Key Learning Priorities

C9- Chemistry of the Atmosphere

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| 1 | In the last 200 million years, the proportions of different gases in the atmosphere have been much the same: about four-fifths (approximately **80%**) **nitrogen**, about one-fifth (approximately **20%**) oxygen and small proportions of various other gases, including carbon dioxide, water vapour and noble gases. |
| 2 | The Earth’s atmosphere formed about 4.6 million years ago. It is thought that during the first billion years of the Earth’s existence there was intense **volcanic activity** that released gases that formed the early atmosphere- **carbon dioxide, methane and ammonia, and water vapour** that later **condensed** to form the oceans. |
| 3 | About 2.7 million years ago algae began to remove carbon dioxide from the atmosphere through **photosynthesis**, and replace it with oxygen. Around 1 billion years ago, green plants evolved and also photosynthesised, reducing the amount of carbon dioxide in the atmosphere and increasing the amount of oxygen. Carbon dioxide was also reduced because it **dissolved** in oceans, and was locked up in **sedimentary rocks** and **fossil fuels** as they formed. |
| 4 | **Greenhouse gases** are carbon dioxide, methane and water vapour. They trap heat into the Earth’s atmosphere enabling the planet to be warm enough to sustain life. The **infrared radiation** reaching the Earth from the Sun is all of wavelengths. The Earth **absorbs** shorter wavelengths and **reflects** longer wavelength radiation. Greenhouse gases absorb some of this longwave radiation and trap it in our atmosphere. |
| 5 | Some human activities increase the amounts of greenhouse gases in the atmosphere. The amount of carbon dioxide is increased by **burning** fossil fuels and **deforestation**, and methane is released in large amounts by cattle. Many scientists believe that human activities will cause the temperature of the Earth’s atmosphere to increase and that this will result in global **climate change**. |
| 6 | An increase in global temperature can cause climate change. The effects of climate change include increased **storms, droughts, flooding, sea level rises, changed migration patterns and the melting of sea ice.** |
| 7 | **Carbon footprint** is the amount of carbon dioxide and other greenhouse gases emitted over the whole life cycle of a product, service or event. Carbon footprint can be reduced by reducing emissions of greenhouse gases through alternatives such as renewable fuels, but making the changes necessary to reduce carbon footprint can be expensive. |
| 8 | The **combustion** of fuels is a major source of **atmospheric** **pollutants**. Most fuels, including coal, contain carbon and/or hydrogen and may also contain some sulfur.  The gases released into the atmosphere when a fuel is burned may include **carbon** **dioxide** and **water** **vapour** which contribute to **global** **warming**, **carbon** **monoxide** which can cause **respiratory** **difficulties**, **sulfur** **dioxide** and **oxides** of **nitrogen** which can cause **breathing** **difficulties** and can dissolve in rainwater to form **acid** **rain**, solid particles and unburned hydrocarbons may also be released that form **particulates** in the atmosphere- these cause **lung** **disease** and **global** **dimming**. |