

CHEMISTRY A

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OCR 2024
GCSE Chemistry A (Gateway Science)

J248/04 (Higher Tier)

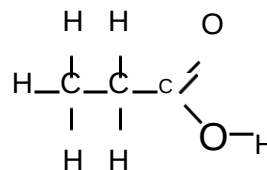
With Marking Scheme Merged

(f) Draw lines to connect each **description** with its correct **structural formula**.

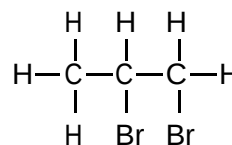
Description

Structural Formula

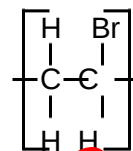
Made by an addition reaction between an alkene and hydrogen, H₂



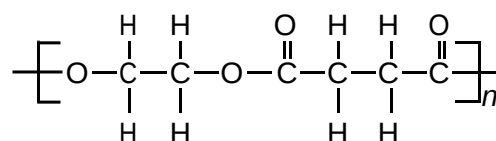
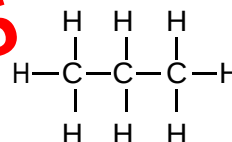
Made when propanol is oxidised



Made when propene reacts with bromine water



Made in a condensation polymerisation reaction



[4]

20 The Earth's early atmosphere is thought to have been mainly carbon dioxide, with smaller amounts of water vapour.

(a) Describe how the amounts of these gases changed over time to develop an oxygen-rich atmosphere.

.....

.....

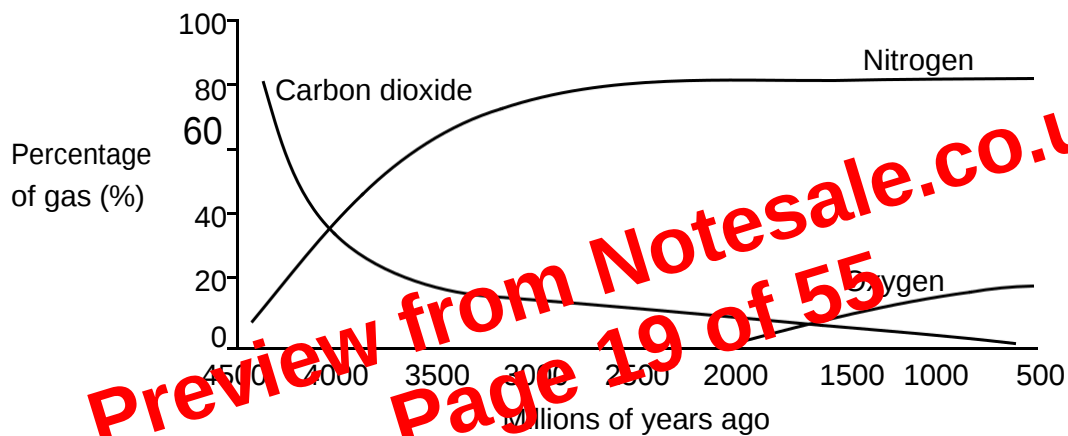
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..... [3]

(b) The graph shows how the percentages of different gases in the atmosphere have changed over time.



(i) Describe the relationship between the percentage of carbon dioxide and the percentage of nitrogen in the atmosphere.

.....

..... [1]

(ii) Estimate when the percentage of carbon dioxide and the percentage of oxygen were equal.

Answer = millions of years ago [1]

In each experiment they use the **same**

- The table shows their results.

Evaluate the student's results, explaining the difference in the rate of reaction.

Use the reacting particle model.

State how the student's experiment could be improved.

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OCR

Higher

GCSE

Chemistry A Gateway Science

J248/04: Paper 4 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2024

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Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject -specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
DO NOT ALLOW	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
()	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

Question			Answer	Marks	AO element	Guidance
20	(a)		The Earth cooled, and water vapour condensed / the Earth cooled, and water vapour turned to water ✓ (Water vapour condensed) to form oceans ✓ Plants or algae evolved <u>and</u> used <u>photosynthesis</u> to take in carbon dioxide and make oxygen ✓	3	3 x 1.1	ALLOW MAX 2 marks if processes not in the correct order
	(b)	(i)	As the percentage of carbon dioxide decreases, the percentage of nitrogen increases / ORA	1	3.1a	IGNORE references to proportionality
		(ii)	Answer in range 1700 – 1600 (millions of years) ✓	1	3.1a	
	(c)	(i)	Idea that as the amount of sulfur dioxide increases, the pH (of the rainwater) decreases / ORA ✓ (the lower the pH) the more acidic the water / ORA ✓ (so) the higher the hydrogen ion / H^+ concentration / ORA ✓	3	3 x 3.1a	ALLOW higher amount of hydrogen / H^+ ions ALLOW just the idea that as the amount of sulfur dioxide increases the higher the hydrogen ion / H^+ concentration for 1 mark, if no other mark awarded
		(ii)	Idea of less acid rain because of less use of fossil fuels / more use of renewable energy OR of using cars less / using mass transportation e.g., trains or buses OR of reducing energy consumption in homes ✓	1	3.1a	ALLOW a named form of renewable energy e.g., solar panels, wind turbines, tidal turbines ALLOW idea that the amount of sulfur dioxide (in the atmosphere) has decreased

Question			Answer	Marks	AO element	Guidance
21	(b)	(ii)	First check the answer on the answer line If answer = 7.5 (cm³) award 4 marks moles of acid = $\frac{0.12 \times 25.0}{1000} / 0.12 \times 0.025 /$ $0.00125 / 0.12 \times 10^{-3}$ idea that moles of alkali = moles acid / 1:1 ratio or moles of alkali = $0.00125 / 0.12 \times 10^{-3}$ ✓ volume of alkali = $\frac{0.003}{0.4} = 0.0075 \text{ dm}^3$ ✓ = 7.5 cm³ ✓	4	4 x 2.2	ALLOW ECF from moles of acid ALLOW ECF from moles of alkali i.e. volume = $\frac{\text{moles}}{0.4}$ ALLOW ECF for conversion of dm³ to cm³

Question	Answer	Marks	AO element	Guidance
22 (d)*	Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. Level 3 (5–6 marks) Analyses the results to conclude that experiment 2 has the faster rate of reaction and suggests how the experiment could be improved. Applies knowledge and understanding to give a detailed explanation, involving both surface area and temperature, why experiment 2 is faster. <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i> Level 2 (3–4 marks) Analyses the results to conclude that experiment 2 has the faster rate of reaction OR suggests how the experiment could be improved AND Applies knowledge and understanding to clearly explain the difference in the rate of reaction. <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i> Level 1 (1–2 marks) Analyses the results to conclude that experiment 2 has the faster rate of reaction OR Suggests how the experiment could be improved OR Applies knowledge and understanding to attempt to explain the difference in the rate of reaction. <i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i> 0 marks <i>No response or no response worthy of credit.</i>	6	2 x 2.2 2 x 3.2b 2 x 3.3b	AO3.2b Analyses information to draw conclusions - The data shows that experiment 2 has a faster rate. AO2.2 Applies knowledge & understanding to explain results - Experiment 2 is faster because the magnesium is in smaller pieces (than experiment 1). - Smaller pieces have a larger surface area so there is a higher collision frequency, and the reaction is faster. - Experiment 2 is faster because the temperature of the acid is higher (than experiment 1). - Higher temperature means that the particles move faster / have more energy. - There is a higher frequency of (successful) collisions, and the reaction is faster. AO3.3b Analyses information to improve experimental procedures - The experiment could be improved by only changing one variable (size of magnesium / temperature of acid) at a time