PERCENT COMPOSITION AND CHEMICAL FORMULAS

10.3

Section Review

Objectives
- Calculate the percent by mass of an element in a compound
- Interpret an empirical formula
- Compare and contrast empirical and molecular formulas

Vocabulary
- percent composition
- empirical formula

Key Equation
- % mass of element = $\dfrac{\text{mass of element}}{\text{mass of compound}} \times 100\%$

Part A Completion

Use this completion exercise to check your knowledge of the terms and your understanding of the concepts introduced in this section. Each blank can be completed with a term, short phrase, or number.

The __**1**__ of a compound is the percent by mass of each

element in a compound. The percent by mass of an element in a

compound is the number of grams of the element per __**2**__ g

of the compound, multiplied by 100%. To calculate the percent by

mass of an element in a known compound, divide the mass of the

element in one mole by the __**3**__ and multiply by 100%.

A(n) __**4**__ formula represents the lowest __**5**__ ratio of the

elements in a compound. It can be calculated from a compound's

percent composition. The __**6**__ formula of a compound is either

the same as its empirical formula, or it is some whole-number

multiple of it.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

_____ **7.** It is necessary to know the formula of a compound in order to calculate its percent composition.

_____ **8.** If the percent by mass of carbon in methane, CH_4, is 75%, then 100 grams of methane contain 25.0 grams of hydrogen.

_____ **9.** The formula for methane, CH_4, is both a molecular and an empirical formula.

_____ **10.** The empirical formula for glucose, $C_6H_{12}O_6$, is $C_2H_4O_2$.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A   Column B

_____ **11.** percent composition   **a.** describes the actual number of atoms of each element in a molecule of a compound

_____ **12.** empirical formula   **b.** the lowest whole-number ratio of atoms of the elements in a compound

_____ **13.** molecular formula   **c.** the percent by mass of each element in a compound

Part D Problems

Solve the following problems in the space provided. Show your work.

14. What is the percent composition of each of the following?

   a. Cr_2O_3 **c.** HgS

   b. $Mn_2P_2O_7$ **d.** $Ca(NO_3)_2$

15. Determine the empirical formula of the compound with the percent composition of 29.1% Na, 40.5% S, and 30.4% O.

16. How many kilograms of iron can be recovered from 639 kilograms of the ore Fe_2O_3?