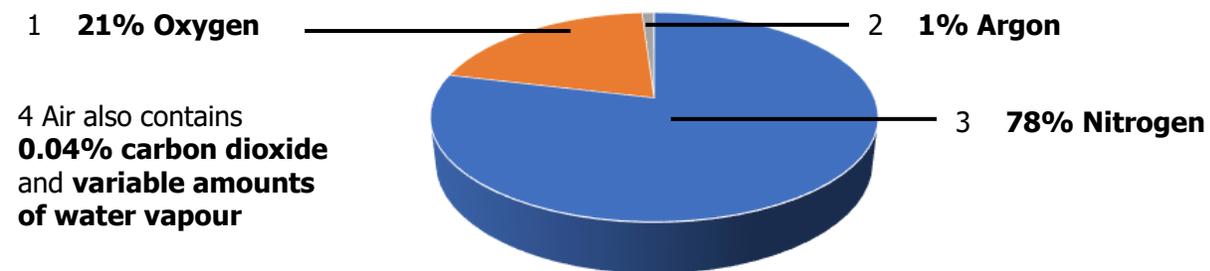


Chemistry 9: Chemistry of the Atmosphere

Section 1: The Atmosphere



Section 2: Formation of the Atmosphere

5. Early Atmosphere
Atmosphere is **mainly carbon dioxide** with **no oxygen**.

6. 4.6 – 3.6 Billion Years Ago
Volcanoes erupt releasing nitrogen and water vapour. Water vapour condenses and forms the oceans. Some **carbon dioxide dissolves in the oceans. Carbon dioxide is also locked in fossil fuels and sedimentary rocks.**

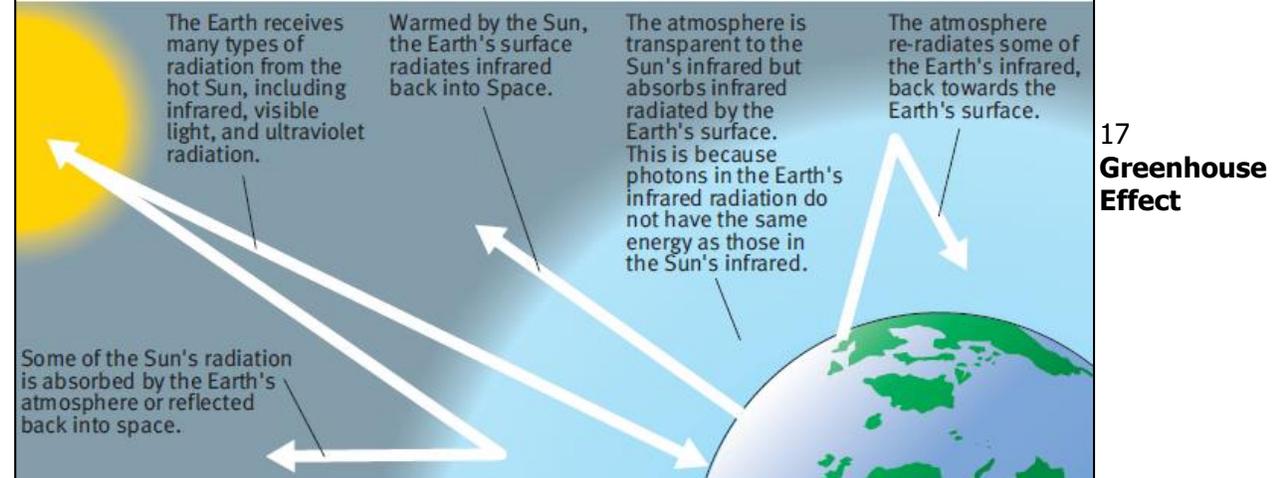
7. 2.7-1.7 Billion Years Ago
Plants evolve and release oxygen through photosynthesis. They take in more carbon dioxide.

Section 2a: Reduction of CO₂ by formation of deposits

8 Coal	Plants absorbed CO₂. They died and decayed. This layer of decaying plants was compressed to form coal.
9 Oil and natural gas	Plankton absorbed CO₂. Plankton died and were deposited in muds on the sea floor. They were covered over and compressed over millions of years.
10 Limestone	Shelled animals absorbed CO₂ to make their calcium carbonate shells. The remains of these animals were compressed to form limestone.

Section 3: Greenhouse Effect and Global Warming

11 Greenhouse effect	The process by which the temperature on Earth is kept high enough to support life by greenhouse gases absorbing radiation radiated by the Earth.
12 Greenhouse gas	Greenhouse gases keep temperatures on Earth high enough to support life. Water vapour, methane and carbon dioxide are greenhouse gases.
13 Short wavelength radiation	The radiation from the Sun. Is able to pass through the Earth's atmosphere and warm the surface of the Earth without being absorbed by greenhouse gases.
14 Long wavelength radiation	The radiation from the Earth's surface. Some is absorbed by greenhouse gases and doesn't escape the atmosphere.
15 Carbon footprint	The total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product or event.
16 Global warming	The increase of the average temperature of the Earth.



18 How humans increase carbon dioxide in the atmosphere	19 How humans increase methane in the atmosphere
Combustion of fossil fuels	Increased animal farming
Deforestation	Decomposition of rubbish in landfill
20 How humans can decrease carbon dioxide concentration	21 How humans can decrease methane concentration
Use alternative forms of energy e.g. wind turbines	Alternative foods – non-animal based
Energy efficiency e.g. more efficient cars	Increased recycling
Carbon capture – capturing CO ₂ from power stations and trapping it	
Carbon off-setting – planting more trees	
Effects of global warming	
22 Some regions will not be able to produce enough food because of drought.	
23 Changes to distribution of species and migration patterns.	
24 Increase in sea levels because of melting of polar ice caps.	
25 Reduction of water supplies in some regions.	

Section 4: Common Pollutants

Pollutant	Formula	Cause	Effect
26 Carbon monoxide	CO	Incomplete combustion of a hydrocarbon fuel.	Toxic gas. Colourless and odourless so hard to detect.
27 Sulfur dioxide	SO ₂	Burning coal or petrol. Both contain sulfur which reacts with oxygen in the air.	Cause respiratory problems (e.g. for those with asthma).
28 Nitrogen oxides	NO _x	In car engines. N₂ and O₂ from air react at high temperatures.	Combine with water vapour to cause acid rain.
29 Particulates	CO ₂	Incomplete combustion of a hydrocarbon fuel.	Global dimming (reduction in sunlight reaching Earth).