

| NO. OF PERIOD | TOPIC | SUB-TOPIC | ASSIGNMENT/ACTIVITY | LEARNING OUTCOMES |
|---------------|---|--|---------------------------------|--|
| 8 | UNIT-1 BASIC CONCEPTS OF CHEMISTRY | Chemical formulae | Work sheet on chemical formulae | Learners will be able to understand that how to write the formulae of compounds |
| | | Properties of matter | | Student will be able to know the classification and properties of matter |
| | | Determine significant figures; | | Student will be able to differentiate between precision and accuracy and find out the significant figures |
| | | Laws of chemical combination and Daltons | | Learners will be able to know the various laws of chemical combination |
| | | Atomic Theory | | Learners will be able to understand the significance of atomic mass, average atomic mass, molecular mass and formula mass |
| | | Mole concept | problems 1:1 NCERT | Student will be able to know the terms – mole and molar mass |
| | | mass per cent | problems 1:2 NCERT | Learners will be able to understand the how to calculate the mass per cent of different elements constituting a compound |
| | | empirical formula and molecular formula | Work sheet -1 | Learners will be able to calculate the empirical formula and molecular formula for a compound from the given experimental data |
| | | stoichiometric calculations. | problems 1:3 to 1:8 NCERT | Student will be able to solved the problems based on stoichiometric reactions |
| 10 | UNIT-2 STRUCTURE OF ATOM | electron, proton and neutron | problems 2:1 & 2:2 NCERT | Learners will be able to know about the discovery of electron, proton and neutron and their characteristics |
| | | Thomson, Rutherford and Bohr atomic models | | Student will be able to know about Thomson, Rutherford and Bohr atomic models |

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| | | quantum mechanical model of atom; | | Student will be able to understand the important features of the quantum mechanical model of atom |
| | | electromagnetic radiation and Planck's quantum theory | problems 2:3 to 2:5 NCERT | Student will be able to understand nature of electromagnetic radiation and Planck's quantum theory |
| | | photoelectric effect and describe features of atomic spectra | problems 2:6 to 2:9 NCERT | Student will be able to know about the photoelectric effect and features of atomic spectra |
| | | de Broglie relation and Heisenberg uncertainty principle | problems 2:10 to 2:16 NCERT | Student will be able to know about the de Broglie relation and Heisenberg uncertainty principle |
| | | atomic orbital in terms of quantum numbers; | problems 2:17 & 2:18 NCERT | Student will be able to know about the atomic orbital in terms of quantum numbers |
| | | aufbau principle, Pauli exclusion principle and Hund's rule of maximum multiplicity; | | Student will be able to know about the aufbau principle, Pauli exclusion principle and Hund's rule of maximum multiplicity |
| | | electronic configurations of atoms. | Work sheet -2 | Student will be able to know about the electronic configurations of atoms. |
| 10 | UNIT-3 CLASSIFICATION OF ELEMENTS | classification of elements | | Student will be able to understand the concept of grouping elements in accordance to their properties led to the development of Periodic Table. |
| | | Periodic Law | | Student will be able to understand the Periodic Law |
| | | Atomic number and electronic configuration as the basis for periodic classification | | Student will be able to understand the significance of atomic number and electronic configuration as the basis for periodic classification; |
| | | IUPAC nomenclature; of the elements with Z >100 | problems 3:1 to 3:2 NCERT | name the elements with Z >100 according to IUPAC nomenclature |

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| | | classification of elements into s, p, d, f blocks | | classify elements into s, p, d, f blocks and learn their main characteristics |
| | | periodic trends in physical and chemical properties of elements | problems 3:3 to 3:8 NCERT | Student will be able to recognise the periodic trends in physical and chemical properties of element |
| | | | | Student will be able to compare the reactivity of elements and correlate it with their occurrence in nature |
| | | | | Student will be able to explain the relationship between ionization enthalpy and metallic character |
| | | | Work sheet -3 | Student will be able to use scientific vocabulary appropriately to communicate ideas related to certain important properties of atoms e.g., atomic/ ionic radii, ionization enthalpy, electron gain enthalpy, electronegativity, valence of elements. |
| 12 | UNIT-4 CHEMICAL BONDING AND MOLECULAR STRUCTURE | Kössel-Lewis approach to chemical bonding | | Student will be able to understand Kössel-Lewis approach to chemical bonding |
| | | octet rule and its limitations, | problems 4:1 to 4:2 NCERT | Student will be able to explain the octet rule and its limitations, draw Lewis structures of simple molecules |
| | | different types of bonds | | Student will be able to explain the formation of different types of bonds |
| | | VSEPR theory | | Student will be able to describe the VSEPR theory and predict the geometry of simple molecules |
| | | valence bond approach | problems 4:3 to 4:5 NCERT | Student will be able to explain the valence bond approach for the formation of covalent bonds |
| | | properties of covalent bonds | | Student will be able to predict the directional properties of covalent bonds |
| | | hybridisation | Work sheet -4 | Student will be able to explain the different types of hybridisation involving s, p and d orbitals and draw shapes of simple covalent molecules |

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| | | molecular orbital theory | | Student will be able to describe the molecular orbital theory of homonuclear diatomic molecules |
| | | hydrogen bond. | Work sheet -4-A | Student will be able to explain the concept of hydrogen bond. |
| 12 | UNIT-12 ORGANIC CHEMISTRY - SOME BASIC PRINCIPLES | General introduction to organic compounds | problems 12:2 to 12:3 NCERT | Student will be able to understand the distinction between organic and inorganic compounds, Vital force theory, modern definition of organic compounds, Understand reasons for tetravalency of carbon and shapes of |
| | | shapes of simple organic compounds | problems 12:4 to 12:6 NCERT | Student will be able to know various ways of representing structures of organic molecules. |
| | | Nomenclature of organic compounds | problems 12:7 to 12:10 NCERT | Student will be able to classify the organic compounds; name the compounds according to IUPAC system of nomenclature and also derive their structures from the given names |
| | | Fundamental concepts of organic reaction mechanism Electronic displacement in covalent bond Reaction intermediate | problems 12:11 to 12:19 NCERT | Student will be able to understand the concept of organic reaction mechanism |
| | | | Work sheet -12 | Student will be able to explain the influence of electronic displacements on structure and reactivity of organic compounds |
| | | | Work sheet -12-A | Student will be able to recognise the types of organic reactions |
| | | Method of Purification of Organic Compound Qualitative analysis of organic compounds | problems 12:20 to 12:24 NCERT | Student will be able to learn the techniques of purification of organic compounds |

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| | | Quantitative analysis of organic compounds | Work sheet -12-B | Student will be able to write the chemical reactions involved in the qualitative analysis of organic compounds and understand the principles involved in quantitative analysis of organic compounds. |
| 8 | UNIT-5 STATES OF MATTER | Intermolecular forces | | Student will be able to explain the existence of different states of matter in terms of balance between intermolecular forces and thermal energy of particles |
| | | Gas Laws - Boyle's law, Charles' law, | problems 5:1to 5:4 NCERT | Student will be able to explain the laws governing behaviour of ideal gases |
| | | Real and ideal gases Vander wals equation Liquids - | Work sheet -5 | Student will be able to apply gas laws in various real life situations; explain the behaviour of real gases |
| | | surface tension, viscosity, vapor pressure, evaporation | Work sheet -5-A | Student will be able to describe the conditions required for liquifaction of gases; realise that there is continuity in gaseous and liquid state; differentiate between gaseous state and vapours; explain properties of liquids in terms of intermolecular attractions. |

LIST OF EXPERIMENTS

No. of Periods (9)

1. Basic Laboratory Techniques

- (a) Cutting glass tube and glass rod
- (b) Bending a glass tube
- (c) Drawing out a glass jet
- (d) Boring a cork

2. Characterization and purification of chemical substance

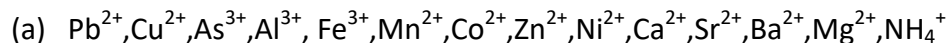
- (a) Determination of melting point of organic compound
- (b) Determination of boiling point of organic compound

(c) Crystallization involving impure sample of any one of the following: Alum, copper sulphate, Benzoic acid.

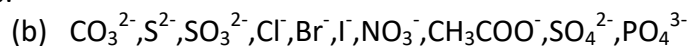
No. of Periods (12)

3. Determination one anion and one cation from the given salt:

Cations:



Anions:



4. Experiments related to pH change

- (a) Determination of pH of some isolation obtained from fruit juices, isolations of known and varied concentrations of acids, bases and salts using pH paper or universal indicator.
- (b) Comparing the pH of solutions of strong and weak acid of same concentration.
- (c) Study the pH change in the titration of a strong acid with a strong base using universal indicator.
- (d) Study of pH change by common-ion effect in case of weak acids and weak bases.

5. Chemical equilibrium

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

TERM 2

| NO. OF PERIOD | TOPIC | SUB-TOPIC | ASSIGNMENT/ACTIVITY | LEARNING OUTCOMES |
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| 8 | UNIT-6 THERMODYNAMICS | Some basic Terms and Concepts | problems 6:1 to 6:5 NCERT | Student will be able to know the terms : system and surroundings; discriminate between close, open and isolated systems |
| | | First law of thermodynamics. Internal energy (DU) | | Student will be able to know internal energy, work and heat |
| | | | | Student will be able to know the first law of thermodynamics and express it mathematically |
| | | | | calculate energy changes as work and heat contributions in chemical systems |
| | | | | explain state functions: U, H. correlate ΔU and ΔH |
| | | | | measure experimentally ΔU and ΔH |
| | | Student will be able to define standard states for ΔH | | |
| Enthalpy of reactions | | Student will be able to calculate enthalpy changes for various types of reactions | | |
| Hess's Law | problems 6:7 & 6:8 NCERT | Student will be able to know and apply Hess's law of constant heat summation | | |
| Entropy and Second law of thermodynamics | problems 6:9 to 6:11 NCERT | Student will be able to define spontaneous and non-spontaneous processes; explain entropy as a thermodynamic state function and apply it for spontaneity | | |

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| | | Free energy and spontaneity Free energy and equilibrium constant | Work sheet -6 | Student will be able to explain Gibbs energy change and establish relationship between ΔG and spontaneity, ΔG and equilibrium constant. (ΔG) |
| 12 | UNIT-13 HYDROCARBONS | IUPAC nomenclature of hydrocarbons | | Student will be able to name hydrocarbons according to IUPAC system of nomenclature |
| | | isomers | problems 13:1 & 13:5 NCERT | Student will be able to recognise and write structures of isomers of alkanes, alkenes, alkynes and aromatic hydrocarbons |
| | | Preparation of hydrocarbons | | Student will be able to learn about various methods of preparation of hydrocarbons |
| | | properties of hydrocarbons | problems 13:6 & 13:13 NCERT | Student will be able to distinguish between alkanes, alkenes, alkynes and aromatic hydrocarbons on the basis of physical and chemical properties and appreciate the role of hydrocarbons as sources of energy and for other industrial applications; predict the formation of the addition products of unsymmetrical alkenes and alkynes on the basis of electronic mechanism |
| | | conformations of ethane | | Student will be able to draw and differentiate between various conformations of ethane |
| | | structure of benzene and directive influence | problems 13:14 NCERT | Student will be able to comprehend the structure of benzene, explain aromaticity and understand mechanism of electrophilic substitution reactions of benzene; predict the directive influence of substituents in mono-substituted benzene ring |

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| | | toxic effect of benzene | Work sheet -13 &13-A | Student will be able to learn about carcinogenicity and toxicity. |
| 12 | UNIT-7 EQUILIBRIUM | Dynamic nature of equilibrium | | <ul style="list-style-type: none"> • Student will be able to identify dynamic nature of equilibrium involved in physical and chemical processes |
| | | | | <ul style="list-style-type: none"> • Student will be able to know the law of equilibrium |
| | | | | <ul style="list-style-type: none"> • Student will be able to explain characteristics of equilibria involved in physical and chemical processes |
| | | Equilibrium constant - K_p and K_c | problems 7:1 to7:11 NCERT | <ul style="list-style-type: none"> • Student will be able to write expressions for equilibrium constants and |
| | | | | Establish a relationship between K_p and K_c |
| | | LeChataelier's principle | | <ul style="list-style-type: none"> • Student will be able to explain various factors that affect the equilibrium state of a reaction |
| | | Arrhenius, Bronsted-Lowry and Lewis concepts of acids and bases | problems 7:12 to7:15 NCERT | <ul style="list-style-type: none"> • Student will be able to classify substances as acids or bases according to Arrhenius, Bronsted-Lowry and Lewis concepts |
| | | | | <ul style="list-style-type: none"> • Student will be able to classify acids and bases as weak or strong in terms of their ionization constants |
| | | pH & Ionic product of water | | <ul style="list-style-type: none"> • Student will be able to explain the dependence of degree of ionization on concentration of the electrolyte and that of the common ion |
| | | | problems 7:16 to7:23 NCERT | <ul style="list-style-type: none"> • Student will be able to describe pH scale for representing hydrogen ion concentration |

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| | | | | <ul style="list-style-type: none"> • Student will be able to explain ionisation of water and its dual role as acid and base, describe ionic product (K_w) and pK_w water |
| | | Hydrolysis of salts Solubility product Buffer | problems 7:24 to 7:28 NCERT | Student will be able to appreciate use of buffer solutions |
| | | | Work sheet -7 & 7-A | <ul style="list-style-type: none"> • Student will be able to calculate solubility product constant. |
| 10 | UNIT-8 REDOX REACTIONS | Oxidation and reduction | | Student will be able to identify redox reactions as a class of reactions in which oxidation and reduction reactions occur simultaneously |
| | | Oxidizing agent and reducing agent | problems 8:1 to 8:4 NCERT | Student will be able to define the terms oxidation, reduction, oxidant (oxidising agent) and reductant (reducing agent) |
| | | | | Student will be able to explain mechanism of redox reactions by electron transfer process |
| | | | | Student will be able to use the concept of oxidation number to identify oxidant and reductant in a reaction |
| | | Types of redox reaction | problems 8:5 to 8:7 NCERT | Student will be able to classify redox reaction into combination (synthesis), decomposition, displacement and disproportionation reactions |
| | | | Worksheet-8, 8-A & 8B | Student will be able to suggest a comparative order among various reductants and oxidants |
| Balance redox reaction | problems 8:8 to 8:10 NCERT | Student will be able to balance chemical equations using (i) oxidation number (ii) half reaction method | | |

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| | | Electro chemical cells Electrode potential and emf | | Student will be able to learn the concept of redox reactions in terms of electrode processes. |
| 6 | UNIT-9 HYDROGEN | Position of hydrogen in the periodic table. | | Student will be able to present informed opinions on the position of hydrogen in the periodic table |
| | | occurrence Preparation properties and uses of hydrogen, | | Student will be able to identify the modes of occurrence and preparation of dihydrogen on a small and commercial scale; describe isotopes of hydrogen |
| | | hydrides | problems 9:1 to 9:2 NCERT | Student will be able to explain how different elements combine with hydrogen to form ionic, molecular and non- stoichiometric compounds |
| | | | | Student will be able to describe how an understanding of its properties can lead to the production of useful substances, and new technologies |
| | | structure of water, properties and uses of hydrogen, water, Hydrogen peroxide | problems 9:3 to 9:4 NCERT | Student will be able to understand the structure of water and use the knowledge for explaining physical and chemical properties |
| Hard and soft water | | Student will be able to explain how environmental water quality depends on a variety of dissolved substances; difference between 'hard' and 'soft' water and learn about water softening | | |

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| | | | Worksheet-9 & 9 A | Student will be able to acquire the knowledge about heavy water and its importance, understand the structure of hydrogen peroxide, learn its preparatory methods and properties leading to the manufacture of useful chemicals and cleaning of environment; |
| | | Hydrogen economy | | Student will be able to understand and use certain terms e.g., electron-deficient, electron-precise, electron-rich, hydrogen economy, hydrogenation etc. |
| 8 | UNIT-10-S-BLOCK ELEMENTS | general characteristics of the alkali metals | | Learners will be able to describe the general characteristics of the alkali metals and their compounds; |
| | | general characteristics of the Alkaline earth metals | problems 10:1 to 10:3 NCERT | Learners will be able to explain the general characteristics of the alkaline earth metals and their compounds; |
| | | Some important compounds of alkaline earth metals like | problems 10:4 to 10:5 NCERT | Learners will be able to describe the manufacture, properties and uses of industrially important sodium and calcium compounds including Portland cement; |
| | | biological significance of sodium, potassium, magnesium and calcium. | Worksheet-10 & 10 A | Learners will be able to appreciate the biological significance of sodium, potassium, magnesium and calcium. |
| 8 | UNIT-11-GENERAL INTRODUCTION OF P- BLOCK ELEMENTS | general trends in the chemistry of p-block elements; | | Student will be able to appreciate the general trends in the chemistry of p-block elements; |
| | | physical and chemical properties of group 13 and 14 elements; | problems 11:1 to 10:4 NCERT | Student will be able to describe the trends in physical and chemical properties of group 13 and 14 elements; |

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| | | anomalous behaviour of boron and carbon; | problems 11:5 & 11:6 NCERT | Student will be able to explain anomalous behaviour of boron and carbon; |
| | | allotropic forms of carbon; | problems 11:7 & 11:8 NCERT | Student will be able to describe allotropic forms of carbon; |
| | | some important compounds of boron, carbon and silicon; | | Student will be able to know the chemistry of some important compounds of boron, carbon and silicon; |
| | | uses of group 13 and 14 elements and their compounds. | Worksheet-11 & 11 A | Student will be able to list the important uses of group 13 and 14 elements and their compounds. |
| 6 | UNIT-14- ENVIRONMENTAL CHEMISTRY | meaning of environmental chemistry; | Activity 1 collect samples of water from nearby places and record their pH values Discuss your results in the class. | Student will be able to understand the meaning of environmental chemistry; |
| | | atmospheric pollution | | Student will be able to define atmospheric pollution, list reasons for global warming, green house effect and acid rain; |
| | | ozone layer depletion and its effects; | | Student will be able to identify causes for ozone layer depletion and its effects; |
| | | water pollution | Activity 2 visit local water sources and observe if the river/lake/tank/pond are unpolluted/slightly polluted/moderately polluted or severely polluted by looking at water or by checking pH of water. | Student will be able to give reasons for water pollution and know about international standards for drinking water; |
| | | soil pollution; | | Student will be able to describe causes of soil pollution; |
| | | control of environmental pollution; | | Student will be able to suggest and adopt strategies for control of environmental |



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| | | | | pollution; |
| | | importance of green chemistry | | Student will be able to appreciate the importance of green chemistry in day to day life. |

LIST OF EXPERIMENTS

.Quantitative estimation

(a) Using a chemical balance

(b) Preparation of standard solution of oxalic acid

(c) Determination of strength of a given solution of sodium hydroxide by titrating it against standard solution of oxalic acid

(d) Preparation of standard solution of sodium carbonate

(e) Determination of strength of a given solution of hydrochloric acid by titrating it against standard sodium carbonate solution.

2.Detection of elements (N, S & Halogen) in Organic compounds