

# Carbon dioxide + Methane as Greenhouse

## Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.9 Chemistry of the Atmosphere
Sub-Topic	Carbon dioxide + Methane as Greenhouse
Difficulty Level	Gold Level
Booklet	Question Paper 1

Time Allowed: 41 minutes

Score: /39

Percentage: /100

Grade Boundaries:

**Q1.** There is less carbon dioxide in the Earth's atmosphere now than there was in the Earth's early atmosphere.

- (a) The amount of carbon dioxide in the Earth's early atmosphere decreased because it was used by plants and algae for photosynthesis, dissolved in the oceans and formed fossil fuels.

Give **one** other way that the amount of carbon dioxide in the Earth's early atmosphere decreased.

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(1)

- (b) Carbon dioxide is a greenhouse gas.

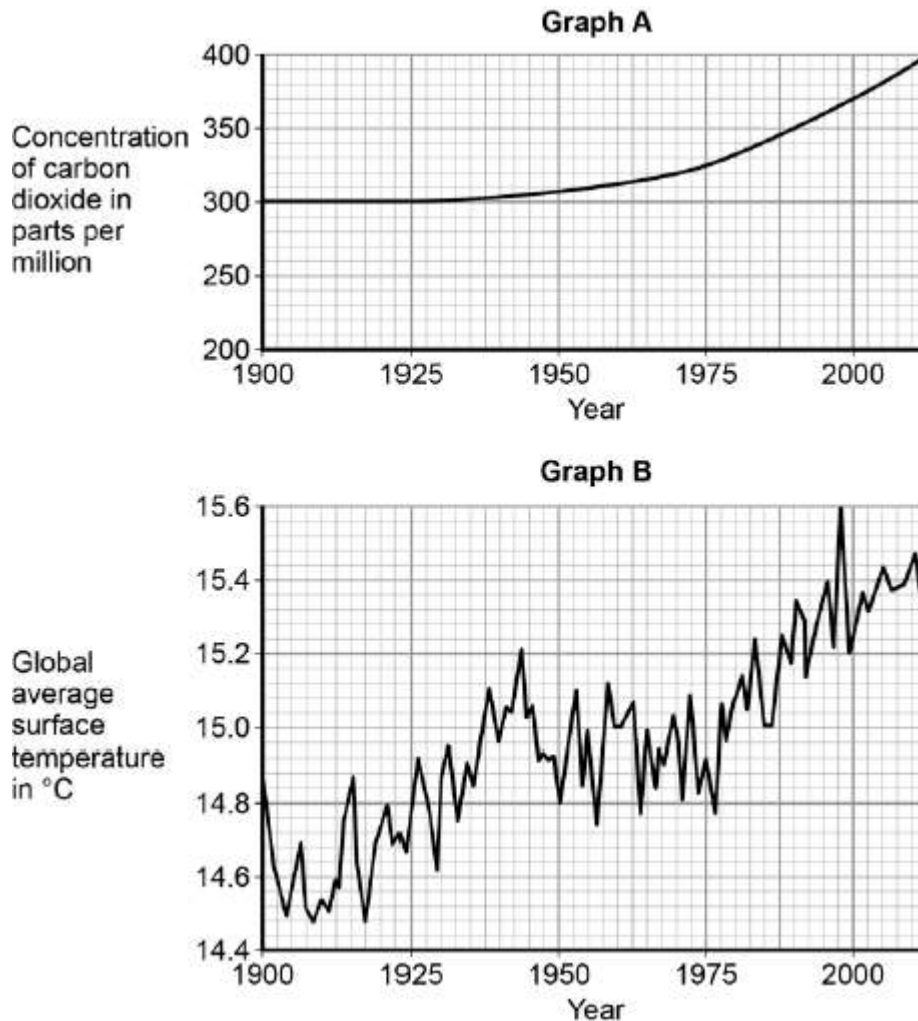
Describe the greenhouse effect.

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(4)

- (c) The graphs in **Figure 1** show the concentration of carbon dioxide in the atmosphere and global average surface temperature since 1900.

**Figure 1**



Calculate the percentage increase in the concentration of carbon dioxide from 1975 to 2000.

..... %

(1)

- (d) What was the global average surface temperature in 1980?

Global average surface temperature = ..... °C

(1)

- (e) A student stated: 'The graphs show that increasing the concentration of carbon dioxide in the atmosphere causes global temperature increases.'

Discuss why this statement is only partially true.

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(4)  
(Total 11 marks)

**Q2.**In the last 200 years the concentration of carbon dioxide in the Earth's atmosphere has risen.

Explain how a rise in carbon dioxide concentration in the atmosphere can decrease biodiversity.

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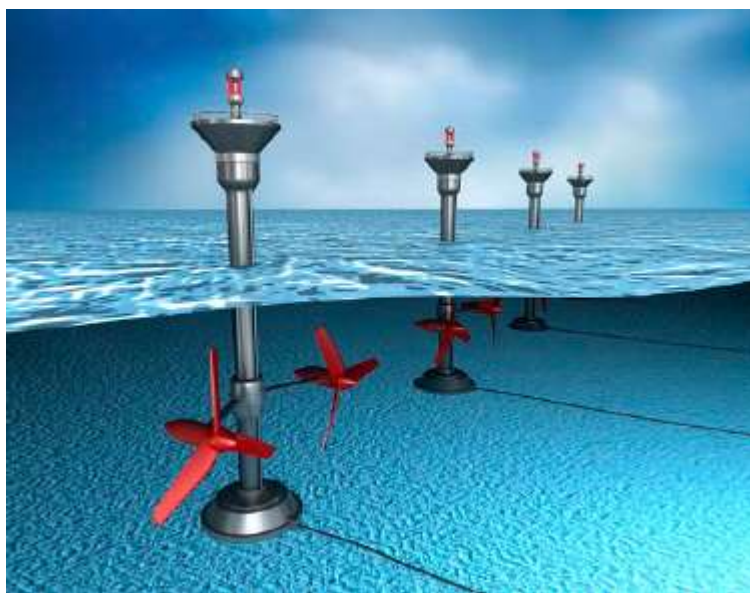
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(Total 6 marks)

**Q3.**Electricity in the UK is generated in many ways.

The figure below shows an undersea turbine.

The undersea turbine uses tidal energy to generate electricity.



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- (a) What is the original source of energy for tidal power schemes?

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(1)

- (b) Explain **two** advantages of using undersea tidal turbines to generate electricity rather than burning fossil fuels.

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(4)

- (c) Some power stations burn wood instead of fossil fuels to generate electricity.
- A coal-burning power station burns 6 million tonnes of coal per year.
- Coal has an average energy value of 29.25 MJ per kg.

If this power station burned dry willow wood instead of coal, how much agricultural land would be needed to grow the willow?

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**(3)**

- | Fuel        | Direct CO <sub>2</sub> emissions<br>in kg per MWh | Lifecycle CO <sub>2</sub><br>emissions<br>in kg per MWh |
|-------------|---|---|
| Coal        | 460   | 540   |
| Natural gas | 185   | 215   |
| Oil         | 264   | 313   |
| Wood        | 2 100   | 58  |

Use the data from the table above to explain why wood is considered to be a low carbon dioxide emitting fuel.

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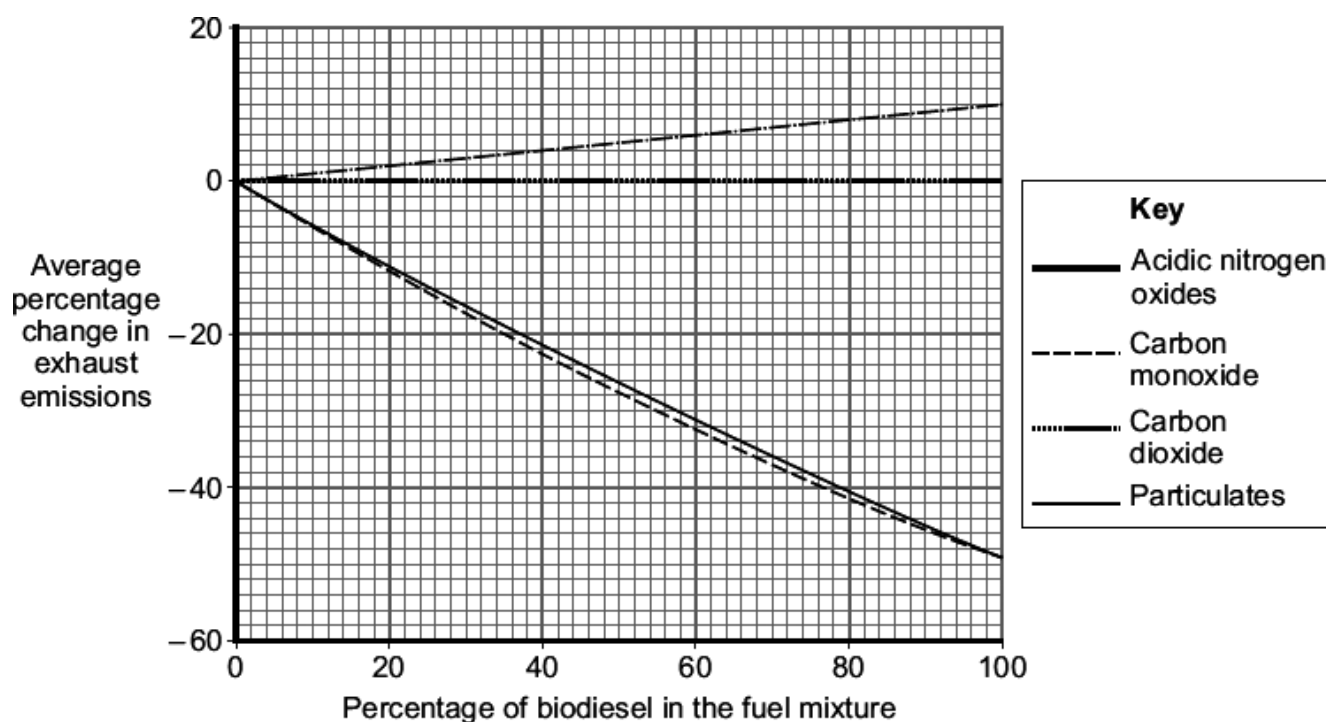
(2)  
(Total 10 marks)

**Q4.** Petroleum diesel is produced from crude oil.

Most vehicles that use petroleum diesel as fuel can also use biodiesel or a mixture of these two fuels. In the UK (in 2010) there must be 5 % biodiesel in all petroleum diesel fuel.

Biodiesel is produced from plant oils such as soya. The crops used to produce biodiesel can also be used to feed humans. The benefit that biodiesel is ‘carbon neutral’ is outweighed by the increasing demand for crops. This increasing demand is causing forests to be burnt to provide land for crops to produce biodiesel. Only a huge fall in the price of petroleum diesel would halt the increasing use of biodiesel.

The graph shows the average percentage change in exhaust emissions from vehicles using different mixtures of petroleum diesel and biodiesel.



There is no difference in carbon dioxide emissions for all mixtures of petroleum diesel and biodiesel.

Use the information and your knowledge and understanding to evaluate the use of plant oils to produce biodiesel.

Remember to give a conclusion to your evaluation.

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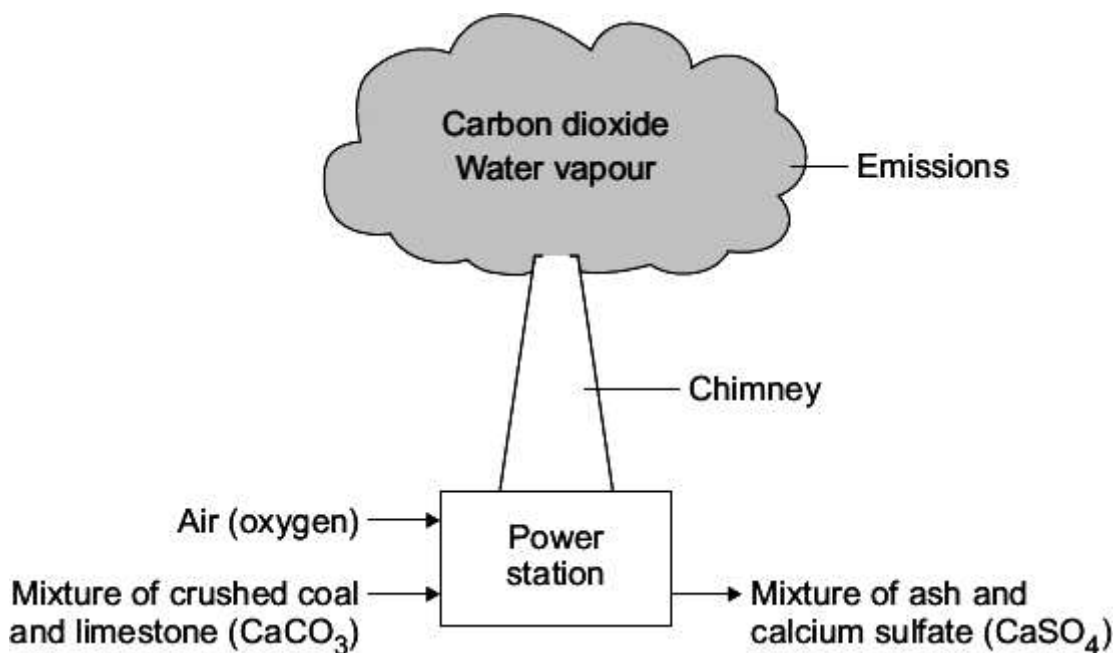
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(5)  
(Total 5 marks)

- Q5.** Most power stations burn coal to generate electricity. Burning coal gives off sulfur dioxide gas which can be removed from the waste gases by using limestone. This prevents sulfur dioxide from entering the atmosphere and causing acid rain. One disadvantage of using limestone in a power station is that it releases 'locked up carbon dioxide' into the atmosphere.





(a) How does the limestone used in a power station:

(i) release carbon dioxide

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(1)

(ii) remove sulfur dioxide?

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(1)

(b) The waste gases from the chimney are monitored. One toxic gas that should not be released is carbon monoxide.

Explain how carbon monoxide would be formed.

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(2)

- (c) The use of limestone in a power station releases 'locked up carbon dioxide' into the atmosphere.

- (i) Explain the meaning of 'locked up carbon dioxide'.

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(2)

- (ii) Why does the release of this carbon dioxide cause an environmental problem?

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(1)

(Total 7 marks)