

## 10.1

## THE MOLE: A MEASUREMENT OF MATTER

## Section Review

## Objectives

- Relate Avogadro's number to a mole of a substance
- Calculate the mass of a mole of any substance
- Describe methods of measuring the amount of something
- Compare and contrast the atomic mass of an element and its molar mass

## Vocabulary

- mole (mol)
- Avogadro's number
- representative particle
- molar mass

## Key Equations

- moles = representative particles  $\times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ representative particles}}$
- representative particles = moles  $\times \frac{6.02 \times 10^{23} \text{ representative particles}}{1 \text{ mole}}$

## 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.

Chemists relate units of counting, of mass, and of volume to a single quantity called the 1. The number of representative particles in a mole of a substance is 2.

To find the mass of a mole of a compound, scientists add together the 3 of the atoms making up the compound.

When you substitute the unit *grams* for amu, you obtain the 4 of the compound. There are 5 representative particles in a mole of any substance.

## Part B True-False

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

- \_\_\_\_\_ 6. A mole of a pure substance contains  $6.02 \times 10^{23}$  atoms.
- \_\_\_\_\_ 7. The representative particle of a compound is the molecule.
- \_\_\_\_\_ 8. A mole of  $\text{CCl}_4$  is composed of one atom of carbon and four atoms of chlorine.
- \_\_\_\_\_ 9. A mole of carbon atoms has a mass approximately three times as great as the mass of a mole of helium atoms.
- \_\_\_\_\_ 10. The molar mass of nitrogen gas is 14.0 g.

## Part C Matching

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

### Column A

- \_\_\_\_\_ 11. Avogadro's number
- \_\_\_\_\_ 12. molar mass
- \_\_\_\_\_ 13. mole
- \_\_\_\_\_ 14. representative particles

### Column B

- a. the atoms, molecules, or ions present in a substance
- b.  $6.02 \times 10^{23}$
- c. the mass of one mole of a substance
- d. SI unit that measures the amount of a substance

## Part D Problems

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

15. How many moles of Pb is  $9.3 \times 10^{15}$  atoms of Pb?
16. What is the molar mass of ethane,  $\text{C}_2\text{H}_6$ ?
17. Find the mass of  $3.65 \times 10^{-2}$  mol  $\text{K}_2\text{SO}_4$ .
18. How many representative particles are in 2.5 mol  $\text{H}_2\text{O}_2$ ?