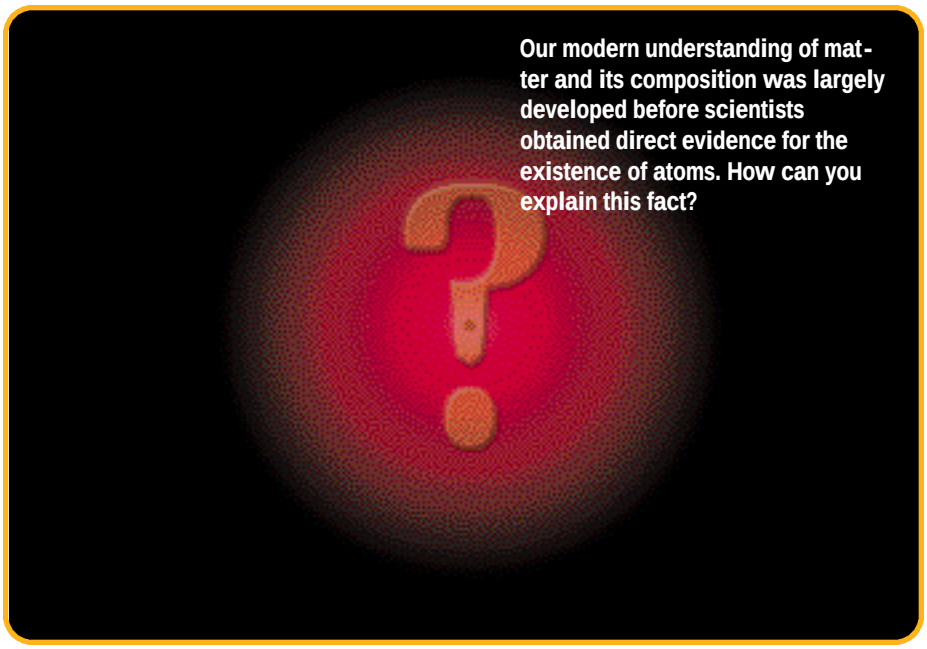
CHAPTER 2

Elements and the Periodic Table

Today, if you want to travel by air across the country or overseas, you take an airplane. During the first three decades of the twentieth century, you would have boarded a hydrogen-filled balloon such as the one shown in the black-and-white photograph. Large and small airships such as these, called dirigibles, were common sights in the skies above many North American and European cities. Unfortunately, during a landing in Lakehurst, New Jersey in 1937, the hydrogen in one of these airships, the *Hindenburg*, ignited. The resulting explosion killed 36 people, and marked the end of the use of hydrogen for dirigibles.

Gas-filled airships and balloons like the one shown in the colour photograph now use helium gas instead of hydrogen. Helium, unlike hydrogen, does not burn. In fact, helium is a highly unreactive gas. What is it about hydrogen that makes it so reactive? Why is helium so unreactive? The answer lies in the structure of the atoms of these elements. In previous science courses, you traced the history of our understanding of atoms and their structure. You also learned how chemists use properties to arrange elements, and the atoms of which they are made, into a remarkable tool called the periodic table. This chapter highlights and expands on key ideas from your earlier studies. By the end of the chapter, you will have a greater understanding of the properties of elements at an atomic level. This understanding is a crucial foundation for concepts that you will explore in your chemistry course this year.



Our modern understanding of matter and its composition was largely developed before scientists obtained direct evidence for the existence of atoms. How can you explain this fact?

Chapter Preview

Concepts and Skills You Will Need

Before you begin this chapter, review the following concepts and skills:

- expressing the results of calculations to the appropriate number of decimal places and significant digits (Chapter 1, section 1.2)