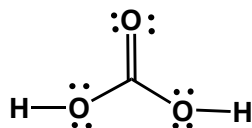
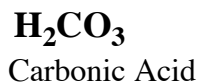


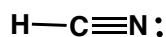
**Answers to Problem Set #1**  
**CHM 333**  
**September 15, 2008**

1. Write a Lewis dot structure for each of the following compounds. Show the formal charge on atoms if any. Be sure to show all valence electrons including lone pair electrons. Also add an electron for each negative charge. Subtract an electron for a positive charge.

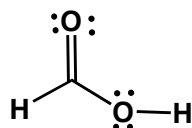
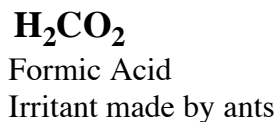
a)



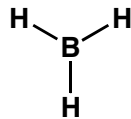
b)



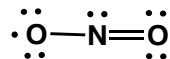
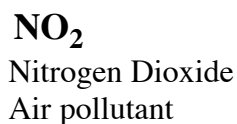
c)



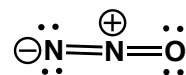
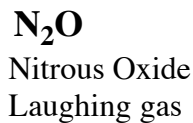
d)



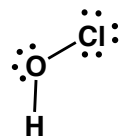
e)



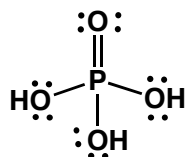
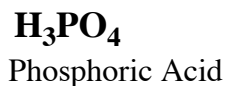
f)



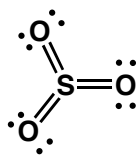
g)



h)

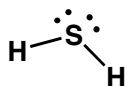


i) **SO<sub>3</sub>**  
Sulfur Trioxide



Note that sulfur can expand beyond the octet because the third shell (holds 18 e) is the valence shell. Oxidation States: +6, +4, -2

j) **H<sub>2</sub>S**  
Hydrogen Sulfide

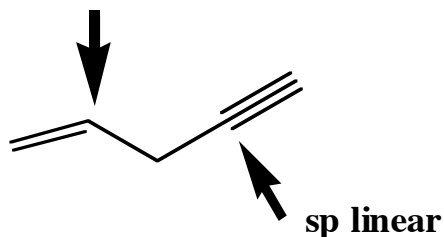


k) **NO<sup>+</sup>**  
Subtract one electron for the positive charge

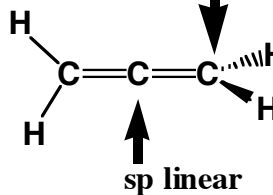


3. 2. Describe the hybridization and geometry of the indicated atoms of the structures below. Write your answers in the space provided.

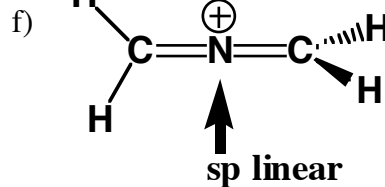
a) **sp<sup>2</sup> trigonal planar**



e) **sp<sup>2</sup> trigonal planar**



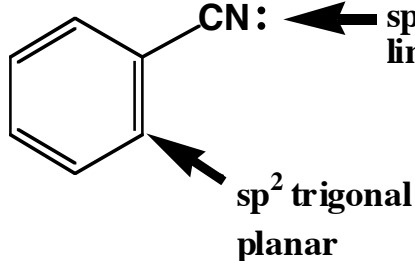
b) **sp<sup>2</sup> trigonal planar**



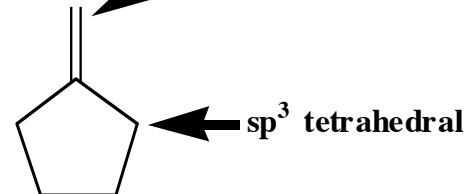
c) **H<sub>2</sub>C=N<sup>+</sup>=N<sup>-</sup>**

**sp<sup>2</sup> trigonal planar**

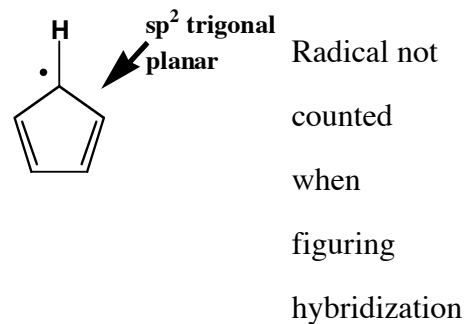
d) **sp linear**



g) **sp<sup>2</sup> trigonal planar**



h) **sp<sup>2</sup> trigonal planar**



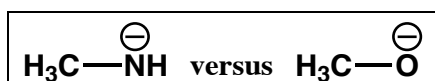
3. Provide the requested answer along with a brief explanation for your choice.

a) Which is the **stronger base**?



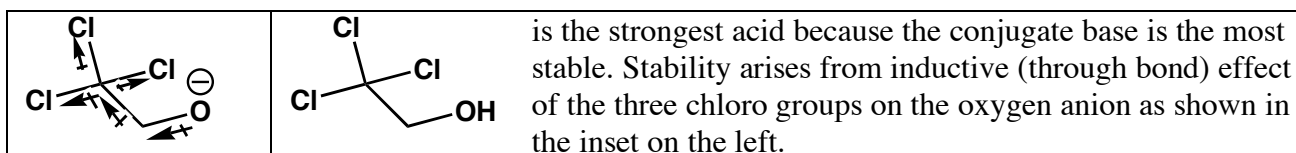
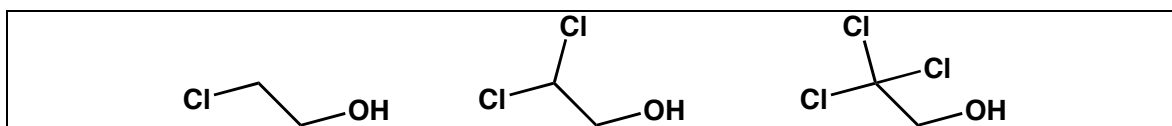
$\text{HO}^{\ominus}$  (hydroxide) is the stronger base. The sulfur anion is more stable because it is larger than the oxygen anion. Therefore the hydroxide anion more readily accepts a proton.

b) Which is the **stronger base**?

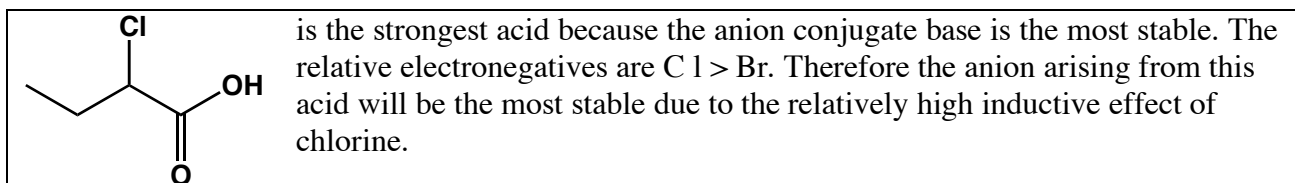
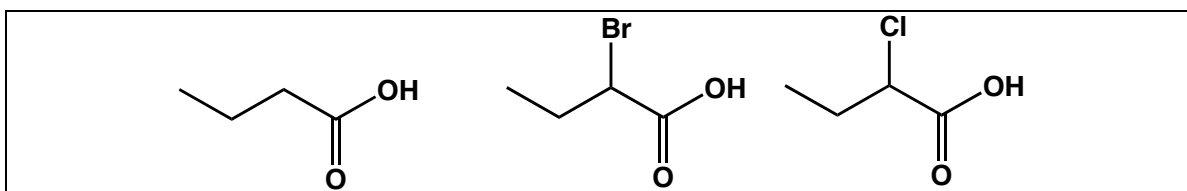


$\text{H}_3\text{CNH}^{\ominus}$  is the stronger base. Since nitrogen is less electronegative than oxygen, the anion on the oxygen atom is more stable than that on the nitrogen atom. Therefore the nitrogen anion more readily accepts a proton.

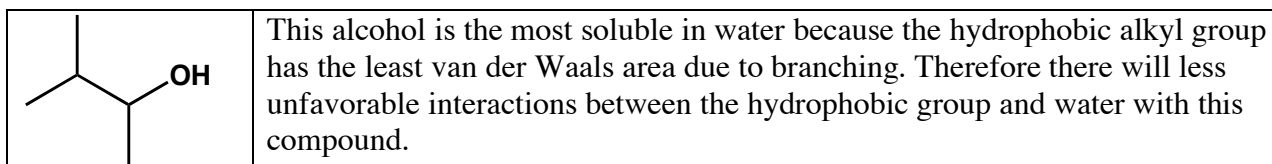
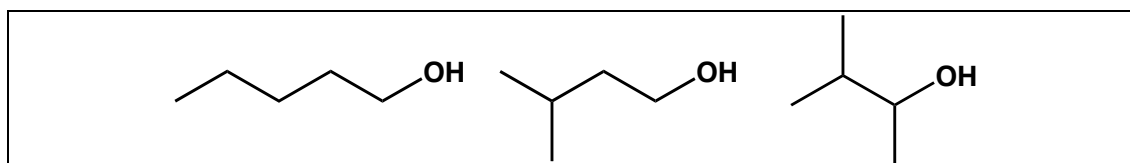
c) Which is the **strongest acid**?



d) Which is the **strongest acid**?

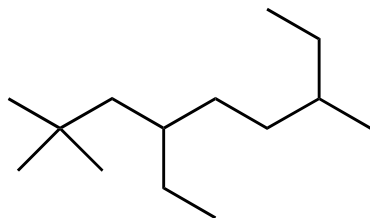


e) Which of the following is more soluble in water?



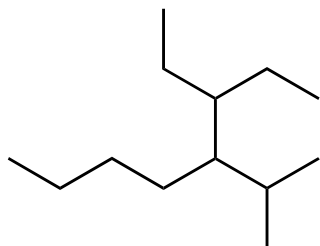
4. Provide an IUPAC or common name for each of the following groups and compounds.

a)



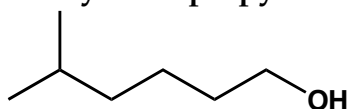
**4-Ethyl-2, 2, 7-trimethylnonane**

c)



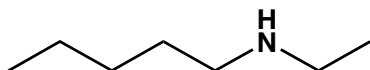
**3-Ethyl-4-isopropyloctane**

e)



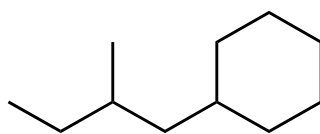
**5-Methylhexan-1-ol or isoheptyl alcohol**

g)



**N-Ethyl-1-pentanamine**

i)



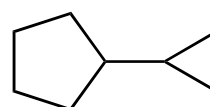
**(2-Methylbutyl)cyclohexane**

b)



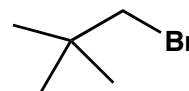
**cis - 1, 3 - Dichlorocyclohexane**

d)



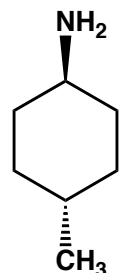
**Cyclopropylcyclopentane**

f)



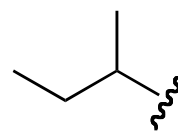
**1-Bromo-2, 2-dimethylpropane or neopentyl bromide**

h)



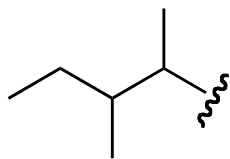
**trans-4-methylcyclohexanamine**

j.



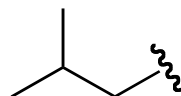
**1-methylpropyl**

l.



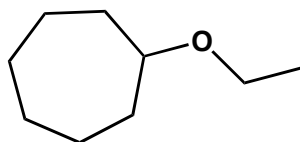
**1,2-Dimethylbutyl**

m.



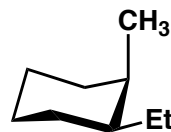
**Isobutyl or 2-Methylpropyl**

n.



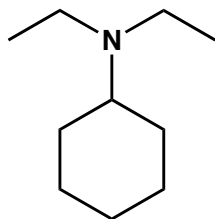
**Ethoxycycloheptane**

o.



***cis*-1-Ethyl-2-methylcyclohexane**

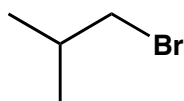
p.



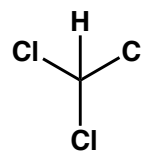
**N,N-Diethylcyclohexanamine**

5. Provide the structure of each of the following compounds.

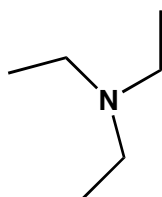
a) Isobutyl Bromide



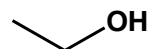
b) Chloroform

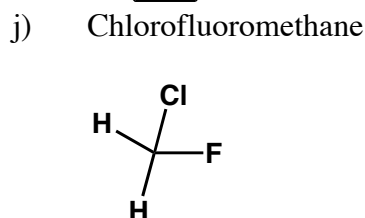
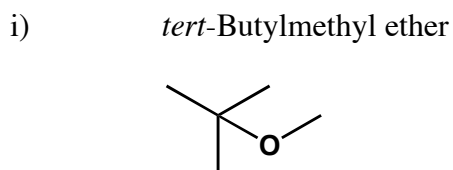
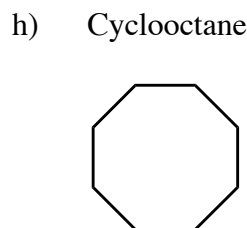
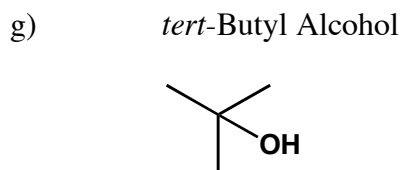
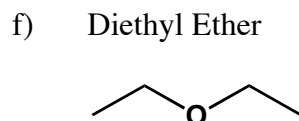
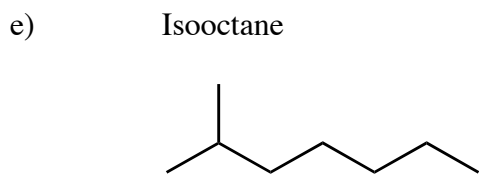


c) Triethylamine

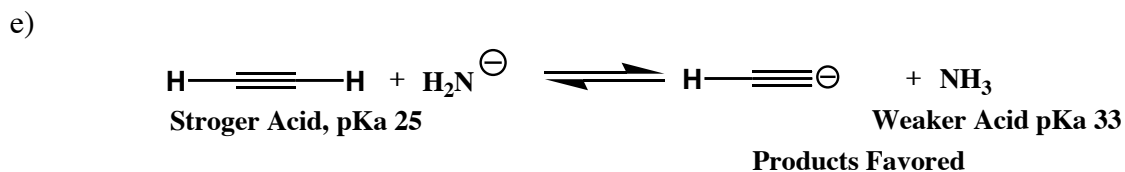
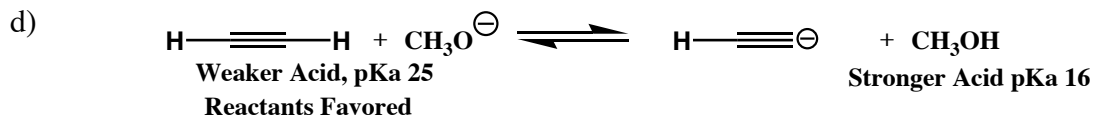
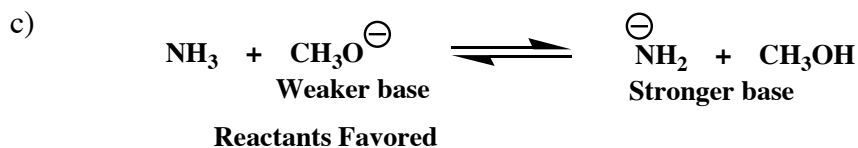
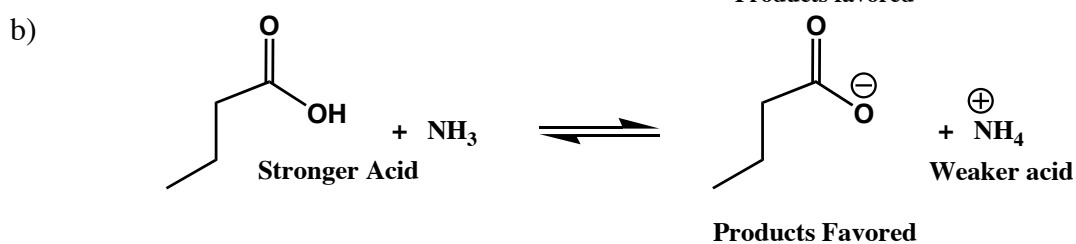
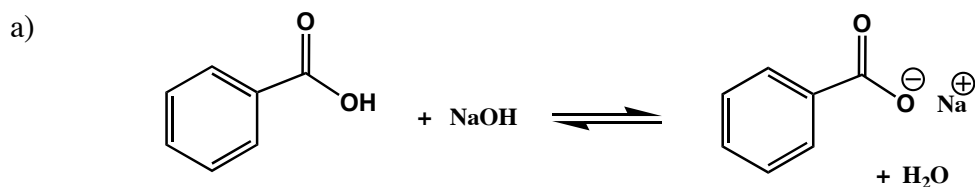


d) Ethanol



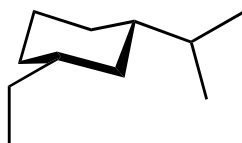


6. In the following acid / base reactions, predict the products and the direction of the equilibrium (products versus reactants).



7. Draw the requested conformations.

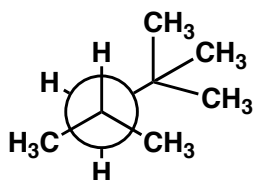
- a) Draw *cis*-3-ethyl-1-isopropylcyclohexane in its lowest energy chair conformation.



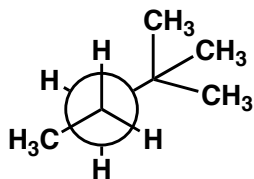
- b) Draw *trans*-1-ethyl-2-methylcyclohexane in its lowest energy chair conformation.



- c) Using Newman Projections draw the most stable conformation with respect to the C3-C4 of 2, 2, 4-trimethylpentane.



- d) Using Newman Projections draw the most stable conformation with respect to the C3-C4 of 2, 2-dimethylpentane.



8. Show the curved arrows on the first structure that result in the corresponding reaction product.

