CHEMISTRY

UNIT 1 – Basic Chemical calculations: Density - mole concept - empirical and molecular formula – stoichiometry - volumetry, equivalent and molecular masses, percentage composition

UNIT 2 - Atomic structure & periodicity: Atomic models, sub-atomic particles, orbital shapes, Pauli's exclusion, Hund's rule, Aufbau principle, de-Broglie relation, Heisenberg's uncertainty, electronic configuration and periodic properties.

UNIT 3 - Chemical bonding: Ionic bonding, lattice energy – Born-haber cycle, covalent bond - Fajan's Rule –VSEPR theory - - hybridization, valence bond and molecular orbital theory, coordinate, metallic and hydrogen bonding

UNIT 4 - S-block and hydrogen: Hydrogen, isotopes, liquid hydrogen as fuel, alkali metals, oxides and hydroxides, extraction and properties of lithium, sodium and potassium. Group 2 elements and their properties.

UNIT 5 - P-block elements: Boron - borax, boranes, diboranes, Carbon - allotropes, oxides, carbides, halides and sulphides of carbon group- silicon and silicates – silicones, Nitrogen – Fixation – compounds of nitrogen- Phosphorous

– allotropes and compounds. Oxygen - oxides and peroxide. Sulphur – its compounds - inter-halogen compounds.

UNIT 6 - d and f block elements: d-block elements configuration and properties - transition elements, chromium, copper, zinc, silver, interstitial compounds and alloys, f - block elements and extraction, lanthanides and actinides

UNIT 7 - Solid state: Solids - amorphous and crystalline, classification of crystalline - unit cell, Miller indices - packing efficiency, unit cell dimensions, crystal structure, ionic crystals, imperfections in solids, electric and magnetic properties.

UNIT 8 - Coordination compounds: Terminology in coordination- isomerism, Werner, VBT, CFT theories - Bio-coordination compounds.

UNIT 9 - Gaseous State & Surface chemistry: Gaseous state and gas laws, deviation- van der Waal's constants - Joule-Thomson effect - liquefaction of gases, theory of catalysis, colloids and emulsions.

UNIT 10 - Colligative properties: Lowering of vapour pressure, Depression of freezing point, Elevation in boiling point, Osmotic pressure, abnormality - dissociation and association

UNIT 11 – Electrochemistry: Faraday's laws - specific, equivalent and molar conductances, Kohlraush's law and applications- electrode potentials - EMF, electrochemical and, galvanic cells, Nernst equation, batteries, fuel cells, corrosion and its prevention.

UNIT 12 -Thermodynamics: First and second law- internal energy, enthalpy, entropy, free energy changes– specific heats at constant pressure and constant volume – enthalpy of combustion, formation and neutralization, Kirchoff law – Hess's law - bond energy

UNIT 13 - Chemical and Ionic Equilibria: Law of chemical equilibrium, homogenous and heterogeneous equilibrium, Le Chatlier's principle, equilibrium constants, factors affecting- Ionic equilibrium, ionization of acids and bases, buffer solutions, pH -solubility of sparingly soluble salts

UNIT 14 - Chemical kinetics: Order, molecularity, rate and rate constant – first and second order reactions - temperature dependence, factors influencing rate of reaction, integrated rate equation, collision theory of chemical reaction

UNIT 15 - Basic Organic chemistry: Classification, functional groups, nomenclature and isomerism, types of organic reactions, mechanism, purification, qualitative and quantitative analysis carbocation, carbanion and free radical, electron displacement in covalent bond.

UNIT 16 - Hydrocarbons & Polymers: IUPAC nomenclature, alkanes –alkynes – aromatic hydrocarbons-nomenclature, preparation, physical and chemical properties uses. Polymerization – types, molecular mass, biodegradable and commercial polymers.

UNIT 17 - Organic halogen compounds: Nature of C-X bond- preparation - properties and reactions of alkyl and aryl halides- polyhalogen compounds - substitution and elimination – mechanism- Grignard reagents.

UNIT 18 - Stereochemistry and Organic nitrogen compounds: Preparation - properties and uses of Aliphatic and aromatic nitro compounds --aliphatic and aromatic amines, nitriles, Diazonium salts. – 1°, 2°, and 3° amines – distinction - Optical activity.

UNIT 19 - Organic functional groups – hydroxyl, carbonyl compounds and ethers: Nomenclature, preparation, properties and uses of alcohols, ethers, aldehydes, ketones, aliphatic carboxylic acids, benzoic acid - salicylic acid

UNIT 20 - Biomolecules and Environmental chemistry: Carbohydrates, proteins, amino acids - enzymes, vitamins and nucleic acids - lipids. Pollution. - air, water and soil - industrial waste, acid rain, greenhouse effect, global warming, Strategies to control pollution.