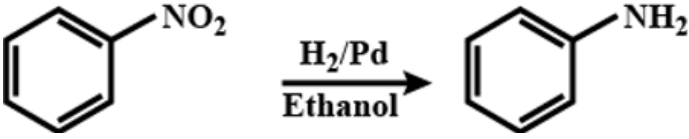
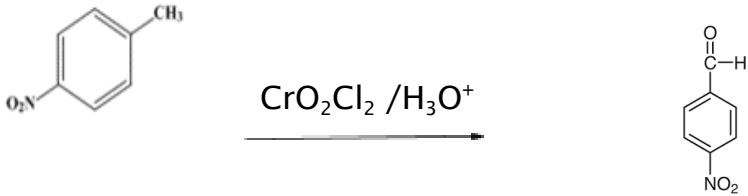
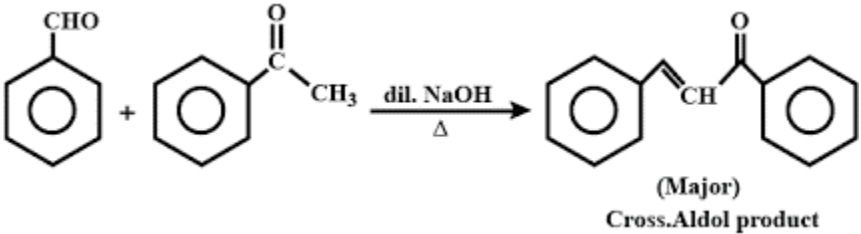
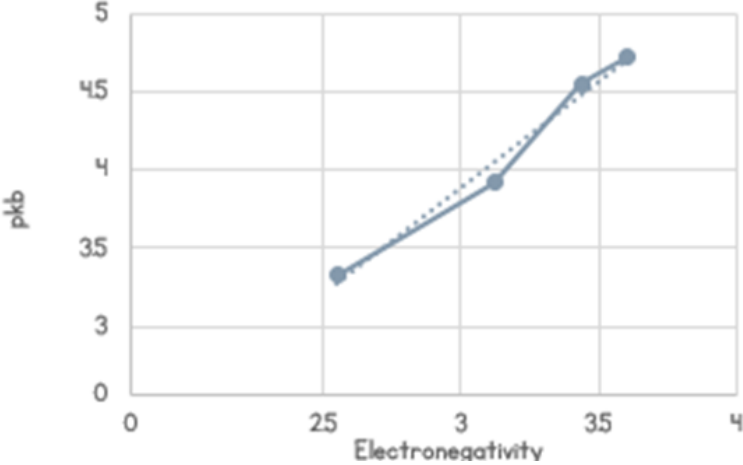


	$e^{-kt} = 0$, which is not possible for any finite value of t. Here, t is ∞ .	
11	(a) Nitrobenzene 	1
12	(a) CH_3COCH_3 Aldehyde and ketones give nucleophilic addition reactions. Other carbonyl compounds do not give nucleophilic addition reactions.	1
13	(a) Both A and R are true and R is the correct explanation of A	1
14	(d) A is false but R is true. $\Lambda_m^\circ = \Lambda_m - A c^{1/2}$ is an incorrect equation, the correct equation is $\Lambda_m = \Lambda_m^\circ - A c^{1/2}$	1
15	(b) Both A and R are true but R is not the correct explanation of A. Due to the absence of a free aldehydic group, it does not give a reaction with NaHSO_3 .	1
16	(d) A is false but R is true. The half-life for a zero order reaction $t_{1/2} = [\text{Ro}]/2k$ where $[\text{Ro}]$ is the initial concentration of the reactant.	1
SECTION B		
17	(a) Solubility of gas is inversely proportional to the value of Henry's constant K_H . On increasing temperature nitrogen gas becomes less soluble because its K_H value increases. (b) (ii) 64.5°C Chloroform and acetone mixture show negative deviation from Raoult's law therefore, they form maximum boiling azeotrope at a specific composition. The boiling point of the mixture so obtained will be higher than the individual components. OR (a) At higher altitudes i.e. in Srinagar the atmospheric pressure is	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

	<p>lower. The solubility of a gas in a liquid is directly proportional to the partial pressure of the gas over the solution, therefore, the carbon dioxide dissolved in water will be lesser at Srinagar making the soda go flat faster.</p> <p>(b) Preservation of fruits by adding sugar/salt protects against bacterial action. Through osmosis, a bacterium on canned fruit loses water, shrivels and dies.</p>	1
18	<p>(a) Potassium diaquadioxalatochromate(III) hydrate</p> <p>(b) (i) Haemoglobin: Iron (ii) Vitamin B-12: Cobalt</p>	1 1
19	<p>(a) $Y(s) Y^{2+}(aq) X^{+}(aq) X(s)$</p> <p>(b) ions are carrier of current in salt bridge</p> <p>(c) $Y(s) \rightarrow Y^{2+}(aq) + 2e^{-}$</p> <p>(for visually challenged learners)</p> <p>a. Cathode: silver , Anode: Magnesium</p> <p>b. $Mg + 2Ag^{+} \rightarrow Mg^{2+} + 2Ag$</p>	1 $\frac{1}{2}$ $\frac{1}{2}$
20	<p>(a) CH_3CH_2CN (major), CH_3CH_2NC (minor)</p> <p>(b) $CH_3CH_2CHBrCH_3$ (major) $CH_3CH_2CH_2CH_2Br$ (minor)</p> <p>(c) $(CH_3)_2C=CHCH_3$ (major) $(CH_3)_2CHCHCH_2$ (minor)</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
21	<p>The carbonyl group present in glucose is aldehyde and the C₁ atom . Glucose gets oxidised to six-carbon carboxylic acid (gluconic acid) with COOH group at the C1 atom on reaction with a mild oxidising agent like bromine water. This indicates that the carbonyl group is present as an aldehydic group</p>	$\frac{1}{2}$ $\frac{1}{2}$ 1
SECTION C		
22	<p><u>(a) Product of electrolysis of Copper Chloride</u></p> <p>Cathode(-)</p> <p>$Cu^{2+} + 2e^{-} \rightarrow Cu(s)$</p> <p>anode(+)</p> <p>$2Cl^{-} \rightarrow Cl_2 + 2e^{-}$</p> <p><u>Product of electrolysis of concentrated Copper Sulphate</u></p> <p>Anode(+) $SO_4^{2-} \rightarrow S_2O_8 + 2e^{-}$</p> <p>Cathode (-) $Cu^{2+} + 2e^{-} \rightarrow Cu(s)$</p> <p>(b) $\lambda_m^0 [Al_2(SO_4)_3] = 2 \lambda_m^0 (Al^{3+}) + 3 \lambda_m^0 (SO_4^{2-})$</p>	1 1 1
23	<p>(a) In the case of a lower oxide of a transition metal, the metal atom has some electrons present in the valence shell of the metal atom that are not involved in bonding. As a result, it can donate electrons and behave as a base whereas in higher oxide of a transition metal,</p>	1

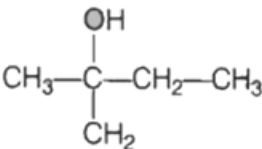
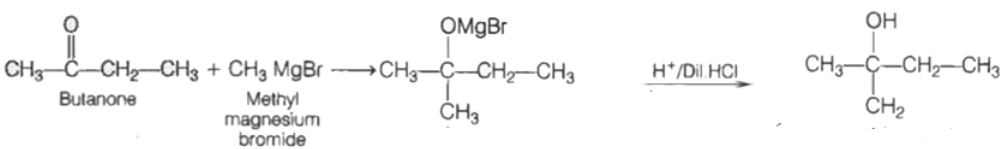
	<p>the metal atom does not have an electron in the valence shell for donation. As a result, it can accept electrons and behave as an acid.</p> <p>(b) Chromium has unpaired electrons which result in strong metallic bonding which results in it being a hard solid and the absence of unpaired electrons in Hg results in it being a liquid.</p> <p>(c) The increase in effective nuclear charge responsible for steady increase in ionisation energy is counterbalanced by shielding effect of (n-1)d electrons</p>	<p>1</p> <p>1</p>
<p>24</p>	<p>(a)</p>  <p>(b) Benzoic acid undergoes extensive intermolecular hydrogen bonding, leading to the formation of dimer.</p> <p>(c) Benzoic acid does not undergo reaction with CH_3Cl i.e. Friedel Craft reaction because the carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group</p> <p style="text-align: center;">OR</p> <p>Compound 'X' = Benzaldehyde, Compound Y = Acetophenone</p>  <p style="text-align: center;">(Major) Cross.Aldol product</p> <p>Chemical test to distinguish between X and Y is the Tollen Test.</p> <p>Benzaldehyde undergoes Silver mirror test with Tollen reagent and forms silver mirror. However Acetophenone does not react with Tollen Reagent.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1/2, 1/2</p> <p>1</p> <p>1</p>

	<p>c. The slowest step is the rate-determining step. From mechanism 2, Rate = k [A] [B] while from mechanism 1 Rate = k [A] Therefore mechanism 2, is consistent with the experimental finding</p>	1										
30	<p>a</p>  <p>..... Is the line of best fit The pKb increases with an increase in the electronegativity of the substituent, therefore the basic strength decreases with an increase in the electronegativity of the substituent</p> <p>b. (iv) 9.1</p> <p>c. (i) 3.5</p> <p>OR</p> <p>(iii) 10.15</p> <p>(for visually challenged learners) The pKb increases with an increase in the electronegativity of the substituent, therefore the basic strength decreases with an increase in the electronegativity of the substituent</p> <table border="1" data-bbox="256 1768 1273 1877"> <thead> <tr> <th>Substituent "X"</th> <th>Electro-negativity of X</th> <th>Compound</th> <th>pKa</th> <th>pKb</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Substituent "X"	Electro-negativity of X	Compound	pKa	pKb						<p>1½</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
Substituent "X"	Electro-negativity of X	Compound	pKa	pKb								

CH ₂	2.55	CH ₃ CH ₂ CH ₂ NH ₂	10.67	3.33	1	
NH	3.12	NH ₂ CH ₂ CH ₂ NH ₂	10.08	3.2		
O	3.44	HOCH ₂ CH ₂ NH ₂	9.45	4.55		
CH ₃ CON	3.6	CH ₃ CONHCH ₂ CH ₂ NH ₂	9.28	4.72		
b. (iv) 9.1						1
c. (i) 3.5						1
OR						1
(iii) 10.15						1

SECTION E

31	(a) (i) Test tube C $10\text{I}^- + \text{MnO}_4^- + 16\text{H}^+ \rightarrow 5\text{I}_2 + 2\text{Mn}^{2+} + 8\text{H}_2\text{O}$	1
	(ii) Test tube A $\text{C}_2\text{O}_4^{2-} + 2\text{MnO}_4^- + 16\text{H}^+ \rightarrow 10\text{CO}_2 + 2\text{Mn}^{2+} + 8\text{H}_2\text{O}$	1
(b) (i)		2
(ii) Sp^3d^2 , Since $\Delta_0 > P$ it will form an outer orbital complex as the electrons in the 3d orbital will not pair up.		$\frac{1}{2}$
(iii) Optical isomerism.		$\frac{1}{2}$
OR		
a. A = Co^{2+}		$\frac{1}{2}$
B = 3		$\frac{1}{2}$
C = $d^2 sp^3$		$\frac{1}{2}$
D = Paramagnetic		$\frac{1}{2}$
E = sp^3		$\frac{1}{2}$
F = tetrahedral		$\frac{1}{2}$
b.		$\frac{1}{2}$

	<p>The acidic character of alcohols is due to the polar nature of O-H bond. An electron-releasing group ($-\text{CH}_3$, $-\text{C}_2\text{H}_5$) increases electron density on oxygen tending to decrease the polarity of O-H bond</p> <p>2-methylpropan-2-ol < 2-methylpropanol < butan-2-ol < Butan-1-ol</p> <p>c. An organic compound A is a Grignard reagent : RMgX B is a ketone RCOR'</p> <p>A + B \square</p> <div style="text-align: center;">  <p>(2-methylbutan-2-ol)</p> </div> <p>Ketones lead to the formation of tertiary alcohol, so the compound B is a ketone B - Butan-2-one and A is CH_3MgBr</p> <div style="text-align: center;">  </div>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1</p>
33	<p>a. Depression in the freezing point is a colligative property. In dilute solutions the depression of freezing point (ΔT_f) is directly proportional to the molal concentration of the solute in a solution. From the graph it is interpreted that Solution 2 shows more depression in freezing point</p> <p>1 M $\text{Al}(\text{NO}_3)_3$ has higher i value ($i=3$) than 1 M glucose ($i=1$)</p> <p>1 M $\text{Al}(\text{NO}_3)_3$ will have higher depression, hence solution 2 is $\text{Al}(\text{NO}_3)_3$ solution and solution 1 is glucose solution.</p> <p>(for visually challenged learners)</p> <p>a. 1 M $\text{Al}(\text{NO}_3)_3$ shows greater depression in freezing point</p> <p>1 M $\text{Al}(\text{NO}_3)_3$ has higher i value ($i=3$) than 1 M glucose ($i=1$) and we know that $\Delta T_f = iK_f m$</p> <p>b. $\pi = (n_2/V) RT$ Given $\pi = 2.64 \text{ atm}$</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p>

<p> $i = 1 - 0.73/2$ $i = 0.635$ </p> <p>Depression in freezing point can be calculated as:</p> $\Delta T_f = i K_f m$ $= i K_f (w_b / M_b \times w_a)$ <p> $K_f = 5.12 \text{ K Kg/mol}$, $w_b = 2 \times 10^{-2} \text{ kg} = 20 \text{ g}$, $w_a = 1 \text{ kg}$ $M_b = 94$ </p> $\Delta T_f = (0.635 \times 5.12 \times 20) / (94)$ $= 0.691 \text{ K}$	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
--	---