



SYLLABUS FOR CHEMISTRY (XL: SECTION H)

(Compulsory Section)

Atomic structure and periodicity:

Planck's quantum theory, wave particle duality, uncertainty principle, quantum mechanical model of hydrogen atom; electronic configuration of atoms; periodic table and periodic properties; ionization energy, electron affinity, electronegativity, atomic size.

Structure and bonding:

Ionic and covalent bonding, M.O. and V.B. approaches for diatomic molecules, VSEPR theory and shape of molecules, hybridisation, resonance, dipole moment, structure parameters such as bond length, bond angle and bond energy, hydrogen bonding, van der Waals interactions. Ionic solids, ionic radii, lattice energy (Born-Haber Cycle).

s.p. and d Block Elements:

Oxides, halides and hydrides of alkali and alkaline earth metals, B, Al, Si, N, P, and S, general characteristics of 3d elements, coordination complexes: valence bond and crystal field theory, color, geometry and magnetic properties.

Chemical Equilibria:

Colligative properties of solutions, ionic equilibria in solution, solubility product, common ion effect, hydrolysis of salts, pH, buffer and their applications in chemical analysis, equilibrium constants (K_c , K_p and K_x) for homogeneous reactions,

Electrochemistry:

Conductance, Kohlrausch law, Half Cell potentials, emf, Nernst equation, galvanic cells, thermodynamic aspects and their applications.

Reaction Kinetics:

Rate constant, order of reaction, molecularity, activation energy, zero, first and second order kinetics, catalysis and elementary enzyme reactions.

Thermodynamics:

First law, reversible and irreversible processes, internal energy, enthalpy, Kirchoff's equation, heat of reaction, Hess law, heat of formation, Second law, entropy, free energy, and work function. Gibbs-Helmholtz equation, Clausius-Clapeyron equation, free energy change and equilibrium constant, Troutons rule, Third law of thermodynamics.

Basis of Organic Reactions Mechanism:

Elementary treatment of SN1, SN2, E1 and E2 reactions, Hoffmann and Saytzeff rules, Addition reactions, Markonikoff rule and Kharash effect, Diels-Alder reaction, aromatic electrophilic substitution, orientation effect as exemplified by various functional groups. Identification of functional groups by chemical tests

Structure-Reactivity Correlations:

Acids and bases, electronic and steric effects, optical and geometrical isomerism, tautomerism, conformers, concept of aromaticity