Summary Sheet Year 8 Types of Reaction

Chemical reactions

Chemical reactions always form one or more new substances.

Many chemical reactions occur in everyday life, for example, burning, cooking, rusting, digesting food. Chemical changes are difficult to reverse.

Typical signs of chemical reaction include:

- a colour change
- a gas being given off (fizzing/bubbling)
- a solid forming in a liquid (a precipitate)
- an energy change (getting hotter of colder)

In a **physical change**, a substance will simply change physical state, and no new substances are formed eg. ice melting. Physical changes are easy to reverse.

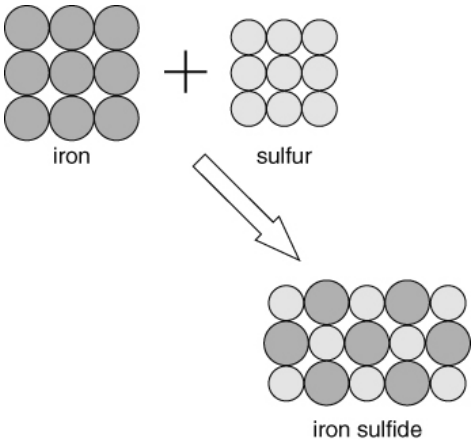
Word equations

Word equations are used to show chemical reactions. The arrow separates the reactants (chemicals we start with) from the products (chemicals we finish with).

hydrogen + chlorine → hydrogen chloride
REACTANTS **PRODUCTS**

Making compounds

Compounds are formed when elements react so that the atoms join together.



Naming compounds

If there is a metal in the compound, the name of the metal goes first.

If the compound contains only two elements then one of the element's name has its ending changed to 'ide'.

e.g. zinc + oxygen = zinc ox**ide**

iron + bromine = iron brom**ide**

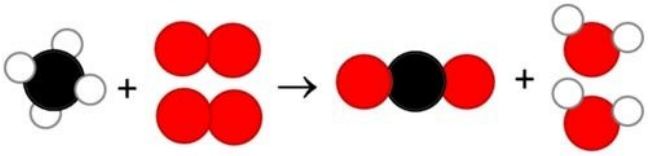
If a compound contains two elements plus oxygen, then the name ending of one of the elements is changed to 'ate'.

e.g. sodium + carbon + oxygen = sodium carbon**ate**

Combustion and Oxidation

Combustion of fuels will oxidise elements present in the fuel. Many fuels are **hydrocarbons** (compunds containing **carbon and hydrogen** only), so **complete combustion will form CO_2 and H_2O**

hydrocarbon + oxygen → carbon dioxide + water



Incomplete combustion (in a poor supply of oxygen) may also produce **carbon monoxide**, CO (toxic), and **carbon particles or soot** (causes breathing difficulties and global dimming or smog)

hydrocarbon + oxygen → carbon monoxide + water

hydrocarbon + oxygen → carbon (soot) + water

Combustion is also an **oxidation reaction** because the substances react with oxygen.

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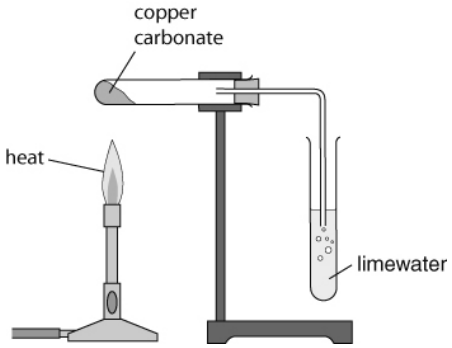
Thermal Decomposition

Thermal decomposition reactions involve **breaking down** a single compound **using heat.**

Heating copper carbonate produces copper oxide and **carbon dioxide**. This carbon dioxide will **turn limewater milky/cloudy** white if bubbled through it.

Thermal decomposition reactions are used in industry to extract metals.



Conservation of mass in reactions

In a reaction, the mass of the **reactants** is always the same as the mass of the **products**.

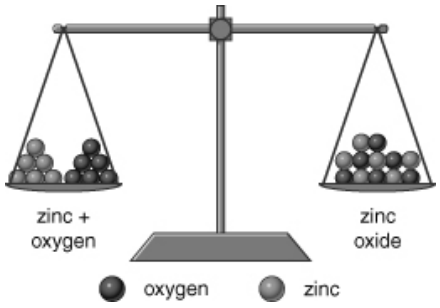
Metals can appear to gain mass when heated in air:

zinc + oxygen → zinc oxide

64g + ? → 80g

The difference in mass (16g) is the mass of oxygen that reacted.

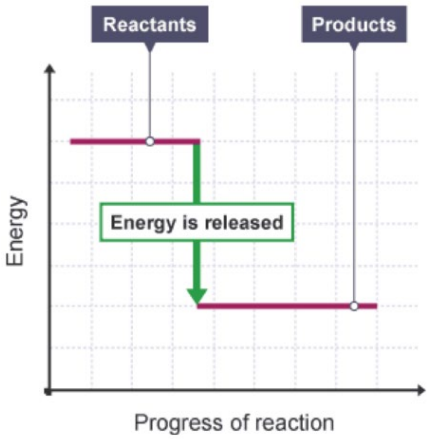
When a hydrocarbon fuel combusts, it appears to lose mass because the products of the reaction (carbon dioxide, water vapour) are lost into the air.



Exothermic and Endothermic Reactions

During a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy).

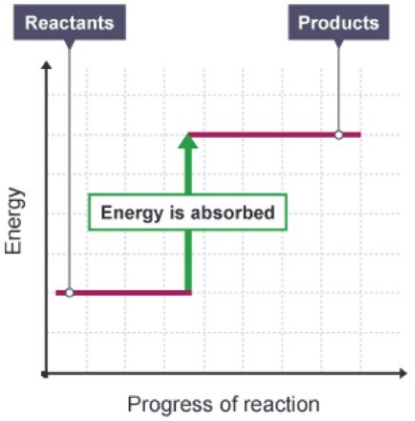
If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, it is endothermic.



EXOTHERMIC - a reaction which **gives out (loses) heat energy**

Exothermic reactions '**feel warm**' and show a **temperature increase on a thermometer** as heat energy is transferred to the surroundings

eg. combustion, oxidation reactions, neutralisation



ENDOTHERMIC - a reaction which **takes in (gains) heat energy**

Endothermic reactions '**feel cold**' and show a **temperature decrease on a thermometer** as heat energy is taken from the surroundings

eg. thermal decomposition, sports injury packs

Metals as catalysts

Some metals act as **catalysts**. These are substances that speed up chemical reactions without being used up.