CHAPTER HIGHLIGHTS

Gases and Pressure

Vocabulary

pressure
newton
barometer
millimeters of mercury
atmosphere of pressure
pascal
partial pressure
Dalton's law of partial pressures

- The kinetic-molecular theory of gases describes an ideal gas. The behavior of most gases is nearly ideal except at very high pressures and low temperatures.
- A barometer measures atmospheric pressure.
- Dalton's law of partial pressure states that in a mixture of unreacting gases, the total pressure equals the sum of the partial pressures of each gas.

The Gas Laws

Vocabulary

Boyle's law
absolute zero
Charles's law
Gay-Lussac's law
combined gas law

- Boyle's law states the inverse relationship between the volume and the pressure of a gas:

$$PV = k$$

- Charles's law illustrates the direct relationship between a gas's volume and its temperature in kelvins:

$$V = kT$$

- Gay-Lussac's law represents the direct relationship between a gas's pressure and its temperature in kelvins:

$$P = kT$$

- The combined gas law, as its name implies, combines the previous relationships into the following mathematical expression:

$$\frac{PV}{T} = k$$

Gas Volumes and the Ideal Gas Law

Vocabulary

Gay-Lussac's law of combining volumes of gases
Avogadro's law
standard molar volume of a gas
ideal gas law
ideal gas constant

- Gay-Lussac's law of combining volumes states that the volumes of reacting gases and their products at the same temperature and pressure can be expressed as ratios of whole numbers.
- Avogadro's law states that equal volumes of gases at the same temperature and pressure contain equal numbers of molecules.
- The volume occupied by one mole of an ideal gas at STP is called the *standard molar volume,* which is 22.414 10 L.
- Charles's law, Boyle's law, and Avogadro's law can be combined to create the ideal gas law:

$$PV = nRT$$

Diffusion and Effusion

Vocabulary

Graham's law of effusion

- Gases *diffuse,* or become more spread out, due to their constant random molecular motion.
- Graham's law of effusion states that the relative rates of effusion of gases at the same temperature and pressure are inversely proportional to the square roots of their molar masses.