COMMON HALF YEARLY EXAMINATION-2025 CUDDALORE DT.

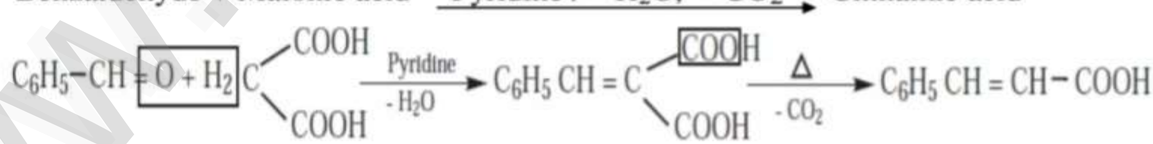
XII th STANDARD CHEMISTRY ANSWER KEY

PART - I

I. CORRECT ANSWERS.

Q.NO	ANSWER		Q.NO	ANSWER	
1	A)	Carbon reduction	9	D)	Both assertion and reason are false
2	D)	$(SiO_4)^{4-}$	10	D)	$(Al_2(SO_4)_3$
3	B)	F_2	11	A)	Phenol
4	A)	5.92BM	12	B)	Victor Mayer test
5	B)	0	13	A)	Sn/HCl
6	B)	FeO	14	D)	D-Glucose
7	B)	Activation Energy	15	D)	PHBV
8	A)	BF_3			

PART - II

16	Sulphide ores - Galena [PbS], Zinc blende [ZnS]
17	**the uses of silicones.** • Lubricants • Water proof cloths • Insulating material in electrical motor • Low temperature vaccuum pumbs and High temperature oil baths • Mixed with paints to make them resistance towards sun light
18	Aqua (H_2O), Ammine(NH_3), Diethyleneamine(en), Triphenylphosphine ($P(Ph)_3$),
19	No. of Atoms in FCC Unit cell = (Nc/8) + (N_f/2) = (8/8) + (6/2) = 1+ 3 = 4
20	➢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.
21	➢ When beam of light is passed through colloidal solution, the path of light is illuminated by the scattering of light by colloidal particles
	➢ The phenomenon of scattering of light by the solution particles is called Tyndall effect
22	**<u>Knovenagal Reaction</u>** Benzaldehyde + Malonic acid $\xrightarrow{\text{Pyridine / – } H_2O,\ – CO_2}$ Cinnamic acid 
23	• Hormone is an organic substance that is secreted by one tissue. • It limits the blood stream and induces a physiological response in other tissues. • It is an intercellular signaling molecule. • Insulin, androgen, estrogen
24	$t_{1/2}$ **= 0.693 / k** = 0.693 / 1.54 x 10^{-3} S^{-1} = 450 Sec.

PART - III

25

- When alum stone is treated with excess of sulphuric acid . Then calculated quantity of potassium sulphate is added . The solution is crystallised to generate potash alum

$K_2SO_4 . Al_2(SO_4)_3 .4Al(OH)_3 + 6 H_2SO_4 \rightarrow K_2SO_4 + 3Al_2(SO_4)_3 + 12H_2O$

$K_2SO_4(aq) + Al_2(SO_4)_3(aq) + 24 H_2O \rightarrow K_2SO_4 . Al_2(SO_4)_3.24H_2O(s)$ (Potash Alum)

26

Compare lanthanoids and actinoids.

	Lanthanoids	Actinoids
1.	Colourless	Coloured
2.	They show less tendency to form complexes.	They show greater tendency to form complexes
3.	They do not form oxocations	They do form oxocations
4.	Differentiating electrons enters in 4f orbital.	Differentiating electrons enters in 5forbital.
5.	Binding energy of 4f orbitals are higher	Binding energy of 5f orbitals are lower
6.	Oxidation state +2, +3, +4	Oxidation state +2, +3, +4, +5, +6, +7

27

1	Central metal atom/ion	Pt
2	Coordinatin Number	4
3	Oxidation number of the central metal ion	+2

28

- In certain reactions one of the products formed acts as a catalyst to the reaction.
- E.g : In the hydrolysis of ethylaetate, product acetic acid is auto catalyst

29

Faraday's First Law

The mass of the substance (m) liberated at an electrode during electrolysis is directly proportional to the quantity of charge (Q) passed through the cell.

$m \alpha Q$

Faraday's Second Law

When the same quantity of charge is passed through the solutions of different electrolytes, the amount of substances liberated at the respective electrodes are directly proportional to their electrochemical equivalents.

$m \alpha Z$

m – mass of the substance, Z- electro chemical equivalent of the substance

30

- In aqueous solution the proton from carboxyl group can be transferred to the amino group of an amino acid leaving these groups with opposite charges.
- Despite having both positive and negative charges this molecule is neutral and has amphoteric behaviour.
- These ions are called zwitter ions.

Zwitter ion structure of alanine.

$^{+}H_3N - CH - COO^{-}$ (with CH_3 on the CH)

31

Trans Esterification Reaction (Preparation of Ethyl acetate from Methyl acetate)

Methyl acetate + Ethyl alcohol $\xrightarrow{H^+}$ Ethyl acetate + Methyl alcohol

$CH_3COOCH_3 + C_2H_5OH \xrightarrow{H^+} CH_3COOC_2H_5 + CH_3OH$

32

Nylon– 2-Nylon -6

It is a co – polymer which contains polyamide linkages. It is obtained by the condensation polymersiation of the monomers, glycine and E - amino caproic acid.

$$n\ H_2N-CH_2-COOH + n\ H_2N-(CH_2)_5-COOH \longrightarrow \left[HN-CH_2-\underset{\underset{O}{\|}}{C}-NH-(CH_2)_5-\underset{\underset{O}{\|}}{C}\right]_n + (2n-1)\ H_2O$$

Glycine — Aminocaproic acid — Nylon -2-nylon - 6

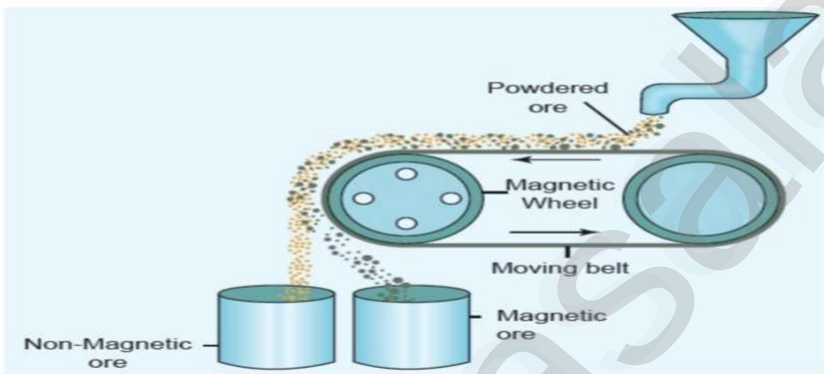
33 A) C_6H_6(Benzene) B) $C_6H_5CH_3$(Toluene) C) C_6H_5COOH (Benzoic acid)

PART - IV

34.A)

Explain the Magnetic separation process.

- It is based on the difference in the magnetic properties of the ore and the impurities.
- It is used to concentrate ferromagnetic ores
- Tin stone can be separated from the wolframite impurities
- The powdered ore is added on an electro magnet containing a moving belt on a magnetic rollers.
- The magnetic ore falls near the magnet.
- The non magnet patrs fall away from the magnet.



B.i)

Catenation is an ability of an element to form chain of atoms.
Carbon forms a wide range of compounds with C, H, N, S

<u>Conditions</u>

- Valency of element is greater than or equal to two
- Element should have an ability to bond with itself
- Self bond must be strong
- Kinetic inertness of catenated compound towards other molecules

ii)

the uses of helium.

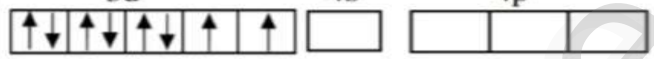
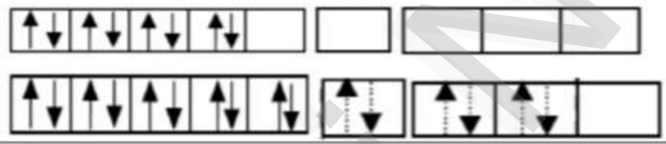
- Helium is used for filling air balloons.
- He - O_2 mixture is used by divers
- It is used in cryogenics
- It is used in electric arc welding of metals

35.A) i.

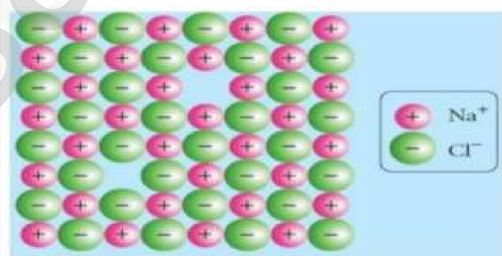
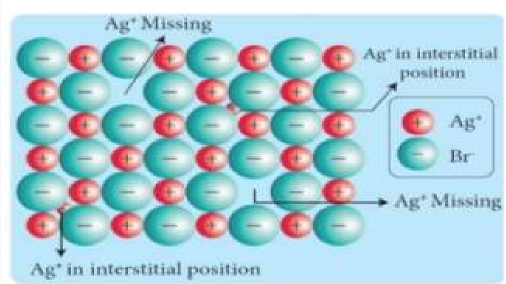
1.White phosphorus 2. Red phosphorus 3. Black phosphorus 4. Scarlet phosphorus 5. Violet phosphorus

	White phosphorus	Red phosphorus
1	Poisonous in nature	It is not poisonous
2	Garlic smell	Odourless
3	It shows Phosphorescence	Does not show Phosphorescence.
4	Its ignition temperature is very low	It does not ignite at low temperatures
5	It undergoes spontaneous combustion in air at room temperature	It does not undergo spontaneous combustion

ii)	Each halogen combines with other halogens to form a series of compounds called inter halogen compounds. E.g : BrF, IF_5, IF_7
B)	(see table below)

Complex	$[Ni(CN)_4]^{2-}$
Outer electronic configuration of $_{28}Ni$	$3d^8\ 4s^2$
Outer electronic configuration of Ni^{2+}	$3d^8$ $4s^0$ 4p 
Nature of ligand	CN^- strong field ligand - pairing of 3d electrons
Outer orbital of metal atom in presence of ligands	3d 4s 4p 
Hybridisation	dsp^2
Co ordination number	4
Geometry	Square planer
Number of unpaired electon	0
Magnetic property	diamagnetic
Magnetic moment	$\mu_s = \sqrt{n(n+2)} = 0$ BM

36.A.

Schottky defect ❖ Arises due to the missing of equal number of cations and anions from the crystal lattice ❖ Ex: NaCl ❖ Size of anion and cation similar ❖ Lowers its density ❖ Does not change the stoichiometry of the crystal.	
Frenkel defect ❖ Arises due to dislocation of ions from its crystal lattice ❖ The ion which is missing from the lattice point occupies an interstitial position. ❖ Ex : AgBr ❖ Size of anion and cation differ ❖ Does not affect the density of crystal	

B.i)

Derive integrated rate law for a zero order reaction A $\longrightarrow$ product

$A \longrightarrow$ Products

Rate $= k[A]^0$ (k -Rate constant)

$$\frac{-d[A]}{dt} = k\,(1) \qquad (\because [A]^0 = 1)$$

$$-d[A] = k\,dt$$

At, $t = 0 \Rightarrow [A] = [A_0]$ & $t = t \Rightarrow [A] = [A]$

$$-\int_{[A_0]}^{[A]} d[A] = k\int_0^t dt$$

$$-([A])_{[A_0]}^{[A]} = k\,(t)_0^t$$

$$[A_0] - [A] = kt$$

$$k = \frac{[A_0] - [A]}{t}$$

ii) Definite attractive force exists between dispersion medium and dispersed phase. They are more stable. They will not get precipitated easily
E.g. Proteins and Starch

37.A)

Oswald's Dilution law

$CH_3COOH \rightleftharpoons CH_3COO^- + H^+$

	CH_3COOH	H^+	CH_3COO^-
Initial number of moles	1	-	-
Number of moles Ionized	α	-	-
Number of moles at equilibrium	1-α	α	α
Equilibrium concentration	(1-α)C	αC	αC

$$\alpha = \frac{\text{Number of moles dissociated}}{\text{total number of moles}}$$

The dissociation constant of acetic acid is,

$$k_a = \frac{[H^+][CH_3COO^-]}{[CH_3COOH]}$$

$$k_a = \frac{(\alpha C)(\alpha C)}{(1-\alpha)C} = \frac{\alpha^2 C}{1-\alpha}$$

Weak acid dissociates only to a very small extent.

Compared to one, α is so small

$K_a = \alpha^2 C$

(α = degree of dissociation, K_a = dissociation constant, C = concentration.)

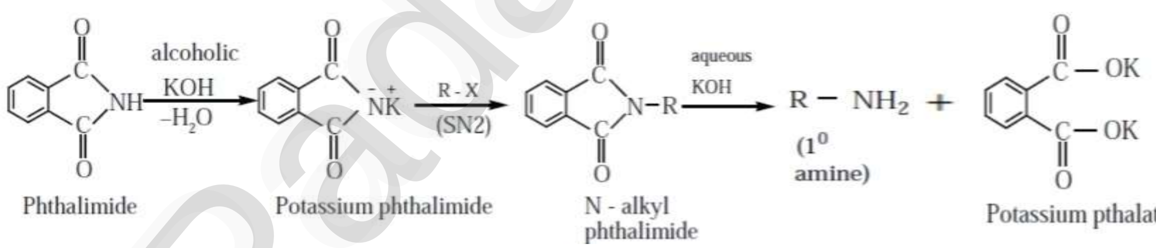
$$\alpha^2 = \frac{K_a}{C}$$

$$\boxed{\alpha = \sqrt{\frac{K_a}{C}}}$$

B.i)

Gabriel Phthalimide Synthesis

Phthalimide $\xrightarrow{KOH}$ Pottasium Phthalimide $\xrightarrow{RX}$ N-Alkyl Phthalimide $\xrightarrow{KOH}$ Primary amine



ii) Preservatives are capable of inhibiting or arresting the process of fermentation or other decomposition of food by growth of microorganisms. E.g., Aceticacid - preparation of pickles . Sodium metabisulphite - preservatives for fresh vegetables and fruits

38.A)

Acetyl chloride + H_2 $\xrightarrow{Pd / BaSO_4}$ Acetaldehyde

$CH_3COCl + H_2 \xrightarrow{Pd / BaSO_4} CH_3CHO + HCl$

Pd - Catalyst,

$BaSO_4$ - Catalytic poison (prevents the further reduced of aldehyde to alcohol)

ii)

Poppof's rule

When an asymmetric Ketone is oxidized, the Keto group stays with the small alkyl group.

$$CH_3-CH_2-CH_2-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow[\text{Con } HNO_3]{(O)} CH_3CH_2-COOH + CH_3COOH$$

B) A- C_6H_5OH - Phenol. B-$C_6H_5NH_2$ - Aniline . C. C_6H_6- Benzene