



Chemical Reactions



Physical Changes

This refers to a change in state. For example, when a solid melts into a liquid.

Ice melting into water is a physical change because it can be reversed.



Chemical Reactions

When substances go through chemical reactions you can create new substances. All reactions involve a transfer of energy to or from the surroundings.

The following observations can be made during chemical reactions:



Releasing Gas



Giving out heat or light



LITHIUM



SODIUM



POTASSIUM



CALCIUM



COPPER

Changing colour

Word Equations

Word equations are used to predict what products are made in a reaction. They must have the following format:

Magnesium + Oxygen



Magnesium Oxide

(Reactants)



(Products)

This side known as the **reactants** shows what is reacting together.

This side known as the **products** shows what is being made.

Writing Word Equations

When writing word equations you need to remember that elements change their name when they join to make compounds. Use the common compound names to complete the word equations.

Common Name Changes

Oxygen \rightarrow Oxide
Chlorine \rightarrow Chloride
Fluorine \rightarrow Fluoride
Bromine \rightarrow Bromide
Iodine \rightarrow Iodide

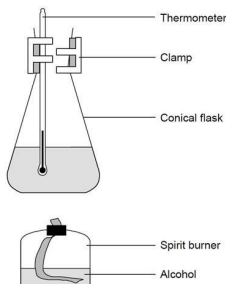
E.g. Magnesium + Chlorine \rightarrow Magnesium Chloride

1. Sodium + Chlorine
2. Potassium + Chlorine
3. Iron + Bromine
4. Magnesium + Bromine
5. Potassium + Fluorine

Burning Fuels

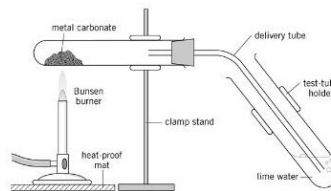
Fuels burn with the oxygen in the air when ignited.

Fuel + Oxygen \rightarrow Carbon Dioxide + Water



There are many different types of fuels such as: coal, methane, alcohol and wood. They all contain different amounts of chemical energy. When ignited this **chemical** energy **transfers** to **thermal** energy.

Thermal Decomposition



Some large compounds can be broken down by heating them up.

Heating them up breaks the bonds making the compound turn into smaller products.

Metal Carbonate \rightarrow Metal Oxide + Carbon Dioxide

CO₂ Test: If you pass this through lime water it will turn cloudy

Catalysts

They speed up chemical reactions without taking part.

Catalysts are used in industry because:

- They speed up reactions
- They reduce the energy needed making it cheaper
- They can be used more than once

Conservation of Mass

In a reaction, the mass of the reactants used is equal to the mass of the products formed.

Mass of reactants = Mass of products

For example, look at this reaction between 5g of sodium and 2g of chlorine. It will form 7g of sodium chloride.

Sodium + Chlorine \rightarrow Sodium Chloride
5g 2g 7g





CORE Questions



The following are core questions for this topic. Cover the answer section with a sheet of paper and try and quiz yourself. Only try learning 5 at a time, once you know them move on.

1	Is melting an ice cube a chemical reaction or a physical change?	Physical Change
2	Is burning a candle a chemical reaction or a physical change?	Chemical reaction
3	True or False. All chemical reactions transfer energy to the surroundings	False. Some take energy from the surroundings
4	What is the difference between a chemical reaction and a physical change?	Chemical reactions make new substances.
5	Identify three ways you can observe a chemical reaction has taken place.	Changes colour, releases gas, releases heat/light
6	Sulphur + Oxygen -> Sulphur Dioxide. Identify the reactants in this equation.	Sulphur and oxygen
7	Carbon + Oxygen -> Carbon Dioxide. Identify the products in this equation.	Carbon dioxide
8	Write the word equation for the reaction of calcium and chlorine.	Calcium + Chlorine -> Calcium Chloride
9	Write the word equation for the reaction of lithium and oxygen.	Lithium + Oxygen -> Lithium Oxide
10	True or False. Burning fuels is a chemical reaction called reduction.	False. It is called combustion
11	Fuel + Oxygen -> Carbon Dioxide + Water. Identify the reactants of combustion.	Fuel and oxygen
12	Fuel + Oxygen -> Carbon Dioxide + Water. Identify the products of combustion.	Carbon dioxide and water
13	Write the word equation for the combustion of methane.	Methane + Oxygen -> Carbon Dioxide + Water
14	Define the term fuel.	A substance that burns.
15	What is the name of a reaction where a compound breaks down into smaller compounds or elements using heat.	Thermal Decomposition
16	Lead Carbonate -> Lead oxide + Carbon dioxide. How do you know this is a thermal decomposition reaction?	A large compound breaks down into two smaller compounds.
17	What gas is released when calcium carbonate is thermally decomposed?	Carbon Dioxide
18	What is a catalyst?	A substance that speeds up a chemical reaction without taking part in the reaction
19	Why do chemical companies use catalysts?	It saves them energy (cheaper fuel costs)
20	Define rate of reaction.	The speed at which a reaction takes place.
21	What effect does a catalyst have on a rate of reaction?	It increases
22	Define an exothermic reaction	A reaction that releases energy to the surroundings
23	Give two examples of exothermic reactions	Hand warmers and burning a fuel
24	Define an endothermic reaction	A reaction that takes in energy from the surroundings
25	What tends to happen to substances in endothermic reactions?	They get colder
26	State the law of conservation of mass	No atoms are lost or made during a chemical reaction so the mass of the products equals the mass of the reactants
27	If the reactants equal 12g in a chemical reaction, suggest the mass of the products.	12g
28	Magnesium + Oxygen -> Magnesium Oxide. If the magnesium has a mass of 10g and the mass of the magnesium oxide is 12g. Suggest what mass of the oxygen reacted.	2g
29	Marble chips are added to acid whilst on the scales. The mass appears to go down, suggest why.	A gas is released. (Carbon Dioxide)
30	80 tonnes of a product was created in chemical reaction. Suggest the mass of the reactants.	80 tonnes