

**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)	$\text{sp}^2$
7	a)	$\text{sp}^2$	7	b)	Al
8	d)	+3	8	a)	Schiff's base
9	d)	Both <b>Assertion</b> and <b>Reason</b> are true and <b>Reason</b> is the correct explanation of <b>Assertion</b>	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 <b>Assertion</b> and <b>Reason</b> are true and <b>Reason</b> 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	<b>Sulphide ore</b> <b>Galena, Zinc blende (or) any two suitable examples with name or formula</b>	1 ½+½	2
17	Any two uses	1+1	2
18	<b>Central atom</b> 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	<b>Conjugate acid – base pairs</b> 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	$\text{CH}_3 - \text{CO} - \text{CH}_3 + 4[\text{H}] \xrightarrow{\text{Zn/Hg / Con HCl}} \text{CH}_3 - \text{CH}_2 - \text{CH}_3$ Acetone Propane (OR) $\text{CH}_3 - \text{CO} - \text{CH}_3 + 4[\text{H}] \xrightarrow{\text{NH}_2 - \text{NH}_2 / \text{C}_2\text{H}_5\text{ONa}} \text{CH}_3 - \text{CH}_2 - \text{CH}_3$ Acetone Propane (or) Correct explanation.	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	<b>Fisher tropesch synthesis:</b> $n\text{CO} + (2n + 1)\text{H}_2 \xrightarrow{500-700\text{K, less than 50 atm}} \text{C}_n\text{H}_{2n+2} + n\text{H}_2\text{O}$ (or) $n\text{CO} + 2n\text{H}_2 \xrightarrow{500-700\text{K, less than 50 atm}} \text{C}_n\text{H}_{2n} + n\text{H}_2\text{O}$ (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) $\text{Pt}^{2+}$ (or) Pt(II) b) Co-ordination number = 4 c) Oxidation number of central metal ion = +2	1 1 1	3
28	<b>Helmholtz electrical double layer:</b> Correct explanation (or) Diagram alone	3 2	3
29	<b>First Law : Correct statement</b> (or) <b>Correct mathematical expression</b> <b>Second Law : Correct statement</b> (or) <b>Correct mathematical expression</b>	1½ 1 1½ 1	3
30	$\begin{array}{c} \text{COO}^- \\   \\ \text{}^+\text{H}_3\text{N}-\text{CH} \\   \\ \text{R} \end{array}$ <b>Zwitter Ion</b> (or) any other correct structure		3
31	$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5 + \text{H}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5 \xrightleftharpoons{\text{C}_2\text{H}_5\text{ONa}} \text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5 + \text{C}_2\text{H}_5\text{OH}$ Ethyl acetate                      Ethyl acetate                      Ethyl aceto acetate                      Ethyl alcohol (or) equation without sodium ethoxide (or) <b>Mere Explanation</b>	3  2½ 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	<b>Zone Refining</b>		
(a)	Principle - fractional crystallization Correct explanation Example: Germanium (Ge) / silicon (Si) / gallium (Ga) / Semiconductor <b>(OR)</b>	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  <b>Any four points from the following.</b></p> <ol style="list-style-type: none"> <li>Two BH<sub>2</sub> units are linked by two bridged hydrogens.</li> <li>It has eight B-H bonds.</li> <li>It has only 12 valence electrons unable to form normal covalent bonds.</li> <li>The four terminal B-H bonds (2c-2e) bond.</li> <li>Two B-H-B (3c-2e) or bridged bond.</li> <li>The bridging hydrogen atoms are in a plane</li> <li>The boron is sp<sup>3</sup> hybridized.</li> </ol> <p>(ii). <b>Ethyl Borate test</b></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;"><b>(OR)</b></p>	1  4×½  2 1½ 1	3         2
(b)	<p><b>Bonding in metal carbonyls</b></p> <ol style="list-style-type: none"> <li>The bond between metal atom and the carbonyl ligand consists of two components.</li> <li>M ← <math>\overset{\sigma \text{ bond}}{\text{---}}</math> CO <b>sigma bond.</b> (or) explanation</li> <li>The sigma bond formation increases the electron density in metal d orbitals.</li> <li>Correct explanation for <b>π-back bonding</b> (or) suitable diagram</li> </ol>	1  1 1 2	5
36 (a)	<p><b>Schottky defect:</b></p> <p>Correct reason  Similar size (or) density decreases.  Example: NaCl.  Diagram</p> <p><b>Frenkel defect:</b></p> <p>Correct reason  differ in size (or) does not affect the density  Example: AgBr  Diagram</p> <p style="text-align: center;"><b>(OR)</b></p>	1 ½ ½ ½  1 ½ ½ ½	5

36 (b)	(i) Any two correct examples for a zero order reaction  (ii) <b>uses of colloids</b> in Tanning of leather ( one use)  in Rubber industry ( one use)	2  1½  1½	2  3
37 (a)	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.  (ii). Correct equation (or) Mere explanation alone	1 1  3 2	2  3
38 (a)	(i). Correct equation Correct equation without conc.sulphuric acid (or) Mere explanation alone  (ii) . Correct equation Correct equation without Na / ether (or) Mere explanation only  (OR)	3 2½ 2 2 1½ 1	3 3 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 <sub>6</sub> H <sub>5</sub> OH (or) Phenol (B) -C <sub>6</sub> H <sub>5</sub> NH <sub>2</sub> (or) Aniline (C) - C <sub>6</sub> H <sub>6</sub> (or) Benzene	1  1 1 1 1	5

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