Topic 8 : Acids and Alkalis

Revised April 1995

Water is slightly ionised and therefore contains **small** and **equal** concentrations of hydrogen ions H^+ and hydroxide ions OH^-

$$H_2O \rightleftharpoons H^+ + OH^-$$

An **acidic solution** is a solution which contains more H^+ ions than Water.

Examples :

Hydrochloric acid	H^+Cl^-
Sulphuric acid	$(H^+)_2SO_4^{2-}$
Nitric acid	$H^+NO_3^-$

Household vinegar is a 4% solution of Ethanoic acid.

An **alkali** is a solution which contains more OH^- ions than Water.

Examples :

Sodium hydroxide	Na^+OH^-
Potassium hydroxide	K^+OH^-

Household Ammonia is an alkali.

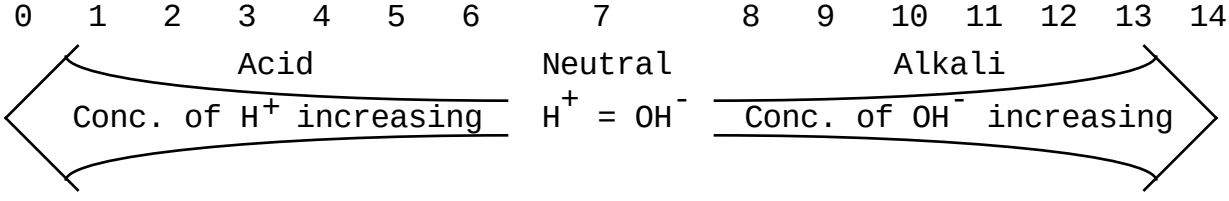
Neutral solutions contain equal numbers of H^+ and OH^- ions.

The pH scale

To measure whether a solution is acidic, alkaline or neutral we use the pH scale which ranges from 0 to 14.

Solution	**pH**
Acidic	less than 7
Alkali	greater than 7
Neutral	7

The higher the conc. of H^+ in an acid the lower the pH.
The higher the conc. of OH^- in an alkali the higher the pH.



Diluting an acidic solution therefore lowers the conc. of H^+, reduces the acidity and raises the pH.

Diluting an alkaline solution lowers the conc. of OH^-, reduces the alkalinity and lowers the pH.

Acid Rain

Most metal oxides, which dissolve in Water, form alkalis.

Example : Calcium oxide

$Ca^{2+}O^{2-}$ + H_2O -> $Ca^{2+}(OH^-)_2$

Most non-metal oxides, which dissolve in Water, form acids.

Example : Sulphur dioxide

This gas, produced on burning fossil fuels, reacts with rain water thus :

SO_2 + H_2O -> $(H^+)_2SO_3^{2-}$
Sulphurous acid

The Sulphurous acid is further oxidised by the Oxygen in the air to Sulphuric acid $(H^+)_2SO_4^{2-}$.

Thus the rain water is acidic (acid rain).

Acid rain causes corrosion of metal structures and sandstone buildings.

It destroys whole forests.