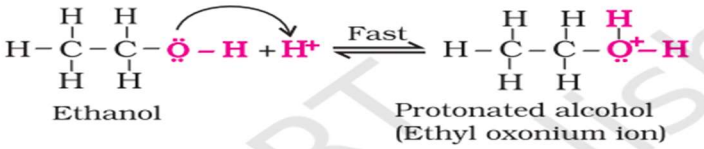
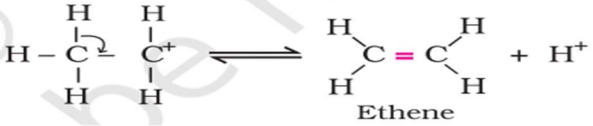
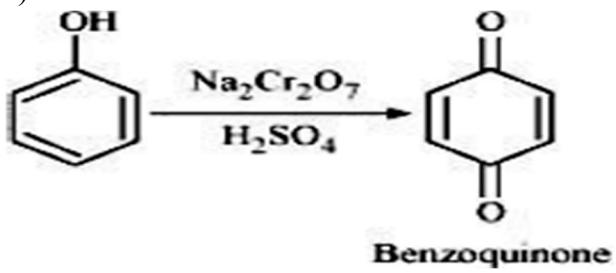
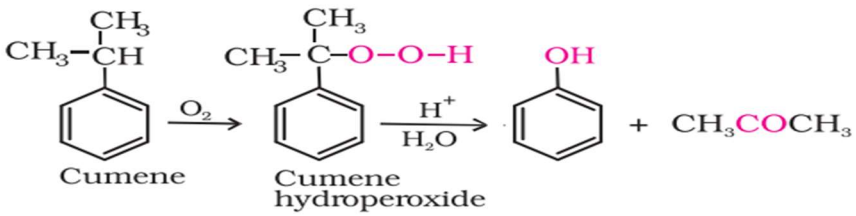
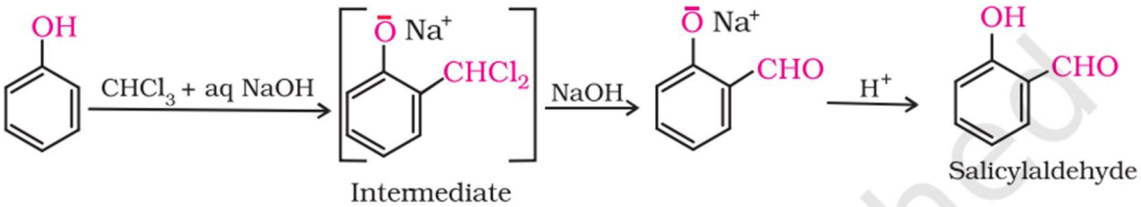
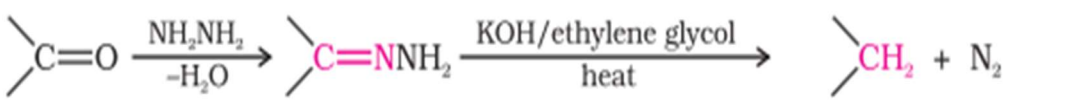
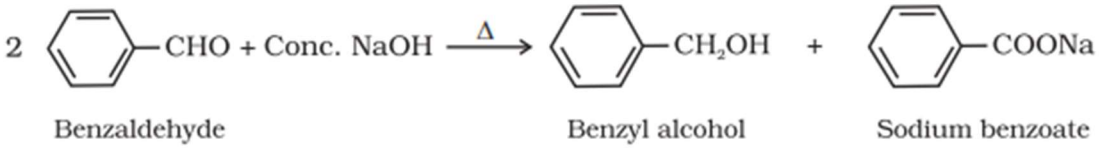
SAHODAYA PREBOARD EXAMINATION – 2024-25
MARKING SCHEME
SET-1

	SECTION-A	
1.	D	1
2.	A	1
3.	B	1
4.	B	1
5.	D	1
6.	D	1
7.	A	1
8.	C	1
9.	A	1
10.	A	1
11.	A	1
12.	A	1
13.	A-Both A and R are true and R is the correct explanation of A.	1
14.	C- A is true but R is false.	1
15.	B- Both A and R are true and R is not the correct explanation of A	1
16.	C- A is true but R is false	1
	SECTION-B	
17.	(a) Negative deviation shown by mixture of phenol and aniline due to the intermolecular hydrogen bonding between them. b) It forms maximum boiling azeotropes.	1 1
18.	a) First Order reaction. b) Slope = -k.	1 1
19.	*Step 1:* Formation of protonated alcohol.  Ethanol — Protonated alcohol (Ethyl oxonium ion) *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.  Ethene	1 ½ ½

20.	a)$CH_3CH=CHCH_2CHO$ b)C_6H_5COOH OR a)Acetophenone < p-Tolualdehyde < Benzaldehyde < p-Nitrobenzaldehyde b)$(CH_3)_2CHCOOH < CH_3CH_2CH_2COOH < CH_3CH(Br)CH_2COOH < CH_3CH_2CH(Br)COOH$	1 1 1 1
21.	a) Starch 1. It is a branched chain polysaccharide. 2. It's a polymer of $\propto -D-$Glucose Cellulose 1. It is a straight chain polysaccharide. 2. It's a polymer of $\beta - D-$Glucose b) Glycine	1 1
	SECTION-C	
22.	$Fe_{(s)} + 2H^+_{(aq)} \rightarrow Fe^{2+}{}_{(aq)} + H_{2(g)}$ $E^\circ_{cell} = 0.00 - (-0.44) = 0.44\ V$ $E_{cell} = E^\circ_{cell} - \frac{0.0591}{2}\log\frac{[Fe^{2+}]}{[H^+]^2}$ $= 0.44 - \frac{0.0591}{2}\log\frac{0.001}{(0.01)^2}$ = 0.44 - 0.02955 = 0.41045 V	½ 1 ½ 1
23.	a) Case I If a = 100; (a-x) = (100 - 99) = 1 For 99% completion of the reaction $t_{99\%} = \frac{2.303}{k}\log\frac{100}{1} = \frac{2.303}{1}\log 10^2 = \frac{2.303\times 2}{k}$ $t_{99\%} = \frac{4.602}{k}$ ..... (i) Case II: If a = 100; (a-x) = (100-90) = 10 For 90% completion of the reaction $t_{90\%} = \frac{2.303}{k}\log\frac{100}{10} = \frac{2.303}{k}\log 10 = \frac{2.303}{k}$ ..... (ii) On dividing Eq. (i) by Eq. (ii), we get $\frac{t_{99\%}}{t_{90\%}} = \frac{4.603}{k}\times\frac{k}{2.303} = 2$ It means that time required for 99% completion of the reaction is twice the time required to complete 90% of the reaction. b) For the reaction, X → Y as it follows second order kinetics, therefore the rate law equation will be Rate = $k[X]^2 = ka^2$	2

	if [X] = a mol^{-1} if the concentration of X is increased three times, then [X] = 3a mol L^{-1} ∴ Rate = k $(3a)^2$ = 9 ka^2 Thus, the rate of the reaction will become 9 times.	1
24.	a) $[Ni(H_2O)_6]Cl_2$ and secondary valency is 6 b) Ionisation isomer is $[Co(NH_3)_5Cl]\ SO_4$ Name: Pentaammine chlorido cobalt(III) sulphate c) Ligand which has two different donor atoms and either of the two ligates in the complex is called ambidentate ligand Example: Any correct example(NO_2^-, SCN^-)	1 1 1
25.	(a) 1-methylcyclohex-1-ene (b) Grignard reagents should be prepared under anhydrous conditions because they are highly reactive and can react with moisture to produce corresponding hydrocarbon. (c) $C_6H_5Cl + 2Na + CH_3Cl \xrightarrow{Dry\ ether} C_6H_5CH_3 + 2NaCl$ When chlorobenzene is treated with methyl chloride in the presence of sodium metal and dry ether toluene ($C_6H_5CH_3$) is produce.	1 1 1
26.	a)  Benzoquinone b)  Cumene Cumene hydroperoxide c)  Intermediate Salicylaldehyde	1 1 1
27.	a)  (Wolff-Kishner rduction)	1

b)



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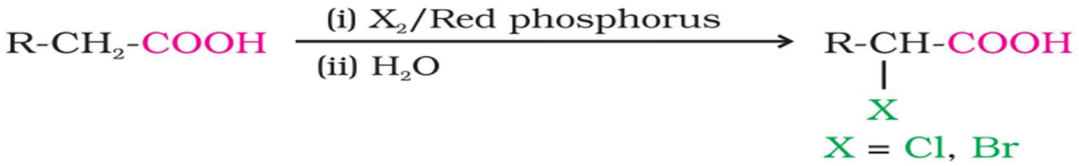
c)



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28. a) i)

Fibrous Proteins	Globular Proteins
These consist of linear molecules which lie side by side to form fibres. *For example*, keratin	These consist of polypeptide chains which are folded into compact units forming spheroidal shapes. *For example*, albumin
These are insoluble in water.	These are soluble in water.

1

ii)

Nucleoside	Nucleotide
Nucleoside is a compound formed by the union of a nitrogen base with a pentose sugar.	Nucleotide is a compound formed by the union of a nitrogen base, a pentose sugar and phosphate.

1

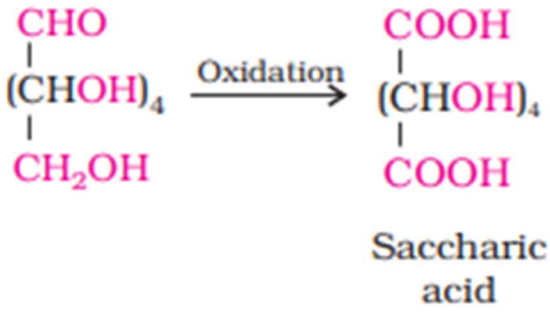
1

b) Xerophthalmia or any other correct answer..

OR

a)

(i)Conc.HNO_3



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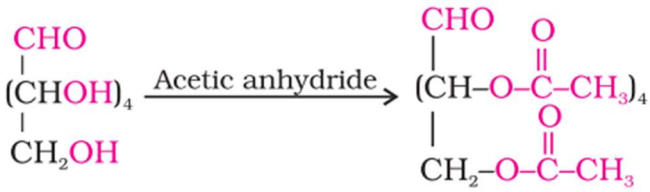
	(ii)Acetic anhydride.  	1
	(b) When a protein in its native form, is subjected to physical change like change in temperature or chemical change like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity. This is called denaturation of protein.	1
	SECTION-D	
29.	a) i) $\Delta_o > P : t_{2g}^6 e_g^0$ and $\Delta_o < P : t_{2g}^4 e_g^2$ ii) $Co(C_2O_4)_3]^{3-}$ is more stable due to chelate effect. b) $\Delta_t = \frac{4}{9}\Delta_o$ OR **In $[Ni(H_2O)_6]^{2+}$** the H_2O molecules are weak field ligands, so they don't cause electron pairing. This results in a d-d transition of electron, where the complex absorbs radiation corresponding to red light and emits complementary green color but in **$[Ni(CN)_4]^{2-}$** the CN^- ions are strong field ligands, so the two unpaired electrons in the 3d-orbitals pair up. This means that there is no unpaired electron, so there is no d-d transition of electron. c) $[Co(CN)_6]^{3-} < [Co(NH_3)_6]^{3+} < [CoF_6]^{3-}$.	1 1 1 1 1
30.	(a) Given, Current = 2.0 Ampere $3Fe^{3+} + 3e^- \longrightarrow 3Fe^{2+}$ Charge required = $Faraday = 3 \times 96500$ coulomb $= 289500$ coulomb We know, $Charge = Current \times Time$ or Time = $\frac{289500}{2}$ $= 144750$ sec (b) At cathode: $Cu^{2+} + 2e \rightarrow Cu$ At Anode: $2Cl^- \rightarrow Cl_2 + 2e^-$ **OR** CH_3COOH **is a** weak electrolyte and when diluted, the degree of dissociation increases which leads to a drastic increase in the molar conductivity but CH_3COONa is a strong electrolyte which when diluted, only the interionic forces of attraction increase, resulting in a small increase in the molar conductivity. (c) The overall reaction is represented by $Zn(Hg) + HgO(s) \longrightarrow ZnO(s) + Hg(l)$	2 1 1 1

SECTION – E

31. a)

(i) $Cr_2O_7^{2-} + 3H_2S + 8H^+ \longrightarrow 2Cr^{3+} + 3S + 7H_2O$ — 2

ii) $2MnO_4^- + H_2O + I^- \longrightarrow 2MnO_2 + 2OH^- + IO_3^-$

b) (i) This is because the oxidation state of Mn is +7, and as the oxidation state increases, the ions accept electrons more easily. — 1

(ii) Transition metals form complex compounds because of their empty valence shell orbitals, small size, and high nuclear charge. (Any two points.) — 1

(iii) Zr and Hf have identical atomic sizes due to lanthanoid contraction. — 1

OR

a)

$$2MnO_2 + 4KOH + O_2 \xrightarrow{\text{heat}} \underset{\text{Potassium magnate}}{2K_2MnO_4} + 2H_2O$$

$$\underset{\text{Potassium magnate}}{2K_2MnO_4} + 4HCl \longrightarrow \underset{\text{Potassium Permagnate}}{2KMnO_4} + MnO_2 + H_2O + 4KCl$$

— 2

(b) Out of $CuCl_2$ and Cu_2Cl_2, $CuCl_2$ is more stable due to its high negative hydration enthalpy of Cu^{2+}. — 1

(c) Mischmetal is an alloy of lanthanum metal and iron and traces of S, Ca, C or Al. It is used in making bullets and lighter flint. — 1

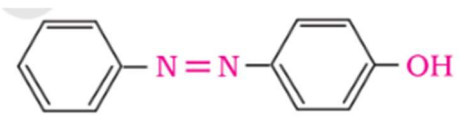
(d) In aqueous solution, Cr^{2+} is a stronger reducing agent than Fe^{2+} because Cr^{2+} oxidizes more easily to Cr^{3+}, which has a stable half-filled electron configuration. — 1

32. (a) Acetylation of aniline reduces its activation effect because the lone pair of electrons on the nitrogen atom of acetanilide is less available for donation to the benzene ring by resonance. — 1

(b) $C_6H_5NH_2 > C_6H_5NHCH_3 > C_2H_5NH_2 > (C_2H_5)_2NH$ — 1

(c) i) A: CH_3CONH_2 B: CH_3NH_2 C: CH_3OH (6×0.5) — 3

ii) A: C_6H_5NH2 B: $C_6H_5N_2Cl$ C:



p-Hydroxyazobenzene (orange dye)

OR

	(a) X: $C_6H_5NO_2$ Y: $C_6H_5NH_2$ Z: C_6H_5NC	1
	$C_6H_5NO_2 \xrightarrow{sn/HCl} C_6H_5NH_2$ $C_6H_5NH_2 + CHCl_3 + 3KOH \xrightarrow{\Delta} C_6H_5NC + 3KCl + 3H_20$	2
	(b) (i) Ethylamine and aniline Br_2/H_2O produce white ppt of 2,4,6- tribromo aniline when reacts with aniline whereas ethyl amine does not . (ANY OTHER SUITABLE CHEMICAL TEST)	1
	(ii)Methylamine and dimethylamine. When methyl amine reacts with $CHCl_3$ in presence of alc. KOH produce a pungent smell whereas dimethylamine does not. (ANY OTHER SUITAB LE CHEMICAL TEST)	1
33.	a)Fluorine, being most electronegative, has the highest electron withdrawing inductive effect. Hence, trifluoroacetic acid ionizes to the largest extent . Greater the ions produced, greater is the depression in freezing point. Hence, the depression in freezing point is maximum for the fluoroacetic acid.	1
	b)The vapor pressure of an aqueous solution of glucose is lower than that of water because glucose is a non-volatile solute that occupies some of the surface of the liquid, reducing the number of solvent molecules that can evaporate.	1
	c) $\Delta T_f = \frac{i \times K_f \times W_B \times 1000}{M_B \times W_A}$ Here, $i = 1.87$, $W_A = 65.0$ g, $\Delta T_f = 7.50$ K $K_f = 1.86$ K kg mol^{-1}, $M_B = 58.5$ g mol^{-1} Substituting these values in the above equation, we get $7.5\ K = \frac{1.87 \times 1.86\ K\ kg\ mol^{-1} \times W_B \times 1000\ g\ kg^{-1}}{58.5\ g\ mol^{-1} \times 65.0\ g}$ $W_B = \frac{7.5 \times 58.5 \times 65.0}{1.87 \times 1.86 \times 1000}\ g = 8.199\ g$ $W_B = 8.2\ g$	3
	OR	
	a) K_H is inversely proportional to the solubility of a gas in water. This means that a gas with higher solubility will have a lower K_H value. Since CO_2 is more soluble in water than O_2, it will have a lower K_H value, and O_2 will have a higher K_H value.	1

	b)Blood cells shrink due to osmosis c) Given Molality(m) = 1m $\propto = 0.6$ $K_b = 0.52 Kkgmol^{-1}$ $A_2B_3 \rightarrow 2A^{3+} + 3B^{2-}$ n = 2+3=5 $i = 1 - \alpha + n\alpha = 1 - 0.6 + (5 \times 0.6) = 3.4$ $\Delta T_b = iK_b m$ $= 3.4 \times 0.52 \times 1$ $= 1.768$ $\Delta T_b = T_b - T_b^0$ $T_b = T_b^0 + \Delta T_b$ $T_b = 373 + 1.768 = 374.768$	1 1 1 1