SET - 1

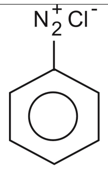
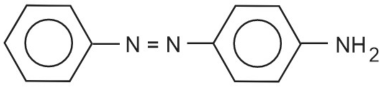
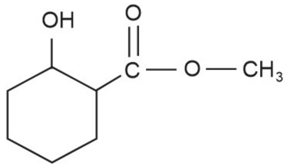
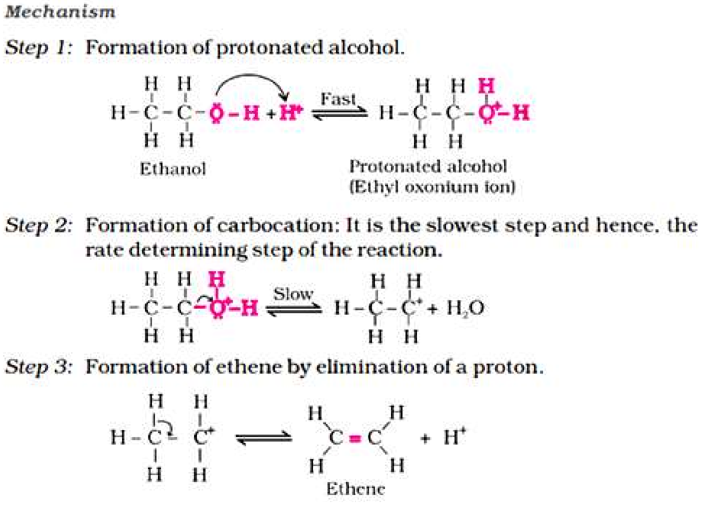
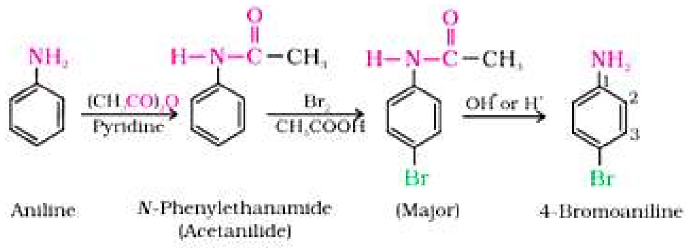
SAHODAYA PRE BOARD EXAMINATION 2025-26

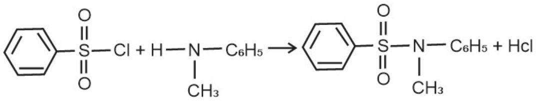
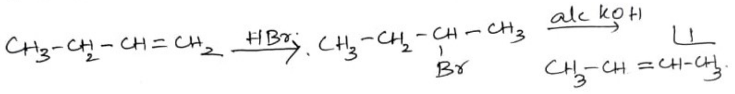
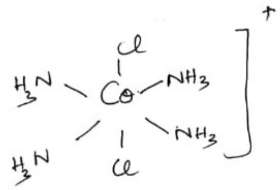
CLASS – XII

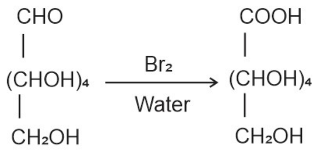
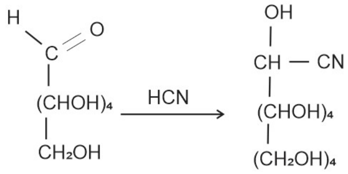
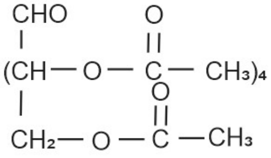
Sub.: CHEMISTRY (043)

MARKING SCHEME

Q.NO	ANSWER	MARKS
1.	(d)	1
2.	(a)	1
3.	(c)	1
4.	(b)	1
5.	(b)	1
6.	(b)	1
7.	(c)	1
8.	(c)	1
9.	(c)	1
10.	(d)	1
11.	(d)	1
12.	(b)	1
13.	(d)	1
14.	(d)	1
15.	(b)	1
16.	(a)	1
17.	According to Raoult's law: $p_1 = p_1^0 x_1$ or $x_1 = \frac{p_1}{p_1^0}$ $x_1 = \frac{750}{760} = 0.987$ $x_2 = 1 - x_1$ $= 1 - 0.987 = 0.013$	
	OR	
	(i) It can be concluded from the given data that the solution shows a negative deviation from Raoult's law, where in A – A and B – B interactions are weaker than A – B interactions. (ii) When salt is spread over snow covered roads, snow starts melting from the surface because of depression in freezing point of water and it helps in clearing the roads.	
18.(a)	Cyanocobalamine,	½

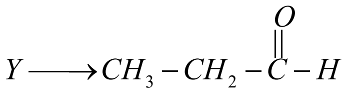
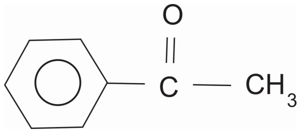
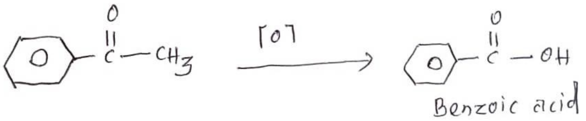
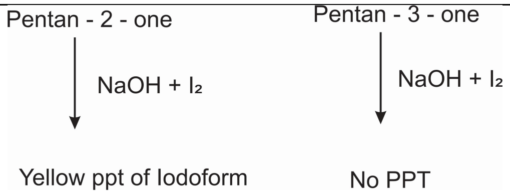
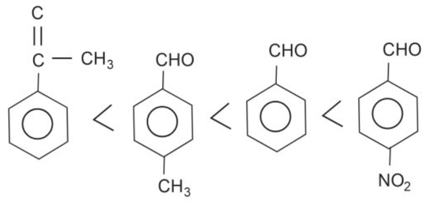
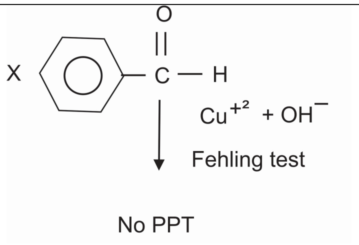
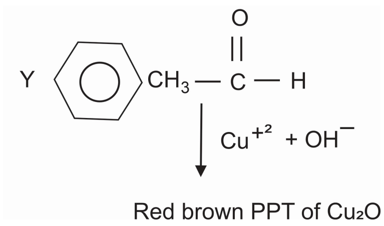
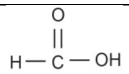
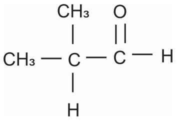
	Pernicious Anaemia	½
18(b)	After boiling the egg, water inside it gets absorbed by the coagulated protein and held in place through H-bonding.	1
19.(a)	Due to salt formation with the Lewis acid, $AlCl_3$, which is used as a catalyst. The anilinium ion of the salt acts as a strong deactivating group for further reaction.	1
19.(b)	A =  B =  Or Or Benzene Diazonium Chloride p-Aminoazobenzene	½ + ½
20.	(a) Williamson's synthesis $R-X+NaOR' \longrightarrow R-O-R' + NaX.$	1
	(b) 	1
21.	(a) Magnetic nature – Diamagnetic, Colour - Purple (b) As Cu^+ is highly unstable in aqueous solution due to low hydration enthalpy, it undergoes disproportionation reaction	½ 1
22.	 ***Mechanism*** *Step 1:* Formation of protonated alcohol. *Step 2:* Formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction. *Step 3:* Formation of ethene by elimination of a proton. 	
23.	(a) 	

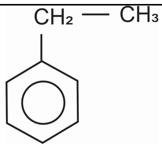
	(b) (Not soluble in Alkali) Tertiary amines do not react with benzene sulphonyl chloride.	
	(c) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$	
24.	(a) Allyl Carbocation is stablised by resonance.	
	(b) $H_3C{-}Br + AgF \longrightarrow H_3C{-}F + AgBr$	
	(c) But-1-ene to But-2-ene $CH_3{-}CH_2{-}CH{=}CH_2 \xrightarrow{HBr} CH_3{-}CH_2{-}\underset{Br}{CH}{-}CH_3 \xrightarrow{alc\ KOH} CH_3{-}CH{=}CH{-}CH_3$	
25.	(a) trans- Tetraammine dichloridocobalt (III) ion (b) $t_{2g}^{5}e_{g}^{0}$	1 1 1
26.	The given quantities are $W_B = 3.9$ g, $W_A = 49$ g, $\Delta T_f = 1.62$ K, $M_B = 122$ g mol^{-1} and $K_f = 4.9$ K kg mol^{-1} Substituting these values in the equation, $M_B = \dfrac{K_f \times W_B \times 1000}{\Delta T_f \times W_A}$, we get $M_B = \dfrac{4.9 \times 3.9 \times 1000}{1.62 \times 49}$ $M_B = 240.74$ g mol^{-1} Thus, observed molecular mass of benzoic acid in benzene = 240.74 g mol^{-1} Normal molecular mass of benzoic acid = 122 g mol^{-1} $i = \dfrac{\text{Normal molecular mass}}{\text{Observed molecular mass}}$ $i = \dfrac{122 \text{ g mol}^{-1}}{240.74 \text{ g mol}^{-1}}$ = **0.507** As $i < 1$, therefore, benzoic acid will undergo association in benzene.	
27.	pH = -log [H+] => [H+] = antilog(-pH) = antilog (-10) = 10^{-10}M	

	in hydrogen electrode $H^+ + e \rightarrow ½ H_2$. And E_{cell} = Ec-Ea =0.0591 log[H^+]-$E^0_{H+/H2}$ = 0.0591 log (10-10)- 0 = 0.059(-10) = -0.59V $E_{cell} = E^0$ -0.0591 log [Ni^{2+}]/[Ag^+]^2 = 1.05-0.059/2log0.160/(0.002)^2 = 1.05-0.1358 = 0.914V	
28.	(i)  $CHO-(CHOH)_4-CH_2OH \xrightarrow[Water]{Br_2} COOH-(CHOH)_4-CH_2OH$ Gluconic acid	
	(ii)  $HC(=O)-(CHOH)_4-CH_2OH \xrightarrow{HCN} CH(OH)-CN-(CHOH)_4-(CH_2OH)_4$ Cyanohydrin	
	(iii)  $CHO-(CH-O-\overset{O}{\overset{\Vert}{C}}-CH_3)_4-CH_2-O-\overset{O}{\overset{\Vert}{C}}-CH_3$ Glucose Pentaacetale	
	OR	
	(i) Amylose is water soluble component which constitutes about 15-20% of starch. Chemically amylose is a long unbranched chain with 200-1000 a-D-(+)-glucose units held together by C1– C4 glycosidic linkage. Amylopectin is insoluble in water and constitutes about 80-85% of starch. It is a branched chain polymer of a-D-glucose units in which chain is formed by C1–C4 glycosidic linkage whereas branching occurs by C1–C6 glycosidic linkage (ii) A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside. When nucleoside is linked to phosphoric acid at 5' - position of sugar moiety, we get a nucleotide	

	(iii) When the polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre– like structure is formed. Such proteins are generally insoluble in water. Some common examples are keratin (present in hair, wool, silk) and myosin (present in muscles), etc. *Globular proteins* This structure results when the chains of polypeptides coil around to give a spherical shape. These are usually soluble in water. Insulin and albumins are the common examples of globular proteins	
29.	(a) Reaction taking place at cathode when the battery is in use: $PbO_2(s) + SO_4^{2-}(aq) + 4H^+(aq) + 2e^- \rightarrow PbSO_4(s) + 2H_2O(l)$	1
	(b) (iii) The battery is discarging	1
	OR	
	Molarity $= \frac{\% \times \text{density} \times 10}{\text{Molar mass of } H_2SO_4} = \frac{38 \times 1.294 \times 10}{98} = 5.017 \text{ mol L}^{-1}$ (c) **Molarity = 5.02 mol L⁻¹** From above reaction 1 mole of PbO_2 require 2F of electricity for reduction to $PbSO_4$.	1
	$2H_2O(l) \xrightarrow[\text{Electrolysis}]{H_2SO_4(\text{dil.})} \underset{(\text{at cathode})}{2H_2(g)} + \underset{(\text{at anode})}{O_2(g)}$ (d)	1
30.	I. Chelating effect **OR** $[Co(NH_3)_3Cl_3] < [Co(NH_3)_4Cl_2]Cl < [Co(NH_3)_5Cl]Cl_2 < [Co(NH_3)_6]Cl_3$ II. Ionisation isomerism A- Pentaamminesulphate cobalt (III) chloride B- Pentaamminechloridocobalt (III) sulphate. III. Aqueous pink solution of cobalt (II) chloride is due to electronic transition of electron from t_2g to eg energy level of $[Co(H_2O)_6]^{2+}$ complex. When excess of HCl is added to this solution (i) $[Co(H_2O)_6]^{2+}$ is transformed into $[CoCl_4]^{2-}$. (ii) Tetrahedral complexes have smaler crystal field splitting than octahedral complexes because $\Delta_t = 4/9\Delta_0$ (any one point)	1 1 ½ 1
31.	(a) A= MnO_2 B= K_2MnO_4 C= $KMnO_4$ $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$	½ x 3 1

	$MnO_4^{2-} \xrightarrow{Electrolytic\ oxidation\ in\ alkaline\ medium} MnO_4^-$	½
	(b) (i) $2MnO_4^- + 3Mn^{2+} + 2H_2O \longrightarrow 5MnO_2 + 4H^+$ or. $2MnO_4^- + 3Mn^{2+} + 4OH^- \rightarrow 5MnO_2$ (ii) $Cr_2O_7^{2-} + 3NO_2^- + 8H^+ \longrightarrow 2Cr^{3+} + 4H_2O + 3NO_3^-$	1 1
	OR	
	ⓐ $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \rightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$. $2Na_2CrO_4 + 2H^+ \longrightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$. $Na_2Cr_2O_7 + 2KCl \rightarrow K_2Cr_2O_7 + 2NaCl$. ⓑ Mischmetal is an alloy of Lanthanoid metal (95%) and Fe (5%) with traces of S, C, Ca & Al. Use:- It is used for making bullets and lighter flints. ⓒ Much larger 3rd Ionisation Energy of Mn (for $d^5 \rightarrow d^4$). is mainly responsible for this.	1 1 1 1 1
32.(a)	$X \xrightarrow{orange\ red\ ppt}$ Aldehyde or Ketone $X \xrightarrow{positive\ Tollen's\ test}$ It means it is aldehyde $X \xrightarrow[NaOH\ and\ I_2]{yellow\ ppt\ with}$ It is α – methyl aldehyde $Y \xrightarrow{orange\ red\ ppt}$ Aldehyde or ketone $Y \xrightarrow{positive\ Tollen's\ Test}$ It means it is aldehyde $Z \xrightarrow{orange-red\ ppt}$ Aldehyde or ketone $Z \xrightarrow{not\ show\ Tollen's\ test}$ Ketone is present $Z \xrightarrow{yellow\ ppt\ with\ NaOH\ \&\ I_2}$ It means α – methyl ketone $Z \xrightarrow{on\ oxidation\ gives\ C_7H_6O_2}$ It means contain benzene ring $X \longrightarrow CH_3 - \overset{\overset{\Large O}{\|}}{C} - H$ Or Benzaldehyde	½ ½

	 $Y \longrightarrow CH_3-CH_2-\overset{\overset{O}{\parallel}}{C}-H$ Or any possible structure $Z \longrightarrow$  (ii) 	½ ½ 1
32.(b)		1
32.(c)		1
	OR	
32.(a)	 	½ x 2 1
32.(b)	(i)  $H-\overset{\overset{O}{\parallel}}{C}-OH$ As it contain free aldehyde group and it is more reactive so it will show Tollen's test. (ii)  Due to +I effects of two alkyl group C – H polarisation decreases, so H is not acidic, so they will not show cannizzaro reaction.	

32.(c)		
33.(a)	Ester + H_2O $\xrightleftharpoons{H^+}$ carboxylic acid + Alcohol (i) First order reaction (ii) 2 times as r = K [Ester]	(1) (1)
33.(b)	(i) It is 1st Order (ii) $\log\left(\frac{Ro}{R}\right) = \frac{Kt}{2.303}$ $\quad Slope = \frac{K}{2.303}$ $\frac{K}{2.303} = 2\times10^{-4}$ $\quad K = 4.606\times10^{-4}\ \text{min}^{-1}$ (iii) $t_{1/2} = \frac{0.693}{K} = \frac{0.693}{4.606\times10^{-4}} = 0.1504\times10^{4} = 1.504\times10^{3}\ \text{min}$	(1)
	OR	
33.(a)	$\log\left(\frac{K_2}{K_1}\right) = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$ $\log 2 = \frac{Ea}{2.303\times8.314}\left[\frac{10}{300\times310}\right]$ $0.3010 = \frac{Ea}{19.15}\left[\frac{10}{300\times310}\right]$ $Ea = 54.586\ KJ/Mol$	(½) (1) (1) (½)
33.(b)	$t_{1/2} = \frac{0.693}{K}$ $K = \frac{0.693}{50}$ $t = \frac{2.303}{K}\log\left(\frac{Ro}{R}\right) = \frac{2.303}{\frac{0.693}{50}}$ $\quad \log\left(\frac{100}{10}\right)$ $t = \frac{2.303\times50}{0.693} = 166.16\ \text{min}$	(½) (1) (½)