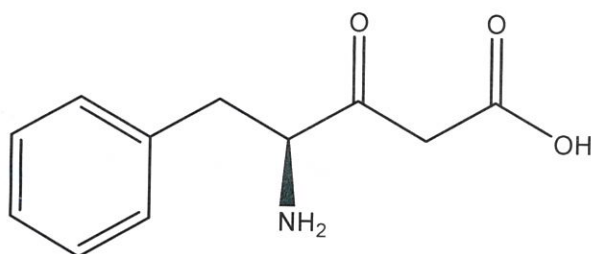


1.



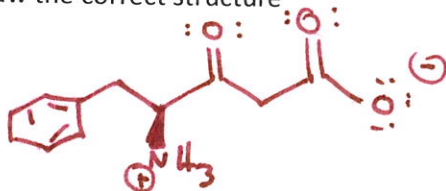
a. What is the IUPAC name for this molecule?

(S)-4-amino-3-oxo-5-phenylpentanoic acid

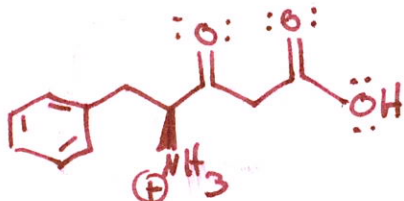
b. Considering that the pKa of a protonated amine is around 10 and the pKa of a carboxylic acid is around 5, what is wrong with this picture assuming a pH of 7.4?

C.A. protonated but amino group unprotonated

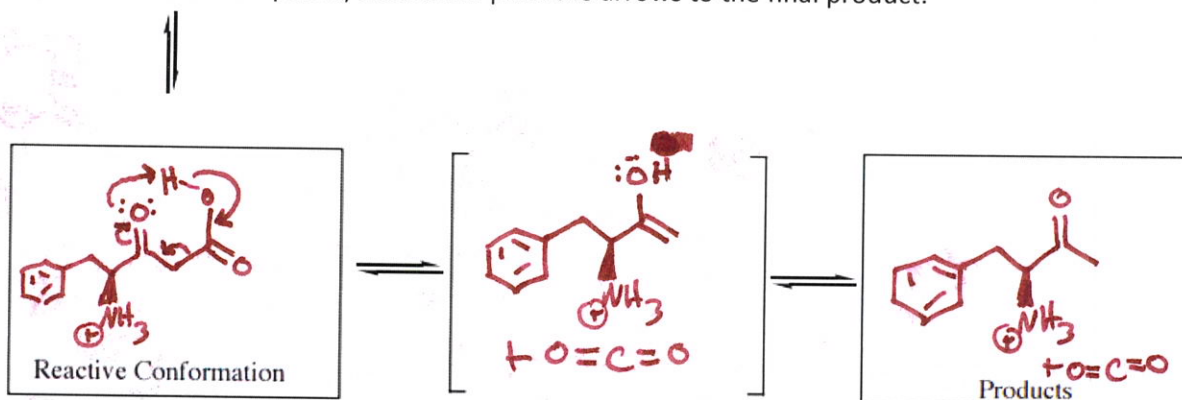
c. Draw the correct structure



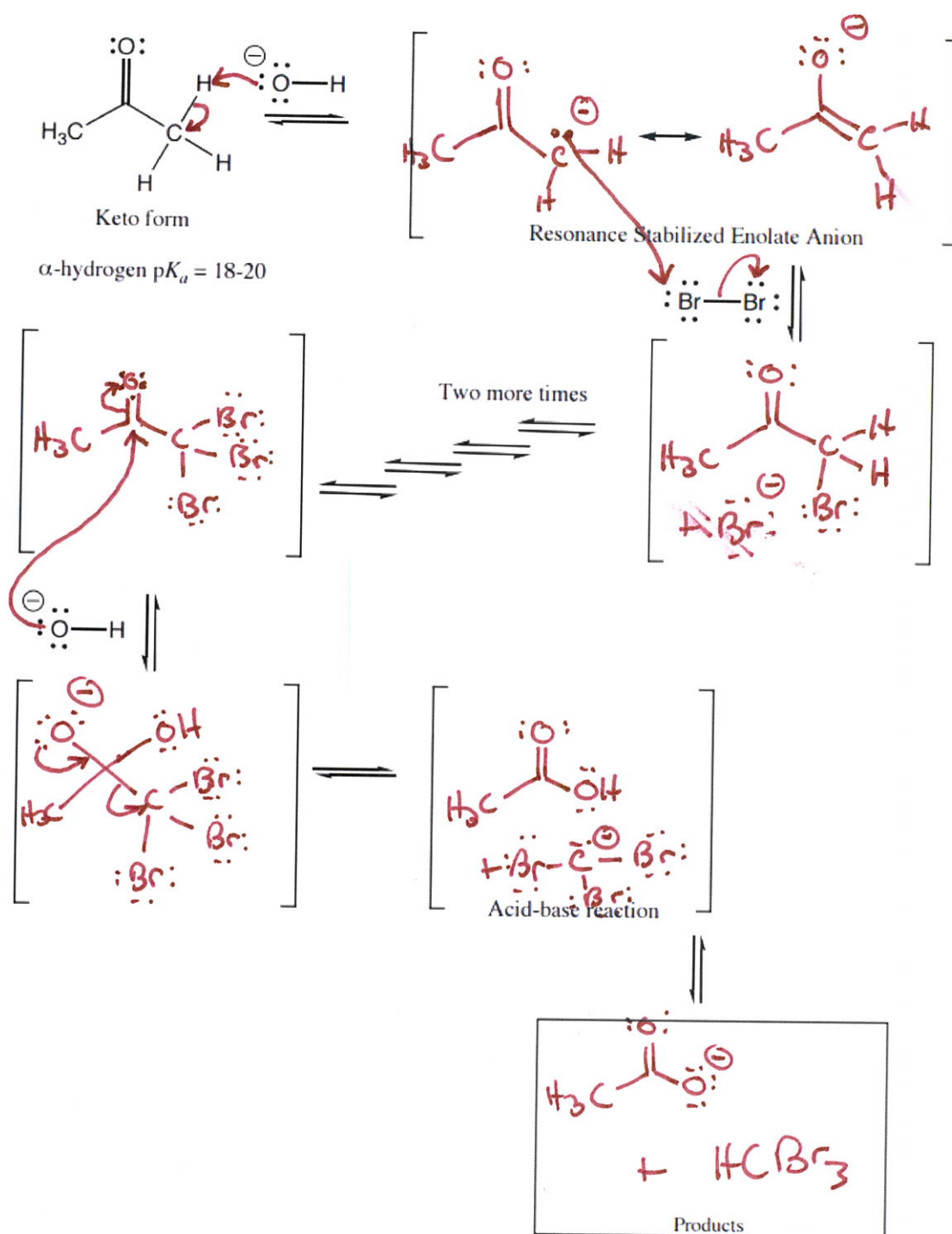
d. Now assume the pH is 4.0. Draw the correct structure.



e. A little heat and we can do a reaction! Draw the reactive conformer of the correct structure from part d) above and push the arrows to the final product.



Time to practice a challenging mechanism from your mechanism packet!



A carbanion was an intermediate in this reaction. Normally carbanions are so high in energy that we don't see them. What factor in this reaction substantially reduces the energy of this intermediate? (WHERE ARE THE ELECTRONS?)

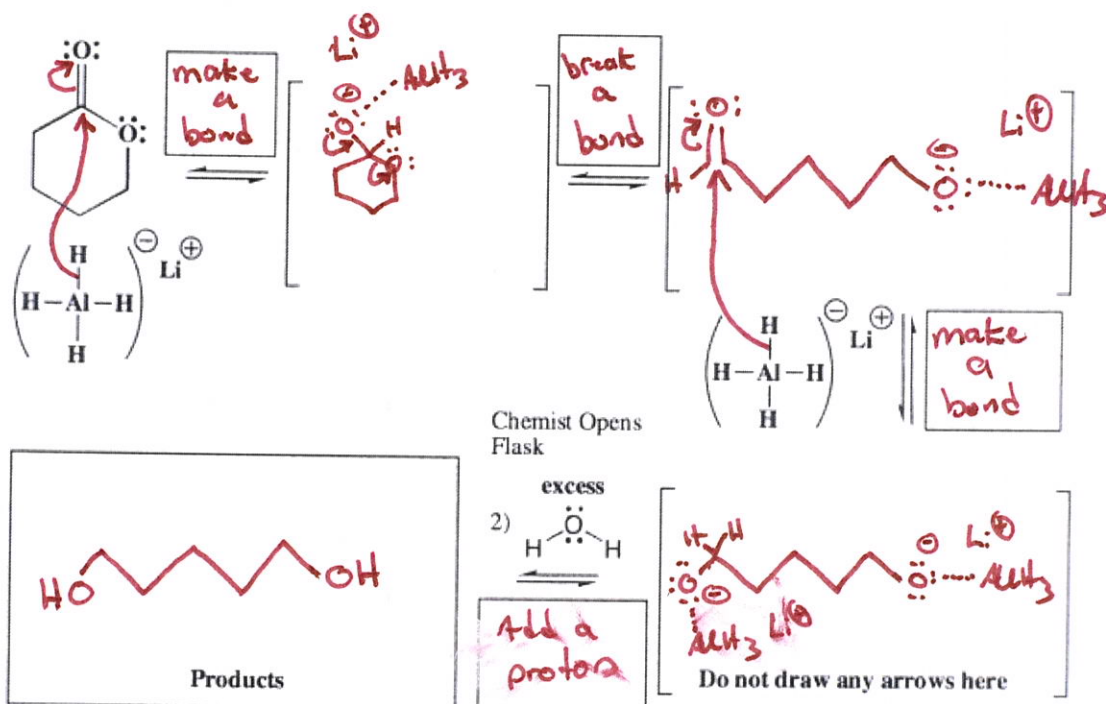
Br withdraws  $e^-$  density from C reducing isolated charge

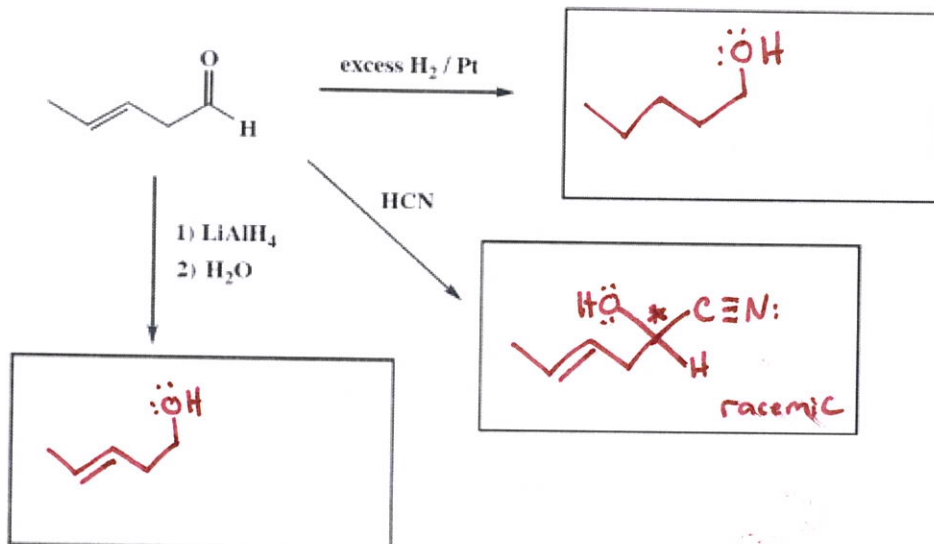
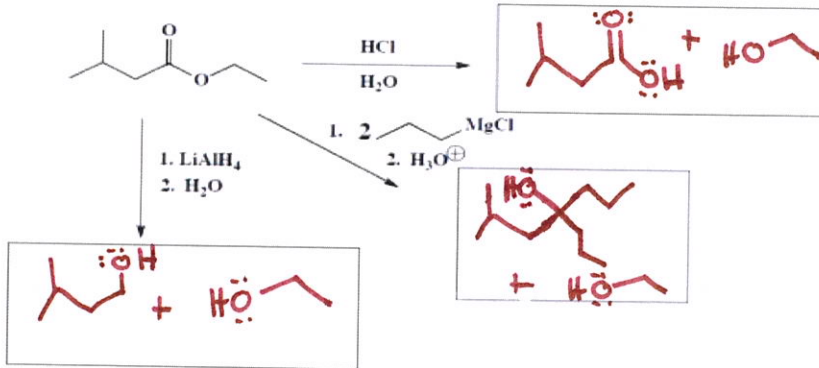
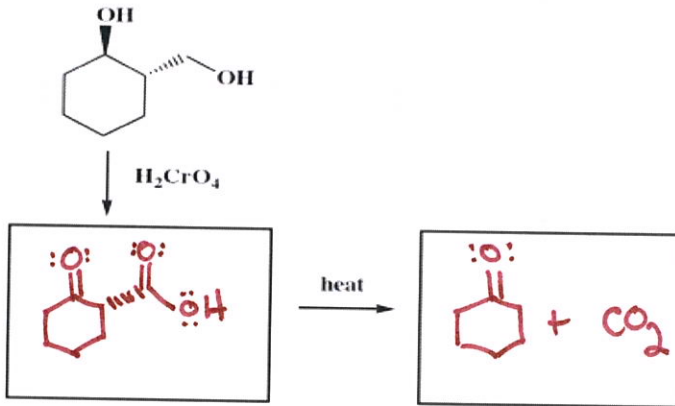
$\downarrow$   
lower E

Signature \_\_\_\_\_

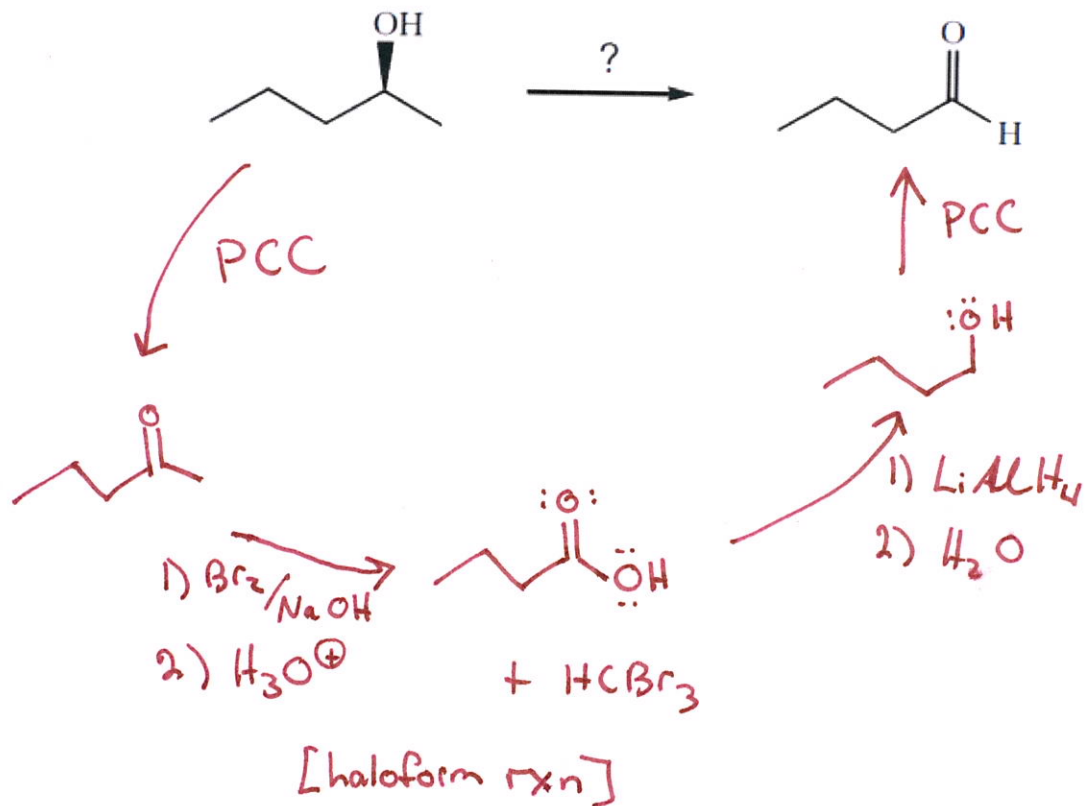
Pg 6 \_\_\_\_\_ (30)

13. (30 pts) Complete the mechanisms for the following two lactone reactions. Be sure to show arrows to indicate movement of all electrons, write all lone pairs, all formal charges, and all the products for each step. Remember, I said all the products for each step. IF A NEW CHIRAL CENTER IS CREATED IN AN INTERMEDIATE OR PRODUCT, MARK IT WITH AN ASTERISK AND LABEL IT AS RACEMIC IF APPROPRIATE. In the boxes provided, write which of the 4 mechanistic elements describes each step (make a bond, break a bond, etc.).

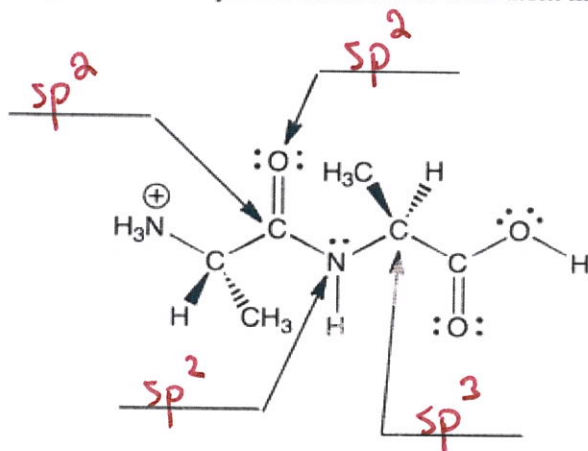




Complete the following synthesis. All carbons must come from the starting material:



4. (4 points) On the lines, indicate the hybridization state of each atom indicated by the arrows.



For each substrate, predict the product of a reduction with  $\text{LiAlH}_4$  followed by a water workup. Also, think through the mechanism and box the oxygen that leaves, if applicable.

