**Honors Chem Final Exam Review NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part 2: Units 4-7**

* **Unit 4**

**Ionic compounds**

1. How can the periodic table be used to predict the charges of ions?
2. What are the rules for naming ionic compounds? (s-block metals vs d-block metals- meaning when do you use Roman numerals?)
3. Examples: (write the name of the ionic compound or write the formula)

*\*remember: Ag is always 1+; Zn is always 2+*

* 1. NaCl l. KNO3
  2. SrI2 m. CuCO3
  3. LiC2H3O2 n. CuF
  4. Barium iodide o. Magnesium hydroxide

p. Ammonium chlorate

* 1. Barium oxide q. Aluminum Phosphate
  2. FeCl3 r. MnO2
  3. KMnO4 s. NaC2H3O2
  4. Ni(NO3)2 t. CuCN
  5. Iridium(III) chloride u. Cobalt (II) oxide
  6. Iron (II) nitrate
  7. Potassium sulfate

**Covalent Compounds (MOLECULES)**

1. How are covalent bonds different from ionic bonds?
2. Elements that form covalent molecules are Hydrogen and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (metals or non-metals?)
3. Examples: Name or write formula. (*REMEMBER- USE PREFIXES!)*
   1. NO2 e. CCl4
   2. N2O f. CO2
   3. Dihydrogen monoxide g. Diphosphorous pentoxide
   4. Phosphorous pentchloride h. Carbon monoxide

**Acids:**

1. How do you recognize an acid?
2. What are the naming rules for acids?
3. Examples:
   1. HNO3 e. H3PO4
   2. HCl f. HNO2
   3. Sulfuric acid g. Hypochloric acid
   4. Acetic acid h. Carbonic acid

**Lewis & VSEPR Structures:**

1. Draw the Lewis dot structure and then use VSEPR theory to determine the molecular shape, geometry, and bond angle of the following compounds:
   1. H2O
   2. CO2
   3. NH3
   4. CH4

**Unit 5**

**Chemical Reactions:**

1. What are the 5 types of chemical reactions?

Balance the following equations:

1. \_\_\_Na2SO3(s) + \_\_\_\_HCl(aq) → \_\_\_NaCl(aq) + \_\_\_H2O(l) + \_\_\_SO2(g)
2. Calcium reacts with water to produce calcium hydroxide and hydrogen gas.
3. What type of Rxn is #3?
4. Hydrochloric acid and solid Iron (II) sulfide react to produce Iron (II) chloride and gaseous hydrogen sulfide
5. What type of rxn is #5?
6. Electric current causes Water to produce oxygen and hydrogen.
7. Type of rxn is #7?

**Net Ionic Equations –** Balance the ‘molecular’ & write the total and net ionic equation for the following: (\*need solubility chart)

1. Molecular: \_\_\_\_KBr(aq) + \_\_\_\_AgNO3(aq) → \_\_\_\_AgBr(s) + \_\_\_\_KNO3(aq)

Total Ionic:

Net Ionic:

1. If all products are aqueous, what is the result??

**Unit 6:**

**The Mole**

1. What is Avogadro’s number?
2. Examples: *(Remember to use conversion factors)*
   1. How many molecules are there in 1.77 moles of nickel (Ni)?
   2. How many moles are in 9.54 x 1024 molecules of carbon (C)?

**Empirical formulas**

1. What does an empirical formula represent?
2. Example Problems:

a. Propane is a hydrocarbon that is typically used in cooking. It contains 81.82% carbon and 18.18% hydrogen. What is the empirical formula for propane? (*Remember: convert the % to g if they total 100%*)

* 1. A compound was found to contain 49.98 g of carbon, and 10.47 g of hydrogen. What is the empirical formula of this compound?

**Molar mass**

1. What is molar mass?
2. Example Problems:
   1. How many grams are in 55.98 moles of Ba(C2O4)2?
   2. How many grams are contained in 8.99 x 1023 molecules of MnO2?
   3. How many molecules are in 25.9 g of Na3PO4?

**Using Mole to Mole Ratios for Conversions (Stoichiometry)**

Examples:

1. How many moles of O2 can be produced from 4.79 moles of MnO2?

\_\_ MnO2 🡪 \_\_ MnO + \_\_ O2

2. How many moles of Na are required to produce 78.4 moles of NaCl?

\_\_\_ Na + \_\_\_ Cl2 🡪 \_\_\_ NaCl

1. How many grams of NaCl can be produced from 14.2 moles of NaClO3?

\_\_\_ NaClO3 🡪 \_\_\_ NaCl + \_\_\_ O2

1. How many grams of Al can be produced if you begin with 75.9 g of Fe?

\_\_\_ Al + \_\_\_ Fe3N2 🡪 \_\_\_ AlN + \_\_\_ Fe

1. How many grams of KBr are necessary to produced 78.42 grams of FeBr3?

\_\_\_ KBr + \_\_\_ Fe(OH)3 🡪 \_\_\_ FeBr3 + \_\_\_ KOH

1. How many liters of hydrogen gas can be produced from 9.56 g of H2O2 at STP?

H2O2 → O2 + H2

**Limiting Reactant**

1. What is a limiting reactant?
2. What is a theoretical yield?
3. What is the formula for percent yield?
4. Examples: SHOW WORK!
   1. What is the limiting reactant when 4.1 g of Cr reacts with 9.3 g of Cl2?

\_\_\_ Cr + \_\_\_ Cl2 🡪 \_\_\_ CrCl3

* 1. What is the limiting reactant when 8.65 g of O2 reacts with 31.5 g of S8?

\_\_\_ O2 + \_\_\_ S8 🡪 \_\_\_ SO2

* 1. How many liters of O2 can be produced from 15.9 g of CO2 and 19.5 g of H2O?

\_\_\_ H2O + \_\_\_ CO2 → \_\_\_ C7H8 + \_\_\_ O2

* 1. Determine the percent yield for the reaction of 4.57 g of K with excess O2 if 7.36 g of KO2 is recovered.

\_\_\_ K + \_\_\_ O2 🡪 \_\_\_ KO2

* 1. Determine the percent yield for the reaction between 45.9 g of NaBr and excess Cl2 to produce 12.9 g of NaCl.

\_\_\_ NaBr + \_\_\_ Cl2 🡪 \_\_\_ NaCl + \_\_\_ Br2

**Unit 7**

**Thermodynamics: Heat of reaction, enthalpy**

1. What is the first law of thermodynamics?
2. What equation is used to calculate the heat energy of a reaction?

3. Differentiate: endothermic vs exothermic & draw an energy diagram of each

4. a) Distinguish between a negative delta H value and a positive delta H; b) Where are each of these values written in a chemical equation?

**Thermochemical Equations**

1. How much heat will be transferred when 5.81g of graphite (carbon) reacts with excess H2 according to the following equation?
   1. Is the reaction endothermic or exothermic? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Balance the equation: \_\_\_\_\_ C + \_\_\_\_\_ H2 → \_\_\_\_\_ C6H6 ∆Ho = 49.03kJ
   3. Solve problem & show work:
2. How much heat will be released when 1.48g of chlorine reacts with excess phosphorous according to the following equation?
   1. Is the reaction endothermic or exothermic? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Balance the equation: \_\_\_\_\_ P + \_\_\_\_\_ Cl2 → \_\_\_\_\_ PCl5 ∆Ho = -866kJ
   3. Solve problem & show work:

**Specific Heat**

1. Sample Problems:

* 1. A piece of metal with a mass of 4.68 g absorbs 256 J of heat when its temperature increases from 100º C to 282º C. What is the specific heat of the metal?
  2. The temperature of a sample of water increases from 20º C to 46.6º C, as it absorbs 5650 J of heat. What is the mass of the sample? The specific heat of water is 4.18 J/g ºC.

**Equilibrium**

1. In terms of reaction rate, when is equilibrium reached?
2. Keq > 1 means?
3. Write equilibrium expression for the following reaction (\**do not have to solve it, just set up the expression*):

3 CaCO3 + 2 H3PO4 🡪 Ca3(PO4)2 + 3 H2CO3

3. Which way will equilibrium shift if more calcium carbonate is added to the above reaction?

**Molarity (**Molarity equals moles/L)

Examples:

1. A solution contains 234 g of C2H5OH and has a volume of 1.3 L. What is the concentration (molarity) of the solution?
2. How many grams of MgCl2 are in 15 L of a 7.5 M NaOH solution?
3. A solution contains 31.5 g of KMnO4 and has a volume of 750 mL. What is the concentration of the solution?

**Dilutions (**M1V1 = M2V2)

Examples:

1. What volume of 1.59 M Na3PO4 stock solution would you use to make 1.50 L of a 0.125 M Na3PO4 solution?
2. What volume of 12 M hydrochloric acid (HCl) stock solution would you use to make 125 mL of a 4.50 M HCl solution?

**Acids & Bases:**

1. What does the pH scale measure the concentration of?

1. A pH of 3 is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_; pH of 10 is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_.
2. pH + pOH = \_\_\_\_\_\_\_
3. What is H+ concentration if pH = 4?
4. Write the general equation for a neutralization reaction: