HALF YEARLY EXAMINATION -2024 (DINDIGUL DISTRICT)

STD: XII **CHEMISTRY ANSWER KEY** **DATE: 20.12.2024**

I. Choose the best answer:

S.NO	ANSWER	S.NO	ANSWER
1.	C) Mg	9.	b) 107.2 minutes
2.	b) HF>HCl>HBr>HI	10.	b) Increase with increase in T
3.	d) Al,Cu,Mn,Mg	11.	C) Trichloro methane
4.	d) Group number 3 Period number 6	12.	a) Acetyl chloride
5.	a) 3	13.	a) CH_3-CO NH NH_3
6.	a) 1-iii, 2-I, 3 –iv, 4-ii	14.	d) Vitamin B_2
7.	c) 20 min	15.	d) PHBV
8.	b) PF_3		

II. Answer in very short

16. **What is Calcinations?**

Calcination is the process in which the concentrated ore is strongly heated in the absence of air.

$$PbCO_3 \longrightarrow PbO + CO_2\uparrow$$

17. **Write a short note on anamolous properties of the first element of p-block.**

(i) Small size of the first member . (ii) High ionization enthalpy and high electronegativity. (iii) Absences of d-orbital in their valence shell.

18. **What is inert pair effect ?**

In P-block, the pair of s-electrons becomes chemical inert and do not take part in bonding. This is called as Inert pair effect.

19. **Define Solubility product.**

The solubility product of a compound is defined as the product of the molar concentration of the constituent ions, each raised to the power of its stoichiometric co – efficient in a balanced equilibrium equation.

20. A solution of silver nitrate is electrolysed for 20 minutes with a current of 2 amperes. Calculate the mass of silver deposited at the cathode.

Electrochemical reaction at cathode is $Ag^+ + e^- \rightarrow Ag$ (reduction)

$m = ZIt$

$$m = \frac{108\ gmol^{-1}}{96500\ C\ mol^{-1}} \times 2400C$$

$m = 2.68$ g.

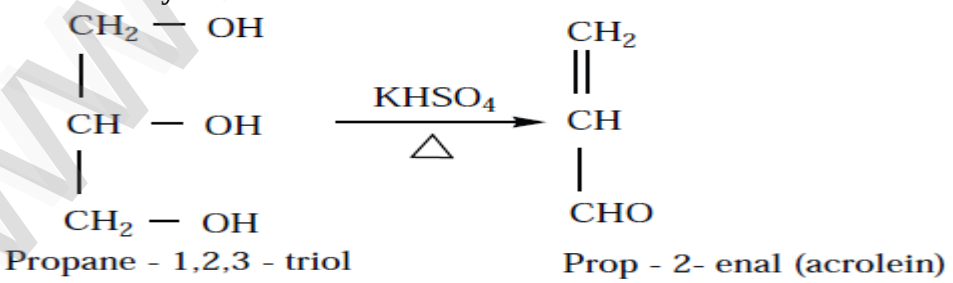
$$Z = \frac{\text{molarmass of Ag}}{(96500)} = \frac{108}{1\times 96500}$$

$I = 2A$

$t = 20 \times 60S = 1200\ S$

$It = 2A \times 1200S = 2400C$

21. **Acrolein from Glycerol.**



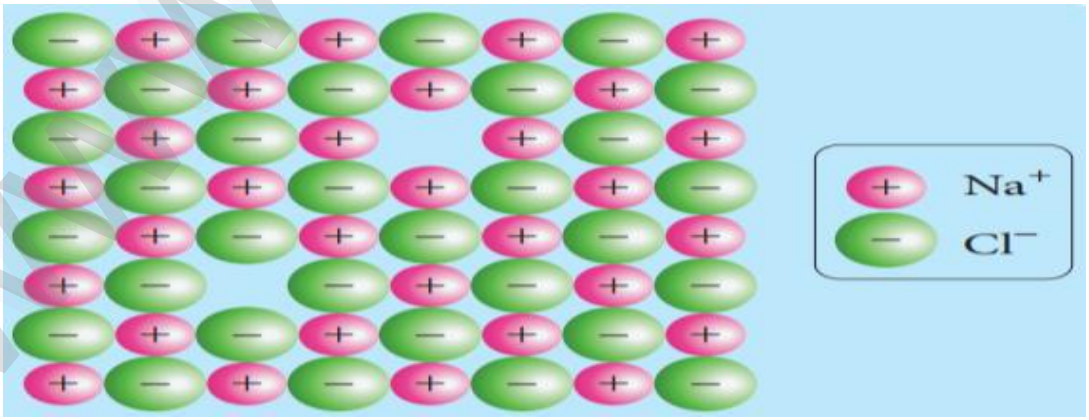
Propane - 1,2,3 - triol — Prop - 2- enal (acrolein)

22. **What are Hormones? Give examples?**

- Hormone is an organic substance that is secreted by one tissue in the blood stream . Eg: Insulin, Estrogen

23.	**What are antibiotics?** The medicines that have the ability to kill the pathogenic bacteria are called as antibiotics. Eg: Amoxicillin, Erythromycin
24.	**Surface area of adsorbent:** As the adsorption is a surface phenomenon it depends on the surface area of adsorbent. i.e., higher the surface area, higher is the amount adsorbed.

III. Answer in short

25.	**Give the uses of Helium:** 1. Helium and oxygen mixture is used by divers in place of air oxygen mixture. This prevents the painful dangerous condition called bends. 2. Helium is used to provide inert atmosphere in electric arc welding of metals 3. Helium has lowest boiling point hence used in cryogenics (low temperature science). 4. It is much less denser than air and hence used for filling air balloons
26.	**Out of $Lu(OH)_3$ and $La(OH)_3$ which is more basic and why?** $La(OH)_3$ is more basic because of the following reasons, **$La(OH)_3$** — **$Lu(OH)_3$** 1)Size of La^{3+} is large — 1) Size of Lu^{3+} is small 2) Ionic characters of La-OH bond is high — 2) Ionic characters of Lu-OH bond is low 3) Covalent character of La-OH bond is low. — 3) Covalent character of Lu-OH bond is high. 4) $La(OH)_3$ is more basic. — 4) $Lu(OH)_3$ is less basic.
27.	**Explain Schottky defect.** Schottky defect arises due to the missing of equal number of cations and anions from the crystal lattice .Hence stoichiometry of the crystal is not changed. Ionic solids in which the cation and anion are of almost of similar size show schottky defect. Example: **NaCl**. Presence of large number of schottky defects in a crystal lowers its density. 

28. Differentiate order and Molecularity

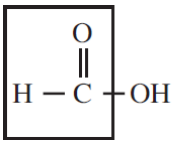
S.NO	ORDER	MOLECULARITY
1	It is the sum of the powers of concentration terms involved in the experimentally determined rate law.	It is the total number of reactant species that are involved in an elementary step.
2	It can be zero (or) fractional (or) integer	It is always a whole number, cannot be zero or a fractional number
3	It is assigned for a overall reaction	It is assigned for each elementary step of mechanism.

29. Tyndall Effect:

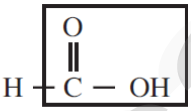
The scattering of light by a sol (colloidal) particle is called as Tyndall effect.

30. Reducing action of Formic acid (Mar-20, May-22)

Formic acid contains both an aldehyde as well as an acid group. Hence, like other aldehydes, formic acid can easily be oxidised and therefore acts as a strong reducing agent.



Aldehyde group

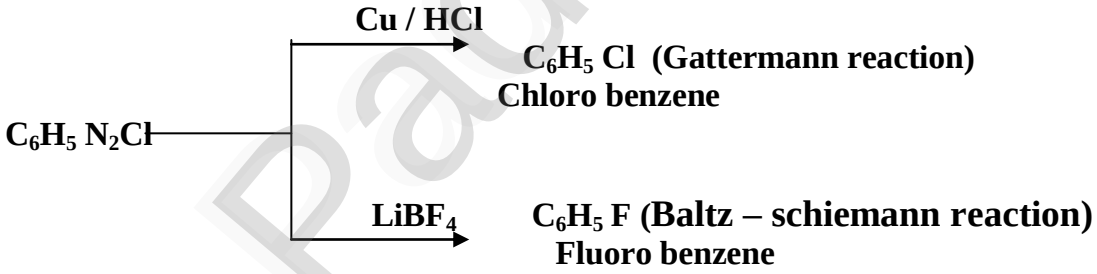


Carboxylic acid group

i) Formic acid reduces Tollen's reagent (ammonical silver nitrate solution) to metallic silver.

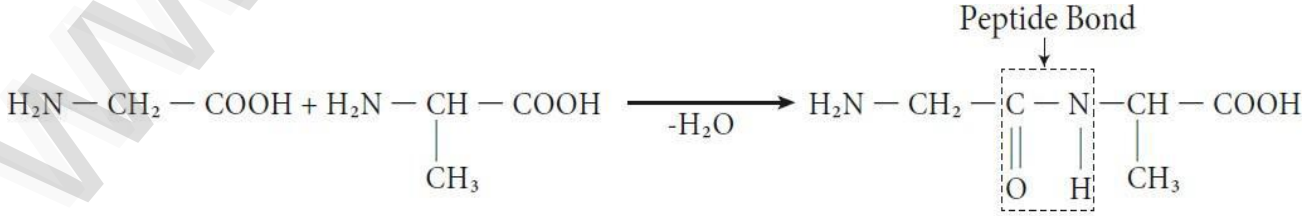
ii) Formic acid reduces Fehlings solution. It reduces blue coloured cupric ions to red coloured cuprous ions.

31.



32. Write a short note on peptide bond?

The carboxyl group of the first amino acid react with the amino group of the second amino acid to give an amide linkage between these amino acids. This amide linkage is called **peptide bond**. The resulting compound is called a dipeptide.



Glycine Alanine Glycyl alanine - Dipeptide

33. **$[Ti(H_2O)_6]^{3+}$ is coloured, while $[Sc(H_2O)_6]^{3+}$ is colourless- explain.**

	$[Ti(H_2O)_6]^{3+}$	$[Sc(H_2O)_6]^{3+}$
Central metal ion :	Ti^{3+}	Sc^{3+}
Electronic Configuration :	$3\,d^1$	$3d^0$
Number of unpaired electron :	1	0
	Ti^{3+} has one unpaired electron for d-d transition, possible hence it is coloured	No unpaired electron, so d-d transition is not hence it is not coloured

IV. Answer in Detail:

34. a) **(i) Explain Gravity separation or hydraulic wash?**

Ore with high specific gravity is separated from gaugue with low specific gravity by simply washing with running water. Finely powdered ore is treated with rapidly flowing current of water. Lighter gaugue particles are washed away by the running water. This method is used for concentrating native ore such as gold and oxide ores such as haematite (Fe_2O_3), tin stone(SnO_2).

(ii) **limitations of Ellingham diagram.**

1. It gives information about the thermodynamic feasibility of a reaction.
2. It does not tell anything about the rate of the reaction.
3. More over it does not give any idea about the possibility of other reactions that might be taking place.
4. The interpretation of ΔG is based on the assumption that the reactants are in equilibrium with the product which is not always true.

b) **(i) Uses of boric acid:**

1. Boric acid is used in the manufacture of pottery glases, enamels and pigments.
2. It is used as an antiseptic and as an eye lotion.
3. It is also used as a food preservative.

(ii) **Deacon's process:** In this process a mixture of air and hydrochloric acid is passed up a chamber containing a number of shelves, pumice stones soaked in cuprous chloride are placed. Hot gases at about 723 K are passed through a jacket that surrounds the chamber.

$$4HCl + O_2 \xrightarrow[Cu_2Cl_2]{400^0C} 2H_2O + 2Cl_2\uparrow$$

The chlorine obtained by this method is dilute and is employed for the manufacture of bleaching powder. The catalysed reaction is given below,

$$2Cu_2Cl_2 + O_2 \longrightarrow \underset{\text{Cuprous oxy chloride}}{2Cu_2OCl_2}$$

$$Cu_2OCl_2 + 2HCl \longrightarrow \underset{\text{Cupric chloride}}{2CuCl_2} + H_2O$$

$$2CuCl_2 \longrightarrow \underset{\text{Cuprous chloride}}{Cu_2Cl_2} + Cl_2$$

35. a) (i) What are interstitial compounds?

An interstitial compound or alloy is a compound that is formed when small atoms like hydrogen, boron, carbon or nitrogen are trapped in the interstitial holes in a metal lattice. Ex : TiC, $ZrH_{1.92}$, Mn_4N.

(ii) **Compare lanthanides and actinides**

S.No.	Lanthanoids	Actinoids
1	Orbital Differentiating electrons enters in 4f orbital	Orbital Differentiating electrons enters in 5f orbital.
2	Higher Binding energy of 4f orbitals are higher.	Lower Binding energy of 5f orbitals are lower.
3	They show less tendency to form complexes.	They show greater tendency to form complexes.
4	Most of the lanthanoids are colourless.	Most of the actinoids are coloured. Eg. U^{3+} (Red), U^{4+}(Green),UO_2^{2+} (Yellow)
5	They do not form oxo cations.	They do not form oxo cations such $U0_2^{2+}$,NpO_2^{2+}.

b) (i) Double salts and coordination compounds

S.NO	Double salt	Coordination compound
1	Double salts lose their identity in aqueous solution by completely dissociating in to ions in the solvent	They don't lose their identity in aqueous solution as they do not ionize completely (the complex ion further doesnot get ionized)
2	They give test for all the constituent ions Example : $K_2SO_4.Al_2(SO_4)_3.24H_2O$	Example : $K_4[Fe(CN)_6]$

(ii) What is crystal field stabilization energy (CFSE) ?

The crystal field stabilization energy is defined as the energy difference of electronic configurations in the ligand filed (E_{LF}) and the isotropic field/barycentre (E_{iso}).

$$CFSE\ (\Delta Eo) = \{E_{LF}\} - \{E_{iso}\}$$

$$= \{[nt_{2g}(-0.4)+n_{eg}(0.6)]\ \Delta o + n_p P\} - \{n'_p P\}$$

nt_{2g} = the number of electrons in t_{2g} orbitals

n_{eg} = number of electrons in eg orbitals

n_p = number of electron pairs in the ligand field

n'_p = number of electron pairs in the isotropic field (barycentre).

36. a) Differentiate crystalline solids and amorphous solids.

S.NO	CRYSTALLINE SOLIDS	AMORPHOUS SOLIDS
1	Long range orderly arrangement of constituents	Short range random arrangement of constituents
2	Definite shape	Irregular shape
3	Anisotropic in nature	Isotropic in nature
4	They are true solids	They are pseudo solids (or) super cooled liquids
5	Definite Heat of fusion	Heat of fusion is not definite
6	They have sharp melting points	They do not have sharp melting points

b)

It is used to determine the pH of Buffer solution.

The concentration of hydronium ion in an acidic buffer solution depends on the ratio of the concentration of the weak acid to the concentration of its conjugate base present in the solution i.e.,

$$HA + H_2O \rightleftharpoons H_3O^+ + A^-$$

$$K_a = \frac{[H_3O^+][A^-]}{[HA]}$$

$$K_a = \frac{[H^+][A^-]}{[HA]} \qquad (\text{Since } [H_3O^+] = [H^+])$$

$$[H_3O^+] = Ka \frac{[HA]}{[A^-]}$$

$$\left[H_3O^+\right] = K_a \frac{[acid]_{eq}}{[base]_{eq}}$$

The equilibrium concentration of the acid is nearly equal to the initial concentration of the unionised acid. i.e, $[Acid]_{eq} = [Acid]$

The concentration of the conjugate base is nearly equal to the initial concentration of the added salt. i.e, $[Base]_{eq} = [Salt]$

$$\left[H_3O^+\right] = K_a \frac{[acid]}{[salt]}$$

Taking logarithm on both sides of the equation,

$$\log [H_3O^+] = \log K_a + \log \frac{[acid]}{[salt]}$$

reverse the sign on both sides,

$$-\log [H_3O^+] = -\log K_a - \log \frac{[acid]}{[salt]}$$

We know that

$pH = -\log [H_3O^+]$ and $pK_a = -\log K_a$

$$\Rightarrow pH = pK_a - \log \frac{[acid]}{[salt]}$$

$$\Rightarrow pH = pK_a + \log \frac{[salt]}{[acid]}$$

Similarly for a basic buffer, $pOH = pK_b + \log \frac{[salt]}{[base]}$

37. a)

(i) State Kohlrausch Law.

At infinite dilution,the limiting molar conductivity of an electrolyte is equal to the sum of the limiting molar conductivities of its constituent ions.

$$\left(\Lambda_m^0\right)_{A_xB_y} = x\left(\lambda_m^0\right)_{A^{y+}} + y\left(\lambda_m^0\right)_{B^{x-}}$$

(ii) **Write a note on catalytic poison**

Certain substances when added to a catalysed reaction decreases or completely destroys the activity of catalyst and they are often known as catalytic poisons.

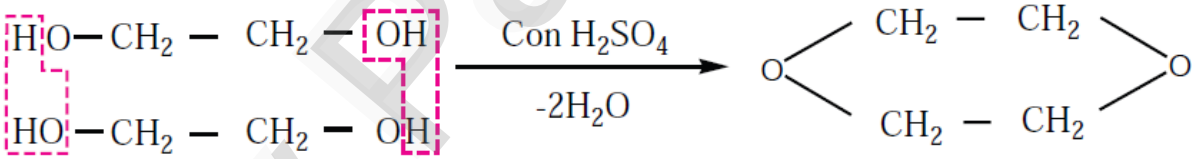
Example : $2SO_2 + O_2 \xrightarrow{Pt} 2SO_3$

In the above reaction Pt catalyst, the poison is As_2O_3 i.e., As_2O_3 destroys the activity of Pt

b)

(i) Glycol to 1,4-Dioxan

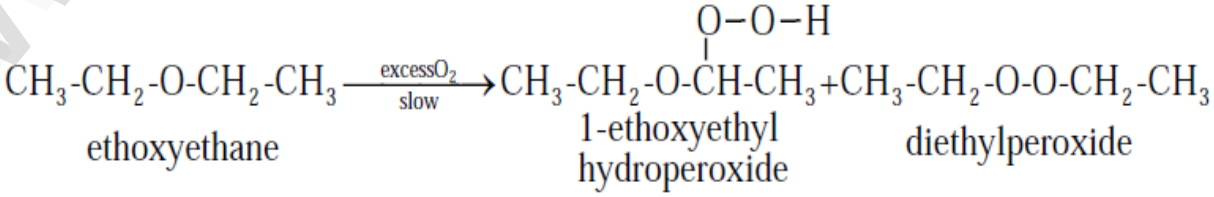
When distilled with Conc. H_2SO_4, glycol forms dioxane



ethane - 1,2 - diol 1,4 - dioxane

(ii) What happens when oxygen reacts with Diethyl ether?

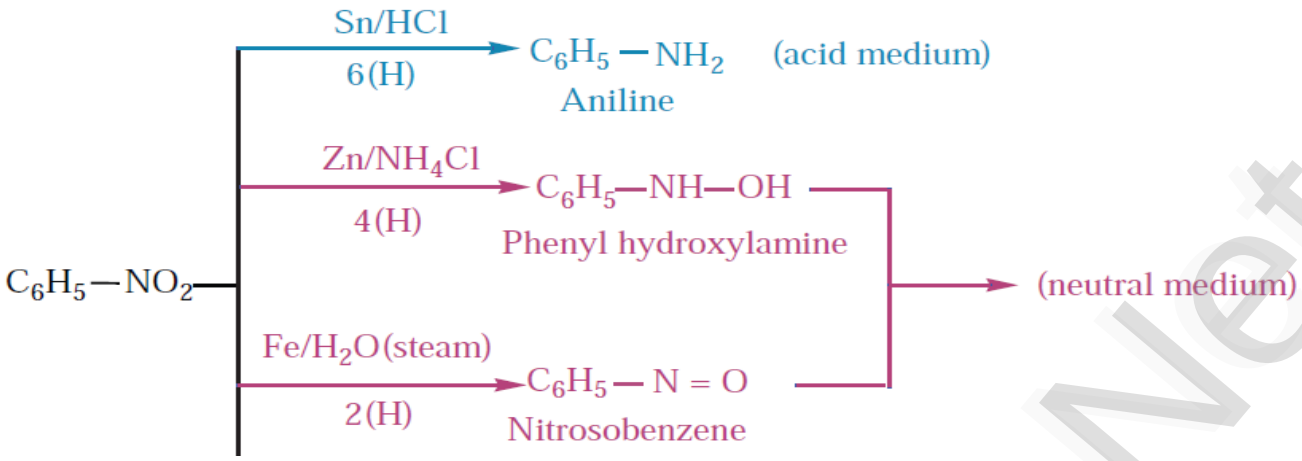
When ethers are stored in the presence of atmospheric oxygen, they slowly oxidise to form hydroperoxides and dialkylperoxides. These are explosive in nature. Such a spontaneous oxidation by atmospheric oxygen is called autooxidation.



ethoxyethane 1-ethoxyethyl hydroperoxide diethylperoxide

38. a)

(i) Reduction of Nitro Benzene in acidic and Neutral medium.



(ii) Carbylamine reaction:

Aliphatic (or) aromatic primary amines react with chloroform and alcoholic KOH to give isocyanides (carbylamines), which has an unpleasant smell. This reaction is known as carbylamine test. This test used to identify the primary amines.

$$\underset{\text{Ethylamine}}{C_2H_5 - NH_2} + \underset{\text{Chloroform}}{CHCl_3} + 3KOH \longrightarrow \underset{\text{Ethylisocyanide}}{C_2H_5 - NC} + 3KCl + 3H_2O$$

b)

(i)What is Epimerisation?

Epimers: Sugar differing in configuration at an asymmetric centre is known as epimers.

Eg: D(+) glucose, D(+) galactose

Epimerisation: The process by which one epimer is converted into other is called epimerisation and it requires the enzymes epimerase.

(ii) What are bio-degradable polymers? Give examples

The materials that are readily decomposed by microorganisms in the environment are called biodegradable.

Eg: PHB, PHBV, PGA, PLA, PCL **Uses:** Used in medical field such as surgical sutures, plasma substitute etc…

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