

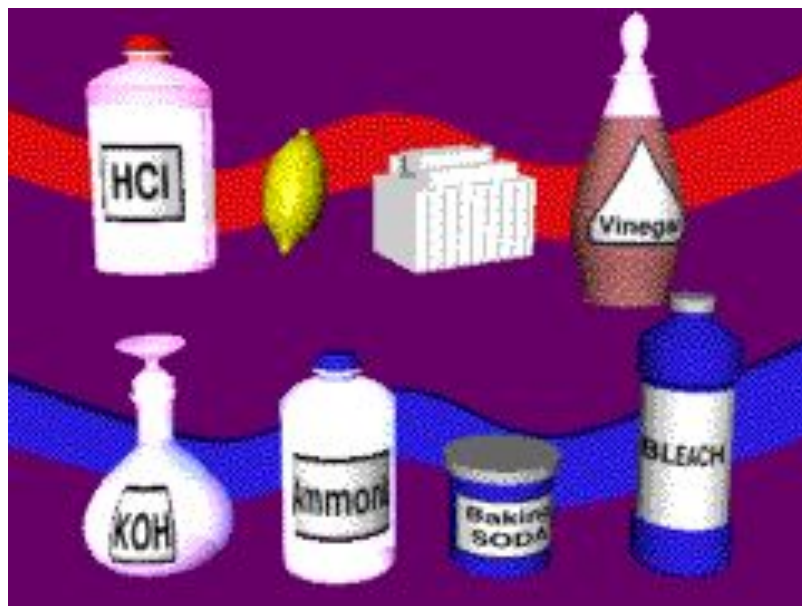
Acids and Alkalis

Learning Objectives

- To know that solutions can be sorted by whether they are: acid, alkali or neutral.
- To understand that an alkali reacts with an acid to cancel it out.
- To know that indicators show you how acidic or alkaline a solution is.

Acids and alkalis

When a substance dissolves in water it makes a solution.



Solutions can be sorted by whether they are: **acid**, **alkali** or **neutral**.

When the **oxide**
of some **non-metals**
dissolve in **water**
they make an **acid**.

Non-Metal
↓
+ Oxygen
↓
Oxide
↓
+Water
↓
Acid



Acids have a **sour taste**.
They are **corrosive**.

Acids react with metals and carbonates.

Metal + Acid \longrightarrow Salt + Hydrogen

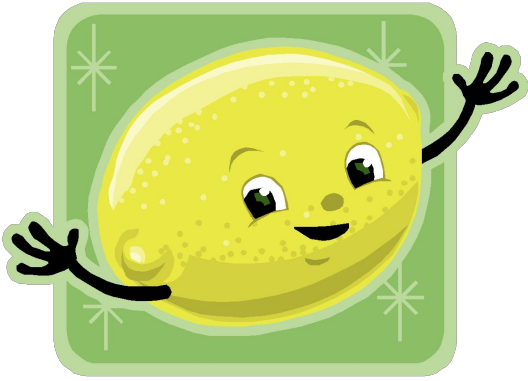
magnesium + hydrochloric acid \longrightarrow magnesium chloride + hydrogen



Acid + Carbonate \longrightarrow Salt + Water + Carbon dioxide

sulphuric acid + copper carbonate \longrightarrow copper sulphate + water + carbon dioxide

Acids



There are many acids present in our everyday lives.



Lemon juice contains **citric acid**, and **vinegar** contains **ethanoic acid**.

Some strong acids are hydrochloric acid, sulphuric acid and nitric acid.

Some weak acids are ethanoic acid, citric acid and carbonic acid.

Neutralisation

- Acids and alkalis **react** with each other. The alkali **cancels out** the acid in the reaction. This is called **neutralisation**.

Acid + Alkali \rightarrow Salt + Water

$\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

A salt is made.

Salts

- The salt made depends on the acid and alkali used.
- The salt contains the metal atom from the alkali, and part of the acid molecule.

The salts of sulphuric acid are known as **sulphates**.
The salts of hydrochloric acid are known as **chlorides**.

The salts of nitric acid are known as **nitrates**.



Alkalis

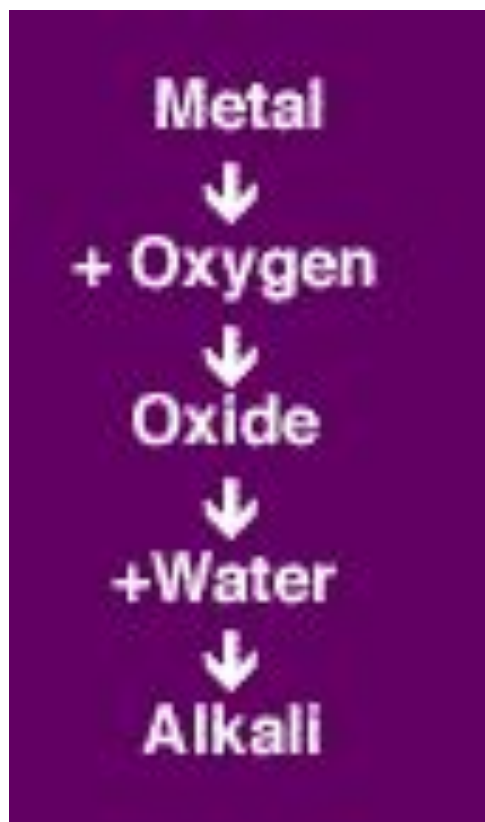
Many everyday substances are alkalis.

They feel **soapy**.

They are **corrosive**.

When the **oxides of some metals** dissolve in **water** they make an **alkali solution**.

Alkalis react with **acids** and **neutralise** them.



Alkalis



Alkalis are present in many **cleaning substances** in use in our homes.

Kitchen cleaners are alkaline

because they contain **ammonia** or **sodium hydroxide**, which **attack grease**.

Calcium hydroxide and **sodium hydroxide** are **strong alkalis**.

The most recognisable and common **weak alkali** is **ammonia**.

Indicators



Indicators help you find out whether a solution is acidic or not.

They change colour in acid or alkaline solutions.

Different indicators change to different colours.

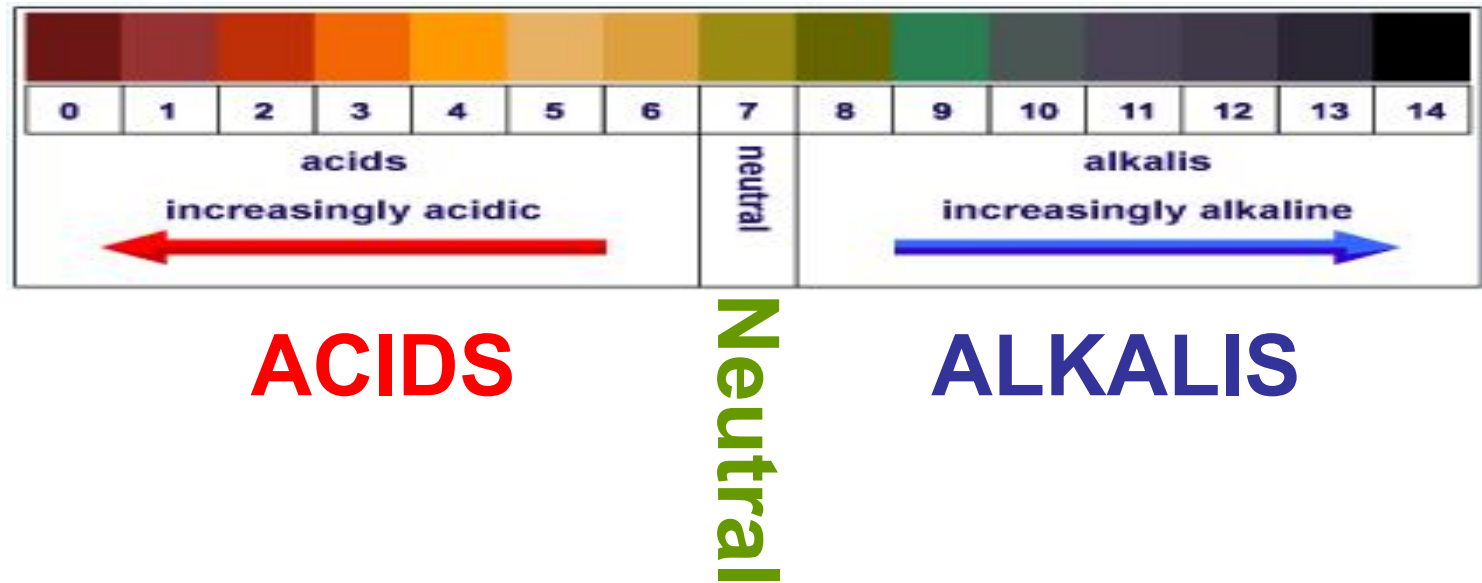


Litmus Test

- Litmus is an indicator. It changes colour in acid and alkaline solutions.
- Litmus is **red** in an **acid**.
- Litmus is **blue** in an **alkali**.

Universal Indicator

- Universal indicator **changes colour** in acids and alkalis.



Its colour shows the strength of an acid or alkali.

The pH scale



1 – 6
Acids

7 Neutral

8 - 14
Alkalis

Applications of Neutralisation



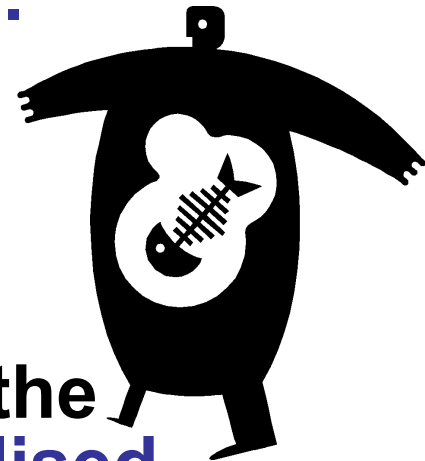
- **Insect Stings**

Bee stings are **acidic** and can be **neutralised** with **baking soda** (bicarbonate of soda). **Wasp stings** are **alkaline** and can be **neutralised** with **vinegar**.

- **Indigestion**: Our stomach carries around **hydrochloric acid**.

Too much of this leads to indigestion.

To cure indigestion, you can **neutralise** the excess acid with **baking soda** or **specialised indigestion tablets**.



Soil Treatment: When soils are too acidic (often as a result of acid rain) they can be treated with slaked lime, chalk or quicklime, all alkalis. Plants and crops grow best in neutral soils.

Factory Waste: Liquid waste from factories is often acidic. If it reaches a river it will destroy and kill sea life of many forms. Neutralising the waste with slaked lime can prevent this.



More Applications of Neutralisation