

**CHEMISTRY****THEORY****Class XII****One Paper****Time : 3 Hours****Marks : 70**

Units	Titles	Period	Marks
I.	Solid state	12	23
II.	Solutions	12	
III.	Electrochemistry	12	
IV.	Chemical Kinetics	10	
V.	Surface chemistry	6	
VI.	General Principles and Processes of Isolation of Elements	6	19
VII.	p-Block elements	16	
VIII.	d- and f-Block elements	10	
IX.	Coordination compounds	8	
X.	Haloalkanes and Haloarenes	12	18
XI.	Alcohols, Phenols and Ethers	12	
XII.	Aldehydes, Ketones and Carboxylic acids	12	
XIII.	Amines	8	
XIV.	Biomolecules	10	10
XV.	Polymers	8	
XVI.	Chemistry in everyday life	6	
<b>Total</b>		<b>160</b>	<b>70</b>

**Note: A minimum of 3 marks must be allotted to each unit.****Unit I: Solid State****(Periods 12)**

General characteristics of solid state, Amorphous and Crystalline solids, classification of crystalline solids, crystal lattices and unit cell, Number of Atoms in a unit cell, close packed structures, Packing Efficiency, Calculation Involving unit cell Dimensions, Imperfection in solids, Electrical and Magnetic Properties.

**Unit II: Solutions****(Periods 12)**

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't Hoff factor and calculations involving it.

**Unit III: Electrochemistry (Periods 12)**

Electrochemical cells, Galvanic cells, Nernst Equation, Conductance of Electrolytic Solutions, Electrolytic Cells and Electrolysis, Batteries, Fuel cells and corrosion.

**Unit IV: Chemical Kinetics (Periods 10)**

Rate of a reaction (average and instantaneous), factors affecting rates of reaction : concentration, temperature, catalyst; order and molecularity of reactions; 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 (Periods 6)**

Adsorption - physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis : homogeneous and heterogeneous, activity and selectivity : enzyme catalysis; colloidal state; distinction among true solutions, colloidal solutions and suspensions; lyophilic, lyophobic, multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsion-elements idea of nano materials.

**Unit VI: General Principles and Processes of Isolation of Elements (Periods 6)**

Principles and method of extraction - concentration, oxidation, reduction , Thermodynamic Principles of Metallurgy, Electrochemical principles of Metallurgy and refining, uses of aluminium, copper, zinc and iron.

**Unit VII: The p-Block elements (Periods 16)**

**Group 15 elements :** Dinitrogen, Ammonia, Oxides of Nitrogen, Nitric Acid, phosphorus Allotropic Forms, Phosphine, Phosphorus Halides, oxo acid of phosphorus.

**Group 16 elements :** Dioxygen, Simple oxides ozone, sulphur Allotropic Forms, Sulphur Dioxides, Oxoacids of sulphur, Sulphuric acid.

**Group 17 elements :** Chlorine, Hydrogen chloride, oxoacids of halogens, Interhalogen compounds.

**Group 18 elements :** General introduction, electronic configuration. Occurrence, trends in physical and chemical properties, uses.

**Unit VIII: The d- and f- Block Elements****(Periods 10)**

General introduction, electronic configuration, occurrence and 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.

**Lanthanoids** - electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.

**Actinoids** - Electronic configuration, oxidation states and comparison with lanthanoids.

Some application d- and f- Block elements.

**Unit IX: Coordination Compounds****(Periods 8)**

Werner's Theory of co-ordination Compound, Definition of some important terms pertaining to Co-ordination Compounds, Nomenclature of Co-ordination compounds, isomerism in co-ordination compounds, Bonding in metal carbonyl, stability of co-ordination compounds and importance and application of co-ordination compounds.

**Unit X: Haloalkanes and Haloarenes****(Periods 12)**

**Haloalkanes** : Classification, Nomenclature, nature of C-X bond, Method of preparation of Haloalkanes, physical and chemical properties, mechanism of substitution reactions. Stability of carbocations, R-S and D-L configurations.

**Haloarenes** : Nature of C-X bond, method of preparation of Haloarenes substitution reactions (directive influence of halogen for mono substituted compounds only, stability of carbocations R-S and D-L configurations) Uses and environmental effects of- dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons DDT.

**Unit XI: Alcohols, Phenols and Ethers****(Periods 12)**

Classification, Nomenclature structures of functional groups, preparations, properties and reaction of alcohol and phenols. Preparation, Physical properties and chemical reactions of Ethers.

**Unit XII: Aldehydes, Ketones and Carboxylic acids****(Periods 12)**

Nomenclature and structure of carbonyl group, preparation of aldehydes and ketones, physical properties and chemical reactions, uses of aldehydes

and ketones. Nomenclature and structure of carboxyl groups - Methods of Preparation of Carboxylic acids, physical properties and chemical reactions, uses of carboxylic acids.

**Unit XIII: Amines:****(Periods 8)**

Structure of Amines, classification and nomenclature of amines, preparation of amines, physical properties and chemical reactions, Methods and preparation of diazonium salts, physical properties, chemical reactions and its importance in synthesis of aromatic compounds.

**Unit XIV: Biomolecules****(Periods 10)**

**Carbohydrates :** Structure of glucose and fructose, disaccharides, polysaccharides, cellulose and importance of carbohydrates..

**Protiens :** Aminoacids and its classification, structure of protein and denaturation of protein.

**Enzymes :** Mechanism of Enzyme action.

**Vitamins :** Classification and Importance of Vitamins.

**Nucleic acids :** Chemical composition, function of nucleic acids.

**Hormones :** Its functions.

**Unit XV: Polymers****(Periods 8)**

**Classification of polymers --** types of polymerisation reactions, molecular mass of polymers, biodegradable polymers of commercial importance.

**Unit XVI: Chemistry in Everyday life****(Periods 6)**

Drugs and their classification, Drug-target interaction, Therapeutic action of different classes of drugs, chemicals in food, cleansing agents.

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**CHEMISTRY**  
**PRACTICALS**  
**CLASS - XII**

	<b>Evaluation Scheme for Exmamination</b>	<b>Marks</b>
A.	Volumetric Analysis	10
B.	Salt Analysis	8
C.	Content Based Experiment	6
D.	Class record and viva	6
<b>Total =</b>		<b>30</b>

**Practicals Syllabus**

**A. Determination of concentration/molarity of  $\text{KMnO}_4$  solution by titrating it against a standard solution of : (Periods 8)**

- (a) Oxalic acid,  
(b) Ferrous ammonium sulphate  
(Students will be required to prepare standard solutions by weighing themselves)

**B. Qualitative Analysis : (Periods 14)**

Determination of one cation and one anion in a given salt.

**Cations :**  $\text{Pb}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{As}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{NH}_4^+$ ;

**Anions :**  $\text{CO}_3^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{SO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{CH}_3\text{COO}^-$ ;

*(Note : Insoluble salts excluded)*

**C. Content based experiment**

**(i) Surface Chemistry (Periods 6)**

- (a) Preparation of any one lyophilic and one lyophobic sol.  
Lyophilic sol - starch, egg albumin and gum.  
Lyophobic sol - aluminum hydroxide, ferric hydroxide, arsenious sulphide.  
(b) Study of the role of emulsifying agents in stabilizing the emulsions of different oils.

- (ii) Chemical Kinetics** **(Periods 4)**
- (a) Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.
  - (b) Study of reaction rates of any one of the following :
    - (i) Reaction of iodide ion with hydrogen peroxide at room temperature using different concentrations of iodide ions.
    - (ii) Reaction between potassium iodate  $\text{KIO}_3$  and sodium sulphite:  $(\text{Na}_2\text{SO}_3)$  using starch solution as indicator (clock reaction).
- (iii) Thermo chemistry** **(Periods 4)**
- Any one of the following experiments :
- (a) Enthalpy of dissolution of copper sulphate or potassium nitrate.
  - (b) Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH).
  - (c) Determination of enthalpy change during interaction (Hydrogen bond formation) between acetone and chloroform.
- (iv) Electrochemistry** **(Periods 2)**
- Variation of cell potential in  $\text{Zn}/\text{Zn}^{2+} \parallel \text{Cu}^{2+}/\text{Cu}$  with change in concentration of electrolytes ( $\text{CuSO}_4$  or  $\text{ZnSO}_4$ ) at room temperature.
- (v) Chromatography** **(Periods 2)**
- (i) Separation of pigments from extracts of leaves and flowers by paper chromatography and determination of  $R_f$  values.
  - (ii) Separation of constituents present in an inorganic mixture containing two cations only (constituents having wide difference in  $R_f$  values to be provided).
- (vi) Preparation of Inorganic Compounds** **(Periods 4)**
- (a) Preparation of double salt of ferrous ammonium sulphate or potash alum.
  - (b) Preparation of potassium ferric oxalate;
- (vii) Preparation of Organic Compounds** **(Periods 4)**
- Preparation of any two of the following compounds
- (i) Acetanilide;
  - (ii) Di-benzal acetone;
  - (iii) p-Nitro acetanilide;
  - (iv) Aniline yellow or 2-Naphthol aniline dye;
  - (v) Iodoform

- (viii) **Test for Functional Groups in Organic compounds** (Periods 6)  
 Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (primary) groups.
- (ix) **Characteristic tests of carbohydrates, fats and proteins in pure samples and their detection in given Food Stuffs.** (Periods 4)

#### D. Class record and viva

#### Prescribed Textbooks :

1. Chemistry Part I & II (Textbook for class XII)  
 Published by : The Council of Higher Secondary Education, Manipur with copy right from the NCERT, New Delhi.

#### Reference Book :

1. A Textbook of Chemistry Book-II  
 by : R.L. Madan  
 Published by: Macmillan Publishers India Pvt. Ltd.
2. Conceptual Chemistry for Class XII  
 By : S.K. Jain  
 Published by : S. Chand & Company Ltd., New Delhi.
3. Dinesh Companion Chemistry for Class XII (Vol. I & II)  
 By : S.K. Malhotra  
 Published by : S. Dinesh & Co., Jalandhar City
4. Practical Chemistry for Class XII  
 By : R.P. Manchanda.  
 Published by : Saraswati House Pvt. Ltd., New Delhi.
5. A Textbook of Practical Chemistry for Class XII  
 By : Dr. N. Nila Singh and Dr. K. Nabachandra Singh  
 Published by : Writer's Book Store, Paona Bazar, Imphal
6. Comprehensive Practical Chemistry for Class XII  
 By : Dr. N.K. Varma, B.K. Vermani and Dr. Neera Verma and K.K. Rehani  
 Published by : Laxmi Publications (P) Ltd., New Delhi.
7. Dinesh Manual Practical in Chemistry for Class XII  
 By : V.K. Sharma and Munish Ratti  
 Published by S. Dinesh & Co., Jalandhar City.
8. Pradeep's New Course Chemistry for Class XII  
 By : S.C. Kheterpal, S.N. Dhawan & P.N. Kapil  
 Published by : Pradeep Publications, Jalandhar.

