



NMAT Chemistry

Suggested Study Plan

❖ General and Inorganic Chemistry

Week 1

Suggested Time Plan: 6 hrs

Matter

- Classification of Matter (elements, compounds, mixtures)
- Physical vs Chemical Changes
- Macroscopic Properties of Matter (density, temperature, pressure, volume)

Atomic Structure and the Periodic Table

- Bohr's Model of the Atom
- Atomic Number and Mass Number
- Isotopes
- Energy Levels and Orbitals
- Electron Configuration
- Quantum Numbers
- Periodic Table Structure
- Periodic Table Trends

Chemical Bonding, Chemical Compounds, and Chemical Formulas

- Types of Chemical Bonds and Compounds
- Simple and Polyatomic Ions and their Charges
- Writing and Naming Compounds
- Chemical Formulas: Molecular Formula and Empirical Formula
- Laws of Definite and Multiple Proportions

Lewis Structures, Molecular Geometry, and Intermolecular Forces

- Lewis Structures
- VSEPR Theory and Molecular Geometry
- Polar Bond
- Dipole Moment
- Intermolecular Forces: Hydrogen Bonding, London Dispersion Forces

Week 2

Suggested Time Plan: 6 hrs

Chemical Equations, Mole Concept, and Stoichiometry

- Chemical Equations and Reactions
- Mole Concept
- Mole Ratios
- Chemical Quantities and Stoichiometry
- Limiting Quantities and Percent Yield
- Chemical Equilibrium and Le Chatelier's Principle

Solutions

- Solution Formation and Colligative Properties
- Solubility
- Solution Concentrations: Mass per Volume, Molarity, Molality
- Dilution Formula
- Ionic Concentration
- Percentage Composition
- Normality and Equivalent

Acids and Bases

- Theories on Acids and Bases
- Conjugate Acid-Base Pairs
- Strong and Weak Acids and Bases
- pH Concept
- Acid-Base Neutralization
- Buffers

❖ Analytical Chemistry (Week 3)

Suggested Time Plan: 2 hrs

Basic Concepts in Chemical Analysis

- Methods of Chemical Analysis
- Gravimetric Analysis
- Gravimetric Factor
- Titrimetric Analysis

❖ Physical Chemistry (Week 3)

Suggested Time Plan: 4 hrs

Behavior of Gases

- Gas Variables and Kinetic Molecular Theory of Gases
- Gas Laws (Boyle's, Charles', Gay Lussac's, Combined Gas, and Avogadro's Laws, Ideal Gas Law, Dalton's Law of Partial Pressures, and Graham's Law)

Thermochemistry and Thermodynamics

- Law of Conservation of Energy, Activation Energy
- Energy Changes in Chemical Reactions
- Exothermic and Endothermic Reactions
- Heat Transfer and Calorimetry
- Laws of Thermodynamics
- Gibbs' Free Energy and Spontaneity of Reactions.

❖ Organic Chemistry (Week 4)

Suggested Time Plan: 8 hrs

Chemical Bonding in Organic Compounds

- Common Elements in Organic Compounds
- Valence Electrons and Bond Order
- Hybrid Orbitals
- Resonance

Hydrocarbons

- Characteristics and Classification of Hydrocarbons
- Aliphatic Hydrocarbons
- Branched and Cyclic Hydrocarbons
- Degree of Unsaturation
- Physical and Chemical Properties of Hydrocarbons
- Benzene and Aromatic Compounds

Functional Groups, Naming Organic Compounds and Isomers

- Functional Groups
- Naming Organic Compounds
- Constitutional Isomers
- Stereoisomers
- Diastereomers (Cis-Trans-Isomers, Conformers, Epimers, Anomers)

Major Organic Reactions

- Petrochemical Reactions: Combustion and Cracking
- Electrophilic and Nucleophilic Addition Reactions
- Elimination Reactions and Substitution Reactions (Free Radical Substitution, Electrophilic/Nucleophilic Aromatic Substitution)
- Reduction-Oxidation (Redox) Reactions

❖ **Biochemistry (Week 5)**

Suggested Time Plan: 4 hrs

Biomolecules

- Proteins,
- Carbohydrates
- Lipids
- Nucleic Acids

Reactions of Biomolecules

- Dehydration Synthesis and Hydrolysis of Polymers
- Oxidation and Reduction Reactions
- Reducing Sugars and Biochemical Tests for Sugars
- Reactions of Fats and Oils: Esterification, Hydrogenation, Oxidation, Beta-Oxidation
- Phosphorylation and Dephosphorylation Reactions
- Disulfide Bond Formation and Structure of Proteins

❖ **Take Chemistry Practice Tests and Mock Exam (Week 5)**