

# AQA Chemistry GCSE

Topic 9: Chemistry of the Atmosphere

Flashcards



Describe the proportions of gases in  
the modern atmosphere



# Describe the proportions of gases in the modern atmosphere

- Around 80% of  $N_2$
- 20% of  $O_2$ ,
- Small quantities of  $CO_2$ ,  $H_2O$ , and noble gases



Describe the Earth's early atmosphere and how it was formed



## Describe the Earth's early atmosphere and how it was formed

- a) The Earth was hot when it was formed
- b) There was significant volcanic activity
- c) Gases have been released from these volcanoes
- d) These gases included  $\text{CO}_2$ ,  $\text{N}_2$ ,  $\text{CH}_4$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{O}$



How did the amount of oxygen  
in the atmosphere increase?



# How did the amount of oxygen in the atmosphere increase?

Algae and plants produced the atmospheric  $O_2$  by photosynthesis, which can be represented by the equation:  $6 CO_2 + 6 H_2O \rightarrow C_6H_{12}O_6 + 6 O_2$ . As the amount of gradually  $O_2$  increased, there were more plants that produced more oxygen.



How did the amount of carbon dioxide in the atmosphere decrease?



# How did the amount of carbon dioxide in the atmosphere decrease?

- a) Some  $\text{CO}_2$  was dissolved in the oceans, where it reacted with metal ions to form insoluble carbonates, such as  $\text{CaCO}_3$ , or was taken in by animals to become a part of skeleton. When animal dies, this becomes a sedimentary rock.
- b) Some  $\text{CO}_2$  was used in photosynthesis to make oxygen.



What is the greenhouse effect? What are greenhouse gases? Give examples



# What is the greenhouse effect? What are greenhouse gases? Give examples

Greenhouse gases in the atmosphere maintain temperatures on Earth high enough to support life.

They allow short wavelength radiation from the sun to pass through the atmosphere to the Earth's surface, but absorb the outgoing long wavelength radiation from the Earth causing an increase in temperature.

Water vapour, carbon dioxide, and methane



# Why is the greenhouse effect necessary for life?



# Why is the greenhouse effect necessary for life?

The greenhouse effect is a natural phenomenon. Without it, the Earth would be too cold for life to exist.



How have human activities led to an increase in greenhouse gases?



# How have human activities led to an increase in greenhouse gases?

Carbon dioxide – combustion and deforestation

Methane – increased farming and decomposition in landfills



# What are the potential effects of global climate change?



# What are the potential effects of global climate change?

- sea level rise, which may cause flooding and increased coastal erosion
- more frequent and severe storms
- changes in the amount, timing and distribution of rainfall
- temperature and water stress for humans and wildlife
- changes in the food-producing capacity of some regions
- changes to the distribution of wildlife species



# What is a carbon footprint?



# What is a carbon footprint?

A 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.



What actions can be taken to  
reduce a carbon footprint?



# What actions can be taken to reduce a carbon footprint?

- increased use of alternative energy supplies
- energy conservation
- carbon capture and storage (where CO<sub>2</sub> is trapped in solvents and stored underground)
- carbon taxes and licences
- carbon off-setting including through tree planting
- carbon neutrality – zero net release.



What are the challenges faced  
with reducing a carbon  
footprint?



# What are the problems of reducing the carbon footprint?

- scientific disagreement over causes and consequences of global climate change
- lack of public information and education
- lifestyle changes (people don't want to give up their cars)
- economic considerations (it will cost money)
- incomplete international cooperation



# What are the advantages of complete combustion?



## What are the advantages of complete combustion?

- less soot (carbon particulates) is made with complete combustion
- more heat per gram of fuel is released with complete combustion
- poisonous carbon monoxide is not produced with complete combustion



# How is pollution caused by combustion?



# How is pollution caused by combustion?

When a fuel burns, the gases released to the atmosphere include carbon dioxide, water (vapour), carbon monoxide, sulphur dioxide and oxides of nitrogen.

Solid particles and unburned hydrocarbons may also be released that form particulates in the atmosphere.



What are the issues  
regarding sulfur dioxide and  
oxides of nitrogen?



# What are the issues regarding sulfur dioxide and oxides of nitrogen?

Sulfur dioxide and oxides of nitrogen cause respiratory problems in humans and cause acid rain. Acid rain damages plants and buildings.



# What problems do particulates cause?



## What problems do particulates cause?

Particulates, such as carbon particles, cause global dimming by reducing the amount of sunlight that reaches the Earth's surface. Particulates cause health problems for humans because of damage to the lungs.

