

## COMBUSTION AND POLLUTION

Content	Page number			Exam paper
	C FT	C HT	Sep	
<p>For 200 million years, the proportions of different gases in the atmosphere have been much the same as they are today:</p> <ul style="list-style-type: none"> <li>• about four-fifths (approximately 80%) nitrogen</li> <li>• about one-fifth (approximately 20%) oxygen</li> <li>• small proportions of various other gases, including carbon dioxide, water vapour and noble gases.</li> </ul>	155	157	91	2
<p>Theories about what was in the Earth's early atmosphere, and how the atmosphere was formed, have changed and developed over time. Evidence for the early atmosphere is limited because of the time scale of 4.6 billion years.</p> <p>One theory suggests that during the first billion years of the Earth's existence there was intense volcanic activity that released gases that formed the early atmosphere and water vapour that condensed to form the oceans. At the start of this period the Earth's atmosphere may have been like the atmospheres of Mars and Venus today, consisting of mainly carbon dioxide with little or no oxygen gas.</p> <p>Volcanoes also produced nitrogen which gradually built up in the atmosphere and there may have been small proportions of methane and ammonia.</p> <p>When the oceans formed, carbon dioxide dissolved in the water and carbonates were precipitated producing sediments, reducing the amount of carbon dioxide in the atmosphere.</p>	155	157	91	2
<p>Algae and plants produced the oxygen that is now in the atmosphere by photosynthesis, which can be represented by the equation:</p> $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ <p style="text-align: center;">carbon dioxide + water (light) → glucose + oxygen</p> <p>Algae first produced oxygen about 2.7 billion years ago and soon after this oxygen appeared in the atmosphere. Over the next billion years plants evolved and the percentage of oxygen gradually increased to a level that enabled animals to evolve.</p>	155	157	91	2
<p>Algae and plants decreased the percentage of carbon dioxide in the atmosphere by photosynthesis.</p>	155	157	91	2

Carbon dioxide was also decreased by the formation of sedimentary rocks and fossil fuels that contain carbon.				
Greenhouse gases in the atmosphere maintain temperatures on Earth high enough to support life.	156	157	92	2
Water vapour, carbon dioxide and methane are greenhouse gases.				
Some human activities increase the amounts of greenhouse gases in the atmosphere. These include: <ul style="list-style-type: none"> <li>• carbon dioxide</li> <li>• methane</li> </ul> <p>Based on peer-reviewed evidence, many scientists believe that human activities will cause the temperature of the Earth's atmosphere to increase at the surface and that this will result in global climate change.</p> <p>However, it is difficult to model such complex systems as global climate change. This leads to simplified models, speculation and opinions presented in the media that may be based on only parts of the evidence and which may be biased.</p>	156	157	94	2
An increase in average global temperature is a major cause of climate change.	156	157-158	92-94	2
There are several potential effects of global climate change.				
The carbon footprint is the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event.	157	159	93	2
The carbon footprint can be reduced by reducing emissions of carbon dioxide and methane.				
The combustion of fuels is a major source of atmospheric pollutants.	158	160	94	2
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, water vapour, carbon monoxide, sulfur dioxide and oxides of nitrogen. Solid particles and unburned hydrocarbons may also be released that form particulates in the atmosphere.				
Carbon monoxide is a toxic gas. It is colourless and odourless and so is not easily detected.	158	160	94	2
Sulfur dioxide and oxides of nitrogen cause respiratory problems in humans and cause acid rain. Particulates cause global dimming and health problems for humans.				