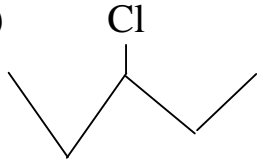


Marking Scheme

Chemistry

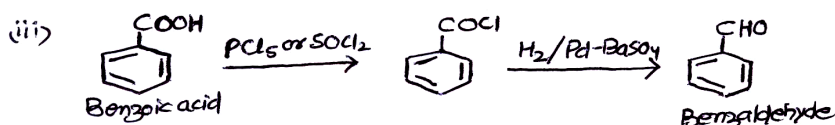
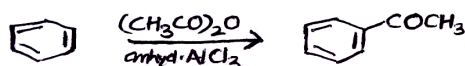
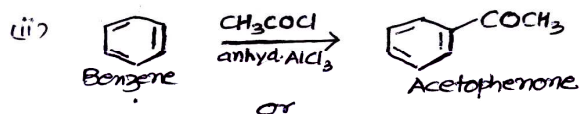
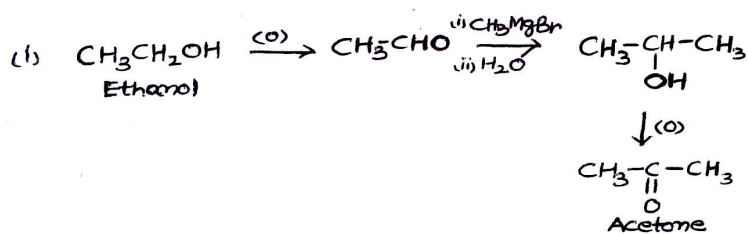
Delhi- SET (56/1/2)

1	4	1
2	In primary battery the reaction occurs only once and after use over a period of time becomes dead. Leclanche cell or Dry cell is an example.	½+½
3	Q.3 Set 1	1
4	Q.4 Set 1	1
5	Q.5 Set 1	1
6.	Pentane -2, 4 -dione	1
7.	Q.7 Set 1	1
8.	Q.8 Set 1	1
9	<p>Raoult's law states that for a solution of volatile liquids, the partial vapour pressure of each component in the solution is directly proportional to its mole fraction.</p> <p>When the solute-solvent interaction is weaker than those between the solute-solute and solvent-solvent molecules than solution shows positive deviation from Raoult's law because the partial pressure of each component is greater.</p> <p>ex. mixture of ethanol and acetone or carbondisulphide and acetone behave in this manner.</p> <p>When the solute-solvent interaction is stronger than those between the solute-solute and solvent-solvent molecules than solution shows negative deviation from Raoult's law and the partial vapour pressure of each component is lower.</p> <p>ex. mixture of chloroform and acetone behave in this manner.</p> <p><i>(Note: Explanation with suitable example of any one of the two.)</i></p> <p style="text-align: center;">OR</p> <p>The extra pressure applied on the solution side that just stops the flow of solvent to solution through semi-permeable membrane is called osmotic pressure of the solution.</p> <p>Here π is the osmotic pressure and R is the gas constant.</p> $\pi = (n_2 / V) R T$ $\pi V = \frac{w_2 R T}{M_2}$ <p>or $M_2 = \frac{w_2 R T}{\pi V}$</p> <p>Thus knowing the quantities w_2, T, π and V we can calculate the molar mass of the solute.</p>	<p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p>

10	$\Lambda_m = \frac{\kappa \times 1000 \text{ cm}^3 \text{ L}^{-1}}{c}$ $= \frac{0.0248 \text{ S cm}^{-1} \times 1000 \text{ cm}^3 \text{ L}^{-1}}{0.20 \text{ mol L}^{-1}} = \frac{24.8 \text{ S cm}^2}{0.20 \text{ mol}}$ $\Lambda_m = 124 \text{ Scm}^2 \text{ mol}^{-1}$	1 1
11	<p>The galvanic cell is depicted as: $\text{Zn(s)} \text{Zn}^{2+}(\text{aq}) \text{Ag}^{+}(\text{aq}) \text{Ag(s)}$</p> <p>(i) Zinc electrode is negatively charged</p> <p>(ii) The ions formed i.e Zn^{2+} and Ag^{+} in the solution are the carriers of the current within the cell.</p> <p>(iii) At anode: $\text{Zn(s)} \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{e}^{-}$ At cathode: $2\text{Ag}^{+}(\text{aq}) + 2\text{e}^{-} \rightarrow 2\text{Ag(s)}$</p>	1/2 1/2 1/2 1/2
12	Q.14 Set 1	2
13	Q.15 Set 1	2
14	<p>(i) $\text{C}_6\text{H}_5\text{I} + \text{KCl} + \text{N}_2$</p> <p>(ii) $\text{BrCH}_2\text{-CH}_2\text{Br}$</p>	1+1
15	<p>(i) Aryl halides are less reactive towards nucleophilic substitution <u>because of any of the following reasons</u></p> <p>(i) Resonance effect stabilization</p> <p>(ii) sp^2 hybridization in haloarenes and sp^3 in haloalkanes.</p> <p>(iii) Instability of phenyl cation</p> <p>(iv) possible repulsion</p> <p>(ii)</p>  <p>Undergoes $\text{S}_{\text{N}}1$ reaction faster because of the stability of secondary carbocation.</p>	1 1/2+1/2
16	Q.18 Set 1	2
17	Q.16 Set 1	2
18	Q.17 Set 1	2
19	Q.21 Set 1	3
20	Q.20 Set 1	3
21	Q.19 Set 1	3

22	Q.23 Set 1	3
23	Q.22 Set 1	3
24	Q.26 Set 1	3
25	Q.27 Set 1	3
26	Q.25 Set 1	3
27	Q.24 Set 1	3
28	<p>(a) Half life of a First order reaction:</p> <p>*</p> $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ <p>at $t_{1/2}$ $[R] = \frac{[R]_0}{2}$</p> <p>So, the above equation becomes</p> $k = \frac{2.303}{t_{1/2}} \log \frac{[R]_0}{[R]_0/2}$ <p>or $t_{1/2} = \frac{2.303}{k} \log 2$</p> $t_{1/2} = \frac{2.303}{k} \times 0.301$ $t_{1/2} = \frac{0.693}{k}$ <p>(b) $2\text{NH}_3(\text{g}) \longrightarrow \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$</p> <p>Rate = $-\frac{d[\text{NH}_3]}{dt} = k[\text{NH}_3]^0 = 2.5 \times 10^{-4} \text{Ms}^{-1}$</p> $-\frac{1}{2} \frac{d[\text{NH}_3]}{dt} = + \frac{d[\text{N}_2]}{dt} = + \frac{1}{3} \frac{d[\text{H}_2]}{dt}$ <p>Rate of production of $\text{N}_2 = + \frac{d[\text{N}_2]}{dt} = - \frac{1}{2} \frac{d[\text{NH}_3]}{dt}$</p> $= \frac{1}{2} \times (2.5 \times 10^{-4} \text{Ms}^{-1}) = 1.25 \times 10^{-4} \text{Ms}^{-1}$ <p>Rate of production of hydrogen = $\frac{d[\text{H}_2]}{dt} = - \frac{3}{2} \frac{d[\text{NH}_3]}{dt}$</p> $= \frac{3}{2} \times (2.5 \times 10^{-4} \text{Ms}^{-1})$ $= 3.75 \times 10^{-4} \text{Ms}^{-1}$	<p>1/2</p> <p>1/2</p> <p>1</p> <p>1</p> <p>1</p>
	<p>or</p> <p>Rate = $-\frac{d[\text{NH}_3]}{dt} = k[\text{NH}_3]^0 = 2.5 \times 10^{-4} \text{Ms}^{-1}$</p> $\text{Rate} = -\frac{1}{2} \frac{d[\text{NH}_3]}{dt} = + \frac{d[\text{N}_2]}{dt} = + \frac{1}{3} \frac{d[\text{H}_2]}{dt}$ <p>Rate of production of $\text{N}_2 = + \frac{d[\text{N}_2]}{dt} = \text{Rate} = 2.5 \times 10^{-4} \text{Ms}^{-1}$</p>	<p>1</p> <p>1</p>

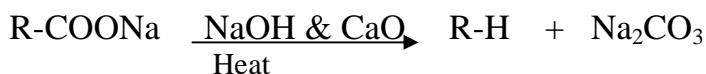
<p>Rate of production of hydrogen = $\frac{d[H_2]}{dt} = 3 \times \text{Rate}$</p> $= 3 \times (2.5 \times 10^{-4} \text{ Ms}^{-1})$ $= 7.5 \times 10^{-4} \text{ Ms}^{-1}$	1
<p>(Note: No marks to be deducted for wrong unit in this question, as there is a misprint in the question in units of k)</p>	
<p>or</p>	
<p>(a) Factors affecting rate of chemical reaction are:</p>	
<p>(i) Concentration of reactants</p>	
<p>(ii) Temperature</p>	
<p>(iii) Presence of catalyst</p>	
<p>(iv) Surface Area</p>	
<p>(v) Activation energy</p>	
<p>(b) $k = \frac{0.693}{t_{1/2}}$</p>	<p>(any four) $\frac{1}{2} \times 4 = 2$</p>
<p>$k = \frac{0.693}{5730 \text{ y}}$</p>	$\frac{1}{2}$
<p>$K = 1.21 \times 10^{-4} \text{ y}^{-1}$</p>	$\frac{1}{2}$
<p>$t = \frac{2.303}{k} \log \frac{[A_0]}{[A]}$</p>	1
<p>$k = \frac{2.303}{1.21 \times 10^{-4} \text{ y}^{-1}} \log \frac{100}{80}$</p>	
<p>$k = \frac{2.303}{1.21 \times 10^{-4} \text{ y}^{-1}} \log 1.25$</p>	
<p>$k = \frac{2.303}{1.21 \times 10^{-4} \text{ y}^{-1}} \times 0.0969$</p>	
<p>= 1845 years</p>	1



1x3=3

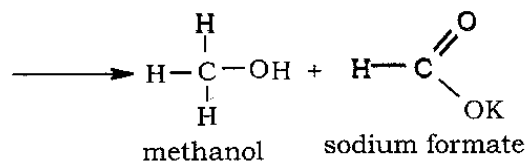
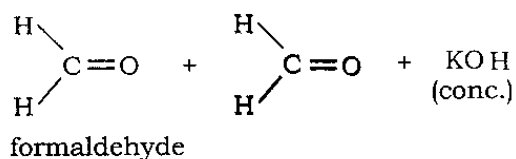
(or any other suitable method)

- (a) (i) **Decarboxylation:** Carboxylic acids lose carbon dioxide to form hydrocarbons when their sodium salts are heated with sodalime. The reaction is known as decarboxylation.



- (ii) **Cannizzaro reaction:** Aldehydes which do not have an α -hydrogen atom, undergo self oxidation and reduction reaction on treatment with concentrated alkali.

1+1



(or any other suitable reaction)

(Note: Award full marks for correct chemical equation; award 1/2 mark if only statement is written)

OR

(a)

(i)

C	69.77/12	5.81	5.81/1.16	5
H	11.63/1	11.63	11.63/1.16	10
O	18.60/16	1.16	1.16/1.16	1

Empirical formula $C_5H_{10}O$, empirical formula mass $60+10+16=86$
Hence, Mol formula $C_5H_{10}O$

It is a ketone as it appears from its reactions which on oxidation gives ethanoic and propanoic acids, hence the compound is



(b)(i) Because the stability of conjugate base of monochloroethanoic acid is less due to presence of one electron withdrawing -Cl group than in dichloroethanoic acid.

(ii) This is because of greater electronegativity of sp^2 hybridised carbon to which carboxyl carbon is attached.

(or any other suitable reason)

1

1

1

1+1

30

Q.29 Set 1

5