

Medi-Caps University

Syllabus for Ph. D. Entrance Exam in Chemistry

Unit I

Chemical Kinetics: Reaction rate, Rate Law, Order, Molecularity, Methods of determining rate laws, Collision and absolute reaction rate theory, Homogeneous catalysis, Michaelis-Menton kinetics, Heterogeneous catalysis, Salt effect, Complex reactions, Photochemical reactions.

Unit II

Spectroscopy: Introduction, Principle, Electromagnetic spectrum, quantization of energy, Electronic, vibrational and rotational energy levels, and transitions in atoms and molecules. Absorption and emission spectra. Beer- Lambert's Law and its limitations, Principle, Instrumentation and applications of IR, NMR, UV, Visible and Mass spectroscopy, Gas Chromatography.

Unit III

Metal and Metalloids: Main group elements and their compounds- Synthesis, structure, properties and applications, Chemistry of Transition elements and co-ordination compounds- structure, bonding, spectral and magnetic properties, Organometallic compounds, Metal ions in biology, Properties and applications of metalloids.

Unit IV

Water and Water Analysis: Sources, Impurities, Hardness & its units, Industrial water characteristics, softening of water by various methods (External & Internal treatment), Boiler trouble- causes, effects & remedies, Characteristics of municipal water & its treatment, Numerical problems based on softening methods. Alkalinity, hardness (Complexometric), Chloride, Free chlorine, DO, BOD and COD determination of water sample, Numerical problems based on above techniques.

Unit V

Carbon and its compound: Aromaticity, Chemistry of natural products, Stability and reactivity of carbocations, carbanions and free radicals, Organic reaction mechanism involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species, Selective organic named reactions- Stork enamine reaction, Michael addition, Mannich reaction, Ene reaction, Barton reaction, Baeyer- Villiger reaction, Shapiro reaction.