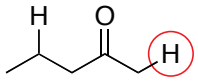
CHM 1321A
Mid Term 2 Answers version A

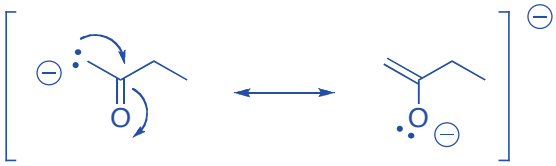
1. Compare the two hydrogens shown in this compound and circle the one that is more acidic. (**1 point**)



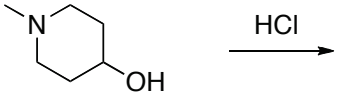
   a. Draw the two possible conjugate bases (**2 points**).

   b. Circle the conjugate base in part a that is more stable (**1 Point**)
   c. Briefly justify your answer in part b. Structures may be helpful in your explanation. (**5 points**)

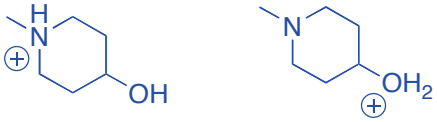
Resonance is possible in the molecule on the left. This spreads out the negative charge and stabilizes this conjugate base relative to the other



2. Consider the two reacting sites on the following molecule, and how they can react with HCl.



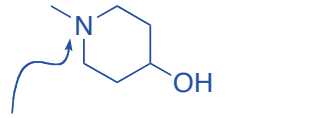
   a. Draw the two possible conjugate acids that can be formed from this reaction. (**2 points**).



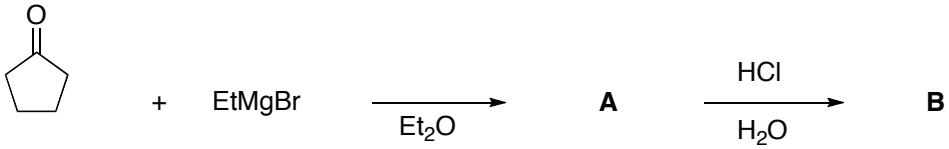
   b. Using the data from the pKa table on the last page, predict which conjugate acid is the stronger acid. (**3 Point**)

lower number = stronger acid

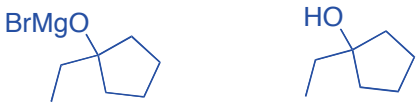
   c. Using the data from part b, predict which atom on the original molecule is the strongest base. (**3 Points**)



3. Consider the following reaction.

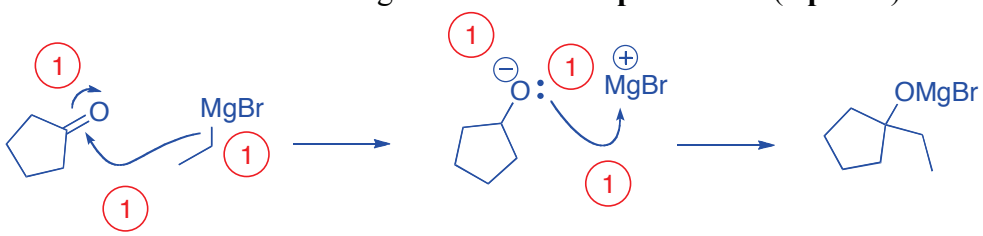


a) What is the structure of product **A** and product **B**? (**2 points**).

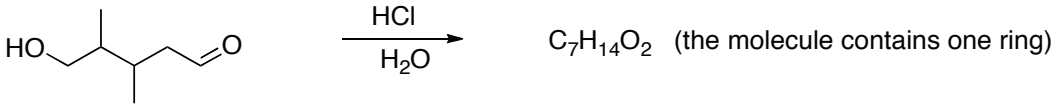


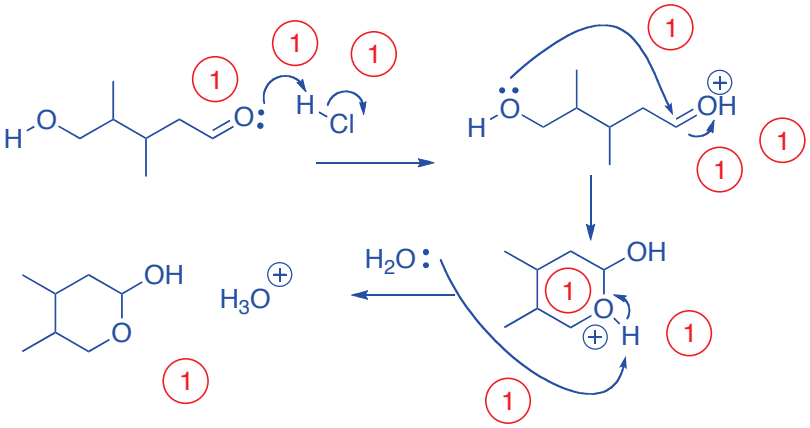
A **B**

b) Provide a detailed mechanism showing the formation of **product A**. (**6 points**).

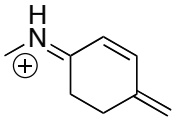


4. Write a <u>detailed</u> mechanism for this transformation (**10 points**).

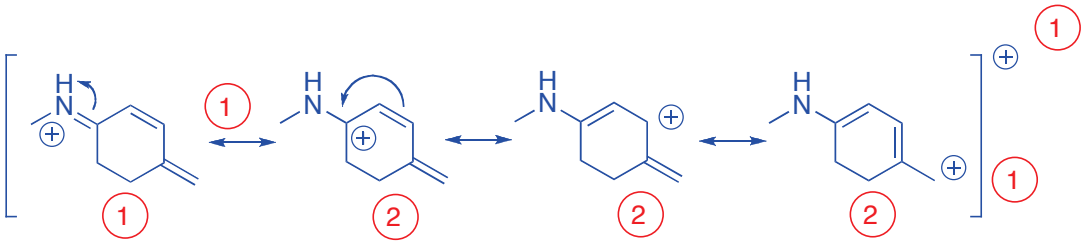




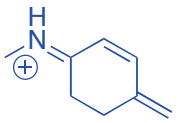
5. Consider the following structure



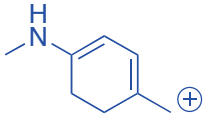
a) Construct the significant resonance forms for this molecule. (**10 points**).



b) Label the **best** and **worst** resonance forms in part a. Provide a brief justification for your choice. (**3 points**).

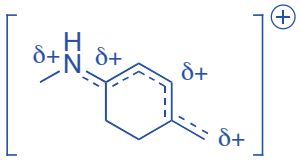


best
all atoms have octets

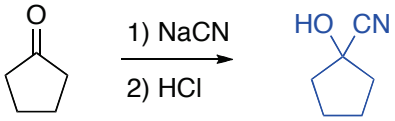


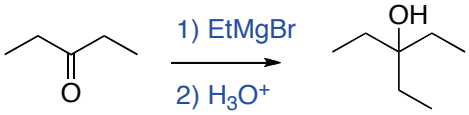
worst
carbon missing an octet
carbocation is primary

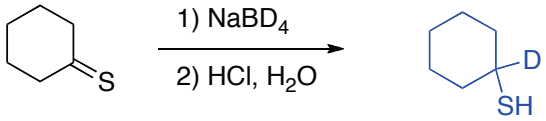
c) Draw the resonance hybrid structure for this molecule. (**3 points**).



6. Supply the missing products, reagents or starting materials as necessary. (**9 points**)

a. 

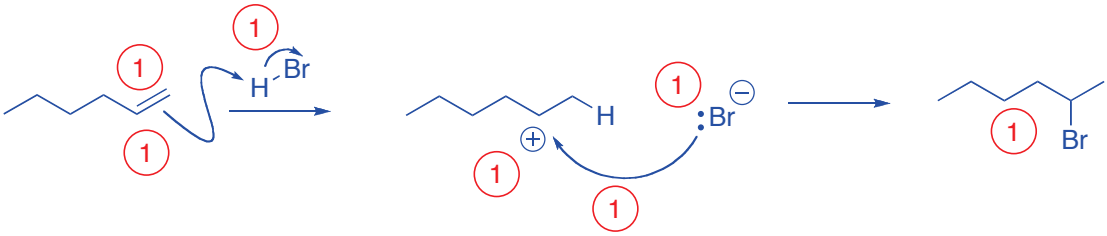
b. 

c. 

7. A student wishes to selectively prepare a certain hexylbromide from 1-hexene using HBr.
   a. Draw the structure of both possible products and identify the Markovnikov product (**3 Points**).

Markovnikov

   b. Give a mechanism to explain the preferential formation of the Markovnikov product from 1-hexene. (**7 Points**)



   c. What controls the selectivity in this reaction? (**3 Points**)

Carbocation is located on the most substituted carbon
Alkyl groups on this carbon donate electron density to the carbocation
This distributes the positive charge lowering the energy of the carbocation

Bonus: Give a mechanism to explain the following reaction: (**3 points**)