Class notes from Tuesday 2/19/08 KF

*FSG did not take place yesterday (Mon 2/18) but there will be FSG this Friday (2/22) and Monday (2/25). These FSGs will be geared towards the exam next week.
*On the Chem. 115 website, there are two practice tests and a study guide for Exam 1.
http://alpha.chem.umb.edu/chemistry/ch115/sevian/index.html

**Group Problem #2**
**Balance the following equations:**
1)a. $C_2H_2 + O_2 \rightarrow CO_2 + H_2O$

Balanced:
$2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$

b. Calcium hydroxide + silver nitrate → silver hydroxide + calcium nitrate
-first rewrite compounds as chemical formulas (Note: Need to memorize first 36 elements names and their symbols and also the polyatomic ions and their charges!)

$Ca(OH)_2 + AgNO_3 \rightarrow AgOH + Ca(NO_3)_2$

This equation is NOT balanced, so:

$Ca(OH)_2 + 2AgNO_3 \rightarrow 2AgOH + Ca(NO_3)_2$

2) When 2.06g of nitrogen gas react with an excess of hydrogen gas, what mass of ammonia ($NH_3$) would be formed?

Grams of $N_2$ to moles of $N_2$:

$$\frac{2.06\text{g of } N_2}{} \times \frac{1\text{mol } N_2}{28.02\text{g } N_2} = .0735\text{mol } N_2$$

Moles of $N_2$ to moles of $NH_3$:

$$.0735 \text{ mol } N_2 \times \frac{2 \text{ mol } NH_3}{\text{I mol } N_2} = .147\text{mol } NH_3$$

Moles of $NH_3$ to grams of $NH_3$:

$$.147\text{mol } NH_3 \times \frac{17.03\text{g } NH_3}{1 \text{ mol } NH_3} = 2.50\text{g } NH_3$$

**Tips on how to solve stoichiometry problems:**
-figure out the information you are given and the information you need to find out (mass? moles?)
-converting from grams of one chemical to grams of another requires knowing how many moles are present of each chemical

-write the units and chemical/chemical formulas of what you are converting, otherwise it can get very confusing and you lose track of what you are converting. Set up "before and after" tables (See class slide for lecture 7: top of page 5)

What do *limiting reagent* and *excess reagent* mean?

-*limiting reagent*: the reagent that is used up first in the chemical reaction, *limiting* the amount of product that can be made.

-*excess reagent*: the reagent that is left over in a chemical reaction.

In group problem #2, question 2, the limiting reagent is $NH_3$ because there is only 2.06g of it, whereas $H_2$ is the excess reagent because you are told there is more than enough needed.

**Chapter 4: Aqueous Reactions and Solution Stoichiometry**

**Some terms to know:**

-a **solution** is a homogeneous mixture with two or more substances. Aqueous solutions means water solutions.

-a **solvent** is the substance that does the dissolving (e.g. water is often called the "universal solvent").

-**solutes** are the chemicals being dissolved in the solution.

Electrical Conductivity

-"electrical" means that there are charged parts as a result of electrons imbalanced with the protons of particles. "Conductivity" means that parts can circulate so that there is a complete circuit (See class slide for lecture 7: page 7). Pure water does not conduct electricity (well, it actually does a tiny tiny bit because a tiny fraction of $H_2O$ molecules break into $H^+$ ions and $OH^-$ ions, but we won't learn more about that until later). However, because of the ions that are dissolved in tap water, for example, tap water does conduct electricity.

-an **electrolyte** is a solute that produces ions when it dissolves in a solvent. NaCl (table salt) is an electrolyte and when dissolved in water forms $Na^+$ ions and $Cl^-$ ions. As salt dissolves, the oxygen sides of water molecules, which have a partial negative charge, surround the positively charged $Na^+$ ions. And the hydrogen sides of the water molecules, which have a slightly positive charge, surround the negatively charged $Cl^-$ ions. (See pictures at the bottom of pages 8 and 9 in lecture 7).

-a solution that cannot dissolve any more of the solute is called a **saturated solution**

-levels of solubility: 1) *very* soluble (more than .10 mol can dissolve in 1L of water
2) *moderately* soluble
3) *pretty much* insoluble (less than .01 mol can dissolve in 1L of water)

*There is nothing that is completely insoluble. Think in terms of degrees of solubility.

!!YOU HAVE TO REMEMBER THE SOLUBILITY GUIDELINES!!
These guidelines are found in the lecture 7 slides: bottom of page 11 or in the Book: page 127, Table 4.1

-according the Coulomb's Law, the force of attraction between two ions is a result of the magnitude of charges on those ions and the distance between their nuclei (See class notes from lecture 7: top of page 12). So, in general, salts that contain highly charged ions will be less soluble then salts with lower charged ions.