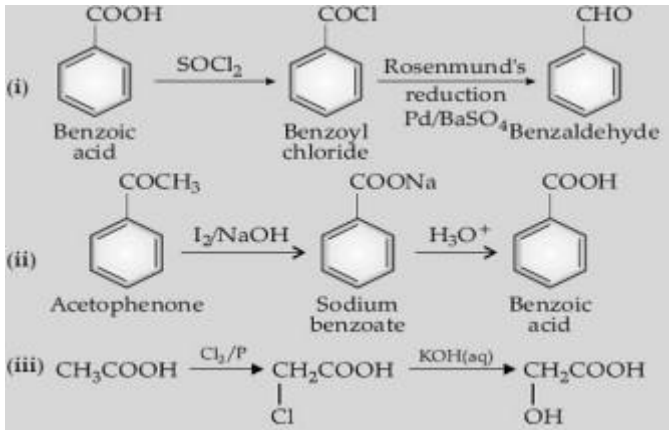


KENDRIYA VIDYALAYA SANGATHAN
CHEMISTRY XII
MARKING SCHEME

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
b	c	b	b	c	b	b	b	a	b	b	c	a	a	d	c

Q. No.	Value Point/ Expected Answer	Marks
17	During recharging, electrical energy is supplied to the cell from an external source. The reactions are reverse of those that takes place during discharge. At cathode: $\text{PbSO}_4 (\text{s}) + 2\text{e}^- \rightarrow \text{Pb}(\text{s}) + \text{SO}_4^{2-}(\text{aq})$ At anode: $\text{PbSO}_4 (\text{s}) + 2\text{H}_2\text{O} \rightarrow \text{PbO}_2 (\text{s}) + 4\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) + 2\text{e}^-$ Overall reaction: $\text{PbSO}_4 (\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{Pb}(\text{s}) + \text{PbO}_2 (\text{s}) + 2\text{H}_2\text{SO}_4 (\text{aq})$	2
18	$E_{(\text{cell})} = E_{(\text{cell})}^{\circ} - \frac{0.059}{2} \log \frac{[\text{Ni}^{2+}]}{[\text{Ag}^+]^2} = 0.91\text{V}$	2
19	(i) Octahedral splitting will takes place. (ii) As $\Delta_0 > P$ pairing will occur in the t_{2g} orbitals and e_g orbitals will remain vacant. $t_{2g}^4 e_g^0$	1 1
20	(a) Methanol, ethanol, propan-1-ol, butan-2-ol, butan-1-ol, pentan-1-ol. (b) n-Butane, ethoxyethane, pentanal and pentan-1-ol. O R Step 1: Protonation of ethene to form carbocation by electrophilic attack of H^+. $\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} = \text{C} \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array} + \text{H}-\overset{\text{H}}{\underset{\cdot\cdot}{\text{O}}}-\text{H}^+ \rightleftharpoons \begin{array}{c} \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C}- & \text{C}^+ & -\text{H} \\ & & \\ \text{H} & & \text{H} \end{array} + \text{H}_2\ddot{\text{O}}$ Step 2: Nucleophilic attack of water on carbocation. $\begin{array}{c} \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C}- & \text{C}^+ & -\text{H} \\ & & \\ \text{H} & & \text{H} \end{array} + \text{H}_2\ddot{\text{O}} \rightleftharpoons \begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}- & \text{C}-\text{O}^+-\text{H} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$ Step 3: Deprotonation to form an alcohol. $\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}- & \text{C}-\text{O}^+-\text{H} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array} + \text{H}_2\ddot{\text{O}} \rightarrow \begin{array}{c} \text{H} & & \text{:OH} \\ & & \\ \text{H}-\text{C}- & \text{C}-\text{H} \\ & & \\ \text{H} & & \text{H} \end{array} + \text{H}_3\text{O}^+$	1 1 2
21	(i) Cyanohydrin, (ii) Oxime	1 1

22	Given: $\Lambda_m^\circ(\text{CH}_3\text{COONa}) = 83 \text{ mho cm}^2 \text{ mol}^{-1}$ $\Lambda_m^\circ(\text{NaCl}) = 127 \text{ mho cm}^2 \text{ mol}^{-1}$ $\Lambda_m^\circ(\text{HCl}) = 426 \text{ mho cm}^2 \text{ mol}^{-1}$ $\Lambda_m^\circ(\text{CH}_3\text{COOH}) = ?$ Using Kohlrausch law of independent migration of ions $\Lambda_m^\circ(\text{CH}_3\text{COOH}) = \Lambda_m^\circ(\text{CH}_3\text{COONa}) + \Lambda_m^\circ(\text{HCl}) - \Lambda_m^\circ(\text{NaCl})$ or $\Lambda_m^\circ(\text{CH}_3\text{COOH}) = 83 + 426 - 127 = 382 \text{ mho cm}^2 \text{ mol}^{-1}$	3
23	At anode: $\text{Fe} \longrightarrow \text{Fe}^{2+} + 2e^-$; $E_{\text{Fe}^{2+}/\text{Fe}}^\circ = -0.44 \text{ V}$ At cathode: $2\text{H}^+ + \frac{1}{2}\text{O}_2 + 2e^- \longrightarrow \text{H}_2\text{O}$; $E_{\text{H}^+/\text{O}_2/\text{H}_2\text{O}}^\circ = 1.23 \text{ V}$ Overall reaction: $\text{Fe} + 2\text{H}^+ + \frac{1}{2}\text{O}_2 \longrightarrow \text{Fe}^{2+} + \text{H}_2\text{O}$; $E_{\text{cell}}^\circ = 1.67 \text{ V}$ The Fe^{2+} ions are further oxidised by atmospheric oxygen to Fe^{3+} ions, which comes out in the form of hydrated ferric oxide (rust). $2\text{Fe}^{2+} + \frac{1}{2}\text{O}_2 + 2\text{H}_2\text{O} \longrightarrow \text{Fe}_2\text{O}_3 + 4\text{H}^+$ $\text{Fe}_2\text{O}_3 + x\text{H}_2\text{O} \longrightarrow \text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} \text{ (Rust)}$	3
24	 (i) Benzoic acid $\xrightarrow{\text{SOCl}_2}$ Benzoyl chloride $\xrightarrow[\text{Pd/BaSO}_4]{\text{Rosenmund's reduction}}$ Benzaldehyde (ii) Acetophenone $\xrightarrow{\text{I}_2/\text{NaOH}}$ Sodium benzoate $\xrightarrow{\text{H}_3\text{O}^+}$ Benzoic acid (iii) $\text{CH}_3\text{COOH} \xrightarrow{\text{Cl}_2/\text{P}} \text{CH}_2\text{ClCOOH} \xrightarrow{\text{KOH(aq)}} \text{CH}_2\text{OHCOOH}$	
25	(i) A - $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Cl}$ B - $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$ (ii) Ionisation isomerism (iii) (A), Pentaamminesulphatocobalt (III) chloride (B), Pentaamminechloridocobalt (III) sulphate.	1 1 1
26	(a) Alcohols have hydrogen bonding whereas hydrocarbons have weak vander waal's force of attraction. (b) due to +M or +R effect in phenoxide ion. (c) Ortho nitrophenol is more acidic due to electron withdrawing effect of nitro group which facilitates release of proton. OR (a) $\text{R-X} + \text{R-ONa} \longrightarrow \text{ROR} + \text{NaX}$ (in presence of dry ether) (b) $\text{C}_6\text{H}_5\text{OH} + \text{CHCl}_3 + \text{KOH} \longrightarrow \text{Salicyldehyde} + \text{KCl} + \text{H}_2\text{O}$ (c) $\text{C}_6\text{H}_5\text{OH} + \text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4 \longrightarrow \text{benzoquinone}$	1 1 1 1 1 1

27	(i) $(\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > \text{NH}_3$	1
	(ii) $\text{C}_6\text{H}_5\text{NH}_2 < \text{NH}_3 < \text{C}_6\text{H}_5\text{CH}_2\text{NH}_2 < \text{C}_2\text{H}_5\text{NH}_2 < (\text{C}_2\text{H}_5)_2\text{NH}$	1
	(iii) $\text{C}_6\text{H}_5\text{NH}_2 < \text{C}_6\text{H}_5\text{N}(\text{CH}_3)_2 < \text{CH}_3\text{NH}_2 < (\text{C}_2\text{H}_5)_2\text{NH}$	1
28	(i) Amylose is a long unbranched chain polymer of α -D(+) glucose. Amylopectin is a branched chain polymer of α -D(+) glucose.	1
	(ii) Globular protein (haemoglobin) and its shape are spherical.	1
	(iii) Peptide linkage	1

29	(i) due to less steric hindrance in methanal.	1
	(ii) Correct structure.	1
	OR	2
30	(i) Chloral iodoform test and correct equation.	
	(i) The amount of dissolved oxygen in water decreases with rise in the water's temperature. Cold water has more dissolved oxygen per unit area than warm water. This the reason why aquatic animals are more comfortable in cold water than warm water.	1
	i) Solubility of gas in liquid decreases. (iii) Any two applications	1
31	OR	2
	ii) According to Henry's law "the mass of a gas dissolved per unit volume of the solvent at constant temperature is directly proportional to the pressure of the gas in equilibrium with the solution". $P = K_H \cdot X$	
32	This is because transition metals have strong metallic bonds as they have large number of unpaired electrons.	
	(b) This is because 5d and 4d-series elements have virtually the same atomic and ionic radii due to lanthanoid contraction.	1x5=5
	(c) due to the fact that the 5f, 6d and 7s levels are of comparable energies.	
32	(d) The high energy to transform $\text{Cu(s)} \rightarrow \text{Cu}^{2+}(\text{aq})$ is balanced by its hydration enthalpy.	10
	(e) The stability of the half-filled d sub-shell in Mn^{2+} and the completely filled Zn configuration in Zn^{2+} are related to their more negative E° V values.	
	due to incomplete d orbitals and presence of unpaired electron.	
32	(g) Because of fully filled d orbitals in zinc.	
	(i) (a) $\text{CH}_3-\text{CH}_2-\underset{\text{Br}}{\text{CH}}-\text{CH}_3$ 2-Bromobutane	2
	(b) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{Br}$ 1-Bromobutane	3
32	(c) $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2-\text{Br}$ and $\text{CH}_3-\underset{\text{Br}}{\text{C}}(\text{CH}_3)_2$ 1-Bromo-2-methyl propane and 2-Bromo-2-methyl propane	
	(ii) (a) 2-chloro cyclopent-1-ene-1-carboxylic acid	
	(b) 1-bromo-2, 2-dimethyl propane	1x3

	OR (i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl} + \text{KOH(alc.)} \xrightarrow[\text{(Dehydrohalogenation)}]{\Delta} \text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 + \text{KCl} + \text{H}_2\text{O}$ <i>n</i>-Butyl chloride But-1-ene (ii)  + Mg $\xrightarrow{\text{Dry ether}}$  Bromobenzene Phenylmagnesium bromide (iii)  + NaOH(aq) $\xrightarrow[300 \text{ atm, H}^+]{\Delta}$  Chlorobenzene Phenol (iv) $\text{CH}_3\text{CH}_2\text{Cl} + \text{KOH(aq)} \xrightarrow[\Delta]{\text{Hydrolysis}} \text{CH}_3\text{CH}_2\text{OH} + \text{KCl} + \text{H}_2\text{O}$ Ethyl chloride Ethyl alcohol (v) $\text{CH}_3\text{Br} + 2\text{Na} + \text{BrCH}_3 \xrightarrow[\text{(Wurtz reaction)}]{\text{Dry ether}} \text{CH}_3\text{CH}_3 + 2\text{NaBr}$ Methyl bromide Ethane	2x1
33	(a) $t = 2.303/k \log [A_0]/[A]$ $= 2.303/60 \log 1/1/16 = 0.046 \text{ s}$ (b) $\log [k_2/k_1] = E_a / 2.303R[T_2-T_1/T_1 \times T_2]$ Substituting the correct value and ans= 52.9kJ/mol OR (a)(i) First order (ii) Infinite, because no first order reaction is 100% completed. (iii) $k = Ae^{-E_a/RT}$, if $E_a=0$ then $k=A$, so the rate constant does not depend on temperature. (b) $\text{Rate(R)} = k[A][B]^2$ (i) $\text{Rate(R1)} = k[A][B]^2$ $(R1) = 9R$, so the rate increases 9 times. (ii) $R2 = k[A][B]^2$ $R2=8R$, rate increases 8 times	1 1 1 2 1x5

