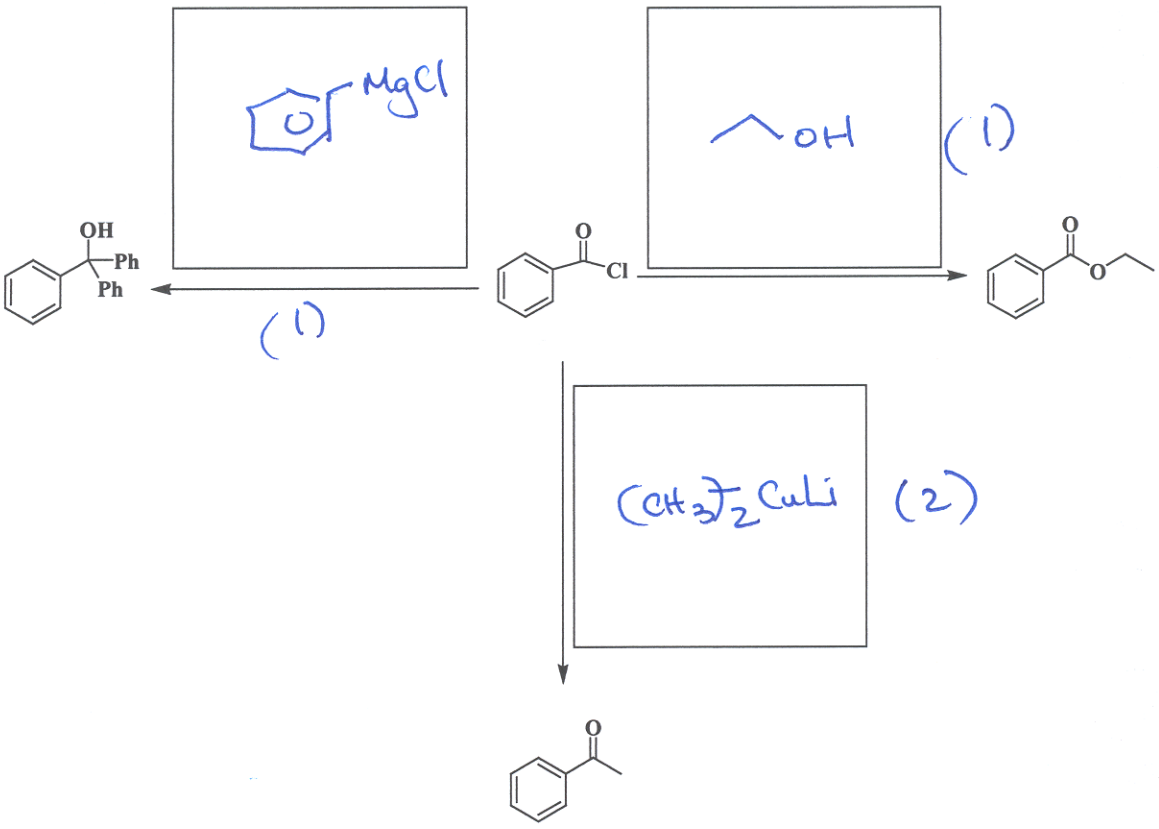
m)



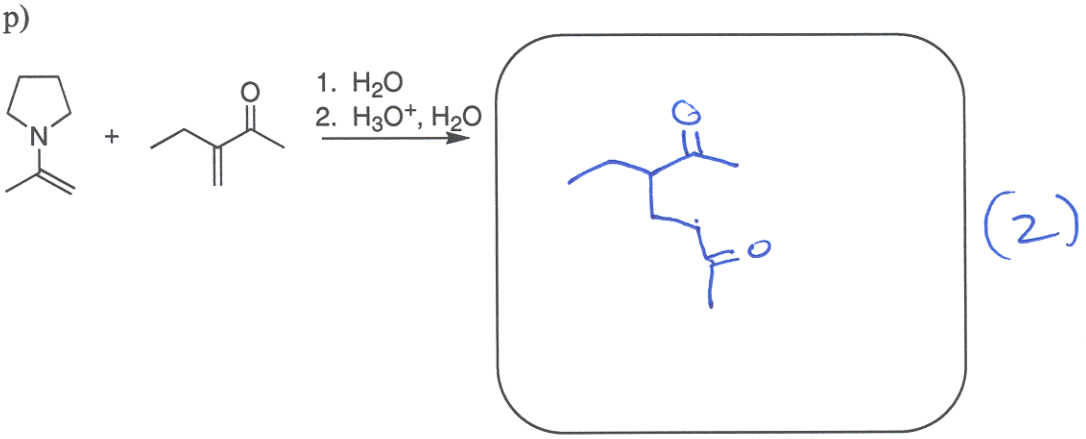
n)



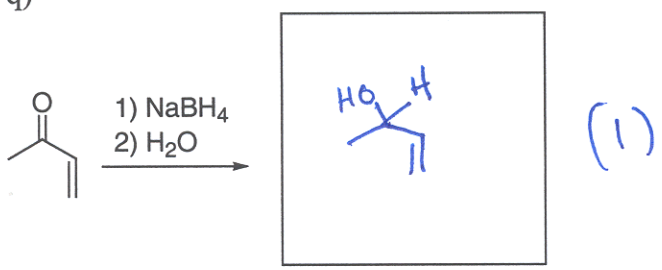
o) From homework, problem 18.19



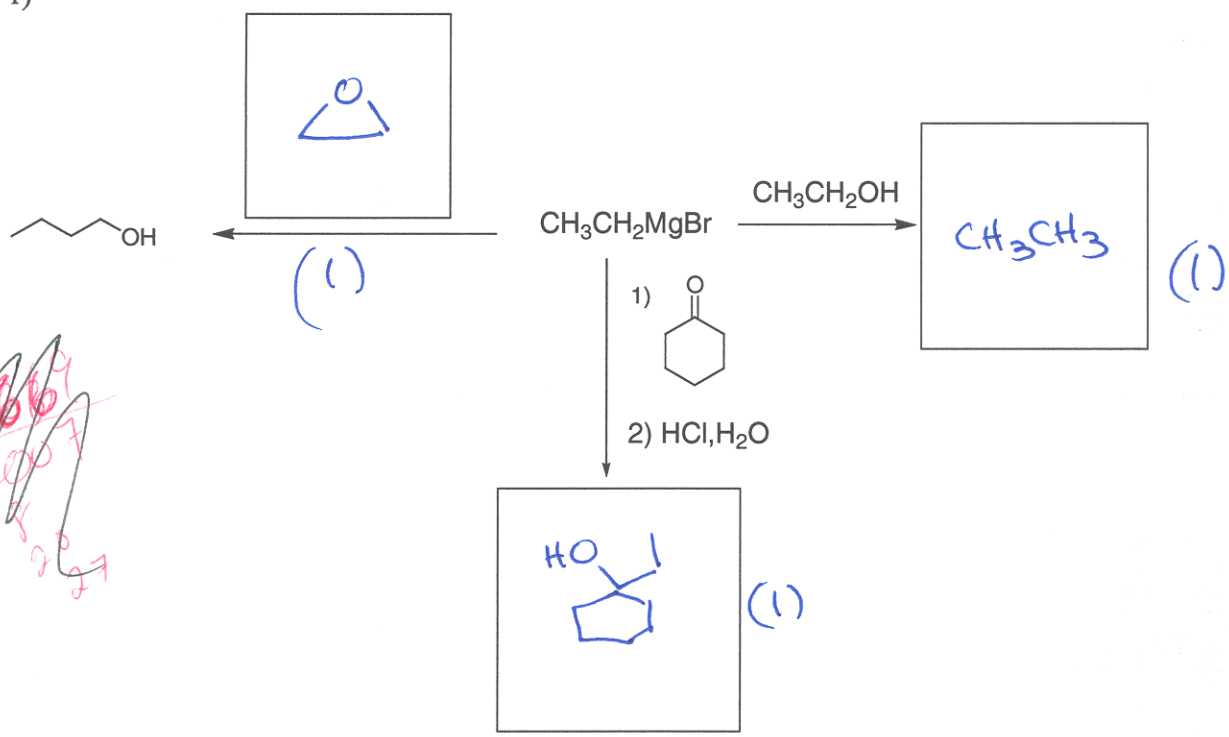
p)



q)

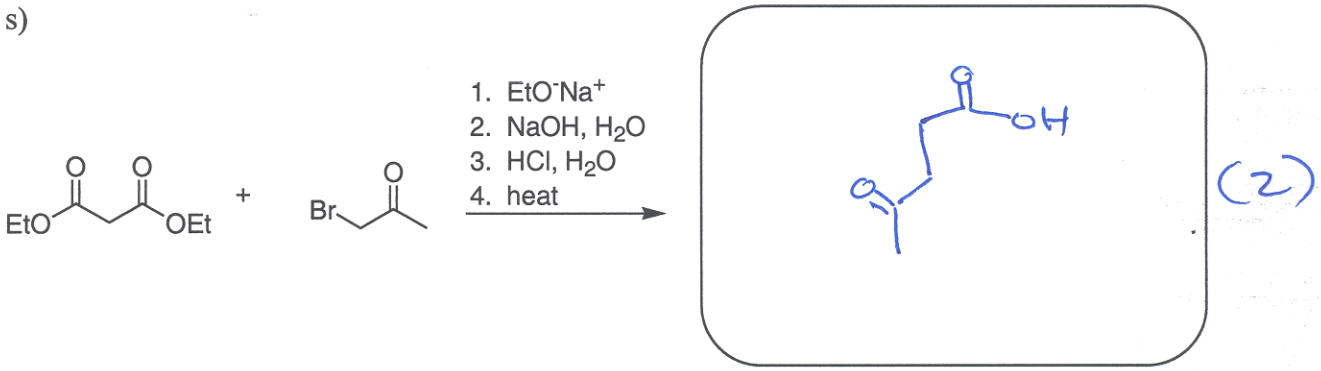


r)



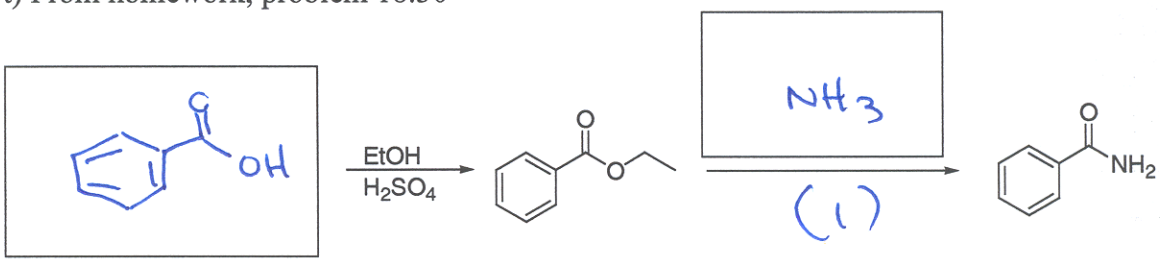
(1) (1) (1)

s)



(2)

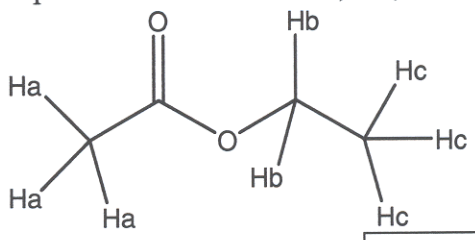
t) From homework, problem 18.30

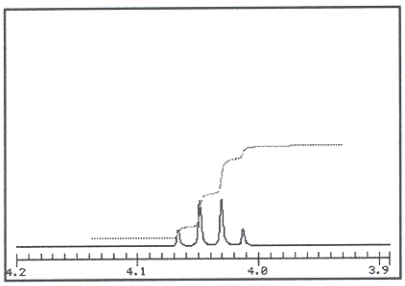


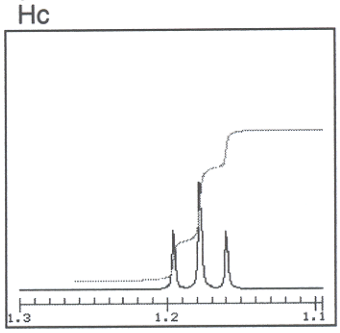
(1) (1)

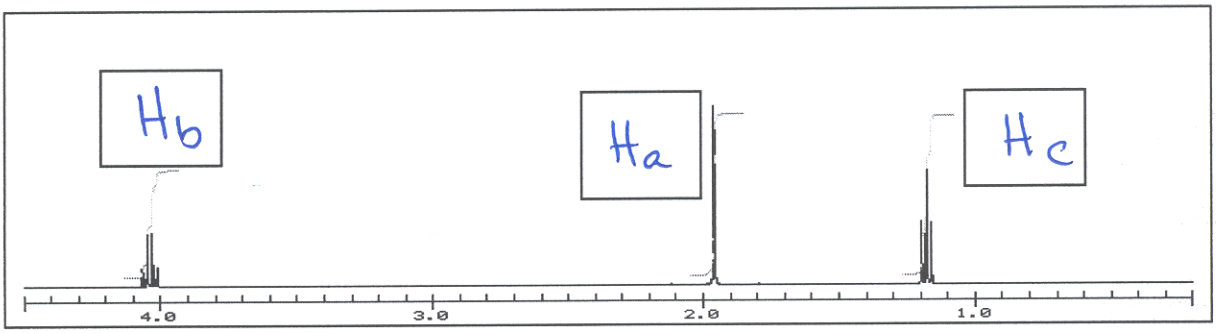
3)

a) Below is the H-NMR spectrum and structural formula of ethyl acetate. Label the peaks in the H-NMR by filling in the provided boxes with Ha, Hb, and Hc. (3 points)

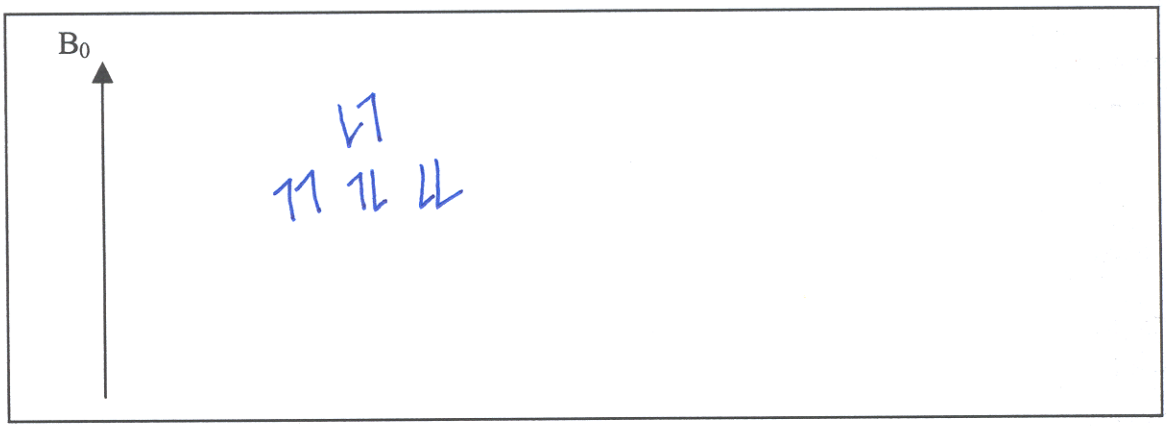




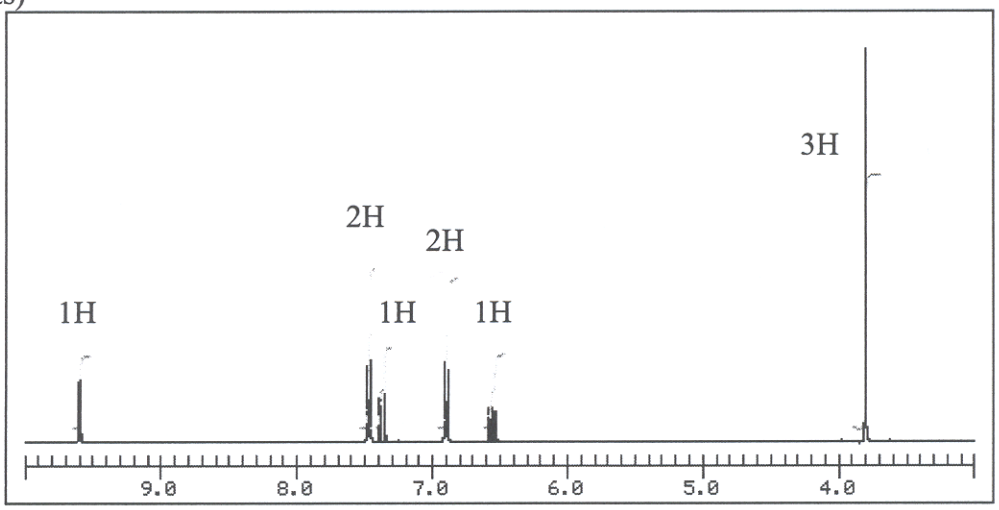




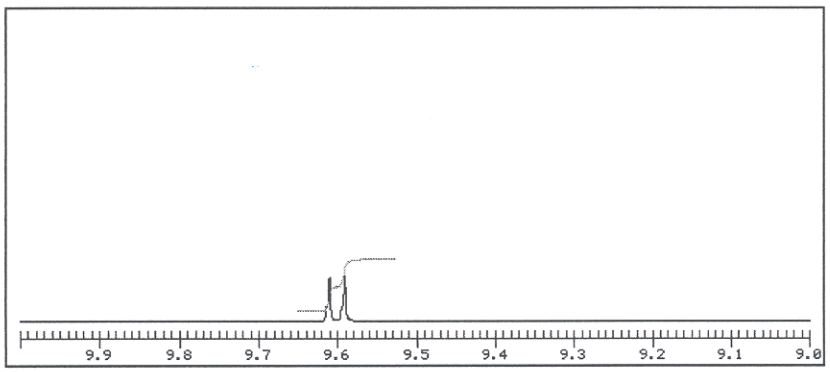
b) Explain the splitting pattern of proton **Hc** by sketching the spin alignment of the two **Hb** protons. Use arrows to represent the **Hb** spins in the bottom box. (**Hint:** We are looking for a diagram that explains the splitting pattern of proton **Hc**.) (4 points)

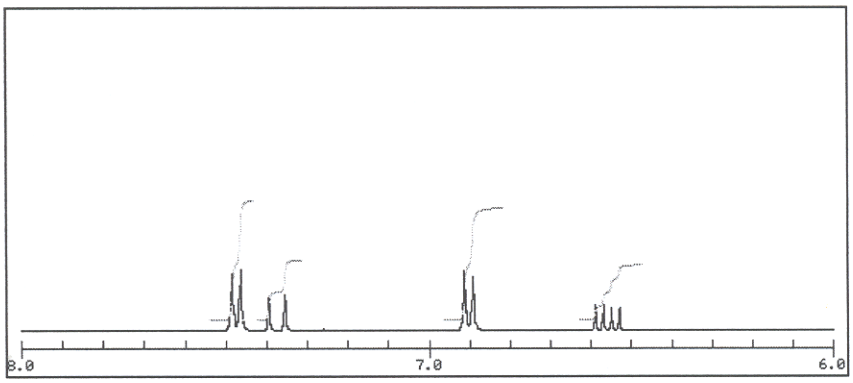


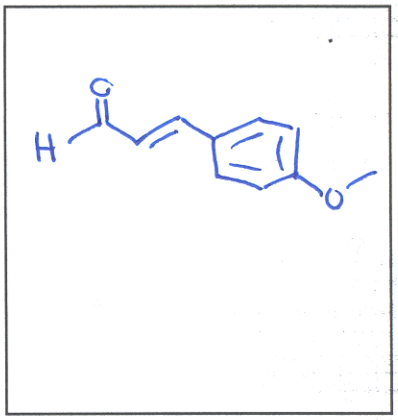
4) Below is the ^{1}H-NMR spectrum of a compound, with a molecular formula, $\mathbf{C_{10}H_{10}O_2}$. This compound reacts with a nucleophile by **Michael Addition**. Draw the structure in the provided box. (**Hint:** Think about what we said in the question about Michael Addition) (6 points)



Expanded spectrums:

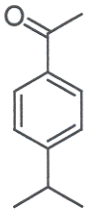






5) Show the synthesis of each product, starting from benzene. It may require multiple steps to get to the product. There may be multiple ways to obtain the product, but you only need to show one correct way. List the reagents used to produce the product in the correct order. You do not need to show any of the intermediates formed. You may use any organic and inorganic material necessary. (21 pts)

a)

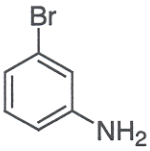


① 

② 

3

b)



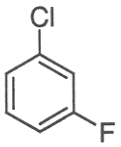
① HNO_3 / H_2SO_4

② $Br_2 / FeBr_3$

③ H_2 / Pt

3

c)



① HNO_3 / H_2SO_4

② $Cl_2 / FeCl_3$

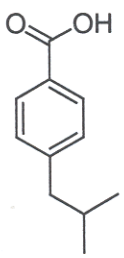
③ H_2 / Pt

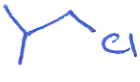
④ $HNO_2 / 0°C$

⑤ HBF_4

3

d)



① 

② $Br_2 / FeBr_3$

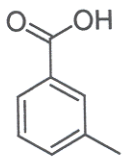
③ Mg° / Et_2O

④ CO_2

⑤ H_3O^+ / H_2O

3

e)

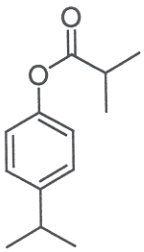


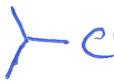
① $CH_3Cl / AlCl_3$

② $KMnO_4$ OR $K_2Cr_2O_7$

③ $CH_3Cl / AlCl_3$

f)



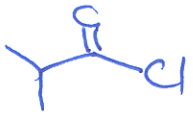
①  $/ AlCl_3$

② HNO_3 / H_2SO_4

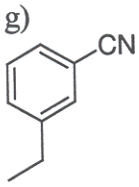
③ H_2 / Pt

④ $HNO_2 / 0°C$

⑤ H_2O

⑥ 

g)



① $Cl_2 / FeCl_2$

② $NaNH_2 / NH_3$

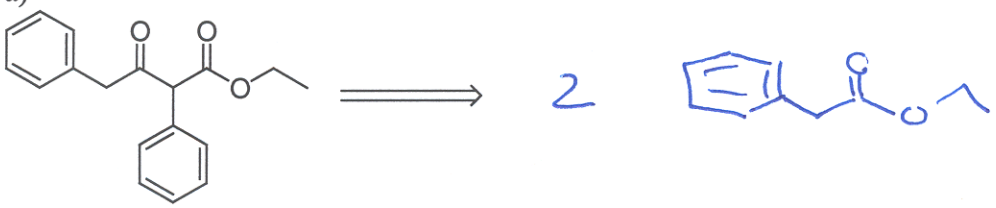
③ $HNO_2 / 0°C$

④ $CuCN$

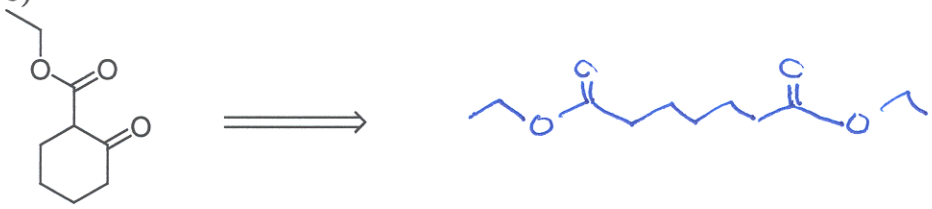
⑤  $/ AlCl_3$

6) Suppose you were trying to devise a synthesis of the following molecules shown below using a retrosynthetic approach. Draw what the starting material would be for the Claisen Condensation, Malonic Ester Synthesis, Aldol Condensation, Acetoacetic Ester Synthesis, Acetoacetic Ester Type Conjugate Addition, Robinson Annulation, Malonic Ester Conjugate Addition, or Dieckman reaction. (18 points)

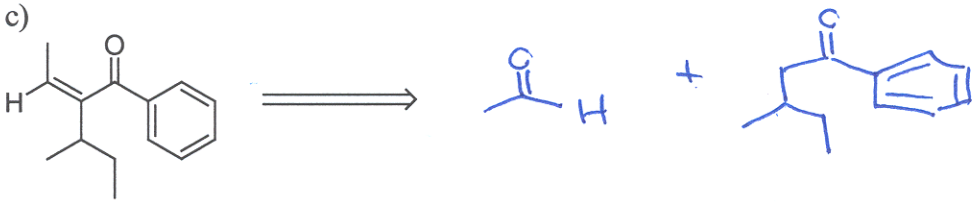
a)



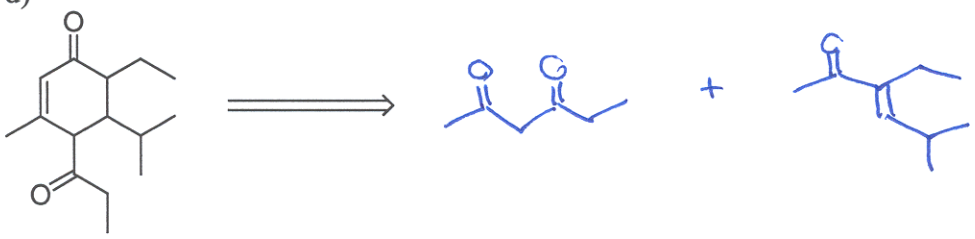
b)



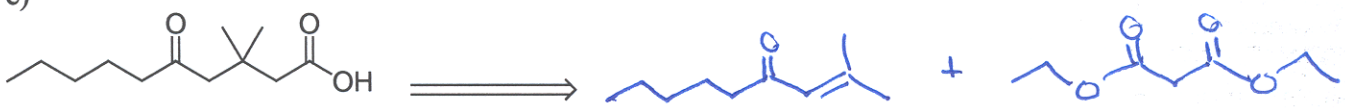
c)



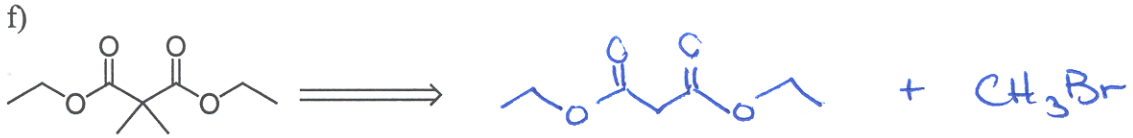
d)



e)

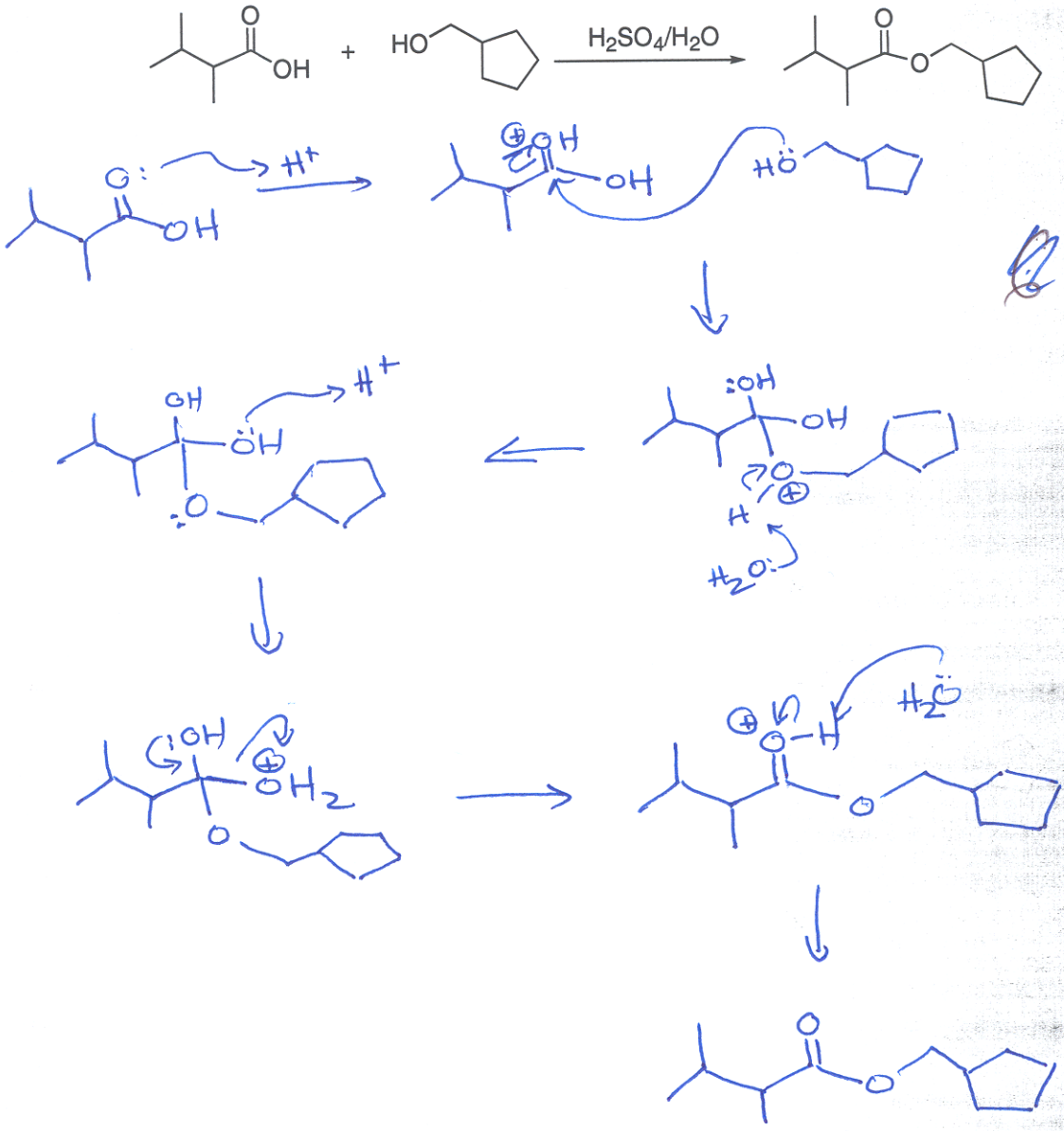


f)

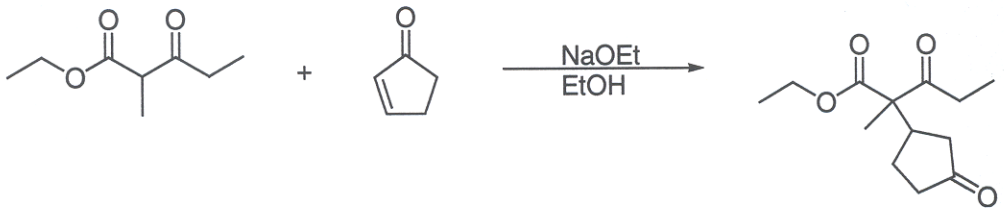


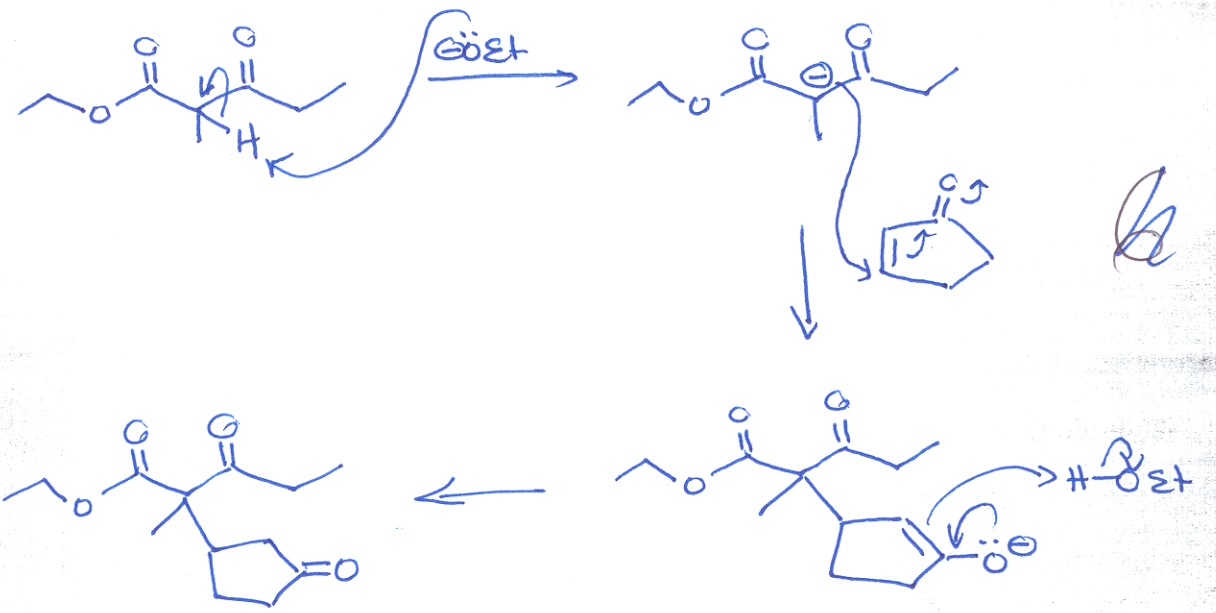
7) Propose a mechanism for the following reaction. Show all the arrow pushing. (7pts)

Show all intermediate formed

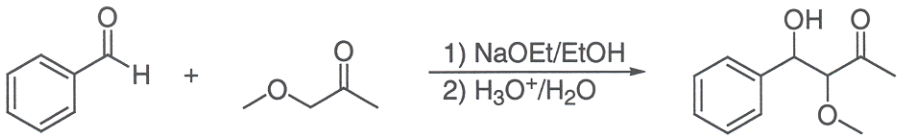


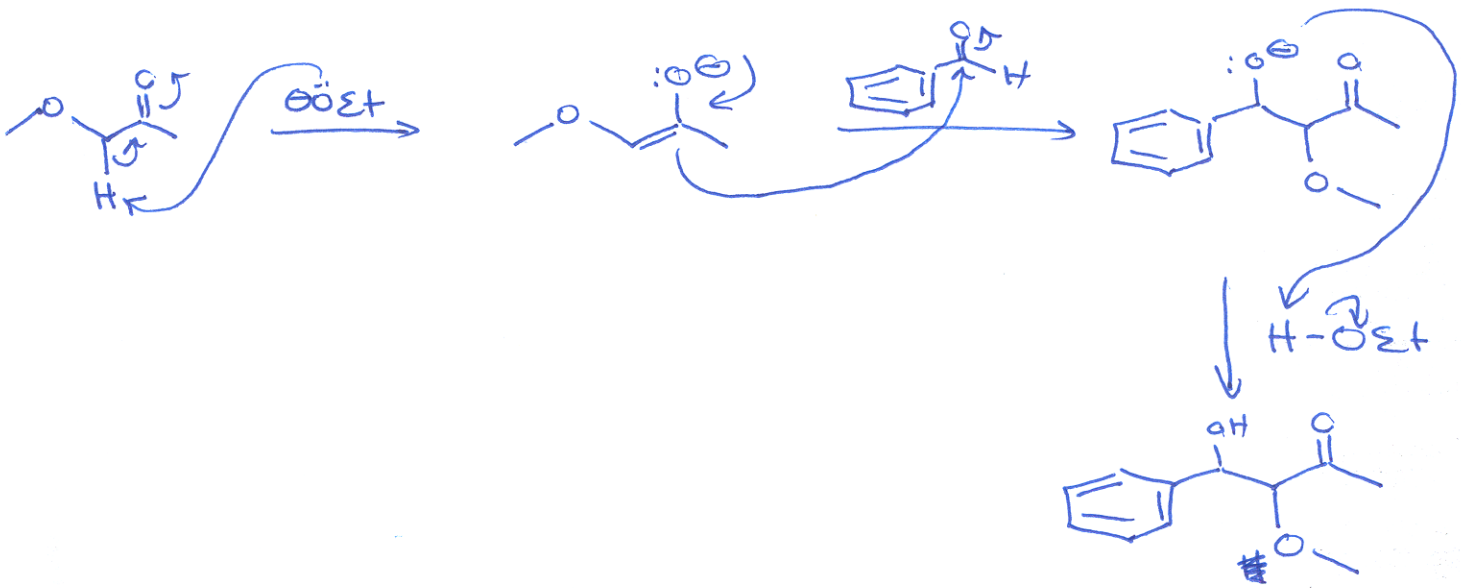
8) Propose a mechanism for the following reaction. Show all the arrow pushing. (7pts)
Show all intermediates formed





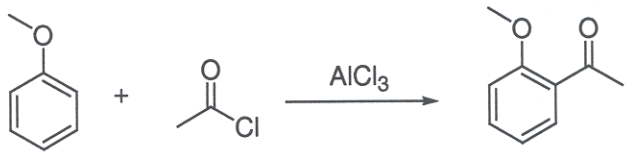
9) Propose a mechanism for the following reaction. Show all the arrow pushing and intermediates formed. (7 points)

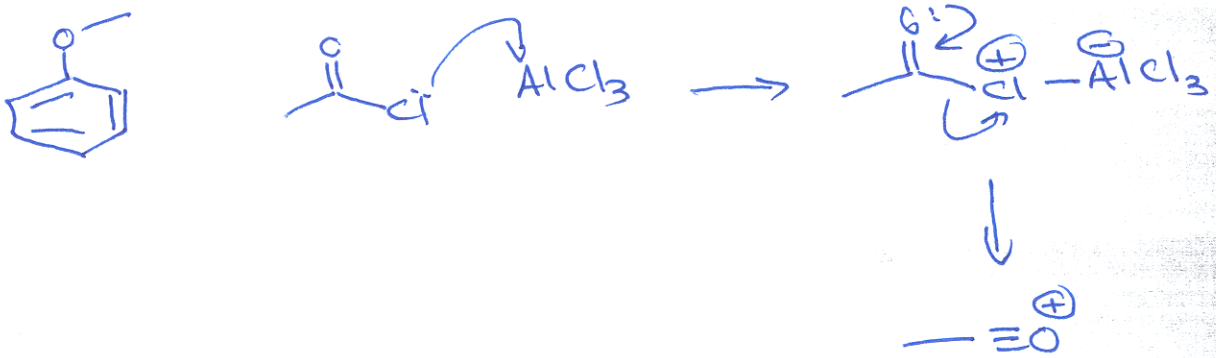


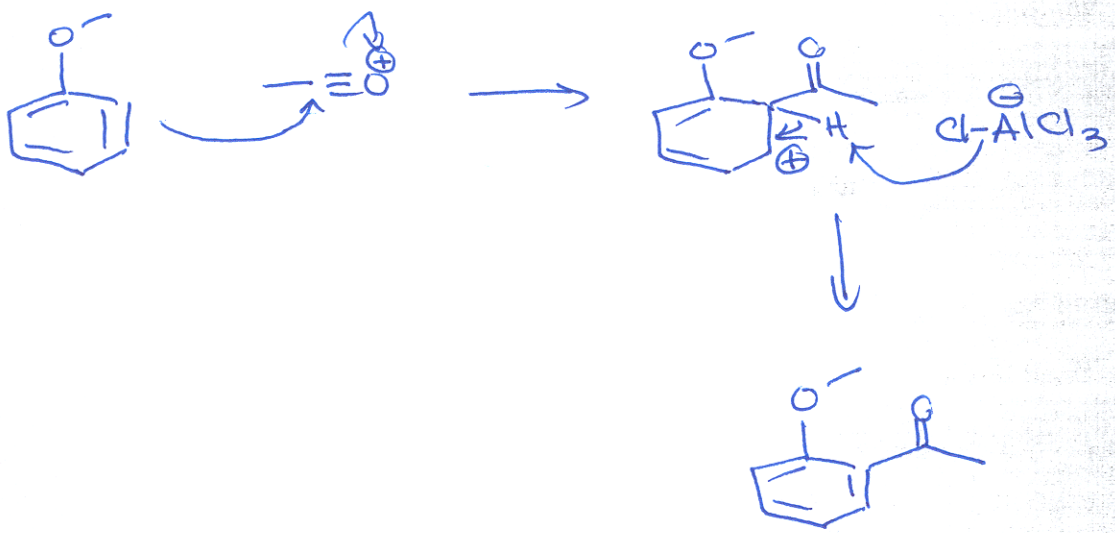


show all intermed. formed.

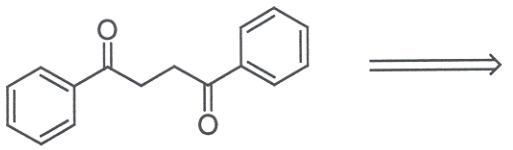
10) Propose a mechanism for the following reaction. Show all the arrow pushing. You do not need to show any resonance structures of the intermediates. (7 pts)





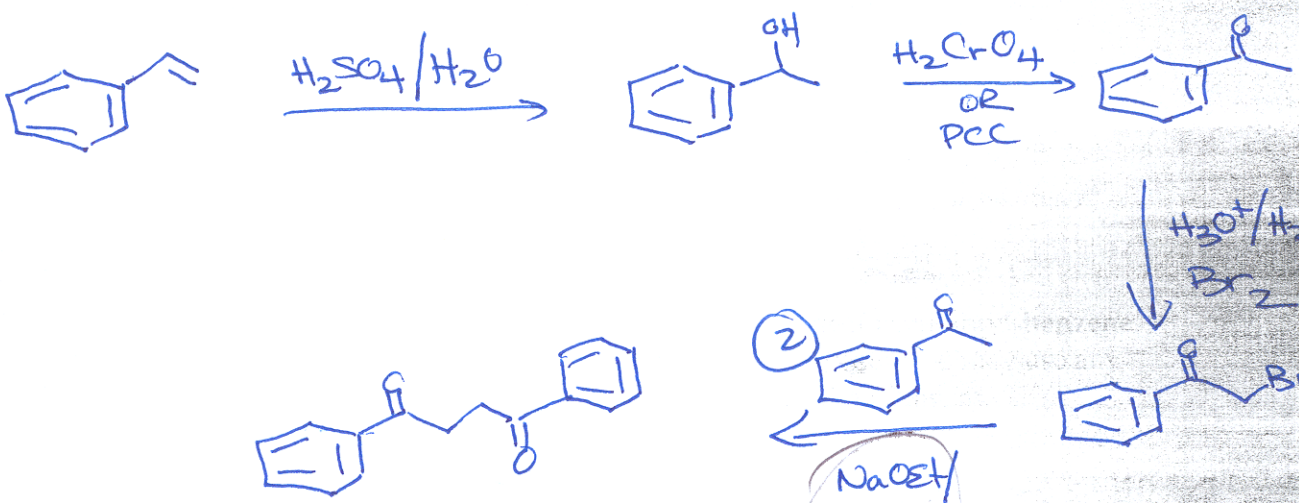


11) Show how **1,4-diphenyl-butane-1,4-dione** is synthesized from **vinyl-benzene**. Vinyl-benzene is the only carbon source you are allowed to use. You may use any inorganic reagents necessary. You do not need to show any mechanism. (7pts)

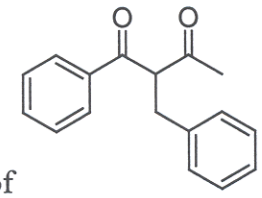


1,4-Diphenyl-butane-1,4-dione

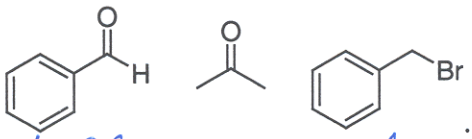
Vinyl-benzene



Note: Take Both Answers

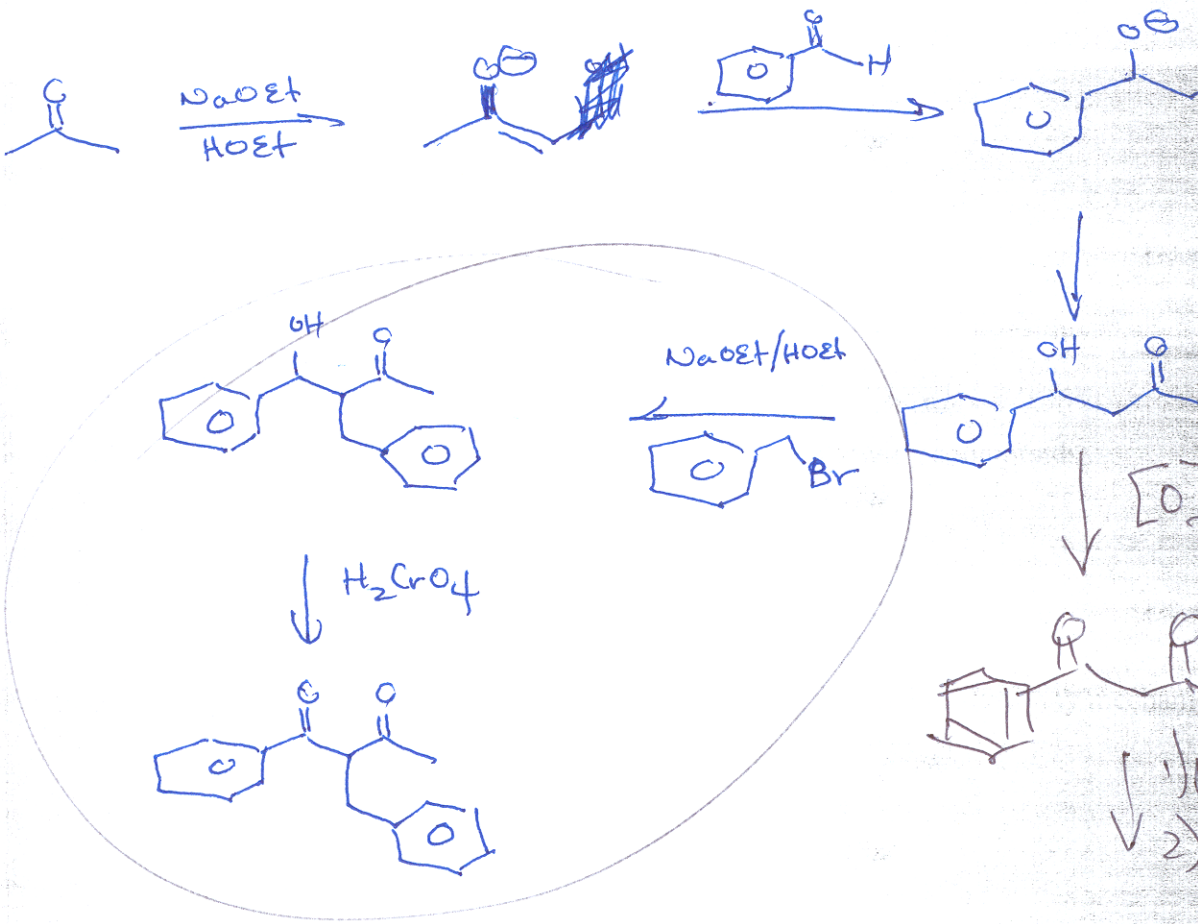


12) Propose a synthesis of from the following compounds: 8pts.



These are your only carbon source.

You may use any inorganic reagents necessary. You do not need to show any mechanism.



Note: Take Both Answers