G.C.E. A/L Examination June - 2016

Conducted by Field Work Centre, Thondaimanaru
In Collaboration with
Zonal Department of Education Jaffna.

FWC

Grade :- 13 (2016)	Scheme	Chemistry

Chemistry - I

01)	**3**	11)	**5**	21)	**4**	31)	**2**	41)	**5**
02)	**5**	12)	**2**	22)	**1**	32)	**5**	42)	**1**
03)	**2**	13)	**4**	23)	**2**	33)	**2**	43)	**3**
04)	**3**	14)	**4**	24)	**1**	34)	**5**	44)	**4**
05)	**2**	15)	**4**	25)	**2**	35)	**3**	45)	**4**
06)	**3**	16)	**3**	26)	**3**	36)	**2**	46)	**1**
07)	**2**	17)	**2**	27)	**1**	37)	**5**	47)	**4**
08)	**4**	18)	**4**	28)	**5**	38)	**3**	48)	**5**
09)	**2**	19)	**2**	29)	**3**	39)	**4**	49)	**3**
10)	**3**	20)	**5**	30)	**2**	40)	**2**	50)	**5**

Chemistry - II
A - Structure

1. a.

i. $Cr^{3+} < Fe^{3+} < Cr$

ii. $Br > Ca > Mg$

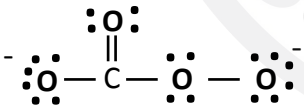
iii. $NaCl < NH_3 < CH_3OH$

iv. $CH_3COO^- < CN^- < CH_3CH_2O^-$

v. $AsH_3 < NH_3 < SbH_3$ **(5x3 = 15 Marks)**

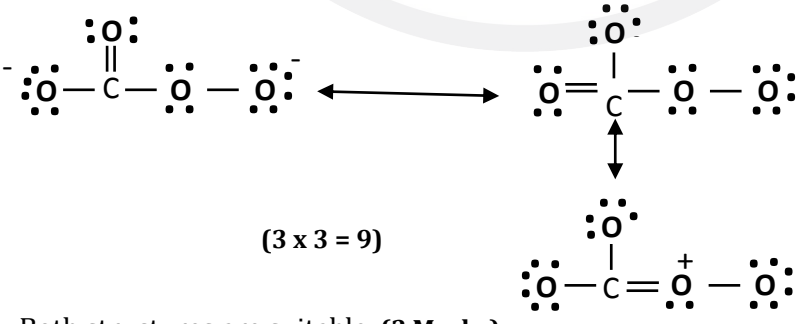
b.

i. **(5 Marks)**



Both structures are stable **(3 Marks)**

ii.



(3 x 3 = 9)

Unstable more electro negative atom have (+) change high charge diaperion. **(3 Marks)**

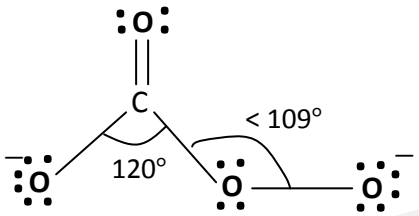
Both structures are suitable. **(3 Marks)**

iii. C - Total no of electron pairs - 4
Total no of repulsion units - 3
no of 6 bonds - 3
no of lone pair electrons - 0
Shape - Trigonal planer **(5 Marks)**

O_b - Total no of electron pairs - 4
Total no of repulsion units - 4
no of 6 bonds pairs - 2
no of lone pair electrons - 2
Shape - Bent shape **(5 Marks)**

iv. C - Trigonal planer $\underline{\Omega}$ 120° SP^2
O_b- Tetrahedral < 109° SP^3 **(6 Marks)**

v.



(5 Marks)

vi. 1. SP^3 Hybrid orbital of O_b - SP^3 Hybrid orbital of O_a
2. SP^2 Hybrid orbital of C - SP^3 Hybrid orbital of O_b **(2 x 5 = 10 Marks)**

vii. $H_2O + CO_2$ **(5 Marks)**

viii. $H_2O_2 + H_2CO_4 \Rightarrow 2H_2O + CO_2 + O_2$ **(5 Marks)**

c.

i. CF_3COH, H_2SO_4, $H_2S_2O_8$
ii. CF_3COOH, H_2SO_4, $H_2S_2O_8$
iii. Br_2 **(7 x 2 = 14 Marks)**

d.

i. London dispersal forces
ii. dipole - induced dipole
iii. Hydrogen bond (London dispersal forces)
iv. Ionic interaction **(5 x 2 = 10Marks)** **[100 Marks]**

2. a.

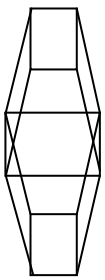
vi. Sulphur **(5 Marks)**
$1S^2\ 2S^2\ 2P^6\ 3S^2\ 3P^4$ **(5 Marks)**

vii. Crystalline
Amorphous, Non crystalline **(2 x 2 ½ = 5 Marks)**

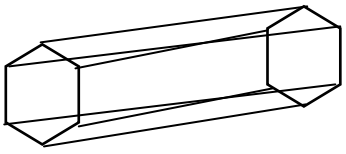
viii. Rhombic Sulphur, Mnoclinicsulphur
Plastic suphaur, Milk of sulphur **(5 Marks)**

ix. Rhombic sulphur
When Rhombicsulphur is heated to temperatures greater 96°C, Needle line, Crystals are formed. **(2 + 3 = 5 Marks)**

x.



Rhombic Sulphur

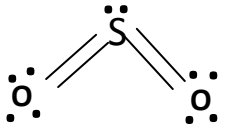


MonodnmicSulphur

(2 x 2 ½ = 5 Marks)

xi. $4S + 6NaOH \Rightarrow 2Na_2S + Na_2S_2O3 + 3H_2O$ **(5 Marks)**

b.

i. 

(5 Marks)

(iv)

ii. Suphuric and **(5 Marks)**

iii. $2Mg + SO_2 \Rightarrow 2MgO + S$ **(5 Marks)**

iv. $2KMnO_4 + 5SO_2 + H_2O \Rightarrow K_2SO_4 + 2MnSO_4 + 2H_2SO_4$

$2FeCl_3 + SO_2 + 2H_2O \Rightarrow 2FeCl_2 + 2HCl + H_2SO_4$ **(2x5= 10 Marks)**

c.

i. $SO_{2(g)} + H_2O_{(\ell)} \Rightarrow H_2SO_{3(aq)}$

$H_2SO_{3(aq)} + H_2O_{(\ell)} \Rightarrow H_2SO_{4(aq)} + 2H$

$2H + X \Rightarrow 2HX$ **(15 Marks)**

ii. Bleaching is done by reduction of substance by SO_2. The reduce substance can be oxidised by atmosphere. **(5 Marks)**

d.

i. H_2S **(5 Marks)**

ii. $2H2S + SO2 \rightarrow 3S + 3H_2O$ **(5 Marks)**

iii. Yellow, Orange, Yellow **(5 Marks)**

iv. AS_2S_3 , S **(2 x 2 ½ = 5 Marks)** **(100 Marks)**

3. a.

xii. $-\log_{10}[H^+] = 1$

$[H^+] = \log^{-1} -1 = 10^{-1} moldm^{-3}$ **(05 Marks)**

xiii. in $NaOH_{solution} [H^+] = 1 \times 10^{-12} moldm^{-3} [OH^-] = \frac{1 \times 10^{-14} moldm^{-6}}{10^{-12} moldm^{-3}}$

n OH^- = $1 \times 10^{-2} moldm^{-3} \times 0.2\ dm^3$

$= 2 \times 10^{-3} mol$

$nHCl = 10^{-1} moldm^{-3} \times 5 \times 10^{-2} dm^3$

$= 5 \times 10^{-3} mol$

$nH^+_{remaining} = 3 \times 10^{-3} mol$

$[H^+] = \frac{3 \times 10^{-3} mol}{300 \times 10^{-3} dm^3} = \frac{1}{100} moldm^{-3}$

$= 1 \times 10^{-2}\ moldm^{-3}$

pH = 2 **(10 Marks)**

b.

i.

	$CH_3COOH + H_2O \leftrightharpoons H_3O^+ + CH_3COO^-$		
initially	0.1	-	-
atcaulibrium	0.1 - *x*	*x*	*x*

$Ka = \frac{[H_3O] \times [CH_3COO^-]}{CH_3COOH} = \frac{x^2}{0.1-x}$

$x = \sqrt{Ka \times 0.1 moldm^{-3}}$ $pH = -\log 10^{-1 \times 10^{-3}} = 3$

= 1 x 10-5M x 0.1 M

$= 1 \times 10^{-3} moldm^{-3}$ **(10 Marks)**

ii. $[OH^-]$ = 1 x 10^{-2}moldm^{-3}
n OH^- = 1 x 10^{-2}moldm^{-3} x 50 x 10^{-3} dm^3
= 0.5 x 10^{-3}mol

n HAc = 0.1moldm^{-3} x 55 x 10^{-3} dm^3
= 5.5 x 10^{-3}mol **(10 Marks)**

nHAc $_{remaining}$ = (5.5 - 0.5) x 10^{-3}mol = 5 x 10^{-3}mol

$$pH = pKa + \frac{[Salt]}{[Acid]} = 5 + \log \frac{\frac{0.5 \times 10^{-3} mol}{105} \times 1000 dm^{-3}}{\frac{5.5 \times 10^{-3} mol}{105} \times 1000 dm^{-3}}$$

$$= 5 + \log 10^{-1} = 4$$ **(10 Marks)**

iii. n HAc $_{remaining}$ Kb = $\frac{K_w}{K_a}$

$CH3COO^-_{(aq)} + H_2O_{(\ell)} \leftrightharpoons CH3COOH_{(aq)} + OH^-_{(aq)}$

$$\frac{K_w}{K_a} = \frac{\left[OH^-_{(aq)}\right]^2 \left[CH_3COOH_{(aq)}\right]}{\left[CH_3COO^-_{(aq)}\right]} \qquad \left[OH^-_{(aq)}\right] = \left[CH_3COOH_{(aq)}\right]$$

$$\frac{K_w}{K_a}\left[CH_3COO^-_{(aq)}\right] = \left[OH^-_{(aq)}\right]^2$$

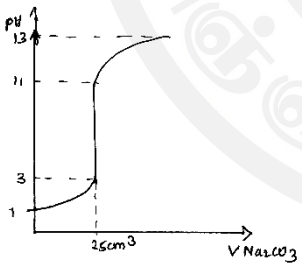
$$\left[OH^-_{(aq)}\right] = \sqrt{\frac{K_w}{K_a}\left[CH_3COO^-_{(aq)}\right]}$$

$= \sqrt{10^{-9} \text{moldm}^{-3} \times 0.1} = 10^{-5}$moldm^{-3}

pOH = -log 10^{-5} moldm^{-3} = 5
pH = 9 **(20 Marks)**

iv. pH doesn't change, it's a batter solution = 4 **(5 Marks)**

c. i.



(5 Marks)

ii. Eq point :- The point at all base completely react with acid **(5 Marks)**
iii. End point :- The point that the indicator used in titrated change colour **(5 Marks)**
v. Phenolphthalein

d. i. $n\ CH_3\ COOH_{(aq)}$ = $0.25\ mol\ dm^{-3} \times 250 \times 10^{-3}\ dm^3$
= $6.25\ \times\ 10^{-2}\ mol$
$n\ HCOOH_{(aq)}$ = $0.32\ mol\ dm^{-3}\ \times 250 \times 10^{-3} dm^3$
= $8 \times 10^{-2}\ mol$
$[n\ H^+] = \left[n\ OH^-_{(aq)}\right]$ = $14.25 \times 10^{-2}\ mol$

$\left[OH^-_{(aq)}\right] \times 425 \times 10^{-3} dm^3 = 14.25 \times 10^{-2}\ mol$ **(15 Marks)**
$\left[OH^-_{(aq)}\right] = 0.335\ moldm^{-3}$

ii. POH = $-\lg 3.55 \times 10^{-1} mol\ dm^{-3}$ **(5 Marks)**

= $1 - \lg 3.35$

PH = $14 - 1 + \lg 3.35 = 13 + \lg 3.35$

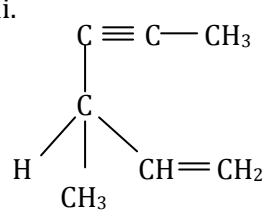
= 13.525

100

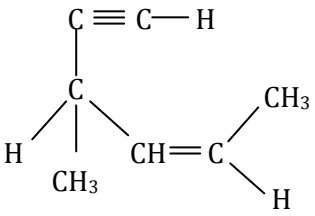
4.

i. C_7H_{10}

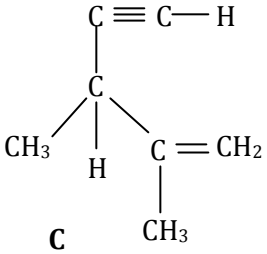
ii.



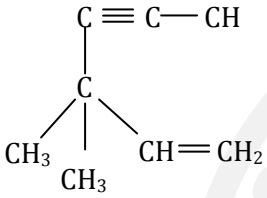
A



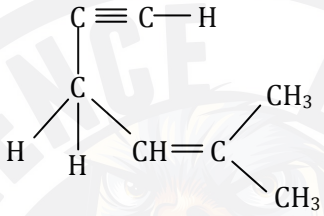
B



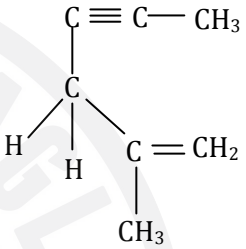
C



X

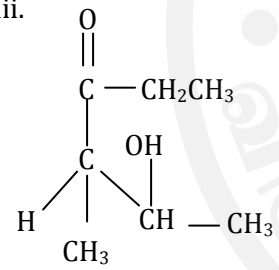


Y

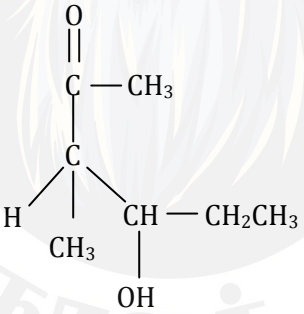


Z **(6 X 10 = 60Marks)**

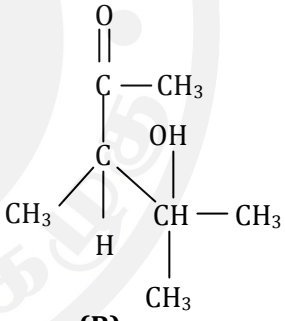
iii.



(P)



(Q)



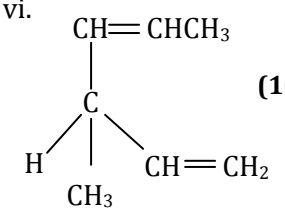
(R) **(3 x 5 = 15 Marks)**

iv. 4 - Methyl - 5 - hydroxyl hexan - 3 - one

3 - Methyl - 4 - hydroxyl hexan - 2 - one **(2 x 5 = 10 Marks)**

v. 4 (four) **(5 Marks)**

vi.

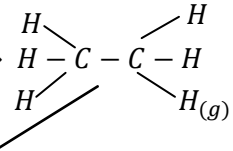


(10 Marks)

100

B - Essay

5. a. (1)

i. $H-C\equiv C-H_{(g)} + H_{2(g)} + HI_{(g)} \xrightarrow{\Delta H_R^\theta}$ 

$C \equiv C$
$2 \times C-H$
$H-H$
$H-I$

$5 \times C-H$
$C-C$
$C-I$

$2C_{(g)} + 5H_{(g)} + I_{(g)}$ **(20 Marks)**

$\Delta H_R^\theta = \Delta H_D^\theta\, C \equiv C + 2 \times \Delta H_D^\theta (C-H) + \Delta H_D^\theta (H-H) + \Delta H_D^\theta (H-I) - 5 \times \Delta H_D^\theta (C-H) - \Delta H_D^\theta (C-C)\, \Delta H_D^\theta (C-I)$

But $\Delta H_D^\theta (C \equiv C) = \Delta H_D^\theta (C-C) + [\Delta H_D^\theta\, C=C - \Delta H_D^\theta\, C-C] \times 2$

$= 346\ KJmol^{-1} + (265 \times 2) KJmol^{-1} = 876\ KJmol^{-1}$ **(10 Marks)**

ii. $\Delta H_R^\theta = (876 + 824 + 432 + 297) KJmol^{-1} - (2060 + 346 + 218) KJmol^{-1}$

iii. $= -595 KJmol^{-1}$ **(10 Marks)**

(2)

i. $CO_{2(g)} + 2NH_{3(g)} \rightarrow CO(NH2)_{2\,(g)} + H_2O_{(\ell)}$

$\Delta H_R^\theta = \sum \Delta Hf^\theta product - \sum \Delta Hf^\theta reactants$

$= (-330\ KJmol^{-1} + -286\ KJmol^{-1}) - (-394 - 92)\ KJmol^{-1}$

$= -616\ KJmol^{-1} + 486 KJmol^{-1} = -130\ KJmol^{-1}$ **(10 Marks)**

$\Delta S^\theta = 1\ \Delta H_{R^1}^\theta \times 2 = -260\ Jmol^{-1}$ **(5 Marks)**

$\Delta G^\theta = \Delta H_1^\theta - T\Delta S^\theta$

$= -130\ KJmol^{-1} - (298 \times -260)\ Jmol^{-1} = -52520\ Jmol^{-1}$ **(10 Marks)**

ii. $\Delta G < 0$, Therefore it's spontaneous at 25°C. **(5 Marks)**

70

b. (1)

i. In the saturated solution :

$Ksp = [Br^{2+}_{(aq)}]\ [SO_4^{2-}{}_{(aq)}]$ **(10 Marks)**

Let the concentration of Br^{2+} be x moldm^{-3}.
then$[SO_4^{2-}{}_{(aq)}] = x$ moldm-3.
$Ksp_{BaSO4(aq)} = x^2 mol^2 dm^{-6}$
$x = 1 \times 10^{-5}$

$[Br^{2+}_{(aq)}] = [SO_4^{2-}{}_{(aq)}] = 1 \times 10^{-5} moldm^{-3}$ **(15 Marks)**

ii. Number of moles of Na2SO4 $= \frac{15.62 \times 10^{-3} g}{142 g mol^{-1}} = 1.1 \times 10^{-4} mol$ **(10 Marks)**

$[Na_2SO_{4(aq)}] = [SO_4^{2-}{}_{(aq)}] = 1.1 \times 10^{-4} mol = 11 \times 10^{-5} mol$

(2)

$Na_2SO_4 \rightleftharpoons 2Na^+ + SO_4^{2-}$

$BaSO4_{(s)} \rightleftharpoons Ba^{2+}{}_{(ag)} + SO_4^{2-}{}_{(aq)}$

$1.1 \times 10^{-10} = [Ba^{2+}_{(g)}][SO^{2-}_{4(aq)}]$ **(10 Marks)**

$1.1 \times 10^{-10} = S(S + 1.1 \times 10^5)$

$1.1 \times 10^{-10} = S \times 1.1 \times 10^5$ $S << 1.1 \times 10^5$

Solubility $S = 1 \times 10^{15}$ moldm^{-3}

Precipitate = $1.1 \times 10^{-5} - 1.1 \times 10^{-15} = 1 \times 10^{-5}$mol

$W_{BaSO4} = 1 \times 10^{-5} \times 233 = 2.33 \times 10^{-3}$g **(20 Marks)**

(3)

$Pb(NO_3)_2 + SO_4^{2-} \rightleftharpoons PbSO_4 + 2NO_3^-$

$nPb(NO_3)_2 = n\ PbSO_4$ **(5 Marks)**

$= \frac{32.62 \times 10^{-3}}{303}$

$W\ Pb(NO_3)_2 = \frac{32.62 \times 10^{-3}}{303} \times 331 = 35.64 \times 10^{-3}$ g **(10 Marks)**

80

150

6. a.

i. $N_2 + 3H_2 \leftrightharpoons 2NH_3$

$Kp = \frac{P^2_{NH_3}}{P_{N_2} \times P^3 H_2} = \frac{[(NH_3)RT]^2}{[N_2](RT) \times [(H_2)RT]^3} = \frac{(NH_3)^2}{[N_2][H_2]^3}(RT)^{-2}$

PV - nRT

$P = \frac{n}{V}RT = CRT$

(5 Marks)

$Kp = Kc(RT)^{-2}$ **(10 Marks)**

ii. $NH_{3(g)} \leftrightharpoons \frac{1}{2}N_{2(g)} + \frac{3}{2}H_{2\,(g)}$ $Kc = 75R$

$Kc_1 = \frac{(N_2)^{\frac{1}{2}}(H_2)^{\frac{3}{2}}}{(NH_3)} = 75$ R moldm^{-3} **(10 Marks)**

$N_2 + 3H_2 \leftrightharpoons 2NH_{3(g)}$

$Kc = \frac{(NH_3)^2}{[N_2][H_2]^3}$

$= \frac{1}{(Kc_1)^2} = \frac{1}{(75R)^2}$ mol^{2}dm^{-3} **(20 Marks)**

iii. $Kp = Kc(RT)^{-2} = \frac{1}{(75R)^2}(RT)^{-2}$

$= \frac{1}{(75R)^2} \times (600^{-2})(Nm^{-2})^{-2} = 5 \times 10^{-10} N^2 m^{-3}$ **(10 Marks)**

iv. $[N_2] = [H_2] = 0.2\ moldm^{-3}$

$Kc = \frac{(NH_3)^2}{[N_2][H_2]^3}$

$$\frac{1}{(75R)^2} = \frac{(NH_3)^2}{(0.2 \times 10^3\ moldm^{-3})^4}$$

$(NH_3)^2 = \frac{16 \times 10^8}{(75R)^2} = \frac{4 \times 10^4}{75R}\ molm^{-3}$ **(20 Marks)**

v. $V = 1.5dm^{-3}$

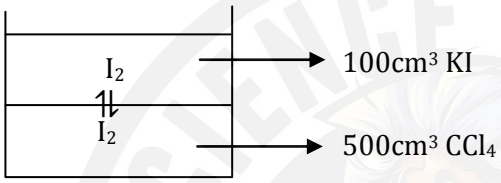
$n\ N_2 = n\ H_2 = 0.2\ moldm^{-3} \times 1.5dm^{-3} = 0.3\ mol$

$P \times 1.5 \times 10^{-3}m^3 = 0.3\ mol \times 8.314 NmK^{-1}mol^{-1} \times 600K$

$P_{N_2} = 1 \times 10^6 Pa = P_{H_2}$ **(15 Marks)**

90

b.



i. $[I_2]_{CCl_4} = \frac{13.716 - x}{500}\ gcm^{-3}$ **(5 Marks)**

$[I_2]_{H_2O} = \frac{x}{100}\ gcm^{-3}$ **(5 Marks)**

$$\frac{\frac{13.716-x}{500}}{\frac{x}{100}} = 9$$

$45x = 13.716\ x$

$46x = 13.716$

$x = {}^{13.716}/_{45}$

Weight of extracted I_2 in KI = 0.304g **(10 Marks)**

ii. Weight of extracted I_2 in KI KI from 13.76g = 0.304g

Weight of extracted I_2 in KI KI from 13.42g = $\frac{0.304}{13.76} \times 13.42 = \frac{4.079}{13.76} = 0.29g$

(5Marks)

Weight of extracted I_2 in KI from 13.13 g = $\frac{0.304}{13.76} \times 13.13 = \frac{3.99}{13.76} = 0.28g$

(5 Marks)

Total weight in three time = 0.874 g **(5 Marks)**

iii. $\frac{\frac{13.716-x}{500}}{\frac{x}{100}} = 9$

$x = \frac{13.716}{16} = 0.857\ g$ **(10 Marks)**

iv. The best way is done individually three times **(5 Marks)**

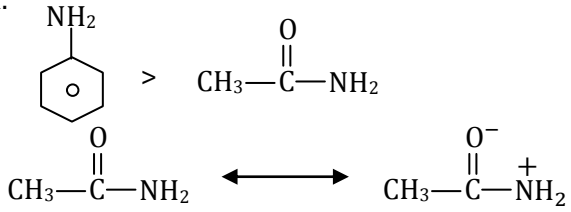
v. Can't extract Cl_2 with using KI because no complex ion forming between KI + Cl^-

(10 Marks)

60

7. a. **(150 Marks)**

vi.

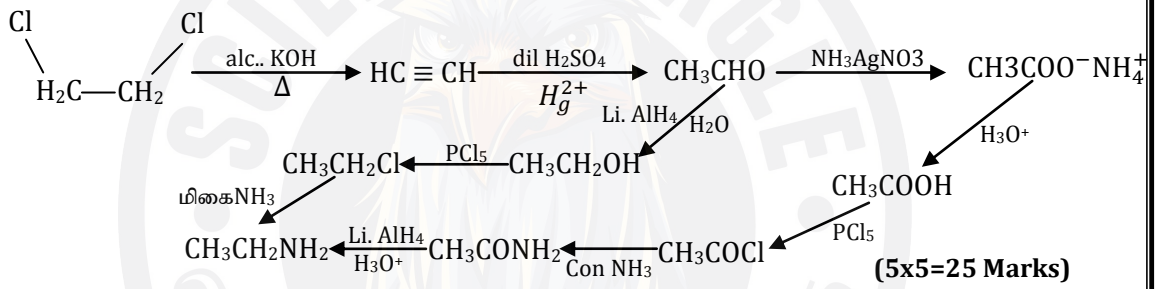


This compounds is neutral **(10 Marks)**

b. - OH is strong activating group so increases electron density in benzene ring
- NO_2 is deactivating group decreases elections density in benzene ring

(10 Marks)

c.

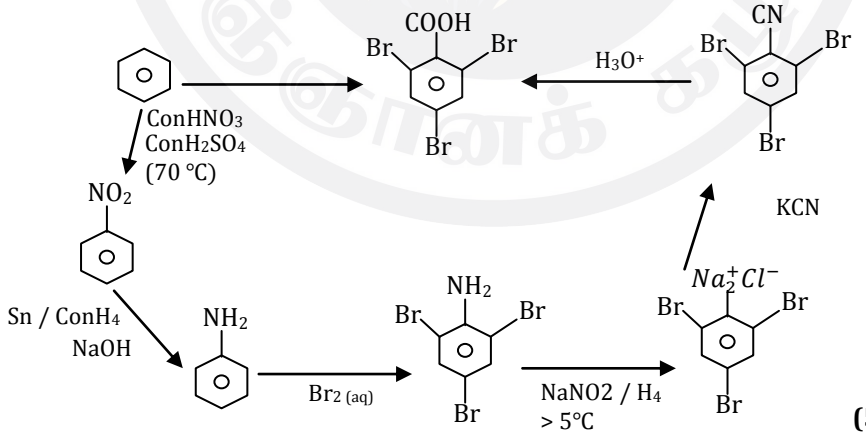


(5x5=25 Marks)

(4x5=20 Marks)

d.

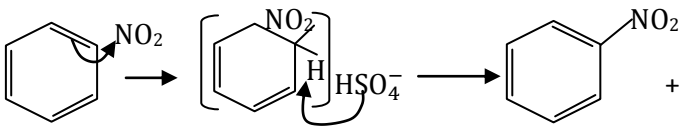
i.



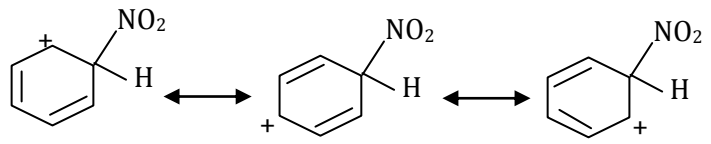
(5x5=25 Marks)

(6x5=30 Marks)

ii. $HNO_3 + H_2SO_4 \rightleftharpoons NO_2^+ + HSO_4^- + H_2O$ **(10 Marks)**



(10 Marks)



(10Marks)

150

8. b. 1.

i. A chloride ppt found $PbCl_2$, AgCl, Hg_2Cl_2, Cu_2Cl_2

ii. Amphoteric metal may present.

iii. A chromium salt / Cr^{3+}, Salt with a white ppt (Amphoteric meal may present Zn

iv. Zn is present

v. Cr is present

vi. Zn is present

vii. AgClppt Ag^+ salt found / Cu is found

viii. Confirms Ag is found. **(8x4=32 Marks)**

Metals : Zn, Cr, Cu **(3 x 5 = 15 Marks)**

Salt Ag+ salt **(5 Marks)**

2.

ii. $Cr^{3+} + 4\ NaOH_{ex} \rightarrow NaCr(OH)_{4\,(aq)} + 3Na^+$ ($Na_3Cr(OH)_6$ also possible)

$Zn^{2+} + 4\ NaOH_{ex} \rightarrow Na_2ZnO_2 + 2H_2O + 2Na^+$

iii. $NaCr(OH)_4 + H^+ \rightarrow Cr(OH)_3 \downarrow + H_2O + Na^+$

$Na_2ZnO_2 + 2H^+ \rightarrow 2Na^+ + Zn(OH)_2$

iv. $2Cr^{3+} + 10NaOH + 3H_2O_2 \rightarrow Na_2CrO_4 + 8H_2O + 6Na^+$

v. $2CrO_4^{2-} + 2H^+ \leftrightharpoons Cr_2O_7^{2-} + H_2O$ **(6x5=30 Marks)**

3. A - $CrCl_3$ / $[CrCl_3(H_2O)_3]$ / $Cr^{3+}_{(aq)}$ - Green

B - $NaCr(OH)_4$ - Green

C - $Cr_2O_7^{2-}{}_{(aq)}$ - Orange **(6x3=18 Marks)**

c.

i. $5FeI_2 + 3KMnO_4 + 24H^+ \Rightarrow 5Fe^{3+} + 5I_2 + 3Mn^{2+} + 2H_2O$

$KI + I_2 \rightarrow KI_3$ (Not essential)

$I_2 + 2Na_2S_2O_3 \rightarrow 2NaI + Na_2S_4O_6$

$Fe^{3+} + 3NaOH \rightarrow Fe(OH)_3 \downarrow$

$Mn^{2+} + 2NaOH \rightarrow Mn(OH)_2 \downarrow$ **(4x5=20 Marks)**

ii. n MnO_4^- $= 0.2 moldm^{-3} \times 50 \times 10^{-3} dm^3 = 10 \times 10^{-3}\ mol$

n MnO_4 : n I_2 = 3 : 5

n $I_2 = \frac{10}{3} \times 5 \times 10^{-3} mol = \frac{50}{3} \times 10^{-3} mol$

n I_2 : n $Na_2S_2O_3$ = 1 : 2

n $Na_2S_2O_3 = \frac{\frac{100}{3} \times 10^{-3} mol}{0.2 moldm^{-3}} = 133.34 cm^3$

n Fe^{3+} : n MnO_4^- = 5 : 3

n $Fe^{3+}_{(aq)} = \frac{10}{3} \times 5 \times 10^{-3}$mol

$\frac{50}{3} \times 10^{-3}$mol

(20 Marks)

iii. $n\ Mn^{2+} = n\ MnO_{4\ (aq)}^- = 10 \times 10^{-3}\ mol$

Total weight = $10 \times 10^{-3}\ mol \times 54 gmol^{-1} + \frac{50}{3} \times 10^{-3}$mol $54 gmol^{-1}$ = 1.4734g

(10 Marks)

150

9. a.

i. 1 - Seawater 6 - $NaHCO_3$ 11 - $CaCO_3$ 16 - Coconut oil

ii. 2 - NaCl 7 - Heat 12 - Coaltar

iii. 3 - con $NaCl_{(aq)}$ 8 - CaO 13 - CaC_2

iv. 4 - NaOH 9 - CO_2 14 - $Ca(OH)_2$

v. 5 - Soap 10 - 900°C 15 - NH_4^+

(15x4 = 70 Marks)

(1) Solvay process **(3 Marks)**

(2) Solubility $KHCO_3$ is High No precipitate **(5 Marks)**

$X_2 \Rightarrow Cl_2$ gas **(2 Marks)**

80

b.

i. NO, NO_2, CO_2, CO, SO_2, C_xH_y **(10 Marks)**

ii. C dust, Pb Dust, PbO dust **(5 Marks)**

iii. NO_2, SO_2 **(5 Marks)**

iv. CO_2 solution pH > 5.1

acid rain pH < 5.1 **(10 Marks)**

v. NO, NO_2, CO_2, CO, H_2O, SO_2 **(10 Marks)**

vi. No, G.H keep the temperature normally. Excess G.H is increase tempratane

(10 Marks)

70

vii. NO_2, NO, C_xH_y **(10 Marks)**

150

viii. Aldehyde, PAN / PBN **(10 Marks)**

10. a.

i. Cathode - Cu Anode - Zn **(2 x 5 = 10 Marks)**

ii. Positive electrode - Cu Negative electrode - Zn **(5 Marks)**

iii. Current flow Cu → Zn

Electron flow Zn → Cu **(10 Marks)**

iv. $E^{\theta} = E^{\theta}\text{cathode} - E^{\theta}\text{anode}$

$= E^{\theta}Cu^{2+}_{(aq)} / Cu_{(s)} - E^{\theta}Zn^{2+}_{(aq)} / Zn_{(s)}$

= + 0.34V - (-0.76V) = +1.1V **(10 Marks)**

v. No change because $Zn^{2+}_{(aq)}$ No change **(5 Marks)**

vi. Complete the electrical circuit without changing in electrolytes **(5 Marks)**

vii. KCl, $NaNO_3$ ionic compounds and soluble in ivater **(5 Marks)**

viii. (1) EMF - No change

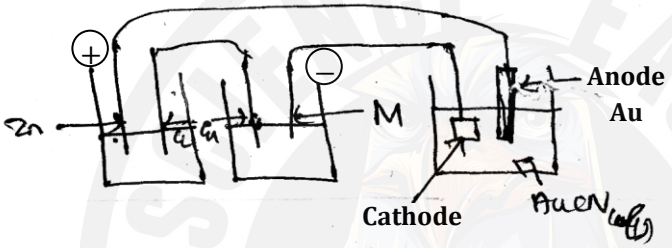
(2) EMF - No change

(3) EMF - No change

(4) EMF - No change **(10 Marks)**

60

b.



(10 Marks)

i. 2.61V **(5 Marks)**

ii. Anode : $Au_{(s)} \rightarrow Au^{+}_{(aq)} + e$

Cathode : $Au^{+}_{(aq)} + e \rightarrow Au_{(s)}$ **(5 Marks)**

iii. No change in concentration of solution and E.M.F **(5 Marks)**

c.

i. V = IR

$I = \frac{V}{R} = \frac{2.61V}{0.522\Omega} = 5A$ **(10 Marks)**

ii. Volume placed = 25mm x 50mm x 0.1mm = 125 x 10^{-9} m^3 **(5 Marks)**

Mass of Au = 125 x 10^{-9} m^3 x 19300Kgm^{-3} = 2.4125 x 10^{-9} Kg = 2.4125g **(10 Marks)**

iii. n Au = $\frac{2.4125g}{197gmol^{-1}} = 0.012$ mol

Q = It ❒ 0.012mol x 96500$Cmol^{-1}$ = 5A x t

t = 236.35 seconds **(10 Marks)**

iv.

1) $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$
2) $NH_4NO_2 \xrightarrow{\Delta} N_2 + 2H_2O$
3) $3NH_4NO_3 + 8NaOH + 8Al \longrightarrow 6NH_3 + 8NaAlO_2 + H_2O$
4) $2Cr(OH)_3 + 10NaOH + 3Br_2 \longrightarrow 2Na_2CrO_4 + 6NaBr + 8H_2O$
5) $S + \text{con b } HNO_3 \longrightarrow H_2SO_4 + 6NO_2 + 2H_2O$
6) $4NH_3 + Cl_2 \longrightarrow 3NH_4Cl + NCl_3$ **(6 X 5 = 30 Marks)**

90

150