Acids and Alkalis

- All Acids contain H^+ ions.
- Common examples are:

  Hydrochloric acid: H^+Cl^-

  Sulphuric Acid: $H_2^+SO_4^{2-}$

  Nitric Acid: $H^+NO_3^-$

- All Alkalis contain OH^- ions.
- Common examples are:

  Sodium Hydroxide: Na^+OH^-

  Potassium Hydroxide: K^+OH^-

  Barium Hydroxide: $Ba^{2+}(OH^-)_2$

Reactions of Acids

- 1. With Metals:

  Metals above Hydrogen in the activity Series react with acids.

Acid + Metal → Salt + Hydrogen

$H^+Cl^- + Mg \rightarrow Mg^{2+}(Cl^-)_2 + H_2$

or $H^+NO^-_3 + Zn \rightarrow Zn^{2+}(NO_3^-)_2 + H_2$

Metals below Hydrogen in the Activity Series , such as copper, silver and gold, do not react with dilute acid.

Reactions of Acids(contd).

- 2.With Alkalis:

Acid + Alkali → Salt + Water

$H^+Cl^- + Na^+OH^- \rightarrow Na^+Cl^- + H_2O$

Note: The Main Reaction taking place is between the H^+ ion and the OH^- ion which react to produce H_2O.This is a ***Neutralisation*** reaction which produces heat energy ie.An ***Exothermic*** Reaction.

Na^+ and Cl^- are said to be ***Spectator ions***.ie They remain unchanged and don't take part in the reaction

Reactions of Acids(contd).

- 3. With Metal Carbonates:

  Acids react with metal Carbonates to produce Salt, Carbon Dioxide and water.

Acid + Metal Carbonate → Salt + CO_2 +Water

H^+Cl^- + $CaCO_3$ → $Ca^{2+}(Cl^-)_2$ + CO_2 + H_2O

The test for CO_2 is that it turns limewater milky.

Reactions of Acids(contd).

- 4. With Metal Oxides:

Acid + Metal Oxide → Salt + Water

H^+Cl^- + CuO → $Cu^{2+}(Cl^-)_2 + H_2O$

Note:***Alkalis,Metal Carbonates*** and ***Metal Oxides*** can be regarded as ***Bases***. This because they can all **remove H+ions** from solution and produce **water**.

Precipitation Reactions

- ***Salts***.These can be regarded as Acids whose H^+ ions has been replaced with metal ions.eg. NaCl, $KNO_3$and $BaSO_4$
- ***Salts*** can be prepared by the four methods mentioned earlier but they can also be made by adding two salts together which results in their Ions ***crossing*** over.

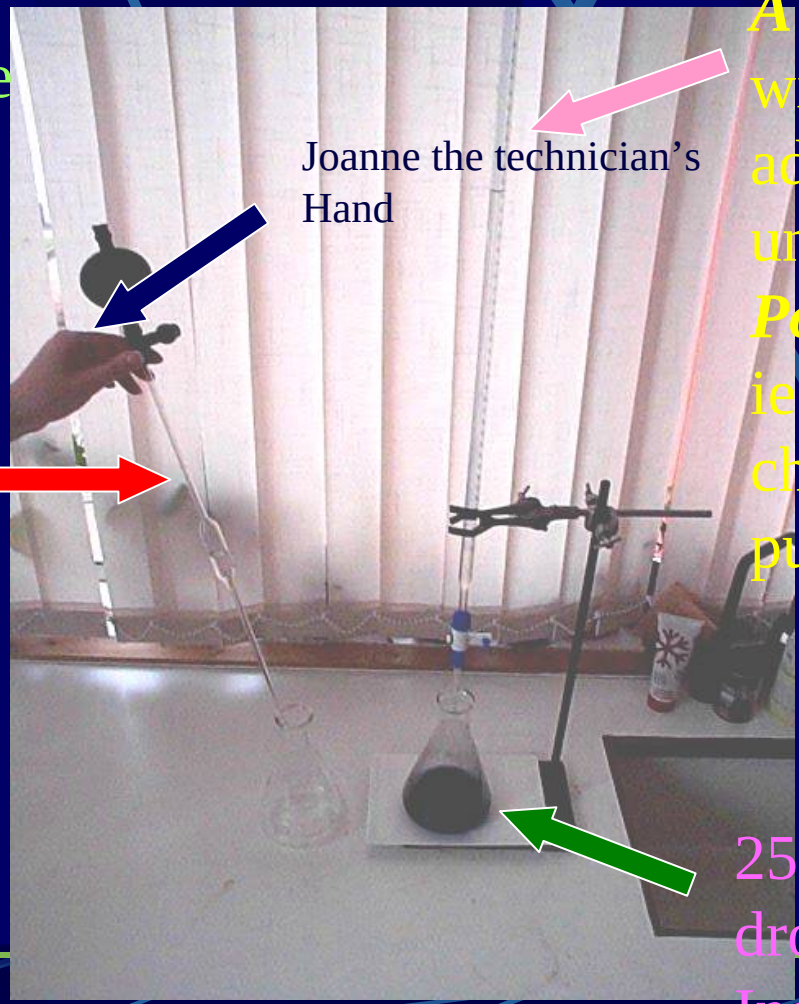
$$Na^+Cl^- + Ag^+ NO^-_3$$

$$AgCl(s) + Na^+NO^-_3$$

Titrations

The purpose of a ***Titration*** is to accurately determine the volume of acid required to neutralise an alkali of known volume and concentration and vice versa.

A *Pipette* is used to fill a conical flask with 25ml of Alkali of known concentration



A Burette filled with HCl acid is added slowly until the ***End-Point*** is reached ie.The colour changes from purple to green.

25ml of NaOH +five drops of Universal Indicator.