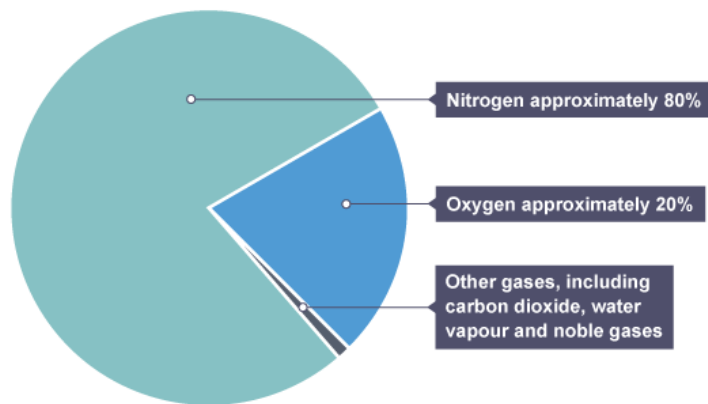


AQA C9 Atmosphere Triple Chemistry

Composition of the atmosphere



The early atmosphere

The Earth formed approximately 4.6 billion years ago.

The early atmosphere came from volcanoes. It was probably like the atmospheres of Venus and Mars today.

These atmospheres have:

- a large amount of carbon dioxide
- little or no oxygen
- small amounts of ammonia and methane

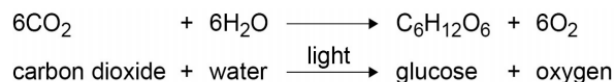
Volcanoes also released water vapour, which condensed as the Earth cooled to form the oceans

Nitrogen was probably also released by volcanoes which gradually built up in the atmosphere because it is unreactive.

Over time, the levels of oxygen increased, and the levels of carbon dioxide decreased. Today human activity is releasing more carbon dioxide.

How oxygen increased

Photosynthesis by algae and plants released oxygen.



This started around 2.7 billion year ago, and the percentage of oxygen gradually increased.

How carbon dioxide decreased

Algae and plants absorbed carbon dioxide through photosynthesis.

Many of these organisms formed fossil fuels such as crude oil, coal and natural gas. This “locked up” carbon dioxide.

Carbon dioxide dissolved in oceans. This formed carbonate compounds, which formed sedimentary rocks.

The greenhouse effect

Greenhouse gases include water vapour, carbon dioxide and methane.

They transmit short wavelength radiation to Earth, but absorb long wavelength radiation reflected from Earth. This increases the temperature of Earth.

Human activities are increasing the amount of greenhouse gases in the atmosphere. This is causing global warming.

Methane is released by farming cattle and by landfill
Carbon dioxide is released by burning fossil fuels, and by deforestation.

Global warming → Glaciers melting / Sea levels rising /
More floods and droughts / Habitats changing

Carbon footprint

A carbon footprint is the total amount of greenhouse gases emitted over the full life of something.

Other pollutants

Combustion of fuels causes pollution in the atmosphere.

Complete combustion releases carbon dioxide.

Incomplete combustion releases carbon monoxide, a colourless, odourless, and toxic gas.

Combustion can produce carbon particulates, which cause global dimming and health problems.

Often fossil fuels contain impurities. If sulfur is present, it can burn to produce sulfur dioxide. This dissolves to cause acid rain.

Nitrogen in the air can react at high temperatures in a car engine to produce nitrogen oxides. These also dissolve to cause acid rain.