classmate

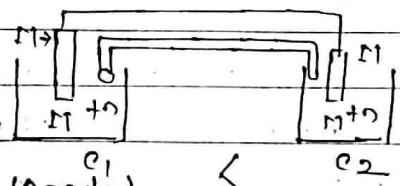
Date 16

Page

Concentration cell

- 2 metal rod of same metal are dipped in same electrolyte soln of Diff conc. & both connected through salt bridge formed galvanic cell → conc cell.

For it $\boxed{E^0_{cell} = 0}$



$C_2 > C_1$ then cell rxn spontaneous & $E_{cell} = +ve$.

if $C_1 = C_2$ then rxn stops.

Reversiable or Irreversiable cell :-

cell rxn is reversiable when

1. cell rxn is stops when apply ext. emf equal to cell emf.
2. cell rxn is excatly reversed and current will flow in opposite dirn when apply ext. emf is slightly greter than cell emf.
3. if cell emf < ext. emf

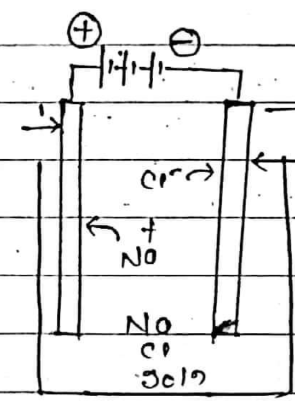
$Zn^{++} + Cu \longrightarrow Zn + Cu^{++}$ (reversed)

- Daniel cell is example of reversiable cell.

⇒ if above condn is not satisfied then cell is irreversiable.

eg. Zn / H_2SO_4 / Ag cell.

Electrolysis



Cathode → cation
Red^n

Anode → Anion
oxid^n.

→ During electrolysis, free energy of system ↑ so $-\Delta G = +ve$ & non spontaneous cell.

Imp. pt :-

1. During electrolysis less active element discharge firstly.
2. During electrolysis, electrolytic soln remains electrically neutral.

Product of Electrolysis Depends on

1. Nature of Electrode (active or inactive) (2) Nature of electrolytic sol^n.
3. conc of electrolytic sol^n (4) charge density of electric current.

Preferential Discharge theory

- if in electrolysis more than one ion attracted toward electrode then ion having least value of Discharge potential will discharge firstly
→ At cathode, red^n occurs. ion greater SRP reduced firstly.
→ At Anode, oxd^n occurs. ion greater SOP oxidised firstly.
- For cation → Li^{++}, K^+ ...... Au^{+3}
  For Anion → $SO_4^{--}, NO_3^-, OH^-, Cl^-, Br^-, I^-$
  Tendency to get discharge ↑ ⇒ Discharge potential ↓.

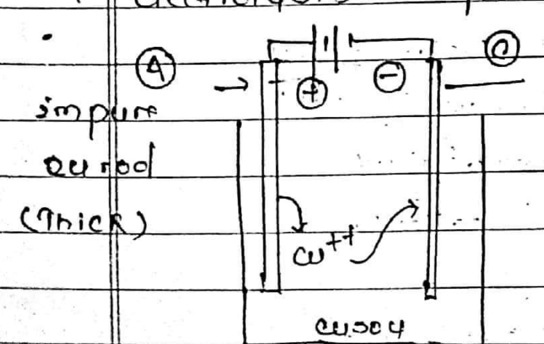
Some exp. case

1. Electrolysis of very dilute sol^n.
   in it excess amount of H^+ & OH^- so the deposite firstly on electrode irrespective of which type sol^n electrolysed.
   $2H^+ + 2e^- \rightarrow H_2$ (cathode) } always.
   $2OH^- \rightarrow H_2O + 1/2 O_2 + 2e$ (anode)

2. Electrolysis of aq. sol^n of electrolite having Hg (active electrode)
   NaCl aq. sol^n →
   Cathode $Na^+ + e + Hg \rightarrow NaHg$ Due to exc. of Hg, Metal ion's
   Anode $Cl^- \rightarrow 1/2 Cl_2 + e$ DP ↓ so reduced firstly.

3. Electrolysis of aq. sol^n of H_2SO_4 By pt-electrod & High current.
   $H_2SO_4 \xrightarrow[\text{current}]{\text{High}} H^+ + HSO_4^-$
   Anode $2HSO_4^- \rightarrow H_2S_2O_8 + 2e^-$
   cathode $2H^+ + 2e^- \rightarrow H_2$.

4. Electrolysis of Aq. sol^n of $CuSO_4$ By using Cu electrode (Refining process).



→ conc of $CuSO_4$ sol^n is unaffected
→ Here decomposi^n of $CuSO_4$ sol^n not occurs
some consider as electrolysis process.

28. Main features of different cells.

	Names of the cell/Battery	Anode	Cathode	Electrolyte
(i)	Dry cell	Zinc	Graphite	$MnO_2 + C$ (touching cathode) $NH_4Cl + ZnCl_2$ (touching anode)
(ii)	Mercury cell	Zinc	Graphite	$HgO+KOH$ (moist)
(iii)	Lead storage battery	Lead	Lead dioxide	H_2SO_4 (38%)
(iv)	Ni-Cd cell	Cadmium	Nickel dioxide	KOH sol.
(v)	H_2–O_2 fuel cell	Porous carbon contg catalysts (H_2 passed)	Porous carbon contg catalstss (O_2 passed)	Conc. aq. KOH sol.

...nce are deposited.

...Faraday].

...mical equivalent.

...n, same

⇒ Comparision b/w electrolytic & electrochemical cell

(1)	Electrochemical	Electrolytic
(1)	Anode ⊖ & cathode (+).	(1) Anode ⊕ & cathode ⊖
(2)	Current flow – C ⟶ A	(2) Current flow – A ⟶ C
(3)	Cell rxn – spontaneous & separate beaker & salt bridge use.	3. Cell rxn : nonspo. & same beaker & salt bridge ✗.
4.	Deposition only at cathode	(4) Deposition on Both.

Some extra point

1. Relⁿ b/w molar conductance of ion (λm) & mobility of ion (u)

$\boxed{\lambda m = F\mu}$ = F = Faraday const

2. Transport no. or, Hittrof's no.

$\boxed{t_a + t_c = 1}$ $\quad t_c = \dfrac{\lambda c}{\lambda c + \lambda a} = \dfrac{u_c}{u_c + u_a}$

λc = molar conductance of cation.

Commercial Batteries

(1) Primary (non Rechargable) ⟨ Drycell (leclanchecell), mercury cell (1.35 V)

(2) Secondary (Rechargable ⟨ lead storage battery, Ni/cd battery.

(3) Fuel cell – pollⁿ free cell

Used appolo space ship programme.