DEPARTMENT OF GOVERNMENT EXAMINATIONS – CHENNAI-6

HSC SECOND YEAR EXAMINATION MARCH/APRIL - 2023

CHEMISTRY ANSWER KEY

Note: 1. Answer written with Blue or Black ink only to be evaluated
2. Choose the most suitable answer in **PART – I** from the given alternatives and write the option code and the corresponding answer.

Maximum Marks : 70

PART – I

Answer all the questions **15×1=15**

Q.No	Option	'A' Type	Q.No	Option	'B'Type
1	c)	Antacid	1	a)	NaCl
2	c)	Activation energy	2	a)	Uracil
3	b)	Al	3	c)	Antacid
4	c)	$[Cu(NH_3)_4]^{2+}$	4	d)	+3
5	d)	Gel-butter	5	b)	Ethane – 1,2-diol
6	d)	HCl	6	a)	sp^2
7	a)	sp^2	7	b)	Al
8	d)	+3	8	a)	Schiff's base
9	d)	Both **Assertion** and **Reason** are true and **Reason** is the correct explanation of **Assertion**	9	b)	0
10	c)	Rn	10	c)	$[Cu(NH_3)_4]^{2+}$
11	b)	0	11	c)	Activation energy
12	a)	NaCl	12	d)	HCl
13	a)	Uracil	13	d)	Both **Assertion** and **Reason** are true and **Reason** is the correct explanation of
14	b)	Ethane – 1,2-diol	14	c)	Rn
15	a)	Schiff's base	15	d)	Gel-butter

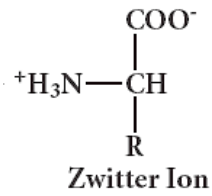
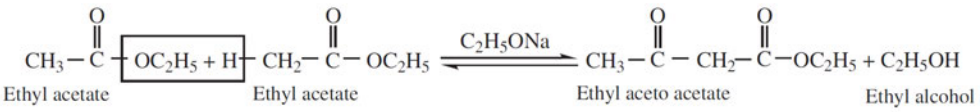
Part –II

Answer any **SIX** Questions and **Question No.24** is Compulsory. **6×2=12**

16	**Sulphide ore** **Galena, Zinc blende (or) any two suitable examples with name or formula**	1 ½+½	2
17	Any two uses	1+1	2
18	**Central atom** Correct Definition		2
19	Number of atoms in FCC unit cell = **Nc / 8 + N_f / 2** **(or)** **= 8/8 + 6/2** **= 4** (or) Correct Structure	1 1 1	2
20	**Conjugate acid – base pairs** Chemical species that differ only by a proton (or) suitable explanation (or) mentioning any one conjugate acid base pair	2 1	2
21	correct explanation	2	2
22	$CH_3-\mathbf{CO}-CH_3 + 4[H] \xrightarrow{Zn/Hg \ / \ Con\ HCl} CH_3-\mathbf{CH_2}-CH_3$ Acetone Propane (OR) $CH_3-\mathbf{CO}-CH_3 + 4[H] \xrightarrow{NH_2-NH_2 \ / \ C_2H_5ONa} CH_3-\mathbf{CH_2}-CH_3$ Acetone Propane (or) Correct explanation.	2 1	2
23	Correct explanation Any one example	1 1	2
24	(A) - $CH_3CH_2NH_2$ (or) Ethyl amine (or) ethanamine (B) - $CH_3CH_2NHCOCH_3$ (or) N-ethylacetamide	1 1	2

Part–III

Answer any **SIX** Questions and **Question No.33 is Compulsory.** 6×3=18

25	**Fisher tropsch synthesis:** $nCO + (2n+1)H_2 \xrightarrow{500-700K,\text{less than 50 atm}} C_nH_{2n+2} + nH_2O$ (or) $nCO + 2nH_2 \xrightarrow{500-700K,\text{less than 50 atm}} C_nH_{2n} + nH_2O$ (or) unbalanced equation(or) equation without condition (or) mere explanation alone	3 2	3
26	Any three differences	3×1	3
27	a) Central metal atom / ion = Pt (or) Pt^{2+} (or) Pt(II) b) Co-ordination number = 4 c) Oxidation number of central metal ion= +2	1 1 1	3
28	**Helmholtz electrical double layer:** Correct explanation **(or)** Diagram alone	3 2	3
29	**First Law : Correct statement** **(or) Correct mathematical expression** **Second Law : Correct statement** **(or) Correct mathematical expression**	1½ 1 1½ 1	3
30	 Zwitter Ion (or) any other correct structure		3
31	 Ethyl acetate Ethyl acetate Ethyl aceto acetate Ethyl alcohol (or) equation without sodium ethoxide (or) **Mere** Explanation	3 2 ½ 2	3

32	Correct explanation Any two Examples	2 ½+½	3
33	$t = \frac{2.303}{k} \log \frac{[A_0]}{[A]}$ $t_{90\%} = \frac{2.303}{k} \log \frac{[100]}{[100-90]}$ (or) $t_{90\%} = \frac{2.303}{k} \log (10)$ $t_{99\%} = \frac{2.303}{k} \log \frac{[100]}{[100-99]}$ (or) $t_{99\%} = \frac{2.303}{k} \log (100)$ $t_{99\%}/t_{90\%} = \frac{\log 100}{\log 10}$ (or) $t_{99\%}/t_{90\%} = 2$	1 ½ ½ 1	3

Part– IV

Answer all the Questions **5x5=25**

34 (a)	**Zone Refining** Principle - fractional crystallization Correct explanation Example: Germanium (Ge) / silicon (Si) / gallium (Ga) /Semiconductor **(OR)**	 1 3 1	5
(b)	(i). (1) - 1 (2) + 4 (ii). (1) $P_4 + 3NaOH + 3H_2O \longrightarrow 3NaH_2PO_2 + PH_3 \uparrow$ (2) $XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF$ (3) $Cu + 2H_2SO_4 \longrightarrow CuSO_4 + 2H_2O + SO_2 \uparrow$ con. (or) Unbalanced equations - ½ + ½ +½	1+1 **1** **1** 1 **1½**	2 3

35 (a)	(i). Correct Structure **Any four points from the following.** 1. Two BH_2 units are linked by two bridged hydrogens 2. It has eight B-H bonds. 3. It has only 12 valence electrons unable to form normal covalent bonds 4. The four terminal B-H bonds (2c-2e) bond. 5. Two B-H-B (3c-2e) or bridged bond. 6. The bridging hydrogen atoms are in a plane 7. The boron is sp^3 hybridized.	1 4×½	**3**
	(ii). **Ethyl Borate test** $H_3BO_3 + 3C_2H_5OH \xrightarrow[H_2SO_4]{Conc.} B(OC_2H_5)_3 + 3H_2O$ (or) Equation without conc.sulphuric acid (or) correct explanation (or) mentioning triethyl borate or green flame (or) unbalanced equation	2 1½ 1	2
	(OR)		
(b)	**Bonding in metal carbonyls** i. The bond between metal atom and the carbonyl ligand consists of two components. ii. $M \leftarrow^{\sigma\ bond} CO$ **sigma bond**. (or) explanation ii. The sigma bond formation increases the electron density in metal d orbitals. iv. Correct explanation for **π-back bonding** (or) suitable diagram	1 1 1 2	5
36 (a)	**Schottky defect:** Correct reason Similar size (or) density decreases. Example: NaCl. Diagram **Frenkel defect:** Correct reason differ in size (or) does not affect the density Example: AgBr Diagram **(OR)**	1 ½ ½ ½ 1 ½ ½ ½	5

36 (b)	(i) Any two correct examples for a zero order reaction	2	2
	(ii) **uses of colloids**		
	in Tanning of leather (one use)	1½	3
	in Rubber industry (one use)	1½	
37 (a)	Oswald dilution law		5
	$CH_3COOH \rightleftharpoons H^+ + CH_3COO^-$	1	
	$K_a = \frac{[H^+]\,[CH_3COO^-]}{[CH_3COOH]}$	1	
	$K_a = \frac{(\alpha.C)\,(\alpha.C)}{(1-\alpha)C}$	1	
	$k_a = \frac{\alpha^2 C}{1-\alpha}$	1	
	$\alpha = \sqrt{\frac{K_a}{C}}$ (or) $[H^+] = \sqrt{K_a C}$	1	
	(OR)		
(b)	(i). Aniline is basic in nature	1	2
	It donates its lone pair to the lewis acid to form an adduct / inhibits further the electrophilic substitution reaction.	1	
	(ii). Correct equation	3	3
	(or)Mere explanation alone	2	
38 (a)	(i). Correct equation	3	3
	Correct equation without conc.sulphuric acid	2½	
	(or) Mere explanation alone	2	
	(ii) . Correct equation	2	2
	Correct equation without Na / ether	1½	
	(or) Mere explanation only	1	
	(OR)		
(b)	$C_6H_5 - OH + NH_3 \xrightarrow[\Delta]{anhy.ZnCl_2} C_6H_5 - NH_2$ (A) (B)	1	5
	$C_6H_5 - OH + Zn \xrightarrow{\Delta} C_6H_6 + ZnO$ (C)	1	
	(A) -C_6H_5OH (or) Phenol	1	
	(B) -$C_6H_5NH_2$ (or) Aniline	1	
	(C) - C_6H_6 (or) Benzene	1	