Name _____ **Block** _____

Unit 7 Test Review Packet

Part A: Percent Composition

1. Explain how to find the total mass of a compound, such as **sodium sulfate, Na_2SO_4**.

2. Calculate the percent composition of ***sodium*** in Na_2SO_4. [Must show work]

3. Calculate the percent composition of ***sulfur*** in Na_2SO_4. [Must show work]

4. Calculate the percent composition of ***oxygen*** in Na_2SO_4. [Must show work]

Part B: Empirical and Molecular Formulas

1. A formula with the lowest whole # ratio of elements in a compound is called the _____ formula.
2. The actual formula that shows the exact number and ratio of atoms is called the _____ formula.
3. Which of the following are empirical formulas? **$C_4H_8O_2$** **N_2O_4** **CH_4** **P_2O_5**
4. All of the following are empirical formulas, *EXCEPT:* **C_3H_8** **Na_2SO_4** **C_4H_6** **$Al_3(SO_4)_2$**
5. Ascorbic acid is a naturally occurring organic compound with antioxidant properties, known as Vitamin C. The molecular formula is **$C_6H_8O_6$**. What is the empirical formula? _____

6. Caffeine has an elemental analysis of 49.48% carbon, 5.190% hydrogen, 16.47% oxygen, and 28.85% nitrogen. What is the empirical formula for caffeine? [Must show work.]

7. What is the name and empirical formula of an ionic compound that contains 55.2584 % potassium, 14.5919 % phosphorus, and 30.1497 % oxygen? [Must show work.]

8. A compound with an empirical formula of **C_2H_4O** and a molecular mass of **88 grams per mole**. What is the molecular formula of this compound? **[Must show work]**

9. Naphthalene is compound containing carbon and hydrogen. It is often used in moth balls. The empirical formula is **C_5H_4** and its molar mass is 1**28.16g/mol**. Find the molecular formula. **[Must show work]**

10. A compound containing **39.97% C; 13.41% H;** and **46.62% N** has a molar mass of **60.10g/mol.** Find the molecular formula. **[Must show work]**

Part C: Types of Chemical Reactions

Define each type of chemical reaction in your own words.

- Synthesis _____
- Decomposition _____
- Single Replacement _____
- Double Replacement _____
- Neutralization _____
- Combustion _____

Part D: Balancing Chemical Equations

1) ___ AlI_3 + ___ Br_2 ---> ___ $AlBr_3$ + ___ I_2

2) ___ B + ___ F_2 ---> ___ BF_3

3) ___ NO + ___ O_2 ---> ___ NO_2

4) ___ $Al(NO_3)_3$ + ___ $Ba(OH)_2$ ---> ___ $Al(OH)_3$ + ___ $Ba(NO_3)_2$

5) ___ H_2 + ___ Br_2 ---> ___ HBr

6) ___ HCl + ___ MnO_2 ---> ___ $MnCl_2$ + ___ H_2O + ___ Cl_2

7) ___ F_2 + ___ H_2O ---> ___ O_2 + ___ HF

8) ___ Fe_2O_3 + ___ C ---> ___ Fe + ___ CO_2

9) ___ Cl_2 + ___ PCl_3 ---> ___ PCl_5

10) ___ SO_3 ---> ___ SO_2 + ___ O_2

11) ___ HCl + $Ba(OH)_2$ ---> ___ $BaCl_2$ + ___ H_2O

12) ___ Na + ___ O_2 ---> ___ Na_2O

13) ___ $KClO_3$ ---> ___ KCl + ___ O_2

14) ___ Al + ___ O_2 ---> ___ Al_2O_3

15) ___ Al + ___ $CuCl_2$ ---> ___ Cu + ___ $AlCl_3$

Part E: Identifying the Type of Reaction

For each reaction below, identify the type of reaction.

1) sodium + bromine ---> sodium bromide

2) calcium chloride ---> calcium + chlorine

3) ethane (C_2H_6) + oxygen ---> carbon dioxide + water

4) aluminum + sulfur ---> aluminum sulfide

5) barium chloride + copper (II) sulfate ---> barium sulfate + copper (II) chloride

6) copper (II) carbonate ---> copper (II) oxide + carbon dioxide

7) nickel + lead (IV) nitrate ---> lead + nickel (II) nitrate

8) propane (C_3H_8) + oxygen ---> carbon dioxide + water

9) diphosphorous pentoxide + water ---> phosphoric acid

10) mercury (II) oxide ---> mercury + oxygen

11) gold + magnesium bromide ---> gold (III) bromide + magnesium

12) hydrochloric acid + sodium hydroxide ---> sodium chloride + water

13) potassium oxide + water ---> potassium hydroxide

14) magnesium chlorate ---> magnesium chloride + oxygen

15) butane (C_4H_{10}) + oxygen ---> carbon dioxide + water

Part F: Predicting the Products

Predict the products for each reaction below. Then write the balanced chemical equation.
Hint: It will help to identify the type of reaction first.

1) iron (II) nitrate + potassium hydroxide --->

2) zinc + copper (I) bromide --->

3) hydrogen + oxygen --->

4) water + sulfur trioxide --->

5) sulfuric acid + potassium hydroxide --->

6) barium carbonate --->

7) phosphorous pentachloride --->

8) silver nitrate + calcium bromide --->