

## CHAPTER 7 REVIEW

# Chemical Formulas and Chemical Compounds

## SECTION 4

**SHORT ANSWER** Answer the following questions in the space provided.

1. Write empirical formulas to match the following molecular formulas:

\_\_\_\_\_ a.  $C_2H_6O_4$

\_\_\_\_\_ b.  $N_2O_5$

\_\_\_\_\_ c.  $Hg_2C_{12}$

\_\_\_\_\_ d.  $C_6H_{12}$

2. \_\_\_\_\_ A certain hydrocarbon has an empirical formula of  $CH_2$  and a molar mass of 56.12 g/mol. What is its molecular formula?

3. A certain ionic compound is found to contain 0.012 mol of sodium, 0.012 mol of sulfur, and 0.018 mol of oxygen.

\_\_\_\_\_ a. What is its empirical formula?

\_\_\_\_\_ b. Is this compound a sulfate, sulfite, or neither?

**PROBLEMS** Write the answer on the line to the left. Show all your work in the space provided.

4. Water of hydration was discussed in **Sample Problem K** in **Section 4** of the text. Strong heating will drive off the water as a vapor in hydrated copper(II) sulfate. Use the data table below to answer the following:

Mass of the empty crucible	4.00 g
Mass of the crucible plus hydrate sample	4.50 g
Mass of the system after heating	4.32 g
Mass of the system after a second heating	4.32 g

\_\_\_\_\_ a. Determine the mass percentage of water in the original sample.

**SECTION 4** *continued*

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\_\_\_\_\_ b. The compound has the formula  $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$ .  
Determine the value of  $x$ .

c. What might be the purpose of the second heating?

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5. Gas X is found to be 24.0% carbon and 76.0% fluorine by mass.

\_\_\_\_\_ a. Determine the empirical formula of gas X.

\_\_\_\_\_ b. Given that the molar mass of gas X is 200.04  
g/mol, determine its molecular formula.

6. A compound is found to contain 43.2% copper, 24.1% chlorine, and 32.7% oxygen by mass.

\_\_\_\_\_ a. Determine its empirical formula.

b. What is the correct Stock system name of the compound in part a?

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## Assessment

# Chemical Formulas and Chemical Compounds

## Section Quiz: Determining Chemical Formulas

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question. For calculations that require the atomic mass of an element, use the atomic mass found on the periodic table on page 49 rounded to two decimal places.

- \_\_\_\_\_ 1. The smallest whole-number ratio of atoms of each element, combined in the simplest unit of a chemical compound is known as a(n)  
a. molecular formula.  
b. formula unit.  
c. empirical formula.  
d. molecule.
- \_\_\_\_\_ 2. What is the empirical formula for benzene,  $C_6H_6$ ?  
a. CH  
b.  $C_2H_2$   
c.  $C_3H_3$   
d.  $C_6H_6$
- \_\_\_\_\_ 3. What other information do you need in order to determine the molecular formula from the empirical formula of a compound?  
a. the number of moles of the compound  
b. the formula mass of the compound  
c. the oxidation numbers of all the elements in the compound  
d. the smallest whole-number mole ratio of the atoms in the compound
- \_\_\_\_\_ 4. What is the empirical formula for a compound that contains 1.18 mol Na, 1.18 mol N, and 3.53 mol O?  
a. NaNO  
b.  $NaNO_2$   
c.  $Na_2NO$   
d.  $NaNO_3$
- \_\_\_\_\_ 5. What is the empirical formula for a compound that contains 83.01% K and 16.98% O by mass?  
a. KO  
b.  $KO_2$   
c.  $K_2O$   
d.  $K_5O$

**Section Quiz, *continued***

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- \_\_\_\_\_ 6. What is the empirical formula of a compound that contains 79.86% I and 20.14% O by mass?
- IO
  - I<sub>2</sub>O<sub>2</sub>
  - IO<sub>2</sub>
  - I<sub>4</sub>O
- \_\_\_\_\_ 7. What is the empirical formula for lactic acid, which has a molecular formula of C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>?
- CH<sub>2</sub>O
  - C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>
  - C<sub>3</sub>H<sub>6</sub>
  - CHO
- \_\_\_\_\_ 8. NaCl is
- a molecular formula only.
  - an empirical formula only.
  - both an empirical formula and a chemical formula.
  - both a molecular formula and an empirical formula.
- \_\_\_\_\_ 9. What is the empirical formula mass of the compound C<sub>2</sub>H<sub>4</sub>?
- 13.02 g
  - 14.03 g
  - 26.04 g
  - 28.05 g
- \_\_\_\_\_ 10. What is the molecular formula for the compound with an empirical formula of NO<sub>2</sub> and a formula mass of 92.02 u?
- NO<sub>2</sub>
  - N<sub>2</sub>O<sub>4</sub>
  - N<sub>4</sub>O<sub>8</sub>
  - NO

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## Section Quiz, *continued*

### THE PERIODIC TABLE

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