

9C1 Knowledge Organiser – Environmental Chemistry

Key words

Key word	Definition
Igneous	Rocks that formed under very hot conditions within the Earth
Metamorphic	Rocks that formed under intense heat or pressure
Sedimentary	Rocks that formed through the deposition of sediments, e.g. limestone and sandstone
Acid rain	Rain that contains dissolved acidic gases such as sulphur dioxide
Crude oil	Mixture of hydrocarbons, formed over millions of years from ancient remains of dead marine organisms
Hydrocarbons	Molecule made up of hydrogen and carbon atoms
Evaporate	Turn from a liquid into a gas
Condense	Turn from a gas into a liquid
Fossil fuel	Natural, finite fuel formed from the remains of living organisms, e.g. oil, coal, natural gas.
Global warming	The rise in the average temperature of the Earth's surface
Greenhouse effect	The retention of heat in the atmosphere caused by the build-up of greenhouse gases

The atmosphere

Today the atmosphere is 80% nitrogen and 20% oxygen. However, it hasn't always been like this. Take a look at the image to the right to see how it has developed over the Earth's history.



- Volcanic eruptions cause **high Carbon dioxide** in the atmosphere
- Also released **nitrogen and water vapour**



- Surface cooled, all the **water condensed** into oceans.
- **Carbon dioxide** levels fell as it **dissolved** in the oceans



- Green plants evolved
- These plants started **photosynthesizing**.
- **Lowered CO₂** even further but started to **produce O₂** – which rose.

Rocks: Igneous, sedimentary and metamorphic

Sedimentary rock

A river transports rock to sea/lake where it is deposited. Deposited rocks build up in layers in a process called sedimentation. The weight of each layer compacts the layer below. Over millions of years this forms sedimentary rocks.

Igneous rocks

The core of the Earth is extremely hot. The intense heat produces magma, a type of molten rock. When the magma cools and solidifies, it creates igneous rock.

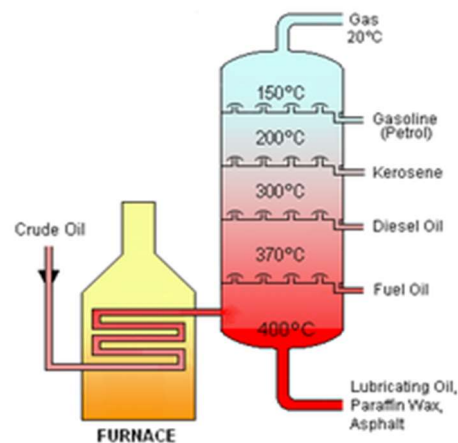
Metamorphic rock

Tectonic plate movement causes rocks to be buried or squeezed = rocks under high heat and pressure. They do not melt, but the minerals within the rocks are chemically altered, producing metamorphic rocks

Fractional distillation

Crude oil is a mixture of hydrocarbons, meaning it is lots of different chain lengths of molecules made of just hydrogen and carbon. Fractional distillation is a method of separation – it aims to separate each hydrocarbon according to size.

1. Oil is heated so each chain of hydrocarbon evaporates.
2. The gas is then pumped into a fractionating column – a large metal tube that is hot at the bottom and cool at the top.
3. The small chains condense back into a liquid when they reach cool temperatures at the top.
4. The large chains condense back into liquids even at higher temperatures at the bottom.



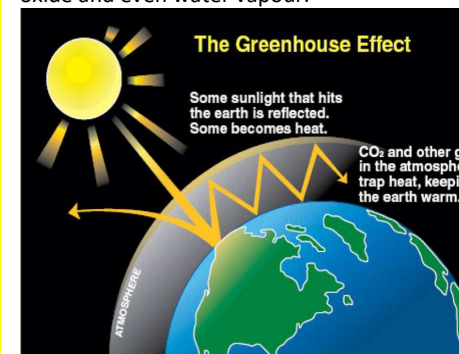
Life Cycle Assessments (LCA)

These are ways to analyse the impact of a product on the environment. You can then compare two products to decide which is better for the environment.

1. Raw materials – what materials does it require?
2. Manufacture – what is the process involved in making it?
3. Use – what impact does using it have? Any pollution?
4. Disposal – how do you get rid of it? Can it be recycled?

Greenhouse gases

Greenhouse gases are those responsible for global warming such as methane, nitrous oxide and even water vapour.



Common pollutants

A pollutant is a toxic chemical that causes damage to the environment or humans, e.g.: **Carbon monoxide**: is carried by red blood cells, causes drowsiness and even death.

Sulphur dioxide: results from combustion and can form acid rain.

Nitrous oxides – during high temperatures of engines, nitrogen and oxygen can react. These products can form smog and cause problems with breathing.