Interpreting and interacting with earth systems – 2021/20 GCSE Gateway Chemistry Combined Science A

1. Nov/2021/Paper_J250/04/No.1

The burning of fossil fuels can produce gases that cause **acid rain**.

Which gas causes acid rain?

A Carbon monoxide

B Nitrogen

C Oxygen

D Sulfur dioxide

Your answer ☐ **[1]**

2. Nov/2021/Paper_J250/04/No.4

The Earth's early atmosphere contained little or no oxygen.

Which process produced the oxygen found in the Earth's atmosphere today?

A Burning fossil fuels

B Photosynthesis by plants and algae

C Respiration by bacteria

D Volcanic activity

3. Nov/2021/Paper_J250/04/No.6

Many scientists believe that increased levels of methane in the atmosphere are contributing to global warming.

What causes increased levels of methane in the atmosphere?

A Cutting down trees

B Exhaust gases from car engines

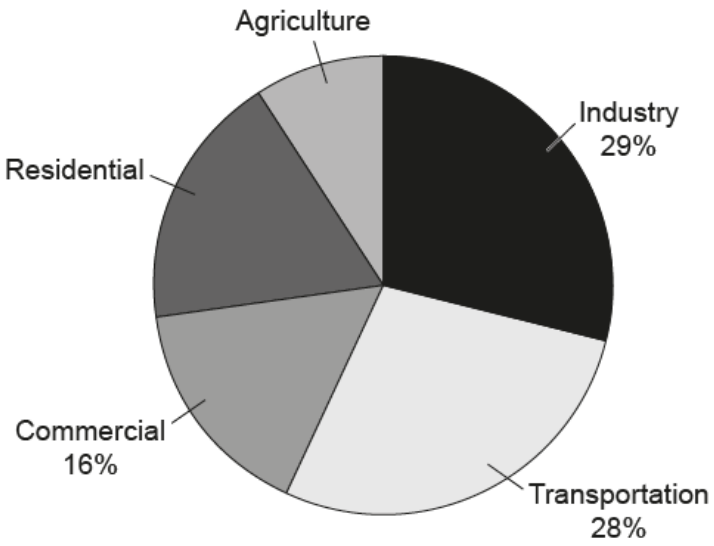
C Incomplete combustion of fossil fuels

D Waste gases from cows and landfill sites

Your answer ☐ **[1]**

4. Nov/2021/Paper_J250/04/No.10

The diagram shows the percentage of greenhouse gases made from different sources.



The percentage of greenhouse gases produced from Residential is **twice** that produced from Agriculture.

What is the percentage of greenhouse gases produced from Residential?

A 9%

B 18%

C 27%

D 36%

Your answer ☐ **[1]**

5. Nov/2021/Paper_J250/04/No.16

Fig. 16.1 shows how the atmospheric carbon dioxide concentration changed between 1970 and 2010.

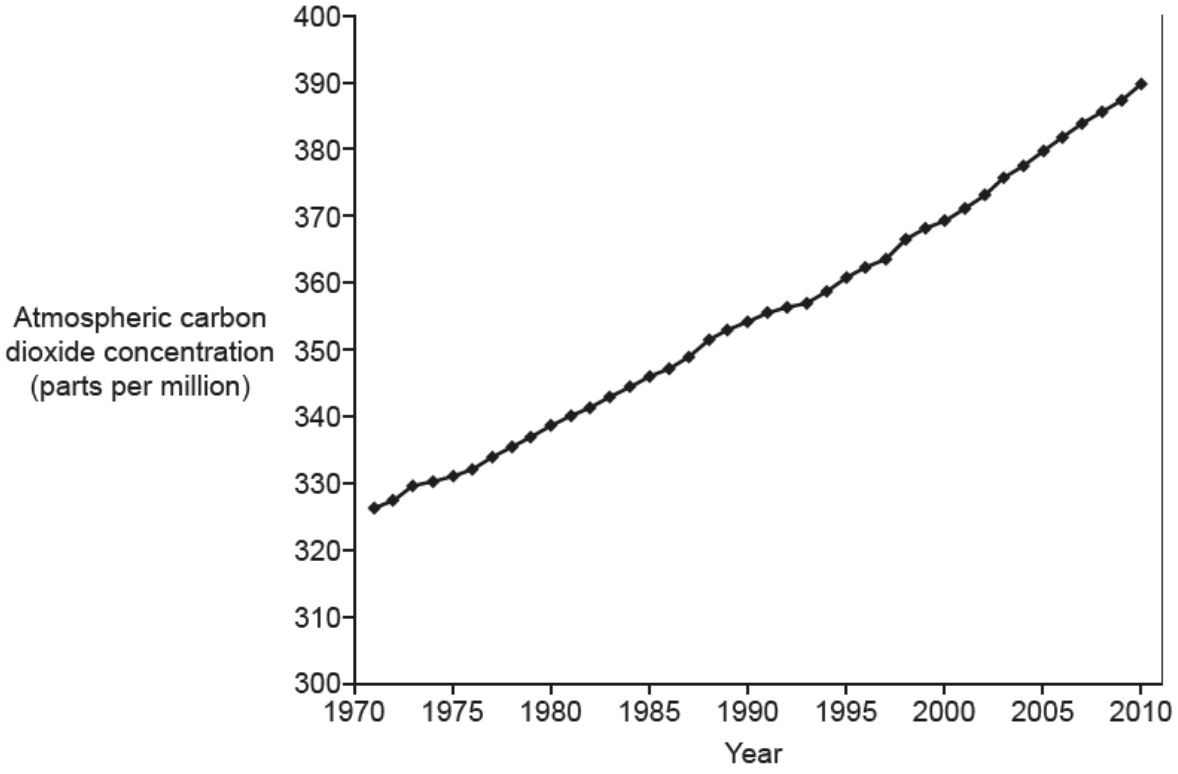


Fig. 16.1

Fig. 16.2 shows how the global consumption of fossil fuels changed between 1990 and 2010.

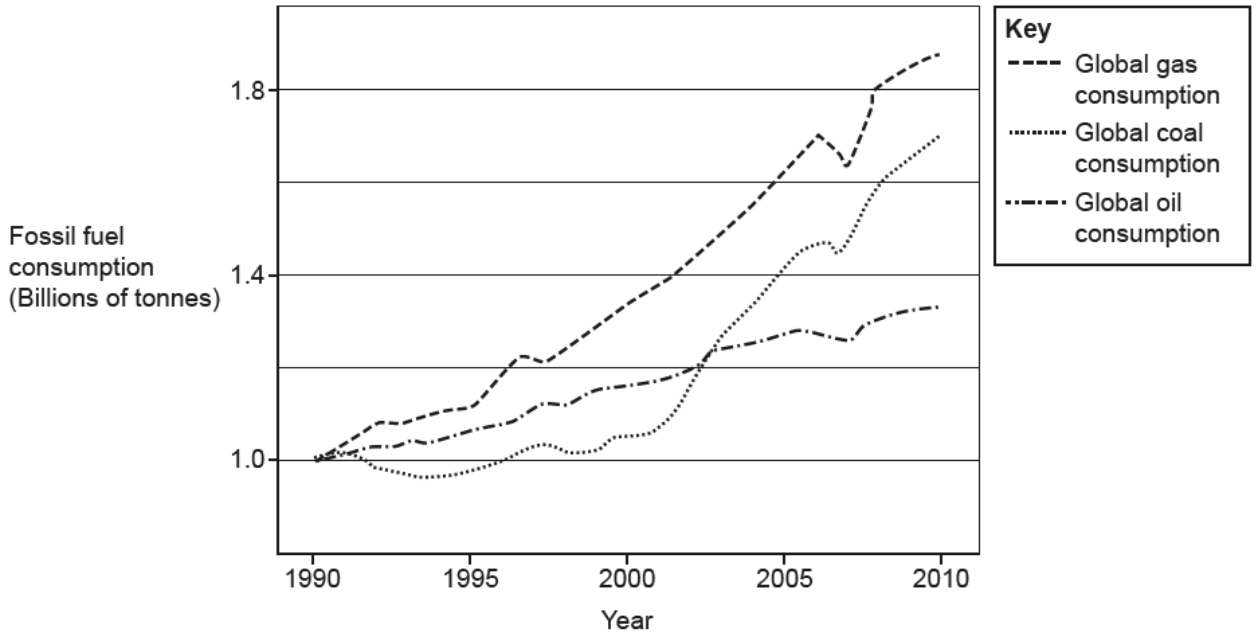


Fig. 16.2

A student thinks that the increase in atmospheric carbon dioxide is because of the increased consumption of fossil fuels.

Describe and **explain** if the graphs in **Fig. 16.1** and **Fig. 16.2** support this statement.

Use information from **Fig. 16.1 and Fig. 16.2** in your answer.

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..... **[6]**

6. Nov/2020/Paper_J250/04/No.11

4.5 billion years ago the Earth's atmosphere was different from the atmosphere today.

The table shows the gases found in the Earth's atmosphere as it is today.

Gas	Nitrogen	Oxygen	Argon	Carbon dioxide	Other gases
Percentage in atmosphere (%)	78	21		0.04	0.06

(a) Calculate the percentage of argon in the atmosphere.

Percentage = ... % **[1]**

(b) Look at the list of gases that may have been present in the Earth's atmosphere 4.5 billion years ago.

ammonia **carbon dioxide** **carbon monoxide**

hydrogen **methane** **water vapour**

Answer the following questions using words from the list.

Each word may be used once, more than once, or not at all.

(i) Which gas condensed to form the oceans?

..... **[1]**

(ii) Which gas was turned into oxygen by plants and algae?

..... **[1]**

(iii) Which gas was turned into nitrogen by bacteria?

..... **[1]**

7. Nov/2020/Paper_J250/04/No.14

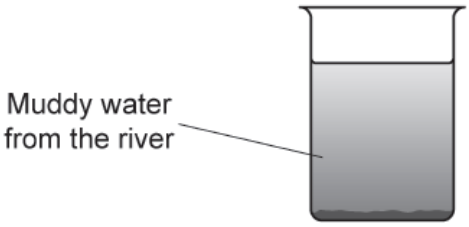
Drinking water which comes from rivers needs to be made safe to drink.

(a) What is the name of water that is safe to drink?

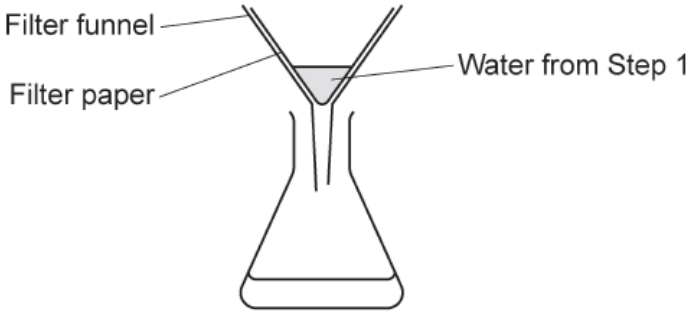
..... **[1]**

(b) A student wants to produce water that is safe to drink from **muddy water** from a river.

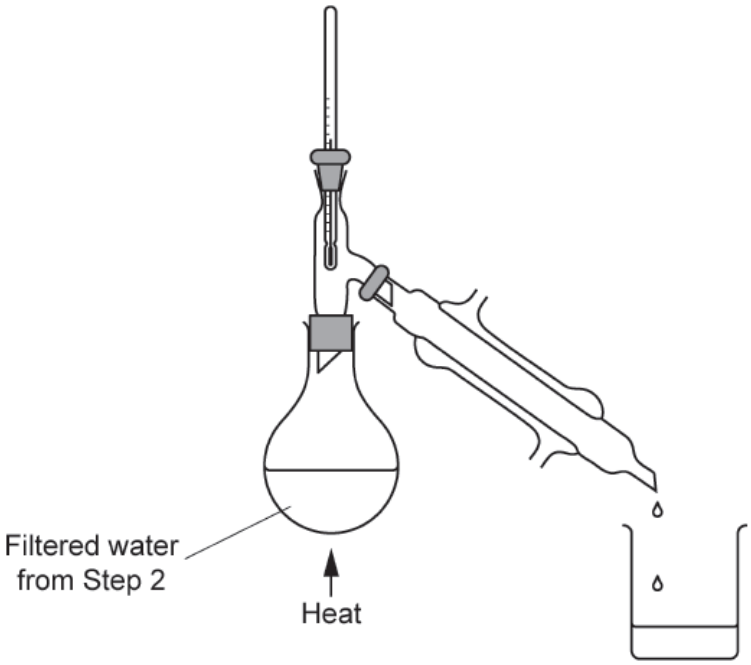
Step 1: He leaves the water from the river in a beaker for 24 hours.



Step 2: He filters the top half of the water in the beaker from Step 1.



Step 3: He distils the filtered water from Step 2.



Explain how **each** step purifies the water.

Step 1 .....

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Step 2 .....

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Step 3 .....

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[3]

(c) Seawater can be turned into drinking water by desalination. There are two main methods for this, reverse osmosis and simple distillation.

Name of method	**Description of method**	**Approximate cost of drinking water (£ per m^3)**
Reverse osmosis	Seawater is pumped through 'ultrafilters', which trap salt and produce drinking water.	30
Simple distillation	Seawater is heated to separate pure water from salt which is left behind.	80

(i) Suggest why simple distillation is **more** expensive than reverse osmosis.

..... **[1]**

(ii) Suggest **one** environmental problem with both methods.

..... **[1]**

8. Nov/2020/Paper_J250/04/No.15

Shopping bags can be made from different types of plastics.

The table shows information about three different plastic bags.

Plastic bag	Weight (g)	Volume (cm^3)	For every 100 bags made:	
			Energy used (kJ)	Waste produced (g)
A	8	19000	2.0×10^3	42
B	35	21000	1.7×10^4	17
C	116	20000	.....	585

(a) Plastic bag **C** uses 31600 J of energy for every **one** bag made.

Calculate the energy used (in kJ) for every **100** bags of **Plastic bag C** made.

Write your answer in standard form in the table.

[3]

(b) One student thinks that **Plastic bag A** is the best bag to use.

Another student thinks **Plastic bag B** is the best bag to use.

Explain why **both** students could be correct.

Use information from the table in your answer.

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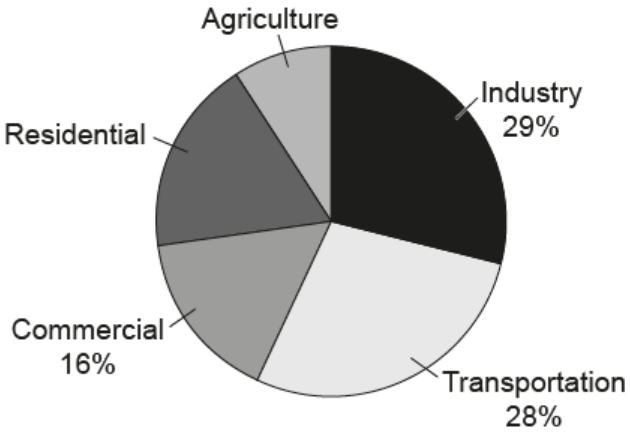
..... **[2]**

9. Nov/2021/Paper_J250/10/No.2

The diagram shows the percentage of greenhouse gases made from different sources.



The percentage of greenhouse gases produced from Residential is **twice** that produced from Agriculture.

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D 36%

Your answer ☐ **[1]**

10. Nov/2021/Paper_J250/10/No.5

Which row correctly shows a gas produced in a car engine and the problem it can cause?

	Gas produced by a car engine	**Problem caused by the gas**
A	Water vapor	Toxic to humans
B	Carbon monoxide	Lung disease
C	Methane	Breathing difficulties
D	Nitrogen dioxide	Acid rain

Your answer ☐ **[1]**

11. Nov/2021/Paper_J250/10/No.6

The table shows the composition of the atmosphere of four different planets.

Planet	Composition of the planet's atmosphere		
A	Carbon dioxide 96%	Nitrogen 3%	Other gases 1%
B	Hydrogen 80%	Helium 19%	Methane 1%
C	Nitrogen 97%	Methane 2.5%	Carbon monoxide 0.5%
D	Nitrogen 78%	Oxygen 21%	Other gases 1%

Which planet, **A**, **B**, **C** or **D**, has an atmosphere closest to the Earth's **early** atmosphere?

Your answer ☐ **[1]**

12. Nov/2020/Paper_J250/10/No.5

The composition of the Earth's atmosphere has changed over the last 4.5 billion years.

Which gas has increased by the **largest** amount?

A Ammonia

B Nitrogen

C Oxygen

D Water vapour

Your answer ☐ **[1]**

13. Nov/2020/Paper_J250/10/No.9

The Earth's early atmosphere is thought to have contained large amounts of carbon dioxide.

Which process does **not** explain how the amount of carbon dioxide in the atmosphere was decreased?

A It became 'locked up' in fossil fuels.

B It dissolved in the oceans.

C It reacted to produce metal oxides found in metal ores.

D It was used in photosynthesis by green plants.

Your answer ☐ **[1]**

14. Nov/2020/Paper_J250/10/No.15

This question is about the Earth's atmosphere and the greenhouse effect.

(a) Scientists think that without the greenhouse effect the average temperature of the Earth's surface would be about −18 °C.

Explain how the greenhouse effect keeps the average temperature above −18 °C.

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..... **[2]**

(b) Many scientists think that human activity is enhancing the greenhouse effect and leading to global warming.

Explain this statement.

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..... **[2]**

(c) Student **A** thinks that the increased use of electric cars would help reduce the greenhouse effect.

Student **B** thinks that the increased use of electric cars would **not** help reduce the greenhouse effect.

Explain why **each** student may be correct.

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..... **[2]**

(d) The waste gases from vehicle engines contain oxides of nitrogen.

(i) Explain how the oxides of nitrogen are formed in an engine.

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..... **[2]**

(ii) Most vehicles are fitted with catalytic converters. They reduce the amount of the oxides of nitrogen released into the atmosphere.

Describe why this is important.

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..... **[1]**