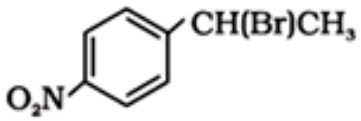
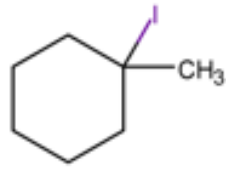
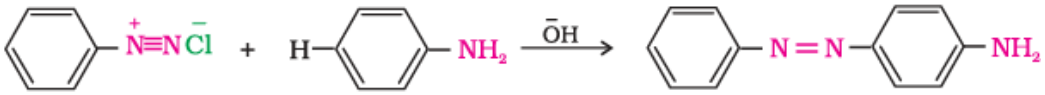
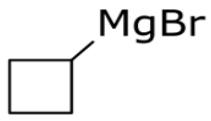
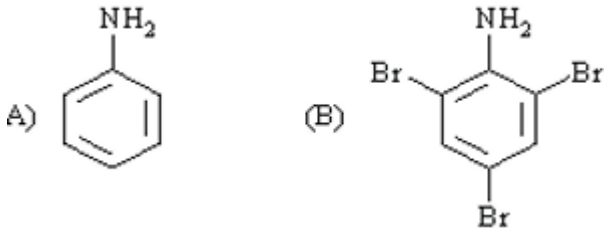
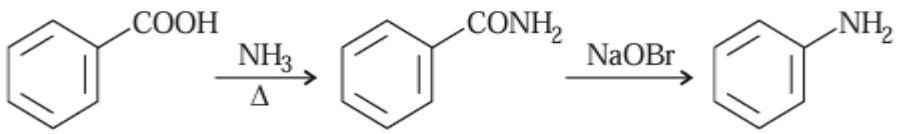
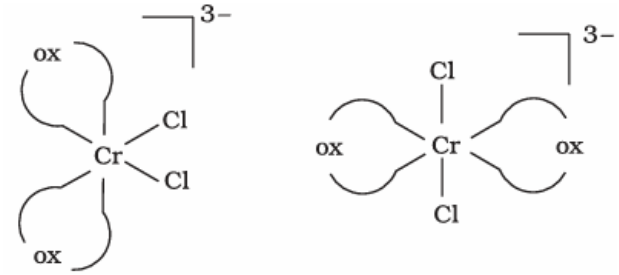
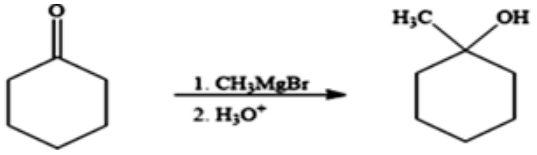
Indian School Al Wadi Al Kabir
Second Rehearsal Examination (2024-2025)

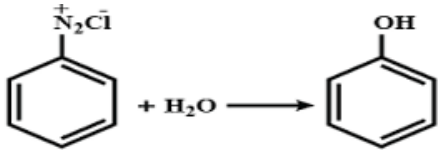
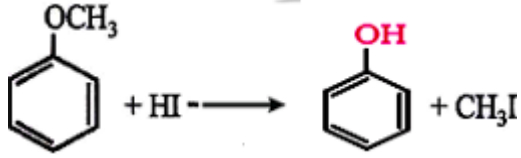
Class: XII | Subject: Chemistry (043) | Max. marks: 70
Date: 02/02/2025 | SET I | Time: 3 Hours

1.	(B) 2 and 3	**1**
2.	(C) Dry cell	**1**
3.	(B) On oxidation with nitric acid, glucose yields saccharic acid.	**1**
4.	(C) $CH_3CH_2CH_2NH_2$	**1**
5.	(A) 20 minutes	**1**
6.	(A) S_N1 reactions	**1**
7.	(D) 2,4,6-Trinitrophenol	**1**
8.	(D) Cross-Aldol condensation	**1**
9.	(A) $t_{2g}^{\ 4}\ e_g^{\ 0}$	**1**
10.	(B) Scandium	**1**
11.	(C) +3	**1**
12.	(D) S_N2 reaction	**1**
13.	(C) A is true but R is false.	**1**
14.	(D) A is false but R is true.	**1**
15.	(A) Both A and R are true and R is the correct explanation of A	**1**
16.	(D) A is false but R is true.	**1**
17.	a) Ethanol-water forms an azeotropic mixture. b) Two solutions having same osmotic pressure at a given temperature are called isotonic solutions. Eg: - Fluid inside the blood cell and 0.9% (mass/ volume) sodium chloride solution. **OR** a) At a constant temperature, the solubility of a gas in a liquid is directly proportional to the pressure of the gas. Any one application. b) No effect	**1** ½ ½ ½ ½ ½ ½

	Both solids and liquids are highly incompressible.	
18.	$\Lambda_m\,(\mathrm{S\,cm^2\,mol^{-1}}) = \dfrac{\kappa\,(\mathrm{S\,cm^{-1}}) \times 1000\,(\mathrm{cm^3/L})}{\mathrm{molarity\,(mol/L)}}$ $= \dfrac{8 \times 10^{-5}}{2 \times 10^{-3}} \times 1000\ \mathrm{S\,cm^2\,mol^{-1}}$ $= 40\ \mathrm{S\,cm^2\,mol^{-1}}$ $\alpha = \dfrac{\Lambda_m}{\Lambda_m^\circ}$ = 40/420 = 0.095	½ ½ **1**
19.	Consider a zero-order reaction, R → P $\mathrm{Rate} = -\dfrac{d[R]}{dt} = k[R]^0$ As any quantity raised to power zero is unity $\mathrm{Rate} = -\dfrac{d[R]}{dt} = k \times 1$ $d[R] = -k\,dt$ Integrating both sides $[R] = -kt + I$ where, I is the constant of integration. At t = 0, $[R] = [R]_0$, where $[R]_0$ is initial concentration of the reactant. $[R]_0 = -k \times 0 + I$ $[R]_0 = I$ Substituting the value of I $[R] = -kt + [R]_0$ On re-arranging, $k = \dfrac{[R]_0 - [R]}{t}$	**2**
20.	a) When heated with Fehling's reagent, Methanal gives a reddish-brown precipitate whereas Benzaldehyde doesn't. b) When heated with iodine and NaOH, Pentan-2-one gives yellow precipitate of iodoform whereas Pentan-3-one doesn't.	**1** **1**
21.	a) 	**1**

	b) 	**1**
22.	$\Delta T_b = i \frac{K_b \times 1000 \times w_2}{M_2 \times w_1}$ $\Delta T_b = i \frac{K_b \times 1000 \times w_2}{M_2 \times w_1}$ $i = 2$ $T_b - T_b^0 = \frac{2 \times 0.52 \times 4 \times 1000}{120 \times 100}$ $T_b - 373\ K = 0.346\ K$ $T_b = 373.346\ K$ **or** **= 373.496 K**	½ ½ **1** **1**
23.	a) i) $C_6H_5NH_2 < (CH_3)_2NH < CH_3NH_2$ ii) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$ b) i) Due to resonance stabilisation of diazonium salts of aromatic amines. ii) 	½ ½ **1** **1**
24.	a) i) Due to –I and +R effect in chlorobenzene, net dipole moment is lower than that of cyclohexyl chloride in which net dipole moment is due to –I effect only / sp^2 hybridised carbon in chlorobenzene is more electronegative and C-Cl bond length is shorter as compared to sp^3 hybridized carbon in cyclohexyl chloride. ii) Due to branching, t-butyl bromide has less surface area and weaker van der Waal forces than n-butyl bromide. b) 1-Bromo-2,2-dimethylpropane < 1-Bromo-2-methylbutane < 1-Bromo-3-methylbutane **OR** a) i) $CH_3CH_2CH_2Br$ (A) $CH_3CH_2CH_2I$ (B)	**1** **1** **1** ½ + ½

	ii)   A B	½ + ½
	b) 	**1**
25.	a) i) Potassium hexacyanidochromate(III) ii) Hybridization is d^2sp^3 and shape is octahedral. b) $(NH_4)_2[Co(H_2O)_2F_4]$	**1** ½ + ½ **1**
26.	a) i)  ii) (A) $CH_3CH_2NH_2$ (B) $CH_3CH_2NHCOCH_3$ b) 	½ + ½ ½ + ½ **1**
27.	a) On addition of $BaCl_2$ solution, $[Co(NH_3)_5Cl]SO_4$ forms a white precipitate of $BaSO_4$ while $[Co(NH_3)_5(SO_4)]Cl$ does not. b) In $[Ni(CO)_4]$, Ni is in zero oxidation state whereas in $[NiCl_4]^{2-}$,it is in +2 oxidation state. In the presence of CO ligand, the unpaired d electrons of nickel pair up but Cl^- being a weak ligand is unable to pair up the unpaired electrons. c)  cis-$[CrCl_2(ox)_2]^{3-}$ trans-$[CrCl_2(ox)_2]^{3-}$	**1** **1** **1**
28.	a) 	**1**

	b) 	**1**
	c) 	**1**
29.	a) DNA has a double strand while RNA has single stranded. DNA has 2-Deoxyribose sugar moiety while RNA has ribose sugar moiety. (or any other points) b) (C) Tertiary c) (B) doesn't contain a chiral carbon **OR** (B) Rickets	**1+1** **1** **1**
30.	a) $E_{cell} = E^{\circ}_{cell} - \frac{0.0591}{n} \log \frac{[Mg2+]}{[Cu2+]}$ $= 2.71V - \frac{0.0591}{2} \log \frac{[0.1]}{[0.01]}$ $= 2.71\ V - 0.0295 \times 1 = 2.68\ V$ b) Q = It t = 96.5 s **OR** b) Anode: $Zn(Hg) + 2OH^- \longrightarrow ZnO(s) + H_2O + 2e^-$ Cathode: $HgO + H_2O + 2e^- \longrightarrow Hg(l) + 2OH^-$ c) + 0.74 V	**2** **1** **1**
31.	a) i) Cr, due to half-filled t_2g configuration of Cr^{3+} ii) Cr, due to maximum number of unpaired electrons. iii) Cu, as Cu^+ has a stable completely filled ($3d^{10}$) configuration. b) Due to relatively poor shielding effect of 5f electrons in actinoids than 4f electrons in lanthanoids. c) i) 2 ii) 4 **OR** a) The overall decrease in atomic and ionic radii from La to Lu is known as lanthanoid contraction.	**1** **1** **1** **1** **½ + ½** **1**

	Atomic radii of second and third transition series are very similar.	**1**
	b) i) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$	**1**
	ii) $Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$	**1**
	iii) $2Cu^{2+} + 4I^- \rightarrow Cu_2I_2 + I_2$	**1**
32.	a) Order of reaction with respect to A is 2 and B is 1	**1+1**
	b) Rate = k $[A]^2[B]$ and overall order of reaction is 3	**1**
	c) Rate constant, k = 1.33 $mol^{-2}L^2s^{-1}$	**1**
	d) 0.16 $molL^{-1}s^{-1}$	**1**
	OR	
	a) $\log \frac{k2}{k1} = \frac{Ea}{2.303R}\left[\frac{1}{T1} - \frac{1}{T2}\right]$	½
	$\log \frac{6 \times 10^{-2}}{2 \times 10^{-2}} = \frac{Ea}{2.303 \times 8.314\ J\ K^{-1}mol^{-1}}\left[\frac{1}{300} - \frac{1}{320}\right]\ K^{-1}$	
	$\log 3 = \frac{Ea}{19.15\ J\ mol^{-1}}\left[\frac{320-300}{300 \times 320}\right]$	
	$0.4771 = \frac{Ea}{19.15\ J\ mol^{-1}}\left[\frac{20}{300 \times 320}\right]$	½
	Ea= 43855 J mol^{-1} or 43.855 kJ mol^{-1}	**2**
	b) k = (2.303 / 40) log (100 / 75)	½
	= 0.007 min^{-1}or 0.0071 min^{-1}or 0.0072 min^{-1}	½
	t = (2.303 / 0.0071) log (100/20)	
	t =230 min or 226.7min or 223.7 min.	**1**
33.	a) A: 2-Methylbut-2-ene / $CH_3CH=C(CH_3)_2$	**1**
	B: Ethanal / CH_3CHO	**1**
	C: Propanone / CH_3COCH_3	**1**
	b) i) $CH_3CH_2CH_3$	**1**
	ii) $(CH_3)_3CCH_2OH + (CH_3)_3CCOONa$	**1**
	OR	
	a) i) $CH_3Br \xrightarrow{KCN\ (alc.)} CH_3CN \xrightarrow[H^+/OH^-]{H_2O} CH_3COOH \xrightarrow[H_3O^+]{LiAlH_4\ /\ Ether\ or\ B_2H_6} CH_3CH_2OH$	**1**

	ii) $CH_3CN \xrightarrow{\text{(i) CH3MgBr (ii) H2O / H+}} CH_3COCH_3$	**1**
	iii) $CH_3\text{-}CH_2\text{-}CHO \xrightarrow[H^+]{KMnO_4} CH_3\text{-}CH_2\text{-}COOH \xrightarrow[\text{(2)NaOH (aq)}]{\text{(1) } Cl_2 / P_4} CH_3\text{-}\underset{\displaystyle OH}{\underset{|}{CH}}\text{-}COOH$	**1**
	b) i) $CH_3CH_2CH(OCH_3)_2$	**1**
	ii) $CH_3CH_2CH(OH)CH(CH_3)CHO$	**1**