SAMPLE PAPER SOLUTION(2021-22)

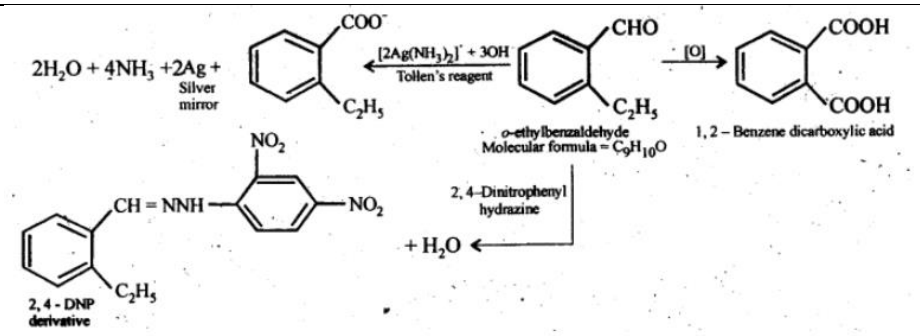
CLASS XII TERM – II

CHEMISTRY THEORY (043)

Important Instructions

1. This is only a suggestive answer key/marking scheme.
2. Any other correct response/(s) are also accepted.

Q.No.	Suggestive Answers	Step Marking
1. a.	This is due to stearic hindrance/Nu^- has difficulty in approaching carbon	1
b.	The NH_2 in conjugation with carbonyl involves in RESONANCE, loses its nucleophilicity	1
2. a.	Increases linearly	½
b.	Increases steeply, the degree of dissociation is higher in weak electrolyte	½ + 1
3. a	The negative charge is dispersed more on, more electronegative atom i.e. Oxygen in carboxylate ion.	1
3. b.	Iodoform test/Fehling's test/Tollens' test	1
4. a	Because of lower electronegativity of Nitrogen than oxygen/The removal of H as H^+ is weaker.	1
b.	Primary amines forms more number of Intermolecular H bond/Stronger intermolecular forces of attraction	1
c.	In Aromatic amines lone pairs of nitrogen does resonance with benzene, electron density decreases.	1
OR 4.a.	Due to resonance, aryl part does not detach with halide and can't be introduced on nitrogen salt of Phthalimide.	1
b.	In aromatic salt, Due to resonance, diazonium group does not leave easily and gets extra stability	1
c.	Nitrogen has limited covalency/due to absence of d orbitals	1
5.a.	$[Co(NH_3)_4(H_2O)Cl]Cl_2$	1
b.	$[NiCl_4]^{2-}$ contains unpaired electrons	1
c.	$[Co(NH_3)_6]^{3+}$, Co is d^2sp^3 and $[Ni(NH_3)_6]^{2+}$, Ni is sp^3d^2 hybridised.	1
OR a.	If Δo>P, Pairing occurs and if Δo<P, pairing does not occur in d subshell.	1
b.	i) $t_2^4 e_g^2$ ii) $t_2^6 e_g^0$	1+1
6.a.	According to CFT Cr^{3+} is more stable in d3 (half filled) system than in d^5, there Cr loses one electron to be oxidized and behave as reducing agent.	1
b.	This is due to higher ionization enthalpy of Cu as it is a contributory factor to Ev.	1
c.	Mn in +2 state is d5 and this state is highly stable. Conversion from d^5 to d^4 is highly unstable.	1

7.		1+1+1 (one mark for each correct reaction)
8.a.	On increasing temperature molecules on the surface of adsorbent aquires energy ans desorb.	1
b.	This is due to higher surface area.	1
c.	Because energy releases when bond of adsorbate is formed with adsorbent.	1
9	(*i*) $CH_3COOH \xrightarrow[-SO_2,-HCl]{SOCl_2} CH_3COCl \xrightarrow[NH_4Cl]{NH_3(excess)} CH_3CONH_2 \xrightarrow{Br_2/NaOH} CH_3NH_2$ (*ii*) $CH_3(CH_2)_4CN \xrightarrow{H_3O^+} CH_3(CH_2)_4COOH \xrightarrow[-SO_2,-HCl]{SOCl_2} CH_3(CH_2)_4COCl \xrightarrow[-NH_4Cl]{NH_3(excess)} CH_3(CH_2)_4CONH_2 \xrightarrow{Br_2/NaOH} CH_3(CH_2)_4NH_2$ (*iii*) $CH_3OH \xrightarrow[-POCl_3]{PCl_5} CH_3Cl \xrightarrow{KCN(alc)} CH_3CN \xrightarrow{H_3O^+} CH_3COOH$	1+1+1 (one mark for each correct reaction) Or any other correct conversion
OR 9.a.	NH_3 (alc) + C_2H_5Cl ⟶ $C_2H_5NH_2$ + HCl	1
b.	$C_6H_5NC + H_2O + KCl$	1
c.	p-$NH_3^+C_6H_4SO_3^-$	1
10.	$E_{cell} = E^o_{cell} - \frac{0.0591}{n}\log\frac{[Ni^{2+}]}{[Ag^+]^2}$ $= 1.05V - \frac{0.0591}{2}\log\frac{0.160}{(0.002)^2}$ $= 1.05 - \frac{0.0591}{2}\log(4\times10^4)$ $= 1.05 - \frac{0.0591}{2}(4.6021)$ $= 1.05 - 0.14\,V$ $= 0.91\,V$	½ ½ 1 ½ + ½
11.a.	This is due to high electronegativity and small size	1
b.	Ce^{4+}. Tr^{4+}, Pr^{4+} (Any Two)	1
c.	Shielding of 5f is more poorer than 4f.	1
OR a.	This is due to electron – electron repulsion at the later stage of the series.	1
b.	Lanthanoid Contraction.	1
c.	It is due to lowest intermolecular forces of attraction in zinc as it is d^{10}/no unpaired electrons.	1
12.a.	(i) 0.2M (ii) 0.1M	1+1

b.	Rate = $[A]^{\alpha}\ [B]^{\beta}$ $r_1 = 5{\cdot}07 \times 10^{-5} = (0{\cdot}20)^{\alpha}(0{\cdot}30)^{\beta}$ ----(*i*) $r_2 = 5{\cdot}07 \times 10^{-5} = (0{\cdot}20)^{\alpha}(0{\cdot}10)^{\beta}$ ----(*ii*) $r_3 = 1.43 \times 10^{-4} = (0{\cdot}40)^{\alpha}(0.05)^{\beta}$ ....(*iii*) $\frac{r_1}{r_2} = \frac{5{\cdot}07 \times 10^{-5}}{5{\cdot}07 \times 10^{-5}} = \frac{(0{\cdot}2)^{\alpha}}{(0{\cdot}2)^{\alpha}}\ \frac{(0{\cdot}30)^{\beta}}{(0{\cdot}10)^{\beta}} = 1 = (3)^{\beta}$ $\therefore \beta = 0$ $\frac{r_3}{r_2} = \frac{1.43\times10^{-4}}{5{\cdot}06 \times 10^{-5}} = \frac{(0{\cdot}40)^{\alpha}}{(0{\cdot}20)^{\alpha}}\ \frac{(0{\cdot}05)^{\beta}}{(0{\cdot}10)^{\beta}}$ $= 2.826 = 2^{\alpha}\left(\frac{1}{2}\right)^{\beta}$ $2.826 = 2^{\alpha}$ (as $\beta = 0$) Taking log on both the sides, we get $\log 2.826 = \alpha \log 2$ $\Rightarrow \quad 0.4511 = \alpha \times 0{\cdot}3010$ $\alpha = \frac{0{\cdot}4511}{0{\cdot}3010} = 1.498 = 1{\cdot}5$ $\therefore$ Order with respect to A = 1·5 and order with respect to B = 0	½ ½ ½ ½ ½ ½