

# Syllabus for NEET Chemistry

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## Detailed Class 11 Chemistry Syllabus

### UNIT I: Some Basic Concepts of Chemistry

- General Introduction: Importance and scope of chemistry.
- Laws of chemical combination, Dalton's atomic theory: concept of elements, atoms and molecules.
- Atomic and molecular masses. Mole concept and molar mass; percentage composition and empirical and molecular formula;
- Chemical reactions, stoichiometry and calculations based on stoichiometry

### UNIT II: Structure of Atom

- Atomic number, isotopes and isobars. Concept of shells and subshells
- Dual nature of matter and light, de Broglie relationship
- Heisenberg uncertainty principle, concept of orbital, quantum numbers, shapes of s,p and d orbitals, rules for filling electrons in orbitals- Aufbau principle, Pauli exclusion principles and Hund's rule
- Electronic configuration of atoms, stability of half filled and completely filled orbitals

### UNIT III: Classification of Elements and Periodicity in Properties

- Modern periodic law and long form of periodic table
- Periodic trends in properties of elements- atomic radii, ionic radii, ionization enthalpy, electron gain enthalpy, electronegativity, valence electrons

### UNIT IV: Chemical Bonding and Molecular Structure

- Valence electrons, ionic bond, covalent bond, bond parameters
- Lewis structure, polar character of covalent bond, valence bond theory, resonance, geometry of molecules, VSEPR theory
- Concept of hybridization involving s, p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only). Hydrogen bond.

## UNIT V: States of Matter: Gases and Liquids

- Three states of matter, intermolecular interactions, types of bonding, melting and boiling points,
- Role of gas laws of elucidating the concept of the molecule, Boyle's law, Charle's law, Gay Lussac's law, Avogadro's law, ideal behaviour of gases, empirical derivation of gas equation.
- Avogadro number, ideal gas equation. Kinetic energy and molecular speeds (elementary idea), deviation from ideal behaviour, liquefaction of gases, critical temperature.
- Liquid State- Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations)

## UNIT VI: Thermodynamics

- First law of thermodynamics-internal energy and enthalpy, heat capacity and specific heat, measurement of U and H
- Hess's law of constant heat summation, enthalpy of : bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution.
- Introduction of entropy as state function, Second law of thermodynamics, Gibbs energy change for spontaneous and non-spontaneous process, criteria for equilibrium and spontaneity.
- Third law of thermodynamics- Brief introduction

## UNIT VII: Equilibrium

- Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of chemical equilibrium, equilibrium constant, factors affecting equilibrium-Le Chatelier's principle;
- Ionic equilibrium- ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of PH
- Hydrolysis of salts (elementary idea), buffer solutions, Henderson equation, solubility product, common ion effect (with illustrative examples).

## UNIT VIII: Redox Reactions

- Concept of oxidation and reduction, redox reactions oxidation number.
- Balancing redox reactions in terms of loss and gain of electron and change in oxidation numbers.

## **UNIT IX: Hydrogen**

- Occurrence, isotopes, preparation, properties and uses of hydrogen; hydrides-ionic, covalent and interstitial
- Physical and chemical properties of water, heavy water; hydrogen peroxide-preparation, reactions, uses and structure

## **UNIT X: s-Block Elements (Alkali and Alkaline earth metals)**

- Group I and group 2 elements:
- General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship
- Trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses.
- Preparation and Properties of Some important Compounds: Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate, biological importance of sodium and potassium.
- Industrial use of lime and limestone, biological importance of Mg and Ca.

## **UNIT XI: Some p-Block Elements**

- General Introduction to p-Block Elements.
- Group 13 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states
- Trends in chemical reactivity, anomalous properties of first element of the group;
- Boron, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalis.
- General 14 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states,
- Trends in chemical reactivity, anomalous behaviour of first element. Carbon, allotropic forms, physical and chemical properties: uses of some important compounds: oxides.
- Important compounds of silicon and a few uses: silicon tetrachloride, silicones, silicates and zeolites, their uses.

## **UNIT XII: Organic Chemistry- Some Basic Principles and Techniques**

- General introduction, methods of purification qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds.
- Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyperconjugation.

- Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions; electrophiles and nucleophiles, types of organic reactions

## UNIT XIII: Hydrocarbons

- Alkanes- Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.
- Alkanes-Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation: chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.
- Alkynes-Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of- hydrogen, halogens, hydrogen halides and water.
- Aromatic hydrocarbons- Introduction, IUPAC nomenclature; Benzene; resonance, aromaticity; chemical properties: mechanism of electrophilic substitution- Nitration sulphonation, halogenation, Friedel Crafts alkylation and acylation; directive influence of functional group in monosubstituted benzene; carcinogenicity and toxicity

## UNIT XIV: Environmental Chemistry

- Environmental pollution: Air, water and soil pollution, chemical reactions in atmosphere, smogs, major atmospheric pollutants; acid rain ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming
- Pollution due to industrial wastes; green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

# Class 12 Syllabus for Chemistry

## UNIT I: Solid State

- Classification of solids based on different binding forces; molecular, ionic covalent and metallic solids, amorphous and crystalline solids (elementary idea)
- Unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties
- Band theory of metals, conductors, semiconductors and insulators.

## **UNIT II: Solutions**

- Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties- relative lowering of vapour pressure
- Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties abnormal molecular mass. Van Hoff factor

## **UNIT III: Electrochemistry**

- Redox reactions, conductance in electrolytic solutions, specific and molar conductivity variation of conductivity with concentration, kohlrausch's Law, electrolysis and Laws of electrolysis (elementary idea)
- Dry cell- electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion

## **UNIT IV: Chemical Kinetics**

- Rate of a reaction (average and instantaneous), factors affecting rates of reaction; concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions);
- Concept of collision theory ( elementary idea, no mathematical treatment). Activation energy, Arrhenius equation

## **UNIT V: Surface Chemistry**

- Adsorption-physisorption and chemisorption; factors affecting adsorption of gases on solids, catalysis homogeneous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophilic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions- types of emulsions

## **UNIT VI: General Principles and Processes of Isolation of Elements**

- Principles and methods of extraction- concentration, oxidation, reduction electrolytic method and refining

- Occurrence and principles of extraction of aluminium, copper, zinc and iron

## UNIT VII: p- Block Elements(Group 15 to 18)

- Group 15 elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorus- allotropic forms; compounds of phosphorus: preparation and properties of phosphine, halides ( $\text{PCl}_3$ ,  $\text{PCl}_5$ ) and oxoacids (elementary idea only).
- Group 16 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; classification of oxides; ozone. Sulphur – allotropic forms; compounds of sulphur: preparation, preparation, properties and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).
- Group 17 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds oxoacids of halogens (structures only).
- Group 18 elements: General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.

## UNIT VIII: d and f Block Elements

- General introduction, electronic configuration, characteristics of transition metals, general trends in properties of the first row transition metals- metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of  $\text{K}_2\text{Cr}_2\text{O}_7$  and  $\text{KMnO}_4$ .
- Lanthanoids- electronic configuration, oxidation states, chemical reactivity, and lanthanide contraction and its consequences.
- Actinides: Electronic configuration, oxidation states and comparison with lanthanide.

## UNIT IX: Coordination Compounds

- Coordination compounds: Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, isomerism (structural and stereo) bonding, Werner's theory VBT,CFT; importance of coordination compounds (in qualitative analysis, biological systems)

## **UNIT X: Haloalkanes and Haloarenes**

- Haloalkanes: Nomenclature, nature of C –X bond, physical and chemical properties, mechanism of substitution reactions. Optical rotation.
- Haloarenes: Nature of C-X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only).
- Uses and environment effects of – dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

## **UNIT XI: Alcohols, Phenols and Ethers**

- Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols; mechanism of dehydration, uses with special reference to methanol and ethanol.
- Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols.
- Ethers: Nomenclature, methods of preparation, physical and chemical properties uses

## **UNIT XII: Aldehydes, Ketones and Carboxylic Acids**

- Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties; and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses.
- Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; use

## **UNIT XIII: Organic Compounds Containing Nitrogen**

- Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary secondary and tertiary amines.
- Cyanides and Isocyanides- will be mentioned at relevant places.
- Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.

## **UNIT XIV: Biomolecules**

- Carbohydrates- Classification (aldoses and ketoses), monosaccharide (glucose and fructose), D.L. configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen): importance.

- Proteins- Elementary idea of – amino acids, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes.
- Hormones- Elementary idea (excluding structure).
- Vitamins- Classification and function.
- Nucleic Acids: DNA and RNA

## UNIT XV: Polymers

- Classification- Natural and synthetic, methods of polymerization (addition and condensation), co-polymerization. Some important polymers: natural and synthetic like polyesters, bakelite; rubber, Biodegradable and non-biodegradable polymers.

## UNIT XVI: Chemistry in Everyday Life

- Chemicals in medicines- analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.
- Chemicals in food- preservatives, artificial sweetening agents, elementary idea of antioxidants.
- Cleansing agents- soaps and detergents, cleansing action

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NEETLab Challenge Tests - <https://neetlab.com/courses/mock-test-for-neet-preparation/>

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