



**SARVODAYA CO-ED VIDYALAYA
SEC-6, ROHINI, DELHI-110085**

SCHOOL ID-1413004

Must do syllabus class-12 (2020-21)

Chemistry

UNDER THE GUIDANCE OF

Shri Badan Singh (Principal)

Dr Mrs Pankaj (Vice Principal)

Prepared By:-

Amit Gupta

SYLLABUS
Session-2020-21
Class – XII
Subject : Chemistry (Code : 043)

UNIT 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.

Unit II:SOLUTION: 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 : 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 : 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: 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: 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: 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: 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: 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, PHENOL 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.

UNIT XII: ALDEHYDES, KETONES AND CARBOXYLIC ACID:

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

UNIT :XIV :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.

PRACTICAL SYLLABUS

:MICRO CHEMICAL METHODS ARE AVAILABLE FOR SEVERAL PRACTICAL EXPERIMENTS, WHEREVER POSSIBLE SUCH TECHNIQUE SHOULD BE USED.

A. Chromatography

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

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.

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

D. Determination of concentration/ molarity of KMnO_4 solution by titrating it against a standard solution of:

Oxalic acid,
Ferrous Ammonium Sulphate

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

E. 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+} , Cu^{2+} , Ni^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , NH_4^+

Anions: $(\text{CO}_3)^{2-}$, S^{2-} , $(\text{SO}_3)^{2-}$, $(\text{NO}_2)^-$, $(\text{SO}_4)^{2-}$, Cl^- , Br^- , I^- , PO_4^{3-} , $(\text{C}_2\text{O}_4)^{2-}$, CH_3COO^- , NO_3^-
(Note: Insoluble salts excluded)

PROJECT

Scientific investigations involving laboratory testing and collecting information from other sources A few suggested Projects.

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

General Guidelines(Refer Marking scheme for practicals-visually impaired students)

The practical examination will be of two hour duration. A separate list of ten experiments is included here. The written examination in practicals for these students will be conducted at the time of practical examination of all other students. The written test will be of 30 minutes duration. The question paper given to the students should be legibly typed. It should contain a total of 15 practical skill based very short answer type questions. A student would be required to answer any 10 questions.

A writer may be allowed to such students as per CBSE examination rules.

All questions included in the question papers should be related to the listed practicals. Every question should require about two minutes to be answered.

These students are also required to maintain a practical file. A student is expected to record at least five of the listed experiments as per the specific instructions for each subject. These practicals should be duly checked and signed by the internal examiner.

The format of writing any experiment in the practical file should include aim, apparatus required, simple theory, procedure, related practical skills, precautions etc.

Questions may be generated jointly by the external/internal examiners and used for assessment. The viva questions may include questions based on basic theory/principle/concept, apparatus/materials/ chemicals required, procedure, precautions, sources of error etc.

D. Items for Identification/Familiarity of the apparatus for assessment in practical (All experiments)

Beaker, glass rod, tripod stand, wire gauze, Bunsen burner, Whatman filter paper, gas jar, capillary tube, pestle and mortar, test tubes, tongs, test tube holder, test tube stand, burette, pipette, conical flask, standard flask, clamp stand, funnel, filter paper

Hands-on Assessment

Identification/familiarity with the apparatus

Odour detection in qualitative analysis

E. List of Practical

The experiments have been divided into two sections: Section A and Section B. The experiments mentioned in Section B are mandatory.

SECTION- A**i) Chromatography**

Separation of pigments from extracts of leaves and flowers by paper chromatography and determination of R_f values (distance values may be provided).

ii) Tests for the functional groups present in organic compounds:

Alcoholic and Carboxylic groups.

Aldehydic and Ketonic

iii) Characteristic tests of carbohydrates and proteins in the given food stuffs.**iv) Preparation of Inorganic Compounds- Potash Alum**

SECTION-B (Mandatory)

D. Quantitative analysis

- (a) Preparation of the standard solution of Oxalic acid of a given volume
- (b) Determination of molarity of KMnO_4 solution by titrating it against a standard solution of Oxalic acid.

The above exercise [(a) and (b)] to be conducted using Ferrous ammonium sulphate (Mohr's salt)

E. Qualitative analysis:

Determination of one cation and one anion in a given salt. Cation – NH_4^+ Anions: CH_3COO^- , S^{2-} , SO_3^{2-} , CO_3^{2-} , Cl^-

(Note: Insoluble salts excluded)

Note: The above practicals may be carried out in an experiential manner rather than recording observations.

Prescribed Books:

- G. Chemistry Part -I, Class-XII, Published by NCERT.
- H. Chemistry Part -II, Class-XII, Published by NCERT.

CLASS XII (2020-21)-MARKING SCHEME-THEORY

Time :3Hours

Unit No.	Title	Marks
Unit I	Solid State	23
Unit II	Solutions	
Unit III	Electrochemistry	
Unit IV	Chemical Kinetics	
Unit V	Surface Chemistry	
Unit VII	p -Block Elements	19
Unit VIII	d -and f -Block Elements	
Unit IX	Coordination Compounds	
Unit X	Haloalkanes and Haloarenes	28
Unit XI	Alcohols, Phenols and Ethers	
Unit XII	Aldehydes, Ketones and Carboxylic Acids	
Unit XIII	Amines	
Unit XIV	Biomolecules	
	Total	70

PRACTICALS MARKS DISTRIBUTION:

Evaluation Scheme for Examination	Marks
Volumetric Analysis	08
Salt Analysis	08
Content Based Experiment	06
Project Work	04
Class record and viva	04
Total	30

Practical Examination for Visually Impaired Students of Class- XII

Evaluation Scheme

Time Allowed:Two hours

M.M:30

Identification/Familiarity with the apparatus	5 marks
Written test (based on given/prescribed practicals)	10 marks
Practical Record	5 marks
Viva	10 marks
Total	30 marks

THEORY- DELETED PORTION

S No	Unit	Portion to be Reduced
1	Solid State	Electrical and magnetic properties. Band theory of metals, conductors, semiconductors and insulators and n and p type semi conductors.
2	Solutions	Abnormal molecular mass, Van't Hoff factor
3	Electrochemistry	Lead accumulator, fuel cells, corrosion, law of electrolysis (elementary idea), dry cell- electrolytic cells and Galvanic cells,
4	Chemical Kinetics	Concept of collision theory (elementary idea, no mathematical treatment), activation energy, Arrhenius equation.
5	Surface Chemistry	emulsion - types of emulsions, catalysis: homogenous and heterogeneous, activity and selectivity of solid catalysts; enzyme catalysis,
6	General Principles and Processes of Isolation of Elements	Entire unit
7	p-Block Elements	Preparation and properties of Phosphine, Sulphuric Acid: industrial process of manufacture, Oxides of Nitrogen (Structure only); Phosphorus - allotropic forms, compounds of Phosphorus: Preparation and properties of Halides and Oxo acids (elementary idea only).
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 $\text{K}_2\text{Cr}_2\text{O}_7$
9	Coordination Compounds	Structure and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system)
10	Haloalkanes And Haloarenes	Uses and environmental effects of -dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.
11	Alcohols, Phenols and Ethers	uses with special reference to methanol and ethanol.
12	Aldehydes, Ketones and Carboxylic Acid	---
13	Amines	Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.
14	Biomolecules	Oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen), importance of carbohydrates. Vitamins– classification and functions. Enzymes. Hormones - Elementary idea excluding structure.
15	Polymers	Entire chapter
16	Chemistry in Everyday life	Entire chapter

PRACTICAL -DELETED PORTION

Following portions should be **considered deleted**.

C. Surface Chemistry

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

F. Chemical Kinetics

- d. Effect of concentration and temperature on the rate of reaction between Sodium Thiosulphate and Hydrochloric acid.
- e. Study of reaction rates of any one of the following:
 - vi) Reaction of Iodide ion with Hydrogen Peroxide at room temperature using different concentration of Iodide ions.
 - vii) Reaction between Potassium Iodate, (KIO_3) and Sodium Sulphite: (Na_2SO_3) using starch solution as indicator (clock reaction).

F. Thermo chemistry Any one of the following experiments

- v) Enthalpy of dissolution of Copper Sulphate or Potassium Nitrate.
- vi) Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH).
- vii) Determination of enthalpy change during interaction (Hydrogen bond formation) between Acetone and Chloroform.

F. 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.

I. Preparation of Organic Compounds Preparation of any one of the following compounds

- 1. Acetanilide
- 2. Di-benzal Acetone
- 3. p-Nitroacetanilide

Aniline yellow or 2 - Naphthol Aniline dye

The Solid State

1) Density of unit cell = $\frac{Z \times M}{a^3 \times N_A} \text{ g/cm}^3$

2) what is the formula of a compound in which element Y forms CCP lattice and atoms of X occupy $\frac{1}{3}$ of Tetrahedral void.

3) Defects:-

- i) Schottky defect
- ii) Frenkel defect
- iii) Impurity defect
- iv) F-Centre.

4) A cubic solid is made of two elements P and Q. Atoms of Q are at the corners of the cube and P at the body centre. What is the formula of compound.

5) write two difference between crystalline and amorphous solid.

Solutions

- 1) Definition of a) Molarity b) molality c) ppm
- 2) Define Henry Law.
- 3) Define Raoult's Law.
- 4) Write the difference between ideal and Non ideal solution.
- 5) Define azeotropic mixture.
- 6) Relation between Henry constant and solubility.
- 7) How can you say Raoult's law is a special case of Henry law.
- 8) Define a) osmotic pressure b) Reverse osmosis
c) Isotonic solution. d) colligative property
- 9) What will happen if a cell is kept in 1% NaCl solution.
- 10) Numericals on formulae:-

$$\text{a) Mass percentage} = \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$$

$$\text{b) Molarity} = \frac{\text{No. of mole of solute}}{\text{volume of solution (lit.)}}$$

$$\text{c) Molality} = \frac{\text{No. of mole of solute}}{\text{weight of solvent (kg)}}$$

d) $\text{ppm} = \frac{\text{Mass of solute} \times 10^6}{\text{Mass of solution}}$

e) Henry law:

$$p = k_h \cdot \chi$$

f) Raoult's law for volatile solute

$$P_s = P_A^\circ \cdot \chi_A + P_B^\circ \cdot \chi_B$$

g) Relative lowering of vapour pressure

$$\frac{P_A^\circ - P_s}{P_A^\circ} = \chi_B$$

h) Elevation in B.P.:-

$$\Delta T_b = T_s - T_A$$

$$\Delta T_b = K_b \cdot m$$

i) Depression in freezing point

$$\Delta T_f = T_A - T_s$$

$$\Delta T_f = K_f \cdot m$$

j) Osmotic pressure:-

$$\pi V = nRT$$

Electrochemistry

1) Conductivity :-

$$k = \frac{1}{R} \cdot \frac{l}{a}$$

2) Molar Conductivity :- $\Lambda_m = \frac{k \times 1000}{\text{Molarity}}$

3) Defination of Kohlrausch law.

4) Calculation of degree of dissociation (α) = $\frac{\Lambda_m^c}{\Lambda_m^0}$

5) Calculation of dissociation constant :-

$$K = \frac{C\alpha^2}{1-\alpha}$$

6) Defination of limiting molar conductivity

7) Variation of conductivity and molar conductivity with concentration for strong and weak electrolyte.

8) Nernst equation:-

$$E = E^0 - \frac{0.059}{n} \log \frac{[m]}{[m^{n+}]}$$

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.059}{n} \log \frac{[\text{Anode}]}{[\text{Cathode}]}$$

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.059}{n} \log \frac{[\text{Product}]}{[\text{Reactant}]}$$

$$9) \quad E_{\text{cell}}^{\circ} = \frac{0.059}{n} \log K$$

$$10) \quad \Delta G^{\circ} = -n F E_{\text{cell}}^{\circ}$$

$$11) \quad \Delta G^{\circ} = -2.303 RT \log K$$

Chemical Kinetics

- 1) Define Rate of reaction and rate constant.
- 2) Define instantaneous rate of reaction.
- 3) write difference between order of reaction and molecularity of reaction
- 4) Define pseudo 1st order reaction.
- 5) unit of Rate Constant
- 6) A reaction is first order in A and second order in B.
 - a) write differential rate equation
 - b) How is the rate affected when concentration of B is tripled.
 - c) How is the rate affected when concentration of both A and B is doubled.
- 7) Graph of Zero and 1st order reaction.
- 8) Zero order reaction:-

$$R = \frac{[R_0] - [R]}{t}$$

9) 1st order reaction:-

$$k = \frac{2.303}{t} \log \frac{[R_0]}{[R]}$$

$$k = \frac{0.693}{t_{1/2}}$$

10) The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume



Experiment	Time	Total pressure
1	0	0.5
2	100	0.6

Calculate the rate constant.

Surface Chemistry

- 1) Difference between adsorption and absorption.
- 2) Difference between physisorption and chemisorption.
- 3) why adsorption is exothermic
- 4) why adsorption decreases on increasing the temperature.
- 5) Explain Freundlich adsorption isotherm.
- 6) Define
 - a) Multimolecular Colloid
 - b) Macromolecular Colloid
 - c) Associated Colloid
- 7) Define
 - a) Lyophilic colloid
 - b) Lyophobic Colloid.
- 8) Classification of colloid based on physical state of dispersed phase and dispersion medium.

- 9) Define
- Peptisation
 - Bredig arc method
 - Dialysis
 - Electrophoresis
 - Tyndall effect
- 10) What is coagulation. Explain Hardy Schulze rule.
- 11) Arrange $K_4[Fe(CN)_6]$, Na_3PO_4 and Na_2SO_4 in order of increasing coagulation value for the coagulation of positively charged colloidal sol.
- 12) What is the reason for stability of colloidal sol?

The p-block elements

- 1) N, O, F \rightarrow small size
Absence of d-orbital
- 2) $\text{NH}_3, \text{H}_2\text{O}, \text{HF} \rightarrow$ Hydrogen bond.
- 3) Nitrogen does not form pentahalide. why?
- 4) $\text{R}_3\text{P}=\text{O}$ exist but $\text{R}_3\text{N}=\text{O}$ not. why
- 5) Nitrogen exist in diatomic form but phosphorus in tetraatomic form. why
- 6) $\text{N}_2 \rightarrow$ Gas, $\text{P}_4 \rightarrow$ solid why?
- 7) Arrange $\text{NH}_3, \text{PH}_3, \text{AsH}_3, \text{SbH}_3$ and BiH_3 in order of increasing
 - a) Boiling point
 - b) Basic strength
 - c) Bond dissociation energy
 - d) Thermal stability
 - e) Reducing character.
- 8) Complete the reaction:-
$$\text{Cu} + \text{HNO}_3 \xrightarrow{\text{Conc.}}$$
$$\text{I}_2 + \text{HNO}_3 \xrightarrow{\text{Conc.}}$$

Group 16

- 1) oxygen exist in diatomic form, but sulphur in octaatomic form. why?
- 2) O_2 is gas, but sulphur is solid. why?
- 3) Arrange H_2O , H_2S , H_2Se & H_2Te in order of increasing
 - a) Boiling point
 - b) Bond dissociation energy
 - c) Thermal stability
 - d) Acidic strength
- 4) why ozone act as powerful oxidising agent?
- 5) Ozone is thermodynamically unstable. why?
- 6) Sulphur in which form shows paramagnetic behaviour & why?
- 7)
$$SO_2 + Fe^{3+} + H_2O \rightarrow$$
$$SO_2 + MnO_4^- + H_2O \rightarrow$$
$$Cu + Conc. H_2SO_4 \rightarrow$$
- 8) Structure of H_2SO_3 , H_2SO_4 , $H_2S_2O_7$ and $H_2S_2O_8$.

Group 17:-

- i) Arrange F_2 , Cl_2 , Br_2 & I_2 in order of B.D.E (increasing order)
- ii) why Bond dissociation energy of F_2 is less?
- iii) why fluorine is stronger oxidising agent than Chlorine.
- iv) why are halogens coloured?
- v) Arrange HF , HCl , HBr , HI in order of increasing
 - a) Boiling point
 - b) Bond dissociation energy
 - c) Thermal stability
 - d) Acidic strength
- vi)
$$Cl_2 + NaOH \rightarrow$$

Cold & dil.

$$Cl_2 + NaOH \rightarrow$$

Hot & Conc.

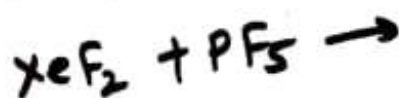
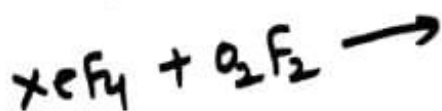
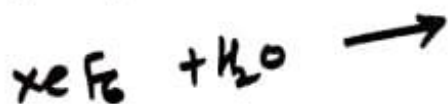
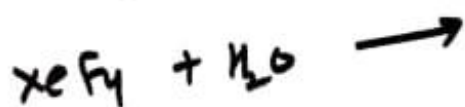
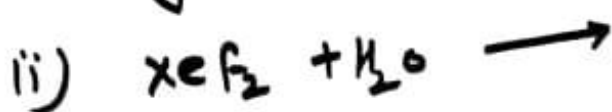
$$Cl_2 + Ca(OH)_2 \rightarrow$$
$$FeSO_4 + H_2SO_4 + Cl_2 \rightarrow$$
$$Au + H^+ + NO_3^- + Cl^- \rightarrow$$
- vii) structure of $HClO_4$, $HClO_3$, $HClO_2$ & $HClO$.

viii) Arrange HClO_4 , HClO_3 , HClO_2 and HClO in order of increasing acidic strength.

ix) What are interhalogen compounds. Why they are more reactive than halogens?

Group 18

i) Why Noble gases have low boiling point.



Structure of :- XeF_2 , XeF_4 , XeF_6 , XeO_3 , XeO_4

ICl_2^- , ICl_4^- , ClF_3 , SF_4 , SF_6 , PCl_5 .

The d & f-block elements

- 1) what are transition elements?
- 2) why Zn, Cd & Hg are not considered transition elements?
- 3) Give reason:-
 - a) Transition metals and their compounds generally shows paramagnetic behaviour.
 - b) Compounds of transition metals are generally coloured.
 - c) Enthalpy of atomisation of transition metal is high.
 - d) Transition metals can show a large no. of oxidation state.
 - e) Transition metals and many of their compounds act as good catalyst.
- 4) which element of 1st transition series exhibit highest oxid. state & why?

5) Why Cr^{2+} is reducing & Mn^{3+} is oxidising although both have d^4 configuration.

6) The $E^\circ_{\text{M}^{2+}/\text{M}}$ for Copper is positive. Why?

7) Mn^{2+} compounds are more stable than Fe^{2+} towards oxidation to their +3 state. Why?

8) The lowest oxide of transition metal is basic while the highest is amphoteric/acidic.

9) Which is a stronger reducing agent Cr^{2+} or Fe^{2+} . Give reason.

10) The E° value for $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is much more positive than that for $\text{Cr}^{3+}/\text{Cr}^{2+}$ couple or $\text{Fe}^{3+}/\text{Fe}^{2+}$ couple.

11) Why the properties of Zr & Hf are almost same?

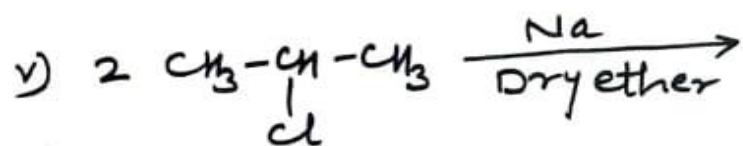
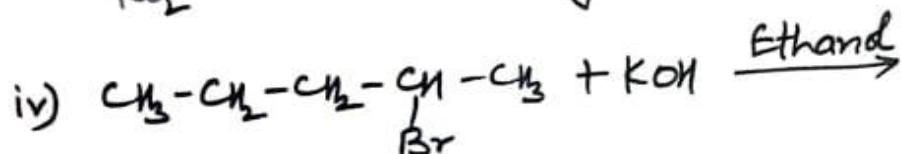
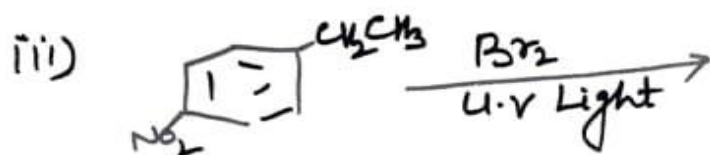
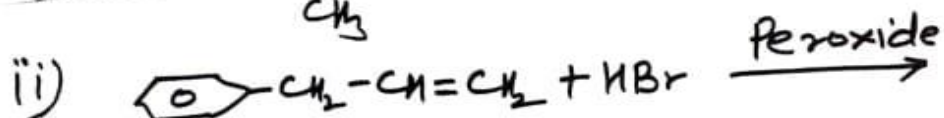
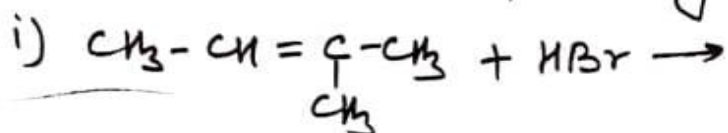
Coordination Compounds

- 1) When a coordination compound $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ is mixed with AgNO_3 , 2 moles of AgCl are precipitated per mole of the compound. Write structural formulae of the complex.
- 2) Define a) Denticity b) Ligand
c) Chelate effect d) Ambident Ligand.
- 3) IUPAC nomenclature
- 4) Why $[\text{NiCl}_4]^{2-}$ is paramagnetic but $[\text{Ni}(\text{CO})_4]$ is diamagnetic?
- 5) For the complex $[\text{Fe}(\text{CN})_6]^{3-}$ write the hybridisation type, magnetic character and spin nature of complex.
- 6) On the basis of crystal field theory, write the electronic configuration of d^4 ion, if $\Delta_o < P$
- 7) A solution of $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green but a solution of $[\text{Ni}(\text{CN})_4]^{2-}$ is colourless. Explain.

1. IUPAC Nomenclature
2. Name reaction
3. Distinguish test
4. Mechanism of reaction
5. Conversion /
6. Complete the reaction
7. Reasoning

Haloalkane and Haloarene

1. Nomenclature.
2. Complete the following reactions:-



Intext Question 10.5, Back Exercise 10.14

3. n-Butyl bromide has higher B.P than t-butyl bromide. why?
4. Alkyl halide though polar are insoluble in water. why.
5. why does p-dichlorobenzene has higher m.p than its o & m-isomers.
6. Dipole moment of chlorobenzene is lower than that of cyclohexyl chloride. why?

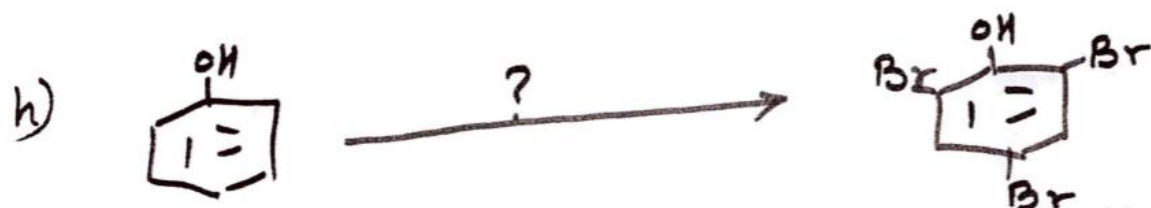
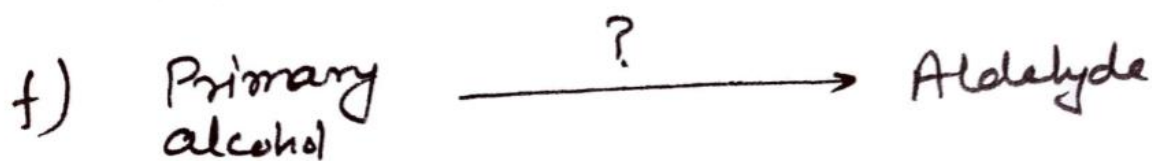
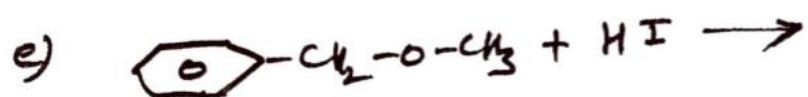
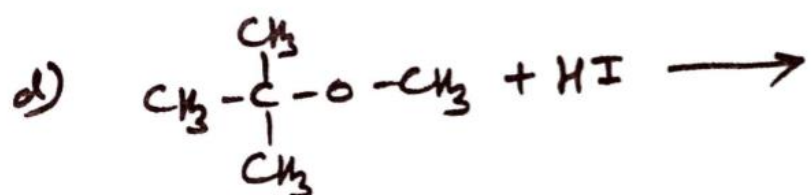
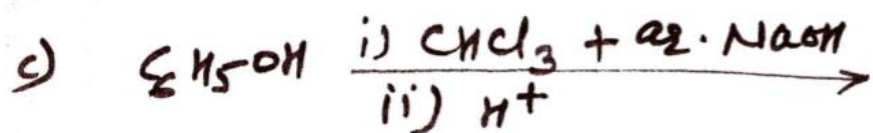
7. C-Cl bond length in chlorobenzene is lower than that of cyclohexyl chloride. why?
8. Although chlorine is an electron withdrawing group, yet it is o & p - directing in electrophilic aromatic substitution reaction. why?
9. why Grignard reagent should be prepared under anhydrous condition.
10. which would undergo S_N1 reaction faster in following pair



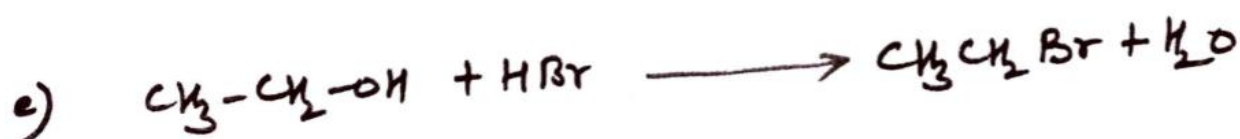
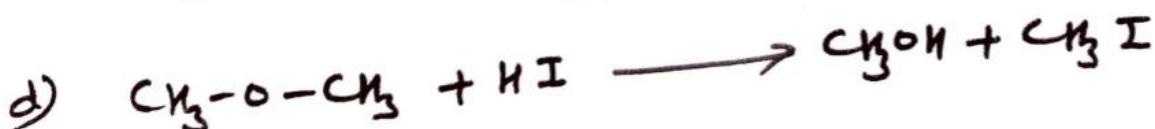
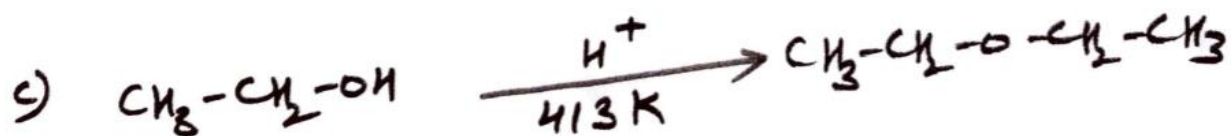
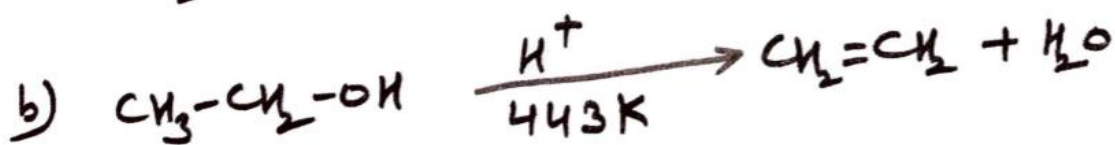
11. which would undergo S_N2 reaction faster in following pair & why CH_3-CH_2-Br and CH_3-CH_2-I
12. Racemic Mixture is optically inactive. why
13. Chlorobenzene is extremely less reactive towards nucleophilic substitution reaction. why?
14. Give a chemical Test to distinguish between C_2H_5Br and C_6H_5Br .
15. out of $C_6H_5CH_2Br$ and $C_6H_5CH(C_6H_5)Br$ which is easily hydrolysed by aqueous KOH and why?

Alcohols, Phenols and ethers

- 1) Nomenclature
- 2) why phenol is more acidic than Ethanol?
- 3) out of o-Nitrophenol and p-Nitrophenol which is steam volatile and why?
- 4) o-Nitrophenol is more acidic than o-Methoxy Phenol. why?
- 5) Propanol has higher boiling point than butane. why?
- 6) Alcohols are more soluble in water than hydrocarbons of comparable molecular mass. why?
- 7) Preparation of Ethers by acid dehydration of secondary & tertiary alcohols is not a suitable method. why?
- 8) Boiling point of ethanol is higher in comparison to methoxymethane. why?
- 9) Complete the reaction:-
 - a) $\text{CH}_3-\text{CH}=\text{CH}_2 \xrightarrow[\text{ii) H}_2\text{O}_2/\text{OH}^-]{\text{i) B}_2\text{H}_6}$
 - b) $\text{C}_6\text{H}_5\text{OH} \xrightarrow[\text{ii) CO}_2/\text{H}^+]{\text{i) aq. NaOH}}$



i) write Mechanism of following reaction:-



11) Name Reactions:-

- a) Reimer-Tiemann reaction
- b) Kolbe's reaction
- c) Williamson synthesis

12) Do the following conversion:-

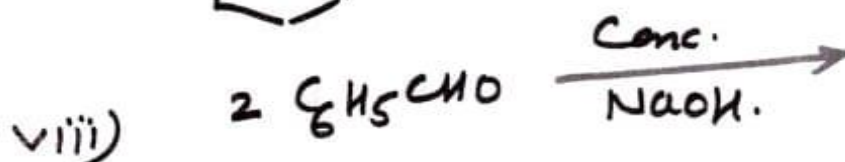
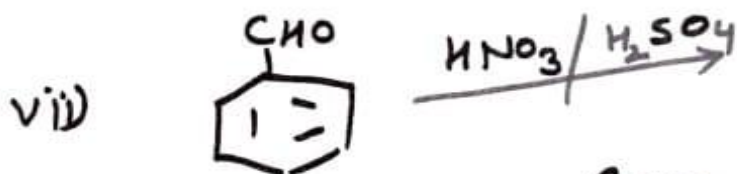
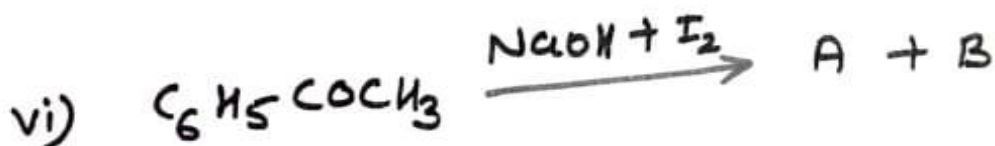
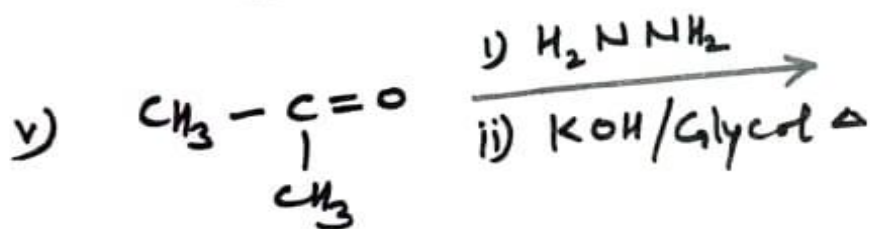
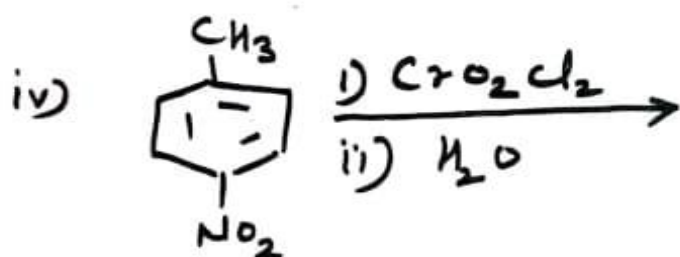
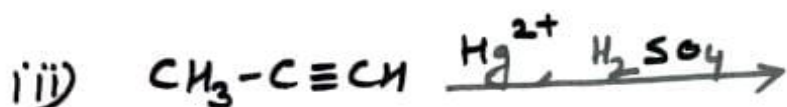
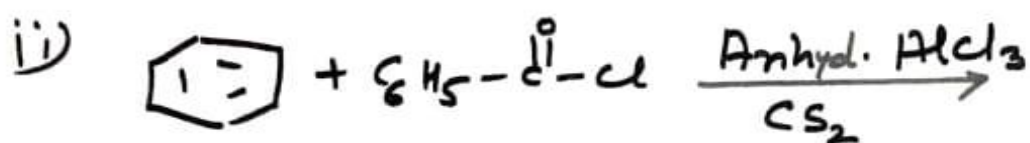
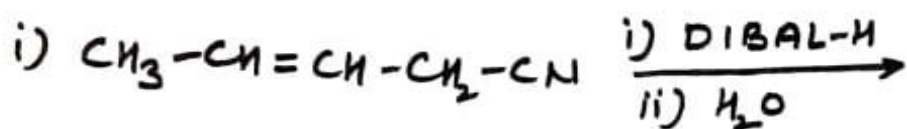
- i) Propene \longrightarrow Propan-2-ol
- ii) Benzyl chloride \longrightarrow Benzyl alcohol
- iii) Ethyl chloride \longrightarrow Ethanol.
- iv) Phenol \longrightarrow 2,4,6-Trinitrophenol
- v) Methylmagnesium bromide \longrightarrow 2-Methylpropan-2-ol.
- vi) phenol \longrightarrow Anisole
- vii) propan-2-ol \longrightarrow 2-Methylpropan-2-ol.

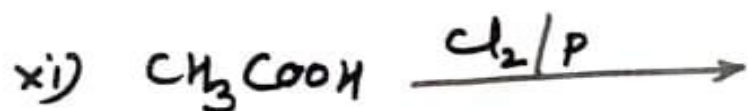
Aldehydes, Ketones & Carboxylic acids.

- Q.1 Aldehydes and ketones have lower boiling point than corresponding alcohols. why
2. Aldehydes are more reactive than ketones towards nucleophilic addition reaction. why?
3. There are two $-NH_2$ group in semicarbazide, however only one is involved in the formation of semicarbazone.
4. Cyclohexanone forms cyanohydrin in good yield but 2,4,6-trimethylcyclohexanone does not. why?
5. Chloroacetic acid is stronger than acetic acid. why?
6. Although phenoxide ion has more number of resonating structures than carboxylate ion, carboxylic acid is stronger acid than phenol. Give reason.

7. Carboxylic acids do not give characteristic reactions of carbonyl group.

8. Complete the reactions:-





9. Distinguish Test :-

i) $\text{C}_6\text{H}_5\text{COCH}_3$ and $\text{C}_6\text{H}_5\text{CHO}$

ii) Ethanal and Propanal.

iii) Benzaldehyde and Benzoic acid

10. Do the following Conversion:-

i) Toluene \rightarrow Benzaldehyde

ii) Benzene \rightarrow Acetophenone

iii) Benzoic acid \rightarrow Benzaldehyde

iv) Propanone \rightarrow Propene

v) Ethanal \rightarrow 2-Hydroxypropanoic acid

vi) Ethanal \rightarrow But-2-enal

vii) Ethanol \rightarrow 3-Hydroxybutanal.

viii) Benzaldehyde \rightarrow Benzophenone

ix) Toluene \rightarrow m-Nitrobenzoic acid

x) Ethylbenzene \rightarrow Benzoic acid

xi) Bromobenzene \rightarrow Benzoic acid

xii) Butan-1-ol \rightarrow Butanoic acid.

11) Name reactions:-

i) Etard reaction.

ii) Wolf-Kishner reduction

iii) Cannizzaro reaction

iv) Aldol Condensation

v) Rosenmund reduction

vi) Clemmensen reduction

vii) Hell-Volhard-Zelinsky reaction

12) Example 12.4 NCERT

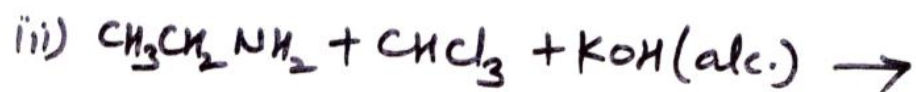
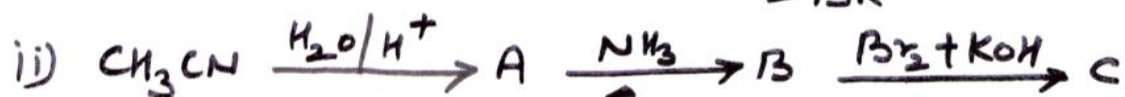
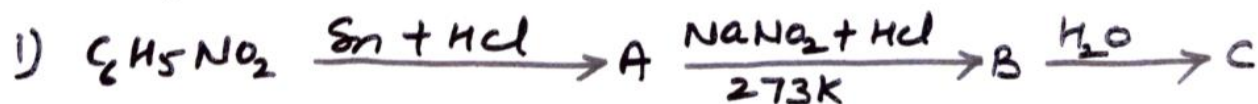
NCERT Back Exercise 12.10 and 12.11

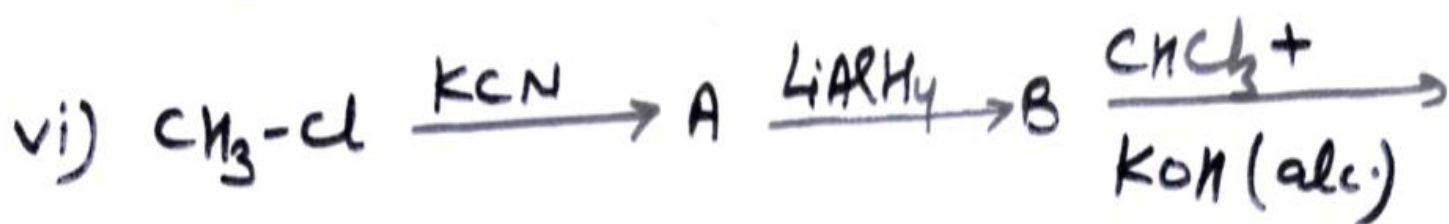
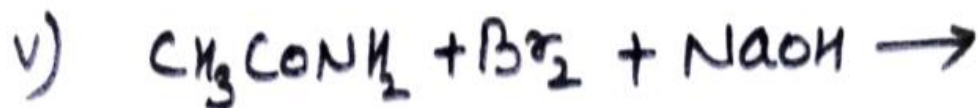
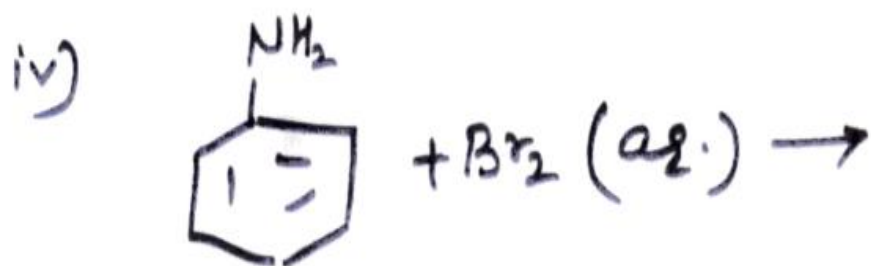
Amines

1. Nomenclature
2. Primary amines have higher boiling point than tertiary amines.
3. Ethylamine is soluble in water whereas aniline not. why
4. Aniline does not undergo Friedel Craft reaction. why?
5. pK_b of aniline is more than that of methylamine. why?
or
why aliphatic amines are stronger base than aromatic amines.
- c) Arrange the following Compounds in increasing order of basic strength.

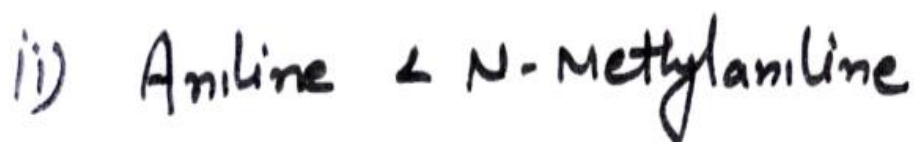
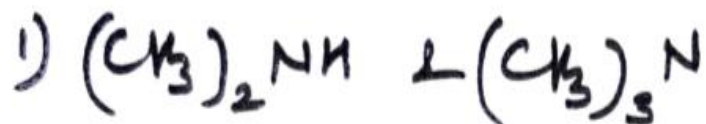
$C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$ and CH_3NH_2

7) Complete the reaction:-





8) Distinguish Test :-



Biomolecules

- 1) write the reaction of Glucose with
 - i) HI
 - ii) H_2NOH
 - iii) HCN
 - iv) $\text{Br}_2/\text{H}_2\text{O}$
 - v) conc. HNO_3
- 2) Enumerate the reaction of Glucose which can not be explained by open chain structure.
- 3) write the difference between fibrous protein and Globular protein.
- 4) Amino acids shows amphoteric behaviour. why?
- 5) what is peptide linkage.
- 6) Define Essential and non essential amino acids. Give examples.
- 7) what do you mean by denaturation of Protein.
- 8) write the difference between nucleotide and nucleoside.
- 9) write structural and functional difference bet. DNA and RNA.

- 10) write the name of different types of RNA found in cells of organisms.
- 11) The two strands in DNA are not identical but are complementary. Explain.