science

chemistry

Y8 Reactions 2 – Types of Reaction

1) 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 + B → C + D
reactants products

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.

2) Combustion

Combustion is the scientific word for **burning**. It is a chemical reaction and for it to take place **oxygen** is required.

metal + oxygen → metal oxide

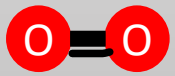
This is also an example of an **oxidation reaction** as the metal is reacting with oxygen.

Combustion and Fuels

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

The amount of energy contained within a fuel can be determined by burning a known amount of fuel and measuring the temperature change. Other factors also influence how good a fuel is, such as the cost, availability and toxicity of the fuel.

3) Oxygen (O_2)



- 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.

4) Acids & Metals

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

acid + metal → salt + hydrogen

Common acids include:

- Hydrochloric acid (HCl)
- Sulfuric acid (H_2SO_4)

5) Hydrogen (H_2)

- 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 lighted splint is held inside.

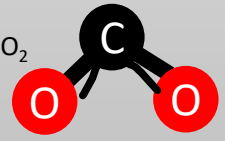
6) Thermal Decomposition

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:

metal carbonate → metal oxide + carbon dioxide

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

7) Carbon Dioxide (CO_2)



- Gas at room temperature
- Human activities increase the amount of CO_2
- 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.

8) 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: thermal decomposition and photosynthesis in plants

9) Rate of reaction

The rate of a reaction is a measure of how quickly a reactant is used up, or a product is formed.

Collision theory - For a chemical reaction to happen:

reactant particles
must collide with each other
the particles must have enough energy for them to react

10) Displacement reactions

When a more reactive metal can displace a less reactive one from a compound.
e.g. zinc + lead nitrate → zinc nitrate + lead

11) Neutralisation

An acid and alkali react in neutralisation reaction and produce a salt and water
e.g. Hydrochloric Acid + Sodium Hydroxide → Sodium Chloride + Water

chaseterrace academy