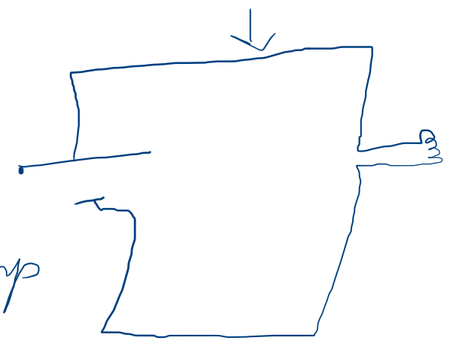
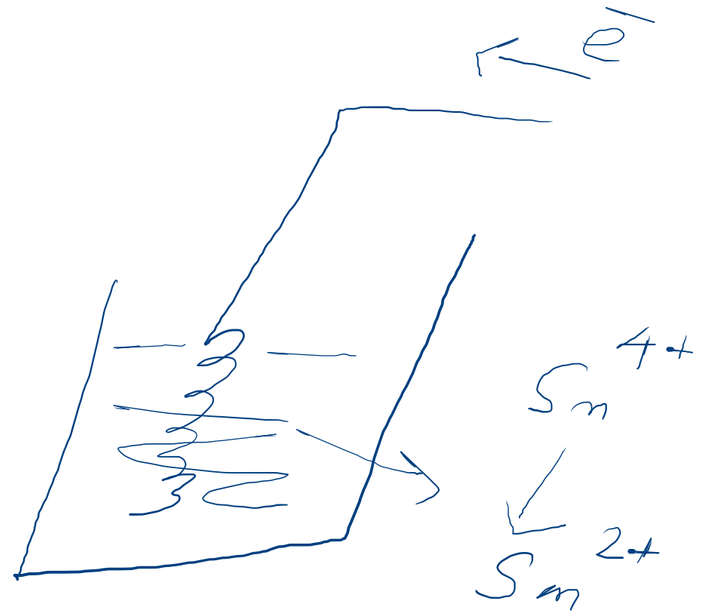
Current :-

$$I = \frac{q}{s} : C/s \rightarrow \text{Amp}$$



$q = nF$ — no. of mole; Faraday's const.

$$I = \frac{nF}{s} \quad s \rightarrow \text{time (Sec)}$$



$$2\bar{e} + Sn^{4+} \longrightarrow Sn^{2+}$$

4·24 m mole

@ 4·24 m mol

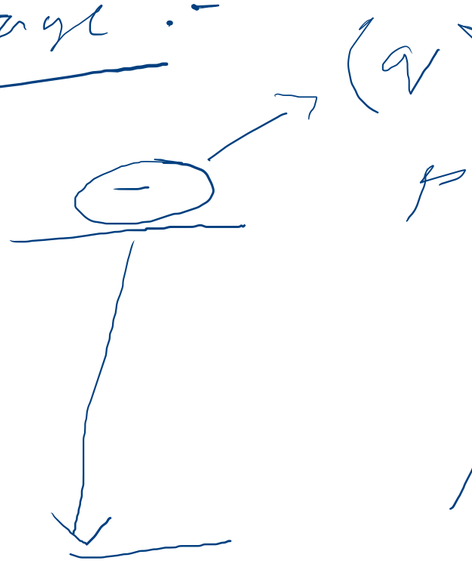
$$n = 2 \times 4.24 \times 10^{-3} \text{ mole}$$

$$= 8.48 \times 10^{-3} \text{ mole}$$

time : 1 hr → 60 × 60 = 3600 sec

$$I = \frac{8.28 \times 10^{-3} \times 96500}{3600\ s} = 0.23\ \text{Amp} \quad (C/s)$$

Voltage :-

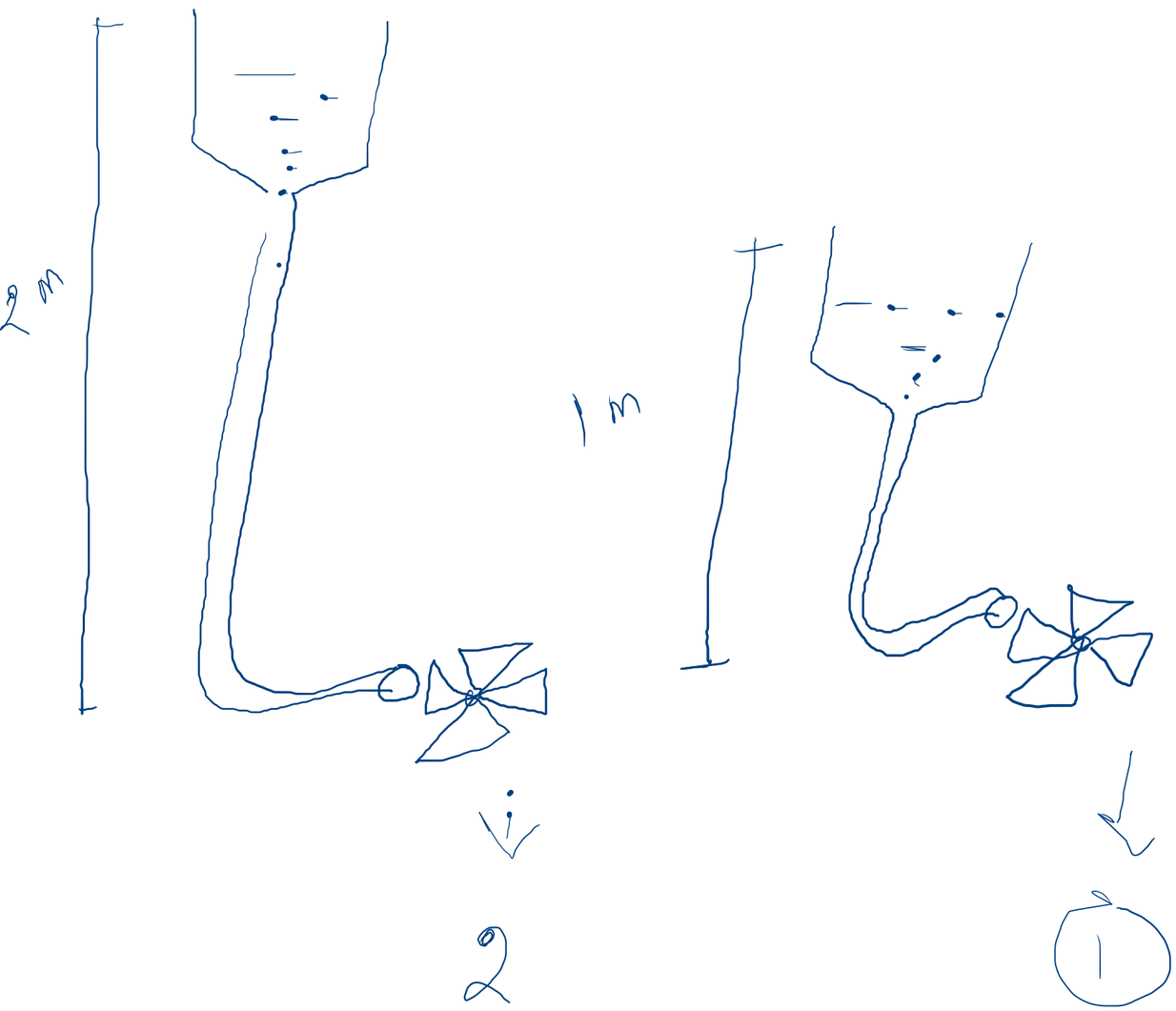


Potential - 1 (V_1)

Potential - 2 (V_2) Potential difference (Δ) = $V_1 - V_2$

Work done = $q \times \Delta$

= $n \times \Delta$



Work = $-\Delta G$

$-\Delta G = nFE$

$\Delta G = -nFE$

C

$C \times V = J$

Power (P) = $\frac{\text{work}}{s}$ = (J/s) → watt

= $\frac{Eq}{s}$ = $\frac{nFE}{s}$ = $\underline{E} \times \underline{I}$

$\underline{I}$

$Q = n \times F \rightarrow C$

$\underline{I} = Q/s \rightarrow \frac{nF}{s} \rightarrow Amp$

$Work = nFE \rightarrow J \rightarrow C \times V$

$P = \frac{nEE}{s} \rightarrow watt$

$\underline{I} = E/R$

Balancing Redox reaction

→ Law of Conservation of Mass

→ Conservation of $\bar{e}$

$$Sn^{2+} + Fe^{3+} \longrightarrow Sn^{4+} + Fe^{2+}$$

$1\times$ $\quad Sn^{2+} \longrightarrow Sn^{4+} + 2e^-$

$2\times$ $\quad 1Fe^{3+} + 1e^- \longrightarrow Fe^{2+}$

$Sn^{2+} \longrightarrow Sn^{4+} + 2e^-$

$2Fe^{3+} + 2e^- \longrightarrow 2Fe^{2+}$

$Sn^{2+} + 2Fe^{3+} \longrightarrow Sn^{4+} + 2Fe^{2+}$

Method 2 half reaction

$$MnO_4^- + C_2O_4^{2-} \longrightarrow Mn^{2+} + CO_2$$

$$MnO_4^- \longrightarrow Mn^{2+}$$

$$C_2O_4^{2-} \longrightarrow CO_2$$

Balance all elements other than O & H

$$MnO_4^- \longrightarrow Mn^{2+}$$

$$C_2O_4^{2-} \longrightarrow 2CO_2$$

Balance O by adding H_2O

$$MnO_4^- \longrightarrow Mn^{2+} + 4H_2O$$

$$C_2O_4^{2-} \longrightarrow 2CO_2$$

Balance H by adding H^+

$$8H^+ + MnO_4^- \longrightarrow Mn^{2+} + 4H_2O$$

$$C_2O_4^{2-} \longrightarrow 2CO_2$$

Balance the Charge by adding e^-

$$5e^- + 8H^+ + MnO_4^- \longrightarrow Mn^{2+} + 4H_2O \qquad \times 2$$

$$C_2O_4^{2-} \longrightarrow 2CO_2 + 2e^- \qquad \times 5$$

---

multiply with an integer to Balance $\bar{e}$

$$10\bar{e} + 16H^+ + 2MnO_4^- \longrightarrow 2Mn^{2+} + 8H_2O$$

$$5C_2O_4^{2-} \longrightarrow 10CO_2 + 10\bar{e}$$

$$16H^+ + 2MnO_4^- + 5C_2O_4^{2-} \longrightarrow 2Mn^{2+} + 8H_2O + 10CO_2$$

Strategic plan

1. Balance all element other than O & H
2. Balance O by adding H_2O
3. Balance H by adding H^+
4. Balance the Charge by adding $\bar{e}$

5. Balance the $\bar{e}$ by multiplying with integers

6. add half reaction

1. $Cu + NO_3^- \longrightarrow Cu^{2+} + NO_2$

2. $Mn^{2+} + NaBiO_3 \longrightarrow Bi^{3+} + MnO_4^-$

Balancing reaction in Basic medium

1. Balance all element other than O & H
2. Balance O by adding H_2O
3. Balance H by adding H^+

5. Balance the $\bar{e}$ by multiplying with integers

6. add half reaction

1. $Cu + NO_3^- \longrightarrow Cu^{2+} + NO_2$

2. $Mn^{2+} + NaBiO_3 \longrightarrow Bi^{3+} + MnO_4^-$

Balancing reaction in Basic medium

1. Balance all element other than O & H
2. Balance O by adding H_2O
3. Balance H by adding H^+

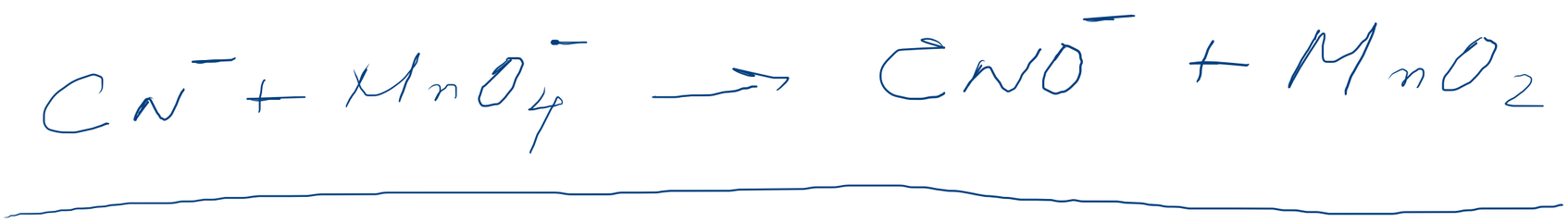
4. neutralize $I-1^+$ by adding $OH-1^-$

5. Balance the charge by adding $\bar{e}$

6. Balance the $\bar{e}$ by multiplying with integer

7 Sum up half reaction

8 Check the result.



$CN^- \rightarrow CNO^-$

$MnO_4^- \rightarrow MnO_2$

Balance all element other then O & H

$$CN^- \longrightarrow CNO^-$$

$$MnO_4^- \longrightarrow MnO_2$$

Balance O by adding H_2O

$$H_2O + CN^- \longrightarrow CNO^-$$

$$MnO_4^- \longrightarrow MnO_2 + 2H_2O$$

Balance H by adding H^+

$$H_2O + CN^- \longrightarrow CNO^- + 2H^+$$

$$4H^+ + MnO_4^- \longrightarrow MnO_2 + 2H_2O$$

---

neutralize H^+ by medium with OH^-

$$2OH^- + H_2O + CN^- \longrightarrow CNO^- + 2H_2O$$

$$4H_2O + MnO_4^- \longrightarrow MnO_2 + 2H_2O + 4OH^-$$

$2OH^- + H_2O + CN^- \rightarrow CNO^- + 2H_2O + 2e^-$ $\times 3$

$4H_2O + MnO_4^- + 3e^- \rightarrow MnO_2 + 2H_2O + 4OH^-$ $\times 2$

Balance e^- by multiplying by integer

$6OH^- + 3H_2O + 3CN^- \rightarrow 3CNO^- + 6H_2O + 6e^-$

$8H_2O + 2MnO_4^- + 6e^- \rightarrow 2MnO_2 + 4H_2O + 8OH^-$

$6OH^- + 2MnO_4^- + 3CN^- + XH_2O \rightarrow 3CNO^- + 2MnO_2 + 8OH^-$

$+ XH_2O$

$2MnO_4^- + 3CN^- + H_2O \rightarrow 3CNO^- + 2MnO_2 + 2OH^-$