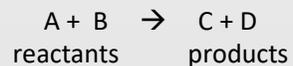




Chemical & Physical Changes

A **chemical change** is **not reversible** and we often call these chemical reactions. The atoms of the reactants are rearranged to **form new products**. During a chemical reaction you will often see fizzing, colour changes and changes in temperature.



A **physical change** is one where **no new product is made**. It is a **reversible** change. A change in state, e.g. melting, is a physical change.

Combustion

Combustion is the scientific word for **burning**. When you burn a substance, e.g. metal, new products are made. Burning is therefore a chemical reaction. For combustion to take place, **oxygen** is required.



This is also an example of an **oxidation reaction** as the metal is reacting with oxygen.

Combustion and Fuels

A fuel is a substance, such as wood or oil, that is burned to give out heat energy. Combustion is burning a fuel in oxygen.

The amount of energy contained within a fuel can be determined by burning a known amount of fuel and measuring the temperature change.

Oxygen (O₂)

- Gas at room temperature
- Non-metal
- Molecule made up of 2 oxygen atoms



If oxygen is present in a test tube, a **glowing splint relights** when it is held inside.

Acids & Metals

Some metals react with acids to form a salt and hydrogen gas.



Common acids include:

- Hydrochloric acid (HCl)
- Sulfuric acid (H₂SO₄)

Hydrogen (H₂)

- Gas at room temperature
- Non-metal
- Very flammable
- Molecule made up of 2 hydrogen atoms



If hydrogen is present in a test tube, a **squeaky pop** will sound when a light splint is held inside.

Thermal Decomposition

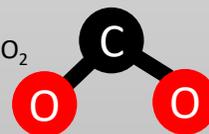
Thermal decomposition reactions happen when **substances break down** to simpler products when they are **heated**. No new substances are added. Many metal carbonates are decomposed on heating:



When metal carbonates decompose they **produce carbon dioxide**.

Carbon Dioxide (CO₂)

- Gas at room temperature
- Human activities increase the amount of CO₂
- Compound made up of 1 carbon atom and 2 oxygen atoms



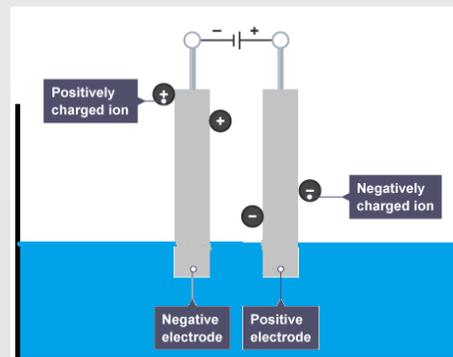
To test a gas to see if it is carbon dioxide it is bubbled through limewater. If the **limewater turns cloudy** then the gas is carbon dioxide.

Electrolysis

Electrolysis is a process where **compounds are decomposed** (broken down) into simpler substances when an **electric current** is passed through them. It can be used to extract metals from their ores.

For electrolysis to work the compound must contain **ions (charged particles)**. The ions must be free to move.

Positive ions move towards the **negative electrode** and **negative ions** move towards the **positive electrode**.



Exothermic & Endothermic Reactions

Exothermic reaction – **energy is given out** to the surroundings, shown by a **rise in temperature**.

- Examples: burning fuels (combustion) and neutralisation reactions (acid + alkali)

Endothermic reaction – **energy is taken in** from the surroundings, shown by a **fall in temperature**.

- Examples: hand warmers and self-heating cans

Naming Compounds and Formula

When the name of a compound ends in **-ide** then it only contains that element, e.g. iron sulfide contains iron and sulfur. When a compound ends in **-ate** then it contains that element and oxygen, e.g. iron sulfate contains iron, sulfur and oxygen.

The formula of a compound tells us:

- Which elements are in the compound
- How many atoms of each element are present

For example, the formula for water is H₂O. This tells us there are 2 hydrogen atoms and 1 oxygen atom.