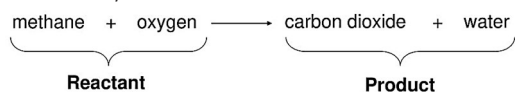


Knowledge organiser – 6 Reactions - Types of reaction and chemical energy

CHEMICAL REACTIONS

- A word equation shows the names of each substance involved in a reaction, and must not include any chemical symbols or formulae.

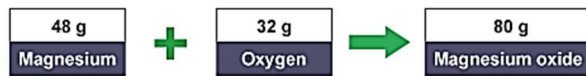


- The arrow means 'react to make'.
- In a chemical reaction, the atoms are rearranged to make new substances. The total number of atoms does NOT change. The number of atoms is conserved (no atoms are created or destroyed).



LAW OF CONSERVATION OF MASS

- Mass is conserved in chemical reactions and in physical changes.
- Mass of reactants = mass of products

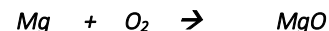


Balanced equations show; the formulae of reactants and products, how atoms are arranged and the relative amounts of reactants & products.

How can we write balanced symbol equations?

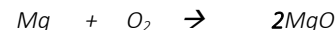
RULE: Do not add or change any little numbers.

- Write the word equation and add formulae.
magnesium + oxygen \rightarrow magnesium oxide



Left = 1 Mg and 2 O Right = 1 Mg and 1 O

- Balance the amount of oxygen.



Left = 1 Mg and 2 O Right = 2 Mg and 2 O

- Now balance the magnesium.



Left = 2 Mg and 2 O Right = 2 Mg and 2 O



COMBUSTION; exothermic reaction.

- The substance reacts with oxygen (from the air) to produce oxides.
- Methane + oxygen \rightarrow carbon dioxide + water*
- Fossil fuels are non-renewable and will run out one day.
- Future fuels?** Scientists are finding ways to use cooking oil, chicken faeces and ethanol to fuel homes and vehicles. New cars are being developed to burn hydrogen in their engines, producing only water as the product (as this does not produce carbon dioxide, it will not contribute to global warming).

BOND ENERGIES

- Bond energy = energy needed to break a bond.
- Bond breaking = endothermic
- Bond making = exothermic

The difference between energy transferred in bond making and breaking determines whether a reaction is endothermic or exothermic. If more heat energy is released when making the bonds than was taken in, the reaction is exothermic.

Exothermic (EXit)	Endothermic (ENtrance)
Energy is transferred to the surroundings from substances that are reacting.	Energy is transferred from surroundings to substances that are reacting.
Melting and boiling, combustion, respiration, neutralisation	Freezing and condensing, thermal decomposition, photosynthesis
Temperature of surroundings increase (negative energy change)	Temperature of surroundings decrease (positive energy change)
Self-heating cans, hand-warmers	Sports ice pack

DECOMPOSITION; each product of decomposition reactions is simpler than the starting substances.



When you heat copper carbonate (green), the reaction makes copper oxide (black) and carbon dioxide (gas – turns limewater cloudy).

KEYWORD	DEFINITION
Catalyst	Substances that speed up chemical reactions but are unchanged at the end.
Catalytic converter	A part of a car between the engine and exhaust pipe that converts harmful substances made in the engine into less harmful ones.
Chemical bonds	Force that holds atoms together in molecules.
Chemical reactions	A change in which a new substance is formed. Atoms are rearranged and joined together differently.
Combustion (burning)	A chemical reaction in which a substance reacts quickly with oxygen and gives out light and heat.
Conservation of mass	In a chemical reaction, the total mass of reactants is equal to the total mass of products. Mass is conserved in chemical reactions and physical changes.
Conserved	When the quantity of something does not change after a process takes place.
Decomposition	A chemical reaction in which a compound breaks down to form more than one product.
Endothermic reaction	Takes in energy (usually as heat) / transfers energy from surroundings.
Energy level diagrams	Diagram showing the relative energies of the reactants and products. It shows whether a reaction is endothermic or exothermic.
Exothermic reaction	Gives out energy (usually as heat or light) / transfers energy to the surroundings.
Fossil fuels	A fuel made from the remains of plants and animals that died millions of years ago. Include coal, oil and natural gas.
Fuel	A substance that stores energy in a chemical store which it can release as heat (e.g. petrol, diesel, coal...)
Non-renewable	Energy resources that have a limited supply and that cannot be replaced within a short timeframe.
Physical change	One that changes the physical properties of a substance, but no new substance is formed. It is reversible.
Products	Substances that are formed in a chemical reaction, shown on the right of the arrow in a chemical equation.
Reactants	Substances that react together, shown on the left of the arrow in a chemical equation.
Renewable	A fuel that can be easily replaced within a short timeframe.
Thermal decomposition	A chemical reaction in which a compound breaks down on heating to form more than one product.

