

SUBJECT:CHEMISTRY (CHEM)**CLASS XII****SEMESTER III****THEORY****FULL MARKS – 30****(MCQ Type Question)**

UNIT	Topic	No of periods assigned	Marks
1	Haloalkanes and Haloarenes, Alcohols, phenols and ethers	18	10
2	Solid State & Solutions	11	5
3	Electrochemistry	10	5
4	s and p block elements	10	5
5	Chemical Kinetics & Surface Chemistry	11	5
		60	30

DETAIL SYLLABUS

UNIT	Topic / Sub Topic	No of periods assigned
1	<ul style="list-style-type: none">Preparation from alcohols by reaction with PX_3 ($X = Cl, Br$), Iodine and red phosphorous thionyl chloride. Haloform reaction – preparation of chloroform and iodoform [preparative methods not required] Physical properties Chemical properties – hydrolysis and dehydrohalogenation Reaction of methyl iodide with Mg – Grignard reagent; Uses of chloroform and iodoform; Freons: examples, uses and environmental hazards. DDT and its environmental hazardsPreparation of chlorobenzene; Substitution reaction (directive influence of chlorine)Primary, secondary and tertiary alcohols (examples); Method of preparation (primary alcohol only): Hydrolysis of alkyl halides, Hydrolysis of estersPreparation of methanol from water gas and synthesis gas.	18

	<ul style="list-style-type: none"> Preparation of ethanol by fermentation and hydration of ethene; Preparation of rectified spirit, absolute alcohol, spectroscopic alcohol, “super dry” alcohol. Identification of methanol and ethanol Physical properties; reaction with Na, PCl₅, SOCl₂, esterification reaction, uses of methanol and ethanol. Preparation (phenol) from aniline (laboratory process) by cumene process (industrial process); Acidic nature of phenol. Acetylation, Benzoylation; reaction with Br₂ – water, Reimer – Tieman reaction. Kolbe-Schmitt reaction. Phenol – formaldehyde resin. Identification and uses of phenol. Preparation of diethyl ether from ethanol (no experimental details); Williamson Synthesis. Preparation of anisole from phenol; Physical properties: inflammability of diethyl ether (precaution to be taken); Reaction with HI, Reaction of diethyl ether with aerial oxygen in the presence of light; Uses of diethyl ether 	
2	<ul style="list-style-type: none"> Classification of solids based on differences in binding forces: ionic, molecular, covalent, metallic solids (definition with example); Crystalline and amorphous solids (elementary idea with examples); Two dimensional and three-dimensional lattice; unit cell – cubic [Primitive, body centered and face centered]; Number of atoms per unit cell in a cubic cell; Schottky defect and Frenkel defect. Solution 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. Reverse Osmosis (qualitative idea); Determination of molar masses using colligative properties 	11
3	<ul style="list-style-type: none"> Concept of oxidation-reduction; oxidation number; balancing redox reaction by oxidation number method and ion electron method; Specific and molar conductivity (definition with 	10

	<p>example); Electrolysis – Laws of Electrolysis; Electrolytic Cell, Galvanic Cell (Voltaic Cell) Half – cell reaction, cell reaction, emf of a cell, standard electrode potential Dry cell (dry cell battery); Primary dry cell battery Common dry cell battery, Alkaline battery, Mercury battery, Lithium battery, Secondary dry cell battery, Lead storage battery (lead accumulator), Fuel cell</p>	
4	<ul style="list-style-type: none"> • Elements of groups 1 & 2; Electronic configuration Trends in variation in ionization enthalpy, atomic and ionic radii. Trends in chemical reactivity with oxygen and halogens • Uses of some important compounds of boron and aluminium: boric acid, boron trifluoride, diborane, alumina, alums, anhydrous aluminium chloride • Carbon: catenation property; allotropic forms – physical properties and uses. Uses of silicon and carborundum. • allotropy of phosphorous; Nitrous acid & nitric acid; phosphine, phosphorous pentoxide, phosphorous pentachloride, phosphorous acid and phosphoric acid (preparation and uses only) • Allotropy in sulfur; Hydrogen Sulfide – use in analysis of basic radicals; Sulfur dioxide and sulfur trioxide [preparation and uses] Sulfur dioxide shows both oxidizing and reducing properties – explanation with examples • Preparation of halogens (only preparative reaction) and comparative reactions of halogens: oxidizing property, reaction with water and alkali; detection of halides. Bleaching powder – preparation and uses 	10
5	<ul style="list-style-type: none"> • Factors influencing rate of a reaction: concentration, temperature, catalyst. Order and molecularity of a reaction. Rate law of first order, second order and zero order reaction. Definition of half-life of a reaction. Concept of activation energy of a reaction • Adsorption: Physisorption and chemisorption; factors affecting adsorption of gases on solid; Catalysis: homogeneous and heterogeneous; 	11

	Colloidal State: Distinction between true solutions, colloids and suspensions; lyophobic and lyophilic colloids. Properties of Colloids: Tyndal effect, Brownian Movement, electrophoresis, coagulation.	
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CHEMISTRY (CHEM)**CLASS XII****SEMESTER IV****THEORY****FULL MARKS – 40****(SAQ AND LAQ Type Question)**

UNIT	Topic	No of periods assigned	Marks
1	Metallurgy	14	6
2	Aldehyde, ketones, carboxylic acid and derivatives	20	11
3	Organic Compounds containing Nitrogen	17	8
4	Coordination Chemistry & d-block elements	17	8
5	Biomolecules, Polymers, Pharmaceuticals, Detergents.	16	7
		84	40

DETAIL SYLLABUS

UNIT	Topic / Sub Topic	No of periods assigned
1	<ul style="list-style-type: none">General principles and methods of extraction Ores and minerals Concentration: Froth floatation; Calcination, roasting, Flux and slag, Electrolytic reduction, carbon reduction, Self reduction; Occurrence and principles of extraction of aluminium, copper and iron (no technical details); Distinction and uses of cast iron, wrought iron and steel.Alloys: Purpose of making alloys Composition and uses of Bronze, Brass, Bell Metal, Duralumin, Stainless Steel.	14
2	<ul style="list-style-type: none">Preparation from: Alcohols Carboxylic acid Acid chlorides (Rosenmund reduction – aldehydes) Gatterman – Koch and Gatterman aldehyde Synthesis (benzaldehyde) Friedel – craft acylation reaction (acetophenone); Physical properties; Chemical properties: Oxidation reaction (including reaction of aldehydes with Fehling's and Tollens' Reagents); Reduction reactions– Reduction with H₂	20

	<p>/ Catalyst Na – Hg, H₂O; lithium aluminium hydride (LAH), sodium borohydride; Clemmensen reduction; Addition reaction: with HCN and NaHSO₃; Hemiacetal and acetal formation; Reaction with hydroxylamine, hydrazine, phenylhydrazine, 2,4-dinitrophenylhydrazine (Brady's Reagent), Semi-carbazide, Aldol reaction, Cannizzaro and crossed Cannizzaro reaction, Benzoin condensation, Perkin reaction; Distinction between aldehydes and ketones; Identification of acetaldehyde and acetone formation – uses.</p> <ul style="list-style-type: none"> Aliphatic carboxylic acids and aromatic carboxylic acid (benzoic acid): Preparation by oxidation of alcohols and aldehydes, oxidation of toluene (benzoic acid); By hydrolysis of alkyl and aryl cyanides; By using Grignard reagent; By the hydrolysis of esters; Physical properties; Acidic properties – reaction with alkali and NaHCO₃. Reaction with PCl₃, PCl₅ and SOCl₂; Esterification reaction;Hunsdiecker reaction; Hell – Volhard – Zelinsky reaction; Identification of formic acid and acetic acid. Uses of Acetic Acid Derivatives of Carboxylic Acids: Acetyl chloride, acetic anhydride, Acetamide ethyl acetate – preparation and uses 	
3	<ul style="list-style-type: none"> Amines: Introduction Classification – primary, secondary and tertiary amines (examples with structures) Preparation of primary amines by reduction of nitro compounds. Gabriel's phthalimide synthesis. Hofmann degradation reaction Aniline: Preparation from nitrobenzene Physical properties Chemical properties Basic nature Isocyanide (carbylamine) reaction Diazo reaction. Benzenediazonium Salts: Preparation Reactions involving replacement of diazo group by H, OH, Halogen, CN, NO₂; Coupling reaction, Reduction Cyanides and Isocyanides: preparation Nitro Compounds: Preparation of Nitrobenzene and 1,3-di-nitrobenzene; Reduction of nitrobenzene 	17

	under different conditions.	
4	<ul style="list-style-type: none"> Coordination Chemistry: Examples ligands, coordination number, shapes; Bonding: Werner's Theory and Simple Isomerism; A few important coordination complex (formula, structure, colour): Brown ring compound, sodium nitroprusside, tetraammine copper(II) sulphate. Few examples of coordination compounds, important in biological system: haemoglobin, chlorophyll, Vitamin B₁₂ (nature and function). d-block elements: electronic configuration, occurrence and characteristic of transition metals, general trends in properties of the first-row transition metals – ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic property, alloy formation. Preparation and properties of K₂Cr₂O₇ and KMnO₄ 	17
5	<ul style="list-style-type: none"> Carbohydrates: Introduction Classification (aldose and ketose); Monosaccharides- Glucose and fructose structure (no elucidation) with D/L nomenclature, Oxidation, and reduction reactions; Osazone formation; Identification Oligosaccharides: Sucrose structure (no elucidation); Non reducing sugar; hydrolysis; Identification; Polysaccharides: Starch, Monomer units, Hydrolysis, Identification Proteins: Elementary idea of amino acids (examples: glycine, alanine, cysteine, serine, methionine, aspartic acid); zwitterionic structure, isoelectric point. Peptide bond, poly-peptides Primary structure of proteins Identification. Nucleic Acid: DNA & RNA Nucleotides and nucleosides. Natural and synthetic polymers Homopolymer and copolymer Polymerization reaction; Thermoplastics (definition with examples) Preparation (no technical details) and uses of polyethylene, Teflon, Bakelite, Nylon, Terylene (synthetic fibres) Hazards of using plastic materials Biodegradable polymers 	16

	<ul style="list-style-type: none"> Analgesics, antipyretics, tranquilizers, antimicrobials, antifungals, antifertility drugs, antiviral drugs, antacids, antihistamines, antimalarials, antiseptics, disinfectants (examples only)Side effects of aspirin and paracetamol Soaps and detergents – their chemical composition and cleansing action 	
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Practical marks: 30

Periods: 72

Practical :

Chemistry Practical Lab

List of Experiments:

Experiment 1

- 1.1 To prepare starch sol (hydrophilic sol)
- 1.2 To prepare hydrated ferric oxide sol (hydrophobic sol)

Experiment 2

- 2.1 To prepare potash alum
- 2.2 To prepare ferrous ammonium sulfate (Mohr's Salt)
- 2.3 To prepare acetanilide
- 2.4 To prepare 2-phenylazo-2-naphthol dye (2-naphtholaniline dye)

Experiment 3

To identify one of the following functional groups present in a solid organic sample:

Aromatic primary amino (azodye test)

Phenolic- OH (FeCl_3 test)

Carboxylic acid group (NaHCO_3 test)

Aldehyde and Ketonic groups (Brady's Reagent and Tollen's Reagent test)

Experiment 4

- 4.1 To prepare methyl orange indicator solution
- 4.2 To prepare BDS indicator solution

4.3 To prepare Fehling's Solution A and Fehling's Solution B

4.4 To prepare 0.1 M Mohr's Salt Solution in 0.5 – 1 M H_2SO_4

Experiment 5

To identify carbohydrates, fats and proteins given as pure samples.

Experiment 6

General acquaintance with chemical balance – sartorius / bunge / electronic (preferably electronic)

6.1 To prepare ~ 0.1 N standard sodium carbonate solution

6.2 To determine the strength of unknown ~ 0.1N $\text{HCl}/\text{H}_2\text{SO}_4$ (in normality, molarity and g/l) by titration with the standard ~ 0.1 N Na_2CO_3 solution.

6.3 To prepare standard 0.1 N oxalic acid solution

6.4 To determine the strength of unknown 0.1N NaOH solution (in normality, molarity and g/l) by titration with the standard ~ 0.1N oxalic acid solution.

6.5 To determine the strength of unknown ~ 0.1 N KMnO_4 solution (in normality, molarity and g/l) by titration with the standard ~ 0.1 N oxalic acid solution.

6.6 To determine the amount of iron in g/l present in the unknown ~ 0.1N Mohr's Salt Solution by titration with the standardised 0.1N KMnO_4 solution.

6.7 To prepare standard ~ 0.1 N $\text{K}_2\text{Cr}_2\text{O}_7$ solution.

6.8 To determine the amount of iron in g/l in the unknown ~ 0.1N Mohr's Salt Solution by the standard ~ 0.1N $\text{K}_2\text{Cr}_2\text{O}_7$ solution.