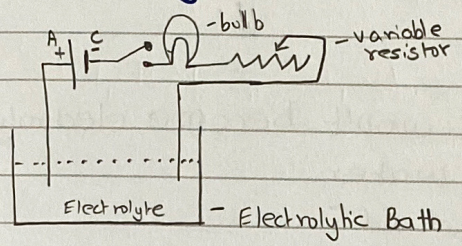
Electrolysis

↳ Electricity break



Electrolyte → substance capable of conducting electricity either in the molten state or in the aqueous state due to the presence of mobile ions

eg. when $NaCl_{(s)} \xrightarrow{heat} NaCl_{(l)} \rightarrow Na^+_{(l)}\ Cl^-_{(l)}$ mobile ions

cathode → negative
anode → positive

Na^+ → cation
Cl^- → anion

Na^+ Cl^-
Cl_2 A^+ C^- → Na metal

to bring about a
↑ Red-ox reaction in which the ions are discharged as neutral atoms or molecules at the respective electrodes.
↳ electrolysis definition

* electrolysis cannot occur in solids as the force between ions is so strong that they are unable to break from their lattice

Water dissolves the ionic lattice thereby the ions are free to move in the solution which results in electrical conduction.
↳ aqueas

Thermal energy reduces the electrostatic force of attraction btwn the oppositely charged ions in the ionic lattice which causes the ions to become free and help conduct electricity.
↳ molten.

Reduction at Cathode — Red Cat
oxidation at anode — An Ox

For electrolysis → need to have ions

In concentrated form, any substance won't become electrolyte
to become electrolyte → dissolve in water.

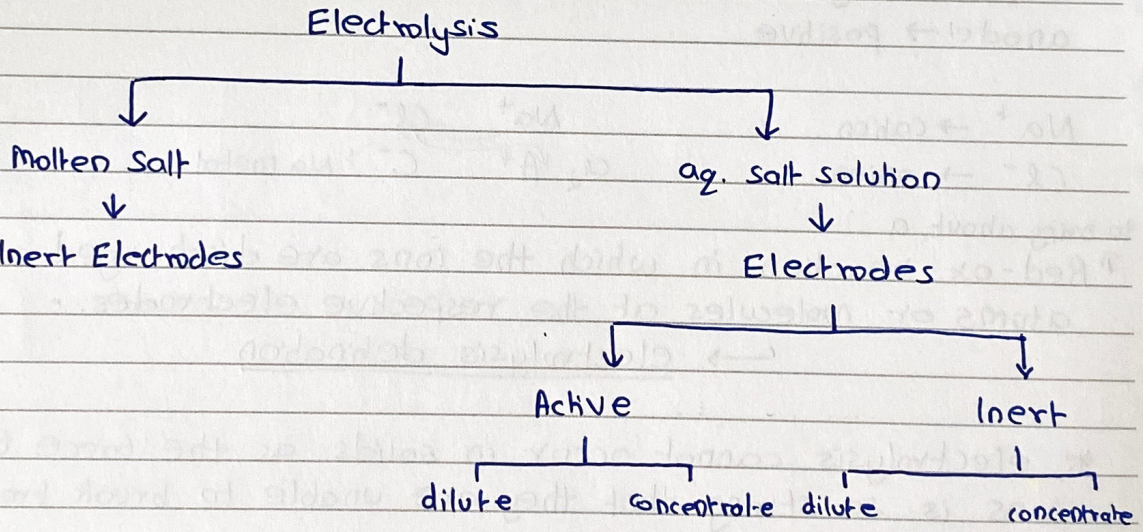
eg. Conc. $HCl + H_2O \longrightarrow H^+ + Cl^-$

$HNO_3 + H_2O \rightarrow H^+ + NO_3^-$

$NaOH + H_2O \rightarrow Na^+ + OH^-$

* More you dissolve : more it conducts

Electrodes
↳ Active
↳ Inert



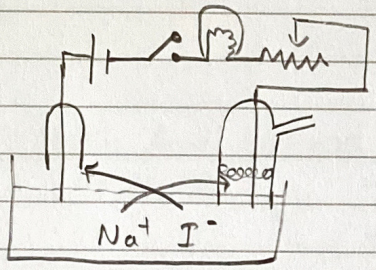
Molten Salt

eg. $NaI(l) \rightarrow Na^+(l) + I^-(l)$

forms $2Na(l) + I_2(g)$

Iodine becomes gas becose the anode it is hot, vapourising it.

The iodide ions move towards anode. The two iodide ions transfer 2 e^- to surface of the anode and they form I_2 molecule. Due to high heat that prevails in the bath, purple vapours of iodine are observed. The 2 e^- from anode move to the cathode ~~in the er~~ through the external circuit during which the bulb glows. The two e^- at cathode are consumed by 2 Na atoms at cathode bringing about a reduction reaction and result in the formation of molten sodium metal. Molten Na floats on the electrolyte as it is less dense than the electrolyte.



aq. salt solution

Anionic series:

- SO_4^{2-}, NO_3^- → spectator ions (never liberate)
- F^-, Cl^-, Br^-, I^- → Concentrated solution (liberate only in these)
- OH^- → In lieu of (alternative to) SO_4^{2-} or NO_3^- → dilute

Catanoic series

Reactive ... stable/unreactive

$K \rightarrow K^+ + 1e$

$Ca \rightarrow Ca^{2+} + 2e$

$Pb \rightarrow Pb^{2+} + 2e$

$[H] \rightarrow H^+ + 1e$

$Cu \rightarrow Cu^{2+} + 2e$

Pt (unreactive) $\rightarrow Pt^{4+} + 4e$ (very unstable/reactive)

If metal is reactive is ion is unreactiv
and vica verca