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Glue on this side

Types of reactions

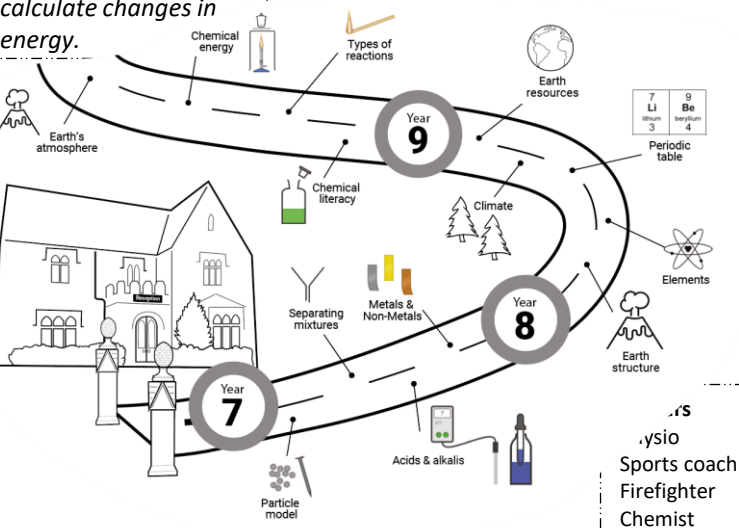
1	I can explain why mass is conserved during changes of state and chemical reactions
2	I can state that during chemical reactions reactants become products
3	I can state that during chemical reactions atoms are rearranged for reactants to become products
4	I can state neutralisation, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids, as examples of chemical reactions
5	I can represent chemical reactions using word equations

1	balanced symbol equation	In a balanced symbol equation, chemical formulae represent the reactants and products. The equation shows how many atoms are rearranged and joined together differently and gives the relative amounts of reactants and products.
2	chemical reaction	A change in which a new substance is formed. In a chemical reaction, atoms are rearranged and joined together differently.
3	conserved	When the quantity of something does not change after a process takes place.
4	fossil fuel	A fuel made from the remains of animals and plants that died millions of years ago. Fossil fuels include coal, oil, and natural gas.
5	fuel	A substance that stores energy in a chemical store which it can release as heat.
6	non-renewable	Energy resources that have a limited supply and that cannot be replaced within a short timeframe.
7	physical change	One that changes the physical properties of a substance, but no new substance is formed. A physical change is reversible.
8	products	Substances that are formed in a chemical reaction, shown on the right of the arrow in a chemical equation.
9	reactants	Substances that react together, shown on the left of the arrow in a chemical equation.
10	renewable	A fuel that can be easily replaced within a short timeframe.
11	thermal decomposition	A chemical reaction in which a compound breaks down on heating to form more than one product.

Before: . At KS2 you will have covered an understanding of materials by exploring and comparing the properties. You should have also explored changes that are difficult to reverse, for example burning, rusting and other reactions.

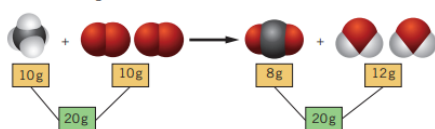
Why? Chemical reactions are useful in everyday use such as hand warmers, ice packs for sports injury.

At GCSE you learn in more detail about exothermic and endothermic reactions, including energy profiles and how to calculate changes in energy.



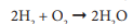
Conservation of mass

- In a reaction the mass will be **conserved**, this means that the total mass of the reactants will be equal to the total mass of the products
- If it appears that some of the mass has been lost, this means that a gas has been produced and escaped, accounting for the lost mass



Balanced symbol equations show the amounts of all of the individual atoms in a reaction

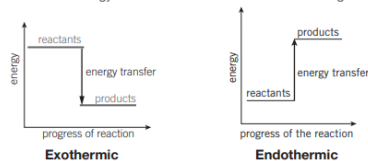
- The symbols used are from the Periodic Table
- They also show:
 - Formulae of reactants and products
 - How the atoms are rearranged
 - Relative amounts of reactants and products



Energy level diagrams

Energy level diagrams show the values of energy between the reactants and the products in a reaction

- If the energy is greater in the reactants than the products then the reaction is exothermic as energy has been given out to the surroundings
- If the energy is lower in the reactants than the products then the reaction is endothermic as energy has been taken in from the surroundings



Chemical reactions

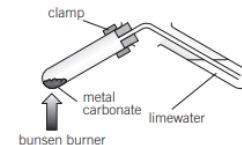
- Word equations can represent a **chemical reaction**:



- The **reactants** are on the left side of the arrow and the **products** are on the right side of the arrow
- We use an arrow instead of an equals sign as it represents that the reactants are changing into a new substance
- In a reaction, the amount of each type of atom stays the same, however they are rearranged to form a new product

Thermal decomposition

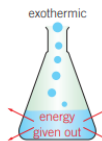
- A **thermal decomposition** reaction is one where the reactants are broken down (decomposition) using heat (thermal energy)
- An example of this is with metal carbonates:
zinc carbonate \rightarrow zinc oxide + carbon dioxide
- We can test for this carbon dioxide by bubbling the gas through limewater, if the limewater turns cloudy, the gas is carbon dioxide



Exothermic and endothermic reactions

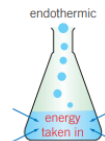
Exothermic reactions involve a transfer of energy from the reactants to the surroundings

- As energy is transferred to the surroundings this will show an increase in temperature
- Examples of exothermic reactions include combustion, freezing, and condensing



Endothermic reactions involve a transfer of energy from the surroundings to the reactants

- As energy is taken into the reactants a decrease in temperature will be shown
- Examples of endothermic reactions include thermal decomposition, melting, and boiling

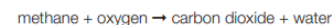


Bond energies

- Energy must be used to break **chemical bonds**, meaning that this reaction is endothermic
- Energy is given out when chemical bonds are made, meaning that this reaction is exothermic
- To see if a reaction is endothermic or exothermic, you must find the difference in the energy needed to break and to make the bonds in the reaction
- If the energy needed to break the bonds is less than the energy given out when making the bonds, the reaction is exothermic
- If the energy needed to break the bonds is more than the energy released when making the bonds, the reaction is endothermic

Combustion

- Combustion** is the burning of a **fuel** in oxygen
- A fuel is a substance which stores energy in a chemical store
- Examples of fuels include petrol, diesel, coal and hydrogen
- When a carbon based fuel undergoes combustion, it will produce water and carbon dioxide



- Hydrogen can also be used as a fuel, this is much better than traditional fossil fuels as it does not produce carbon dioxide:
$$\text{hydrogen} + \text{oxygen} \rightarrow \text{water}$$

Homework Menu Grid

Topic	1 Point	2 Points	4 Points	6 Points	10 Points
Atoms in chemical reactions	Write down the general word equation	Create a mnemonic to remember the different components of word equations	Draw and label a diagram to show how atoms are rearranged in reactions	In the air, nitrogen oxide (NO) reacts with oxygen (O ₂) to produce nitrogen dioxide (NO ₂). Draw a diagram to show the arrangement of particles in this reaction and the amount of each molecule/compound	Research who Democritus was and create a social media profile page on him, focusing on him posting about his ideas on atoms.
Combustion	Create a poem about combustion	Create a glossary of keywords from today's lesson	Cooking oil contains hydrogen and carbon. Predict the products when this is combusted with oxygen in the air	Methane reacts with oxygen in a combustion reaction. Write the word and symbol equation for this reaction and draw a diagram to show the arrangement of atoms in the reactants and products	"Burning any type of fuel contributes to climate change". Do you agree? Explain your answer.
Thermal decomposition	Create a poem about thermal decomposition.	Create a glossary of keywords from today's lesson	Draw a diagram showing the thermal decomposition of hydrogen peroxide to form oxygen and water. Show all of the atoms and bonds. You might wish to draw this out like how a word equation is structured	Predict the products of the thermal decomposition of strontium nitrate. Show this as a word equation	Plan an experiment to investigate the thermal decomposition of copper carbonate. Write down a method and include variables.
Conservation of mass	Write down the definition of conservation of mass	Draw a diagram to show an example of conservation of mass	Write an information leaflet to explain conservation of mass to someone who has no understanding of chemistry.	"In a chemical reaction, everything that goes into a reaction is turned into products". Do you agree? Explain why	Plan an experiment to determine how the mass of steel wool changes when burned in oxygen. Write down a method, variables and a hypothesis (a prediction about what might happen)