

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)	$[\text{Cu}(\text{NH}_3)_4]^{2+}$	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)	$[\text{Cu}(\text{NH}_3)_4]^{2+}$
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 $\frac{1}{2} + \frac{1}{2}$	2
17	Any two uses	1+1	2
18	Central atom Correct Definition		2
19	Number of atoms in FCC unit cell = $N_c / 8 + N_f / 2$ (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	$\text{CH}_3 - \text{CO} - \text{CH}_3 + 4[\text{H}] \xrightarrow{\text{Zn/Hg / Con HCl}} \text{CH}_3 - \text{CH}_2 - \text{CH}_3$ <p style="text-align: center;">Acetone Propane (OR)</p> $\text{CH}_3 - \text{CO} - \text{CH}_3 + 4[\text{H}] \xrightarrow{\text{NH}_2 - \text{NH}_2 / \text{C}_2\text{H}_5\text{ONa}} \text{CH}_3 - \text{CH}_2 - \text{CH}_3$ <p style="text-align: center;">Acetone Propane</p> <p style="text-align: center;">(or) Correct explanation.</p>	2 1	2
23	Correct explanation Any one example	1 1	2
24	(A) - $\text{CH}_3\text{CH}_2\text{NH}_2$ (or) Ethyl amine (or) ethanamine (B) - $\text{CH}_3\text{CH}_2\text{NHCOCH}_3$ (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: $n\text{CO} + (2n + 1)\text{H}_2 \xrightarrow{500-700\text{K, less than 50 atm}} \text{C}_n\text{H}_{2n+2} + n\text{H}_2\text{O}$ <p style="text-align: center;">(or)</p> $n\text{CO} + 2n\text{H}_2 \xrightarrow{500-700\text{K, less than 50 atm}} \text{C}_n\text{H}_{2n} + n\text{H}_2\text{O}$ <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> (or) unbalanced equation (or) equation without condition (or) mere explanation alone </div> <div style="font-size: 3em; line-height: 1;">}</div> </div>	3	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	$\begin{array}{c} \text{COO}^- \\ \\ ^+\text{H}_3\text{N}-\text{CH} \\ \\ \text{R} \end{array}$ <p style="text-align: center;">Zwitter Ion</p> (or) any other correct structure		3
31	$\begin{array}{ccccccc} \text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5 & + & \text{H} & + & \text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5 & \xrightleftharpoons{\text{C}_2\text{H}_5\text{ONa}} & \text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5 + \text{C}_2\text{H}_5\text{OH} \\ \text{Ethyl acetate} & & & & \text{Ethyl acetate} & & \text{Ethyl aceto acetate} \qquad \qquad \text{Ethyl alcohol} \end{array}$ <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="margin-right: 10px;"> (or) equation without sodium ethoxide (or) Mere Explanation </div> <div style="margin-left: 10px;"> 2 ½ 2 </div> </div>	3 2 ½ 2	3

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

35 (a)	<p>(i). Correct Structure Any four points from the following.</p> <ol style="list-style-type: none"> Two BH₂ units are linked by two bridged hydrogens. It has eight B-H bonds. It has only 12 valence electrons unable to form normal covalent bonds. The four terminal B-H bonds (2c-2e) bond. Two B-H-B (3c-2e) or bridged bond. The bridging hydrogen atoms are in a plane The boron is sp³ hybridized. <p>(ii). Ethyl Borate test</p> $\text{H}_3\text{BO}_3 + 3\text{C}_2\text{H}_5\text{OH} \xrightarrow[\text{H}_2\text{SO}_4]{\text{Conc.}} \text{B}(\text{OC}_2\text{H}_5)_3 + 3\text{H}_2\text{O}$ <p>(or) Equation without conc.sulphuric acid</p> <p>(or) correct explanation (or) mentioning triethyl borate or green flame (or) unbalanced equation</p> <p style="text-align: center;">(OR)</p>	<p>1</p> <p>4×½</p> <p>2</p> <p>1½</p> <p>1</p>	<p>3</p> <p>2</p>
(b)	<p>Bonding in metal carbonyls</p> <ol style="list-style-type: none"> The bond between metal atom and the carbonyl ligand consists of two components. M $\xleftarrow{\sigma \text{ bond}}$ CO sigma bond. (or) explanation The sigma bond formation increases the electron density in metal d orbitals. Correct explanation for π-back bonding (or) suitable diagram 	<p>1</p> <p>1</p> <p>1</p> <p>2</p>	<p>5</p>
36 (a)	<p>Schottky defect:</p> <p>Correct reason Similar size (or) density decreases. Example: NaCl. Diagram</p> <p>Frenkel defect:</p> <p>Correct reason differ in size (or) does not affect the density Example: AgBr Diagram</p> <p style="text-align: center;">(OR)</p>	<p>1</p> <p>½</p> <p>½</p> <p>½</p> <p>1</p> <p>½</p> <p>½</p> <p>½</p>	<p>5</p>

36	(i) Any two correct examples for a zero order reaction	2	2
(b)	(ii) uses of colloids in Tanning of leather (one use)	1½	3
	in Rubber industry (one use)	1½	
37	Oswald dilution law $\text{CH}_3\text{COOH} \rightleftharpoons \text{H}^+ + \text{CH}_3\text{COO}^-$ $K_a = \frac{[\text{H}^+][\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$ $K_a = \frac{(\alpha \cdot C)(\alpha \cdot C)}{(1-\alpha)C}$ $k_a = \frac{\alpha^2 C}{1-\alpha}$ $\alpha = \sqrt{\frac{K_a}{C}}$ (or) $[\text{H}^+] = \sqrt{K_a C}$ (OR)	1 1 1 1 1	5
(b)	(i). Aniline is basic in nature It donates its lone pair to the lewis acid to form an adduct / inhibits further the electrophilic substitution reaction.	1 1	2
	(ii). Correct equation (or) Mere explanation alone	3 2	3
38	(i). Correct equation Correct equation without conc.sulphuric acid (or) Mere explanation alone	3 2½ 2	3
(a)	(ii) . Correct equation Correct equation without Na / ether (or) Mere explanation only (OR)	2 1½ 1	2
(b)	$\text{C}_6\text{H}_5 - \text{OH} + \text{NH}_3 \xrightarrow[\Delta]{\text{anhy. ZnCl}_2} \text{C}_6\text{H}_5 - \text{NH}_2$ (A) (B) $\text{C}_6\text{H}_5 - \text{OH} + \text{Zn} \xrightarrow{\Delta} \text{C}_6\text{H}_6 + \text{ZnO}$ (C) (A) -C ₆ H ₅ OH (or) Phenol (B) -C ₆ H ₅ NH ₂ (or) Aniline (C) - C ₆ H ₆ (or) Benzene	1 1 1 1 1	5

