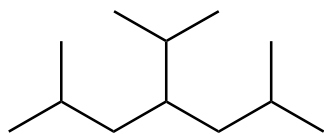
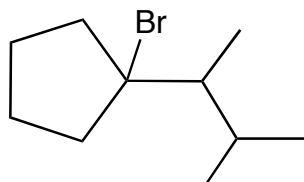
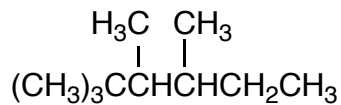


1) Provide an unambiguous name for each of the following compounds (5 points each)





2) In the space indicated, draw a perspective structure of 2,2,3,4-tetramethylhexane showing dashes and wedges on C₃ and C₄. Then draw Newman projections of the 3 most stable conformations of your perspective drawing viewed down the C₃-C₄ bond. Circle the most favorable conformation. For full credit, briefly describe or illustrate why your choice is the most favorable. (12 points)



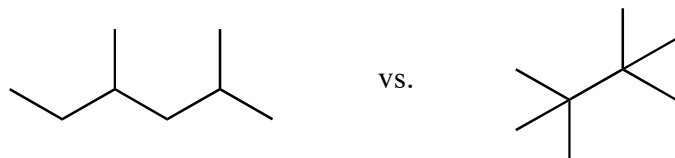
2,2,3,4-tetramethylhexane

perspective drawing

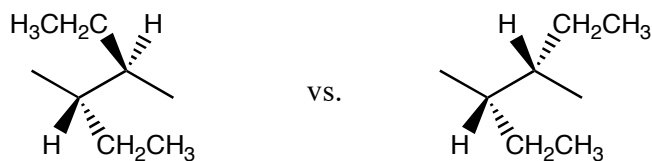
3) For each pair of molecules shown below, select the one that best fits the accompanying description by circling it. Provide a concise but thorough rationale for each of your decisions using pictures *and* words. (7 points each)

Rationale

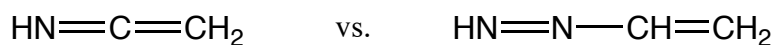
The compound with the higher melting point?



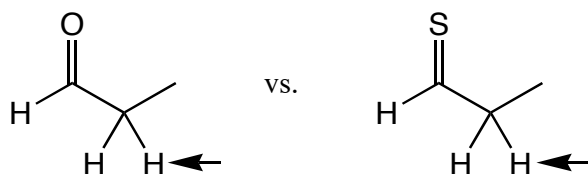
The more stable compound? (Note: compounds aren't necessarily drawn in their most stable conformation)



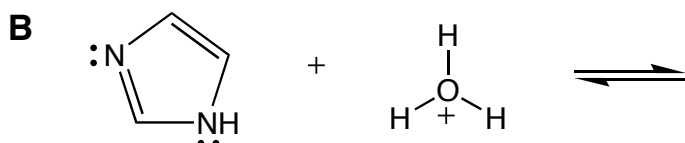
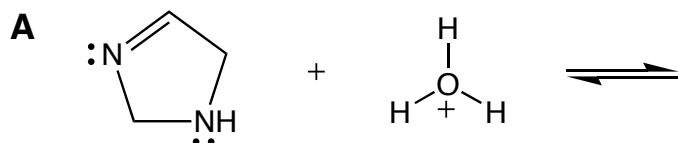
Compound in which *all* its atoms can lie in the same plane?



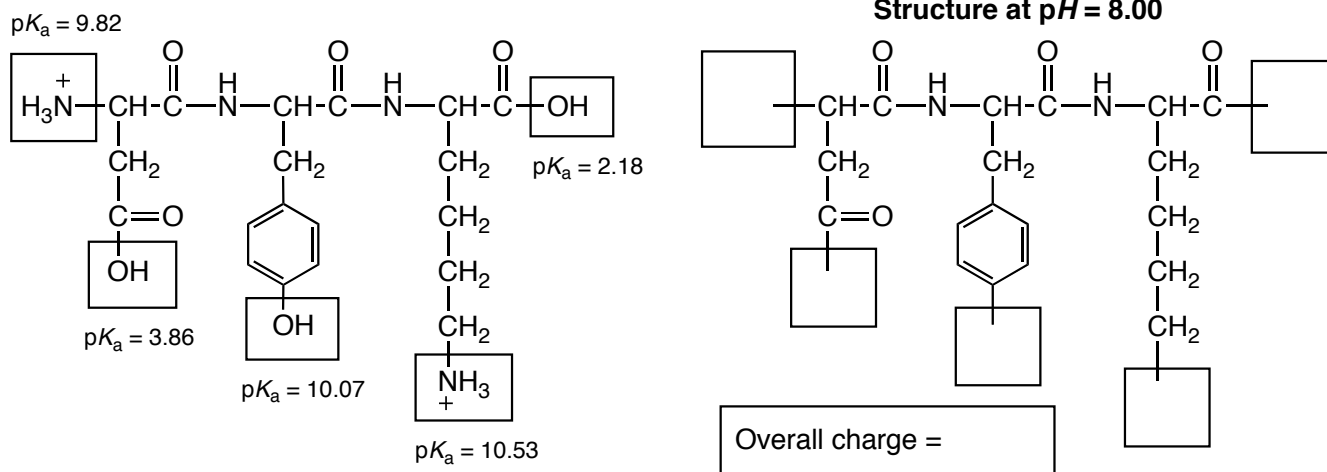
The more acidic of the indicated protons?



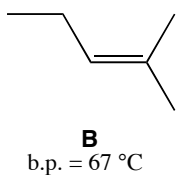
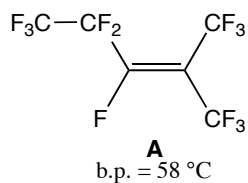
- 4) Predict the products of reactions **A** and **B** and provide a mechanism for each. The basicity of the dinitrogen compound in reaction **A** differs from that of reaction **B**. Explain this difference using pictures and words. (12 points)



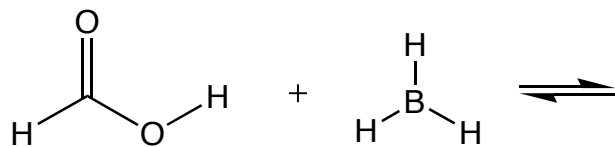
- 5) In the empty boxes, complete the structure of the tripeptide shown when placed in a solution of $pH = 8.00$. Show lone pairs and formal charges. Indicate the overall charge in the box provided. (10 pts)



- 6) Explain why **A** has a lower boiling point than **B**? (only 3 points, don't spend lots of time on this)



- 7) Draw the *two possible products* that can form from the Lewis acid-base reaction between formic acid & BH_3 . Circle the major product and use curved arrows to provide a mechanism for its formation. Show all charges & nonbonded electrons *in your products* for full credit. (10 points)



Formic acid

Use pictures and words to explain why the product you circled is favored over the other. (Note: *do not* use MO theory to explain; you will be asked to use MO theory in the next section) (7 pts)

Now use MO theory to explain why the product you circled is favored over the other. Be sure to label all atomic or hybridized orbitals and any new bonds that are formed. (8 points)