Topic 5: Acids, Salts, Electrolysis

ACIDS

- contain H^+ ion dissociated from molecule eg $HCl \rightarrow H^+ + Cl^-$
- common acids: hydrochloric (HCl), sulphuric (H_2SO_4), nitric (HNO_3), ethanoic (CH_3COOH)
- pH is a scale of H^+ concentration
- higher H^+ concentration, the lower the pH.
  - pH 1-3 = very acidic = lots of H^+
  - pH 1 → 2 : H^+ concentration diluted by 10.
- strong & weak acids
  - fully dissociate → lower pH concentration = higher pH
  - partially dissociate

SALTS

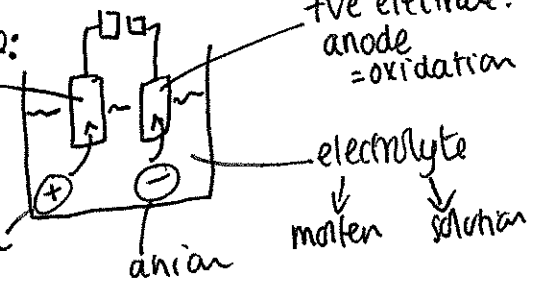
- acids react with bases in neutralisation reactions to make a salt + water
- 3 bases: metal oxide : $2H^+ + O^{-2} \rightarrow H_2O$
  metal hydroxide $H^+ + OH^- \rightarrow H_2O$
  metal carbonate $2H^+ + CO_3^{-2} \rightarrow H_2O + CO_2$
  (alkali are soluble bases)
- hydrochloric → metal chloride salt | sulphuric → metal sulphate | nitric → metal nitrate
  e.g $HCl + NaOH \rightarrow NaCl + H_2O$ // $H_2SO_4 + CuO \rightarrow CuSO_4 + H_2O$ // $CaCO_3 + 2HNO_3 \rightarrow Ca(NO_3)_2 + H_2O + CO_2$
- making salts: insoluble base: heat, excess, filter, evaporate
  soluble base: titrate until neutral, repeat with volumes but no indicator, evaporate
  insoluble salt: mix, filter, wash to remove impurities, dry in oven

insoluble salts: silver/lead chlorides, lead/calcium/barium sulphates, carbonates.

indicators: phenolphthalein: alkali=pink, acid=colourless etc.

Electrolysis

→ using electricity to split an ionic compound apart to make it's constituent elements

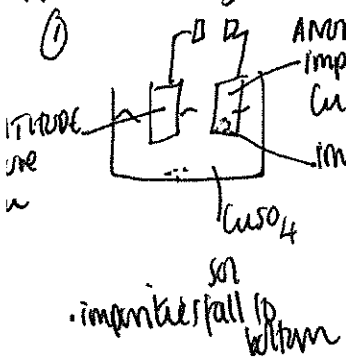


molten electrolysis: ionic compound melted and elements made

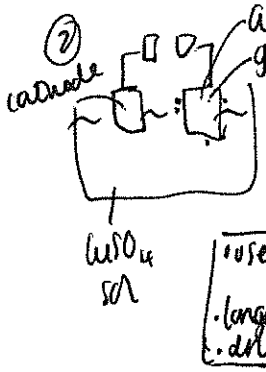
e.g $CuCl_2$: Cu^{+2} → cathode → Cu made ($Cu^{+2} + 2e \rightarrow Cu$)
Cl^- → anode → Cl_2 made ($2Cl^- - 2e \rightarrow Cl_2$)

aution electrolysis: ionic compounds dissolved in H_2O. Rules: cathode: if Cu^{+2} present = Cu made, if not H^+ makes H_2
eg $CuCl_{2(aq)}$ but Na_2SO_4: H^+ → cathode → H_2 ($2H^+ + 2e \rightarrow H_2$)
OH^- → anode → $H_2O + O_2$ ($4OH^- - 4e \rightarrow 2H_2O + O_2$)
anode: if Cl^- present = Cl_2 made, if not OH^- makes $H_2O + O_2$

copper electrolysis



- copper atoms lose $2e^- = Cu^{+2}$
- anode loses Cu^{+2} & ∴ mass
- Cu^{+2} attracted to cathode: gains mass
  Cu^{+2} gain 2e back at cathode = Cu made



- Cu^{+2} attracted to cathode = gain mass
- $H_2O + O_2$ made at anode

- use a variable resistor to change current (A)
- longer or ↑ amps = greater mass change
- dry electrodes with propanone