### Tirupathur District – Quarterly Examination – Sep - 2024 12<sup>th</sup> Std – Chemistry – Answer Key

Part - I

 $15 \times 1 = 15$ 

Q. No	Answer	Q. No	Answer
1	c) Hydraulic wash	9	a) Excitation of electrons in F center
2	d) Acidified copper sulphate	10	b) PF <sub>3</sub>
3	c) Lead	11	c) 12
4	d) NeF <sub>2</sub>	12	c) 4 – Nitro phenol
5	c) H <sub>2</sub> SO <sub>5</sub>	13	a) Both Assertion and Reason are true and
			Reason is the correct explanation of assertion
6	c) 4.89	14	b) Fehling's solution
7	a) Plutonium	15	b) Hydrazine and sodium ethoxide
8	b) NaCl (or) c) ZnO		

#### Part - II

# Answer any 6 questions and question No. 24 is compulsory.

 $6 \times 2 = 12$ 

Answ	ver any 6 questions and question No. 24 is compulsory.	X = 1	_
16	Give the limitations of Ellingham diagram?		
	<ul> <li>It is constructed based only on thermodynamic considerations.</li> </ul>		
	<ul> <li>It gives information about the thermodynamic feasibility of a reaction.</li> </ul>		
	<ul> <li>It does not give any idea about rate of the reaction and the possibility of other reactions.</li> </ul>	2x1	2
	• The interpretation of ΔG is based on the assumption, that the reactants are in equilibrium with the products which is not always true.		
17	What is burnt alum? how it is prepared?		
	Potash alum on heating at 475K, loses water of hydration and swells up. The		
	swollen mass is known as burnt alum. (or)	2	2
	$K_2SO_4.Al_2(SO_4)_3.24H_2O \xrightarrow{475K} K_2SO_4.Al_2(SO_4)_3 + 24H_2O$		
18	Give the uses of helium.		
	1. Helium and oxygen mixture is used by divers to prevent the painful dangerous		
	condition called bends.	2x1	2
	2. It is used to provide inert atmosphere in electric arc welding of metals.		
	3. It has lowest boiling point and used in cryogenics.		
	4. Used for filling air balloons.		
19	Write a short note on chromyl chloride test?		
	Chloride salt + potassium dichromate + con. H₂SO₄ → chromyl chloride	1	
	(orange red vapours) (or)		2
	$K_2Cr_2O_7 + 4NaCl + 6H_2SO_4 \longrightarrow 2KHSO_4 + 4NaHSO_4 + 2CrO_2Cl_2 \uparrow + 3H_2O_4 + 4NaHSO_4 + 2CrO_2Cl_2 \uparrow + 3H_2O_4 + $	2	
20	Explain briefly seven types of unit cell.		
	1. Cubic		
	2. Rhombohedral		
	3. Hexagonal	2	2
	4. Tetragonal		
	5. Orthorhombic		
	6. Monoclinic		
	7. Triclinic		

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Write Arrhenius equation and explain the terms involved in it.		
$K = Ae^{-Ea/RT}$ $k = Rate constant, A = Frequency factor,$	1+1	2
$E_a = Activation energy$ , $R = Gas constant$ , $T = Absolute temperature in K.$		
How will you preparation of Urotropine? Draw its structure.		
6HCHO + 4NH <sub>3</sub> → (CH <sub>2</sub> ) <sub>6</sub> N <sub>4</sub> + 6H <sub>2</sub> O		
Formaldehyde Hexamethylene tetramine	1+1	2
CH <sub>2</sub>		
Explain Kolbe's reaction?		
OH ONa OH OH		
COONa		
	2	2
4-7 total		
phenol sodium phenoxide sodium salicylate Salicyclic acid	4	
(or) Explanation only	!	
Write the expression for the solubility product of Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2.</sub>		
$Ca_3(PO_4)_{2(s)} \iff 3Ca^{2+}_{(aq)} + 2PO_4^{3-}_{(aq)}$		
3S 2S		_
$K_{sp} = [Ca^{2+}]^3 [PO_4^{3-}]^2$ (or)	1	2
$K_{SP} = (3S)^3 (2S)^2$		
$= 27 S^3 \times 4 S^2 = 108 S^5$	1	
	$K = Ae^{-Ea / RT} \qquad k = Rate \ constant,  A = Frequency \ factor,$ $E_a = Activation \ energy,  R = Gas \ constant,  T = Absolute \ temperature \ in \ K.$ $How \ will \ you \ preparation \ of \ Urotropine? \ Draw \ its \ structure.$ $6HCHO + 4NH_3 \qquad (CH_2)_6N_4 + 6H_2O$ $Formaldehyde \qquad Hexamethylene \ tetramine$ $OH \qquad ONa \qquad OH \qquad COONa \qquad H'/H_2O \qquad H'/H_2O \qquad Adold H'/H_2O \qquad Adold H'/H_2O \qquad Salicyclic \ acid \qquad (or) \ Explanation \ only$ $Write \ the \ expression \ for \ the \ solubility \ product \ of \ Ca_3(PO_4)_2 \ (s) \qquad = 3Ca^{2+}(aq) + 2PO_4^{3-}(aq) \qquad 3S \qquad 2S$ $K_{sp} = [Ca^{2+}]^3 \ [PO_4^{3-}]^2 \qquad (or)$ $K_{sp} = (3S)^3 \ (2S)^2$	$K = Ae^{-Ea / RT} \qquad k = Rate \ constant,  A = Frequency \ factor, \\ E_a = Activation \ energy,  R = Gas \ constant,  T = Absolute \ temperature \ in K.$ $How \ will \ you \ preparation \ of \ Urotropine? \ Draw \ its \ structure. \\ 6HCHO + 4NH_3 \qquad (CH_2)_6N_4 + 6H_2O \\ Formaldehyde \qquad Hexamethylene \ tetramine$ $CH_2)_6N_4 + 6H_2O \\ Hexamethylene \ tetramine$ $OH \qquad OH \qquad OOH \qquad O$

Part - III

## Answer any 6 questions and question No. 33 is compulsory.

 $6 \times 3 = 18$ 

<i>,</i> o	······································	any o questions and question No. 33 is	o dompaidory.	<b>X 3 -</b> 1	
25			3	3	
	Ti (s) $+ 2I_2$ (s) $\xrightarrow{550K}$ TiI <sub>4</sub> (vapour) $\xrightarrow{1800K}$ Ti (s) $+ 2I_2$ (s)				
26	What are the differences between Graphite & Diamond				
		Graphite	Diamond		
	1	It is soft	It is hard		
	2	It Conducts Electricity	It will not conduct electricity		
	3	sp <sup>2</sup> Hybridisation	sp <sup>3</sup> Hybridisation		
	4	Flat hexagonal sheets of carbon atoms	Tetrahedral arrangement	71	
	5	Successive carbon sheets held	Covalent bonds	3x1	3
		together by weak Vander Waals forces			
	6	Used as Lubricant	Used for cutting glasses and rock drilling	71	
	7	Using carbons 4 valence electrons, 3e-	There is no free electron for		
		forms $3\sigma$ bonds, $1e^{-}$ forms $1\pi$ bond.	conductivity		
		This $\pi$ e <sup>-</sup> delocalised over entire sheet and responsible for its conductivity.			
27	Wri	te note on Holme's signal?			
		Phosphine is used for producing smok	te screen. In a ship, a container with a		
	mixture of calcium carbide and calcium phosphide, liberates phosphine and			3	3
	acetylene when thrown into the sea. The liberated Phosphine catches fire and ignites			s S	٥
	acetylene. These burning gases serves as a signal to the approaching ships. This is				
	known as Holmes signal.				

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28	What are interstitial compounds? Give example.		
20	<ul> <li>An interstitial compound is formed when small atoms like hydrogen,</li> </ul>		
			2
	boron, carbon or nitrogen are trapped in the interstitial holes in a	2	3
	metal lattice. They are usually non-stoichiometric compounds.	1	
	> Eg: TiC, Mn <sub>4</sub> N		
29	What is Lanthanide contraction? Write its causes.  As we move across 4f series, the atomic and ionic radii of Lanthanoids	,	
	show gradual decrease with increase in atomic number. This decrease in	1	
	ionic size is called Lanthanoid contraction.		
			3
	Causes of Lanthanoid contraction:		
	> the effetive nuclear charge increases	2	
00	➤ the shielding effect of 4f elelctrons were relatively poor		
30	Explain common ion effect with an example?		
	When a salt of a weak acid is added to the acid itself, the dissociation of the weak	2	
	acid is suppressed further.		3
	For eg, the addition of sodium acetate to acetic acid solution leads to the		
	suppression in the dissociation of acetic acid which is already weakly dissociated. In	1	
	this case, CH <sub>3</sub> COOH and CH <sub>3</sub> COONa have the common ion, CH <sub>3</sub> COO		
31	Give three examples for first order reaction.		
	1. Decomposition of N <sub>2</sub> O <sub>5</sub>		
	$N_2O_5(g) \longrightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$		
	2		
	2. Decomposition of H <sub>2</sub> O <sub>2</sub>	3x1	3
	$H_2O_2(aq) \longrightarrow H_2O(1) + \frac{1}{2}O_2(g)$		
	3. Decomposition of SO <sub>2</sub> Cl <sub>2</sub>		
	$SO_2Cl_2(1) \longrightarrow SO_2(g) + Cl_2(g)$		
32	Explain the mechanism of Aldol condensation?		
	H.		
	$CH_3 - C + H - CH_2 - CHO \xrightarrow{dil.NaOH}                                    $	,	
	II I	1	
	О		
	Acetaldehyde Acetaldol (3 - Hydroxy butanal) (or)		
	(OI)		
	Step – 1: ⊝		
	$HO + H - CH_2 - CHO \longrightarrow CH_2 - CHO + H_2O$		
	Step – 2:		3
	H L		
	$CH_3 - C + \Theta CH_2 - CHO \longrightarrow CH_3 - CH - CH_2 - CHO$	3x1	
	Ston 2:		
	Step – 3:		
	$CH_3$ - $CH$ - $CH_2$ - $CHO$ - $CH_3$ - $CH$ - $CH_2$ - $CHO$ + $OH$ -		
	OOH		

33	(B) C <sub>2</sub> H <sub>3</sub> OCI. Compound	An organic compound (A) $C_2H_4O_2$ reacts with thionyl chloride gives compound (B) $C_2H_3OCI$ . Compound (B) reacts with ethanol gives compound (C) with fruit smell. Find (A), (B) and (C). Write the suitable reactions. $C_2H_4O_2 = CH_3COOH$ (A)			
	CH <sub>3</sub> COOH + SOCl <sub>2</sub> ————————————————————————————————————	→ CH <sub>3</sub> COCI Acetyl chloride (B)	Equation (or) Name (or)	3x1	3
	CH <sub>3</sub> COCI + C <sub>2</sub> H <sub>5</sub> OH —— (B)	→ CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub> Ethyl methyl ester (C)	Tormula		

Part - IV

## Answer all the questions.

 $5 \times 5 = 25$ 

A1131	ver all the questions.	J – Z	,
34	<ul> <li>a) i) Explain zone refining process? (5)</li> <li>Principle: Fractional crystallization</li> <li>When an impure metal is melted and allowed to solidify, the impurities will prefer to be in the molten region.</li> <li>Impure metal is taken in the form of rod</li> <li>Process: one end of the rod is heated using a mobile induction heater. when the heater is moved to the other end, pure metal crystallizes while the impurities will move on to the adjacent molten zone. The process is repeated several times by moving the heater in the same direction again and again to achieve the desired purity level.</li> <li>Eg: Germanium, Silicon, Gallium</li> </ul>	5	5
	(or) b) Complete the following reactions i) SiCl <sub>4</sub> + 4 C <sub>2</sub> H <sub>5</sub> OH → Si(OC <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> + 4 HCl	2	
	ii) Al(OH) <sub>3</sub> + 3HCl → AlCl <sub>3</sub> + 3H <sub>2</sub> O	1	
	iii) B <sub>2</sub> H <sub>6</sub> + 6 CH <sub>3</sub> OH → 2 B(OCH) <sub>3</sub> + 6 H <sub>2</sub>	2	
35	a) i) Prepare bleaching powder? (2)  It is prepared by passing chlorine gas through dry slaked lime (calcium hydroxide)(or)  Ca(OH) <sub>2</sub> + Cl <sub>2</sub> CaOCl <sub>2</sub> + H <sub>2</sub> O  ii) Write the molecular formula and structural formula for Phosphoric acid? (3)  Phosphoric acid  H <sub>3</sub> PO <sub>4</sub> HO P OH  OH  (or) b) Explain the preparation of potassium dichromate? (5)  Ore: Chromite ore  Concentration: Gravity separation process.  4 FeCr <sub>2</sub> O <sub>4</sub> + 8 Na <sub>2</sub> CO <sub>3</sub> + 7 O <sub>2</sub> 900-1000°C  (or) Explanation only  (or) Explanation only  (or) Equation without temperature  2 Na <sub>2</sub> CrO <sub>4</sub> + H <sub>2</sub> SO <sub>4</sub> Na <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> + Na <sub>2</sub> SO <sub>4</sub> + H <sub>2</sub> O  (or) Explanation only  Na <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> + 2 KCl  Fc <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> + 2 NaCl  (or) Explanation only	1 2 1½ x 2 1 1 1 1 1	5
	a) i) Write note on schottky defect? (3)	1	_
36	Arises due to the missing of equal number of cations and anions from the crystal lattice	3	5

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	2. The cations and anions are almost similar in size				
	3. It lowers the density of the crystal				
	4. Eg: NaCl				
	5. Na <sup>+</sup> Cl <sup>-</sup> Na <sup>+</sup> Cl <sup>-</sup> Na <sup>+</sup>				
	Cl- Cl- Na+ Cl-				
		Na <sup>+</sup> Cl <sup>-</sup> Na <sup>+</sup> Na <sup>+</sup>			
		Cl- Na <sup>+</sup> Na <sup>+</sup> Cl-			
		Na <sup>+</sup> Cl <sup>-</sup> Na <sup>+</sup> Cl <sup>-</sup>			
	ii)	Why ionic crystals are hard and britt	le? (2)		
	",		ong electrostatic attraction between cations		
	an	d anions. Strong external force needs to	_	2	
		nce ionic crystal is hard and brittle.			
	(or	) b) i) Explain pseudo first order read	ction with an example. (2)		
		A second order reaction in which or	ne of the reactants is taken in large access	1	
	foll	ows first order kinetics is called pseudo	o first order reaction.		
	Eg	: Acid hydrolysis of an ester			
		CH3COOCH3 + H2O -	H <sup>+</sup> → CH₃COOH + CH₃OH	1	
	ii)	Write differences between order and			
		Order of a reaction	Molecularity of a reaction		
		it is the sum of the powers of	it is the total number of reactant		
	1	concentration terms involved in the	species that are involved in an	3 x	
		experimentally determined rate law.	elementary step	3 X	
	2	it can be zero or fractional or integer	it is always a whole number, cannot be	•	
		ŷ.	zero or a fractional number		
	3	it is assigned for a overall reaction	it is assigned for each elementary step of mechanism		
	2)	i) Write note on Lowry – Bronsted co			
	-	id is a proton donor. Eg: HCl	nicept of acid and bases. (2)	1	
		se is a proton acceptor. Eg: NH <sub>3</sub>		1	
		Derive the relationship between pH a	and pOH. (3)		
	-	$pH = - log_{10} [H_3O^+]$		1/2	
		pOH = - log <sub>10</sub> [OH <sup>-</sup> ]		1/2	
		pH + pOH = - log [H+] - log [OH-]		1/2	
	١٨/.	= - log [H <sup>+</sup> ] [OH <sup>-</sup> ]		1/2	
37	VVE	e know that, $K_w = [H^+][OH^-]$		/2	5
		pH + pOH = - log K <sub>w</sub>			
		pH + pOH = pK <sub>w</sub>		1	
	•	) b) Convert	Evalenation only (ar)	1	
	1) [	Ethylene glycol   1,4 - Dioxane	$H_2SO_4$ $CH_2$ $CH_2$	'	
		$H_0 - CH_2 - CH_2 - CH_1 - COIL F$	$\stackrel{\text{1}_2\text{SO}_4}{\longrightarrow}$ 0		
		$HO-CH_2 - CH_2 - OH$ Con H $HO-CH_2 - CH_2 - OH$ -2H	$I_2O$ $CH_2 - CH_2$	2	
		<u> </u>			
		ethane - 1,2 - diol	1,4 - dioxane		
_	· <u> </u>			_	_

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	ii) Glycerol → Acrolein Explanation only (or)	1	
	$CH_2 - OH$ $CH_2$		
	Mileo		
	$CH - OH \xrightarrow{KHSO_4} CH$	1	
	$_{\text{CH}_2}$ — $_{\text{OH}}$ CHO		
	Propane - 1,2,3 - triol Prop - 2- enal (acrolein)		
	iii) Phenol → Phenolphthalein Explanation only (or)	1	
	$\frac{\text{Con H}_2\text{SO}_4}{2}$	2	
	Phenol phthalic		
	anhydride Phenolphthalein		
	<ul> <li>a) i) Write any two tests for carboxylic acid? (2)</li> <li>i) In aqueous solution carboxylic acid turn blue litmus red.</li> <li>ii) Carboxylic acids give brisk effervescence with sodium bicarbonate due to the evolution of carbon-di -oxide.</li> <li>iii) When carboxylic acid is warmed with alcohol and Con H<sub>2</sub>SO<sub>4</sub> it forms an ester, which is detected by its fruity odour.</li> </ul>	2 x	
	ii) Explain Popoff 's rule with an example? (3)  It states that during the oxidation of an unsymmetrical ketone, a (C – CO)  bond is cleaved in such a way that the keto group stays with the smaller alkyl group.	2	
	$CH_3 - CH_2 - CH_2 - C - CH_3 \xrightarrow{(O)} CH_3 CH_2 - COOH + CH_3 COOH$ $O$ $ethanoic acid$ $O$ $ethanoic acid$	1	
38	(or) b) i) Write Rosenmund reduction (3)		5
	$CH_3 - C - Cl + H_2 \xrightarrow{Pd/BaSO_4} CH_3 - C - H + HCl$	2	
	Acetyl chloride Acetaldehyde	1	
	In this reaction, barium sulphate act as a catalytic poison to palladium catalyst, so that aldehyde cannot be further reduced to alcohol.	1	
	ii) Write HVZ reaction? (2)		1
	$CH_3 - COOH \xrightarrow{Cl_2 / red P_4} CH_2 - COOH$ $CH_3 - COOH$	2	
	Acetic acid Mono Chloro acetic acid		
	(or) Explanation only	1	