

Acids and Bases 2

What I should know

- An indicator shows, by means of a colour change, whether a substance is acidic or basic.
 - Acids turn litmus from blue to red.
 - Bases turn litmus from red to blue.
 - A solution whose pH = 7 is neutral.
 - A solution whose pH is less than 7 is acidic.
 - A solution whose pH is greater than 7 is basic.
 - Universal indicator is a mixture of indicators.
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- The two common acids in school laboratories are hydrochloric acid and sulfuric acid.
 - The most common bases are sodium hydroxide and calcium hydroxide.
 - $\text{acid} + \text{base} \longrightarrow \text{salt} + \text{water}$
 - The reaction of an acid with a base is called a neutralisation reaction.
 - A salt may be prepared in the laboratory using the process of titration.
 - A fuel is any substance that burns in oxygen to produce heat.
 - Fossil fuels are fuels that were formed from the remains of plants and animals that lived millions of years ago.
 - The three main **fossil fuels** are coal, oil and natural gas.
 - Fossil fuels contain hydrocarbons. Hydrocarbons are compounds that contain hydrogen and carbon only.
 - Hydrocarbons burn to form carbon dioxide and water.
 - Acid rain is a mixture of sulfuric acid and nitric acid.
 - Acid rain destroys lakes (killing fish), harms trees and attacks stone.

Titration

In a titration we add a strong acid and a strong base together. Acids are at one end of the pH scale and bases are at the other end.



At a certain point the acid and the base make each other harmless - neutral.

This is called a **Neutralisation** reaction.

When an acid and base are neutralised, a salt and water are formed.

If we boil away the water by evaporation we are left with **salt**.

Example of Neutralisation

Antacids are chemicals that we take to stop indigestion. These stop acid from hurting our gut by neutralising it. Antacids are **bases** that mix with an acid to form water and salt.



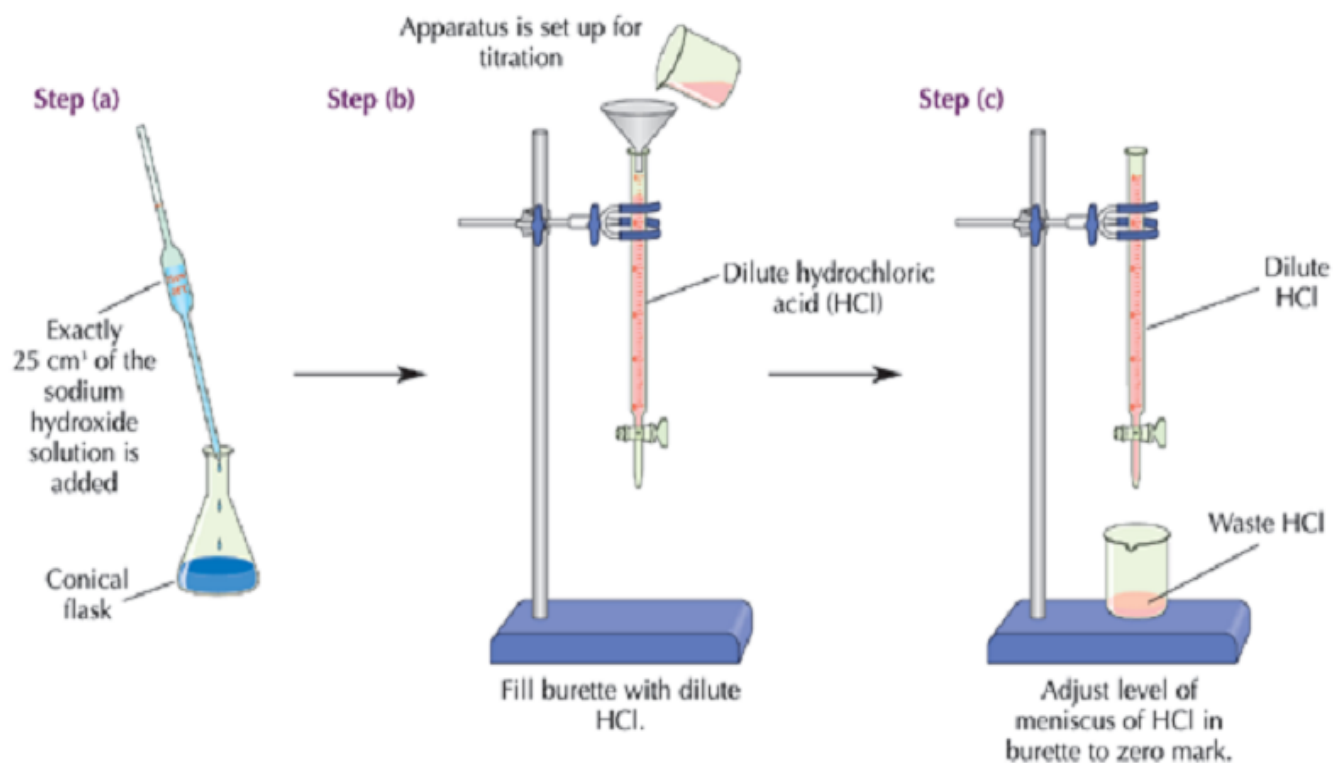
What is a Salt?

A salt is formed when the Hydrogen in an acid is replaced by a metal. Table Salt - NaCl - Sodium Chloride.

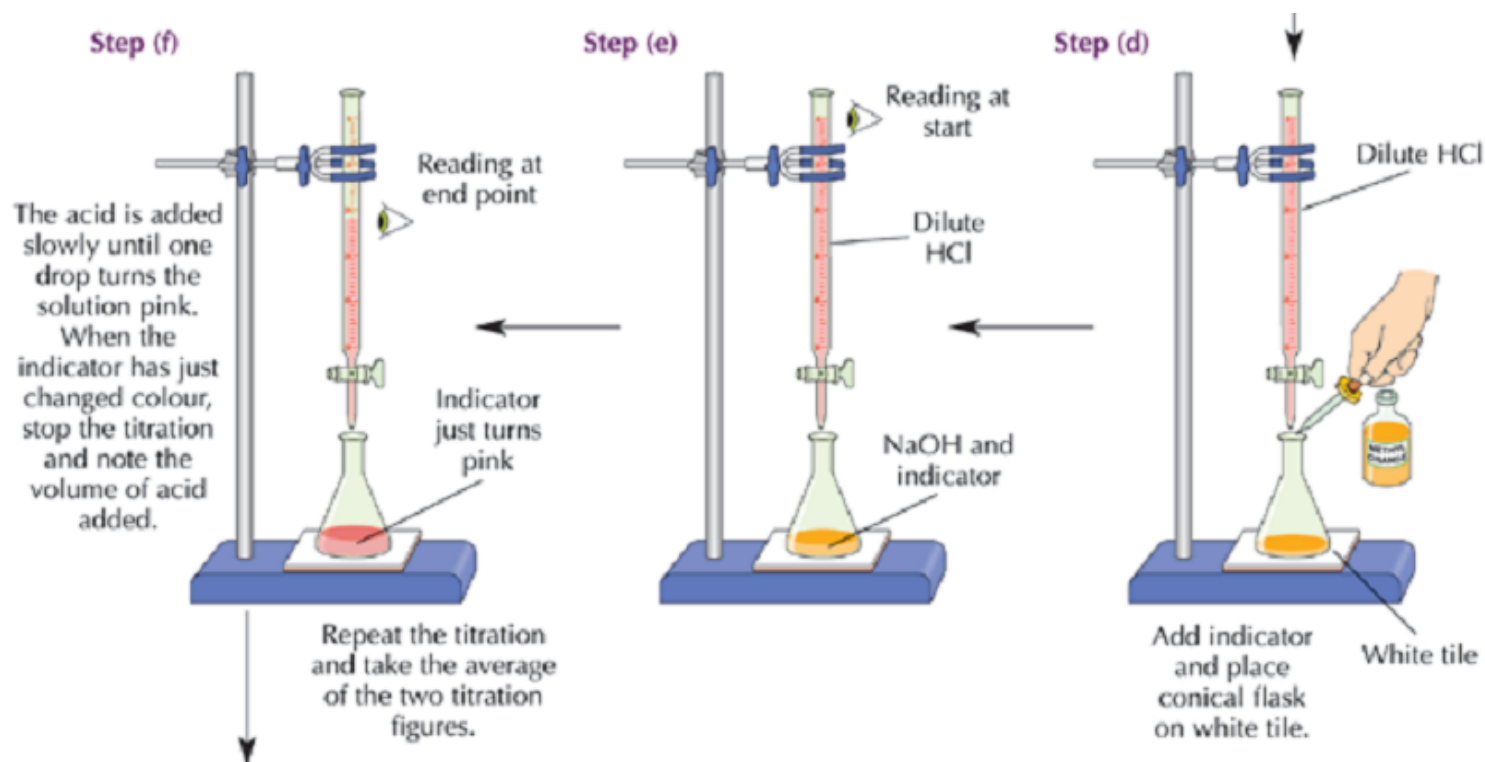


Titration of and Acid and Base

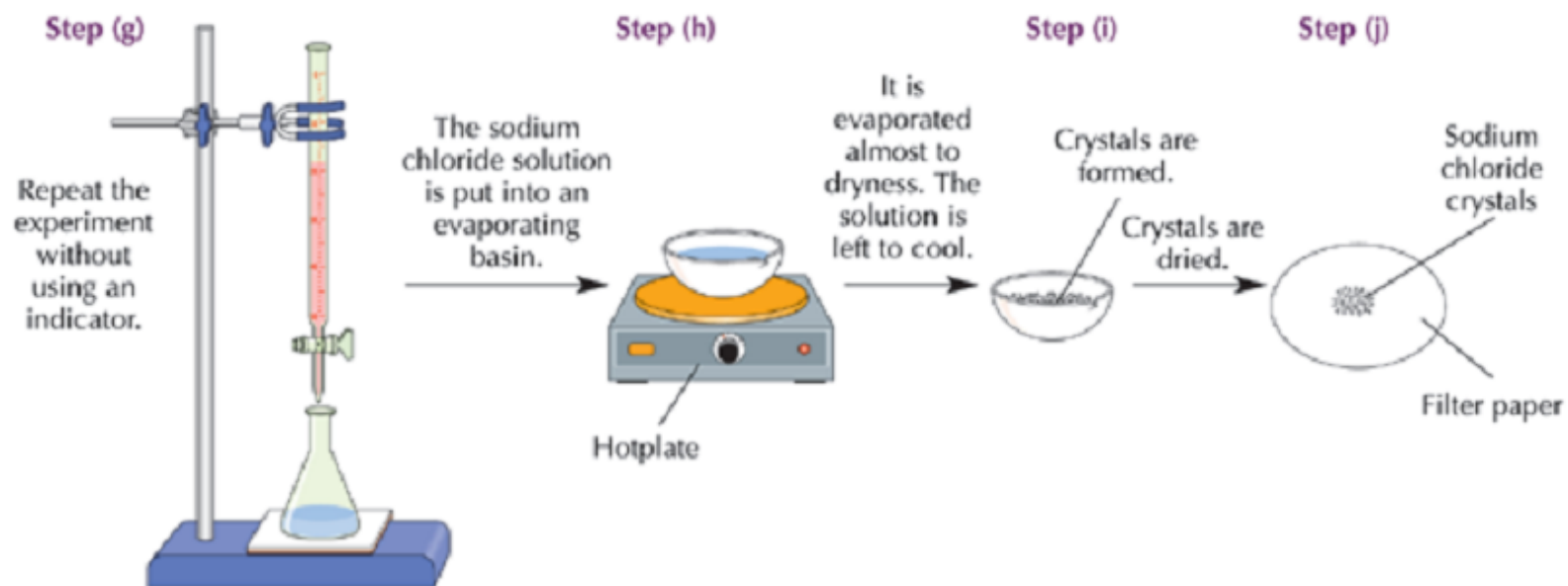
To titrate **HCl** (Hydrochloric Acid) with **NaOH** (Sodium Hydroxide) and prepare a sample of **NaCl** (Sodium Chloride - Salt)



Titration - continued...

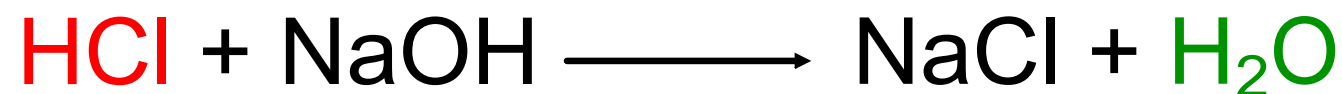


Titration - continued...



Summary

In our titration we added,



Hydrochloric Acid

Sodium Hydroxide

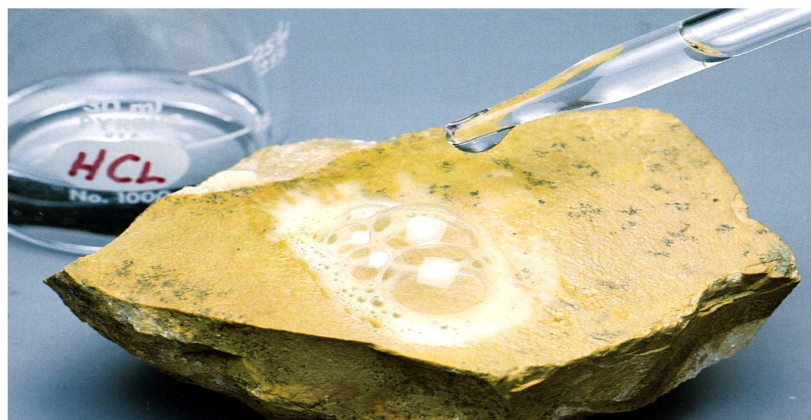
Table Salt

Water

Acids and Limestone

An important reaction that happens everyday is the reaction of an acid with **Limestone**. This reaction produces salt and water but also the gas **CO₂**. The salt made is not Sodium Chloride but instead Calcium Chloride.

Calcium Carbonate + HCl \longrightarrow Calcium Chloride + Water + Carbon Dioxide



Fossil Fuels

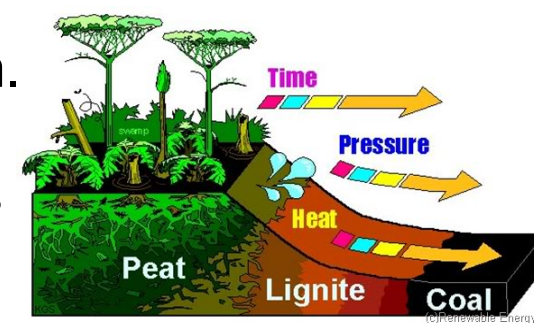
Fuel - is any substance that burns in Oxygen to produce heat.

Fossil fuels are formed from **dead plants and sea-shells.**

Oil, gas, coal and peat are all fossil fuels.

They took hundreds of millions of years to form.

They contain a lot of carbon that is released as **CO₂** - Carbon Dioxide.



CO₂ in the atmosphere traps heat and warms up the planet.

The average world temperatures have been rising since the 1970's.

Fossil Fuels - oil, coal and gas all contain hydrocarbons.

Hydrocarbons are compounds consisting of hydrogen and carbon only.

When hydrocarbons are burnt then water and carbon dioxide are always released.

Acid Rain

Carbonic Acid - rain is naturally slightly acidic due to Carbon Dioxide.

Sulfuric Acid - comes from Sulphur Dioxide (SO_2) and rain water.
Coal and Oil burning produces Sulphur Dioxide.

Nitric Acid - Oxides of Nitrogen come from car exhaust.

Problems of Acid Rain

Acid rain destroys **lakes** (killing fish).

Acid rain harms **trees** - removes minerals and damages leaves.

Acid rain attacks **stone and iron**.

Solving Problems of Acid Rain

Chemical factories can clean their smoke
etc.

Reduce sulfur in oil and gas - expensive.

Catalytic converters in cars reduce nitrogen
oxides.

Burn less fossil fuels.

