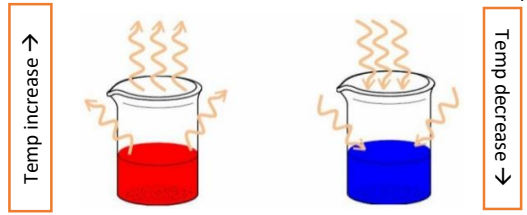
Chemical Reactions

Keyword	Definition
Endothermic	Reactions that take in heat
Exothermic	Reactions that give out heat
Oxidation	Reaction of other elements with oxygen
Combustion	Burning fuel in oxygen
Thermal Decomposition	When a substance is broken down into 2 or more products by heat
Reactivity series	List of metals in order of reactivity
Displacement	A more reactive metal will displace a less reactive metal from its compound
Catalyst	A substance that increases the rate of a reaction but is not itself used up.
Polymer	Long chain molecules made up of many monomers.
Fuel	Contain hydrocarbons – compounds containing hydrogen and carbon atoms only.
Activation Energy	The minimum amount of energy that colliding particles must have for them to react

Further Reading:
https://www.bbc.com/bitesize/guides/zqd2mp3/revision/3
https://www.bbc.com/bitesize/articles/zcwxcj6
https://www.bbc.com/bitesize/guides/zqd2mp3/revision/5
https://www.bbc.com/bitesize/guides/zqd2mp3/revision/6

Endothermic Reactions
In an endothermic reaction, thermal energy is taken in from the surroundings, therefore there is a temperature decrease. Thermal decomposition is an example.

Exothermic Reactions
In an exothermic reaction, thermal energy is given out to the surroundings, therefore there is a temperature increase. Combustion, oxidation and neutralisation reactions are all examples.



Combustion
Combustion is another name for burning. It is an example of an exothermic reaction. There are two types of combustion – complete combustion and incomplete combustion.

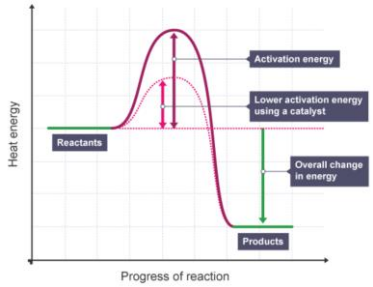
Complete Combustion
Coal, oil and gas are furls. They contain hydrocarbons (compounds of hydrogen and carbon atoms only). When these fuels burn, it reacts with oxygen in the air to produce carbon dioxide and water vapour.
Fuel + Oxygen → Carbon Dioxide + Water

Incomplete Combustion
If there is not enough oxygen in the air for complete combustion, incomplete combustion will happen instead.
This time either carbon monoxide is produced (a toxic gas which can lead to death) or carbon is produced (appears as soot and smoke which can cause breathing problems).
Fuel + Oxygen → Carbon Monoxide + Water
Fuel + Oxygen → Carbon + Water

Catalysts

A catalyst is a substance that:
- Speeds up the rate of a chemical reaction
- Does not alter the products of the reaction
- Is unchanged chemically and in mass at the end of the reaction.

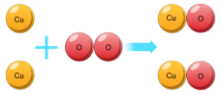
Catalysts provide an alternative reaction pathway that has a lower activation energy than the uncatalysed reaction.



Oxidation Reactions
In an oxidation reaction, a substance gains oxygen. Metals and non-metals can take part in oxidation reactions.

Metals react with oxygen in the air to produce metal oxides. For example, copper reacts with oxygen to produce copper oxide when it is heated in the air.

Copper + Oxygen → Copper Oxide
$2Cu + O_2 \rightarrow 2CuO$



Thermal Decomposition
Some compounds break down when heated, forming two or more products from one reactants.
Many metal carbonates can break down easily when it is heated:
Copper Carbonate → Copper Oxide + Carbon Dioxide

Copper carbonate is green, copper oxide is black. We can test for carbon dioxide using limewater. Limewater is colourless, but turns cloudy when carbon dioxide is bubbled through it.

Reactivity Series

Some metals are very unreactive. This means they don't take part in chemical reactions. For example platinum. Some metals are very reactive and they take part in chemical reactions easily to form new substances.

Displacement Reactions
Displacement reactions involve a metal and a compound of a different metal. In displacement reactions, a more reactive metal will displace a less reactive metal from its compound.
Magnesium + Copper Sulfate → Magnesium Sulfate + Copper

Magnesium is more reactive than copper, so it displaces (pushes out) the copper within the compound.