

CHEMISTRY

CLASS 12

As the regular teaching-learning in schools, during the session 2020-21, has widely been affected due to the COVID-19 pandemic, the subject experts committee, after due consideration, has recommended to reduce the syllabus by 30% in the following manner:-

UNIT 1: Solid State

Electrical and magnetic properties. Band theory of metals, conductors, semiconductors and insulators and n and p type semi conductors.

UNIT 2 : Solutions

Abnormal molecular mass, Van't Hoff factor

UNIT 3 : Electrochemistry

Lead accumulator, fuel cells, corrosion, law of electrolysis (elementary idea), dry cell-electrolytic cells and Galvanic cells,

UNIT 4 : Chemical Kinetics

Concept of collision theory (elementary idea, no mathematical treatment), activation energy, Arrhenius equation.

UNIT 5 : Surface Chemistry

Emulsion - types of emulsions, catalysis: homogenous and heterogeneous, activity and selectivity of solid catalysts; enzyme catalysis,

UNIT 6 : General Principles and Processes of Isolation of Elements (Entire unit)

Principles and methods of extraction – concentration, oxidation, reduction – electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.

UNIT 7 : p-Block Elements (Group 15,16,17,18)

Group 15 elements

Oxides of Nitrogen (Structure only);

Phosphorus - allotropic forms, compounds of Phosphorus: Preparation and properties of Halides and Oxo acids (elementary idea only).

Preparation and properties of Phosphine,

Group 16 elements

Sulphuric Acid: industrial process of manufacture

UNIT 8 : d and f Block Elements

Chemical reactivity of lanthanoids.

Actinoids –Electronic configuration, oxidation states and comparison with lanthanoids.

Preparation and properties of KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$

UNIT 9 : Coordination Compounds

Structure and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system).

UNIT 10 : Haloalkanes and Haloarenes

Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

UNIT 11 : Alcohols, Phenols and Ethers

Uses with special reference to methanol and ethanol.

UNIT 13 : Amines(Organic compounds having nitrogen)

Cyanide and isocyanide will be mentioned at relevant place in text , Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.

UNIT 14 : Biomolecules

Oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen), importance of carbohydrates.

Vitamins– classification and functions. Enzymes.

Hormones - Elementary idea excluding structure.

UNIT 15 : Polymers (Entire chapter)

Classification – Natural and synthetic, method of polymerization (addition and condensation) , Copolymerization, some important polymers : natural and synthetic like polythene, nylon polyesters, Bakelite, rubber, biodegradable and non – biodegradable polymers.

UNIT 16 : Chemistry in Everyday life (Entire chapter)

Chemicals in medicines – analgesics, tranquilizers antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.

Chemicals in food – preservatives, artificial sweetening agents, elementary idea of antioxidants.

Cleansing agents – soaps and detergents, cleansing action.

List of Practicals deleted from syllabus :**Practical syllabus for external evaluation****A. Surface Chemistry**

- Preparation of one lyophilic and one lyophobic sol Lyophilic sol - starch, egg albumin and gum Lyophobic sol - aluminium hydroxide, ferric hydroxide, arsenous sulphide.
- Dialysis of sol-prepared in (a)above.
- Study of the role of emulsifying agents in stabilizing the emulsion of different oils.

Practical syllabus for internal evaluation**A. Preparation of Organic Compounds**

Preparation of any one of the following compounds

- Acetanilide
- Di-benzal Acetone
- p-Nitroacetanilide

Aniline yellow or 2 - Naphthol Anilinedye

B. Chemical Kinetics

- 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 concentration of Iodide ions.
 - Reaction between Potassium Iodate, (KIO_3) and Sodium Sulphite: (Na_2SO_3) using starch solution as indicator (clock reaction).

C. Thermo chemistry

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.

D. Electrochemistry

Variation of cell potential in $\text{Zn}/\text{Zn}^{2+}||\text{Cu}^{2+}/\text{Cu}$ with change in concentration of electrolytes (CuSO_4 or ZnSO_4) at room temperature.

In accordance with the above, the remaining 70 percent of the total syllabus is as follows:

Plan for making question papers:

1.	Multiple choice questions a,b,c,d,e,f	1×6	06
2.	a,b,c,d (each question 02 marks)	2×4	08
3.	a,b,c,d (each question 02 marks)	2×4	08
4.	a,b,c,d (each question 03 marks)	3×4	12
5.	a,b,c,d (each question 04 marks)	4×4	16
6.	a.b(each question 05 marks)	5×2	10
7.	a.b(each question 05 marks)	5×2	10

NOTE –

- Question no. 6 and 7 will also contain optional question.
- At least 08 marks numerical questions should be given.

Unit No.	Title	Marks
I	Solid State	05
II	Solution	07
III	Electrochemistry	05
IV	Chemical Kinetics	05
V	Surface Chemistry	05
VII	P block elements	07
VIII	d and f block elements	04
IX	Coordination compounds	06
X	Haloalkanes and Haloarenes	05

XI	Alcohols, phenols and ethers	05
XII	Aldehydes, ketones and carboxylic acid	06
XIII	Amines (Organic compounds having nitrogen)	04
XIV	Biomolecules	06
	TOTAL	70

NOTE – In this, there will be a single question paper of 70 marks and practical exam of 30 marks. **Min. marks : 23+10 = 33 marks**

Unit I: Solid State

05 marks

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.

Unit II: Solutions

07 marks

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.

Unit III: Electrochemistry

05 marks

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.

Unit IV: Chemical Kinetics

05 marks

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).

Unit V: Surface Chemistry

05 marks

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.

Unit VII: p-Block Elements**07 marks**

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.

Unit VIII: d and f Block Elements**04 marks**

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.

Unit IX: Coordination Compounds**06 marks**

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

Unit X: Haloalkanes and Haloarenes.**05 marks**

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).

Unit XI: Alcohols, Phenols and Ethers**05 marks**

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.

Unit XII: Aldehydes, Ketones and Carboxylic Acids

06 marks

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.

Unit XIII : Amines (Organic compounds having nitrogen)

04 marks

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

Unit XIV: Biomolecules

06 marks

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.

Practical Syllabus –

External Evaluation

S.No.	Experiment	Marks
1.	Qualitative analysis (salt analysis)	04
2.	Volumetric analysis (simple titration)	04
3.	Content based experiment	03
4.	Viva	04
TOTAL		15

Internal Evaluation

S.No.	Experiment	Marks
1.	Project and viva	08
2.	Class record	04
3.	Content based experiment	03
TOTAL		15

For private students 04 marks of class record will be given in viva.

Practical syllabus for external evaluation –

1. Qualitative analysis

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

Cation : Pb^{2+} , Cu^{2+} , As^{3+} , Al^{3+} , Fe^{3+} , Mn^{2+} , Zn^{2+} , Co^{2+} , Ni^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , NH_4^+

Anions: CO_3^{2-} , S^{2-} , SO_3^{2-} , NO_2^- , SO_4^{2-} , Cl^- , Br^- , I^- , PO_4^{3-} , $(\text{C}_2\text{O}_4)^{2-}$, CH_3COO^- , NO_3^-

Note: Insoluble salts excluded

2. Volumetric analysis

Determination of concentration/ molarity of 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.)

3. Content based experiment

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. Tests for the functional groups present in organic compounds: Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (Primary) groups.

C. Characteristic tests of carbohydrates, fats and proteins in pure samples and their detection in given food stuffs.

Practical syllabus for internal evaluation –

Preparation of Inorganic Compounds:

1. Preparation of double salt of Ferrous Ammonium Sulphate or Potash Alum.
2. Preparation of Potassium Ferric Oxalate.

PROJECT –

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

A few suggested Projects :

- Study of the presence of oxalate ions in guava fruit at different stages of ripening.
- Study of quantity of casein present in different samples of milk.
- Preparation of soybean milk and its comparison with the natural milk with respect to curd formation, effect of temperature, etc
- Study of the effect of Potassium Bisulphate as food preservative under various conditions (temperature, concentration, time, etc.)
- Study of digestion of starch by salivary amylase and effect of pH and temperature unit.
- Comparative study of the rate of fermentation of following materials: wheat flour, gram flour, potato juice, carrot juice, etc.
- Extraction of essential oils present in Saunf (aniseed), Ajwain (carum), Illaichi (cardamom).
- 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.