HSC SECOND YEAR SECOND REVISION EXAMINATION – 2025

SUB: CHEMISTRY **THOOTHUKUDI DISTRICT** **MARKS: 70**

ANSWER KEY

Part - I

I. CHOOSE THE CORRECT ANSWER: **(15 X 1 = 15)**

Q.no	options	ANSWERS
1.	**B**	Al_2O_3
2.	**D**	Both are correct, but reason does not explain assertion
3.	**A**	H_3PO_3
4.	**A**	Np, Pu, Am
5.	**C**	Oxalato
6.	**C**	both covalent crystals
7.	**D**	3 mol min^{-1}
8.	**A**	(i) – C, (ii) – D, (iii) – A, (iv) – B
9.	**A**	5F
10.	**B**	Emulsion
11.	**A**	Phenol
12.	**C**	Hexane dioic acid
13.	**D**	1,3 – dinitro benzene
14.	**B**	Uracil
15.	**B**	Polyamide

Part – II

Note: Answer any six questions. Q.No: 24 is compulsory **(6 X 2 = 12)**

16. **Hydroboration:**

$$B_2H_6 + 6\,RCH{=}CHR \xrightarrow{\text{ether}} 2(RCH_2{-}CHR)_3B$$

(OR)

$$6CH_3{-}CH{=}CH_2 + B_2H_6 \longrightarrow \underset{\text{Tripropylborane}}{2(CH_3{-}CH_2{-}CH_2)_3B}$$

$$(CH_3{-}CH_2{-}CH_2)_3B + 3H_2O_2 \xrightarrow{OH^-} \underset{\text{propan-1-ol}}{3CH_3{-}CH_2{-}CH_2{-}OH} + B(OH)_3$$

Correct equation (or) Explanation – 2 marks — **2** | **2**

17. **(a) BrF_5 –** pentagonal bipyramidal — **1**
(b) BrF_3 – T – shaped — **1** | **2**

18. $[Co(NH_3)_5Cl]SO_4 \xrightarrow{BaCl_2}$ White precipitate — **1**
$[Co(NH_3)_5SO_4]Cl \xrightarrow{AgNO_3}$ White precipitate — **2**
1 | **2**

19.

	Tetrahedral voids	Octahedral voids.
1	When the spheres of the second layer is above the voids of the first layer	When the spheres of the second layer partially covers the voids of the first layer
2	The number of Tetrahedral voids is given by '2n'.	The number of Octahedral voids is given by 'n'.
3	3 spheres in the lower layer and one in the upper layer. Total 4 spheres	3 spheres in the lower layer and 3 in the upper layer. Total 6 spheres.
4	When the 4 spheres are joined the center gives a Tetrahedron.	When the 6 spheres are joined the centergives a Octahedron.

2 | **2**

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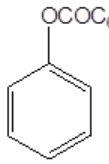
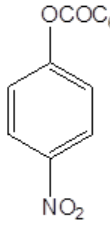
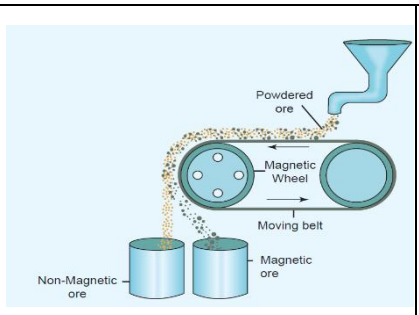
20.	• An acid is a proton donor • A base is a proton acceptor **Limitations:** Substances like BF_3, $AlCl_3$.., that do not donate protons are known to behave as acids.	½ ½ 1	2
21	**Homogenous catalysis** The reactants, products and catalyst are present in the same phase. e.g. $2\,SO_{2\,(g)} + O_{2\,(g)} \xrightarrow{NO_{(g)}} 2\,SO_{3\,(g)}$ **Heterogeneous catalysis** The reactants, products and catalyst are present in the different phase. e.g. $N_{2(g)} + 3H_{2(g)} \xrightarrow{Fe_{(s)}} 2NH_{3(g)}$	1 + 1	2
22.	A -  (Or) Phenyl Benzoate B -  (Or) 4 - nitro phenyl Benzoate	1 1	2
23.	• Change Blue Litmus paper into Red Colour • Brisk effervescence with Sodium bicarbonate solution. • When heated with Alcohol and con.H_2SO_4, Fruity odour ester is obtained **(any two tests – 2 M)**	2	2
24.	$C_6H_5NH_2 < C_6H_5N(CH_3)_2 < CH_3NH_2 < (C_2H_5)_2NH$ 9.376 > 8.92 > 3.38 > 3.00 $\Longrightarrow$ pK_b Value	2	2

Part – III

Note: Answer any six questions. Q.No: 33 is compulsory **(6 X 3 = 18)**

25.	**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 parts fall away from the magnet. 	1 1 1	3

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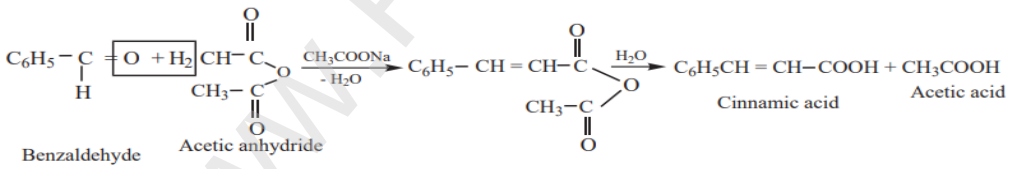
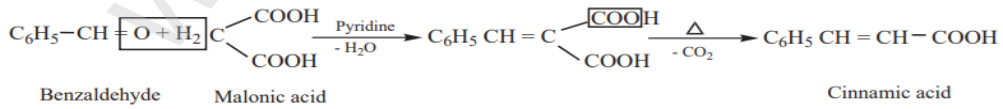
26.	$4NaCl + MnO_2 + 4H_2SO_4 \longrightarrow Cl_2 + MnCl_2 + 4NaHSO_4 + 2H_2O$ **Correct balanced Equation – 3 M ; Explanation only – 1 M**	**2**	**2**
27.	The elements in which the **extra electrons enters (n-2)f orbitals** are called inner transition elements.	**3**	**3**
28.	**Rate law** is the expression which relates the rate, the rate constant and the concentration of the reactants. (or) Rate = K [A] [B] **Rate constant** is equal to the rate of reaction, when the concentration of each of the reactants in unity.	**1 ½** **1 ½**	**3**
29.	When a salt of a weak acid is added to the acid itself, the dissociation of the weak acid is suppressed further. It is known as **Common Ion effect**.	**3**	**3**
30.	**Faraday's Laws of electrolysis:** **I 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. **(or)** **m α Q (or) m α It (or) m = ZIt** **1 M** **II 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. **(or)** **m α Z (or)** $\frac{m_1}{Z_1} = \frac{m_2}{Z_2} = \frac{m_3}{Z_3}$ **1 M**	**1 ½** **1 ½**	**3**
31.	**Cinnamic acid from benzaldehyde:** **Perkins' reaction** When an aromatic aldehyde is heated with an aliphatic acid anhydride in the presence of the sodium salt of the acid corresponding to the anhydride, condensation takes place and an α, β unsaturated acid is obtained. This reaction is known as **Perkin's reaction**. **Example:**  Benzaldehyde Acetic anhydride Cinnamic acid Acetic acid **(or)** **Knoevenagal reaction**  Benzaldehyde Malonic acid Cinnamic acid Benzaldehyde condenses with malonic acid in presence of pyridine forming cinnamic acid, Pyridine act as the basic catalyst. **Correct equation - 3 M (or) explanation only – 1 M; In Perkin's reaction, CH_3COONa is not mentioned – 2 M ; In Knovenagal reaction pyridine is not mentioned – 2 M**	**3**	**3**

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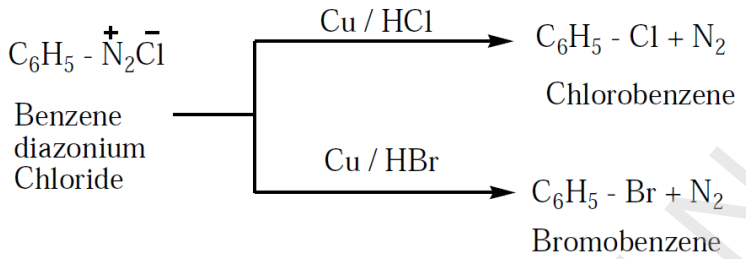
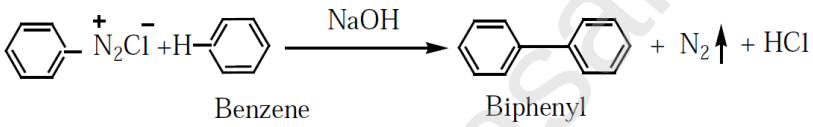
32.	• These interactions can be disturbed when the protein is exposed to a higher temperature or alteration of pH. • It leads to the loss of the three-dimensional structure. • The process of a losing its higher order structure without losing the primary structure, is called denaturation.	**1** **1** **1**	**3**
33.	**(i) Gattermann reaction:** Conversion of benzene diazonium chloride into chloro / bromo arenes can also be effected using hydrochloric / hydrobromic acid and copper powder. This reaction is called Gattermann reaction.  **(ii) Gomberg reaction:** Benzene diazonium chloride reacts with benzene in the presence of sodium hydroxide to give biphenyl. This reaction in known as the Gomberg reaction.  **Correct equation is written for both the equation – 1 ½ + 1 ½** **Explanation only – 1 + 1**	**1 ½** **1 ½**	**3**

PART – IV

Answer all the questions: **(5 X 5 = 25)**

34. a	(i) **Basic requirements of vapour phase refining:** • The metal should form a volatile compound with the reagent. • The volatile compound decomposes to give the pure metal (ii) **Observations of Ellingham diagram:** • The formation of metal oxide gives a positive slope. The value of ΔS is negative. • The formation of Carbon monoxide gives a negative slope. The value of ΔS is positive. So Carbon monoxide is more stable at high temperature • For MgO, due to phase transition, there is a sudden change in the slope at a particular temperature.	**1** **1** **1** **1** **1**	**5**

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34. b	**(i) Uses of Potash Alum:** • Potash alum is used for purification of water • It is used for water proofing and textiles • It is used in dyeing and paper industries • It is used as a styptic agent to arrest bleeding. **(ii)** Catenation is an ability of an element to form chain of atoms. Carbon forms a wide range of compounds with C, H, N, S **Conditions:** • Valence 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.	**2** **1** **2**	**5**
35. a	**(i) Transition metals have high melting point:** • High attractive forces between the atoms • Strong metallic bond. **(ii) Coordination isomerism:** The interchange of ligands between the cationic and the anionic coordination entities. $[Co(NH_3)_6]\,[Cr(CN)_6] \leftrightarrows [Cr(NH_3)_6]\,[Co(CN)_6]$ **Linkage isomerism:** When an ambidentate ligand is bonded to two different donor atoms by the central metal ion are called linkage isomers. $[Cr(H_2O)_5\,NO_2]Br \leftrightarrows [Cr(H_2O)_5\,(ONO)]Br$	**1** **1** **1** **½** **1** **½**	**5**
35. b	(i) $t_{\frac{1}{2}} = \frac{0.6932}{k}$ **(or)** $t_{\frac{1}{2}} = \frac{0.6932}{1.54 \times 10^{-3}}$ = 450 s (ii) **Characteristics of ionic crystals:** • Hard • Dissolved in water. • High Melting Point. • Do not conduct electricity in solid state • Conduct electricity in molten state. **(any three points – 3 M)**	**1** **½ + ½** **3**	**5**

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36. a

(i)

- If we apply DC current through the conductivity cell, it will lead to the electrolysis of the solution taken in the cell. **1**
- So, AC current is used for this measurement to prevent electrolysis **1**

(ii) **Equivalent conductivity:**

$\Lambda_{eq}(Al_2(SO_4)_3)$ = $\frac{1}{3}\lambda_{eq}(Al^{3+}) + \frac{1}{2}\lambda_{eq}(SO_4^{2-})$

(or)

$= \frac{1}{3}$ X 189 $+ \frac{1}{2}$ X 160 **1 ½**

= 143 mho cm^2 $equiv^{-1}$

Molar conductivity:

$\Lambda_m(Al_2(SO_4)_3)$ = $2\lambda_m(Al^{3+}) + 3\lambda_m(SO_4^{2-})$

(or)

= 2 X 189 + 3 X 160 **1 ½**

= 858 mho cm^2 mol^{-1}

5

36. b

(i) Tyndall Effect:

- When beam of light is passed through colloidal solution, the path of light is illuminated by the scattering of light by colloidal particles. **1**
- The phenomenon of scattering of light by the sol particles is called Tyndall effect. **1**

(ii)

Chemical adsorption or Chemisorption or Activated adsorption	Physical adsorption or van der waals adsorption or Physisorption
1. It is very slow	1. It is instantaneous
2. It is very specific depends on nature of adsorbent and adsorbate.	2. It is non-specific
3. Chemical adsorption is fast with increase pressure, it can not alter the amount.	3. In Physisorption, when pressure increases the extent of adsorption increases.
4. When temperature is raised chemisorption first increases and then decreases.	4. Physisorption decreases with increase in temperature.
5. Chemisorption involves transfer of electrons between the adsorbent and adsorbate.	5. No transfer of electrons
6. Heat of adsorption is high i.e., from 40-400kJ/mole.	6. Heat of adsorption is low in the order of 40kJ/mole.
7. Monolayer of the adsorbate is formed.	7. Multilayer of the adsorbate is formed on the adsorbent.
8. Adsorption occurs at fixed sites called active centres. It depends on surface area	8. It occurs on all sides.
9. Chemisorption involves the formation of activated complex with appreciable activation energy.	9. Activation energy is insignificant.

3

5

37. a

(i) Preparation of chloropicrin:

$$CH_3 - NO_2 + 3Cl_2 \xrightarrow{NaOH} \underset{\text{Chloropicrin (trichloronitromethane)}}{CCl_3 - NO_2} + 3HCl$$

2

Correct Equation – 2 M ; NaOH is not mentioned – 1 ½

(ii) Rosenmund's Reduction:

Aldehydes can be prepared by the hydrogenation of acid chloride, in the presence of palladium supported by barium sulphate. This reaction is called **Rosenmund reduction.**

Correct equation – 3 M ; Explanation only – 1 M

$$\underset{\text{Acetyl chloride}}{CH_3-\overset{\overset{O}{\|}}{C}-Cl} + H_2 \xrightarrow{Pd/\,BaSO_4} \underset{\text{Acetaldehyde}}{CH_3-\overset{\overset{O}{\|}}{C}-H} + HCl$$

3

5

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37. b **Functions of Lipids in Living Organism:**

- Lipids are the integral component of cell membrane. **1**
- They yield more energy than carbohydrates and proteins. **1**
- They act as protective coating in aquatic organisms. **1**
- Lipids of connective tissues give protection to internal organs. **1**
- Lipids act as emulsifier in fat metabolism. **1**

5

38. a

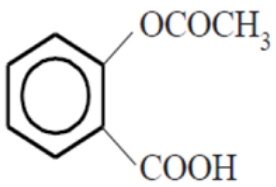
(i)

Antiseptics	Disinfectants
Stop the growth of microorganisms	Stop the growth of microorganisms
Applied to living tissue	Applied to inanimate objects
Eg. H_2O_2, Povidone-iodine	Eg. H_2O_2, alcohol

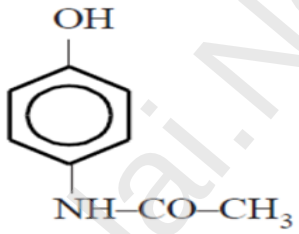
2

(ii)

Aspirin
(Acetylsalicylic acid)



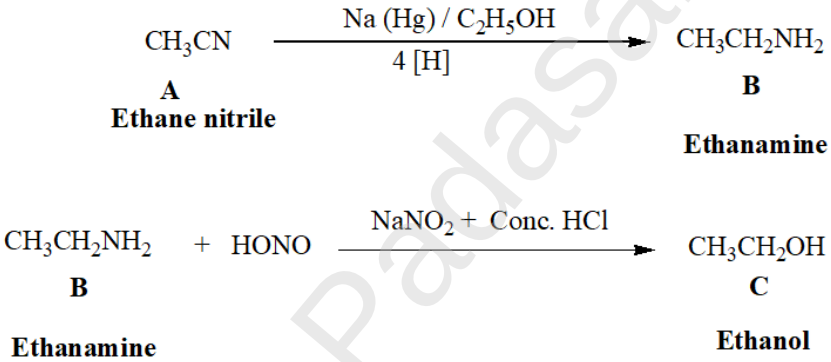
Paracetamol
Acetaminophen



3

5

38. b



1

1

Compound	Molecular Formula	NAME
A	**CH_3CN**	Ethane nitrile / methyl cyanide
B	**$CH_3CH_2NH_2$**	Ethanamine
C	**CH_3CH_2OH**	Ethanol

1

1

1

5

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