Chem 130: Chemistry for Funeral Services
Problem Set 2: Due 1/31/06

Name: **KEY** Date:

Each question is worth one point. Show your work, including sketches, wherever calculations are required. Short answer questions should be written in your own words.

1. What is the electronic configuration ($1s^2$ etc) for the following four atoms:

   Lithium **$1s^2 2s^1$** Nitrogen **$1s^2 2s^2 2p^3$**

   Chlorine **$1s^2 2s^2 2p^6 3s^2 3p^5$** Carbon **$1s^2 2s^2 2p^2$**

2. Use the concept of valence to explain why oxygen and sulfur have some similar chemical properties.
   Oxygen and sulfur both have six valence electrons. Similar number of valence electrons give rise to similar chemical reactivity since it's the valence electrons that are available to react.

3. Why does carbon only have four valence electrons if it has six electrons total?
   Carbon has a configuration of $1s^2 2s^2 2p^2$. The $1s^2$ electrons are like the stable configuration in the helium atom. The core electrons do not participate in chemical reactivity. Only the outer, valence electrons participate. So only the four outer electrons in the 2 level are available to react.

4. Draw the valence electron structures (Lewis structures) for the following four atoms:

   Magnesium 

   Carbon 

   Bromine 

   Neon 

5. Use the concept of valence to explain why non-metals tend to take on electrons in chemical reactions.
   Non-metals like oxygen or fluorine have lots of valence electrons. It takes less energy to take on a few electrons (2 for oxygen, 1 for fluorine) to gain a full shell. They would have to give up a lot of electrons (6 for oxygen, 7 for fluorine) to gain an empty valence shell. Atoms do the easy thing to gain a stable valence so non-metals gain electrons.

6. Write the chemical formulas for the following compounds:

   Magnesium Bromide **$MgBr_2$**

   Water **H_2O**

   Carbon Dioxide **CO_2**

   Iodine (diatomic molecule) **I_2**

   Iron (II) Phosphate (caution! be careful with the charges!) **$Fe_3(PO_4)_2$**

   Calcium Hydroxide **$Ca(OH)_2$**

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7. Name the following compounds

NaOH **sodium hydroxide**

LiBr **lithium bromide**

$CuCO_3$ (Start with the charge of the negative ion and work toward the metal)

copper (II) carbonate

$Fe_3(PO_4)_2$ (Again, start with the negative charge) **iron (II) phosphate**

$Ba(Na)_2$ (This one is a trick question. Use your imagination.) **banana!**

MgO **magnesium oxide**

8. Balance the following equations. Identify each type as synthesis, decomposition or double replacement

2 $NaOH + H_2SO_4 \rightarrow$ **2** $H_2O + Na_2SO_4$ **d. rep.**

$C + O_2 \rightarrow CO_2$ **balanced as given** **synth.**

$N_2 + O_2 \rightarrow$ **2** NO **synth.**

2 $Al +$ **3** $Cl_2 \rightarrow$ **2** $AlCl_3$ **synth.**

$Mg(OH)_2 +$ **2** $HBr \rightarrow MgBr_2 +$ **2** H_2O **d. rep.**

2 $H_2O \rightarrow$ **2** $H_2 + O_2$ **decomp.**

9. Draw the Lewis structures for each molecule in the following equation. Identify the bonding as ionic or covalent.

$NaOH + HCl \rightarrow NaCl + H_20$

ionic **covalent** **ionic** **covalent**

Lewis structures similar to those drawn in class. Types of bonds listed above. Note that ionic for HCl was also acceptable. (Beyond scope of class discussion.)

10. Pick a common example of something that needs to be assembled. Write an "equation" describing that assembly. Explain how your equation is similar to a chemical equation. Explain how assembling your item is similar to assembling molecules.

Many responses possible. The “equation to build a pen” was the example used in class.