

Chapter 5 – Gases

Pressure Units and measurements, use of the manometer;

Basic Gas Laws: Boyle's, Charles, Avogadro's, Combined gas law.

The Ideal Gas Law, Value of R (universal gas constant), STP conditions.

Applications of Ideal Gas Law: Calculations of molar volume, molar mass, molecular weight, and density of gas.

Gas Stoichiometry

Dalton's Law of Partial Pressures and collecting gases over water.

Kinetic-Molecular Theory of Gases, Graham's Law of Effusion and Diffusion,

Deviations of a gas from Ideal behavior of "real" gases, General Understanding of van der Waals equation.

Suggested Exercises for Chapter 5: Self-Assessment Quiz (p. 236-237)

Problems: 27, 29, 31, 33, 35, 43, 45, 51, 55, 57, 61, 63, 65, 69, 73, 77, 79, 81, 87, 89, 97, 99, 101, 103, 109, 113, 117, 123, 125, 129, 133, 137.

Chapter 11- Liquids, Solids and Intermolecular Forces

Solids, Liquids and Gases-Molecular Comparison

Crystalline and Amorphous Solids

Changes between States

Types of Intermolecular Forces: Ion-Dipole, Dipole-Dipole, Hydrogen Bonds, London dispersion forces and polarizability.

Properties related to Intermolecular Forces:

1. Vapor Pressure;
2. Normal Boiling Point;
3. Molar Heat of Vaporization;
4. Surface Tension;
5. Viscosity;
6. Capillary Action.

Phase Changes: ΔH , {Heat of Fusion, Heat of Vaporization}, Heating curves, Phase Diagrams, Equilibrium between phases. Melting Point, Boiling Point and vapor pressure, Critical temperature and pressure, Supercritical fluids.

Suggested Exercises for Chapter 11: Self-Assessment Quiz (p. 522)

Problems: 35, 39, 41, 43, 45, 46, 49, 57, 59, 69, 71, 73, 77, 89, 90, 95, 99, 101.

Chapter 12- Solids [Section 12.4, 12.5 and 12.6 only]

Fundamental Types of Crystalline Solids {Molecular, Ionic and Atomic (metallic and network covalent –carbon and silicates)}

Basic structure of ionic solids.

(Although this chapter contains lots of interesting stuff, due to time constraints we will not be covering the topics in lecture. In your spare time, you should read the sections on modern materials (12.7-12.9) to see the practical applications of compounds).

Suggested Exercises for Chapter 11: Self-Assessment Quiz (p. 561: Q7 and 8)

Problems: 39, 41, 42, 43, 44

Chapter 4 - General Properties and Reactions of Aqueous Solutions [Sections 4.5, 4.6 and 4.7]

Types of aqueous solutions and solubility,
Properties of aqueous solutions, Strong, Weak and Nonelectrolytes,
General Solubility Rules, Precipitation reactions,
Molecular, Complete Ionic and Net Ionic Equations.
Solution Stoichiometry using Molarity, Acid-Base Titrations.

Suggested Exercises for Chapter 11: Self-Assessment Quiz (p. 182-183: Q8 to Q12)
Problems: 71, 73, 79, 87, 120,130.

Chapter 13 - Solutions

Types of Solutions and Solubility, Effect of Intermolecular forces,
Energetics of Solution Formation,
Unsaturated, Saturated and Supersaturated Solutions,
Factors Affecting Solubility – Temperature and Pressure, Henry's Law,
Concentration Units: % by Mass, Molarity (M) , Mole Fraction (X), Molality (m); ppm, ppb,
Colligative Properties:
1. Vapor Pressure Lowering and Raoult's Law, 2) freezing point depression,
3) boiling point elevation, 4) determination of molar mass. 5) Overview of Osmotic pressure
Colligate properties of Strong Electrolytes- van't Hoff factor, Ion Pairing.

Suggested Exercises for Chapter 13: Self-Assessment Quiz (p. 611)
Problems: 29, 33, 35, 39, 41, 43, 49, 50, 51, 55, 59, 63, 67, 71, 73, 79, 83, 87, 93, 99, 119, 121, 123, 131.

Oxidation- Reduction: Chapter 4.9

Definition of Oxidation and Reduction, Calculation of Oxidation States (Oxidation Number),
Identifying Redox Reactions, Oxidizing agent and Reducing agent

Suggested Exercises for Chapter 4.9: Self-Assessment Quiz (p. 611, Q13 and 14)
Problems: 93, 97, 98.

Also, Review Problems like in Experiments 6-9 and Study Assignments 6-9.