

SECTION 2-1

SECTION SUMMARY

Chemical Compounds in Cells

Guide for Reading

- ◆ What are the four main kinds of organic molecules in living things?
- ◆ How is water important to the function of cells?

An **element** is any substance that cannot be broken down into simpler substances. The smallest unit of an element is called an **atom**. The most common elements in living things are carbon, oxygen, hydrogen, and nitrogen. When two or more elements combine chemically, they form a **compound**. The smallest unit of most compounds is called a **molecule**.

Many of the compounds found in living things contain the element carbon, which is usually combined with other elements. Most compounds that contain carbon are called **organic compounds**. **The most important groups of organic compounds found in living things are carbohydrates, lipids, proteins, and nucleic acids.** Compounds that do not contain the element carbon are called **inorganic compounds**.

A **carbohydrate** is an energy-rich organic compound made of the elements carbon, hydrogen, and oxygen. Sugars and starches are examples of carbohydrates. Carbohydrates are important components of some cell parts, including cell walls and cell membranes. Carbohydrates also provide cells with energy.

Proteins are large organic molecules made of carbon, hydrogen, oxygen, nitrogen, and, in some cases, sulfur. Cells use proteins for cell membranes and many of the organelles within the cell. Protein molecules are made up of smaller molecules called **amino acids**. An **enzyme** is a type of protein that speeds up a chemical reaction in a living thing. Without enzymes, many chemical reactions that are necessary for life would either take too long or not occur at all.

Fats, oils, and waxes are all **lipids**. Lipids are energy-rich organic compounds made of carbon, hydrogen, and oxygen.

Nucleic acids are very large organic molecules made of carbon, oxygen, hydrogen, nitrogen, and phosphorus. Nucleic acids contain the instructions that cells need to carry out all the functions of life. There are two kinds of nucleic acids: DNA and RNA. Deoxyribonucleic acid, or **DNA**, is passed from parent to offspring and directs all of the cell's functions. Ribonucleic acid, or **RNA**, plays an important role in the production of proteins.

Water plays many vital roles in cells. **Without water, most chemical reactions within cells could not take place.** Water also helps cells keep their size and shape and helps keep the temperature of cells from changing rapidly.