

UG - CHEMISTRY

Syllabus for Entrance Examination - UG - 2018

Chemistry

Inorganic Chemistry: Structure of Atom, Periodicity and Bonding: Plank's Quantum Theory, Bohr's Atomic model, Hydrogen spectra and its explanation by Bohr's atomic model, wave-particle duality, De-Broglie's equation, photoelectric effect, Heisenberg uncertainty principle, Schrodinger wave equation, definition wave function and operator, radial and angular wave function, quantum numbers, Pauli exclusion principle and Hund's rule, electronic configuration, modern periodic table and periodicity in properties like in electron affinity, ionization energy, electronegativity, ionic/ covalent radii etc. Type of chemical bonds, Lewis structure, explanation of bond formation (ionic bond through energy consideration and covalent bonds through orbital overlap), VSEPR theory, concept of hybridization, molecular diagram for homonuclear diatomic molecules, percent ionic character, Fajan's rule, properties of ionic and covalent bond, molecular forces. General principles and methods of extraction, trends in physical and chemical properties of s- and p- block elements, especially for hydrides, oxides, hydroxides, halides and oxoacids of elements of different groups. Diagonal relationship, concept of allotrope and catenation, preparation and properties of borax, boric acid, silicones, silicates, zeolites and interhalogen compounds, d and f- block elements: General trends in properties of first row transition metals-metallic character, properties of $K_2Cr_2O_7$ and $KMnO_4$, electronic configuration trends in properties in lanthanoids and actinoids, lanthanide contraction and its consequence. IUPAC nomenclature, isomerism and general properties of coordination compounds, different bonding theories like (Werner's theory, VBT and CFT) for explaining bonding and associated properties of coordination compounds.

Organic Chemistry: General Introduction, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds, concept of electronic effects like, inductive effect, mesomeric effect, electromeric effect and hyperconjugation. Understanding of intermediates, like, carbocations, carbanions, free radicals, electrophile, nucleophiles, types of organic reactions. General preparation and important properties of alkane, alkenes, alkynes, aromatic compounds, alkyl halides and aryl halides, alcohols, phenols and ethers, aldehyde, ketones and carboxylic acids, amines, cyanides, isocyanides and diazonium salts, basic information about important biomolecules like, carbohydrates, proteins, nucleic acids and vitamins. Classification, preparation and properties of important polymers like polyethylene, nylon, bakelite rubber etc. Basic information about different types of chemicals in medicine (analgesic, antiseptic, disinfectant, antimicrobials, antifertility, antibiotic and antacids), food (preservatives, artificial sweetening agents, antioxidants), cleansing agents (soap and detergents).

Physical Chemistry: Understanding of stoichiometry, mole concept, empirical formula, empirical mass, molecular formula, molecular mass, chemical reaction. States of matter, intermolecular forces, melting and boiling points, ideal gas laws, deviation from ideal behaviour, Vander Waal's equation, liquefaction of gases, critical temperature, kinetic energy, molecular speeds, elementary idea of vapour pressure, viscosity and surface tension of liquids. Types of solution, expression of concentration of solutions of solid in liquid, colligative properties, abnormal molecular masses, Van't Hoff factor, solution of gas in liquid. Classification of solids based on different binding forces, elementary idea of amorphous and crystalline solids, unit cell and calculation of its density, packing efficiency, voids, number of atoms per unit cell in a cubic cell, point defect, electrical and magnetic properties associated with defects, band theory for explanation of conductors, semiconductors and insulators.

Thermodynamics, equilibrium and electrochemistry: System, its types and surrounding, extensive and intensive properties, state functions, work and heat, First law of thermodynamics and associated concepts like heat capacity for determination of ΔU and ΔH , Hess's law second law of thermodynamics, Concept of work function and Gibbs free energy, introduction of third law of thermodynamics, rate of reaction and factors (concentration, temperature, catalyst) affecting it, order and molecularity of reaction and determination of rate constant for specific reaction, collision theory, Arrhenius equation and Arrhenius energy. Dynamic equilibrium of physical and chemical processes, law of mass action, equilibrium constant, Le-Chatelier's principle, ionic equilibria, concept of weak and strong acid/ base, strong and weak electrolytes, degree of ionization, pH, hydrolysis of salts, common ion effect and solubility products. Redox reactions and its balancing, conductance in electrolytic solution, specific and molar conductivity, Kohlrausch's law, electrolysis and law of electrolysis, dry, electrolytic and galvanic cells, EMF of cells, standard electrode potential, Nernst equation and its application, relation between Gibbs free energy and EMF of a cell, Fuel cell and Corrosion. Surface chemistry, physisorption and chemisorptions, factors effecting adsorption of gases on solids, catalysts, homogeneous and heterogeneous activity and selectivity, enzyme catalysis, colloidal states, Tyndall effect, Brownian movement, electrophoresis, coagulation, emulsion.

Signatures of BOS Members

Members of School Board

Handwritten signatures and dates of BOS Members and School Board members are present at the bottom of the page. The signatures are written in blue ink, and the dates are written in green ink. The BOS Members' signatures are on the left, and the School Board members' signatures are on the right. The dates are written below the signatures.