

BASIC KNOWLEDGE IN CHEMISTRY

PART 1 — GENERAL CHEMISTRY

Atoms, Molecules, and Ions

- Atomic theory and structure
- Isotopes and atomic masses
- Periodic table and periodic trends
- Types of chemical bonds: ionic, covalent, metallic
- Introduction to molecular geometry (VSEPR theory)

Stoichiometry and Chemical Reactions

- Mole concept, Avogadro's number
- Balancing chemical equations
- Types of reactions:
 - Combination
 - Decomposition
 - Single-displacement
 - Double-displacement (precipitation, acid-base reactions)
 - Oxidation-reduction reactions

Chemical Bonding and Molecular Structure

- Lewis structures
- Formal charges
- Resonance structures
- Bond polarity and dipole moments
- Hybridization (sp^3 , sp^2 , sp)
- Molecular orbitals (basic concepts)

States of Matter and Intermolecular Forces

- Gases, Liquids and solids
- Intermolecular forces (London dispersion, dipole-dipole, hydrogen bonding)

Solutions and Solubility

- Types of solutions (solid, liquid, gas)
- Concentration units: molarity, ppm, ppb
- Factors affecting solubility:
 - Temperature
 - Pressure (Henry's Law for gases)

- Saturated, unsaturated, supersaturated solutions
- Precipitation reactions

PART 2 — ORGANIC CHEMISTRY

Introduction to Organic Molecules

- Carbon bonding: sp^3 , sp^2 , sp hybridization
- Hydrocarbons: alkanes, alkenes, alkynes, aromatics
- Functional groups overview:
 - Alcohols, ethers, aldehydes, ketones
 - Carboxylic acids, esters, amides, amines
- Molecular structure and polarity

Polymers and Macromolecules

- Natural polymers:
 - Polysaccharides, Proteins
- Synthetic polymers:
 - Acrylics, polyesters, vinyls

TEXTS

GENERAL CHEMISTRY

- Chemistry: The Central Science, Theodore E. Brown, H. Eugene LeMay, Bruce E. Bursten, Catherine Murphy
- General Chemistry, Atkins, L. Jones, L. Laverman,
- Principle of Chemistry, O.S.S. Zumdahl,

ORGANIC CHEMISTRY

- Fundamentals of Organic Chemistry 5th Edition, T. W. Graham Solomons
- Organic Chemistry, McMurry