



**DELHI PUBLIC SCHOOL, (JOKA) SOUTH KOLKATA**  
**Department of Chemistry**

**Class: XI (Science)**

**Subject: Chemistry**

**Syllabus 2021-22**

**A. Weekly Test 1:**

- (i) **Some Basic Concepts of Chemistry:** General Introduction: Importance and scope of Chemistry. Nature of matter, 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, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.
- (ii) **Redox Reactions:** Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions.

**B. Mid-Term Examination (Theory (Marks 70)):**

- (i) **Some Basic Concepts of Chemistry:** General Introduction: Importance and scope of Chemistry. Nature of matter, 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, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry
- (ii) **Structure of Atom:** Discovery of Electron, Proton and Neutron, atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's model and its limitations. Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, 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 atoms, stability of half-filled and completely filled orbitals.
- (iii) **Classification of Elements and Periodicity in Properties:** Significance of classification, brief history of the development of periodic table. Modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas

radii, Ionization enthalpy, electron gain enthalpy, electronegativity, valency. Nomenclature of elements with atomic number greater than 100.

- (iv) **Chemical Bonding and Molecular Structure:** Valence electrons, ionic bond, covalent bond, bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent 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.
- (v) **Redox Reactions:** Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions
- (vi) **Hydrogen:** Position of hydrogen in periodic table, 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 and structure and use; hydrogen as a fuel.
- (vii) **Organic Chemistry – Some Basic Principles and Techniques:** General introduction, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyper conjugation. Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions.

### **C. Weekly Test 2:**

- (i) **Hydrocarbons:** Classification of Hydrocarbons

#### **Aliphatic Hydrocarbons:**

**Alkanes:** Nomenclature, isomerism, conformation (ethane only), physical properties, chemical reactions, including free radical mechanism of halogenation, combustion and pyrolysis. **Alkenes:** Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markownikov'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 Craft's alkylation and acylation, directive influence of functional group in monosubstituted benzene. Carcinogenicity and toxicity.

(ii) **Some s-Block Elements (General Introduction to s -Block Elements):**

**Group 1 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, Calcium Oxide and Calcium Carbonate and their industrial uses, biological importance of Magnesium and Calcium.

## **PRACTICAL EXAMINATION**

### **Practical Examination for Midterm (Marks 30):**

**a. Basic Laboratory Techniques:**

- Cutting glass tube and glass rod.
- Bending a glass tube.
- Drawing out a glass jet.
- Boring a cork

**b. Characterization and purification of chemical substance:**

- Determination of melting point of an organic compound.
- Determination of boiling point of an organic compound.
- Crystallization of impure sample of any one of the following: Alum, Copper Sulphate, Benzoic Acid.

**c. Quantitative Estimation:**

- Using a mechanical balance/electronic balance.
- Preparation of standard solution of Oxalic acid.

- Determination of strength of a given solution of Sodium hydroxide by titrating it against standard solution of oxalic acid.

**d. Qualitative Analysis: Determination of one anion and cation in a given salt.**

- Cations:  $\text{Pb}^{+2}$ ,  $\text{Cu}^{+2}$ ,  $\text{Al}^{+3}$ ,  $\text{Fe}^{+3}$ ,  $\text{Zn}^{+2}$ ,  $\text{As}^{+3}$ ,  $\text{Mn}^{+2}$ ,  $\text{Ni}^{+2}$ ,  $\text{Co}^{+2}$ ,  $\text{Ca}^{+2}$ ,  $\text{Sr}^{+2}$ ,  $\text{Ba}^{+2}$ ,  $\text{Mg}^{+2}$ ,  $\text{NH}_4^+$ .
- Anions:  $\text{CO}_3^{2-}$ ,  $\text{SO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{S}^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{PO}_4^-$ ,  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{CH}_3\text{COO}^-$ ,  $\text{NO}_2^-$

**e. Projects: (Anyone from the given)**

The scientific investigations involving laboratory testing and collecting information from other sources. A few suggested Projects

- Checking the bacterial contamination in drinking water by testing sulphide ion.
- Study of the methods of purification of water.
- Testing the hardness, presence of Iron, Fluoride, Chloride, etc., depending upon the regional variation in drinking water and study of causes of presence of these ions above permissible limit (if any).
- Investigation of the foaming capacity of different washing soaps and the effect of addition of Sodium carbonate salt.
- Study the acidity of different samples of tealeaves.
- Determination of the rate of evaporation of different liquids.
- Study the effect of acids and bases on the tensile strength of fibers.
- Study of acidity of fruit and vegetable juices.

**IN ANNUAL EXAMINATION OF CLASS – XI, ENTIRE YEAR'S SYLLABUS WILL BE ASSESSED.**