



DELHI PUBLIC SCHOOL (JOKA) SOUTH KOLKATA
SYLLABUS - 2020-2021
CLASS XI
CHEMISTRY

PERIODIC TEST - I

- (i) **Some Basic Concepts of Chemistry:** General Introduction: Importance and scope of Chemistry. Atomic and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry (determination of strength of a solution: Molarity, Molality, Normality, mole fraction).
- (ii) **Redox Reactions:** Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions (oxidation number method and ion-electron method).

MIDTERM EXAMINATION

THEORETICAL EXAMINATION (MARKS 70)

- (i) **Structure of Atom:** 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.
- (ii) **Classification of Elements and Periodicity in Properties:** 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.
- (iii) **Hydrogen:** Position of hydrogen in periodic table, occurrence, isotopes, hydrides-ionic covalent and interstitial; physical and chemical properties of water, heavy water, hydrogen as a fuel.
- (iv) **Some Basic Concepts of Chemistry:** General Introduction: Importance and scope of Chemistry. Atomic and molecular masses, mole concept and molar mass, percentage

composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry (determination of strength of a solution: Molarity, Molality, Normality, mole fraction).

- (v) **Redox Reactions:** Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions (oxidation number method and ion-electron method).

PRACTICAL EXAMINATION (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: Pb^{+2} , Cu^{+2} , Al^{+3} , Fe^{+3} , Zn^{+2}
- Anions: CO_3^{2-} , SO_3^{2-} , SO_4^{2-} , NO_3^- , S^{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 tea leaves.
- 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.

PERIODIC TEST – II

- (i) **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.
- (vi) **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.

ANNUAL EXAMINATION

THEORETICAL EXAMINATION (MARKS 70)

- (i) **Chemical Thermodynamics:** Concepts of System and types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions. First law of thermodynamics - internal energy and enthalpy, measurement of ΔU and ΔH , Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Second law of Thermodynamics (brief introduction) Introduction of entropy as a state function, Gibbs' energy change for spontaneous and non-spontaneous processes. Third law of thermodynamics (brief introduction)
- (ii) **Equilibrium:** Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, 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 poly basic acids, acid strength, concept of pH, buffer solution, solubility product, common ion effect (with illustrative examples).

(iii) **Hydrocarbons:** Classification of Hydrocarbons

Aliphatic Hydrocarbons:

Alkanes: Nomenclature, isomerism, conformation (ethane only), physical properties, chemical reactions. **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

(iv) **s-Block Elements (Alkali and Alkaline Earth Metals):** 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.

(v) **Some p-Block Elements (Group 13 and 14 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 - physical and chemical properties. *Group 14 Elements:* General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behavior of first elements. Carbon-catenation, allotropic forms, physical and chemical properties.

(vii) **Structure of Atom:** 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.

- (viii) **Classification of Elements and Periodicity in Properties:** 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.
- (ix) **Hydrogen:** Position of hydrogen in periodic table, occurrence, isotopes, hydrides-ionic covalent and interstitial; physical and chemical properties of water, heavy water, hydrogen as a fuel.
- (x) **Some Basic Concepts of Chemistry:** General Introduction: Importance and scope of Chemistry. Atomic and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry (determination of strength of a solution: Molarity, Molality, Normality, mole fraction).
- (xi) **Redox Reactions:** Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions (oxidation number method and ion-electron method).
- (xii) **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.
- (xiii) **States of Matter: Gases and Liquids:** Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of the molecule, Boyle's law, Charles law, Gay Lussac's law, Avogadro's law, ideal behavior, empirical derivation of gas equation, Avogadro's number, ideal gas equation and deviation from ideal behavior.
- (xiv) **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.

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- 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.
- Preparation of Standard solution of sodium carbonate.
- Determination of strength of a given solution of hydrochloric acid by titrating it against standard sodium carbonate solution.

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

- Cations: Pb^{+2} , Cu^{+2} , Al^{+3} , Fe^{+3} , Zn^{+2} , As^{+3} , Mn^{+2} , Ni^{+2} , Co^{+2} , Ca^{+2} , Sr^{+2} , Ba^{+2} , Mg^{+2} , NH_4^+ .
- Anions: CO_3^{2-} , SO_3^{2-} , SO_4^{2-} , NO_3^- , S^{2-} , Cl^- , Br^- , I^- , PO_4^- , $\text{C}_2\text{O}_4^{2-}$, CH_3COO^- , NO_2^-

e. Detection of Nitrogen, Sulphur and Chlorine in organic compounds.

f. 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 theregional 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 differentliquids.
- Study the effect of acids and bases on the tensile strength of fibers.
- Study of acidity of fruit and vegetable juices.

DELETED PARTS (GIVEN BY CBSE)

THEORETICAL PART

S No.	Unit	Deleted Topics
1	Some Basic Concepts of Chemistry	Nature of matter, laws of chemical combination, Dalton's atomictheory: concept of elements, atoms and molecules.
2	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
3	Classification of Elements and Periodicity in Properties	Significance of classification, brief history of the development of periodic table,
4	Chemical Bonding and Molecular Structure	-----
5	States of Matter: Gases and Liquids	liquefaction of gases, critical temperature, kinetic energy andmolecular speeds (elementary idea), Liquid State- vapourpressure, viscosity and surface tension (qualitative idea only, nomathematical derivations)
6	Chemical Thermodynamics	Heat capacity and specific heat capacity, Criteria for equilibrium
7	Equilibrium	Hydrolysis of salts (elementary idea), Henderson Equation
8	Redox Reactions	Applications of Redox Reactions

9	Hydrogen	Preparation, properties and uses of hydrogen, hydrogen peroxide - preparation, reactions and structure and use
10	s-Block Elements	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.
11	p-Block Elements	Some important compounds: Borax, Boric acid, Boron Hydrides, Aluminium: Reactions with acids and alkalies, uses. Carbon: uses of some important compounds: oxides. Important compounds of Silicon and a few uses: Silicon Tetrachloride, Silicones, Silicates and Zeolites, their uses.
12	Organic Chemistry: Some Basic Principles and Techniques	methods of purification, qualitative and quantitative analysis
13	Hydrocarbons	Free radical mechanism of halogenation, combustion and pyrolysis.
14	Environmental Chemistry	Entire Chapter

PRACTICAL PART

The following portions are deleted.

a. Experiments based on pH

Any one of the following experiments:

- ❖ Determination of pH of some solutions obtained from fruit juices, solution of known and varied concentrations of acids, bases and salts using pH paper or universal indicator.
- ❖ Comparing the pH of solutions of strong and weak acids of same concentration.
- ❖ Study the pH change in the titration of a strong base using universal indicator.

b. Study the pH change by common-ion in case of weak acids and weak bases.

c. Chemical Equilibrium:

One of the following experiments:

- ❖ Study the shift in equilibrium between ferric ions and thiocyanate ions by increasing/decreasing the concentration of either of the ions.
- ❖ Study the shift in equilibrium between $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ and chloride ions by changing the concentration of either of the ions.