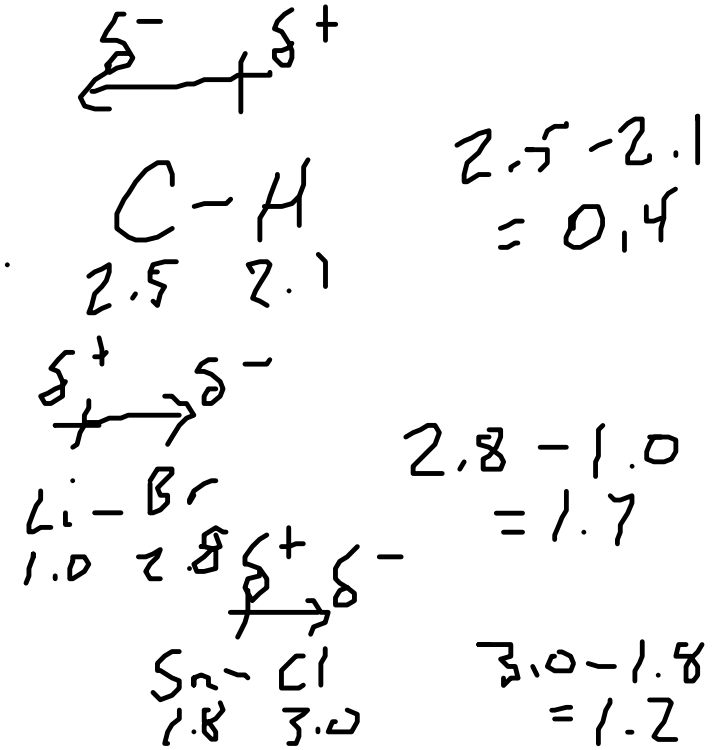
Friday, June 14, 2013
7:47 AM

Chem 11 review: Solutions and titrations.

1) Show the dipole (if any) and classify the following bonds.
   Remember that a dipole is an uneven sharing of electrons. Although the border between covalent and polar covalent is listed in most textbooks as 0.4 and the border between polar covalent is listed at 1.7, remember that bonds are a mixture of covalent and ionic character.

   a. C-H
      Borderline… I describe it as mostly covalent nothing on the test will be borderline.

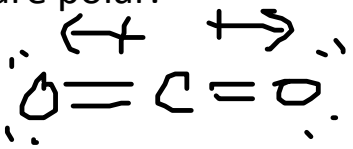


   b. Li-Br
      ionic

   c. Sn-Cl
      Polar covalent

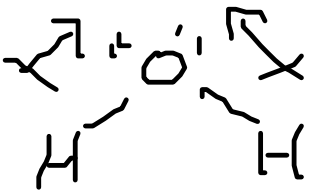
2) Draw the following Lewis structures and show which of the following molecules are polar.

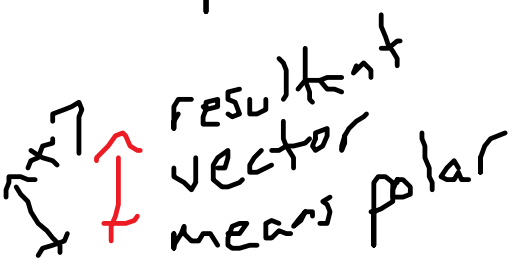
   a. CO_2



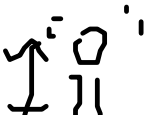
nonpolar

   b. H_2O





   c. CH_2O



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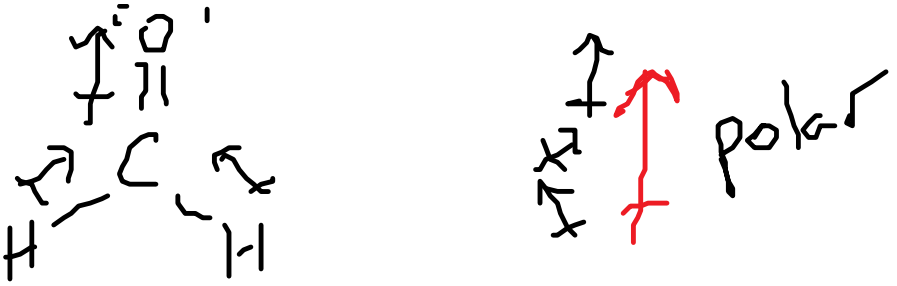

3) Nitrogen gas and Carbon monoxide have the same mass (14) but carbon monoxide has a slightly higher boiling point. Why do you think this might be? (hint: think intermolecular forces.)

Nitrogen gas is non-polar, so the only intermolecular force holding the molecules together are London Forces. Carbon monoxide has a slight dipole, so it will have two forces holding them together, London Forces (every molecule has London Forces,) and dipole-dipole interactions. Since you have to overcome the attraction between the molecules to boil a substance, Carbon monoxide should require more energy to boil . In truth, the dipole on Carbon monoxide is very small, so the difference is minor… only about 4 degrees Celcius.

4) 10.00 mL of an unknown concentration of Carbonic acid is titrated to completion with 0.50 M NaOH. If the average volume delivered over three runs is 11.41 mL, what is the concentration of the Carbonic acid?

$M = \frac{n}{V}$ $0.50\ M = \frac{n}{0.01141\ L}$

$n = 0.005705\ mol\ NaOH$

$H_2CO_3 + 2NaOH \rightarrow Na_2CO_3 + 2H_2O$

$$0.005705\ \text{mol} \times \frac{1\ \text{mol}\ H_2CO_3}{2\ \text{mol}\ NaOH} = 0.0028525\ \text{mol}\ H_2CO_3$$

$$\frac{0.0028528\ \text{mol}}{0.01000} = 0.28\ M\ H_2CO_3$$