Name: _____

AP Chemistry Summer Assignment

Instructions:
Watch this welcome video from Mrs. Nordbrock to give you a brief introduction to the expectations of AP Chemistry: **click here to watch the video***.*

*Complete the following packet to the best of your ability. If you find yourself struggling with a concept, I **highly** recommend using Kahn Academy or YouTube to help you.*

*A **physical copy** of the completed packet is due by the first day of class (August 30 for those enrolled in the A5 class period, August 31 for those enrolled in the B2 class period.) Failure to complete and/or turn in this packet can result in removal from the AP Chemistry course.*

Balancing Equations and Types of Reactions
Balance the following equations by adding the correct coefficients, then state the type of reaction.

1. _____HCl + _____LiOH → _____LiCl + _____H_2O Type:

2. _____Mg + _____N_2 → _____Mg_3N_2 Type:

3. _____Fe + _____$CuSO_4$ → _____$Fe_2(SO_4)_3$ + _____Cu   Type:

4. _____$AgNO_3$ + _____$MgCl_2$ → _____AgCl + _____$Mg(NO_3)_2$ Type:

5. _____C_3H_8 + _____O_2 → _____CO_2 + _____H_2O Type:

Equation Writing
*Write balanced equations for the following reactions, including states of matter.*
1. Aluminum metal is reacted with aqueous hydrochloric acid to form hydrogen gas and aluminum chloride.

2. When solutions of potassium chloride and silver nitrate are reacted, silver chloride is precipitated. The other product is potassium nitrate.

3. Sodium hydroxide is neutralized by the addition of sulfuric acid; producing water and a dissolved salt, sodium sulfate.

4. Solid iron metal can be oxidized with a solution of potassium permanganate to produce iron (III) oxide, manganese (IV) oxide, and potassium oxide.

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Empirical and Molecular Formulas
1. A white powder is analyzed and found to contain 43.64% phosphorus and 56.36% oxygen by mass. Calculate the empirical formula.

2. A compound contains only carbon, hydrogen, and nitrogen. Combustion of 0.350g of the compound produces 0.335 g CO_2 and 0.411 g H_2O. Calculate the empirical formula.

3. The molecular weight of the compound analyzed in question 2 is found to be 138 g/mol.

   Calculate the molecular formula of the compound.

Limiting Reactants and Percent Yield

$$2 NH_3 (g) + 3 CuO (s) \rightarrow N_2 (g) + 3 Cu (s) + 3 H_2O (l)$$
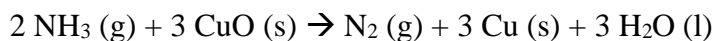
1. What is the limiting reactant when 18.1 g of ammonia is reacted with 90.4 g of copper (II) oxide according to the above balanced equation? (Convert into grams of nitrogen)

2. How many grams of the excess reactant are left over?

$$1\ C_2H_5OH + 3\ O_2 \rightarrow 2\ CO_2 + 3\ H_2O$$
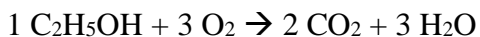
3. How many grams of carbon dioxide are produced from burning 12.0 g of ethanol (C_2H_5OH) in excess oxygen in the equation above?

4. If 15.2 g of carbon dioxide is collected, what is the percent yield?

K_{eq} and K_{sp}

1. At 200 °C equilibrium for the following reaction was studied. Analysis of the mixture showed the following equilibrium concentrations:
   [PCl_3 (g)] = 1.22 x 10^{-2} mol/L
   [Cl_2 (g)] = 1.22 x 10^{-2} mol/L
   [PCl_5 (g)] = 1.02 mol/L
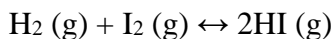
   $$PCl_5\ (g) \leftrightarrow PCl_3\ (g) + Cl_2\ (g)$$

   Calculate the value of K_{eq} at this temperature.

2. In the following equilibrium K_{eq} = 52. The equilibrium concentrations of H_2 and I_2 were found to be:
   [H_2 (g)] = 4.7 x 10^{-3} mol/L
   [I_2 (g)] = 3.52 x 10^{-2} mol/L

   $$H_2\ (g) + I_2\ (g) \leftrightarrow 2HI\ (g)$$

   What is the equilibrium concentration of HI under these conditions?

3. In a saturated solution of silver (I) chromate, the concentration of Ag^+ is 0.0164 M. What is the solubility product constant value (K_{sp} value) for silver (I) chromate?

4. Calculate the concentration of the chloride ion in a saturated solution of lead (II) chloride. The solubility product constant (K_{sp}) is 1.6 x 10^{-10}.

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Polyatomic ions you MUST know!
Memorize these – know the name, symbol, and charge! We will take a quiz over these ions on the third day of class!

Name	Symbol	Charge
Ammonium	NH_4^+	1+
Acetate (ethanoate)	$C_2H_3O_2^-$ (CH_3COO^-)	1-
Hydroxide	OH^-	1-
Hypochlorite	ClO^-	1-
Chlorite	ClO_2^-	1-
Chlorate	ClO_3^-	1-
Perchlorate	ClO_4^-	1-
Bromate	BrO_3^-	1-
Iodate	IO_3^-	1-
Nitrate	NO_3^-	1-
Nitrite	NO_2^-	1-
Cyanide	CN^-	1-
Permanganate	MnO_4^-	1-
Bicarbonate (hydrogen carbonate)	HCO_3^-	1-
Carbonate	CO_3^{2-}	2-
Sulfate	SO_4^{2-}	2-
Sulfite	SO_3^{2-}	2-
Chromate	CrO_4^{2-}	2-
Dichromate	$Cr_2O_7^{2-}$	2-
Phosphate	PO_4^{3-}	3-

See you in August!!!