WLHS / Chem / Monson

Name_____
Date_____Per_____

FINAL EXAM REVIEW: Units 4 & 5 (CH 9, 10, 11)

(Compounds: Names, Formulas, and Quantities; Chem Equations & Reaction Types)

PART 1: Chemical Compounds – Names and Formulas

1) Names to Formulas. Identify whether they are ionic or molecular compounds.

Name:	**Formula:**	**Ionic or Molecular?**
Sodium nitrate		
Carbon disulfide		
Aluminum sulfate		
Diphosphorus pentoxide		
Potassium nitrate		
Iron (II) carbonate		
Lead (II) phosphate		
Sulfur hexabromide		
Copper (II) hydroxide		
Calcium fluoride		
Nickel nitrate		
Silver cyanide		
Ammonium sulfite		
Dicarbon hexahydride		
Zinc sulfate		
Tin (II) chloride		
Trinitrogen pentachloride		
Magnesium acetate		
Copper (I) oxalate		

2) Formulas to Names. Identify whether they are ionic or molecular compounds.\

Formula:	**Name:**	**Ionic or Moleuclar?**
NCl_3		
Li_2O		
$PbCl_2$		
AlI_3		
$FeSO_3$		
$Mg(NO_3)_2$		
$Fe(NO_3)_3$		
SF_6		
$Cu(OH)_2$		
Cu_2CO_3		
$Cr(C_2H_3O_2)_2$		
Rb_2CrO_4		
$(NH_4)_2O$		
OF_2		
PBr_3		
Na_3PO_4		
$Sn(NO_3)_2$		
$Fe(CN)_3$		
ACIDS:		
H_2CO_3		Acid
HNO_2		Acid
H_3PO_4		Acid
HBr		Acid

PART 2: Chemical Quantities (Moles, Molar Mass, Molar Volume, & Comp., etc.)

1) Integrated Problem: Answer all of the following questions for the compound **Copper (II) phosphate**:

A) What is the correct chemical formula?_____

B) Is the compound IONIC or MOLECULAR? **How can you tell?**

C) What is the molar mass of the compound?

D) What would the **mass (in grams) of 0.750 mol** of this compound?

E) If you had **2.05 g** of the compound, **how many particles** would that be?

F) What is the Percent Composition of all the elements in the compound?

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2) Integrated Problem: A compound is found to be **92.24% Carbon**, and **7.757% Hydrogen**. Answer all of the following questions about the compound:

A) Is the compound IONIC or MOLECULAR? **How can you tell?**

B) What is the **empirical formula** of the compound?

C) If the molar mass of the compound is 26.04 g/mol, what is the **molecular formula** of the compound?

D) Using the naming system we covered, what is an appropriate name for this compound?

E) How many moles would 2.50×10^{22} molecules of this compound be?

F) This compound is a GAS at STP. What would be the **mass** of 6.26 Liters of this compound at STP?

G) What is the density of this gas at STP? (remember that D=m/V) The density of air at STP is 1.2754 g/L. Would a balloon of this gas rise or sink in air? EXPLAIN.

3) Mole Conversion Problems: Single Step

A) Convert 1.55 moles of H_2O into molecules of H_2O.

B) Convert 3.77g of $Mg(NO_2)_2$ into moles of $Mg(NO_2)_2$.

C) Convert 25.7 liters of O_2 at STP into moles of O_2.

D) Convert 3.55×10^{24} NaCl particles into moles.

E) Convert 0.0256 moles of H_2 into grams of H_2.

F) Convert 10.1 L of He gas at STP into moles of He.

4) **Mole Conversion Problems: Multiple Step**

A) Determine the mass of 7.88×10^{23} atoms of Sn.

B) How many liters of Cl_2 gas at STP are in 5.14 grams of Cl_2.

C) Determine the number water molecules in 3.05 grams of H_2O.

D) How many molecules of CO_2 are in 177.8 L of the gas at STP?

5) **Percent Composition Problems:**

A) What is the Percent Composition of each Element in Na_3PO_4?

B) A **hydrated** salt has a starting mass of 2.45 g. The salt is heated in a crucible to remove the water. After heating, the **anhydrous** salt has a mass of 1.92 g. What is the percent composition of water in the hydrated salt?

C) Copper (II) chloride pentahydrate, $CuCl_2 * 5H_2O$, when heated to 100°C is dehydrated. What is the mass % of water in this hydrate?

D) From part C above, if you started with 12.55 grams of the hydrated compound and heated it until all of the water had evaporated, what mass of anhydrous $CuCl_2$ would remain?

6) **Empirical Formula Problems:**

A) Qualitative analysis shows that a compound contains 32.38% sodium, 22.65% sulfur, and 44.99% oxygen. Find the **empirical formula** of this compound.

B) Find the **empirical formula** of a compound found to contain 26.56% potassium, 35.41% chromium and the remainder oxygen.

C) A 60.00g sample of tetraethyl lead, a gasoline additive, is found to contain 38.43g lead, 17.83g carbon, and 3.74g hydrogen. Find its **empirical formula**.

7) **Molecular Formula Problems:**

A) A compound has the empirical formula CH_2O and a molar mass of 180.2 g/mol. What is the **molecular formula** of the compound?

B) A compound is 82.6% carbon and 17.4% hydrogen. What is the **empirical formula** of the compound? If the molar mass of the compound is 58.14 g/mol, what is the **molecular formula** of the compound?

PART 3: Chemical Equations – Balancing; Types of Reactions

Balanced Equations and Reaction Types: Balance the following equations, and identify the reaction type. **REACTION TYPE:**

1) $Pb(NO_3)_2 + K_2CrO_4 \rightarrow PbCrO_4 + KNO_3$ _____

2) $Na + Ca_3(PO_4)_2 \rightarrow Na_3PO_4 + Ca$ _____

3) $C_3H_6 + O_2 \rightarrow CO_2 + H_2O$ _____

4) $Al(OH)_3 \rightarrow Al_2O_3 + H_2O$ _____

5) $Fe + O_2 \rightarrow Fe_2O_3$ _____

For each of the following: Convert the description into a BALANCED chemical equation using all the correct symbols (s, l, g, aq). **Identify what type of reaction it is.**

REACTION TYPE:

1) Aluminum metal reacts with oxygen gas producing solid aluminum oxide.

2) Zinc metal is dropped into an aqueous solution of hydrochloric acid to produce hydrogen gas (H_2) and an aqueous solution of zinc chloride.

3) Aqueous hydrogen peroxide (H_2O_2) will break down to form water and oxygen gas (O_2).

4) Octane (C_8H_{18}) "burns" in the presence of oxygen gas, O_2, to produce carbon dioxide gas and water vapor (gas).

5) Aqueous copper (II) chloride and aqueous silver nitrate will react to produce a solid precipitate silver chloride and aqueous copper (II) nitrate.