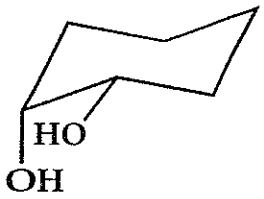
Chemistry 3331-100
Organic Chemistry / Dr. Barney Ellison
Thursday: October 21rd @ **7:00pm → 9:00** / 2nd Exam / Hale Science 230-270)

Name: Key (please print)

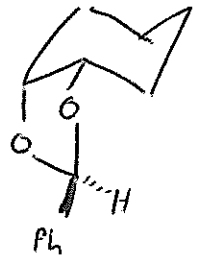
1. (10 pts) What are the structures of the two separable isomers formed in the reaction:



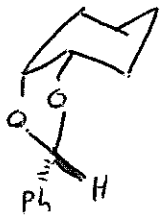
+ C_6H_5-CHO

dilute H^+ →

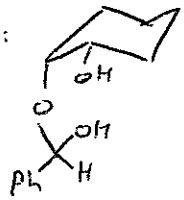
2 ROH groups + aldehyde + acid cat = acetal formation.



+



−5 for Hemiacetal only :



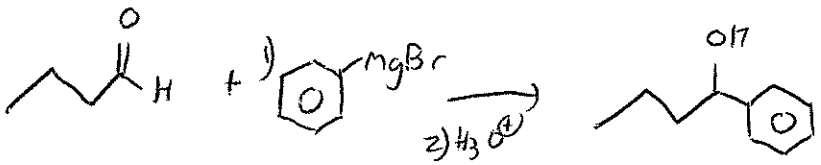
−10 for wrong product entirely.

−2.5 for no stereochem

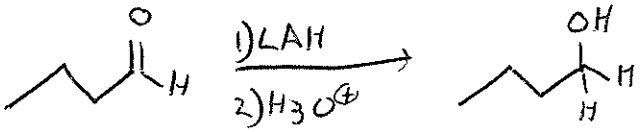
−2.5 for showing cyclohexane as benzene

2. (15 pts) Give the expected products when butyraldehyde (butanal) reacts with the following:

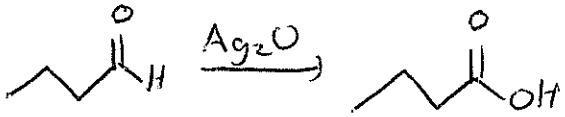
a) PhMgBr followed by H_3O^+



b) $LiAlH_4$ followed by H_3O^+

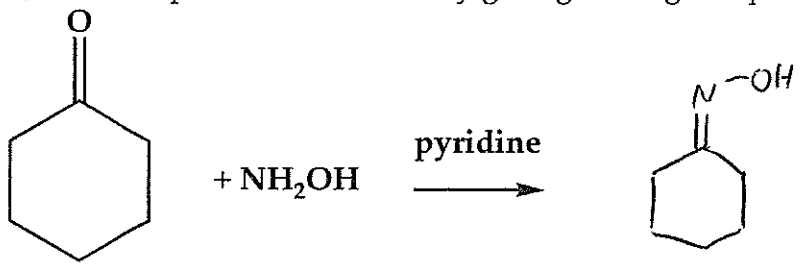


c) Ag_2O

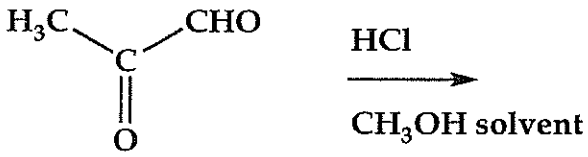


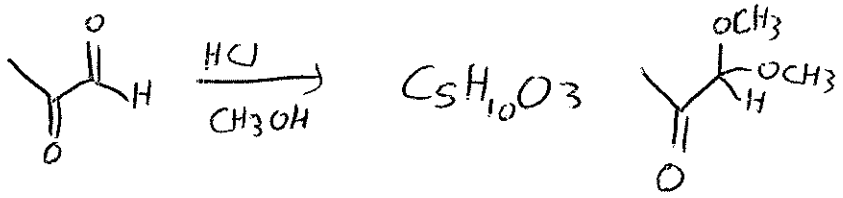
3. (15 pts) Complete the reactions by giving the organic products

a)

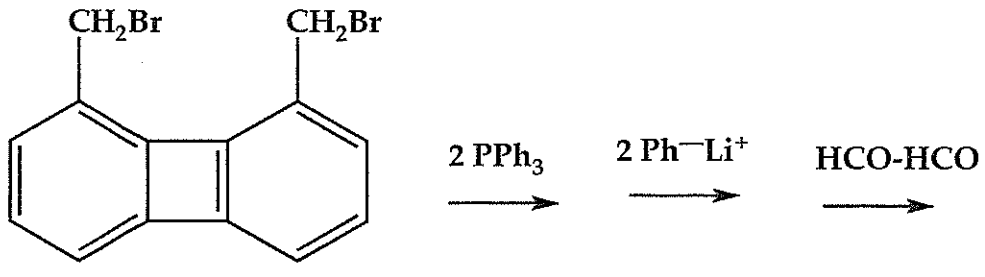


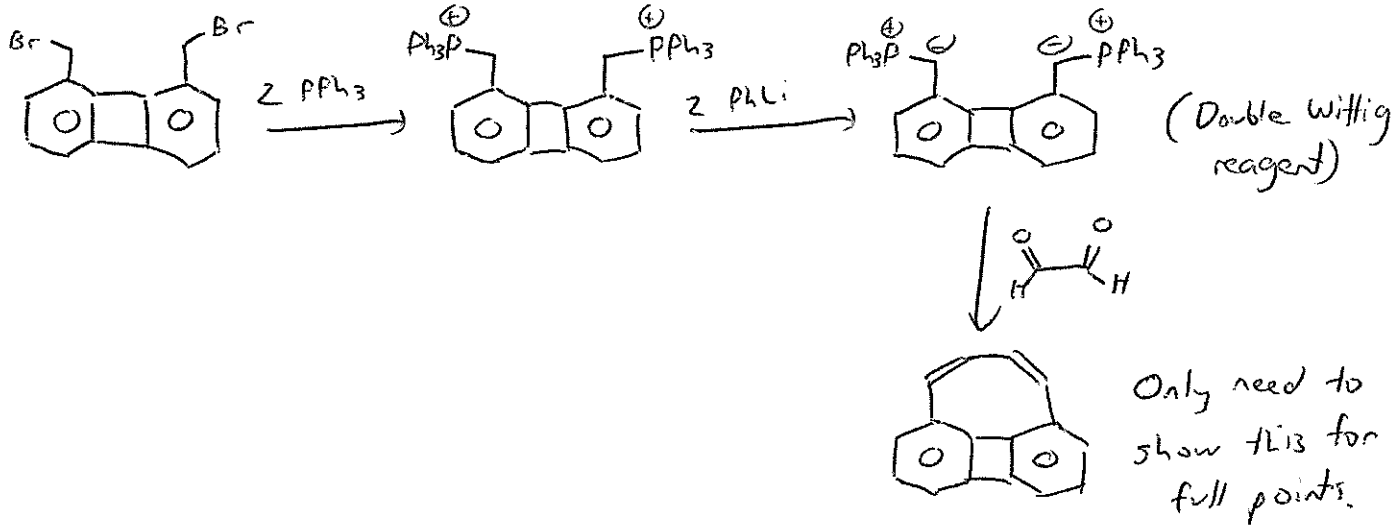
b)



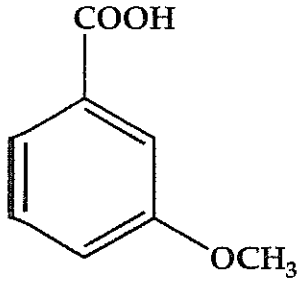


c)

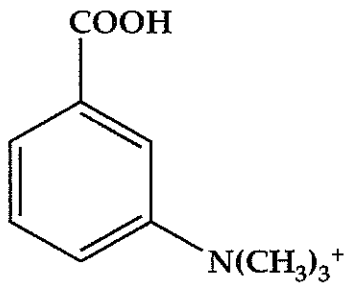

CH2Br
CH2Br
2 PPh3
2 Ph—Li+
HCO-HCO


Br
Br
2 PPh3
Ph3P
PPh3
2 PhLi
Ph3P
PPh3
(Double Wittig reagent)
H
H
Only need to show this for full points.

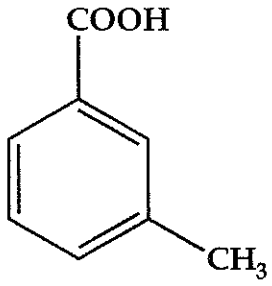
4. (10 pts) Rank the acidity of the following compounds in order of increasing acidity.



middle



strongest



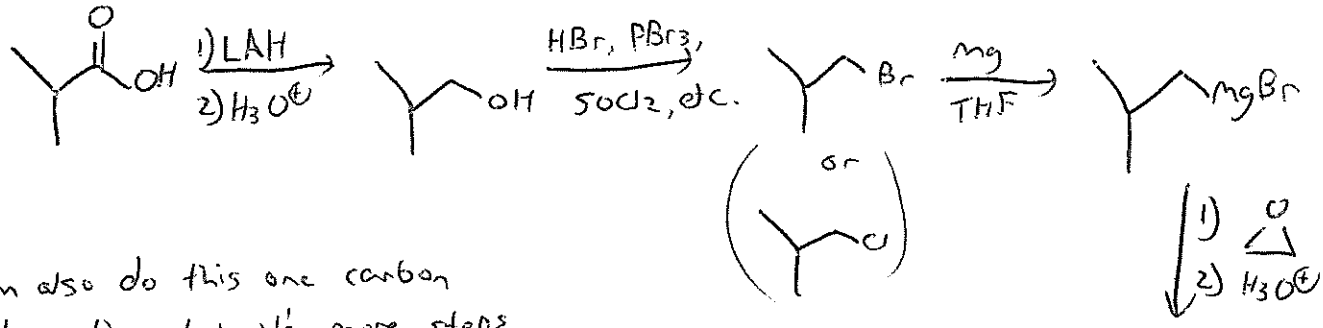
weakest

-5 if two are wrong

-10 if all are wrong

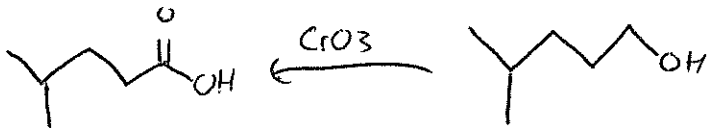
5. (10 pts) Outline a synthesis of each of the following compounds from isobutyric acid (2-methylpropanoic acid)

a) $(CH_3)_2CHCH_2CH_2COOH$

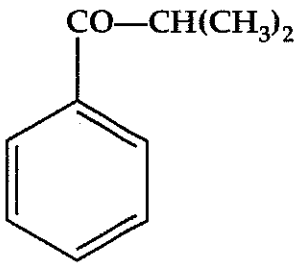


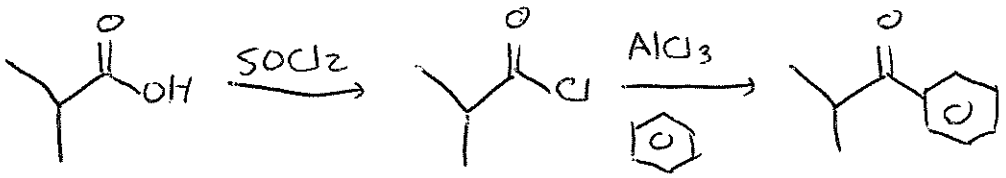
Can also do this one carbon at a time, but it's more steps.

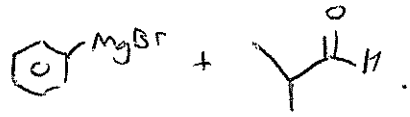
-2 for MgBr if a carbonyl is on the molecule.
-1 for incompatible reagents



b)

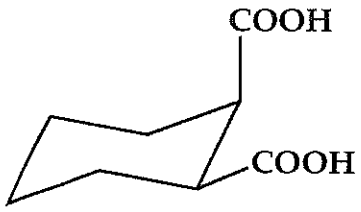


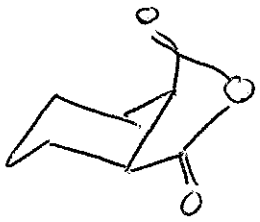


Can also do with 

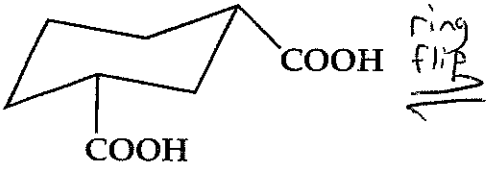
6. (10 pts) Draw the structure of the cyclic anhydride that forms when each is heated.

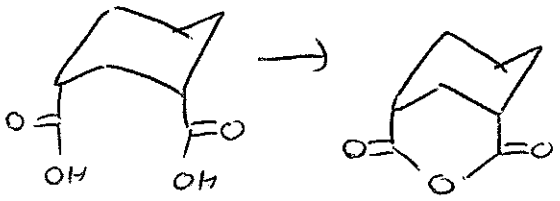
a)





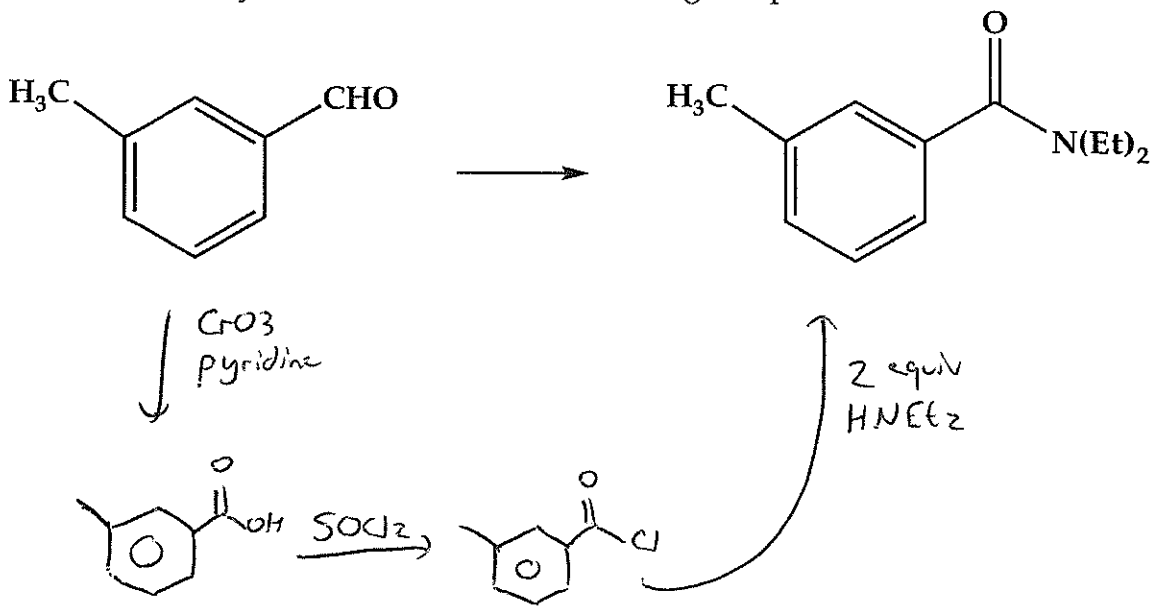
b)



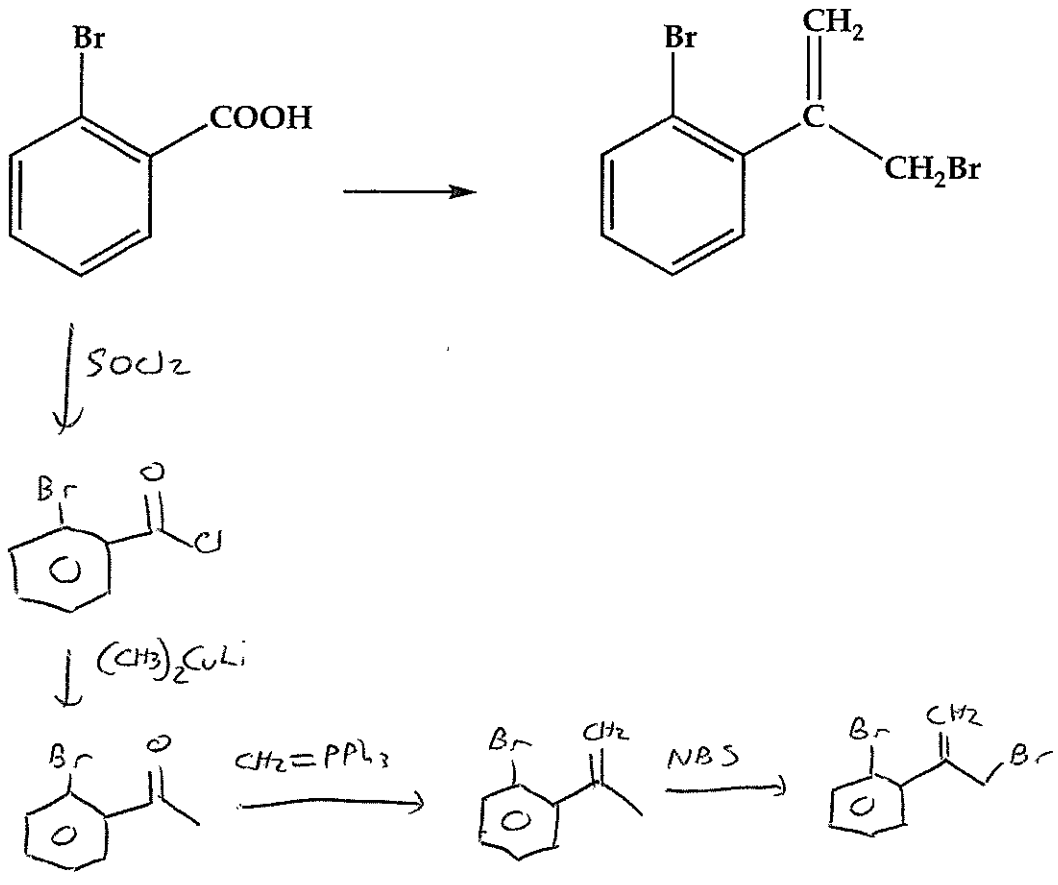


7. (10 pts) Outline a synthesis of each of the following compounds

a)

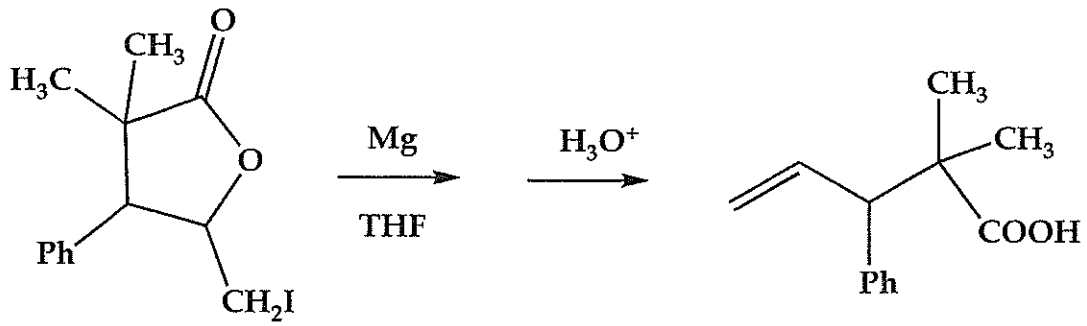


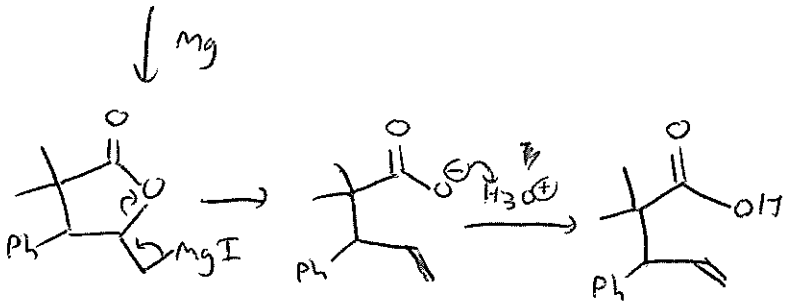
b)



8. (10 pts) Rationalize each of the reactions with a mechanism.

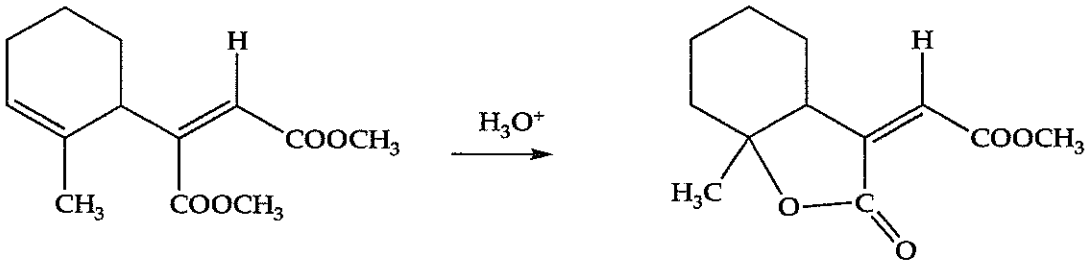
a)



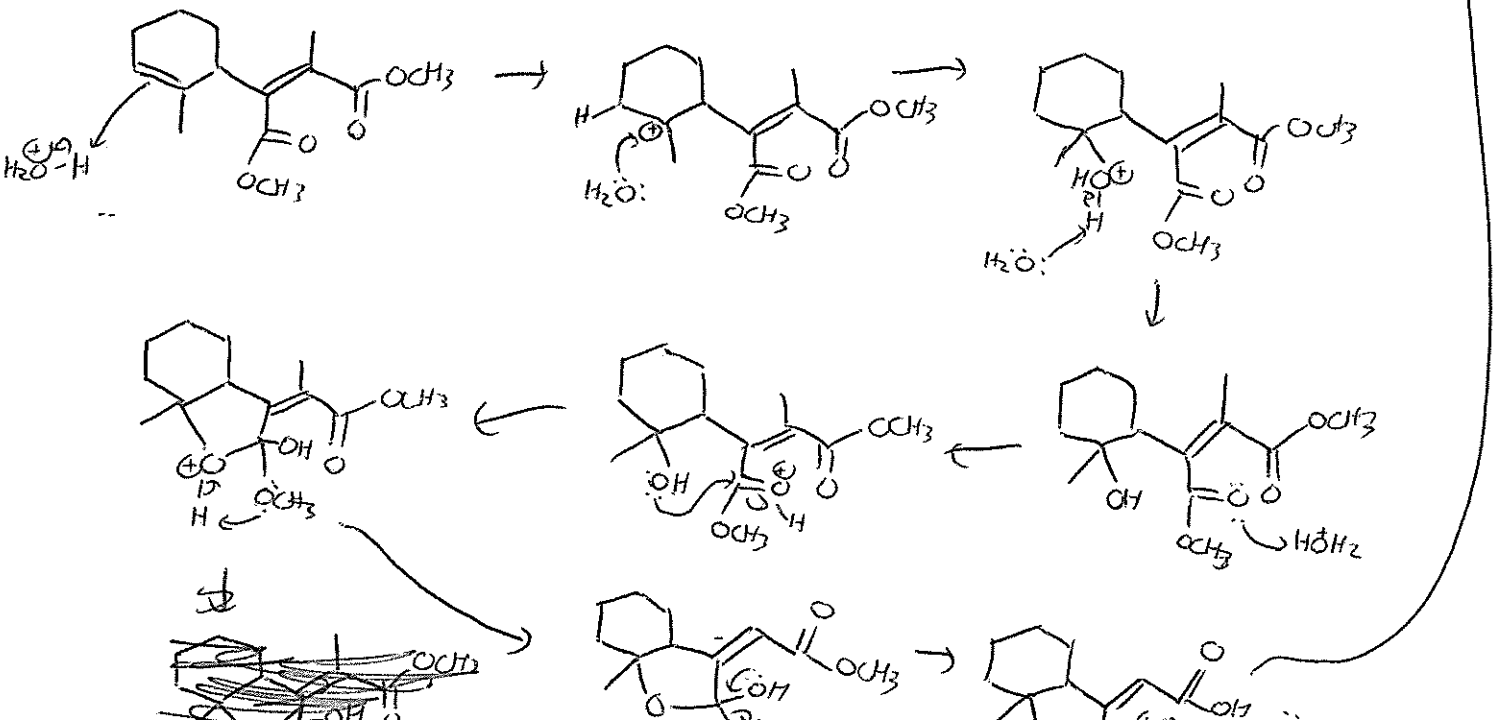


-4 If only got Grignard correct.

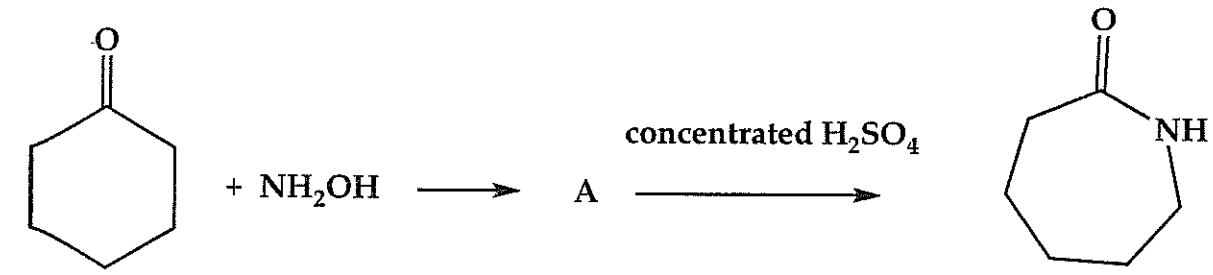
b)

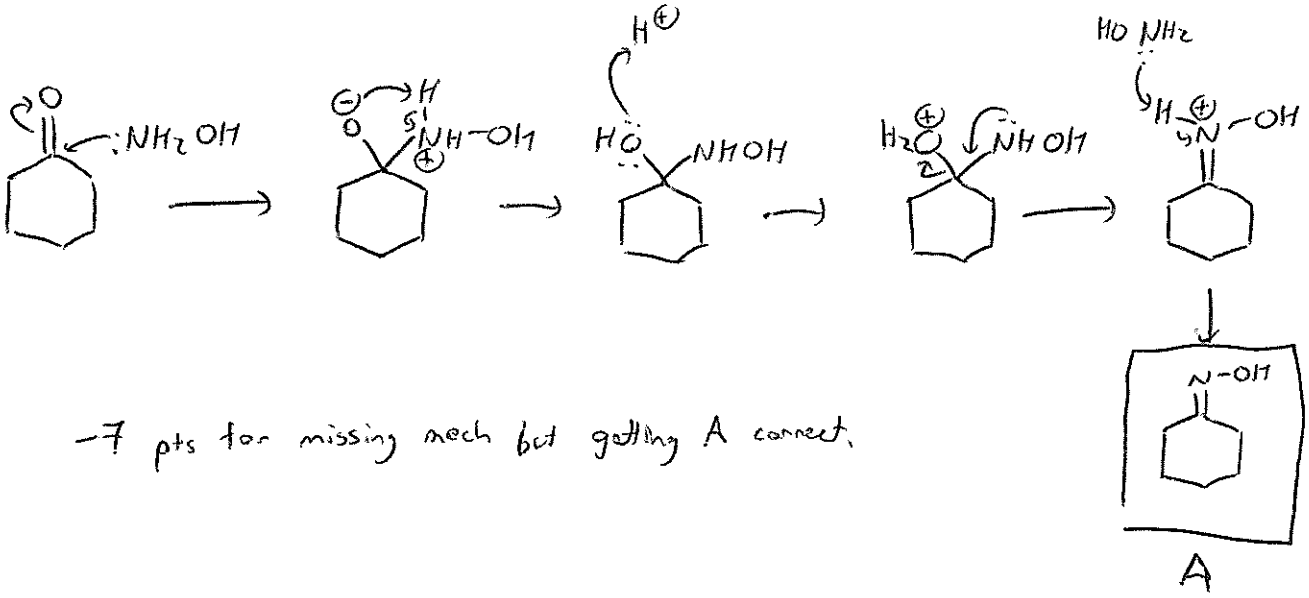


Several mechanisms are possible. Here is one:



9. (10 pts) This a Beckmann rearrangement. What is compound A? What is the mechanism of this reaction?





-7 pts for missing mech but getting A correct.