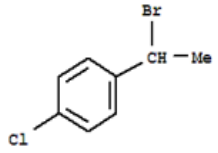
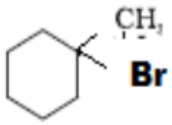
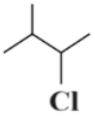
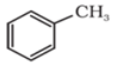
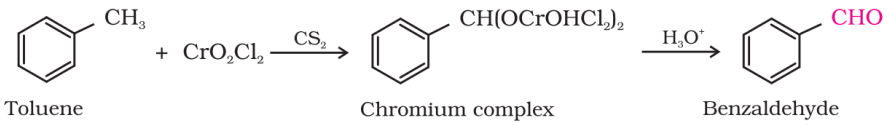
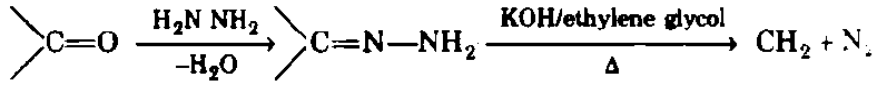
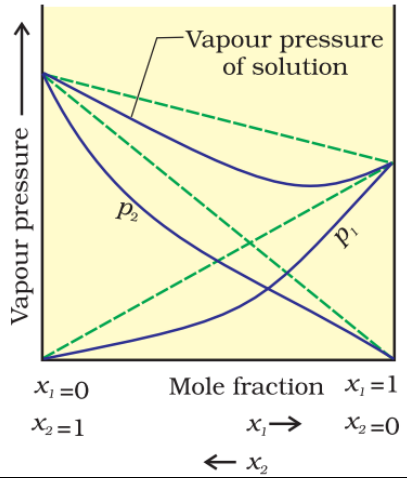
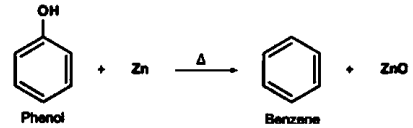
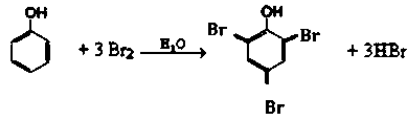
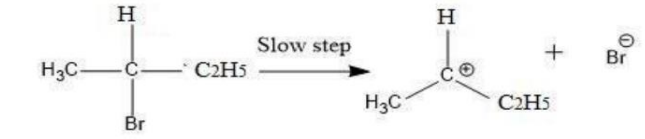
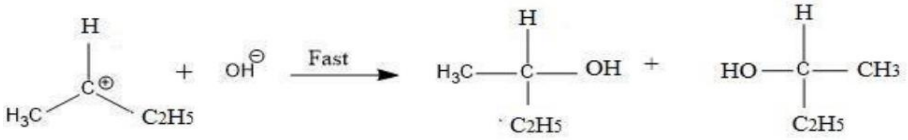
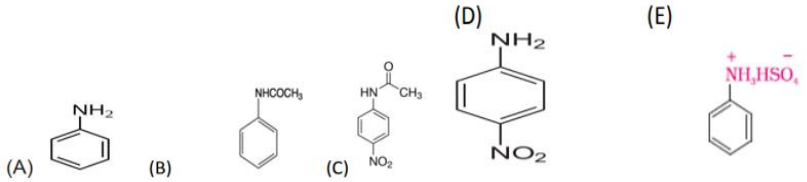
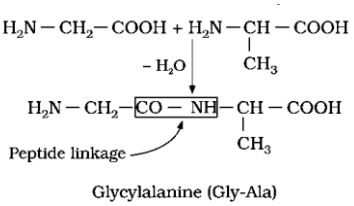
ANSWER KEY – CLASS 12 – CHEMISTRY – P-1 – SET 1 – 2023 – 24

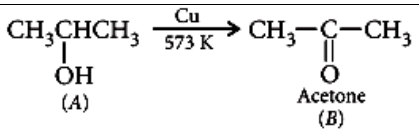
Q.NO.	ANSWERS	MARKS
1	(d) $Zn \mid Zn^{2+} \parallel Ag^{+} \mid Ag$	1
2	(C) $C_6H_5COCH_3 < CH_3COCH_3 < CH_3CHO < HCHO$	1
3	(b) because it does not have an open chain structure and hence it does not have a free − CHO group	1
4	(b) Camphor in nitrogen gas	1
5	(d) Benzyl chloride; Due to resonance, stable benzyl carbocation is formed.	1
6	(c) Ti^{4+}; Mn^{3+}	1
7	(c) Aniline	1
8	(a) $SOCl_2$ in the presence of pyridine	1
9	(a) 9s	1
10	(b) Due to the activation of benzene ring by the methoxy group.	1
11	(b) cis-$[Co(en)_2Cl_2]$ Cl	1
12	(d) Fe has higher number of unpaired electrons than Cu.	1
13	(c) A is true but R is false.	1
14	(a) Both A and R are true and R is the correct explanation of A	1
15	(a) Both A and R are true and R is the correct explanation of A	1
16	(b) Both A and R are true but R is not the correct explanation of A.	1
17	(a) for first order reaction half life of X = 12 hours 2 days = 48 hours means 4 half lives , amount of X left = 1/16 of initial value half life of Y = 16 hours 2 days = 48 hours means 3 half lives, amount left = 1/8 of initial value Ratio of X:Y = 1:2 (b) b. $mol^{1/2}L^{-1/2}s^{-1}$ as Rate = k $[P]^{1/2}$	½ ½ 1
18	Properties that depend on the number of solute particles irrespective of their nature relative to the total number of particles present in the solution. Osmotic Pressure	1 1

19	a.  b.  OR (a) (i)  (b) 	1+1 1 1
20	(a)  Toluene Chromium complex Benzaldehyde (with p.nitrotoluene) (b)  (with Propanone)	1+1
21	(a) $Sn + 2 H^+ \rightarrow Sn^{2+} + H_2$ (Equation must be balanced) $E = E^\circ - \frac{0.059}{2} \log \frac{[Sn^{2+}]}{[H^+]^2}$ $= [0 - (-0.14)] - 0.0295 \log \frac{(0.004)}{(0.02)^2}$ $= 0.14 - 0.0295 \log 10 = 0.11$ V / 0.1105 V	1 1
22	a. It is the magnitude of difference in energy between the two sets of d orbital i.e. t_2g and e_g $\mathbf{t^3_{2g}\ eg^1}$ b. In $[Ni(H_2O)_6]^{2+}$, $Ni^{+2}(3d^8)$ has two unpaired electrons which do not pair up in the presence of weak field ligand H_2O.	1 1 1
23	(a)	½ ½

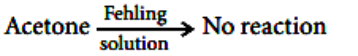
	$\pi_1 = \pi_2$ $iC_1RT = C_2RT$ $\frac{3\times 5}{322} = \frac{2}{M}$ $M = \frac{2\times 322}{3\times 5}$ $M = 42.9\ g$ (b)  	½ ½ 1
24	(a) The formation of ether is a nucleophilic bimolecular reaction (S_N2) involving the attack of alcohol molecule on a protonated alcohol, as indicated below: (i) $CH_3-CH_2-\ddot{O}-H + H^+ \longrightarrow CH_3-CH_2-\overset{+}{\underset{H}{O}}-H$ (ii) $CH_3CH_2-\ddot{O}: + CH_3-CH_2-\overset{+}{O}(H)(H) \rightarrow CH_3CH_2-\overset{+}{\underset{H}{O}}-CH_2CH_3 + H_2O$ (iii) $CH_3CH_2-\overset{+}{\underset{H}{O}}-CH_2CH_3 \longrightarrow CH_3CH_2-O-CH_2CH_3 + H^+$ **(a) (i)**  **(ii)**	½ ½ ½ ½ 1

	 2, 4, 6 tri bromo phenol (White ppt) (b) o-Nitrophenol - due to intramolecular hydrogen bonding while p-nitrophenol - due to intermolecular hydrogen bonding	½ ½ ½
25	(i) $A = CH_3CH_2CN$ $B = CH_3CH_2CH_2NH_2$ $C = CH_3CH_2CH_2OH$ (ii) $A = CH_3CONH_2$ $B = CH_3CH_2NH_2$ $C = CH_3CH_2NH-SO_2-C_6H_5$	½ x6
26	(a) $[Pt(NH_3)BrCl(NO_2)]^-$ (b) Potassium trioxalatoferrate(III) (c) Barium chloride test and / or Silver nitrate test	1 1 1
27	$C_2H_5-CH(Br)-CH_3$ Mechanism:  	1 1 1
28		½ x4 1
29	(a) the rate is reduced to ½ (with working) (b) lower the activation energy (c) $K = 0.0864\ min^{-1}$ $t_{1/2} = 8$ min. OR	1 1 1+1

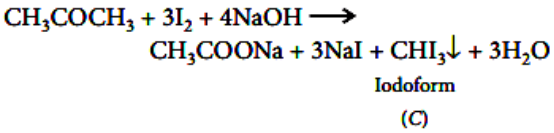
	(c) $\therefore k = \frac{0.693}{t_{1/2}}$ $= \frac{0.693}{60}$ $= 0.01155\ \text{min}^{-1}$ $= 1.155\ \text{min}^{-1}$	1 1
30	(a) any two points (b) alpha helix and beta pleated sheets (c)  Glycylalanine (Gly-Ala) OR (c) Any two points The tertiary structure of proteins represents overall folding of the polypeptide chains i.e., further folding of the secondary structure. It gives rise to two major molecular shapes viz. fibrous and globular. The main forces which stabilise the 2° and 3° structures of proteins are hydrogen bonds, disulphide linkages, van der Waals and electrostatic forces of attraction.	1 1 2 2
31	(a) Cu has an outer shell electronic configuration $4s^1\ 3d^{10}$. (b) • half-filled sets of 3d orbitals are relatively more stable • the energy gap between 3d and 4s orbitals is small. (c) no unpaired electrons; no d-d transition. (d) Mn^{2+} has $3d^5$ configuration, which is more stable than $3d^6$ configuration of Fe^{2+}. This makes removing an electron from Mn^{2+} more difficult than from Fe^{2+}. (e) Mn^{2+}(5 unpaired electrons) >Cr^{2+} (4 unpaired electrons) (f) The decrease in the atomic and ionic radii with an increase in the atomic number of actinoids due to the poor shielding effect of 5f electron. (g) $10I^- + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5I_2$	1 1 1 1 1 1 1
32	(a)	



(A) (B) — 1



1

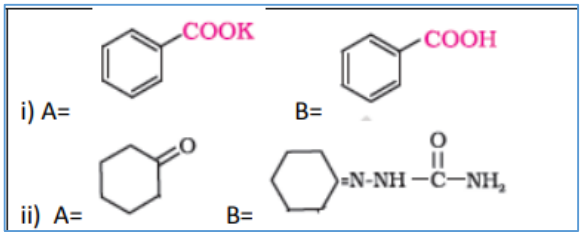


1

(C) — ½ + ½

½ + ½

(b)



i) A= B= — 1

ii) A= B= — 1 + 1

OR

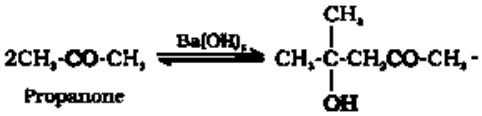
(a)

i) C_6H_5-CH(OH)-CN — 1

ii) 2 $CH_3COCH_2C_6H_5$ + $CdCl_2$

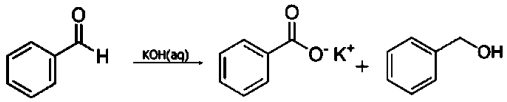
iii) $(CH_3)_2$-C(Br)COOH

(b)(i) — 1



Propanone

(ii)



33	(a) $\Delta_r G^\circ = -nFE^\circ_{cell}$	1
	$= +300\times10^3 \text{ J mol}^{-1} = +2\times96500 \text{ C mol}^{-1}\times E^\circ_{cell}$	1
	$E^\circ_{cell} = \frac{3\cancel{00}\times10^3}{2\times965\cancel{00}}\text{ V}$	1
	$E^\circ_{cell} = 1{\cdot}55 \text{ V}$	
	(Deduct ½ mark for incorrect unit or no unit)	
	(b) $\Lambda^\circ_m = \lambda^\circ_{Mg^{2+}} + 2\lambda^\circ_{Cl^-}$	1
	$\Lambda^\circ_m = (106 + 2\times76{\cdot}3)\text{ S cm}^2\text{ mol}^{-1}$	
	$\Lambda^\circ_m = (106 + 152{\cdot}6)\text{ S cm}^2\text{ mol}^{-1}$	
	$\Lambda^\circ_m = 258{\cdot}6\text{ S cm}^2\text{ mol}^{-1}$	1
	OR	
	(a) $E_{cell} = E^\circ_{cell} - \frac{0{\cdot}059}{2}\log\frac{[Zn^{2+}]}{[Cu^{2+}]}$ or any other correct mathematical expression of Nernst equation.	1
	(i) E_{cell} will increase	
	(ii) E_{cell} will decrease	1
	(b)	
	Cathode: $O_2(g) + 2H_2O(l) + 4e^- \longrightarrow 4OH^-(aq)$	1
	Anode: $2H_2(g) + 4OH^-(aq) \longrightarrow 4H_2O(l) + 4e^-$	
	Overall reaction being:	1
	$2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$	
	(c) two products – chlorine gas liberated at anode; molten sodium deposited at cathode	1