

# CHEMISTRY (043)

## SYLLABUS FOR SESSION 2021-22 CLASS XII

### Term-I

S.No	UNIT	MARKS
1.	Solid State	10
2.	Solutions	
3.	p-Block Elements	10
4.	Haloalkanes and Haloarenes	15
5.	Alcohols, Phenols and Ethers	
6.	Biomolecules	
7.	Practical	15
	<b>TOTAL</b>	<b>50</b>

### Term-II

S.No	UNIT	MARKS
1.	Electrochemistry	13
2.	Chemical Kinetics	
3.	Surface Chemistry	
4.	d-and f-Block Elements	9
5.	Coordination Compounds	
6.	Aldehydes, Ketones and Carboxylic Acids	13
7.	Amines	
8.	Practical	15
	<b>TOTAL</b>	<b>50</b>

### Term-I

**Solid State:** Classification of solids based on different binding forces: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea). Unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects.

**Solutions:** Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, Raoult's law, colligative properties - relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties.

**p-Block Elements:** Group -15 Elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; Nitrogen preparation properties and uses; compounds of Nitrogen: preparation and properties of Ammonia and Nitric Acid.

Group 16 Elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties, dioxygen: preparation, properties and uses, classification of Oxides, Ozone, Sulphur -allotropic forms; compounds of Sulphur: preparation properties and uses of Sulphur-dioxide, Sulphuric Acid: properties and uses; Oxoacids of Sulphur (Structures only).

Group 17 Elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens, Preparation, properties and uses of Chlorine and Hydrochloric acid, interhalogen compounds, Oxoacids of halogens (structures only).

Group 18 Elements: General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.

**Haloalkanes and Haloarenes:** Haloalkanes: Nomenclature, nature of C–X bond, physical and chemical properties, optical rotation mechanism of substitution reactions.  
Haloarenes: Nature of C–X bond, substitution reactions (Directive influence of halogen in monosubstituted compounds only).

**Alcohols, Phenols and Ethers:** Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only), identification of primary, secondary and tertiary alcohols, mechanism of dehydration.  
Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols.  
Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses.

**Biomolecules:** Carbohydrates - Classification (aldoses and ketoses), monosaccharides (glucose and fructose), D-L configuration  
Proteins -Elementary idea of - amino acids, peptide bond, polypeptides, proteins, structure of proteins - primary, secondary, tertiary structure and quaternary structures (qualitative idea only), denaturation of proteins. Nucleic Acids: DNA and RNA

## PRACTICALS

**Term I:** A **15-marks Practical** would be conducted under the supervision of subject teacher/ internalexaminer. This would contribute to the overall practical marks for the subject.

OR

In case the situation of lockdown continues until Nov-Dec 2021, a *Practical Based Assessment (pen-paper)* of 15 marks would be conducted at the end of Term I at the school level and marks would be submitted by the schools to the Board. This would contribute to the overall practical marks for the subject.

### Term-I Evaluation Scheme for Practical

S. No	Practical	Marks
1.	Volumetric Analysis	4
2.	Salt Analysis	4
3.	Content Based experiment	2
4.	Class record and viva (Internal Examiner)	5
	<b>TOTAL</b>	<b>15</b>

**(1) Volumetric analysis (4 marks)**

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

- i. Oxalic acid,
- ii. Ferrous Ammonium Sulphate  
(Students will be required to prepare standard solutions by weighing themselves).

**(2) Salt analysis (Qualitative analysis) (4 marks)**

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 –  $(\text{CO}_3)^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{NO}_2^-$ ,  $\text{SO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{CH}_3\text{COO}^-$  (Note: Insoluble salts excluded)

**(3) Content Based Experiments (2 marks)**

A. Chromatography

- 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 large difference in  $R_f$  values to be provided).
- B. Characteristic tests of carbohydrates, fats and proteins in pure samples and their detection in given foodstuffs.

## Term-II

**Electrochemistry:** Redox reactions, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, Relation between Gibbs energy change and EMF of a cell, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis.

**Chemical Kinetics:** Rate of a reaction (Average and instantaneous), factors affecting rate of reaction: concentration, temperature, catalyst; order and molecularity of a reaction, rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions).

**Surface Chemistry:** Adsorption - physisorption and chemisorption, factors affecting adsorption of gases on solids, colloidal state: distinction between true solutions, colloids and suspension; lyophilic, lyophobic, multi-molecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation.

**d- and f-Block Elements:** 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 and lanthanoid contraction and its consequences.

**Coordination Compounds:** Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's theory, VBT, and CFT.

**Aldehydes, Ketones and Carboxylic Acids:** Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes, uses.

Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

**Amines:** Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines.

## PRACTICALS

**Term II:** At the end of Term II, A **15-marks Practical** would be conducted under the supervision of Board appointed external examiners. This would contribute to the overall practical marks for the subject.

OR

In case the situation of lockdown continues beyond December 2021, a *Practical Based Assessment (pen-paper)* of 10 marks and Viva 5 marks would be conducted at the end of Term II jointly by the external and internal examiners and marks would be submitted by the schools to the Board. This would contribute to the overall practical marks for the subject.

## TERM-II Evaluation Scheme for practical

S. No	Practical	Marks
1.	Volumetric Analysis	4
2.	Salt Analysis	4
3	Content Based Experiment	2
4	Project Work and Viva(Internal and External Both)	5
	<b>TOTAL</b>	<b>15</b>

### 1) Volumetric analysis (4 marks)

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

- i. Oxalic acid,
- ii. Ferrous Ammonium Sulphate

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

### 2) Salt analysis (Qualitative analysis) (4 marks)

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 –  $(\text{CO}_3)^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{NO}_2^-$ ,  $\text{SO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{CH}_3\text{COO}^-$

(Note: Insoluble salts excluded)

### 3) Content based experiment

- A. Preparation of Inorganic Compounds  
Preparation of double salt of Ferrous Ammonium Sulphate or Potash Alum.  
Preparation of Potassium Ferric Oxalate.
- B. Tests for the functional groups present in organic compounds:  
Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (Primary) groups.

## Guidelines on Syllabus for Visually Handicapped students.

Schools are expected to rationalise and divide the syllabus of practicums for visually handicapped students into two halves on the basis of collective guidelines given for the same in the complete syllabus and as per the convenience of their students. This flexibility is given in view of the special condition of visually handicapped students. They will, however, be assessed on 15 marks in practical examination in both the terms as rest of their peers.

**Note:** Kindly see the CBSE guidelines for project work.





