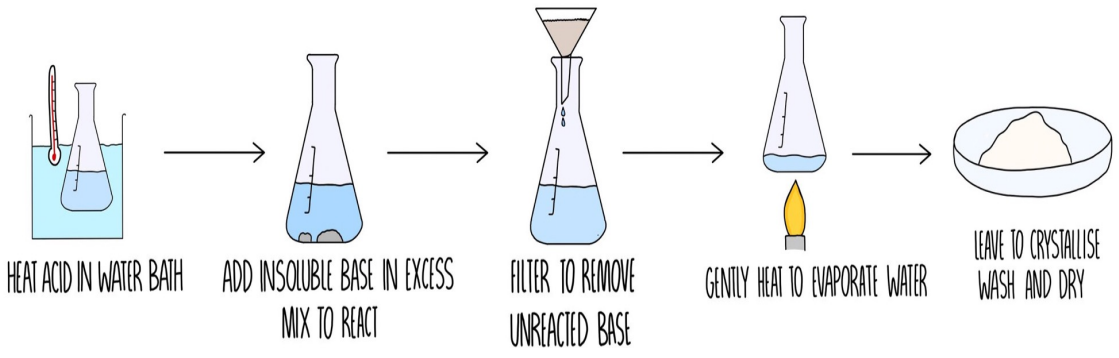
Making soluble salts with an insoluble base:

1. Warm dilute acid with a Bunsen
2. Turn flame off
3. Add insoluble base to acid until no more reacts (excess solid sinks to bottom of flask= acid is neutralised)
4. Filter excess solid = salt solution obtained
5. Heat solution with electric heater/water bath to evaporate the water
6. Let crystals cool & filter them out = crystallisation



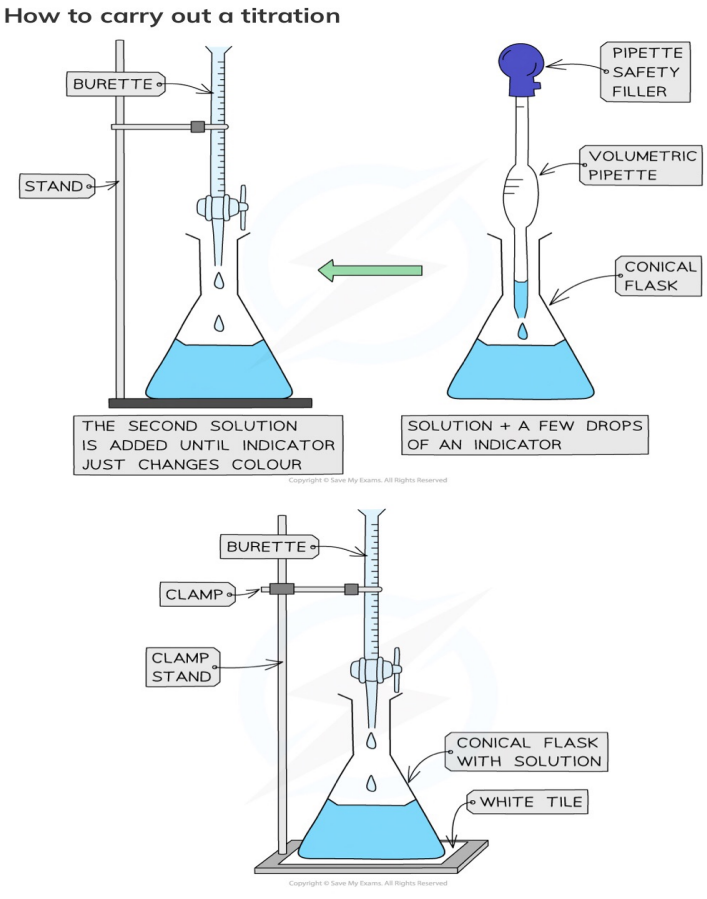
Titrations:

Work out exact volume of alkali needed to neutralise an acid

Method:

1. Measure 25cm^3 of acid with pipette
2. Put acid in conical flask
3. Add drops of a single indicator
4. Fill burette with alkali & record starting volume
5. Add alkali to acid & swirl until the END POINT
6. Record final volume of alkali & calculate total volume added
7. Repeat till you get 2 concordant results (0.1cm^3 away)
8. Find average titre

Single indicator used to get a sudden colour change (not a gradual mixture indicator) at the end point e.g. litmus or phenolphthalein

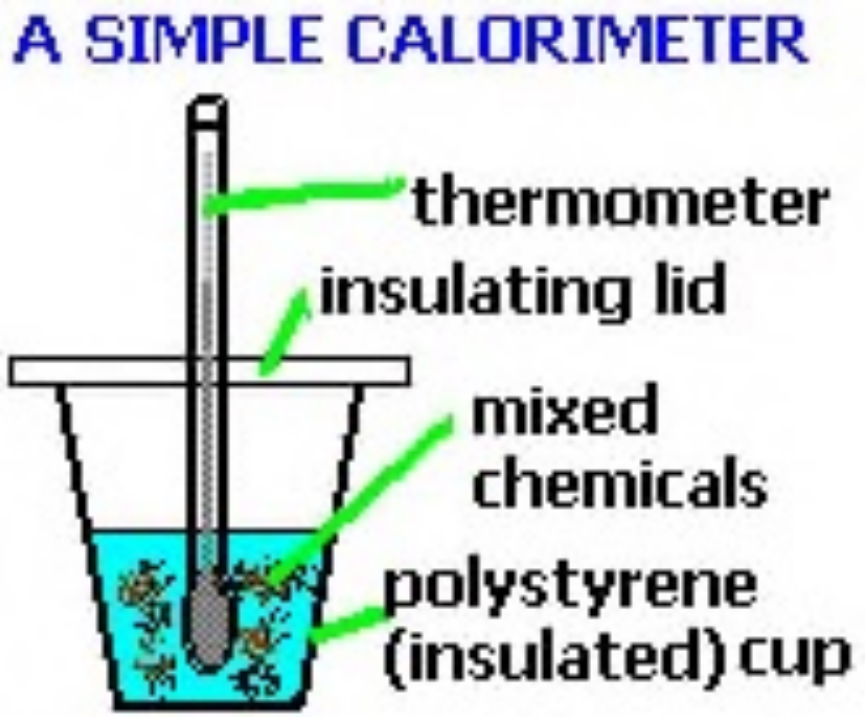


Performing a titration

Measuring energy transfer:

1. Take temperature of the reagents
2. Mix them in a polystyrene cup
3. Measure final temperature at the end of the reaction

To reduce heat loss to surroundings:
Put cup in a beaker of cotton wool / lid on the cup 2 reduce energy loss by evaporation



2 rate experiments:

Mass change:

1. Add dilute hydrochloric acid to conical flask, measure mass on a balance
2. Add magnesium ribbon to the acid & plug flask with cotton wool
3. Start stopwatch, record mass on balance
4. Take mass readings at regular intervals
5. Plot results, work out mass lost
6. Repeat with more concentrated acid solutions (volume & mass of magnesium= controlled)

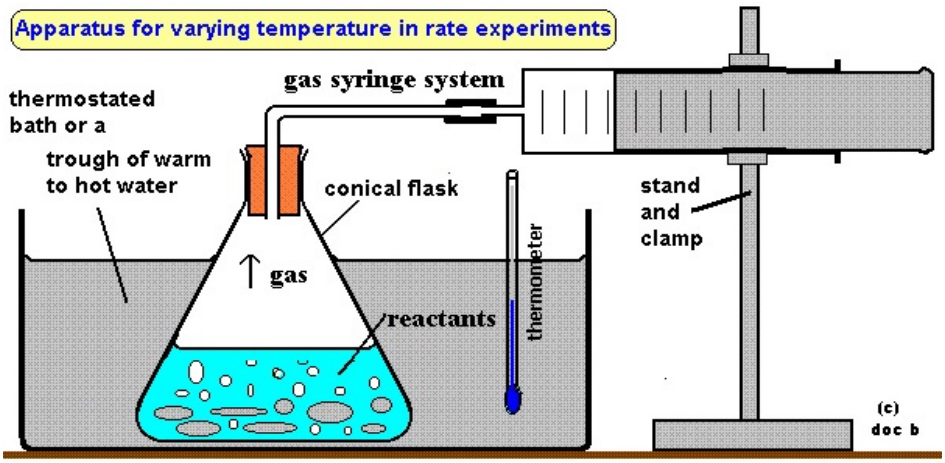
Higher concentration of acid = faster reaction rate

Cloudy precipitate:

1. Add sodium thiosulfate to conical flask
2. Place flask on paper (with a black cross drawn on), add dilute HLC & start stopwatch
3. Time how long it takes for black cross to disappear through the cloudy sulfur
4. Create table of readings

Can repeat with different concentrations of the (one) reactant, volume of liquid = controlled

Increasing concentration of HCL = increases rate of reaction as mark disappears more rapid



Tests for gases & anions:

Common gases:

Chlorine bleaches damp litmus paper white
Oxygen relights a glowing splint in a test tube
Carbon dioxide turns limewater cloudy when bubbled through
Hydrogen makes a squeaky pop when holding a lit splint at the end of a test tube

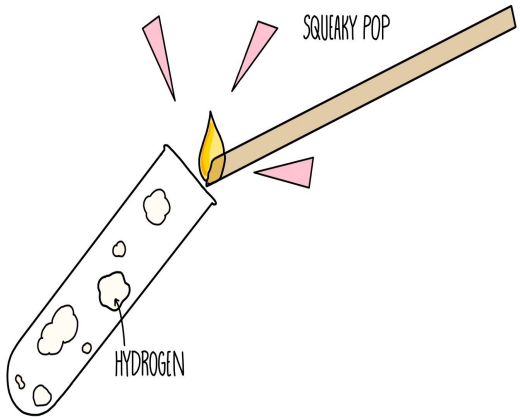
Anions:

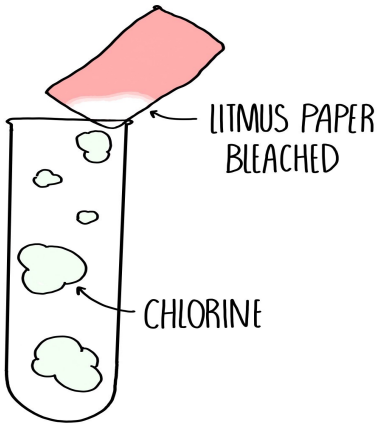
Carbonates = have CO3^-2 ions
Add dilute acid with pipette into test tube (with sample), connect to a tube of limewater. If present, limewater turns cloudy & carbon dioxide released

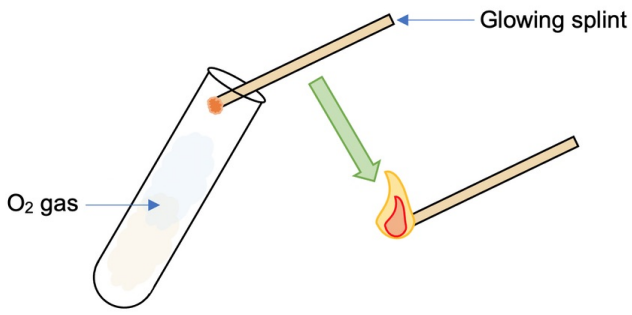
Sulphates = SO4^-2 ions
Use pipette to add HCL & BaCl^2 to test tube with solution. White precipitate forms if present

Halides:
Add HNO3 & AgNO3

Chloride: white precipitate of silver chloride
Bromide: cream precipitate of silver bromide
Iodide: yellow precipitate of silver iodide







Tests for Cations:

IONS burn with distinct colour FLAMES:

Lithium= crimson
Sodium= yellow
Potassium= lilac
Calcium= red
Copper= green

Method:
Clean platinum wire loop with HCL & hold in blue flame till it burns without colour, then dip loop into sample & put into flame, recording the colour

Only works with samples containing ONE metal ion (mixtures = would hide colours)

Metal hydroxides = insoluble so precipitate out of a solution when formed with distinct colours
Add sodium hydroxide & record colour of flame

Metal Ions	Colour of Precipitate	Ionic Equation for Precipitate Form
Calcium, Ca^{2+}	White	$Ca^{2+}_{(aq)} + 2OH^-_{(aq)} \rightarrow Ca(OH)_2$
Copper(II), Cu^{2+}	Blue	$Cu^{2+}_{(aq)} + 2OH^-_{(aq)} \rightarrow Cu(OH)_2$
Iron(II), Fe^{2+}	Green	$Fe^{2+}_{(aq)} + 2OH^-_{(aq)} \rightarrow Fe(OH)_2$
Iron(III), Fe^{3+}	Brown	$Fe^{3+}_{(aq)} + 3OH^-_{(aq)} \rightarrow Fe(OH)_3$
Aluminium, Al^{3+}	White at first. But then redissolves in excess NaOH to form a colourless solution.	$Al^{3+}_{(aq)} + 3OH^-_{(aq)} \rightarrow Al(OH)_3$
Magnesium, Mg^{2+}	White	$Mg^{2+}_{(aq)} + 2OH^-_{(aq)} \rightarrow Mg(OH)_2$