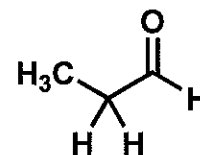
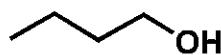
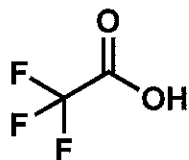
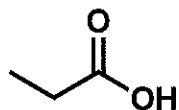


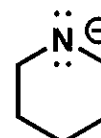
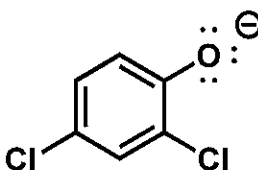
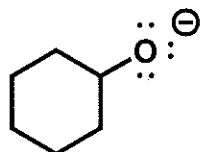
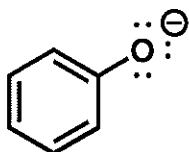
## February 2017, Week 4 Problem Solving Session

Print Name \_\_\_\_\_

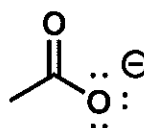
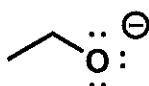
**Acidity/Basicity/Stability:** Rank the following molecules with respect to relative acidity. Place **1** under the most acidic molecule and a **4** under the least acidic.



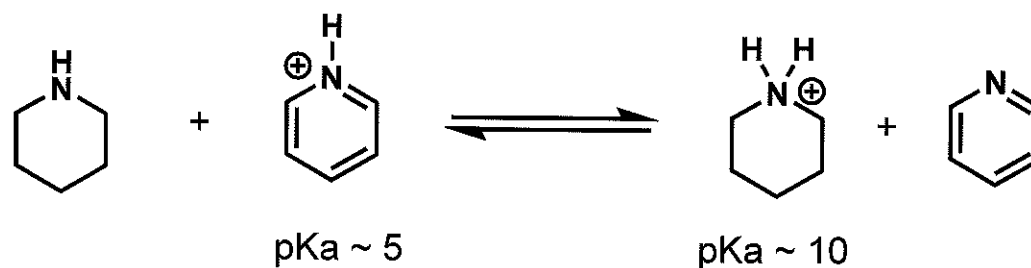
Rank the following molecules with respect to relative **BASICITY**. Place **1** under the **most** basic molecule, and **4** under the **least** basic.



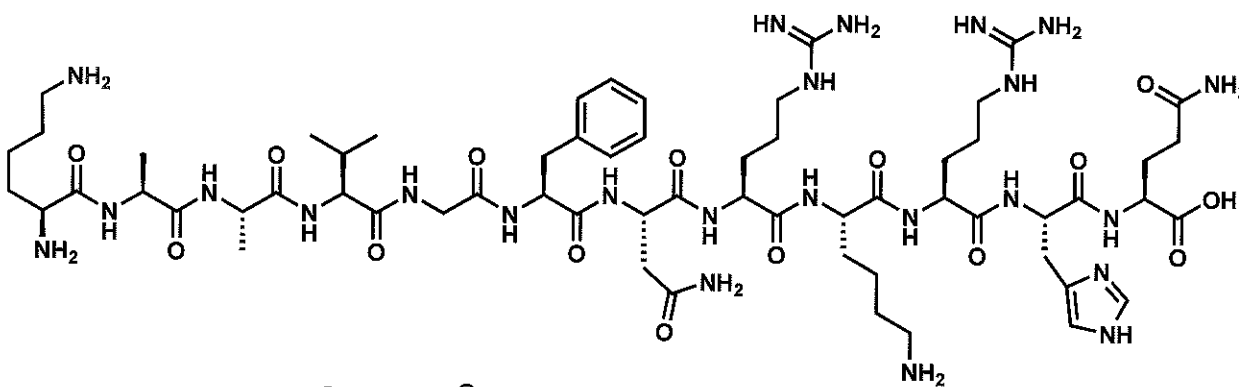
Rank the following molecules with respect to relative anion stability. Place a **1** under the **least** stable anion, and a **4** under the **most** stable anion.



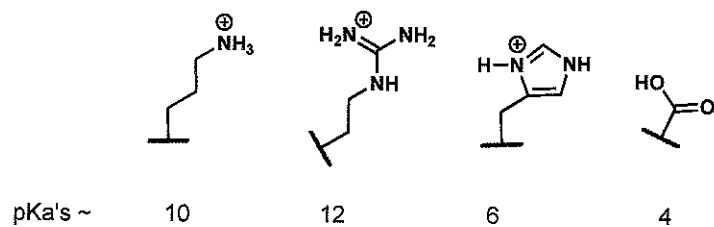
**Acid Base Equilibrium:** Estimate the equilibrium constant of the reaction below (at 25 °C)



**Protonation States:** Your TA Sam synthesized this peptide in lab. He needs help figuring out the protonation state at various pH's to better understand his Mass Spectrometry data. Help him!



hint:



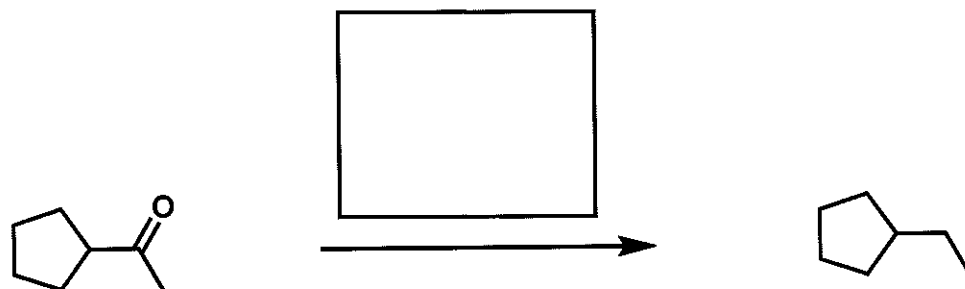
a) What is the overall charge of the molecule at **pH 7.6**?

b) At **pH 2.0**?

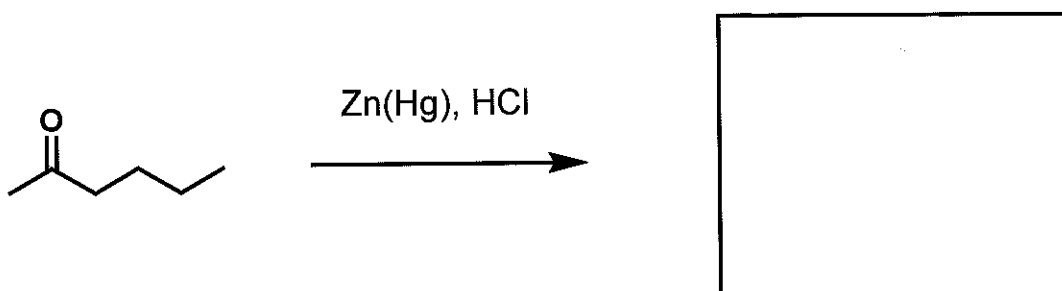
c) At **pH 13.0**?

**Box Problems:** Fill in the boxes with the major product, reagent, or starting material required to achieve the transformation. If a chiral center is created and a racemic mixture is formed you must draw both enantiomers and write racemic under the structure. Use wedges and dashes to indicate stereochemistry.

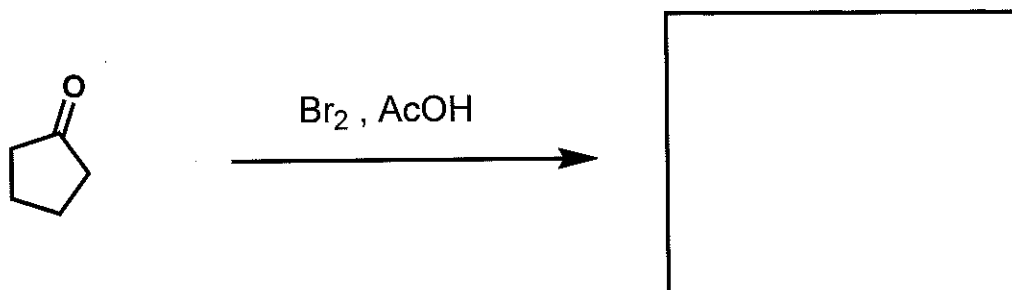
a)



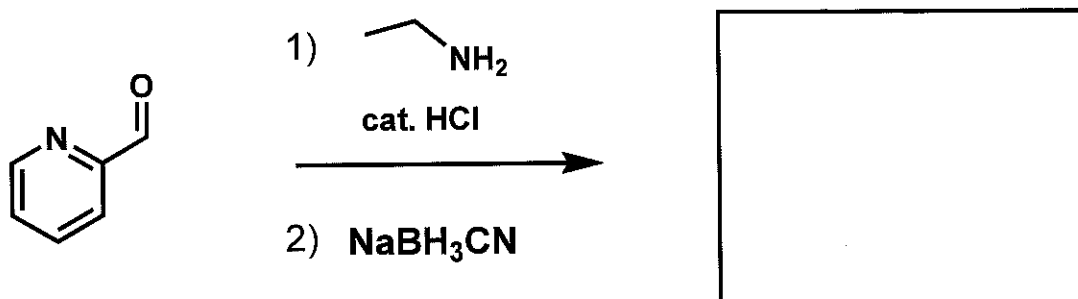
b)



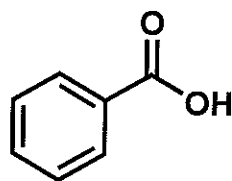
c)



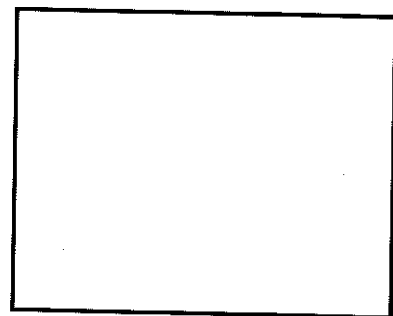
d)



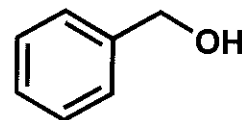
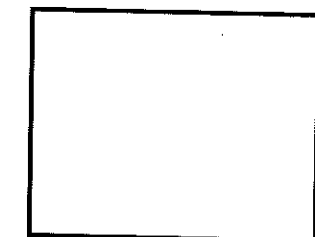
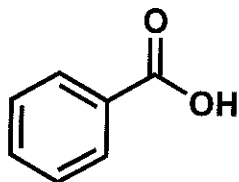
e)



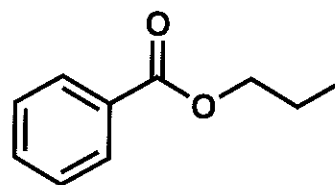
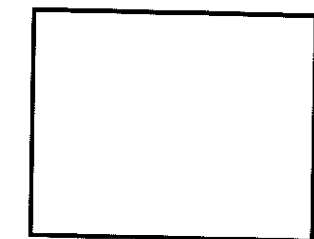
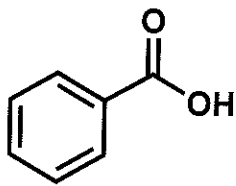
$\text{NaBH}_4$



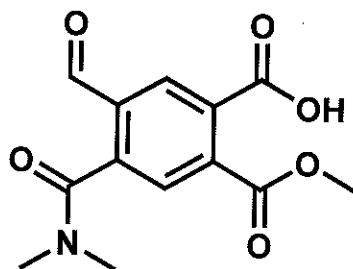
f)



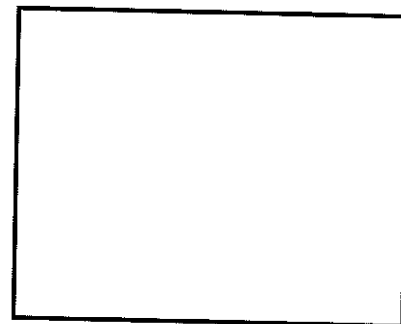
g)



h)

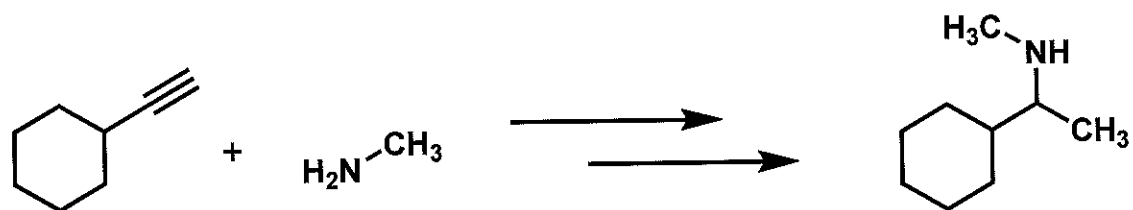


$\text{LiAlH}_4$  (excess),  
then  $\text{H}_3\text{O}^+$



**Synthesis:** Using the following starting materials as your only source of carbon, provide a synthesis for the following transformation. Show all reagents, steps, and intermediates.

**HINT:** methylamine is used in a later step. Can be done in 3 steps.



**Synthesis:** Using the following starting material as your only source of carbon, provide a synthesis for the following transformation. Show all reagents, steps, and intermediates.

