Solids

SECTION 3

OBJECTIVES

- Describe the motion of particles in solids and the properties of solids according to the kinetic-molecular theory.
- Distinguish between the two types of solids.
- Describe the different types of crystal symmetry. Define *crystal structure* and *unit cell.*

The common expression "solid as a rock" suggests that something is hard or unyielding and has a definite shape and volume. In this section you will examine the properties of solids and compare them with those of liquids and gases. The properties of solids are explained in terms of the kinetic-molecular theory, as the other states of matter are.

Properties of Solids and the Kinetic-Molecular Theory

The particles of a solid are more closely packed than those of a liquid or gas. Intermolecular forces between particles are therefore much more effective in solids. All interparticle attractions such as dipole-dipole attractions, London dispersion forces, and hydrogen bonding exert stronger effects in solids than in the corresponding liquids or gases. Attractive forces tend to hold the particles of a solid in relatively fixed positions, with only vibrational movement around fixed points. Because the motions of the particles are restricted in this way, solids are more ordered than liquids and are much more ordered than gases. The importance of order and disorder in physical and chemical changes will be discussed in Chapter 16. Compare the physical appearance and molecular arrangement of the element in **Figure 9** in solid, liquid, and gas form.

CHEMISTRY INTERACTIVE TUTOR

Module 1: States of Matter/Classes of Matter

FIGURE 9 Particles of sodium metal in three different states are shown. Sodium exists in a gaseous state in a sodium-vapor lamp.