WS 18.2 *Name:_____p._____*

1. $Na_3PO_{4(aq)}$ + $BaCl_{2(aq)}$ -------> $Ba_3(PO_4)_{2(\ \ )}$ + $NaCl_{(\ \ )}$

a. Balance the above reaction, and write subscripts on the products.
b. Which compound is the precipitate?_____
c. A solution of barium chloride is analyzed to determine the concentration. 75 mL of barium chloride solution are added to an excess of sodium phosphate solution to form a precipitate. The precipitate is filtered, washed, dried and weighed, and is found to have a mass of 8.12 grams.
Based on the mass of precipitate that formed, calculate the moles of barium chloride that must have been initially present. (use stoichiometry!)

d. Calculate the molarity of the barium chloride solution.

2. $2\ NaOH_{(aq)} + Mg(NO_3)_{2(aq)} \text{ --------> } Mg(OH)_{2(s)} + 2\ NaNO_{3(aq)}$
A solution of "unknown molarity NaOH" is reacted with an excess of magnesium nitrate. The magnesium hydroxide precipitate is collected and washed in a filter paper, and the filter paper (and precipitate) are allowed to dry. Use the data (below) to calculate the molarity of the sodium hydroxide solution.

Volume of NaOH solution used: 50.1 mL
Mass of the filter paper: 3.17 grams
Mass of filter paper and $Mg(OH)_2$: 4.28 grams

3a. If you need to make 500. mL of 1.50 Molar K_2CO_3, what mass of potassium carbonate would you need to weigh out?

b. A solution was made by adding 95.0 grams of potassium carbonate to 578 mL water, and the total solution volume after mixing was 600. mL. Find the concentration (molarity) of potassium carbonate in this solution.

c. Which solution was more concentrated: the solution in (a) or the solution in (b)?_____
d. Which solution was more dilute?_____

4. $Mg_{(s)} + 2\,HCl_{(aq)} \text{ -----> } MgCl_{2(aq)} + H_{2(g)}$

A piece of magnesium with a mass of 10.504 grams is dropped into 251 mL of dilute hydrochloric acid, and the reaction is allowed to proceed until hydrogen bubbles are no longer forming. The piece of Mg is then dried and weighed, and found to have a mass of 10.002 grams. Use this information to find the molarity of the hydrochloric acid.

a. Calculate the mass of Magnesium *consumed* by the reaction:

b. Based on the mass of Mg consumed, used stoichiometry to calculate the moles of HCl that reacted.

c. Calculate the molarity of the HCl solution.

5. Identify the solute(s) and the solvent in each of the following solutions.

	Solute(s)	Solvent
a. A mixture created by mixing 30 mL liquid ethanol with 15 mL water.	_____	_____
b. 200 grams of sugar mixed with 100 grams water	_____	_____
c. Air (list at least 2 solutes)	_____	_____
d. $Cu(NO_3)_{2(aq)}$	_____	_____
e. Gasoline that contains 40 Liters heptane per 60 Liters isooctane	_____	_____
f. Cocacola (for the solutes, name one that started out as a gas, and one that started out as a solid)	_____	_____
g. 0.030 Molar $HCl_{(aq)}$	_____	_____
h. Liquor that is 80 proof (so it is 40% ethanol and 60% water)	_____	_____

6. What is the molarity of sugar ($C_{12}H_{22}O_{11}$) in a soda that contains 35 grams of sugar per 355 mL? (These are the approximate numbers for a coke)

7. If 400. mL of 3.00 M $CuCl_2$ are boiled away, leaving just the copper II chloride crystals, what mass of copper chloride crystals would be left behind?

8. Suppose that 16.0 grams of magnesium chloride were mixed with 84.0 mL of water. After the magnesium chloride dissolved, the overall solution volume was 88.2 mL. Calculate the concentration of $MgCl_2$ in this solution.