MS OF CHEMISTRY FORM THREE EXAM.

SECTION: A

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
C	A	B	C	C	D	A	C	C	B

10 marks

2

LIST A	i	ii	iii	iv	v	vi
LIST B	E	D	A	B	F	E

06 marks

SECTION B.

3. (a) $Na_2CO_3 + 2HCl \longrightarrow 2NaCl + H_2O + CO_2$ — 01 mark

$N_A = 2,\ N_B = 1.$

(b) (i) $M_B = \frac{M_A V_A N_B}{V_B N_A} = \frac{0.25 \times 20 \times 1}{25 \times 2}$ — 01 mark

$M_B = 0.1M.$ — 01 mark

(ii) Concentration of $Na_2CO_3 \cdot X H_2O$

From: concentration $= \frac{\text{mass}}{\text{volume } (dm^3)}$ — $\frac{1}{2}$ mark

$= \frac{7.15g}{0.25\,dm^3}$ — $\frac{1}{2}$ mark $= 28.6\,g/dm^3$ — 01 mark

(iii) Molar mass of $Na_2CO_3 \cdot X H_2O$

$\text{Molarity} = \frac{\text{concentration}}{Mr}$

$Mr = \frac{\text{conc}}{\text{Molarity}}$ — $\frac{1}{2}$ $= \frac{28.6\,g/dm^3}{0.1M}$ — $\frac{1}{2}$ $= 286\,g/mol.$ — 01 mark

(iv) Value of X

$Na_2CO_3 \cdot X H_2O = 286$

$106 + 18X = 286$

$18X = 286 - 106$

$\frac{18X}{18} = \frac{180}{18}$ — 01 mark

$X = 10$ — 01 mark

(4) (a) P — concentrated nitric acid. — 01½ marks
Q — Dilute nitric acid. — 01½ marks.

(b)

REACTIONS:

→ $Mg + 4HNO_3$ (conc) $\longrightarrow Mg(NO_3)_2 + 2NO_2 + 2H_2O$
P — 3 marks

→ $Mg + HNO_3$ (dilute) $\longrightarrow Mg(NO_3)_2 + H_2(g)$ — 3 marks
Q

(5) (a) carbon dioxide is tested by lime water. carbon dioxide turn lime water milky. — 03 marks

$CO_{2(g)} + Ca(OH)_{2(aq)} \longrightarrow CaCO_{3(s)} + H_2O_{(l)}$.
— 03 marks

(b) — $2NaHCO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O + 2CO_2$
— 03 marks

(6) (a) A bright yellow precipitate of lead iodide is formed. — 03 marks

(b) IONIC EQUATION:

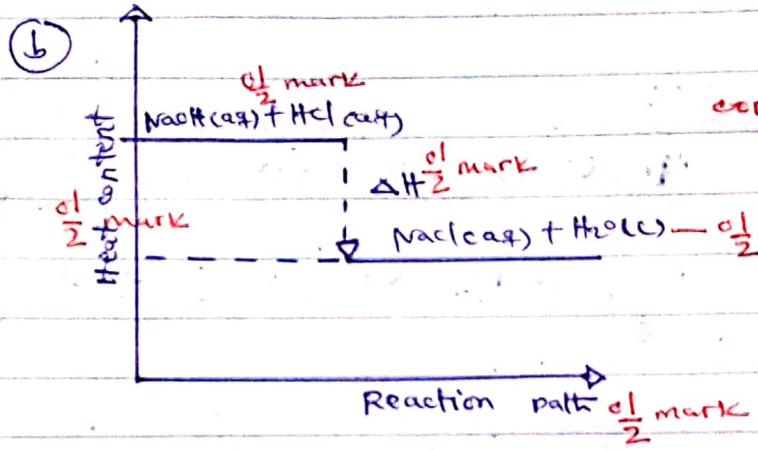
$Pb^{2+}_{(aq)} + I^-_{(aq)} \longrightarrow PbI_{2(s)}$. — 03 marks

(c) CHEMICAL EQUATION:

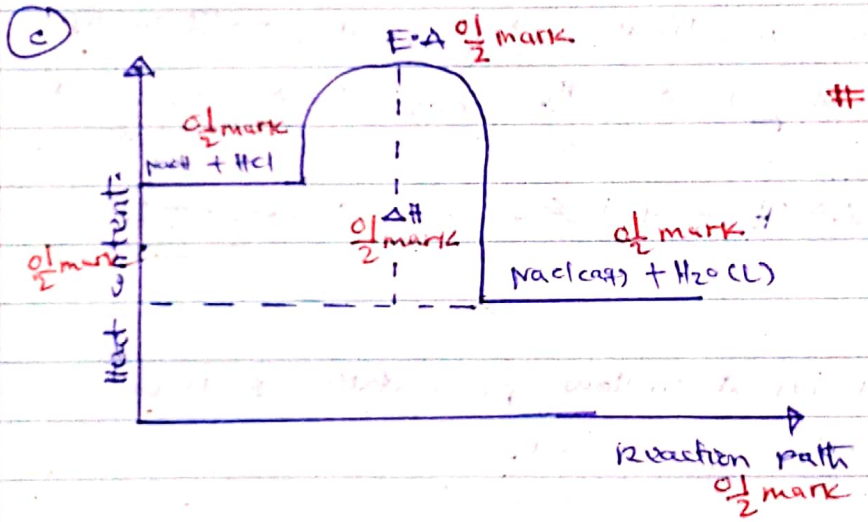
$Pb(NO_3)_{2(aq)} + 2KI_{(aq)} \longrightarrow PbI_{2(s)} + 2KNO_{3(aq)}$
— 03 marks

(7) (a) The reaction is exothermic since there is a temperature rise in the reaction mixture. 02 marks

(b)



(c)



(8) (a) (i) Oxidizing agent is Iodine (I_2) — 03 mark

(ii) Reducing agent is potassium (K). 03 mark

(b) OXIDATION REACTION:

$K(s) \longrightarrow K^+(g) + e^-$ 03 mark

SECTION C

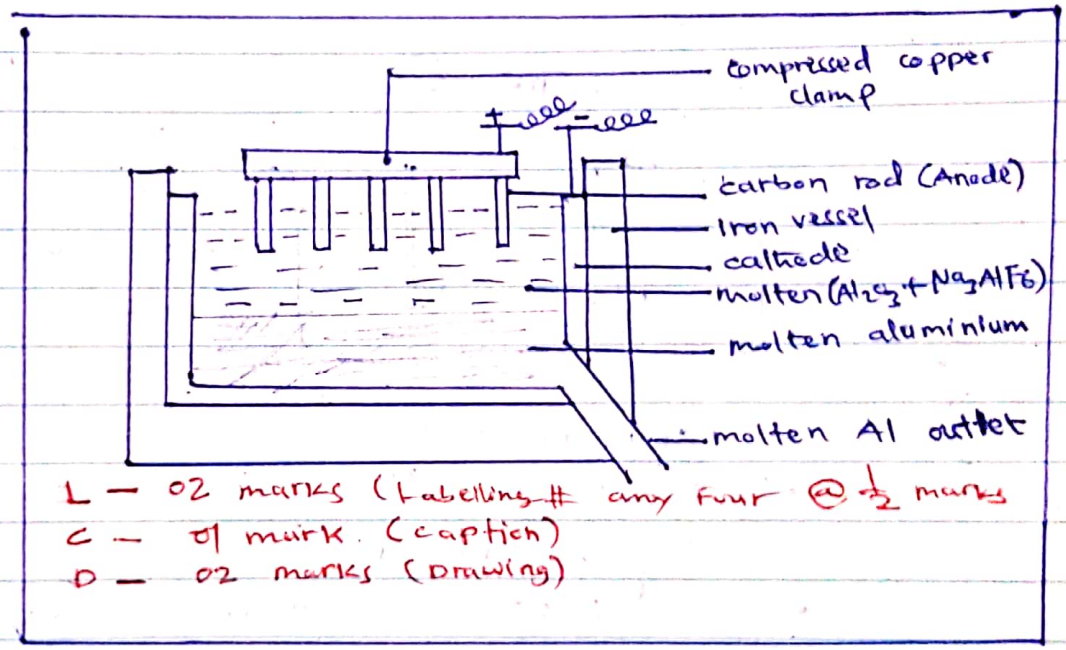
(9) (a) (i) $Na_2CO_{3(s)} + Al_2O_3 \cdot 2H_2O_{(s)} \longrightarrow 2NaAlO_{2(l)} + 2H_2O + CO_{2(g)}$. — 02 marks

(ii) $2NaAlO_{2(l)} + 3H_2O + CO_{2(g)} \longrightarrow 2Al(OH)_{3(s)} + Na_2CO_{3(aq)}$. — 02 marks

(iii) $2Al(OH)_{3(s)} \xrightarrow{1500^\circ C} Al_2O_{3(l)} + 3H_2O_{(l)}$. — 02 marks

(b) Mixture of cryolite and Bauxite. ($Na_3AlF_6 + Al_2O_3 \cdot 2H_2O$). — 02 marks

(c)



L — 02 marks (Labelling # any four @ ½ marks)
C — 01 mark (caption)
D — 02 marks (Drawing)

(d) ANODIC REACTION:

$2O^{2-} \longrightarrow O_{2(g)} + 4e^-$; — 01 mark.

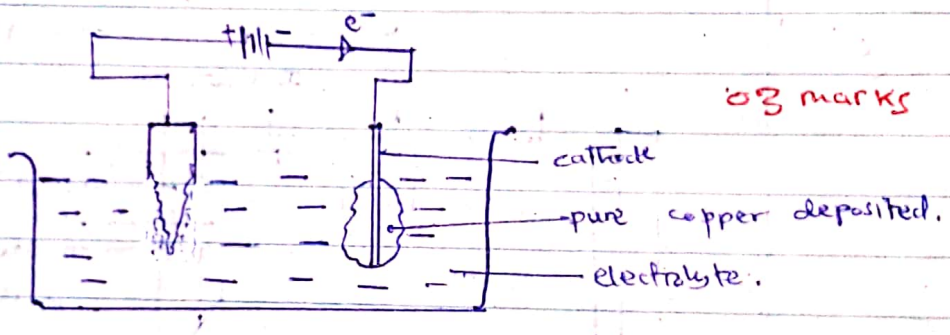
CATHODIC REACTION:

$Al^{3+} + 3e^- \longrightarrow Al_{(s)}$. — 01 mark.

10. (a) — Ablister copper is made an Anode, and cathode is made up a thin sheet of pure copper during electrolyte purification. 02 marks

— Then dissolved in mixture of copper (II) sulphate and sulphuric acid which as electrolyte. -02 marks

— When electricity passed, Anode dissolves and pure copper deposited at cathode while impurities settle at the bottom of the electrolytic tank. 02 marks



03 marks

ANODE REACTION:

— $Cu_{(s)} \longrightarrow Cu^{2+}_{(aq)} + 2e^-$ - 02 marks

CATHODE REACTION:

— $Cu^{2+} + 2e^- \longrightarrow Cu_{(s)}$. 02 marks

(b) — A reduction because a metal ore is, converted to an oxiden, then reduced into crude metal. 02 marks

11. (a) APPLICATIONS of ELECTROLYSIS:

(i) applied in production of gases. 02½ marks

(ii) applied in purification of copper ~~by electrolysis~~ 02½ marks

(iii) applied in electroplating. 02½ marks

#: When explained @2½

#: When mentioned @1

(b) From: $\text{mass} = \frac{Ar \times I \times t}{V \times F}$ # 01½ marks

Where: $Ar = 63.5$
$I = 7.5A$
$t = 100$ seconds.
$F = 96500\,C$
$V = 2$
} 01 mark

So; $\text{mass} = \frac{63.5 \times 7.5 \times 100}{2 \times 96500}$ 02½ marks

$\text{mass} = 0.247g$ 02½ mark