

KENDRIYA VIDYALAYA SANGATHAN

GUWAHATI REGION



SPECIAL STUDY MODULE – **CHEMISTRY**

FOR

CLASS – XII

(2015-16)

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Unit-1

SOLID-STATE

1. No. of atom per unit cell(z)-
 - a. Simple cubic cell : 1 atoms per unit cell
 - b. F.C.C unit cell : 4 atoms per unit cell
 - c. B.C.C unit cell : 2 atoms per unit cell
2. Relation between radius of atom(r) and Edge-length of unit cell(a) -
 - a. Simple cubic cell(a) = 2.r
 - b. F.C.C cubic cell(a) = $2\sqrt{2}.r$
 - c. B.C.C cubic cell(a) = $\frac{4}{\sqrt{3}}.r$
3. Density of unit cell

$$\text{Density (d)} = \frac{Z.M}{a^3.NA}$$
4. For cubic unit cell- 1) Face diagonal (b) = $\sqrt{2}a$
 2) Body diagonal (c) = $\sqrt{3}a$
 Where a= edge length or side of cube.

Unit-2

SOLUTIONS

Ideal Solutions: Which obeys Raoult's Law at all temperature and concentration condition

For ideal solutions

$$(a) \Delta H_{\text{mixing}}=0, \quad (b) \Delta V_{\text{mixing}}=0$$

Raoult's Law:

$$(a) p_A = p_A^\circ \cdot X_A \quad \& \quad p_B = p_B^\circ \cdot X_B$$

$$(b) p_{\text{total}} = p_A + p_B$$

Colligative Properties Of Solution:- Which depend on no of particles in solution.

1. $\frac{P_A^\circ - P_{\text{sol}}}{P_A^\circ} = X_B$ (Mole fraction of solution)
2. Elevation in B.P, $\Delta T_b = K_b \cdot m$ (molality of solution)
3. Depression in F.P, $\Delta T_f = K_f \cdot m$ (molality of solution)
4. Osmotic pressure, $\pi = CRT$, where C= molarity of solution

Unit-3

ELECTRO CHEMISTRY

1. Specific Conductivity (k_v)= Conductance x Cell constant (G^*)= 1/R.G
 Molar conductivity (Λ_m) = $\frac{K \times 1000}{\text{Molarity}}$
 Limiting Molar Conductivity: It is a Molar conductivity at infinite dilution of solution.
2. Kohlrausch's Law:

$$\Lambda_m^\circ = \eta_+ \lambda_+^\circ + \eta_- \lambda_-^\circ$$

Cell :

Function of salt Bridge:

1. Maintain electrical neutrality between two half cells
2. Completes the circuit b/w two half cells.
3. Nernst Equation for electrode: $M^{n+} + n e^{-} \longrightarrow M(s)$

$$E = E^{\circ} - \frac{0.059}{n} \log \frac{1}{[M^{n+}]}$$

For electro chemical cell, $aA + bB \xrightarrow{ne^{-}} cC + dD$

E.M.F or $E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.059}{n} \log \frac{[C]^c [D]^d}{[A]^a [B]^b}$ where n is no of mol of e- used in cell reaction.

4. Relation between e.m.f and equilibrium constant

$$\log K_c = \frac{n}{0.059} \cdot E^{\circ}_{\text{cell}}$$

4. Faraday's Law:

a. 1st law, $W = Z \cdot Q = Z \cdot I \cdot t$ where $Q = I \cdot t$ is charge

Unit-4**CHEMICAL KINETICS****Definitions:**

- a. Rate of reaction: Change in the concentration in unit time
Unit: $\text{mol l}^{-1}\text{Sec}^{-1}$
- b. Order of reaction: Sum of powers of the concentration of the reactants in the rate law
- c. Rate law: $\text{Rate} = K[A]^x[B]^y$
K is a constant called rate constant
- d. Elementary reaction: Reactions which occur in one step.
Complex reaction: Reaction which occur in many steps.
- e. Pseudo First order: A bimolecular reaction whose order of reaction is unity
Ex: Sucrose $\xrightarrow{\text{Hydrolysis}}$ Glucose + Fructose
- f. Integrated Rate-law:
 - i. For zero-order reaction, $K = \frac{[R_0] - [R]}{t}$
 - ii. For first order reaction, $K = \frac{2.303}{t} \log \frac{[R_0]}{[R]}$
- g. Half-life period: Time in which half of the concentration of reactant is consumed.
 1. $t_{1/2}$ for zero order, $K = \frac{R_0}{t/2}$
 2. $t_{1/2}$ for first order, $K = \frac{0.693}{t/2}$
- h. Activation energy:

Energy required by the reactant to form activated complex

Relation b/w rate constants & Activation energy:-

$$\log \left(\frac{k_2}{k_1} \right) = \frac{E_a}{2.303R} \left[\frac{1}{T_1} - \frac{1}{T_2} \right], \text{ where } K_1 \text{ is rate constant at temp. } T_1$$

and K_2 is rate constant at temp. T_2

Unit-5

SURFACE CHEMISTRY

Adsorption:

- A. Definition: Retention of the molecules of one substance on the surface of another.
 Adsorbent: The surface of solid or liquid on which adsorption occurs.
 Adsorbate: The substance which retained on the surface of adsorbent.
- B. Type of Adsorption:
1. Physical adsorption- If force of attraction b/w adsorbate and adsorbent is Vander Waals forces.
 2. Chemical adsorption: If chemical-bond occurs b/w adsorbate & adsorbent.

Adsorption Isotherms -

A Graph of $\left(\frac{x}{m}\right)$ versus P(Pressure) at constant temp.

$(x/m) = K.P^{1/n}$, Where x/m is extent of adsorption.

COLLOIDS:

- A. Colloidal Solution= Dispersion medium + Dispersed phase
 e.g. Smoke = Air + Carbon-particles
 Fog = Air + Water-particles

B. Difference between any two:-

Sl No.	Type of Colloids	Dispersed Phase	Dispersed Medium	Example
1.	Sols	Solid	Liquid	Paint
2.	Gel	Liquid	Solid	Butter
3.	Emulsion	Liquid	Liquid	Milk
4.	Aerosol	Solid, liquid	Air or gas	Smoke
5.	Foam	Gas	Liquid	Lather

Sols- May be, hydrosols/ Aquasols – if water is D.M

Benzosols – if benzene is D.M

Alcosols – if alcohol is D.M

C. Classification of colloidal solution:

- a. Lyophilic sols: C.S in which more affinity between D.M and D.P

e.g. Starch in water

- b. Lyophobic sols: C.S in which no or less affinity between D.M and D.P.

- c. Multi molecular colloidal: C.S in which smaller atoms or small molecules aggregate to form colloids .e.g. Sols of Gold

- d. Macromolecular: C.S. in which macromolecules act as D.P. e.g. Starch, Proteins

- e. Associated molecular colloids: Some molecule at higher concentration behave as C.S. e.g. Soap, detergents

D. Definitions:

1. **Peptisation:** Conversion of fresh precipitate in colloidal solution by adding any electrolyte.
E.g. Colloidal Solution of $\text{Fe}(\text{OH})_3$ by adding FeCl_3 .
2. **Dialysis:** Separation of crystalloids from colloidal solution by diffusing through S.P.M.
If electro-field is applied, then this process is called electro dialysis.
3. **Brownian movement:** Zig-zag motion of colloidal particles.
E.g. Dust particles in air.
4. **Tyndall effect:** Scattering of light by colloidal particles.
5. **Electrophoresis:** Movement of colloidal particles towards oppositely charged electrode in electric field.
This supports the presence of charge on colloidal-particles.
6. **Coagulation:** Aggregation or precipitation or settling down of colloidal-particles.
Coagulation occurs due to
 1. By adding electrolyte
 2. by passing electricity
 3. by boiling .
7. **Emulsions:** Colloidal solution in which both D.P. and D.M. are liquids
Type of emulsions:-
 - a. Oil in water (o/w) – e.g. milk
 - b. Water in oil (w/o) – e.g. Butter
8. **Emulsifying-agent or emulsifier-** Chemicals used to stabilize emulsions.
E.g. Soap-molecules.

CATALYSIS

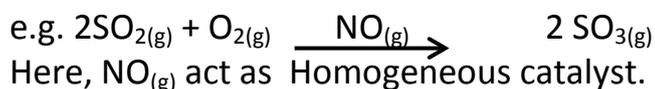
A. Definition: Chemical reaction whose speed or rate is changed by adding a foreign substance.

Catalyst: A foreign substance other than reactants which changes the speed of the chemical reaction.

B. Type of catalysis or catalyst:

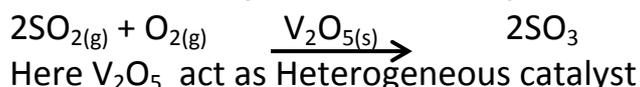
i. Homogeneous catalysis/catalyst:

When the used catalyst is in the same phase as that of reactants.

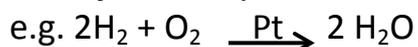


ii. Heterogeneous catalysis/catalyst:

When the catalyst is in different phase from that of reactants.

**C. Features of catalyst:**

i. **Activity of a catalyst:** Ability to increase the speed of a reaction.



- ii. **Selectivity of a catalyst:** Ability to direct a reaction to give a particular product.



- iii. **Shape - selective catalysis/catalyst:**

A catalytic reaction which depends upon the pore-size of catalyst and size of the reactants and product.

e.g. Zeolite, ZSM-5.

Unit-6

GENERAL PRINCIPLES & PROCESS OF ISOLATION OF ELEMENTS

Minerals: Natural occurring chemical substances found in the earth-crust.

Ore: The mineral from which a metal is extracted cheaply and easily.

Gangue: Earthly materials other than metal present in ore.

Concentration of Ore- Removal of gangue from ore.

Important methods for concentration of ore, and their principles-

- a. **Magnetic separation-** Depends on difference in the magnetic properties of ore & gangue.

e.g. Magnetite

- b. **Froth- floatation process:** Depends on difference in wetting tendency of ore by oil and gangue by water. Eg. Sulphide ore.

Froth- Stabiliser: Chemical used to stabilize the froth. Eg. Cresols, Aniline.

Depressant: A chemical which separates two sulphide ores selectively.

e.g. NaCN or KCN separates PbS & ZnS.

- c. **Leaching:** Selective dissolution of ore in a particular solvent.

e.g. (i) Aluminium from bauxite-ore dissolve in NaOH.

(ii) Au /Ag from their ores by NaCN or KCN Solution.

Extraction of crude metal from concentrated-ore-

- i. **Calcination-** Heating of concentrated-ore in absence or limited supply of air.

e.g. Carbonate ores.

- ii. **Roasting:** Heating of ore in excess of air below the m.p of metal.

e.g. Sulphide ores.

- iii. **Smelting:** Heating of metal-oxide in presence of carbon, or coke or CO as a reducing-agent.

iv . **Pyro metallurgy**: Extraction of metals by heating with any reducing-agents.

v. **Hydro metallurgy** : Extraction of metal by displacement reaction in aqueous solutions.

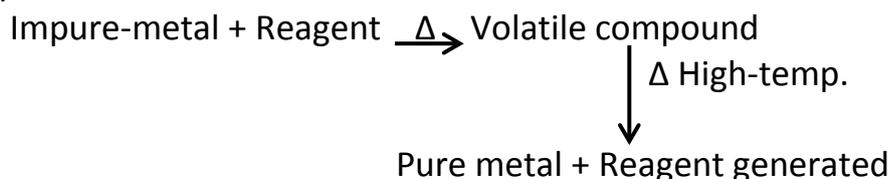
vi. **Electro metallurgy**: Extraction of metal by electrolysis of fused-salt.

Refining: Purification of impure metals:

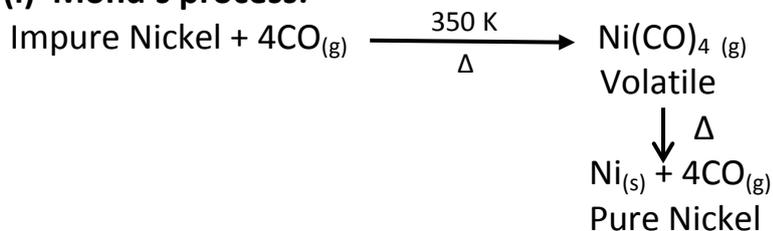
1. **Zone-refining**: Impurities are more soluble in the molten-state than in the solid-state of the metal. Eg: Silicon, Germanium

2. **Vapour-phase refining**:

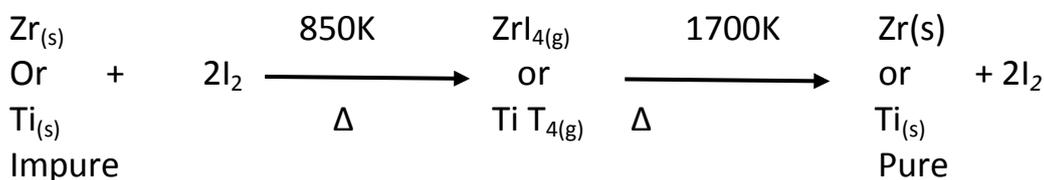
Principles:



e.g. (i) **Mond's process**:



(ii) **Van Arkel Method**:



Q. What is role of:-

1. **Silica**- in the metallurgy of iron or copper- As a flux

2. **Cryolite**- in the metallurgy of Aluminum-

a. To lower m.p. of mixture.

b. To enhance conductivity of molten alumina.

3. **Zinc**- in the metallurgy of Gold/Silver- As a reducing agent

4. **NaCN**- in the metallurgy of Gold/Silver- (i) As a solvent for leaching
(ii) to form complex.

5. **Graphite rod**- in the metallurgy of aluminum- As anode.

UNIT: 7
p-BLOCK ELEMENTS

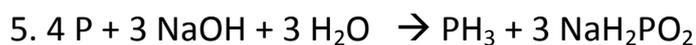
Reasoning:

Group—15: Nitrogen Family

1. 'N' does not form pentahalide. Or NCl_5 is not available.- **due to lack of 'd' orbitals**
2. NH_3 act as a ligand, or a Lewis-base or a complexing-agent, easily protonated.- **Due to lone-pair.**
3. NO_2 makes dimer. Ans: **due to one odd electron to N-atom in NO_2 .**
4. Nitrogen does not show catenation, but 'P' shows. Ans: **P—P bond is stronger.**
5. All bonds in PCl_5 are not equivalent. Or PCl_5 breaks easily into PCl_3 and Cl_2 .Ans: **Due to t_{bp} shape, in which axial bonds are bigger than equatorial bonds.**
6. PCl_3 gives fumes with water. **Ans: HCl forms with water.**
7. PH_3 has low B.P., is weaker base than NH_3 .- **Due to bigger size of P**
8. NCl_3 is hydrolysed, but NF_3 is not. Ans: **due to 'd' orbital of Cl-atom.**
9. Nitric oxide becomes brown in air. Ans: **reacts with O_2 and forms NO_2 .**
10. N_2 gas is least reactive and used in food packing. --Ans :**Less reactive due to triple bond.**
11. Yellow phosphorous is highly reactive, is kept under water. ---**Due to Low ignition-temperature**
12. CN^- ion exists, but CP^- ion does not.—**Due to larger size of P, hence C – P bond is weaker.**
13. Pentahalides are more covalent. ----- **Due to high polarising power P(V).**
14. $\text{R}_3\text{P} = \text{O}$ exists, but $\text{R}_3\text{N} = \text{O}$ does not. ----- **Due to absence of d orbital in N-atom.**
15. Nitrogen exists as N_2 , but Phosphorous as P_4 .—**small size of N, more electronegative than P, P≡P multiple bonds.**
16. BiCl_5 is quite unstable, or act as O.A. - **due to inert pair effect.**
17. NH_3 reacts with both strong and weak acid, but PH_3 only with strong acid.- **more e⁻ density in NH_3**

Chemical reactions:

1. $\text{Mg}_3\text{N}_2 + 6 \text{H}_2\text{O} \rightarrow 3 \text{Mg}(\text{OH})_2 + 2 \text{NH}_3$, (ii) $\text{Mg}_3\text{N}_2 + 6 \text{HCl} \rightarrow 3 \text{MgCl}_2 + 2 \text{NH}_3$
2. $\text{Ca}_3\text{P}_2 + 6 \text{H}_2\text{O} \rightarrow 3 \text{Ca}(\text{OH})_2 + 2 \text{PH}_3$, (ii) $\text{Ca}_3\text{P}_2 + 6 \text{HCl} \rightarrow 3 \text{CaCl}_2 + 2 \text{PH}_3$
3. $8 \text{NH}_3 + 3 \text{Cl}_2 \rightarrow 6 \text{NH}_4\text{Cl} + \text{N}_2$; (ii) $\text{NH}_3 + 3 \text{Cl}_2 \rightarrow \text{NCl}_3 + 3 \text{HCl}$.

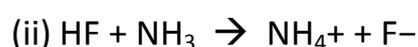
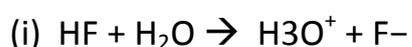


Group—16, Oxygen family

1. Elements of group 16 are called 'Chalcogens'. --- **As they are ore forming.**
2. Oxygen is gas, but sulphur is solid. -**small size, high Electronegative, Pπ- Pπ bond, Vander Waal's forces in O₂.**
3. Sulphur show catenation.-> **Due to S—S bond Stronger.**
4. H₂O is liquid; H₂S is gas.—**Due to H- bond in water.**
5. Sulphur in vapour phase is paramagnetic- **Due to presence of unpaired electrons; like O₂ gas.**
6. Ozone is a powerful O.A.—**gives most reactive atomic O-atom.**
7. SF₄ is hydrolysed, SF₆ is not--- **SF₄ has vacant d- orbital, less hindered.**
8. Bleaching action by SO₂ gas is temporary—**by nascent H- atom.**
9. Sugar gets charred on adding conc. H₂SO₄.—**absorbs water molecules from sugar.**
10. H₂S is less reactive (or weak acid) than H₂Te. --- **B.D.E. of H—S bond is more.**
11. SF₆ exists, but SCl₆ does not.—**bigger size of Cl-atom.**
12. H₂S can act as R.A. only, but SO₂ as both R.A. and O.A.—

Ans: In H₂S, O.N. of S atom is – 2, so it can lose electron and act as R.A. but in SO₂, the O.N. of S-atom is +4, so it can lose or gain electron, so it can act as both.

13. OF₂ is called oxygen difluoride, but not fluorine oxide.- **F is most Electronegative.**
14. HF is a weak acid in water, but stronger in ammonia.—**Conjugate acid of weak-base is stronger.**



Group – 17; HALOGEN FAMILY

1. Halogens have negative electron-gain enthalpy—**easily accept electron to gain stability.**
2. Fluorine is a stronger O.A. -- **B.D.E. of F is lower than all other.**
3. Fluorine shows only – 1 O.S. whereas other halogens show +1, +3, +5 and +7 O.S.—**No d orbital in F.**

4. Bond dissociation energy of F_2 is less than that of Cl_2 .—**lone pair – lone pair repulsion of in F due to small-size.**
5. F does not show disproportionation reaction, but other show.—**due to only one –1 O.S.**
6. Nitric oxide and ClO_2 both have odd electron, but – **odd e^- of ClO_2 is delocalised, but in NO is localised.**
7. HF has lower acidic property than other HX acid – **B.D.E of HF is high due to small size of both H and F.**
8. Iodine is more soluble in KI solution than water.—**due to the formation of KI_3 ion .**
9. Interhalogen compounds are more reactive than halogens—**due to polarity, weaker bond b/w $XX'n$.**
10. HF acid is stored in wax coated glass-bottle—**HF reacts with SiO_2 of glass, but other HX not.**
11. Addition of Cl_2 to KI solution gives it a brown colour, but excess Cl_2 makes it colourless—**KI is oxidised to I_2 by Cl_2 so it makes brown; $2KI + Cl_2 \rightarrow 2KCl + I_2$, Excess Cl_2 further oxidises I_2 to HIO_3 .**
 $5Cl_2 + I_2 + 6 H_2O \rightarrow 2 HIO_3 + 10HCl$.
12. FCl_3 does not exist, but ClF_3 exist. ---**Due to lack of 'd' orbital in F.**
13. Halogens are coloured.—**absorb some radiations from visible-region, other radiations is transmitted.**
14. Halogens are diatomic molecules. — **Due to sharing of unpaired 'e' by both X-atoms.**
15. F_2 and Cl_2 are gases, Br_2 is liquid, but I_2 is solid.—**Due to increasing Vander Waal's forces.**
16. HI or HBr is not prepared by the reaction of KI or KBr with conc. H_2SO_4 acid.—**HI or HBr formed is oxidised by conc. H_2SO_4 to I_2 or Br_2 .**
17. Fluorine does not act as a central atom in its compounds - **most Electronegative element**

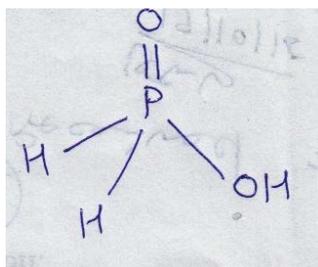
Group 18: NOBLE-GASES

1. Inert gases are monoatomic.--- **Stable Configuration**
2. Electron gain enthalpy of noble- gases is positive.--**Stable Configuration, $ns^2 np^6$.**
3. Atomic radii of inert gases are larger in the period.—**Show Vander waal radii.**
4. M.P. /B.P. of noble gases are low.—**Due to weak Vander waal forces.**
5. Xenon forms true compounds.—**Due to low Ionisation enthalpy among noble gases.**
6. Xenon forms compounds only with F_2 and O_2 .—**Both are most Electronegative, withdraw electros from Xe.**
7. Xenon does not form XeF_3 , XeF_5 .—**All the orbitals of Xe are paired .On promotion of electron to vacant'd' orbitals gives 2,4,6, half-filled orbitals.**
8. Helium is used for sea diver.—**Due to low solubility in blood.**

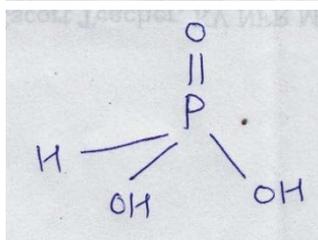
Structures of Oxo-acids-

i. For phosphorus

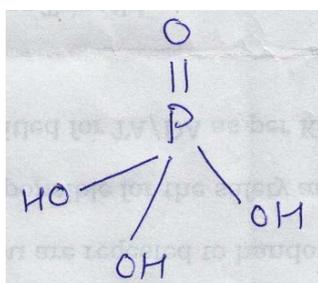
1. H_3PO_2
Basicity/Proticity
= 01



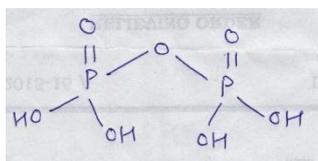
2. H_3PO_3
Proticity=02



3. H_3PO_4
Proticity=03

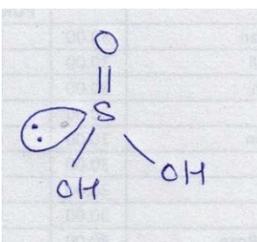


4. $\text{H}_4\text{P}_2\text{O}_7$
Proticity=04

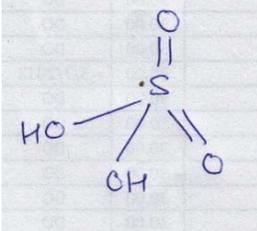


ii. For Sulphur

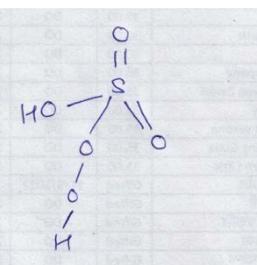
1. H_2SO_3
Proticity=02



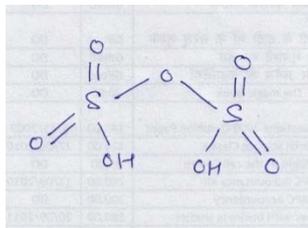
2. H_2SO_4
Proticity=02



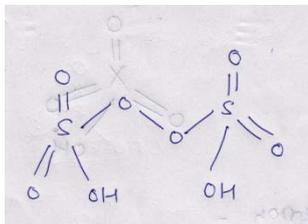
3. H_2SO_5
Proticity=02



4. $\text{H}_2\text{S}_2\text{O}_7$ (Oleum)
Proticity=02

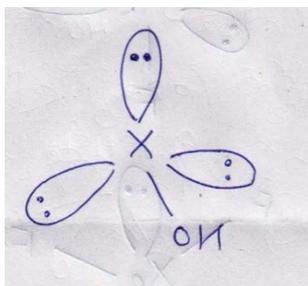


5. $\text{H}_2\text{S}_2\text{O}_8$ (marshal acid)
Proticity=02

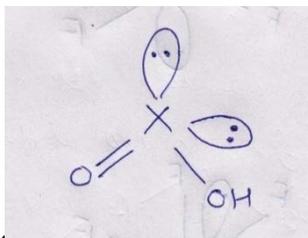


iii. For halogens

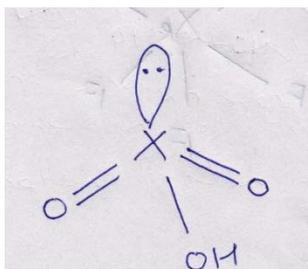
1. HOX
E.g- HOCl, HOBr, HOI
Proticity=01



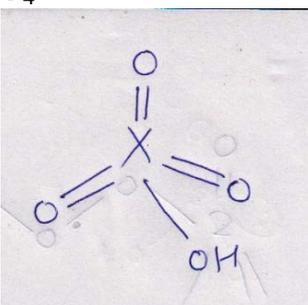
2. HXO_2
E.g- HClO_2 , HBrO_2 , HIO_2
Proticity=01



3. HXO_3
E.g- HClO_3 , HBrO_3 , HIO_3
Proticity=01

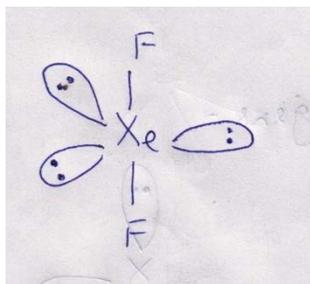


4. HXO_4
E.g- HClO_4 , HBrO_4 , HIO_4
Proticity=01

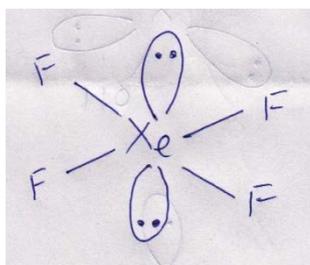


iv. Xenon

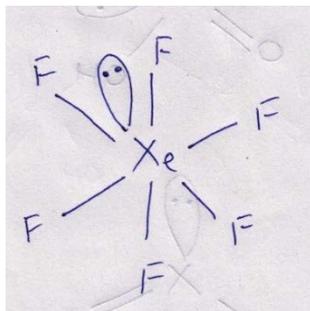
1. XeF_2
Linear (sp^3d)



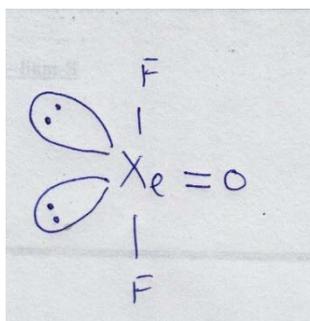
2. XeF_4
Square Planar (sp^3d^2)



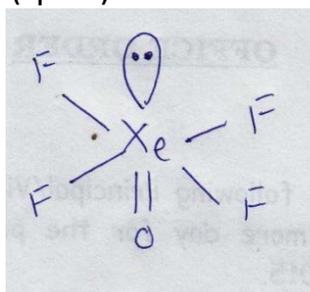
3. XeF_6
Distorted Octahedral (sp^3d^3)



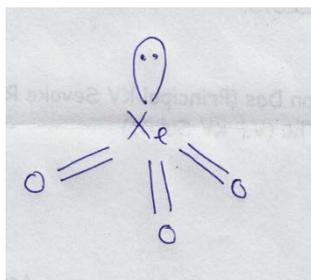
4. XeOF_2
T-Sharp (sp^3d)



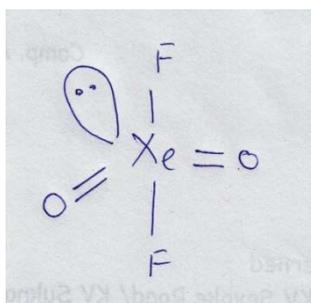
5. XeOF_4
Square Pyramidal (sp^3d^2)



6. XeO_3
Trigonal Pyramidal sp^3



7. XeO_4
Tetrahedral (sp^3)



UNIT: 8 d- & f - BLOCK ELEMENTS

d - Block elements

01. Definitions: - Elements whose **last electron** goes to d subshell.

General Outer electronic configuration: $(n-1) d^{1-10} ns^{1-2}$

Transition Elements:-Elements of d block which have unpaired electron(s) in d subshell of its atom/ ions in common Oxidation-States.

e.g. **Zn** is **not a transition** element due to d^{10} configuration , but d block element.

Classification of d block elements in Series:

1st Series (in the **Fourth period**) → Scandium (Z = 21) to Zinc (Z = 30), Electrons go to **3d Subshell**.

2nd Series (in the **Fifth period**) → Yttrium (Z = 39) to Cadmium (Z = 48), Electrons go to **4d Subshell**.

3rd Series (in the **Sixth period**) → Lanthanum (Z = 57) to Mercury (Z = 80), Electrons go to **5d Subshell**.

In the Sixth period, **Lanthanides** (from **Cerium (58)** to **Lutetium (71)**) are also present.

4th Series (in the Seventh period) → starts from Actinium (Z = 89) and still incomplete.

02. Electronic Configuration of Elements/Ions; & Count the no. of unpaired electrons

in d orbitals: [1st Series]

Elements/Its Ions	At. No. (Z)	Electronic Configuration	No. of Unpaired in d orbitals	Remarks	Stability of Ions
Sc	21	$3d^1 4s^2$	01		
Sc ³⁺	21	$3d^0 4s^0$	Nil		
Ti	22	$3d^2 4s^2$	02		
Ti ²⁺	22	$3d^1 4s^0$	01		
V	23	$3d^3 4s^2$	03		
V ²⁺	23	$3d^3 4s^0$	03		
V ³⁺	23	$3d^2 4s^0$	02		
V ⁵⁺	23	$3d^0 4s^0$	Nil		
Cr	24	$3d^5 4s^1$	05		
Cr ²⁺	24	$3d^4 4s^0$	04		
Cr ³⁺	24	$3d^3 4s^0$	03	$(t_{2g})^3 (e_g)^0$	Most Stable
Mn	25	$3d^5 4s^2$	05		
Mn ²⁺	25	$3d^5 4s^0$	05	Half-filled	Most Stable
Mn ³⁺	25	$3d^4 4s^0$	04		
Mn ⁴⁺	25	$3d^3 4s^0$	03		
Mn ⁷⁺	25	$3d^0 4s^0$	Nil		
Fe	26	$3d^6 4s^2$	04		
Fe ²⁺	26	$3d^6 4s^0$	04		
Fe ³⁺	26	$3d^5 4s^0$	05	Half-filled	Most Stable
Cobalt , Co	27	$3d^7 4s^2$	03		
Co ²⁺	27	$3d^7 4s^0$	03		
Co ³⁺	27	$3d^6 4s^0$	04		
Ni	28	$3d^8 4s^2$	02		
Ni ²⁺	28	$3d^8 4s^0$	02		
Ni ⁴⁺	28	$3d^6 4s^0$	04		
Cu	29	$3d^{10} 4s^1$	Nil		
Cu ²⁺	29	$3d^9 4s^0$	01		
Zn	30	$3d^{10} 4s^2$	Nil		Not a transition Element.
Zn ²⁺	30	$3d^{10} 4s^0$	Nil		

03. Properties of Transition- Elements:-

S. N.	Name of Properties	Reasons
1.	High enthalpy of atomization/ m.p.	Due to strong metallic bonding.
2.	Variable oxidation-states	Due to (n-1)d and ns- electrons.
3.	Paramagnetic Behavior	Due to Unpaired electron in d- orbitals
4.	Catalytic property	
5.	Coloured ions/ Compounds	Due to d-d transition of unpaired electrons.
6.	Complex salt formed	Due to vacant d- orbitals.
7.	Interstitial compounds	Due to presence of voids in the elements.

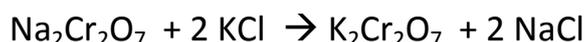
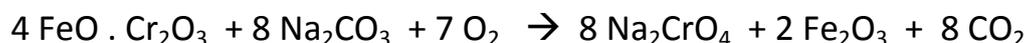
8.	Alloy formation	Due to same atomic size.
9.	Oxides in lower O.S. is basic/ ionic	Due to use of ns electrons or (+2) O.S.
10.	Oxides in higher O.S. is acidic/covalent	Due to more polarizing power, or smaller size of cations and high charge in higher O.S.
11.	Zinc is a soft metal.	Due to weak metallic bonding

04. Ions having same outer E.C:-

Outer E.C.	Ions with same configuration	Properties	
$3d^3 4s^0$	V^{2+} , Cr^{3+} , Mn^{4+}	Same Paramagnetic Value	↑ ↑ ↑
$3d^4 4s^0$	Cr^{2+} , Mn^{3+}		↑ ↑ ↑ ↑
$3d^5 4s^0$	Mn^{2+} , Fe^{3+}	Same Stability	↑ ↑ ↑ ↑ ↑
$3d^6 4s^0$	Fe^{2+} , Co^{3+} , Ni^{4+}		↑↓ ↑ ↑ ↑ ↑

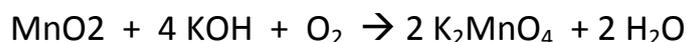
05. Potassium Dichromate, $K_2Cr_2O_7$:-

Preparation: - from Chromite Ore,



Potassium permanganate, $KMnO_4$

Preparation: - from Pyrolusite Ore,



Inner Transition Elements (f block elements):-

Definitions: - Elements whose **last electron** goes to f- subshell are called f-block elements.

General Outer electronic configuration: $(n-2)f^{1-14} (n-1)d^{0-1} ns^2$, where $n = 6, 7$

Classification of 'f' blocks elements in Series

Lanthanides: 1st Series, 4f-Series (in the **Sixth period**) $\rightarrow 4f^{1-14} 5d^{0-1} 6s^2$

Cerium (58) to Lutetium (71) are present.

Actinides: 2nd Series, 5f-Series (in the **Seventh period**) $\rightarrow 5f^{1-14} 6d^{0-1} 7s^2$

Thorium (Z = 90) to Lawrencium (Z = 103) are present.

Lanthanide Contraction:-

Definitions: - Decrease in atomic/ionic radii with increasing atomic number of lanthanoids.

Cause of Lanthanide Contraction: Due to poor **shielding/screening** effect of 4f-electrons.

Effects or Consequences of Lanthanide Contraction:

- (i) **Extraction or separation** of individual element becomes **difficult**.
- (ii) Atomic size of **5d series** of transition elements and **4d series** becomes nearly same.
- (iii) Basicity of Oxides or Hydroxides of lanthanides decreases from La (58) to Lu (71).

Properties of Lanthanides and Actinides

Name of properties		Lanthanides	Actinides
Oxidation States	Common	+3	+3
	Other	+2, +4	+4, +5, +6
Colour compounds		Yes, due to f-f transition	
Reactivity		Less	More
Radio-active Elements		No	Yes, All
Uses		In alloy making	In medicines Atomic reactors

UNIT-9

CO-ORDINATION COMPOUNDS

1. **Co-ordination compound**- These are compounds in which the central atom is linked to atoms or ions by co-ordinate bonds.

2. **Ligands**- An atom, molecule or ion that is capable of donating a pair of electron to the central metal atom or ion and forms a co-ordinate bond with it.

e.g. H_2O , NH_3 , OH^- , CN^- , etc.

3. **Denticity**- is the number of sites through which ligand binds or linked with central atoms/ ion.

4. **Unidentate ligands**- The ligand whose only one donor atom is bonded to metal atom are called unidentate ligands.

e.g. NH_3 , H_2O , CN^- .

5. **Bidentate ligands**- The ligands which contain two donor atoms or ions. Ex- en, $\text{C}_2\text{O}_4^{--}$

6. **Ambident ligands**- Monodentate ligands with more than one co-ordinating atoms are called ambidentate ligands. Ex- NO_2^- .

7. **Ionization isomers**- They give different ions in solution.

e.g. $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ & $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Br}$.

8. **Hydrate isomers**- It is isomerism in which water (solvent) is involved as ligand.

e.g. $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$ and $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$.

9. **Linkage isomers**- are those in which ambidentet ligand uses different atoms for ligation.

e.g. $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]\text{Cl}_2$ and $[\text{Co}(\text{NH}_3)_5(\text{ONO})]\text{Cl}_2$.

10. **Co-ordination isomers**- Isomers, which involve inter change of ligands.

e.g. $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$.

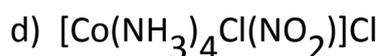
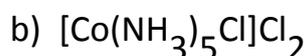
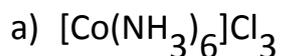
11. **Geometrical isomerism**- It is observed only for square planar and octahedral complexes.

12. **Optical isomers**- Optical isomers are those which are not super imposable on their mirror images.

Important Question (Solved)

Co-ordination compounds

1. Write the IUPAC names of the following co-ordination compounds :



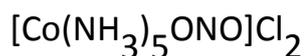
Ans. a. Hexa ammine cobalt (III) chloride

b. Pent ammine chlorido cobalt (III) chloride

c. Potassium hexacyano ferrate (III)

d. Tetra ammine chlorido nitrito-N- cobalt (III) chloride

2. Write the IUPAC name for the linkage isomers of



Ans. Triammine nitrito-N-cobalt(III) chloride

3. Using IUPAC names write the formula for the following:

Potassium tris (oxalato) chromate (III).

Ans. $K_3[Cr(C_2O_4)_3]$

4. Specify the oxidation numbers of the metals in the following co-ordination entities:

a. $[Co(H_2O)(CN)(en)_2]^{+2}$

Ans. a. $x + 0 + (-1) + 2(0) = +2$
 $\Rightarrow x = +3$

5. Name the metal present in

- i. Chlorophyll
- ii. Haemoglobin
- iii. Vitamin B₁₂
- iv. Cis-platin

Ans. i. Mg ii. Fe iii. Co iv. Pt

6. Write the factors on which magnitude of Δ_0 depend

- Ans. i. Nature of ligand and
 ii. Oxidation state of metal ion

7. Using the valence bond approach, predict the shape and magnetic character of $[Fe(CN)_6]^{-3}$ ion.

Ans. It has octahedral shape and is paramagnetic in nature due to presence of one unpaired electron.

8.. Mention applications of co-ordination compounds

- a. Analytical chemistry
- b. Extraction of metals
- c. Biological process
- d. Photography
- e. Medicines

UNIT- 10

HALOALKANES & HALOARENES

IMPORTANT QUESTIONS AND ANSWERS:

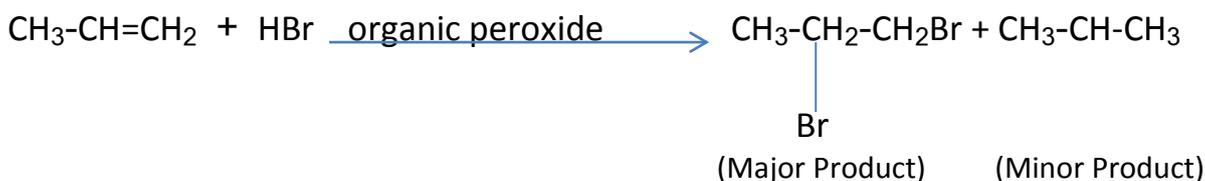
1. • Account for the following or explain why:

(a) Aryl cyanides cannot be formed by the reaction of aryl halides & sodium cyanide.

Ans: Aryl halides are less reactive than alkyl halides towards nucleophilic substitution reaction.

- **Peroxide Effect (Kharsh Effect):**

Ans: Addition of HBr to unsymmetrical alkenes in the presence of organic peroxides takes place against the Markownikoff's rule. This is known as peroxide effect.



• Complete the following reactions:

- $\text{CH}_3\text{-CH}=\text{CH}_2 + \text{HBr} \xrightarrow{\quad} \begin{array}{c} \text{CH}_3\text{-CH}(\text{Br})\text{-CH}_3 \\ \text{Br} \end{array}$
- $\text{CH}_3\text{-CH}=\text{CH}_2 + \text{HBr} \xrightarrow{\text{peroxide}} \text{CH}_3\text{-CH}_2\text{-CH}_2\text{-Br}$
- $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{Cl} \xrightarrow{\text{alc KOH}} \text{CH}_3\text{-CH}=\text{CH}_2 + \text{KCl} + \text{H}_2\text{O}$
- $\text{CH}_3\text{Br} + \text{KCN} \xrightarrow{\quad} \text{CH}_3\text{CN} \quad \text{H}_3\text{O}^+ \quad \text{CH}_3\text{COOH}$
(Ethanoic acid)

- **How will you distinguish between the following?**

- **Methanol & Ethanol:**

Ans: By Iodoform test: Ethanol will give positive Iodoform test (yellow ppt) whereas Methanol will not.

- **Propan-1-ol & Propan-2-ol**

Ans: By Iodoform test: Propan-2-ol will give positive Iodoform test whereas propan-1-ol will not.

- **Ethyl Chloride & Vinyl Chloride:**

Ans: Ethyl Chloride reacts with alc AgNO_3 solution to give white ppt. of AgCl while vinyl chloride does not yield to this test.

Important Questions and Answers.

Q1. Arrange each of the following compounds in order of their increasing boiling point:

- Bromomethane, Bromoform, chloromethane and dibromomethane.
- Propane, 1-chloropropane, isopropyl chloride, 1-chlorobutane.

Ans: -

- Chloromethane < Bromomethane < dibromomethane < Bromoform.
- Propane < isopropyl chloride < 1-chloropropane < 1-chlorobutane;

Q2. Arrange the halide ions in order of increasing basicity and nucleophilicity.

Ans: - i) Basicity: $\text{F}^- < \text{Cl}^- < \text{Br}^- < \text{I}^-$

ii) Nucleophilicity: $\text{I}^- > \text{Br}^- > \text{Cl}^- > \text{F}^-$

Q3. Arrange the following halide characters in order of their increasing S_N2 reactivity .

, $\text{CH}_3\text{CH}_2\text{Cl}$, $(\text{CH}_3)_2\text{CHCl}$

Ans: - The order is $(\text{CH}_3)_2\text{CHCl} < \text{CH}_3\text{CH}_2\text{Cl}$

Q4. Out of $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$ and $\text{C}_6\text{H}_5\text{CHClC}_6\text{H}_5$ which is more readily hydrolyzed by aq. KOH?

Ans: $\text{C}_6\text{H}_5\text{CHClC}_6\text{H}_5$.

UNIT-11

ALCOHOLS, PHENOLS & ETHERS

Short notes:

◆ WILLIAMSON'S SYNTHESIS:-

It is used in the laboratory for the preparation of ether by the action of corresponding alkoxides with alkyl halides.

◆ REIMER – TIEMANN REACTION

Phenol on treatment with Chloroform in presence of an alkali at 340 K and the hydrolysis of product formed yields O-hydroxy benzaldehyde (Salicylaldehyde) & p-hydroxy benzaldehyde.

ACCOUNT FOR THE FOLLOWING

1. Phenol is more easily nitrated than benzene.

Ans: OH group activates the benzene ring towards electrophilic substitution reaction.

2. Phenols are more acidic than alcohols.

The phenoxide ion is more resonance stabilized .

3. Phenols do not give protonation reactions readily but alcohols are easily protonated.

Ans:-Due to the presence of two lone pairs of electrons on oxygen in alcohols , they get protonated very easily whereas phenol is resonance stabilized and does not contain two lone pairs of electrons on O-atom,

4. Propanol has higher b.pt than butane.

Ans:- The higher b.pt of propanol as compared to that of butane is due to the presence of H-bonding in propanol.

5. Alcohols are comparatively more soluble in water than the corresponding hydrocarbon.

Ans:- Because of intermolecular H-bonding between alcohol & water molecules.

6. Ortho-Nitrophenol is more acidic than phenol.

Ans:- O-nitrophenol is more acidic than phenol because $-\text{NO}_2$ group is an electron withdrawing group

. How will you distinguish between the following pairs chemically.

◆ **2-Butanol and 2-methyl-2-propanol**

Ans: - BY LUCAS REAGENT or iodoform test

ETHANOL & PROPANOL:-

Ans:- BY IODOFORM TEST:-

ETHANOL & PHENOL

Ans:- BY FeCl₃ SOLN:-

PHENOL AND BENZOIC ACID

Ans:- BY FeCl₃ SOL or BY NaHCO₃:- test

1-PROPANOL & 2-PROPANOL

Ans:- BY IODOFORM TEST:-

Alcohol, phenols and ethers:

Q1. Of the two hydroxyl organic compounds ROH and R'OH, the first one is basic and the other is acidic in behavior. How is R different from R'?

Ans: R is alkyl group.

R' is an aryl group.

Q2. O-nitro phenol has lower boiling point than p-nitrophenol . Explain?

Ans: - O-nitro phenol has lower b.p. due to intramolecular H-bonding whereas the b.p. of p-nitro phenol is more due to the presence of intermolecular H-bonding.

Q3. Arrange the following in decreasing order of their acidic character?

p-nitro phenol, p-methoxy phenol, phenol.

Ans: - p-nitro phenol > phenol > p-methoxy phenol.

Q4. Lower alcohols are soluble in water, higher alcohol are not why?

Ans:- Lower alcohols can form H-bonds with water and therefore are soluble in water

Q5. Explain how –OH group attached to a carbon in the benzene rings

activates the benzene towards electrophilic reactions?

Ans :In phenol –OH group is attached to the benzene ring. The lone pairs of the oxygen is involved in resonance with benzene ring .

Q6. Phenol is a very weak acid. What substitutions in the molecule can make it a stronger acid and weaker acid why?

Ans: - An electron withdrawing group present at o- or p- position can make phenol a stronger

An e- releasing group present at o- or p- position can make phenol a weaker

Q7. How do you account for the miscibility of ethoxy ethane with water?

ANS: because it can form H-bond with water molecules.

Q8. Which is a stronger acid-Phenol or Cresol- explain.

ANS: Phenol is a stronger acid than cresol because phenoxide ion is more stable .

Q9. Why phenol doesn't undergo nucleophilic substitution reaction?

Ans. It is stable due to resonance..

Q10. Sodium metal can be used for drying diethyl ether but not ethanol.

Ans: Ethanol reacts with Na-metal leading to the evolution of hydrogen gas.

UNIT – 12

ALDEHYDES, KETONES & CARBOXYLIC ACIDS

1. Short notes:

i) ROSENMUND REDUCTION: Acid chlorides are converted into aldehydes by catalytic hydrogenation in the presence of Pd catalyst supported over BaSO_4 .

ii) CLEMENSEN REDUCTION: This involves the reduction of aldehydes or ketones with Zn-Hg amalgam and conc-HCl to give hydrocarbons.

iii) CANNIZARO'S REACTION : Aldehydes which do not contain any α -H-atom such as HCHO & $\text{C}_6\text{H}_5\text{CHO}$ undergo self oxidation and reduction reaction on treatment with conc.alkali. One molecule is oxidized to acid & another is reduced to alcohol.

iv) HELL – VOLHARD-ZELINSKY REACTION: carboxylic acid having an α -H atom are halogenated at α - position on treatment with Cl_2 or Br_2 in presence of red 'P' to give α -halo carboxylic acids.

v) HOFFMANN BROMAMIDE REACTION: when an amide is treated with liq, Br_2 and aq. NaOH, a primary amine containing one C-atom less is formed. This reaction is known as Hoffman's bromamide reaction.

2. Account for the following (i.e. give the reason) :

i) Chloroacetic acid stronger than acetic acid.

Ans. $\text{CH}_3 - \text{COOH}$
Acetic acid

$\text{Cl-CH}_2\text{COOH}$
Chloroacetic acid

Chloroacetic acid is stronger acid than acetic acid because Chloroacetate is more stable than acetate ion due to e-withdrawing nature of Cl-atom.

ii) Formaldehyde gives Cannizaro's reaction where as acetaldehyde does not.

Ans. Cannizzaro's reaction are given by only those aldehydes which do not contain α -H atoms. E.g. HCHO. Since CH_3CHO (acetaldehyde) contains α -H atom, it does not give Cannizzaro's reaction.

(iii) Carboxylic acids have higher boiling point than alcohols of comparable molecular masses.

Ans. In carboxylic acids the intermolecular H-bonding results in the formation of dimeric structure.

Which is as compared to alcohols so the b.pt of acids are higher than those of alcohols.

3. How will you chemically distinguish between the following pairs.

i) Propanal and propanone

Ans. By Iodoform test:

ii) Acetophenone and Benzophenone

Ans. Acetophenone will give Iodoform test while benzophenone ($\text{C}_6\text{H}_5\text{-Co C}_6\text{H}_5$) will not.

iii) Phenol and Benzoic acid

Ans. By FeCl_3 test:

Phenol + FeCl_3 Solution \longrightarrow violet color

Benzoic acid + FeCl_3 Solution \longrightarrow No reaction

iv) Benzoic acid and Ethyl benzoate :

Ans. By NaHCO_3 (Sodium bicarbonate test):

Benzoic acid + NaHCO_3 \longrightarrow brisk effervescence.

Ethyl benzoate + NaHCO_3 \longrightarrow No reaction

(v) Benzaldehyde and Acetophenone

Ans. (a) Tollen's test:

Benzaldehyde + Tollen's Reagent \longrightarrow silver mirror is formed.

Acetophenone + Tollen's Reagent \longrightarrow No Silver mirror is formed

(b) By Iodoform test ;

Benzaldehyde + I_2 + NaOH \longrightarrow No yellow ppt.

Acetophenone + I_2 + NaOH \longrightarrow Yellow ppt. is obtained.

v) Ethanal & Propanal

Ans. By Iodoform test:

Ethanal (CH_3CHO) + I_2 + NaOH \longrightarrow Yellow ppt. of CHI_3

Propanal ($\text{CH}_3\text{CH}_2\text{CHO}$) + I_2 + NaOH \longrightarrow No Yellow ppt. is formed

FEW IMPORTANT QUESTIONS & AND ANSWERS

Q1. Name an alkene which on reductive ozonolysis gives only acetone.

Ans: 2,3-di methyl but -2-ene.

Q2) what is LABH & what is its importance?

Ans) LABH is lithium tri-t-butoxy aluminum hydride. It is a less active reducing agent than LiAlH_4 & does not reduce aldehydes to alcohols.

Q3. Arrange the following in increasing order of reactivity.

HCHO, CH₃CHO, C₆H₅CHO.

Ans: C₆H₅CHO < CH₃CHO < HCHO.

Q4. Ketones containing bulky groups fail to react with NaHSO₃. Why?

Ans: due to steric hindrance.

Q5. Which out of the following is weakest and the strongest acid:

i) C₂H₅OH ii) CH₃COOH iii) C₆H₅OH iv) H₂O

The weakest acid –C₂H₅OH

The strongest acid- CH₃COOH

Q6. Arrange it in the order of their increasing order of acidic strength:

Fluoro acetic acid ii) chloro acetic acid iii) Acetic acid iv) formic acid v) propanoic acid

Ans: v < iii < iv < ii < i.

Q7. Even numbers of carboxylic acid have higher melting point than the odd number acids immediately above and below it. Why?

Ans: it is because in the case of even number of acid the structure is more symmetrical.

Q8. Formic acid reduces tollen's reagent. Why?

Ans: due to the presence of aldehyde group in the structure it gets easily oxidized.

Unit 13

NITROGEN-COMPOUND

Important Questions:

Arrange the following in the order of their increasing basic characters in solution.

NH₃, EtNH₂, Et₂NH, Et₃N

Ans. Et₂NH > Et₃N > EtNH₂ > NH₃

Give a chemical test to distinguish between C₆H₅NH₂ and C₆H₅CH₂NH₂.

Ans. Azo dye test.

Name the nitrogen containing compound which has the smell of bitter almonds.

Ans. Nitrobenzene.

Give one important industrial use of phenyl isocyanide.

Ans. It is used for preparation of N-methylaniline.

Short answer type question (S.A.):

1. Describe a chemical test to distinguish between $\text{CH}_3\text{CH}_2\text{NH}_2$ and $(\text{CH}_3)_2\text{NH}$.

Ans. Carbyl amine test

2. Why is methylamine stronger base than ammonia?

Ans. Due to presence of electron releasing $-\text{CH}_3$ group, having +I effect.

3. Aniline is a weaker base than cyclohexylamine. Why?

Ans. In aniline the lone pair on nitrogen is engaged due to resonance in benzene.

4. Define Hoffmann bromide reaction:

Ans. When amide reacts with Br_2 and KOH , we get primary amine with one carbon atom less than the amide.

5. Give one chemical test to distinguish between ethyl amine and aniline.

Ans. Azo dye test.

Unit 14 BIOMOLECULES

VERY IMPORTANT QUESTIONS WITH ANSWERS

1) **Why a carbohydrate generally optically active?**

Ans:- Because they have one or more chiral carbon atoms.

2) **Why is glucose given to patients under exhaustion?**

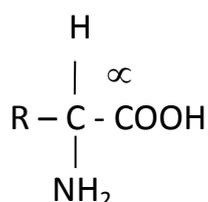
Ans:- Glucose is an instant source of energy and hence is given to patients under exhaustion.

3) **Name the water insoluble fraction of starch. Name the monomer of this.**

Ans:- Amylopectin is a water insoluble fraction of starch. It is a polymer of α -glucose.

4) **Write the structure of α -amino acid.**

Ans:- The structure is



5) **Name any two products derived from cellulose.**

Ans.- Rayon:- Used in textile industry.

Gun Cotton:- Used as an expt.

6) **Name the enzyme that helps in dissolving blood clots?**

Ans:- Streptokinase.

7) Name two purine base.

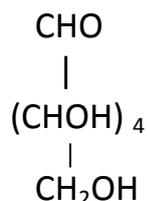
Ans:- Adenine (A) and Guanine (G).

8) What are monosaccharides? Give one example.

Ans:- The carbohydrates which cannot be hydrolyse to simpler compounds. e,g:- Glucose

SHORT ANSWER -TYPE QUESTIONS WITH ANSWERS:**1. Which carbohydrate is called grape sugar? Give its condensed structural formula.**

Ans:- Glucose is called grape sugar. Its condensed structural formula is

**2. Differentiate between the nucleotide of DNA & RNA.**

Ans:- Nucleotide of DNA contains deoxyribose sugar which RNA contains ribose sugar. In RNA nitrogenous base urasil is present at the place of thiamine

Few more important questions with Answers:

Q1) What are the hydrolysis products of maltose?

Ans. 2 Molecules of Glucose.

Q2) Which reaction confirms the presence of five OH-groups in glucose molecule?

Ans.) The formation of pent acetate derivative confirms the presence of five OH-groups.

Q3) Define non reducing sugar with example?

Ans.) The monosaccharide which do not reduce tollen's reagent are called non reducing sugar. Example-Sucrose.

Q4) Name the enzyme that converts maltose into glucose?

Ans.) Maltase.

Q5) Which bonds are responsible for secondary structure of Proteins and which linkages are responsible for primary structure of protein?

Ans.) H₂ Bond. Peptide linkage.

Q6) Define (I) Isoelectric point.

Ans.) (I) At a certain pH, the dipolar ion exists as the neutral ion and does not migrate to either electrode. This pH is known as isoelectric point of amino acid.

Q7) What do you mean by denaturation of protein?

Ans) When a protein in its native form is subjected to physical change in temp or chemical change like change in pH, the proteins lose its biological activity. This phenomenon is called denaturation of proteins. Primary structure being unaltered. e.g. Boiling of egg.

Unit-15

POLYMER CHEMISTRY

KEY NOTES

➤ CLASSIFICATION OF POLYMERS

❖ BASED ON SOURCE

- ❖ Natural polymers- e.g. protein, cellulose, starch, etc.
- ❖ Semi-synthetic polymer: e.g. cellulose acetate (rayon), cellulose nitrate, etc.
- ❖ Synthetic polymers- e.g. polythene, synthetic fibers (nylon 66), synthetic rubber (Buna S) etc.

❖ BASED ON STRUCTURE OF POLYMERS

- Linear polymers- These polymers consists of long and straight chains. e.g. high density polythene, PVC etc.
- Branched chain polymers- These polymers contain linear chains having some branches. e.g. low density polythene, etc.
- Cross linked Polymer

These polymers are usually formed from bi-functional and tri-functional monomers and contains strong covalent bonds between various linear polymer chains. e.g. Bakelite, Melamine, etc.

❖ BASED ON SYNTHESIS:

- ADDITION POLYMERS: These are formed by the repeated addition of molecules possessing double or triple bond.
- CONDENSATION POLYMERS: These polymers are formed by repeated condensation reaction between two different bi-functional or tri-functional monomeric units.

BASED ON MOLECULAR FORCES:

- ELASTOMERS: The polymer chains are held together by the weakest intermolecular forces. e.g. Buna-S, Buna-N, etc.
- FIBRES: The polymers are held together by the intermolecular forces like H-bonding.e.g. Polyamides, polyester etc.
- THERMOPLASTIC POLYMERS: these polymers possess intermolecular forces of attraction intermediate between elastomers & fibres. e.g. Polythene, polystyrene etc.
- THERMOSETTING POLYMERS: these polymers are cross linked or heavily branched molecules.e.g. Bakelite, urea-formaldehyde, resins etc.

Important Questions and Answers:

1) What are biopolymers? Give two examples.

Ans. Naturally occurring polymers that control various life processes in plants and animals are called bio polymers.

e.g. proteins, nucleic acid.

2) What are homopolymers and copolymers?

Ans. Polymers formed from one kind of monomers are called homo-polymers. Polymers formed from more than one kind of monomers are called co-polymers.

2) Name the monomers of Buna-S?

Ans. Styrene & 1, 3-butadiene.

3) Name the monomeric unit of bakelite?

Ans. Formaldehyde & Phenol

4) Name the monomers of Terylene?

Ans. Terephthalic acid & ethylene glycol.

5) Which polymer is used to make T.V. Cabinets, toys, etc?

Ans. Polystyrene (Styrofoam or Styron).

6) What is a monomer of PVC?

Ans. Vinyl Chloride

7) Name a polymer used to make cups for hot drinks?

Ans. Melamine-formaldehyde resin.

8) Arrange the following polymers in the increasing order of their intermolecular forces: Polythene, Buna-S, and Nylon-66.

Ans. Polythene < Buna-S < Nylon-66.

9) Name the polymer used for making medicinal capsules?

Ans. PHBV (Poly- hydroxyl butyrate-Co-β-hydroxy valerate).

10) Which artificial polymer is present in chewing gum and bubble gum?

Ans. It contains synthetic Styrene-butadiene rubber.

11) Give an example of step growth polymer?

Ans. Nylon-66.

12) What are fibres? Give one example.

Ans. Polymers which have quite strong interparticle forces like H-Bond. e.g. Nylon-66.

13) What is PHBV?

Ans. It is poly hydroxy butyrate-co-β-hydroxy valerate.. It is a biodegradable polymer ,.

UNIT-16

CHEMISTRY IN EVERYDAY LIFE

1. **Drug:** It is defined as the chemical compound used for purpose of diagnosis, prevention, relief or cure of a disease.
- a) **Antipyretics:** used to lower the body temperature. e.g. Paracetamol
 - b) **Analgesics :** used to relieve pain .These are of two types :
 - i. Non-narcotics (e.g. Novalgin, analgesics)
 - ii. Narcotics (e.g. morphine)
 - c) **Tranquillizers:** used for treatment of stress, mild and severe mental disorder.
 - d) **Antiseptics: used** to kill or prevent the growth of micro organism.
 - e) **Disinfectants:** used to kill microorganisms but can not be applied on living tissues. e.g. dettol.
 - f) **Antimalarial:-**used for the treatment of malaria e.g. chloroquine.
 - g) **Antimicrobial:** used to cure infections. E.g. sulphadiazine
 - h) **Antibiotics:** produced by micro organisms and can inhibit the growth of microorganism.e.g. penicillin G, penicillin F, Ampicillin.
 - i) **Antifertility drugs:** used to control the pregnancy.
 - j) **Antacids:** Chemical substances which neutralises excess acid in the gastric juices. For e.g. Aluminum hydroxide.
 - k) **Antihistamines:** used to diminish or abolish the main action of histamine and to prevent allergic reactions.
 - l) **Anesthetics:** Chemical substances which produce general or local insensibility to pains.e.g chloroform, vinyl ether.
 - m) **Artificial sweetening agents:** The chemical compounds that have sweetening effect to the food and enhance its odour and flavours .e.g. Saccharin.
 - n) **Antioxidants:** Chemical substances which prevent oxidation and subsequent spoilage of food. e.g. butylated-p-hydroxy anisole (BHA), butylated-p-hydroxy toluene(BHT).

Cleansing Agents: Substance used for cleaning purpose are called cleansing agents. E.g. soaps & detergents.

Limitation of use of soap:

- (i) Can not be used in hard water.
- (ii) Can not be used in acidic medicines

Synthetic detergents: These are better cleansing agents or they can be used in hard water .e.g. sodium lauryl sulphate.

Advantage of synthetic detergents over soaps :

- i) Detergents are used in hard water
- ii) Synthetic detergents can be used in acidic solution
- ii) More soluble in water than soaps
- iv) Give foam even in ice cold water.

Important Questions and Answers

Q1. What are detergents? Give their classification. Why are detergents preferred over soaps?

Ans.

Three types (i) cationic (ii) Anionic (iii) Non-ionic

They preferred because they can be used in hard water and in acidic medium.

Q2. (a) Name one common antacid.

(b) Name a substance which can be used both as an antiseptic as well as disinfectant.

Ans. (a) Baking soda (b) phenol

Q3. (a) What are tranquilizers? Give example

(b) Define with example the antifertility drugs.

(c) Define with example about antihistamines

Ans. (a) chemical substance which reduce anxiety, stress by acting on nerves

e.g. Equanil, luminal, seconal

(b) The drugs which are used for birth control.

e.g Oral pil

(c) These are anti allergic drugs and used to treat allergy.

e.g. Chloropheniramine, promethazine.

Q4) What is aspirin? Why should it not be taken in empty stomach?

Ans Aspirin is 2-acetoxy benzoic acid .It is used as an antipyretic and analgesic.

It should not be taken empty in stomach because it gets hydrolysed to form salicylic acid which causes bleeding in the stomach as well as ulcer formation.
