CHM 201 Organic Chemistry I Name _____
Hour Exam I, 104 pts
19 September 2012 Signature_____

1.(15) Draw Lewis structures for the following formulas. Use lines for covalent bonds and show all lone pairs of electrons and any formal charges if needed. ***Also***, identify the hybridization for each atom other than H.

a) C_2HNO b) CO_2Br_2 c) N_3^- (anion)

2.(14) The molecule **CH_2N_2** (HCNNH bonded *in that order*) can be drawn in two resonance structures where each atom has an octet of electrons (except H).

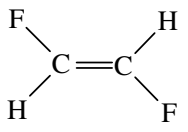
a) Draw Lewis structures of both resonance structures and *include any formal charges*.

b) Draw arrows on the first resonance structure to indicate the flow of electrons to the second structure.

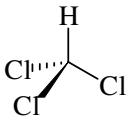
c) If the actual H-C-N bond angle is very close to 180°, what is the major resonance structure? Briefly explain how you know.

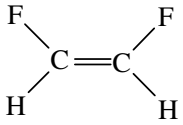
d) What is the approximate N-N-H bond angle in this resonance structure? _____

3.(8) For the following compounds, determine whether or not they are polar (does it have an overall dipole moment – yes or no), **and** show the direction of the dipole moment in those that are polar. For b) you will need to draw it out in a Lewis structure.

a) 

b) H_2S

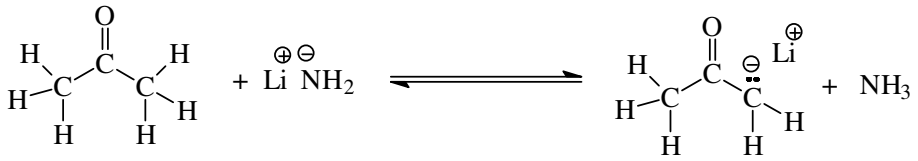
c) 

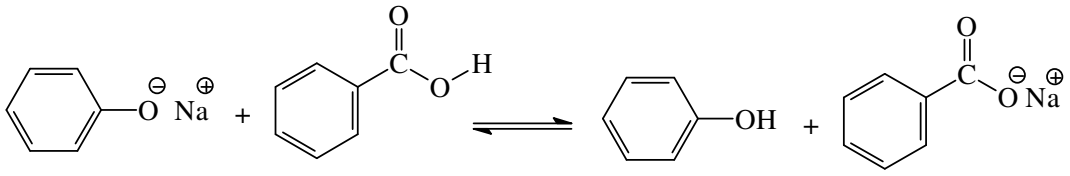
d) 

4.(6) What is the geometry around the central atom of the following small molecules or ions?

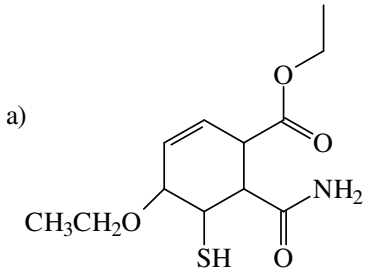
a) BF_3 b) NH_3 c) CH_3^- d) CH_3^+

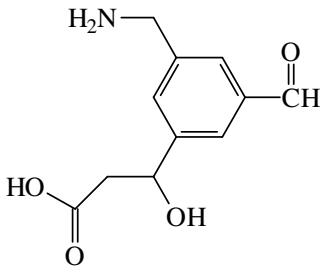
5.(10) *Identify* the acid, base, conjugate acid and conjugate base in the following Bronsted-Lowry acid base reactions. **Also**, *determine whether the reactions below favor the products or reactants*. Note the following approximate pKa values: carboxylic acids = 5; phenols = 9; ketones = 19; ammonia = 32.

a) 

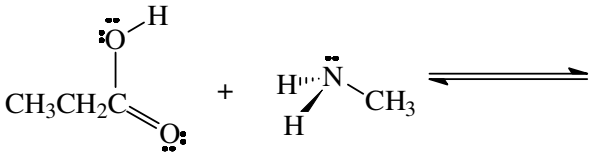
b) 

6.(15) Identify and name the functional groups in the following molecules:

a) 

b) 

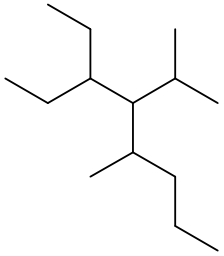
7.(10) In the following reaction, propanoic *acid* reacts with methylamine in a Bronsted-Lowry acid/base reaction.

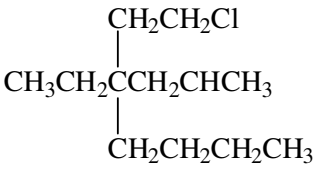


a) Provide arrows on the reactants side that show the flow of electrons in this proton transfer reaction.

b) Draw and label the conjugate acid and conjugate base (draw them as Lewis structures and show any formal charges).

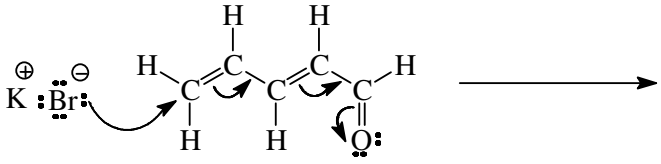
8.(10) Give the IUPAC names for the following alkanes.

a) 

b) 

9.(6) Draw a zig-zag structure of 6-(1,1-dimethyl-2-ethylbutyl)dodecane. What is the **molecular formula** of this alkane? _____

10.(10) For the following Lewis acid-base reactions, draw the products indicated by the arrows shown. Also, label the acid and the base.

a) 

b)