

## Unit 7 Test Review Packet

### Part A: Percent Composition

1. Explain how to find the total mass of a compound, such as **sodium sulfate**,  $\text{Na}_2\text{SO}_4$ .
2. Calculate the percent composition of **sodium** in  $\text{Na}_2\text{SO}_4$ . [Must show work]
3. Calculate the percent composition of **sulfur** in  $\text{Na}_2\text{SO}_4$ . [Must show work]
4. Calculate the percent composition of **oxygen** in  $\text{Na}_2\text{SO}_4$ . [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?  $\text{C}_4\text{H}_8\text{O}_2$        $\text{N}_2\text{O}_4$        $\text{CH}_4$        $\text{P}_2\text{O}_5$
  4. All of the following are empirical formulas, *EXCEPT*:  $\text{C}_3\text{H}_8$        $\text{Na}_2\text{SO}_4$        $\text{C}_4\text{H}_6$        $\text{Al}_3(\text{SO}_4)_2$
  5. Ascorbic acid is a naturally occurring organic compound with antioxidant properties, known as Vitamin C. The molecular formula is  $\text{C}_6\text{H}_8\text{O}_6$ . 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.]
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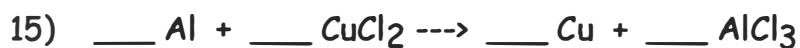
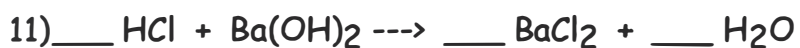
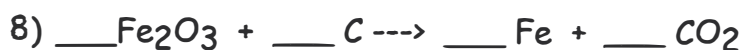
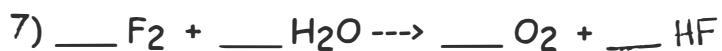
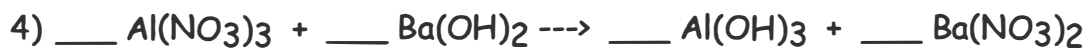
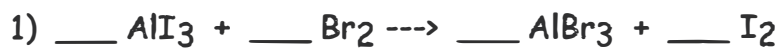
8. A compound with an empirical formula of  $\text{C}_2\text{H}_4\text{O}$  and a molecular mass of **88 grams per mole**. What is the molecular formula of this compound? **[Must show work]**
9. Naphthalene is compound containing carbon and hydrogen. It is often used in moth balls. The empirical formula is  $\text{C}_5\text{H}_4$  and its molar mass is **128.16g/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



## Part E: Identifying the Type of Reaction

For each reaction below, identify the type of reaction.

1) sodium + bromine  $\rightarrow$  sodium bromide

2) calcium chloride  $\rightarrow$  calcium + chlorine

3) ethane ( $C_2H_6$ ) + oxygen  $\rightarrow$  carbon dioxide + water

4) aluminum + sulfur  $\rightarrow$  aluminum sulfide

5) barium chloride + copper (II) sulfate  $\rightarrow$  barium sulfate + copper (II) chloride

6) copper (II) carbonate  $\rightarrow$  copper (II) oxide + carbon dioxide

7) nickel + lead (IV) nitrate  $\rightarrow$  lead + nickel (II) nitrate

8) propane ( $C_3H_8$ ) + oxygen  $\rightarrow$  carbon dioxide + water

9) diphosphorous pentoxide + water  $\rightarrow$  phosphoric acid

10) mercury (II) oxide  $\rightarrow$  mercury + oxygen

11) gold + magnesium bromide  $\rightarrow$  gold (III) bromide + magnesium

12) hydrochloric acid + sodium hydroxide  $\rightarrow$  sodium chloride + water

13) potassium oxide + water  $\rightarrow$  potassium hydroxide

14) magnesium chlorate  $\rightarrow$  magnesium chloride + oxygen

15) butane ( $C_4H_{10}$ ) + oxygen  $\rightarrow$  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 ---->