

## ♦ *Chapter 2: The Chemical Context of Life*

### *Outline*

- I. Matter consists of chemical elements in pure form and in combinations called compounds.
- II. Life requires about 25 chemical elements
- III. Atomic structure determines the behavior of an element
  - A. Subatomic particles
  - B. Atomic Number
  - C. Atomic Weight
  - D. Isotopes
  - E. Energy Levels
  - F. Electron Orbitals
  - G. Electron Configuration
  - H. Chemical Properties
- IV. Atoms combine by chemical bonding to form molecules
  - A. Covalent Bonds (polar, non-polar)
  - B. Ionic Bonds
- V. Weak chemical bonds play important roles in the chemistry of life
- VI. A molecule's biological function is related to its shape
- VII. Chemical reactions change the composition of matter
- VIII. Chemical conditions on the early earth set stage for origin and evolution of life

### *Key Terms*

matter	electron	potential energy	covalent bond
atomic number	electron shell	polar covalent	element
mass number	orbital	ionic bond	hydrogen bond
trace element	isotope	valence electrons	cation
compound	radioactive	chemical bond	anion
atom	half life	molecule	ion
proton	energy	electronegativity	neutron

### *Objectives*

After reading this chapter, the student will be able to:

- 1 State four elements essential to life and make up 96% of living matter.
- 2 Explain why radioisotopes are important to biologists.
- 3 Explain how electron configuration influences the chemical behavior of an atom.
- 4 Explain how electronegativity influences the formation of chemical bonds.
- 5 Distinguish among nonpolar covalent, polar covalent & ionic bonds.
- 6 Describe the formation of a hydrogen bond & explain how it differs from a covalent or ionic bond.
- 7 Explain why weak bonds are important to living organisms.
- 8 Describe the chemical conditions on early Earth & explain how they were different from today.