Syllabus For Chemistry NEET

CLASS XI SYLLABUS

UNIT I: SOME BASIC CONCEPTS IN CHEMISTRY

Matter and its nature: Physical quantities and their measurements in Chemistry, precision, and accuracy, significant figures. S.I.Units, dimensional analysis:

Laws of chemical combination; Dalton's atomic theory: Concept of atom, molecule, element and compound

Atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae: Chemical equations and stoichiometry.

UNIT 2: STRUCTURE OF ATOM

Atomic number, isotopes & isobars, concepts of shells, dual mature of matter and de-Broglie relationship. Heinsberg uncertainty principle, concept of orbital, quantum numbers, shapes of s, p and d orbitals, Rules for filling electrons in orbitals – Aufbau principle. Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of half-filled and completely filled orbitals.

UNIT 3: CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Modern periodic law and present form of the periodic table, s, p. d and f block elements, periodic trends in properties of elements atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states, and chemical reactivity.

UNIT 4: CHEMICAL BONDING AND MOLECULAR STRUCTURE

Kossel - Lewis approach to chemical bond formation, the concept of ionic and covalent bonds. Ionic Bonding: Formation of ionic bonds, factors affecting the formation of ionic bonds; calculation of lattice enthalpy. Covalent Bonding: Concept of electronegativity. Fajan's rule, dipole moment: Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules. Quantum mechanical approach to covalent bonding: Valence bond theory - its important features, the concept of hybridization involving s, p, and d orbitals; Resonance. **Molecular Orbital Theory** - Its important features. LCAOs, types of molecular orbitals (bonding, antibonding), sigma and pi-bonds, molecular orbital electronic configurations of homonuclear diatomic molecules, the concept of bond order, bond length, and bond energy. Elementary idea of metallic bonding. Hydrogen bonding and its applications.

UNIT 5: STATES OF MATTER

Classification of matter into solid, liquid, and gaseous states. **Gaseous State:** Measurable properties of gases: Gas laws -

Boyle's law, Charle's law. Graham's law of diffusion. Avogadro's law, Dalton's law of partial pressure; Concept of Absolute scale of temperature; Ideal gas equation; Kinetic theory of gases (only postulates); Concept of average, root mean square and most probable velocities; Real gases, deviation from Ideal behaviour, compressibility factor, and van der Waals equation. **Liquid State:** Properties of liquids - vapour pressure, viscosity and surface tension, and effect of temperature on them (qualitative treatment only).

UNIT 6: THERMODYNAMICS

Fundamentals of thermodynamics: System and surroundings, extensive and intensive properties, state functions, types of processes.

The first law of thermodynamics - Concept of work, heat internal energy and enthalpy, heat capacity, molar heat capacity; Hess's law of constant heat summation; Enthalpies of bond dissociation, combustion, formation, atomization, sublimation, phase transition, hydration, ionization, and solution.

The second law of thermodynamics - Spontaneity G of theΔS of the universe and Δof processes; (Standard°GΔsystem as criteria for spontaneity. Gibbs energy change) and equilibrium constant

UNIT 7: EQUILIBRIUM

Equilibrium in physical and chemical process, dynamics nature of equilibrium, law of chemical equilibrium, constant factors, factors affecting equilibrium, Le Chatelliers principle, ionic equilibrium – ionization of acids and bases, strong & weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of pH, Hydrolysis of salts (elementary idea), buffer solution, Henderson equation, solubility product, common ion effect (with illustrative examples)

UNIT 8: REDOX REACTIONS

Electronic concepts of oxidation and reduction, redox reactions, oxidation number, rules for assigning oxidation number, balancing of redox reactions.

UNIT 9: HYDROGEN

Position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen; Physical and chemical properties of water and heavy water; Structure, preparation, reactions, and uses of hydrogen peroxide; Classification of hydrides - ionic, covalent, and interstitial; Hydrogen as a fuel.

UNIT 10: S -BLOCK ELEMENTS (ALKALI AND ALKALINE EARTH METALS)

Group -1 and 2 Elements General introduction, electronic configuration, and general trends in physical and chemical

properties of elements, anomalous properties of the first element of each group, diagonal relationships. Preparation and properties of some important compounds - sodium carbonate and sodium hydroxide and sodium hydrogen carbonate; Industrial uses of lime, limestone. Plaster of Paris and cement: Biological significance of Na, K. Mg, and Ca.

UNIT 11: P- BLOCK ELEMENTS

Group -13 to Group 15 Elements

General Introduction: Electronic configuration and general trends in physical and chemical properties of elements across the periods and down the groups; unique behaviour of the first element in each group.

Groupwise study of the p - block elements Group -13 Preparation, properties, and uses of boron and aluminum; Structure, properties, and uses of borax, boric acid, diborane, boron trifluoride, aluminum chloride, and alums.

Group -14 The tendency for catenation; Structure, properties, and uses of Allotropes and oxides of carbon, silicon tetrachloride, silicates, zeolites, and silicones.

Group -15 Properties and uses of nitrogen and phosphorus; Allotrophic forms of phosphorus; Preparation, properties, structure, and uses of ammonia, nitric acid, phosphine, and

phosphorus halides, (PCl3. PCl5); Structures of oxides and oxoacids of nitrogen and phosphorus.

UNIT 12: SOME BASIC PRINCIPLES OF ORGANIC CHEMISTRY

Tetravalency of carbon: Shapes of simple molecules - hybridization (s and p): Classification of organic compounds based on functional groups: and those containing halogens, oxygen, nitrogen, and sulphur; Homologous series: Isomerism - structural and stereoisomerism.

Nomenclature (Trivial and IUPAC) Covalent bond fission - Homolytic and heterolytic: free radicals, carbocations, and carbanions; stability of carbocations and free radicals, electrophiles, and nucleophiles.

Electronic displacement in a covalent bond - Inductive effect, electromeric effect, resonance, and hyperconjugation.

Common types of organic reactions- Substitution, addition, elimination, and rearrangement.

UNITS 13: HYDROCARBONS

Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties, and reactions.

Alkanes - Conformations: Sawhorse and Newman projections (of ethane): Mechanism of halogenation of alkanes.

Alkenes - Geometrical isomerism: Mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen

halides (Markownikoffs and peroxide effect): Ozonolysis and polymerization.

Alkynes - Acidic character: Addition of hydrogen, halogens, water, and hydrogen halides: Polymerization.

Aromatic hydrocarbons - Nomenclature, benzene - structure and aromaticity: Mechanism of electrophilic substitution: halogenation, nitration. Friedel - Craft's alkylation and acylation, directive influence of the functional group in monosubstituted benzene

UNIT 14: ENVIRONMENTAL CHEMISTRY

Environmental pollution - Atmospheric, water, and soil. **Atmospheric pollution** - Tropospheric and Stratospheric **Tropospheric pollutants** - Gaseous pollutants: Oxides of carbon, nitrogen, and sulphur, hydrocarbons; their sources, harmful effects, and prevention; Greenhouse effect and Global warming: Acid rain;

Particulate pollutants: Smoke, dust, smog, fumes, mist; their sources, harmful effects, and prevention.

Stratospheric pollution- Formation and breakdown of ozone, depletion of the ozone layer - its mechanism and effects.

Water Pollution - Major pollutants such as. pathogens, organic wastes, and chemical pollutants; their harmful effects and prevention.

Soil pollution - Major pollutants such as; Pesticides (insecticides. herbicides and fungicides), their harmful effects, and prevention. Strategies to control environmental pollution.

Class XII Syllabus

Unit 1: SOLID STATE:

Classification of solids: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea); Bragg's Law and its applications: Unit cell and lattices, packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, an imperfection in solids; Electrical and magnetic properties.

UNIT 2: SOLUTIONS

Different methods for expressing the concentration of solution - molality, molarity, mole fraction, percentage (by volume and mass both), the vapour pressure of solutions and Raoult's Law - Ideal and non-ideal solutions, vapour pressure - composition, plots for ideal and non-ideal solutions; Colligative properties of dilute solutions - a relative lowering of vapour pressure, depression of freezing point, the elevation of boiling point and osmotic pressure; Determination of molecular mass using colligative properties; Abnormal value of molar mass, van’t Hoff factor and its significance

UNIT 3: ELECTROCHEMISTRY

Electrolytic and metallic conduction, conductance in electrolytic solutions, molar conductivities and their variation with concentration: Kohlrausch's law and its applications. Electrochemical cells - Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half - cell and cell reactions, emf of a Galvanic cell and its measurement: Nernst equation and its applications; Relationship between cell potential and Gibbs' energy change: Dry cell and lead accumulator; Fuel cells.

UNIT 4: CHEMICAL KINETICS

Rate of a chemical reaction, factors affecting the rate of reactions: concentration, temperature, pressure, and catalyst; elementary and complex reactions, order and molecularity of reactions, rate law, rate constant and its units, differential and integral forms of zero and first-order reactions, their characteristics and half-lives, the effect of temperature on the rate of reactions, Arrhenius theory, activation energy and its calculation, collision theory of bimolecular gaseous reactions (no derivation).

UNIT 5: SURFACE CHEMISTRY

Adsorption- Physisorption and chemisorption and their characteristics, factors affecting adsorption of gases on solids - Freundlich and Langmuir adsorption isotherms, adsorption from solutions. Catalysis - Homogeneous and heterogeneous,

activity and selectivity of solid catalysts, enzyme catalysis, and its mechanism. Colloidal state- distinction among true solutions, colloids, and suspensions, classification of colloids - lyophilic. lyophobic; multi-molecular. macromolecular and associated colloids (micelles), preparation and properties of colloids - Tyndall effect. Brownian movement, electrophoresis, dialysis, coagulation, and flocculation: Emulsions and their characteristics.

UNIT 6: GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF METALS

Modes of occurrence of elements in nature, minerals, ores; Steps involved in the extraction of metals - concentration, reduction (chemical and electrolytic methods), and refining with special reference to the extraction of Al. Cu, Zn, and Fe; Thermodynamic and electrochemical principles involved in the extraction of metals

UNIT 7: P- BLOCK ELEMENTS

Group -16 to Group 18 Elements

Group -16 Preparation, properties, structures, and uses of ozone: Allotropic forms of sulphur; Preparation, properties, structures, and uses of sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur.

Group-17 Preparation, properties, and uses of hydrochloric acid; Trends in the acidic nature of hydrogen halides; Structures of Interhalogen compounds and oxides and oxoacids of halogens.

Group-18 Occurrence and uses of noble gases; Structures of fluorides and oxides of xenon

UNIT 8: d - and f- BLOCK ELEMENTS

Transition Elements General introduction, electronic configuration, occurrence and characteristics, general trends in properties of the first-row transition elements - physical properties, ionization enthalpy, oxidation states, atomic radii, colour, catalytic behaviour, magnetic properties, complex formation, interstitial compounds, alloy formation; Preparation, properties, and uses of $K_2Cr_2O_7$, and $KMnO_4$.

Inner Transition Elements

Lanthanoids - Electronic configuration, oxidation states, and lanthanoid contraction.

Actinoids - Electronic configuration and oxidation states.

UNIT 9: CO-ORDINATION COMPOUNDS

Introduction to coordination compounds. Werner's theory; ligands, coordination number, denticity. chelation; IUPAC nomenclature of mononuclear coordination compounds,

isomerism; BondingValence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of co-ordination compounds (in qualitative analysis, extraction of metals and in biological systems).

UNIT 10: ORGANIC COMPOUNDS CONTAINING HALOGENS General methods of preparation, properties, and reactions; Nature of C-X bond; Mechanisms of substitution reactions. Uses; Environmental effects of chloroform, iodoform freons, and DDT.

UNIT 11: ORGANIC COMPOUNDS CONTAINING OXYGEN General methods of preparation, properties, reactions, and uses.

ALCOHOLS, PHENOLS, AND ETHERS

Alcohols: Identification of primary, secondary, and tertiary alcohols: mechanism of dehydration.

Phenols: Acidic nature, electrophilic substitution reactions: halogenation. nitration and sulphonation. Reimer - Tiemann reaction.

Ethers: Structure.

Aldehyde and Ketones: Nature of carbonyl group; Nucleophilic addition to >C=O group, relative reactivities of aldehydes and ketones; Important reactions such as - Nucleophilic addition reactions (addition of HCN. NH3, and its derivatives), Grignard

reagent; oxidation: reduction (Wolf -αKishner and Clemmensen); the acidity of hydrogen. aldol condensation, Cannizzaro reaction. Haloform reaction, Chemical tests to distinguish between aldehydes and Ketones.

Carboxylic Acids Acidic strength and factors affecting it

UNIT 12: ORGANIC COMPOUNDS CONTAINING NITROGEN General methods of preparation. Properties, reactions, and uses. Amines: Nomenclature, classification structure, basic character, and identification of primary, secondary, and tertiary amines and their basic character. Diazonium Salts: Importance in synthetic organic chemistry.

UNIT 13: POLYMERS

General introduction and classification of polymers, general methods of polymerization, - Addition and condensation, copolymerization. Natural and synthetic, rubber and vulcanization, some important polymers with emphasis on their monomers and uses – polythene, nylon, polyester, and bakelite.

UNIT 14: BIOMOLECULES

General introduction and importance of biomolecules. **CARBOHYDRATES** - Classification; aldoses and ketoses: monosaccharides (glucose and fructose) and constituent

monosaccharides of oligosaccharides (sucrose, lactose, and maltose). -aminoα

PROTEINS - Elementary Idea of acids, peptide bond, polypeptides. Proteins: primary, secondary, tertiary, and quaternary structure (qualitative idea only), denaturation of proteins, enzymes.

VITAMINS – Classification and functions.

NUCLEIC ACIDS – Chemical constitution of DNA and RNA. Biological functions of nucleic acids.

UNIT 15: CHEMISTRY IN EVERYDAY LIFE Chemicals in Medicines –

Analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, anti-fertility drugs, antibiotics, antacids. Anti-histamines -their meaning and common examples. Chemicals in food - Preservatives, artificial sweetening agents - common examples. Cleansing Agents - Soaps and detergents, cleansing action