

## **CLASS 11<sup>th</sup> - CHEMISTRY**

### **1. Some Basic Concepts of Chemistry**

- Importance of Chemistry
- Nature of Matter
- Properties of Matter and their Measurement
- Uncertainty in Measurement
- Laws of Chemical Combinations
- Dalton's Atomic Theory
- Atomic and Molecular Masses
- Mole Concept and Molar Masses
- Percentage Composition
- Stoichiometry and Stoichiometric Calculations

### **2. Structure of Atom**

- Discovery of Sub-atomic Particles
- Atomic Models
- Developments Leading to the Bohr's Model of Atom
- Bohr's Model for Hydrogen Atom
- Towards Quantum Mechanical Model of the Atom
- Quantum Mechanical Model of Atom

### **3. Classification of Elements and Periodicity in Properties**

- Why do we Need to Classify Elements
- Genesis of Periodic Classification
- Modern Periodic Law and the present form of the Periodic Table
- Nomenclature of Elements with Atomic Numbers > 100
- Electronic Configurations of Elements and the Periodic Table
- Electronic Configurations and Types of Elements: s-, p-, d-, f-Blocks
- Periodic Trends in Properties of Elements

## **4 Chemical Bonding and Molecular Structure**

- Kössel-Lewis Approach to Chemical Bonding
- Ionic or Electrovalent Bond
- Bond Parameters
- The Valence Shell Electron Pair Repulsion (VSEPR) Theory
- Valence Bond Theory
- Hybridisation
- Molecular Orbital Theory
- Bonding in Some Homonuclear Diatomic Molecules
- Hydrogen Bonding

## **5. States of Matter**

- Intermolecular Forces
- Thermal Energy
- Intermolecular Forces vs Thermal Interactions
- The Gaseous State
- The Gas Laws
- Ideal Gas Equation

- Kinetic Energy and Molecular Speeds
- Kinetic Molecular Theory of Gases
- Behaviour of Real Gases: Deviation from Ideal Gas Behaviour
- Liquefaction of Gases
- Liquid State

## 6. Thermodynamics

- Thermodynamic Terms
- Applications
- Measurement of  $\Delta U$  and  $\Delta H$ : Calorimetry
- Enthalpy Change,  $\Delta_r H$  of a Reaction – Reaction Enthalpy
- Enthalpies for Different Types of Reactions
- Spontaneity
- Gibbs Energy Change and Equilibrium

## 7 Equilibrium

- Equilibrium in Physical Processes
- Equilibrium in Chemical Processes – Dynamic Equilibrium
- Law of Chemical Equilibrium and Equilibrium Constant
- Homogeneous Equilibria
- Heterogeneous Equilibria Applications of Equilibrium Constants
- Relationship between Equilibrium Constant  $K$ ,
- Reaction Quotient  $Q$  and Gibbs Energy  $G$
- Factors Affecting Equilibria
- Ionic Equilibrium in Solution
- Acids, Bases and Salts
- Ionization of Acids and Bases
- Buffer Solutions

- Solubility Equilibria of Sparingly Soluble Salts

## 8. Redox Reactions

- Classical Idea of Redox Reactions-Oxidation and Reduction Reactions
- Redox Reactions in Terms of Electron Transfer Reactions
- Oxidation Number
- Redox Reactions and Electrode Processes

## 9 Hydrogen

- Position of Hydrogen in the Periodic Table
- Dihydrogen, H<sub>2</sub>
- Preparation of Dihydrogen, H<sub>2</sub>
- Properties of Dihydrogen
- Hydrides
- Water
- Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>)
- Heavy Water, D<sub>2</sub>O
- Dihydrogen as a Fuel

## 10. The s-Block Elements

- Group 1 Elements: Alkali Metals
- General Characteristics of the Compounds of the Alkali Metals
- Anomalous Properties of Lithium
- Some Important Compounds of Sodium
- Biological Importance of Sodium and Potassium
- Group 2 Elements : Alkaline Earth Metals

- General Characteristics of Compounds of the Alkaline Earth Metals
- Anomalous Behaviour of Beryllium
- Some Important Compounds of Calcium
- Biological Importance of Magnesium and Calcium

## **11. The p-Block Elements**

- Group 13 Elements: The Boron Family
- Important Trends and Anomalous Properties of Boron
- Some Important Compounds of Boron
- Uses of Boron and Aluminium and their Compounds
- Group 14 Elements: The Carbon Family
- Important Trends and Anomalous Behaviour of Carbon
- Allotropes of Carbon
- Some Important Compounds of Carbon and Silicon

## **12. Organic Chemistry – Some Basic Principles and Techniques**

- General Introduction
- Tetravalence of Carbon: Shapes of Organic Compounds
- Structural Representations of Organic Compounds
- Classification of Organic Compounds
- Nomenclature of Organic Compounds
- Isomerism
- Fundamental Concepts in Organic Reaction Mechanism
- Methods of Purification of Organic Compounds
- Qualitative Analysis of Organic Compounds
- Quantitative Analysis

## **13. Hydrocarbons**

- Classification
- Alkanes
- Alkenes
- Alkynes
- Aromatic Hydrocarbon
- Carcinogenicity and Toxicity

## **14. Environmental Chemistry**

- Environmental pollution
- Atmospheric pollution
- Water pollution
- Soil pollution
- Industrial waste
- Strategies to control environmental pollution
- Green chemistry