

**CHEMISTRY**  
**THEORY**  
**COURSE STRUCTURE**  
**CLASS XI**

*One Paper*

*Time : 3 Hours*

*Marks : 70*

Units	Title	No. of Period	Marks
I.	Some basic concepts of Chemistry	18	28
II.	Structure of atom	18	
III.	Classification of elements and periodicity in properties	12	
IV.	Chemical bonding and molecular structure	18	
V.	Thermodynamics	20	24
VI.	Equilibrium	22	
VII.	Redox reactions	12	
VIII.	Organic Chemistry : Some basic Principles and Techniques	20	18
XIII.	Hydrocarbons	20	
	<b>Total</b>	<b>160</b>	<b>70</b>

*Note: A minimum of 4 marks must be allotted to each unit.*

**Unit I : Some basic Concepts of Chemistry**

**(18 Periods)**

Importance of Chemistry, Nature of Matter, properties of matter and their measurement, uncertainty in measurement, laws of Chemical combination, Dalton's Atomic Theory, Atomic and Molecular Masses, Mole concept and Molar Masses, percentage composition, Empirical and Molecular formula, Stoichiometry and Stoichiometric calculations.

**Unit II : Structure of Atom**

**(18 Periods)**

Discovery of electron, proton and neutron; atomic number, isotopes and isobars. Thompson'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 exclusion principle and Hund's rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

**Unit III : Classification of Elements and Periodicity in Properties. (12 periods)**

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 Number > 100, Electronic configurations of elements and the periodic table, Electronic configuration and types of elements, s-, p-d-f- Blocks, Periodic Trends in Properties of Elements – atomic radii, ionic radii, Ionization enthalpy, electron gain enthalpy, electronegativity, periodic trends in chemical properties.

**Unit IV : Chemical Bonding and Molecular Structure. (18 periods)**

Kossel – Lewis Approach to Chemical Bonding, Ionic or Electrovalent Bond, Covalent bond, Bond parameters, Polarity of bonds, The Valence shell Electron Pair Repulsion (VSEPR) Theory, Valence Bond Theory, Hybridisation, Molecular Orbital Theory, Bonding in some Homonuclear Diatomic molecules, hydrogen Bonding.

**Unit V : Thermodynamics (20 periods)**

Thermodynamic Terms, Applications, First law of thermodynamics, Heat capacity, Relationship between  $C_p$  and  $C_v$ , Measurement of  $\Delta U$  and  $\Delta H$ , Calorimetry, Enthalpy change,  $\Delta_r H$  of a Reaction- Reaction Enthalpy, Enthalpies for different types of reactions, Entropy, Spontaneity, Gibbs energy change and equilibrium, Third law of thermodynamics (brief introduction).

**Unit –VI : Equilibrium (22 periods)**

Equilibrium in physical processes, equilibrium in chemical processes – Dynamic Equilibrium, Law of Chemical Equilibrium and Equilibrium constant, Homogeneous Equilibria, Heterogeneous Equilibria, Application 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, Hydrolysis of salts and pH of their solutions, buffer solutions, Henderson - Hasselbalch equation, solubility Equilibria of sparingly soluble salts common ion effect.

**Unit – VII : Redox Reactions (12 periods)**

Classical idea of Redox reactions – Oxidation and Reduction Reactions, Redox Reactions in terms of Electron Transfer, Oxidation Number, Balancing redox reactions, Redox Reactions and Electrode Processes.

**Unit – VIII : Organic Chemistry – some basic principles and Techniques. ( 20 periods)**

General Introduction, Tetra valance 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.

**Unit –IX : Hydrocarbons ( 20 periods)**

General introduction, classification of Hydrocarbons.

**Alkanes-** Nomenclature, isomerism, conformations (ethane only), Preparations, Physical properties, chemical reactions including free radical mechanism of halogenations, 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 (Markovnikov'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, halogenations, Friedel Craft's alkylation and acylation; directive influence of functional group in mono-substituted benzene; carcinogenicity and toxicity.

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**CHEMISTRY  
PRACTICALS  
CLASS- XI**

Evaluation scheme for Examination		Marks
A	Volumetric Analysis	8
B	Salt Analysis	8
C	Content Based Experiment	5
D	Project Report	5
E	Class Record	2
F	Viva Voce	2
Total =		30

**A. Quantitative estimation (18 Periods)**

- Using a chemical 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 solution of sodium carbonate.

**B. Qualitative analysis (18 Periods)**

Determination of one cation and one anion in a given salt

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

**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) Basic Laboratory Technique : (3 Periods)**

1. Cutting glass tube and glass rod
2. Bending a glass tube
3. Drawing out a glass jet
4. Boring a cork

**(ii) Characterization and Purification of Chemical Substances: (7 Periods)**

1. Determination of melting point of an organic compound.
2. Determination of boiling point of an organic compound.

3. Crystallization of impure sample of any one of the following:  
Alum, Copper sulphate, Benzoic acid

**(iii) Experiments related to pH change (7 Periods)**

- (a) Any one of the following experiments:
- Determination of pH of some solutions obtained from fruit juices, 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 of the pH change in titration of a strong base using universal indicator.
- (b) Study of pH change by common ion effect in case of weak acids and weak bases.

**(iv) Chemical equilibrium (5 Periods)**

One of the experiments:

- (a) Study of the shift in equilibrium between ferric ions and thiocyanate ions by increasing/decreasing the concentration of either of the ions.
- (b) Study in 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.

**(v) Detection of nitrogen, sulphur, chlorine (12 Periods)**

**D. PROJECTS**

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 on it • 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.

**Note: Any other investigatory project, which involves about 10 periods of work, can be chosen with the approval of the teacher.**

**E. Class record**

**F. Viva voce.**

### **PRESCRIBED TEXTBOOKS :**

1. Chemistry Part - I  
Textbook for Class-XI.  
Published by : NCERT, New Delhi.
2. Chemistry Part - II  
Textbook for Class-XI.  
Published by : NCERT, New Delhi.
3. A Textbook of Practical Chemistry for Class XI  
By : Dr. N. Nila Singh and Dr. K. Nabachandra Singh  
Published by : Writer's Book Store, Paona Bazar, Imphal

### **REFERENCE BOOK :**

1. Pradeep's New Course Chemistry (Vol- I & II) for Class XI  
By : S.C. Kheterpal, S.N. Dhawan & P.N. Kapil  
Published by : Pradeep Publications, Jalandhar.
2. Dinesh Companion Chemistry for Class XI (Vol- I & II)  
By : S.K. Malhotra  
Published by : S. Dinesh & Co., Jalandhar City.\
3. Comprehensive Practical Chemistry for Class XI (New Edition)  
By : Dr. N.K. Verma, Dr B.K. Vermani and Dr. Neera Verma  
Published by : Laxmi Publications (P) Ltd., New Delhi - 110 002.
4. Practical Chemistry for Class XI  
By : R.P. Manchanda.  
Published by : New Saraswati House (India) Pvt. Ltd., New Delhi - 110002

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**DESIGN OF  
QUESTION PAPER**

Subject : **CHEMISTRY**

Paper : Theory

Class : XI

Time : 3 hours

Full Marks : 70

<b>WEIGHTAGE TO OBJECTIVES:</b>					
I	Objectives			Marks	Percentage
	Knowledge(K)			10	15
	Understanding(U)			35	50
	Application(A) Including Analysis, Synthesis and Evaluation			21	30
	Skill(S)			4	5
	<b>Total:</b>			<b>70</b>	<b>100</b>
<b>WEIGHTAGE TO FORMS OF QUESTIONS:</b>					
II	Forms of Questions	No. of Question	Time (in minute)	Marks	Percentage
	Essay/Long Answer(E/LA)	3	60	15	21
	Short Answer (SA-I)	6	37	18	26
	Short Answer (SA-II)	10	40	20	29
	Very Short Answer (VSA)	7	21	07	10
	MCQ	10	22	10	14
	<b>Total:</b>		<b>36</b>	<b>180</b>	<b>70</b>
<b>WEIGHTAGE TO CONTENT:</b>					
III	UNITS/CONTENTS:			Marks	
	1	Some basic concepts of chemistry		28	
	2	Structure of atom			
	3	Classification of Elements and Periodicity in properties			
	4	Chemical bonding and Molecular structure			
	5	Thermodynamics		24	
	6	Equilibrium			
	7	Redox reactions			
	8	Organic Chemistry: Some basic Principles and Techniques		18	
	9	Hydrocarbons			
<b>Total:</b>			<b>70</b>		
Note: A minimum of 4 marks must be allotted to each unit					
IV	SCHEME OF SECTIONS: Nil				
V	SCHEME OF OPTIONS: 1. Internal option will be given in Essay Type Question. 2. Internal option will be given in three questions of SA-I including one case-study based question.				
VI	DIFFICULTY LEVEL : Difficult : 35% of the total marks Average : 50% of the total marks Easy : 15% of the total marks				

**Abbreviation:** K(Knowledge), U(Understanding), A(Application), C(Comprehension), Exp.(Expression), S(Skill), E(Essay Type), SA(Short Answer Type), VSA(Very Short Answer Type), MCQ (Multiple Choice Question)

- NOTE-**
- (i) Two questions out of 10 (ten) questions of MCQ will be assertion & reason type question.
  - (ii) Only one question of SA-I will be Case Study based question.

**DESIGN OF  
QUESTION PAPER**  
Subject: **CHEMISTRY**  
Paper: Practical (One Paper)  
Class: XI  
Time: 3 hours  
Full Marks: 30

Sl. No.	Form of Exercise	Nature of Exercise	Skill to be tested					Total Marks	Estimated Time (Mins.)
			Manipulative Skill	Observational Skill	Drawing Skill	Reporting Skill	Related Understanding		
1	Category A	Quantitative Estimation	1	3	0	2	2	8	45
2	Category B	Qualitative Analysis	1	1	0	4	2	8	90
3	Category C	Any one of the Experiments in the category C of the syllabus may be given <b>Eg.</b> Basic Laboratory techniques: Cutting and Rounding, Bending, Drawing out of jet of glass tubes, Boring of cokes;	1	1	0	2	1	5	30
		<b>Or,</b> Characterization and purification of Chemical Substances;	1	1	0	2	1		
		<b>Or,</b> Determination of melting point, boiling point, Crystallization etc.;	1	1	0	2	1		
		<b>Or,</b> Experiments related to pH determination of solutions;	1	1	0	2	1		
		Experiments on equilibrium ionic reactions;	1	1	0	2	1		
4	Project Work	A report on scientific investigations involving laboratory testing and collecting information from other sources in one of the areas suggested in syllabus or any other innovative topic should be submitted.	1	1	0	2	1	5	15
5	Class record							2	
6	Viva Voce							2	
<b>TOTAL</b>								<b>30</b>	<b>180</b>

# CHEMISTRY

## THEORY

### Class XII

*One Paper*

*Time : 3 Hours*

*Marks : 70*

Units	Titles	No. of Periods	Marks
I.	Solutions	18	25
II.	Electrochemistry	18	
III.	Chemical Kinetics	16	
IV.	d- and f-Block elements	18	15
V.	Coordination compounds	16	
VI.	Haloalkanes and Haloarenes	18	30
VII.	Alcohols, Phenols and Ethers	16	
VIII.	Aldehydes, Ketones and Carboxylic acids	18	
IX.	Amines	10	
X.	Biomolecules	12	
	<b>Total =</b>	<b>160</b>	<b>70</b>

#### **Unit I: Solutions**

**(Periods 18)**

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 II: Electrochemistry**

**(Periods 18)**

Electrochemical cells, Galvanic cells, EMF of a cell, standard electrode potential, Nernst Equation, Relation between Gibbs energy change and EMF of a cell, Conductance of Electrolytic Solutions, Kohlrausch's law, Electrolytic Cells and Electrolysis, Batteries, Fuel cells and corrosion.

#### **Unit III: Chemical Kinetics**

**(Periods 16)**

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 IV: The d- and f- Block Elements** **(Periods 18)**

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, preparation and properties of  $K_2Cr_2O_7$  and  $KMnO_4$ .

**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 V: Coordination Compounds** **(Periods 16)**

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

**Unit VI: Haloalkanes and Haloarenes** **(Periods 18)**

**Haloalkanes** : Classification, Nomenclature, nature of C-X bond, Method of preparation of Haloalkanes, physical and chemical properties, mechanism and stereochemical aspects of nucleophilic substitution reactions.

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

**Unit VII: Alcohols, Phenols and Ethers** **(Periods 16)**

Classification, Nomenclature and structures of functional groups, preparations, physical properties and reactions of alcohols and phenols, Mechanism of dehydration, some commercially important alcohols- methanol and ethanol. Preparation, Physical properties and chemical reactions of Ethers.

**Unit VIII: Aldehydes, Ketones and Carboxylic acids** **(Periods 18)**

Nomenclature and structure of carbonyl group, preparation of aldehydes and ketones, physical properties and chemical reactions, mechanism of nucleophilic addition, 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 IX: Amines:** **(Periods 10)**

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

**Unit X: Biomolecules** **(Periods 12)**

**Carbohydrates** : Classification, Structure of glucose and fructose, monosaccharides, disaccharides (sucrose, lactose, maltose), D,L - configuration, polysaccharides, starch, glycogen, cellulose and importance of carbohydrates..

**Proteins** : Aminoacids and its classification, peptide bond and peptides, classification and 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.

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**CHEMISTRY  
PRACTICALS  
CLASS- XII**

Evaluation scheme for Examination		Marks
A	Volumetric Analysis	08
B	Qualitative Analysis of Salt	08
C	Content Based Experiment	05
D	Project Work	05
E	Class Record	02
F	Viva Voce	02
Total =		30

**Practical Syllabus**

**(60 Periods)**

**A. Volumetric Analysis**

**(8 Periods)**

**Determination of concentration/molarity of  $\text{KMnO}_4$  solution by titrating it against a standard solution of:**

- (a) Oxalic acid
- (b) Ferrous ammonium sulphate

(Students will be required to prepare standard solutions by weighing themselves)

**B. Qualitative analysis**

**(15 Periods)**

Determination of one cation and one anion in a given salt

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

**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 Experiments**

**1. Chemical Kinetics:**

**(7 Periods)**

- (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:
- Reaction of iodide ion with hydrogen peroxide at room temperature using different concentrations of iodide ions.
  - Reaction between potassium iodate,  $\text{KIO}_3$  and sodium sulphite,  $\text{Na}_2\text{SO}_3$  using starch solution as indicator (Clock reaction).

**2. Thermochemistry (7 Periods)**

Any one of the following experiments:

- Enthalpy of dissolution of copper sulphate or potassium nitrate.
- Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH).
- Determination of enthalpy change during interaction (Hydrogen bond formation) between acetone and chloroform,

**3. Electrochemistry (3 Periods)**

Variation of cell potential in  $\text{Zn}/\text{Zn}^{2+}/\text{Cu}^{2+}/\text{Cu}$  with change in concentration of electrolytes ( $\text{CuSO}_4$  or  $\text{ZnSO}_4$ ) at room temperature.

**4. Chromatography (3 Periods)**

- Separation of pigments from extracts of leaves and flowers by paper chromatography and determination of  $R_f$  values.
- Separation of constituents present in an inorganic mixture containing two cations only (constituents having wide difference in  $R_f$  values to be provided).

**5. Preparation of Inorganic compounds (2 Periods)**

- Preparation of double salt of ferrous ammonium sulphate or potash alum.
- Preparation of potassium ferric oxalate.

**6. Preparation of Organic compounds (4 Periods)**

Preparation of any two of the following compounds:

- Acetanilide
- Di-benzal acetone
- P-Nitro acetanilide
- Aniline yellow or 2-Naphthol aniline dye
- Iodoform

**7. Test for Functional Groups in Organic compounds (6 Periods)**

Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (primary) groups.

**8. Characteristic tests for carbohydrates, fats and proteins in pure samples and their detection in given Food Stuffs. (4 Periods)**

**D. PROJECT WORK**

Scientific investigations involving laboratory testing and collecting information from other sources.

A few suggested Projects.

- (i) Study of the presence of oxalate ions in guava fruit at different stages of ripening.
- (ii) Study of quantity of casein present in different samples of milk.
- (iii) Preparation of soybean milk and its comparison with the natural milk with respect to curd formation, effect of temperature, etc.
- (iv) Study of the effect of Potassium Bisulphate as food preservative under various conditions (temperature, concentration, time, etc.)
- (v) Study of digestion of starch by salivary amylase and effect of pH and temperature on it.
- (vi) Comparative study of the rate of fermentation of following materials: wheat flour, gram flour, potato juice, carrot juice, etc.
- (vii) Extraction of essential oils present in Saunf (aniseed), Ajwain (carum), Illaichi (cardamom).
- (viii) Study of common food adulterants in fat, oil, butter, sugar, turmeric powder, chilli powder and pepper.

**Note: Any other investigatory project, which involves about 10 periods of work, can be chosen with the approval of the teacher.**

**E. CLASS RECORD**

**F. VIVA VOCE**

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### **Prescribed Textbooks :**

1. Chemistry Part - I  
Textbook for Class-XII.  
Published by : NCERT, New Delhi.
2. Chemistry Part - II  
Textbook for Class-XII.  
Published by : NCERT, New Delhi.
3. 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

### **Reference Book :**

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Published by : Pradeep Publications, Jalandhar.
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Published by : S. Dinesh & Co., Jalandhar City
3. Comprehensive Practical Chemistry for Class XII (New Edition)  
By : Dr. N.K. Verma, Dr B.K. Vermani and Dr. Neera Verma  
Published by : Laxmi Publications (P) Ltd., New Delhi - 110 002.
4. Practical Chemistry for Class XII  
By : R.P. Manchanda.  
Published by : New Saraswati House (India) Pvt. Ltd., New Delhi - 110002.



## FROM THE ACADEMIC SESSION 2025-26

### DESIGN OF QUESTION PAPER

Subject : CHEMISTRY  
Paper : Theory  
Class : XII  
Time : 3 hours  
Full Marks : 70

<b>WEIGHTAGE TO OBJECTIVES:</b>					
<b>I</b>	<b>Objectives</b>		<b>Marks</b>	<b>Percentage</b>	
	Knowledge(K)		10	15	
	Understanding(U)		35	50	
	Application(A) Including Analysis, Synthesis and Evaluation		21	30	
	Skill(S)		4	5	
	<b>Total:</b>		70	100	
<b>WEIGHTAGE TO FORMS OF QUESTIONS:</b>					
<b>II</b>	<b>Forms of Questions</b>	<b>No. of Question</b>	<b>Time (in minute)</b>	<b>Marks</b>	<b>Percentage</b>
	Essay/Long Answer(E/LA)	3	60	15	21
	Short Answer (SA-I)	6	36	18	26
	Short Answer (SA-II)	10	40	20	29
	Very Short Answer (VSA)	7	21	7	10
	MCQ	10	23	10	14
<b>Total:</b>		36	180	70	100
<b>WEIGHTAGE TO CONTENT:</b>					
<b>III</b>	<b>Sl.No</b>	<b>UNITS/CONTENTS:</b>			<b>Marks</b>
	1	I. Solutions			25
	2	II. Electrochemistry			
	3	III. Chemical Kinetics			
	4	IV. d- and f- Block Elements			15
	5	V. Coordination compounds			
	6	VI. Haloalkanes and Haloarenes			30
	7	VII. Alcohols, Phenols and Ethers			
	8	VIII. Aldehydes, Ketones and Carboxylic acids			
	9	IX. Amines			
	10	X. Biomolecules			
<b>Total:</b>				<b>70</b>	
Note: A minimum of 4 marks must be allotted to each unit					
<b>IV</b>	SCHEME OF SECTIONS : Nil				
<b>V</b>	SCHEME OF OPTIONS : 1. Internal option will be given in Essay Type Question. 2. Internal option will be given in three questions of SA-I including one case- study based question.				
<b>VI</b>	DIFFICULTY LEVEL: Difficult : 35% of the total marks Average : 50% of the total marks Easy : 15% of the total marks				

Abbreviation: K(Knowledge), U(Understanding), A(Application), C(Comprehension), Exp.(Expression), S(Skill), E(Essay Type), SA(Short Answer Type), VSA(Very Short Answer Type), MCQ (Multiple Choice Question)

- NOTE-** (i) Two questions out of 10 (ten) questions of MCQ will be assertion & reason type question.  
(ii) Only one question of SA-I will be Case Study based question.

**DESIGN OF  
QUESTION PAPER**  
Subject: **CHEMISTRY**  
Paper: Practical (One Paper)  
Class: XII  
**Full Marks: 30**  
Time: 3 hours

Sl. No.	Form of Exercise	Nature of Exercise	Skill to be tested						Total Marks	Estimated Time (Mins.)
			Manipulative Skill	Observational Skill	Drawing Skill	Reporting Skill	Related Understanding			
1	Category A	Quantitative Estimation	1	3	0	2	2	8	45	
2	Category B	Qualitative Analysis	1	1	0	4	2	8	90	
3	Category C	Any one of the Experiments in the category C of the syllabus may be given <b>Eg.</b> <b>Chemical Kinetics:</b> Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid. <b>Or,</b> <b>Thermochemistry:</b> Enthalpy of dissolution of copper sulphate or potassium nitrate. <b>Or,</b> Electrochemistry: Variation of cell potential in $Zn/Zn^{2+}/Cu^{2+}/Cu$ with change in concentration of electrolytes ( $CuSO_4$ or $ZnSO_4$ ) at room temperature. <b>Or,</b> <b>Surface chemistry:</b> Preparation of one lyophilic or one lyophobic sol. <b>Or,</b> <b>Preparation of an Inorganic compound:</b> preparation of double salt of ferrous ammonium sulphate or potash alum or potassium ferric oxalate. <b>Or,</b> <b>Preparation of one Organic compound:</b> Acetanilide or Di-benzal acetone or P-Nitro acetanilide or Aniline yellow or 2-Naphthol aniline dye or iodoform <b>Or,</b> Test for Functional Groups in Organic compounds: <b>Or,</b> Characteristic tests for carbohydrates, fats and proteins in pure samples and their detection in given Food Stuffs.	1	1	0	2	1	5	30	
4	Project Work	A report on scientific investigations involving laboratory testing and collecting information from other sources in one of the areas suggested in syllabus or any other innovative topic should be submitted.	1	1	0	2	1	5	15	
5	Class record							2		
6	Viva Voce							2		
<b>TOTAL</b>								<b>30</b>	<b>180</b>	