CHAPTER 11 LEARNING OBJECTIVES

To satisfy the minimum requirements for this course, you should be able to:

Use the kinetic-molecular theory to explain the differences in the physical properties of gases, liquids, and solids (Table 11.1)

Distinguish between intramolecular forces and intermolecular forces and discuss their relative strengths

Describe the various types of intermolecular forces (dipole-dipole forces, ion-dipole forces, dispersion forces, and hydrogen bonds) and be able to:

- discuss their relative strengths
- state the kinds of intermolecular forces expected for a substance given its molecular structure
- list substances in order of increasing boiling or melting point given their molecular structures
- define surface tension, capillary action, and viscosity and account for the variations in these properties in terms of intermolecular forces and temperature
- explain how hydrogen bonding affects the properties of water

Distinguish between crystalline and amorphous solids

Predict the type of crystalline solid (ionic, molecular, covalent network, or metallic) formed by a substance and explain how the properties of a crystalline solid are determined by the forces that hold the particles together (table 11.4)

Name the six phase change processes and be able to:

- explain what is meant by dynamic equilibrium
- define vapor pressure and describe its dependence on the strength of intermolecular forces and temperature
- define boiling point and melting (freezing) point and explain why the boiling point of a liquid depends on the pressure on the surface of the liquid
- rationalize the energy changes associated with each phase change (ΔH_{vap}, ΔH_{fus}, ΔH_{sub}) and explain why temperature remains constant during a phase change
- use heat capacities and heats of fusion and vaporization to calculate the heat absorbed or evolved when a substance is heated or cooled and undergoes phase changes
- draw a phase diagram of a substance given appropriate data and use a phase diagram to predict which phases are present at any given temperature and pressure and identify the critical temperature, critical pressure, and triple point