SCIENCE

Year 9: Chemical Reactions

1) Reactions that make salts

The name of a salt has two parts:

- the first part comes from the metal in the base used
- the second part comes from the acid that was used

Acid used	Second part of salt's name
hydrochloric acid	chloride
sulfuric acid	sulfate
nitric acid	nitrate

A **salt** is made when an **acid** reacts with a **metal** or an acid reacts with a **base**. Bases are usually:

- metal oxides, such as copper oxide
- metal hydroxides, such as sodium hydroxide, or
- metal carbonates, such as calcium carbonate

Reaction	**Metal + Acid**
General equation	metal + acid → salt + hydrogen
Example	magnesium + hydrochloric acid → magnesium chloride + hydrogen

Reaction	**Metal Oxide + Acid**
General equation	metal oxide + acid → salt + water
Example	copper oxide + sulfuric acid → copper sulfate + water

Reaction	**Metal Hydroxide + Acid**
General equation	Metal hydroxide + acid → salt + water
Example	sodium hydroxide + hydrochloric acid → sodium chloride + water

Reaction	**Metal Carbonate + Acid**
General equation	metal carbonate + acid → salt + water + carbon dioxide
Example	copper carbonate + sulfuric acid → copper sulfate + water + carbon dioxide

Keyword	Meaning	Keyword	Meaning
Element	A substance made up from a single type of atom.	Combustion	Another name for burning.
Compound	A substance made up from two or more elements chemically bonded together.	Oxidation	In an oxidation reaction, a substance gains oxygen.
Acid	A substance with a pH lower than 7.	Carbon cycle	The carbon cycle shows how atoms of carbon can exist in different compounds at different times and be recycled between living organisms and the environment.
Base	A substance that can react with acids and neutralise them.	Global warming	More thermal energy is trapped by the atmosphere, causing the planet to become warmer.
Alkali	A base that dissolves in water. The pH is above 7.	Greenhouse gas	Gases in the atmosphere that trap escaping thermal energy. Carbon dioxide is a greenhouse gas.
Salt	A salt is any compound formed by the neutralisation of an acid by a base.	Filtrate	A liquid that has passed through a filter

2) How to make a salt

<u>Making a salt from an alkali</u>

1. Add just enough acid to the alkali make a neutral solution
2. Check a small sample with universal indicator paper
3. Warm the salt solution to evaporate the water

<u>Making a salt from an insoluble metal oxide or carbonate</u>

1. Add the base to the warm acid until no more will dissolve and you have some base left over.
2. Warming the acid make the reaction faster. Adding excess base makes sure all the acid has reacted.
3. Filter the mixture to remove the excess base
4. Evaporate the water in the filtrate to leave the salt behind

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3) Oxidation

In an oxidation reaction, a substance gains oxygen.

For example, magnesium reacts with oxygen to produce magnesium oxide when it is heated in air:

magnesium + oxygen → magnesium oxide

4) Combustion

Combustion is another name for burning. It is a reaction that releases energy. Coal, oil and natural gas are fuels. They contain **hydrocarbons**, which are compounds of hydrogen and carbon only.

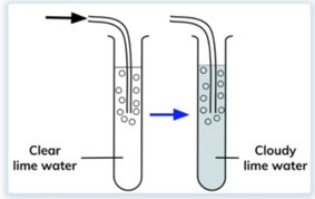
When the fuel burns, its hydrocarbons react with oxygen. For example, natural gas is mostly methane.

methane + oxygen → water + carbon dioxide

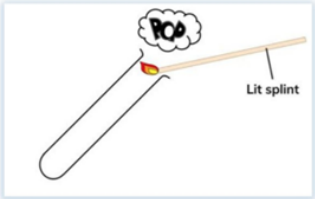
Carbon dioxide is a **greenhouse gas**. This means it can trap heat in the atmosphere. So if there is more carbon dioxide the Earth's temperature will rise. This is **global warming**.

5) Gas Tests

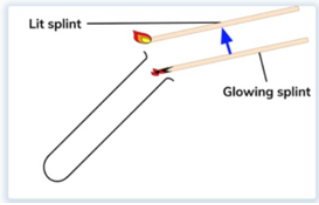
You can test if a gas is **carbon dioxide** by bubbling it through **limewater** which will turn cloudy.



To test a gas to see if it is **hydrogen** put a lit wooden splint in a test tube. If the gas is hydrogen it will make a squeaky pop sound.



To test a gas to see if it is **oxygen** put a glowing wooden splint in a test tube. If the gas is oxygen gas the splint will relight.



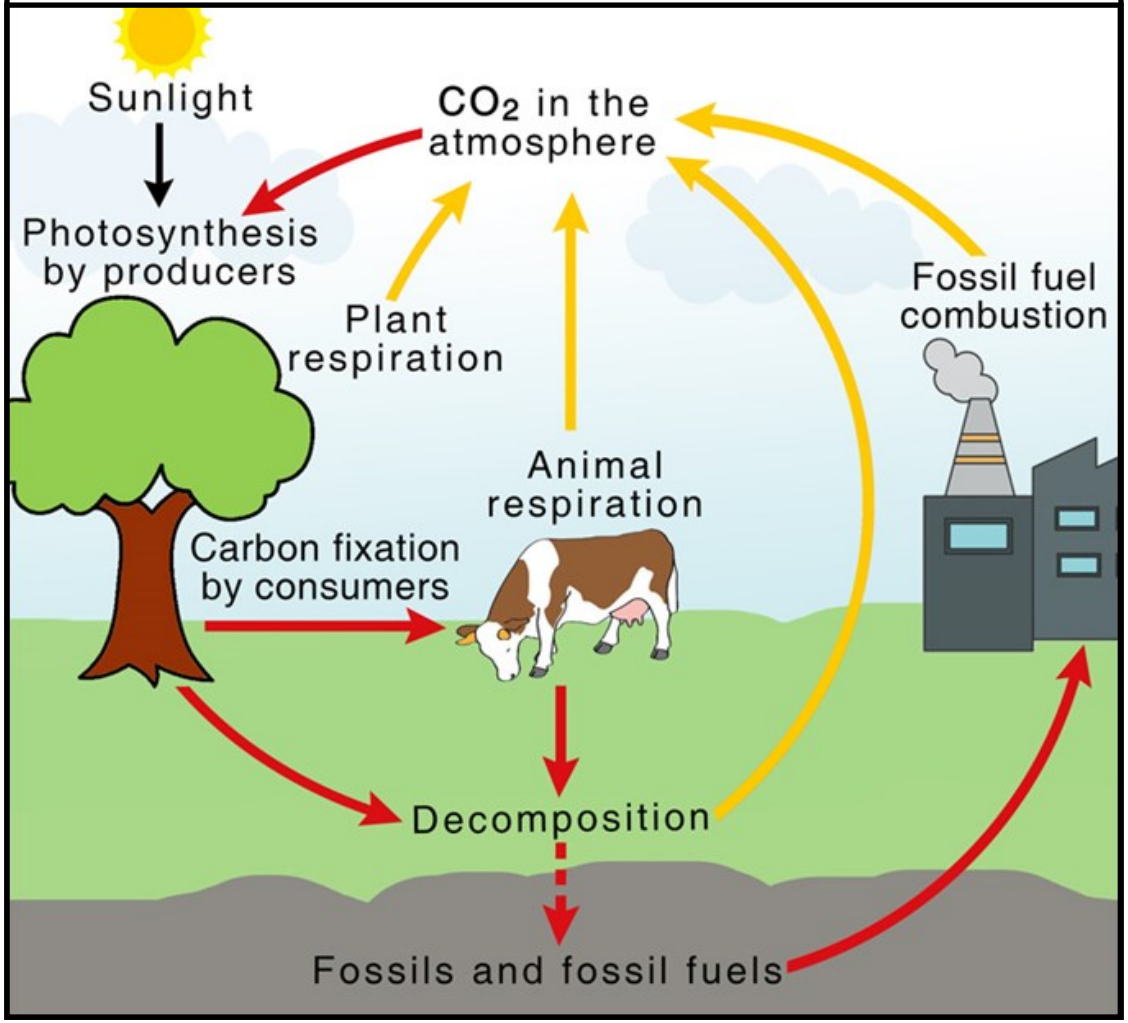
6) Carbon Cycle

Carbon is being continually recycled on Earth.

The processes that release carbon dioxide to the atmosphere include:

- **combustion** of fossil fuels
- **respiration** by plants and animals

Carbon dioxide is taken in from the atmosphere by plant for **photosynthesis.**

Some processes move carbon compounds from place to place, including:

- **feeding** by animals
- formation of **fossil fuels**