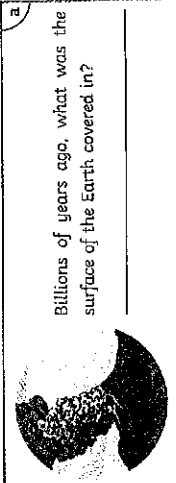


AQA GCSE

Notes and Questions

Combined Science
Chemistry Revision



Billions of years ago, what was the surface of the Earth covered in?

What gas made up most of the Earth's early atmosphere? Circle one of the following.

- oxygen carbon dioxide nitrogen helium
- ammonia methane water vapour

How was carbon dioxide removed from the atmosphere?

What evolved to carry out photosynthesis?



Match up the proportions of gases with the percentage for today's atmosphere.

nitrogen	less than 1%
oxygen	80%
other gases	20%

Why is it difficult to be sure about the evolution of the atmosphere? Clue: think about the length of time.

Name two other gases that are produced from burning fossil fuels.

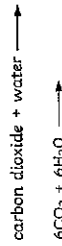
1. s _____ d _____
2. r _____ o _____

What problems can they cause?

How many billions of years ago did algae evolve? Choose the correct answer.

- a. 1.0
- b. 2.7
- c. 5.6
- d. 6.4

Complete the equation for photosynthesis.



Why is this equation so important for the evolution of the atmosphere?

What could then evolve?

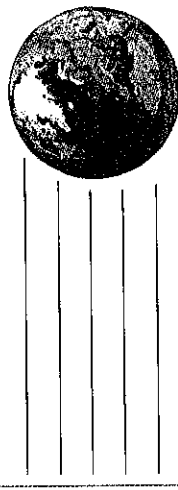
What is a greenhouse gas?

How do greenhouse gases work?

Why is carbon dioxide linked to climate change? Clue: think about the Earth's average temperature.



Why is climate change such a problem? What are the consequences of it? Clue: think about the weather and the polar ice caps.



Why is releasing particulates a problem?

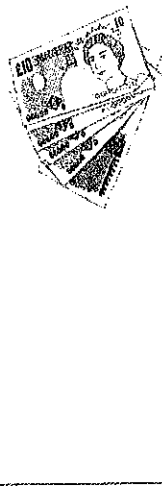
What can carbon monoxide do to the body?

Scientists use the term carbon footprint. Define what this term means. Clue: CO₂

List three ways of reducing the carbon footprint.

1. _____
2. _____
3. _____

What is the biggest reason for governments not lowering their carbon footprint?



Complete combustion is...

Incomplete combustion is...

During incomplete combustion, what other things are released into the atmosphere?

1. s _____
2. c _____ m _____
3. u _____ f _____

a

Define a pure substance.

How can you distinguish a pure substance from an impure substance?

The b_____ p_____ and the m_____ p_____

What will happen to the above if there are impurities in the sample?

b

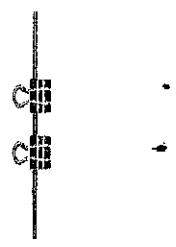
What is a formulation?

Give some everyday examples of where formulations are used.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

c

What does chromatography separate?



Describe how the process works. Use the diagram to help.

Keywords: solvent, paper/soluble, mixture, spots, Rf value.

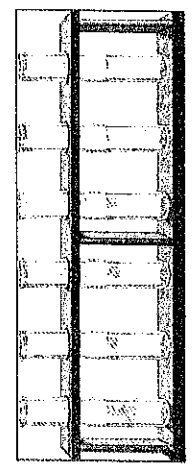
Complete the word equation for calculating the Rf value.

RF = _____

How does the Rf value allow you to identify a substance?

e

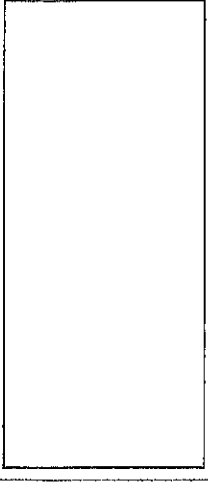
What colour does litmus go if chlorine is present?



f

What is the Rf value of the following chromatogram?

The distance moved by substance B is 30mm and the distance moved by solvent A is 52mm.

$$Rf = \frac{B}{A}$$


g

What are the 2 phases of chromatography?

M_____ phase. Describe this phase.

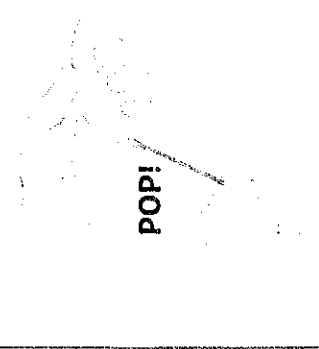
S_____ phase. Describe this phase.

h

Describe the test for oxygen.


i

What gas does this experiment test for?



j

What gas does this experiment test for?



What colour does the limewater go if the gas is present?

I understand the following topic...

I need to work on the following topic...



Chemistry of the Atmosphere **Glossary**

acid	A substance that produces hydrogen ions (H^+) in aqueous solutions and has a pH of less than 7.
acid rain	Precipitation that is acidic due to dissolved sulfur dioxide and oxides of nitrogen.
algae (singular: alga)	A group of mostly aquatic, eukaryotic organisms that take in carbon dioxide and produce oxygen by photosynthesis.
atmosphere	The layer of gases that surrounds the Earth.
carbonate	A compound containing a carbonate ion (CO_3^{2-}).
carbon footprint	The total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event.
climate change	A change in the average temperature and cycles of weather over a long period of time.
combustion	A reaction between a substance and oxygen in the air. The scientific word for burning.
condensation	A change of state from gas to liquid.
dissolve	When a solute is mixed with a solvent to form a solution.
emit	To release or give out.
evidence	The available information or facts that either support or counter a scientific theory or hypothesis.
fossil fuel	A fuel formed over millions of years from the remains of dead plants and animals. Examples are coal, oil and natural gas.
gas	The state of matter in which a substance can flow and completely fill a container. It has no fixed shape or volume and can be compressed. The particles are far apart and move quickly in all directions. Shown as (g) in chemical equations.
global dimming	A decrease in the amount of solar radiation reaching the surface of the Earth, caused by particulates in the atmosphere.
global warming	The gradual increase in the temperature of the Earth's atmosphere.
greenhouse effect	The retention of heat in the atmosphere due to greenhouse gases. The gases absorb energy transferred as long wavelength radiation from the Earth's surface and release it in all directions, including back towards Earth, helping to keep the Earth warm.
greenhouse gas	A gas that can absorb long wavelength radiation, e.g. water vapour, carbon dioxide and methane.



limestone	A sedimentary rock composed mainly of calcium carbonate.
odourless	Having no smell.
particulates	Microscopic particles suspended in the air.
peer review	The evaluation of scientific research by other scientists working in the same field.
photosynthesis	An endothermic reaction in which energy is transferred from the environment to chloroplasts by light. It is represented by the equation: $\text{carbon dioxide} + \text{water} \xrightarrow{\text{light}} \text{glucose} + \text{oxygen}$
pollutant	A substance with undesirable effects that is introduced to the environment.
pollution	The introduction of harmful materials into the environment.
precipitate	An insoluble solid that is formed in a solution during a chemical reaction.
sediment	A collection of small fragments of matter, such as soil and rocks, that is deposited in layers.
sedimentary rock	Rock that is formed when layers of sediment are deposited, e.g. limestone and sandstone.
temperature	The average kinetic energy of the particles in a substance, measured in degrees Celsius (°C).
theory	A general explanation that applies to a wide range of situations and examples.
toxic	A chemical that can cause illness or death if taken into the body. Another word for poisonous.
volcanic activity	Emission of gases or lava from a volcano.

AQA (Trilogy) Combined Science GCSE

Unit 5.9 Chemistry of the Atmosphere

Test (Levels 4 – 9)

Time allowed: 50 minutes

Question	Links to Student Progress Sheet	Score	Total marks Available
1	5.9.1.1 a		5
2	5.9.1.2 c, d, e		6
3	5.9.2.2 b, 5.9.2.3 a,		3
4	5.9.1.3 a, b, c		7
5	5.9.1.4 a, b, d		3
6	5.9.2.1 a, b		5
7	5.9.2.2 b, 5.9.2.3 b		2
8	5.9.2.3 a, b		6
9	5.9.3.1 a, b		5
10	5.9.3.2 b		2
11	5.9.3.2 a, b, c, d		6
Total	5.5		50

Score	Estimated Grade
47 – 50	9
40 – 46	8
33 – 39	7
28 – 32	6
24 – 27	5
20 – 23	4
0 – 19	U

Please be aware that these grade boundaries are Twinkl's own, and may not be in-line with AQA's own.

Area for Improvement:

1. The table below shows the proportions of different gases in the atmosphere.

Gas	Percentage proportion
Nitrogen	78%
Oxygen	
Other	1%

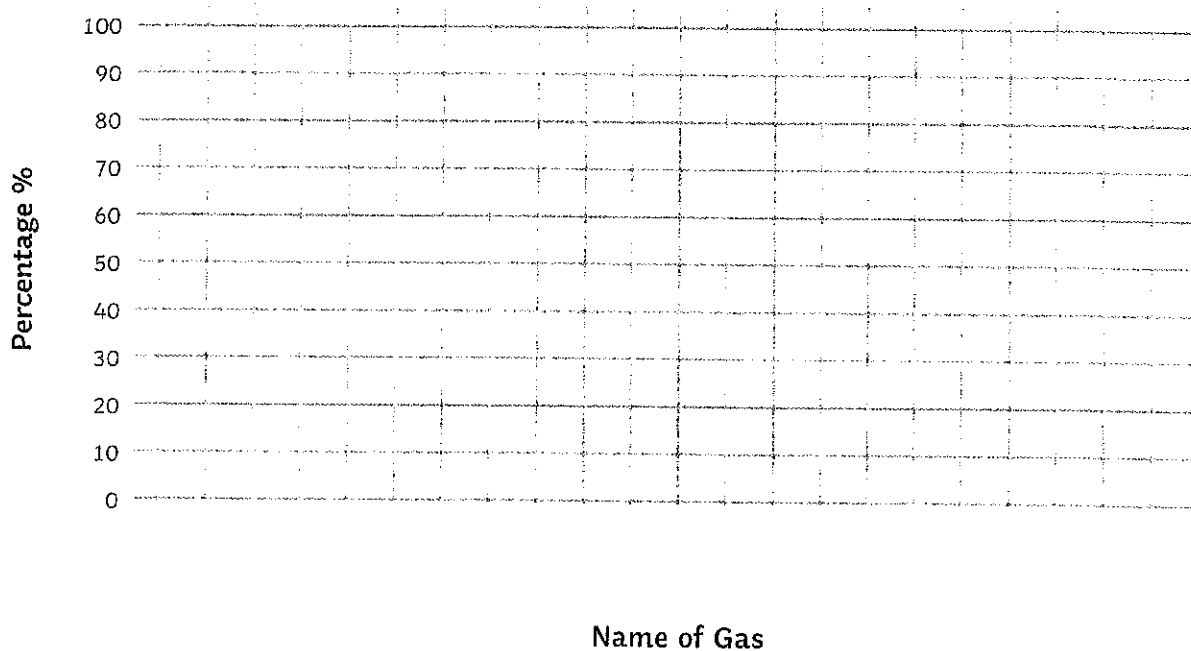
- a. Complete the table to show the percentage of oxygen gas in the atmosphere.

[1 mark]

- b. Name **one** gas that would be included in the 'other' proportion of gases.

[1 mark]

- c. Present the data from the table you have completed as a graph.



[3 marks]

5

2. The Earth and its atmosphere have changed over time from its early composition. This is summarised in the table below.

	Early Earth	Present Day Earth
Earth's surface	Mostly covered by volcanoes	Mostly covered by oceans
Earth's atmosphere	Mostly carbon dioxide and water vapour	Mostly nitrogen and oxygen

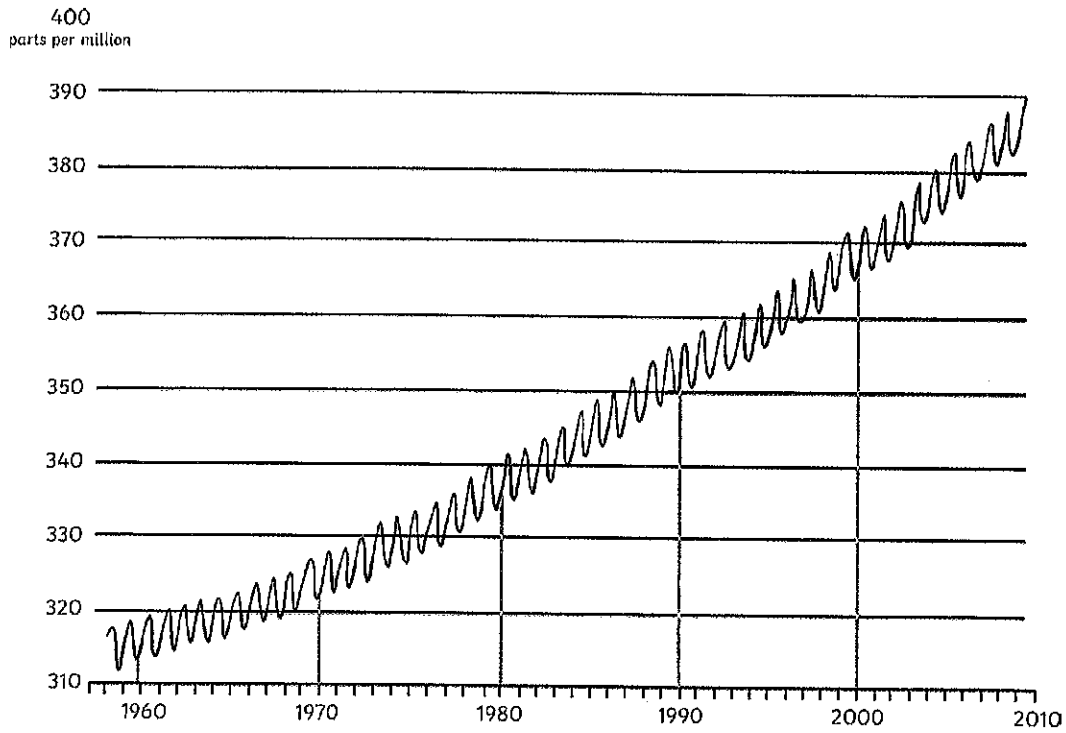
- a. Describe and explain how the surface and atmosphere of the Early Earth have changed and evolved to form the present day Earth.

You will be assessed on your quality of written communication in this question.

[6 marks]

6

3. The graph below shows the level of carbon dioxide recorded each month over a 50-year span.

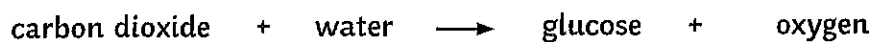


- a. Explain, in as much detail as you can, why the results shown in the graph could cause widespread concern

[3 marks]

3

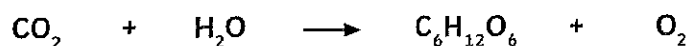
4. The equation below shows a common reaction.



a. What is the name of the reaction?

[1 mark]

b. The equation can also be written as a symbol equation:



Rewrite the equation above so that it is balanced.

[1 mark]

c. About 2.7 billion years ago, the first oxygen was produced by algae. Over the next billion years, the composition of the Earth's atmosphere changed. Describe how this change occurred.

[2 marks]

d. Explain how the changes you have stated affected the living organisms on Earth.

[3 marks]

7

5. As the atmosphere evolved over time, the levels of carbon dioxide decreased.

a. Give three reasons.

Reason 1: _____

Reason 2: _____

Reason 3: _____

[3 marks]

3

6.

a. Which of the gases below is not a greenhouse gas?

Place a ✓ in the correct box.

methane

oxygen

nitrous oxide

water vapour

[1 mark]

b. Explain how the Earth's atmosphere helps to maintain a constant temperature on Earth.

[4 marks]

5

7. Global warming – an increase in the temperature of the Earth – will result in climate change.

a. What is **one** possible human cause of global warming and climate change?

Place a ✓ in the correct box.

deforestation

volcanic eruption and activity

global dimming

rising sea level

[1 mark]

b. What is **one** possible effect of global warming and climate change.

Place a ✓ in the correct box.

deforestation

volcanic eruption and activity

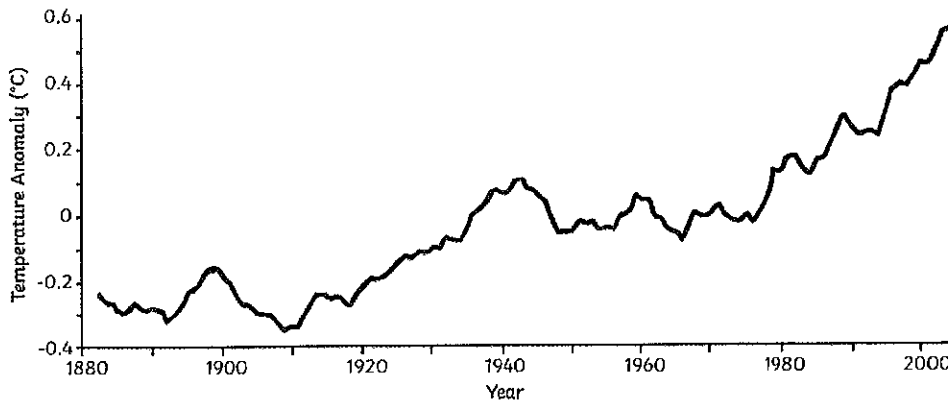
global dimming

rising sea level

[1 mark]

2

8. The graph below shows the average global temperature between 1880 and 2000.



a. State three conclusions you can come to using the information presented in the graph.

[3 marks]

b. Look at the graph between 1920 and 2000. Explain how human activities have contributed to the changes and pattern seen in this section of the graph.

[3 marks]

6

9. Crude oil is an example of a fossil fuel.

a. Name one other fossil fuel.

[1 mark]

b. Coal is made up of:

- 83% carbon
- 1% oxygen
- 12% hydrogen
- 3% sulphur
- 0.5% nitrogen
- metals

What percentage proportion of crude oil is made up of metals?

Metals = _____ %

[1 mark]

c. When coal is burned as a fuel the emissions released include carbon dioxide, water and sulphur dioxide.

Match the product with the type of pollution it causes by drawing one line from each product

Product	Type of pollution
Carbon dioxide	Global dimming
Water	Acid rain
Sulphur dioxide	Global warming
	Noise pollution
	No pollution

[3 marks]

5

10. Sulphur dioxide is realised when some fuels are burned. Sulphur dioxide dissolved in water to make a solution. When tested with universal indicator solution, it turned red.

a. What does this tell you about sulphur dioxide?

[1 mark]

b. What affect can sulphur dioxide have if released into the atmosphere?

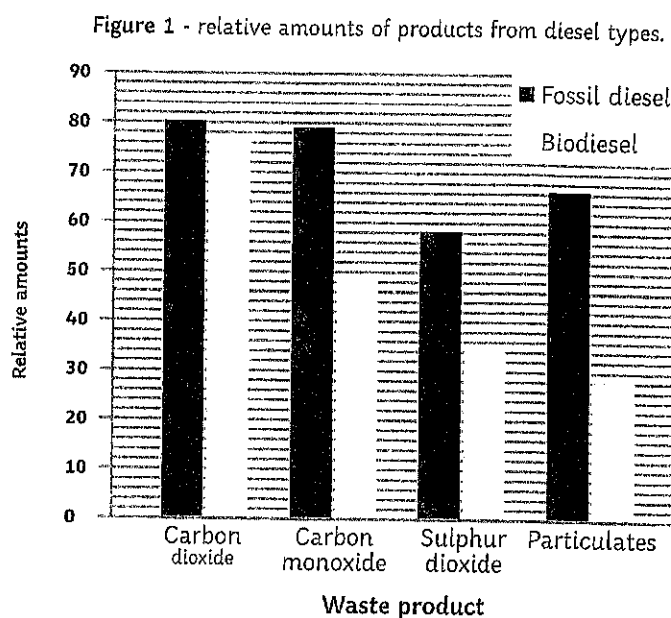
[1 mark]

2

11. The information below is from a scientific article about fuels.

Diesel fuel for cars can be produced from food crops, biodiesel, or from crude oil which is extracted from the ground (fossil diesel).

Figure 1 shows the relative amounts of pollutants and waste products formed when each type of diesel is used in combustion engines as fuel.



- a. Evaluate the use of each type of diesel fuel for cars. Use the information from the article above as well as your own knowledge. You must include a concluding statement.

[6 marks]

6

End of Test

