Pearson

Chapter 11
Liquids, Solids, and Intermolecular Forces

On the space station, astronauts live in the absence of gravity. A sample of spilled water in the absence of gravity forms a perfect sphere. This behavior is a direct result of intermolecular forces—attractive forces that exist among the particles that compose matter.

> "It's a wild dance floor there at the molecular level."
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> *—Roald Hoffmann (1937–)*

Learning Outcomes

RECALL FROM CHAPTER 1 that matter exists primarily in three states (or phases): solid, liquid, and gas. In Chapter 10, we examined the gas state. In this chapter and the next, we turn to the liquid and solid states, known collectively as the *condensed* states. The liquid and solid states are more similar to each other than they are to the gas state. In the gas state, constituent particles—atoms or molecules—are separated by large distances and do not interact with each other very much. In the condensed states, constituent particles are close together and exert moderate to strong attractive forces on one another. Whether a substance is a solid, liquid, or gas depends on the structure of the particles that compose the substance. Remember the theme we have emphasized since Chapter 1 of this book: The properties of matter are determined by the properties of the particles that compose it. In this chapter, we will consider how the structure of a particular atom or molecule determines its state at a given temperature.