

We read earlier in this chapter that matter may be classified according to its physical state as solid, liquid, or gas. This is called the law of definition composition. Nonmetals include solids, such as carbon and sulfur, and gases, such as oxygen, hydrogen, nitrogen, and helium. The list of elements grew and scientists looked for a pattern in order to understand their behavior. In 1869, the Russian chemist Dmitri Mendeleev organized all the known elements, according to their weights and properties, into a table called the periodic table of elements. To date, 92 natural elements have been identified. Each compound has more than one type of atom within each molecule, and a compound has characteristics that are distinct from the characteristics of its constituents. Scientists classify matter on the basis of chemical composition as elements, compounds, or mixtures. Finally, in the 18th century, the early chemists disproved the theory of the four elements when they determined that water was composed of hydrogen and oxygen, and air composed of nitrogen and oxygen. After that, many other substances were determined to be elements, and they were categorized as metals and nonmetals. For example, when the two atoms of hydrogen combine with one atom of oxygen, an entirely new substance is formed –  $H_2O$  or water! Salt is compound of sodium which is an active metal, and chlorine, which is a poisonous gas. Soil, cement, wood, rocks, and food products are categorized as mixtures. Elements are the basic substances that cannot be decomposed or broken down into simpler substances by ordinary chemical means. During the Middle Ages, the alchemists secretly experimented with metals.