**Chemistry and Life**

Chemistry is everywhere! From the combustion of wood to the synthetic fibers that make up the tent and much of the clothing. The steel cooking grate is an alloy of iron and carbon (if it is stainless steel it has other metals such as chromium and nickel mixed in). The trees in the background use a remarkable photochemical reaction to convert CO2 and water into complex carbohydrates. Our bodies are filled with both inorganic and bioorganic compounds such as bone and proteins, and run on a myriad of chemical reactions needed to keep us alive.

The tremendous variety of matter present in our world consists of combinations of only about 100 basic substances called *elements.* Our everyday experiences with matter take place at the **macroscale**, that is, dealing with samples of matter of a size that we can see, handle, and manipulate. But the basic building blocks of matter are atoms and molecules, which make up elements and compounds. In our interactions with matter, we do not handle or even observe these exceedingly tiny individual particles. Atoms and molecules exist at the **nanoscale**. (The general meaning of the prefix “nano” is *exceedingly small*; it has a definite numerical meaning of *one-billionth of.*) The chemical view of nature is that everything in the world around us is made up of atoms combined in very definite ways. Most substances are made up of small units called molecules. All of the properties and behavior of matter result from the properties of their atoms and molecules and the ways that they interact with one another. Throughout our study of chemistry, we always try to relate our macroscopic observations of matter to the nanoscale properties and behavior of its constituent atoms and molecules. Understanding these relationships is the very essence of chemistry; it provides us with a powerful way to describe the world around us.

The Greek philosopher Democritus (470–400 BC) suggested that all matter is composed of tiny, discrete, indivisible particles that he called atoms. His ideas, based entirely on philosophical speculation rather than experimental evidence, were rejected for 2000 years. By the late 1700s, scientists began to realize that the concept of atoms provided an explanation for many experimental observations about the nature of matter.