

Module 2: Basic Chemistry — Keys to Success

Learning Objectives

By the end of this module, you should be able to:

1. Describe atomic structure and subatomic particles
2. Explain how atoms form bonds (ionic, covalent, hydrogen)
3. Distinguish between polar and non-polar molecules
4. Explain water's properties and their importance for life
5. Use the pH scale and explain buffers

Key Terms to Know

- **Atom** — Smallest unit of matter retaining element properties
- **Proton** — Positive charge, in nucleus, determines atomic number
- **Neutron** — No charge, in nucleus, determines isotope
- **Electron** — Negative charge, orbits nucleus, determines bonding
- **Ionic Bond** — Transfer of electrons between atoms
- **Covalent Bond** — Sharing of electrons between atoms
- **Polar Molecule** — Unequal sharing of electrons (e.g., water)
- **Hydrogen Bond** — Weak attraction between H and electronegative atoms
- **Cohesion** — Water molecules sticking to each other
- **Adhesion** — Water sticking to other surfaces
- **Specific Heat** — Energy to raise temperature; water's is high
- **Solvent** — Substance that dissolves others; water is universal solvent
- **pH Scale** — Measures acidity/alkalinity (0-14)
- **Buffer** — Substance that resists pH changes

Study Tips

1. **Remember COHN** — Carbon, Oxygen, Hydrogen, Nitrogen are the four most common elements in living things

2. **Draw water molecules** — Show hydrogen bonds between them
3. **Use the pH scale** — 7 is neutral, <7 is acidic, >7 is basic
4. **Know that pH is logarithmic** — Each number is $10\times$ change