

**DEPARTMENT OF GOVERNMENT EXAMINATIONS – CHENNAI-6**  
**HSC SECOND YEAR EXAMINATION MARCH - 2024**  
**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**

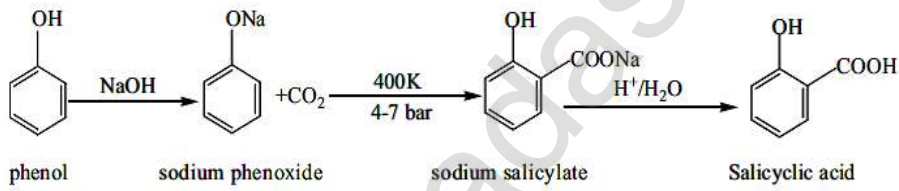
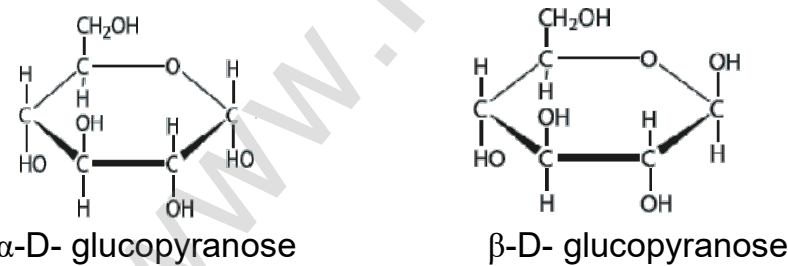
**Answer all the questions**

**15×1=15**

Q.No	Option Code	'A' Type	Q. No	Option Code	'B' Type
1	b)	Both Assertion and Reason are true and Reason is the correct explanation of Assertion	1	b)	First order
2	c)	Potassium trioxalato aluminate (III)	2	b)	Acetyl salicylic acid
3	b)	HI	3	d)	carbon dioxide
4	c)	Dry ice	4	c)	Potassium trioxalato aluminate (III)
5	c)	Cytosine and Uracil	5	a)	Sodium chloride
6	b)	Acetyl salicylic acid	6	b)	(i) and (iv)
7	d)	carbon dioxide	7	d)	Impure copper
8	c)	acetanilide	8	b)	Both Assertion and Reason are true and Reason is the correct explanation of Assertion
9	a)	Sodium chloride	9	c)	Nucleophilic addition
10	b)	(i) and (iv)	10	c)	Dry ice
11	c)	Nucleophilic addition	11	d)	PCC
12	b)	First order	12	b)	HI
13	d)	Impure copper	13	c)	acetanilide
14	c)	Al <sub>2</sub> O <sub>3</sub>	14	c)	Cytosine and Uracil
15	d)	PCC	15	c)	Al <sub>2</sub> O <sub>3</sub>

## Part –II

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

Q.No	Answer	Marks	
16	Correct Explanation (or) Correct Equation	2	2
17	Correct equation (or) unbalanced equation (or) equation without condition (or) mere explanation alone	2 1½ 1	2
18	Any one correct equation (or) Explanation (Any one)	2 1	2
19	Correct explanation Example	1 1	2
20	$E^{\circ}_{\text{cell}} = (E^{\circ}_{\text{oxi}}) + (E^{\circ}_{\text{red}})$ (or) $= -1.09 + 0.771$ $E^{\circ}_{\text{cell}} = -0.319 \text{ V}$ (or) $E^{\circ}_{\text{cell}}$ is -ve , $\text{Fe}^{3+}$ cannot oxidise $\text{Br}^-$ to $\text{Br}_2$	½ ½ 1	2
21	 <p>phenol                      sodium phenoxide                      sodium salicylate                      Salicylic acid</p>	2 1	2
22	 <p><math>\alpha</math>-D- glucopyranose                      <math>\beta</math>-D- glucopyranose</p>	1+1	2
23	Correct explanation (or) one example	2 1	2
24	correct definition	2	2

## Part-III

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

Q.No	Answer	Marks							
25	Any three uses	3	3						
26	$Fe^{3+} = [Ar] 3d^5$ $Fe^{3+}$ - half-filled d orbital $Fe^{3+}$ is stable	1 1 1	3						
27	$r = \frac{a\sqrt{2}}{4}$ (or) $a = \frac{4r}{\sqrt{2}}$ (or) $a = 2\sqrt{2} r$ (or) $a=2 \times 1.414 r$ $a = \frac{4 \times 125}{\sqrt{2}}$ (or) $a = 2\sqrt{2} 125$ (or) $a=2 \times 1.414 \times 125$ $a = 353.5 \text{ pm}$	1 1 $\frac{1}{2} + \frac{1}{2}$	3						
28	$K = Ae^{-E_a/RT}$ K = Rate constant A = Frequency factor R = Gas constant $E_a$ = Energy of activation T = Temperature	1      <b>4x<math>\frac{1}{2}</math></b>	3						
29	<table border="1"> <thead> <tr> <th>Physisorption</th> <th>chemisorption</th> </tr> </thead> <tbody> <tr> <td>Physisorption decreases with increase in temperature.</td> <td>When temperature is raised chemisorption first increases and then decreases.</td> </tr> <tr> <td>In Physisorption, when pressure increases the extent of adsorption increases.</td> <td>Chemical adsorption is fast with increase Pressure, it cannot alter the amount.</td> </tr> </tbody> </table>	Physisorption	chemisorption	Physisorption decreases with increase in temperature.	When temperature is raised chemisorption first increases and then decreases.	In Physisorption, when pressure increases the extent of adsorption increases.	Chemical adsorption is fast with increase Pressure, it cannot alter the amount.	$1\frac{1}{2}$  $1\frac{1}{2}$	3
Physisorption	chemisorption								
Physisorption decreases with increase in temperature.	When temperature is raised chemisorption first increases and then decreases.								
In Physisorption, when pressure increases the extent of adsorption increases.	Chemical adsorption is fast with increase Pressure, it cannot alter the amount.								
30	$\text{C}_6\text{H}_5-\text{CH}=\text{O} + \text{H}_2\text{C}(\text{COOH})_2 \xrightarrow[\text{-H}_2\text{O}]{\text{Pyridine}} \text{C}_6\text{H}_5-\text{CH}=\text{C}(\text{COOH})_2 \xrightarrow[\text{-CO}_2]{\Delta} \text{C}_6\text{H}_5-\text{CH}=\text{CH}-\text{COOH}$ <p style="text-align: center;">Benzaldehyde      Malonic acid    Cinnamic acid</p>	3  <b>2<math>\frac{1}{2}</math></b> <b>1</b>	3						

31	$\text{CH}_3 - \underset{\text{H}}{\text{N}} - \text{H} + \overset{\text{S}}{\parallel} \text{C} = \text{S} \longrightarrow \text{CH}_3 - \text{NH} - \overset{\text{S}}{\parallel} \text{C} - \text{SH} \xrightarrow{\text{HgCl}_2} \text{CH}_3 - \text{N} = \text{C} = \text{S} + \text{HgS} + 2\text{HCl}$ <p>Methylamine                      N - methyl dithiocarbamic acid                      Methyl isothiocyanate (Mustard oil smell)</p> <p>(or)</p> <p>Aniline                      S - diphenyl thiourea                      Phenyl isothiocyanate</p> <p>(or) equation without condition</p> <p>(or) explanation only</p>	3	3
32	Correct explanation (or) correct example (or) -CO-NH- bond only	3 1	3
33	Mere Attempt	3	3

## Part- IV

Answer all the Questions

5x5=25

Q.No	Answer	Marks	
34 (a)	i) Any 3 differences	3	5
	ii) Silica acts as a flux (or) Correct Equation only	2	
(OR)			
(b)	i) Any 3 uses	3	5
	ii) Correct definition	2	
	(or) Correct Structure only	1	
35 (a)	Lanthanoid contraction – Explanation	2	5
	Lanthanoid contraction consequences (Any Three)	3	
(OR)			
(b)	i) Double salt – Explanation (or)	1½	5
	Double salt – Example	1	
	Co-ordination Compound – Explanation (or)	1½	
	Co-ordination Compound – Example	1	
	ii) One example for medicinal importance	1	
	One example for biological importance	1	

36 (a)	Packing efficiency = $\frac{\text{total volume occupied by spheres in a unit cell}}{\text{volume of the unit cell}} \times 100$ Volume of cube = $a \times a \times a = a^3$ (or) Radius of the sphere from figure, $a = 2r$ (or) $r = \frac{a}{2}$ Volume of the sphere with radius = $\frac{4}{3} \pi \left(\frac{a}{2}\right)^3$ (or) = $\frac{\pi a^3}{6}$ Packing efficiency = $\frac{1 \times \frac{\pi a^3}{6}}{a^3} \times 100$ = 52.38%	1 1 1 1 1	5
<b>(OR)</b>			
(b)	i) Rate = $k[A]^0$ (or) $\frac{-d[A]}{dt} = k$ (or) $-d[A] = k dt$ $-\int_{[A_0]}^{[A]} d[A] = k \int_0^t dt$ (or) $-([A])_{[A_0]}^{[A]} = k (t)_0^t$ $[A_0] - [A] = kt$ (or) $k = \frac{[A_0] - [A]}{t}$	1 1 1	5
ii) Correct definition (or)		2	
Formula		1	
37 (a)	i) <div style="text-align: center;"> </div> (or) Correct Explanation (or) $Zn   Zn^{2+}    Cu^{2+}   Cu \quad E^0 = 1.1V$	3 3 1	5
ii) Correct definition		2	

(OR)					
(b)	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3 - \text{C} - \text{OH} \\   \\ \text{CH}_3 \end{array} + \text{HCl} \xrightarrow[\text{ZnCl}_2]{\text{anhydrous}} \begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3 - \text{C} - \text{Cl} \\   \\ \text{CH}_3 \end{array} + \text{H}_2\text{O}$ <p style="text-align: center;">2-methylpropan-2-ol                      2-chloro-2-methylpropane (immediate appearance of turbidity)</p>		2	5	
	$\begin{array}{c} \text{OH} \\   \\ \text{CH}_3 - \text{CH} - \text{CH}_3 \end{array} + \text{HCl} \xrightarrow[\text{ZnCl}_2]{\text{anhydrous}} \begin{array}{c} \text{CH}_3 - \text{CH} - \text{Cl} \\   \\ \text{CH}_3 \end{array} + \text{H}_2\text{O}$ <p style="text-align: center;">propan-2-ol                      2-chloropropane (slow appearance of turbidity)</p>		2		
	$\text{CH}_3 - \text{CH}_2 - \text{OH} + \text{HCl} \xrightarrow[\text{ZnCl}_2]{\text{anhydrous}} \text{No reaction at room temperature}$ <p style="text-align: center;">ethanol                      (Turbidity appears only on heating)</p>		1		
	<p>(or) Correct equation without mentioning turbidity</p> <p>(or) Correct equation without mentioning Lucas reagent</p>		3 3		
38 (a)	i) Any one correct equation		2	5	
	(or)		1		
	Correct Explanation		2		
	ii) Correct definition		2		
		Any one example		1	
(OR)					
(b)	$\begin{array}{c} \text{CH}_3 - \text{C} - \text{H} \\    \\ \text{O} \end{array} + 4(\text{H}) \xrightarrow[\text{Con HCl}]{\text{Zn - Hg}} \begin{array}{c} \text{CH}_3 - \text{CH}_3 \\ \text{Ethane} \end{array} + \text{H}_2\text{O}$ <p style="text-align: center;">Acetaldehyde                      (A)                      (B)</p>		2	5	
	Compound	Formula	(or)		
	A	CH <sub>3</sub> CHO			Name
	B	CH <sub>3</sub> CH <sub>3</sub>			Acetaldehyde
E	CH <sub>3</sub> COOH	Ethane			
				Acetic acid	
			3×1		