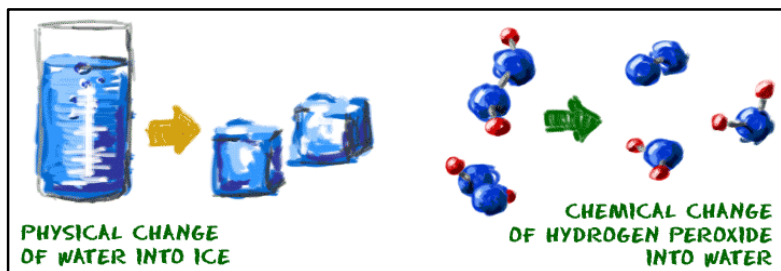


# Year 9– Chemical Reactions

## Physical and Chemical Changes

A reaction can involve **physical** or **chemical** changes.



A **physical change** is reversible. The products can be changed back to the reactants.

For example, **water** can be frozen to **ice** and **ice** can be melted to **water**.

A **chemical change** is usually irreversible. The products cannot be changed back to the products.

For example, once **fuel** is combusted, you cannot recover the **fuel** back.

**Reactants** → **Products**

### Example of a word equation

Carbon + Water → Glucose + Oxygen dioxide

### Example of a symbol equation

$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

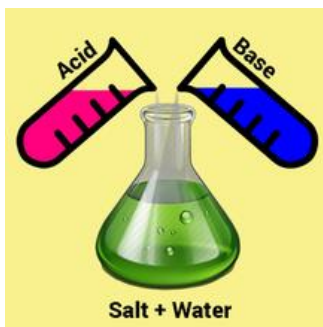
Chemical reactions can be represented using **equations**.

An equation always contains **reactants** and **products**.

## Neutralisation

An **acid** has a pH of less than 7.

An **alkali** has a pH of greater than 7.



Acid + Alkali → Salt + Water

Hydrochloric acid + Sodium Hydroxide → Sodium Chloride + Water

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

## Combustion

**Combustion** is a chemical reaction that involves burning a substance.

It is an **exothermic** reaction that involves release energy to the surroundings.

If there is a sufficient supply of oxygen, **complete combustion** happens:

Methane + oxygen → water + carbon dioxide

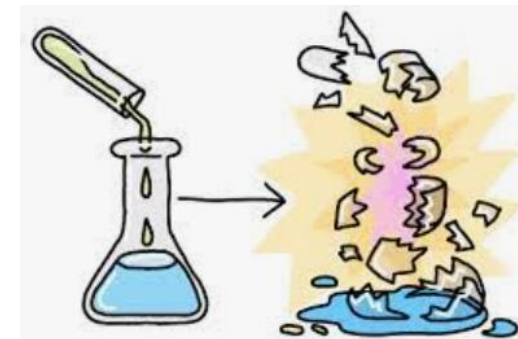
$\text{CH}_4 + 2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{CO}_2$

If there is an insufficient supply of oxygen, **incomplete combustion** happens.

## Signs of a reaction

Typical signs of chemical reaction include:

- a colour change,
- a gas being given off,
- a solid forming in a liquid,
- an energy change.



## Exothermic and Endothermic Reactions

Exothermic reactions release energy – they become hot.

The majority of reactions are exothermic.

Endothermic reactions take in energy – they get colder.

