E. B. Skibo

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)

   H_2CO_3
   Carbonic Acid

   b)

   HCN
   Hydrogen cyanide

   c)

   H_2CO_2
   Formic Acid
   Irritant made by ants

   d)

   BH_3
   Borane

   e) **NO_2**
   Nitrogen Dioxide
   Air pollutant

   f)

   N_2O
   Nitrous Oxide
   Laughing gas

   g)

   HOCl
   Hypochlorous Acid
   Bleach component

   h)

   H_3PO_4
   Phosphoric Acid

i)

SO_3

Sulfur Trioxide

j)

H_2S

Hydrogen Sulfide

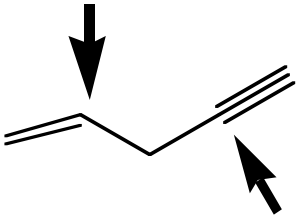
k)

NO^+

Subtract one electron for the positive charge

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

a)



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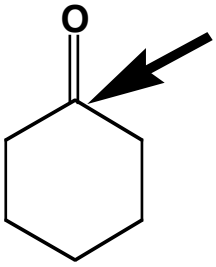

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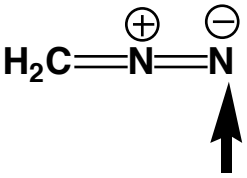

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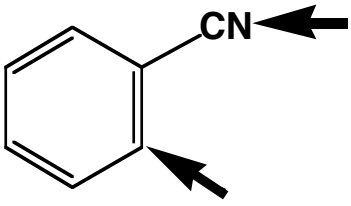

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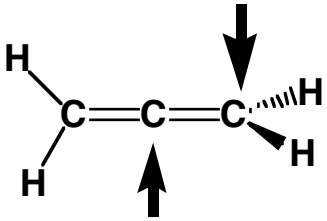

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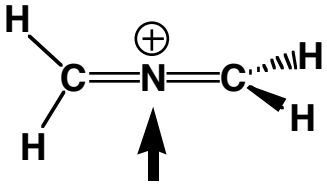

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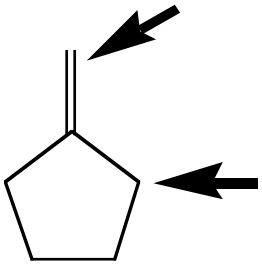

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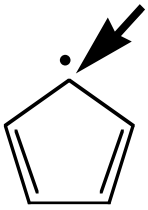
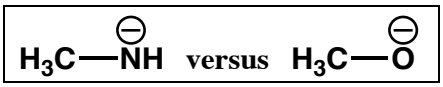


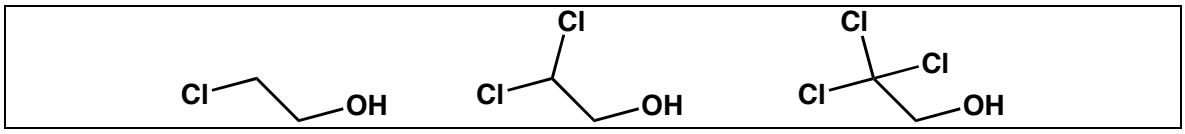
3. Provide the requested answer along with a brief explanation for your choice.

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

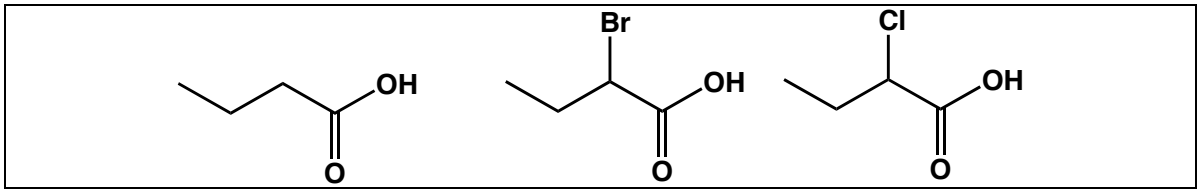
b) Which is the **stronger base**?



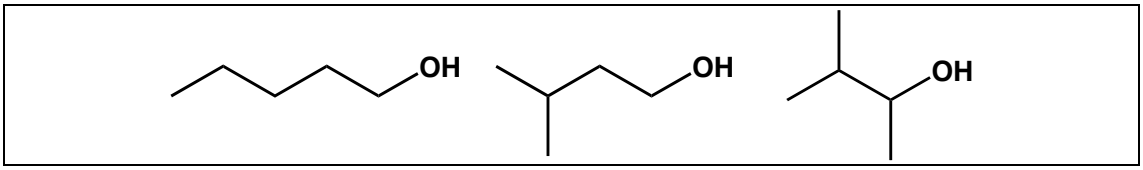
c) Which is the **strongest acid**?



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

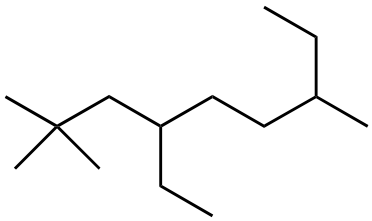


e) Which of the following is more soluble in water?



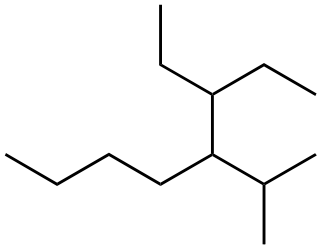
4. Provide an IUPAC or common name for each of the following groups and compounds.

a)



b)

c)



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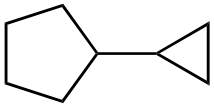

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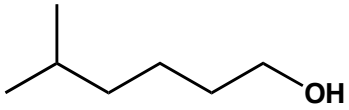

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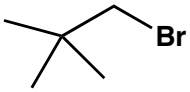

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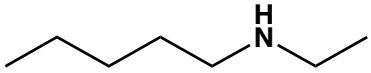

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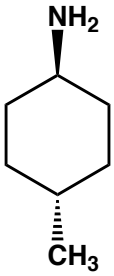

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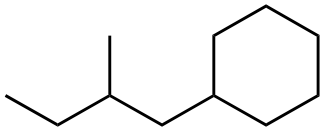

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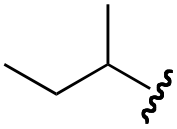
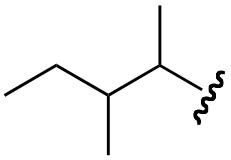
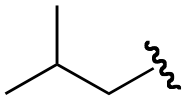
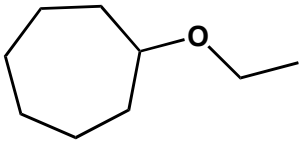
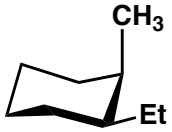
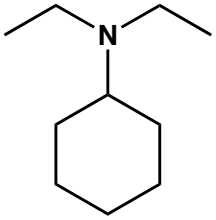


l. 

m. 

n. 

o. 

p. 

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

a) Isobutyl Bromide

b) Chloroform

c) Triethylamine

d) Ethanol

e) Isooctane

f) Diethyl Ether

g) *tert*-Butyl Alcohol

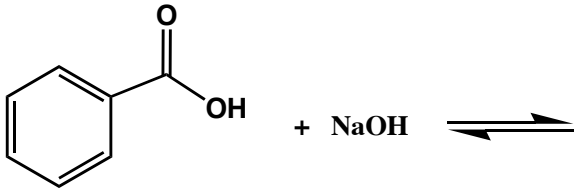
h) Cyclooctane

i) *tert*-Butylmethyl ether

j) Chlorofluoromethane

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

a)



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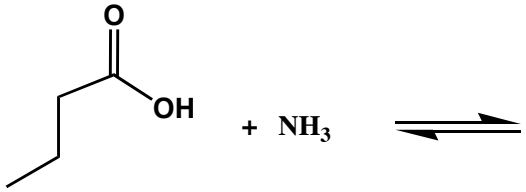

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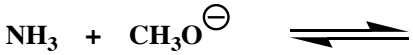

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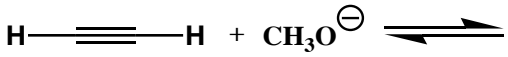

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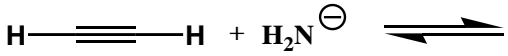


7. Draw the requested conformations.

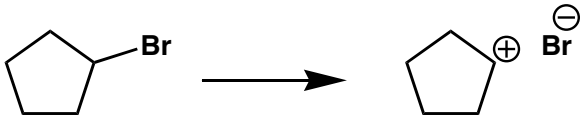
a) Draw *cis*-3-ethyl-1-isopropylcyclohexane in its lowest energy chair conformation.

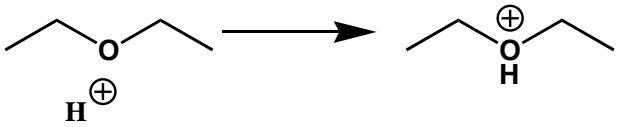
b) Draw *trans*-1-ethyl-2-methylcyclohexane in its lowest energy chair conformation.

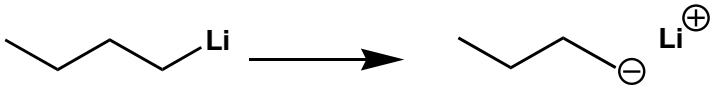
c) Using Newman Projections draw the most stable conformation with respect to the C3-C4 of 2, 2, 4 -trimethylpentane.

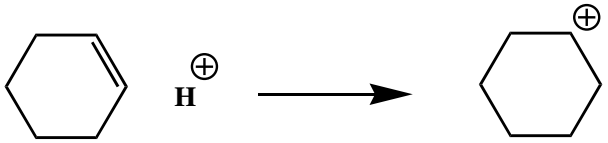
d) Using Newman Projections draw the most stable conformation with respect to the C3-C4 of 2, 2-dimethylpentane.

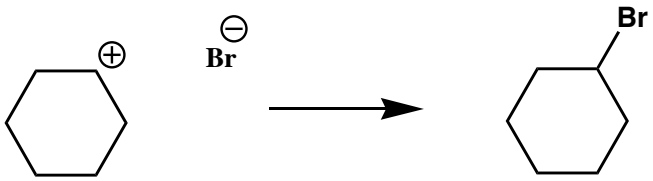
8. Show the curved arrows on the first structure that result in the corresponding reaction product.

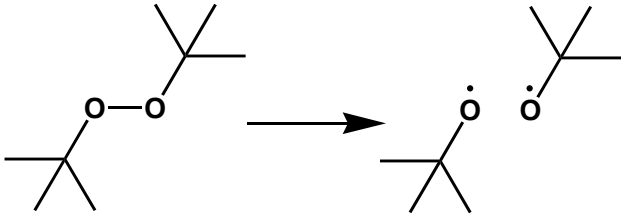
a) 

b) 

c) 

d) 

e) 

f) 

g)