CH101 Chemistry (3-1-0-8)

Structure and Bonding; Origin of quantum theory, postulates of quantum mechanics; Schrodinger wave equation: operators and observables, superposition theorem and expectation values, solutions for particle in a box, harmonic oscillator, rigid rotator, hydrogen atom; Selection rules of microwave and vibrational spectroscopy; Spectroscopic term symbol; Molecular orbitals: LCAO-MO; Huckel theory of conjugated systems; Rotational, vibrational and electronic spectroscopy; Chemical Thermodynamics: The zeroth and first law, Work, heat, energy and enthalpies; The relation between C_v and C_p; Second law: entropy, free energy (the Helmholtz and Gibbs) and chemical potential; Third law; Chemical equilibrium; Chemical kinetics: The rate of reaction, elementary reaction and chain reaction; Surface: The properties of liquid surface, surfactants, colloidal systems, solid surfaces, physisorption and chemisorption; The periodic table of elements; Shapes of inorganic compounds; Chemistry of materials; Coordination compounds: ligand, nomenclature, isomerism, stereochemistry, valence bond, crystal field and molecular orbital theories; Bioinorganic chemistry and organometallic chemistry; Stereo and regio-chemistry of organic compounds, conformers; Pericyclic reactions; Organic photochemistry; Bioorganic chemistry: Amino acids, peptides, proteins, enzymes, carbohydrates, nucleic acids and lipids; Macromolecules (polymers); Modern techniques in structural elucidation of compounds (UV-vis, IR, NMR); Solid phase synthesis and combinatorial chemistry; Green chemical processes.

Textbooks:

[1] P. W. Atkins, Physical Chemistry, 5th Ed., ELBS, 1994.

[2] C. N. Banwell, and E. M. McCash, Fundamentals of Molecular Spectroscopy, 4th Ed., Tata McGraw-Hill, 1962

[3] F. A. Cotton, and G. Wilkinson, Advanced Inorganic Chemistry, 3rd Ed., Wiley Eastern Ltd., New Delhi, 1972, reprint in 1988.

[4] D. J. Shriver, P. W. Atkins, and C. H. Langford, Inorganic Chemistry, 2nd Ed., ELBS, 1994.

[5] S. H. Pine, Organic Chemistry, McGraw-Hill, 5th Ed., 1987

References:

[1] I. A. Levine, Physical Chemistry, 4th Ed., McGraw-Hill, 1995.

[2] I. A. Levine, Quantum Chemistry, EE Ed., prentice Hall, 1994.

[3] G. M. Barrow, Introduction to Molecular Spectroscopy, International Edition, McGraw-Hill, 1962.

[4] J. E. Huheey, E. A. Keiter and R. L. Keiter, Inorganic Chemistry: Principle, structure and reactivity, 4th Ed., Harper Collins, 1993

[5] L. G. Wade (Jr.), Organic Chemistry, Prentice Hall, 1987.