

PART III. ATOMS

This unit deals with two of the fundamental concepts in chemistry, the *atomic theory* and the *chemical periodic table*. When you finish this unit you will understand what atoms, ions, elements and isotopes are, and how their properties are measured and explained in terms of fundamental subatomic particles. You will also begin to learn the language of chemistry through the symbolism used to represent atoms, isotopes and ions.

The foundation concepts for this unit are that, except under relatively extreme energy conditions, *all matter is composed of fundamental components, called atoms, of which there are a finite number (about 100) of different types, called elements, that atoms, in turn, are composed of more fundamental particles, of which there are a finite number (3 dominant) of different types, and that the behavior of matter is described accurately by wave mechanics.* These concepts will be applied to the analysis and behavior of elemental matter.

The notions related to atomic behavior were first discovered through experimentation and applied as heuristics to explain and predict. Now they are understood through more fundamental principles that provide theoretical justification for the algorithms of atomic science. The long history of the analysis of matter achieved three landmarks with John Dalton's atomic theory at the beginning of the Nineteenth Century, Ernest Rutherford's nuclear theory at the beginning of the Twentieth, and Erwin Schrödinger's wave theory of 1925. These models of the structure of matter will form the subject of this unit.