

SUBJECT: Science

UNIT: C9 Chemistry in the atmosphere



While you were away.

Lesson 1: Evolution of the Atmosphere

1. What gases were released into the early atmosphere by volcanic activity?
2. How did oxygen levels in the atmosphere begin to increase over time?

Lesson 2: The Greenhouse Effect

1. What are the main greenhouse gases and how do they affect Earth's temperature?
2. What happens to heat during the night due to the greenhouse effect?

Lesson 3: Global Warming

1. What human activities contribute to the increase in greenhouse gases?
2. What is the link between carbon dioxide concentration and global temperatures?

Lesson 4: Carbon Footprint

1. How does deforestation affect the carbon dioxide levels in the atmosphere?
2. Why is it important to consider the source and bias of data when evaluating environmental claims?

Lesson 5: Atmospheric Pollution

1. What pollutants are produced during incomplete combustion and what are their effects?
2. How does sulfur dioxide contribute to acid rain and what are its environmental impacts?

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The early atmosphere

4.6 billion years ago the Earth was formed. As no one was around we need to look at Mars and Venus to determine what the earth's early atmosphere was like. The main theory suggested that intense volcanic activity released gases such as Carbon Dioxide, Nitrogen gas and water. The earth's early atmosphere would have contained little oxygen.

Ambitious Vocabulary

Global warming, fossil fuels, condensed, greenhouse gases.

How the oceans formed

The earth cooled down, Water vapor condensed (went from gas to liquid) to create the oceans.

Carbon dioxide would have dissolved into the water decreasing the level in the atmosphere.

How did oxygen levels increase?

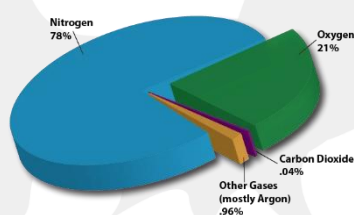
2.7 billion years ago, algae first produced oxygen. Gradually over time, the levels of oxygen increased as plants evolved. Oxygen is produced by photosynthesis
 $\text{Carbon dioxide} + \text{water} \rightarrow \text{Glucose} + \text{oxygen}$

The human impact and the greenhouse effect.

Scientists believe that human activities have resulted in the increased amount of greenhouse gases in the atmosphere. Burning fossil fuels – producing CO_2
Deforestation – excess CO_2 not being absorbed by photosynthesis.

How did the levels of Carbon Dioxide Decrease?

1. Dissolved in water. As the water vapour condensed and the oceans and seas formed the carbon dioxide gas dissolved producing carbonate compounds.
2. Plants in the oceans absorbed Carbon Dioxide gas for photosynthesis.
3. Passing on the carbon produces down the food chains the Carbon was locked into fossil fuels such as crude oil.



Percentage of gases in our atmosphere

The greenhouse effect

The earth and its atmosphere are very similar to a greenhouse. The greenhouse gases in the atmosphere trap the heat and keep the earth warm. The main greenhouse gases are Carbon dioxide, water vapour and methane. During the daylight, the sun warms up the earth's surface. During the night, as the earth begins to cool and release the heat back into the atmosphere, some of the heat is trapped by the greenhouse gases in the atmosphere.

If the greenhouse effect becomes too strong, the earth will get too warm and melt the arctic ice.

Sulfur Dioxide

SO_2 is an atmospheric pollutant. It is a gas produced from burning coal. It will dissolve in rainwater and produces acid rain. Acid rain causes damage to forests, kills plants and animals that live in aquatic environments.

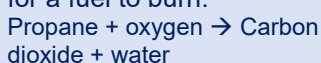


Trusting data

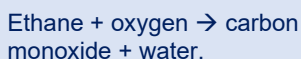
Once you have read an article consider the following
Is the research done by an expert in that field?
Which organisation is reporting the evidence? Is there bias?
Was research funded by a legitimate organisation and was it conducted in a non-bias way.

Combustion

Complete combustion occurs when there is enough oxygen for a fuel to burn.



Incomplete combustion occurs when there isn't enough oxygen for a fuel to burn. The products in this reaction are water and poisonous carbon monoxide. Carbon particles (soot) may also be seen.



Carbon monoxide is a poisonous gas. Carbon monoxide works by binding to the red blood cells. This prevents them from carrying oxygen to the cells around your body.

Particulate carbon irritates the lining of the lungs making asthma worse and could cause cancer.

Nitrogen

Nitrogen and oxygen react together to make oxides of nitrogen. This occurs inside car engine where there is a high temperature and pressure.

Nitrogen compounds along with sulphur dioxide are responsible for acid rain.

Nitrogen oxides react in the atmosphere with UV light from the sun to produce photochemical smog. The smog can have a major impact on human health. Particularly to those with asthma.

Link between carbon dioxide and global warming

There is a strong correlation between the percentage concentration of carbon dioxide in the atmosphere and the increased global temperatures.