AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.9.1.3

# How oxygen increased

## Past-paper questions

| | |
|---|---|
| Tier | **Higher** |
| Question groups | **1** |
| Available paper years | **2024–2024** |

## Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

**Name:** _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

### 5.9.1.3 How oxygen increased

**Question 01**

June 2024 | 8464/C/2H | Original Q5

**0 5** Sulfuric acid is produced by an industrial process.

In the process, sulfur dioxide ($SO_2$) reacts with oxygen ($O_2$) to produce sulfur trioxide ($SO_3$).

The equation for the reversible reaction is:

$$2\,SO_2(g) + O_2(g) \rightleftharpoons 2\,SO_3(g)$$

The forward reaction releases 198 kJ/mol of energy.

**0 5 . 1** What is the amount of energy transferred during the reverse reaction?

**[1 mark]**

Tick (✓) **one** box.

< 198 kJ/mol ☐

= 198 kJ/mol ☐

> 198 kJ/mol ☐

**0 5 . 2** The concentration of oxygen is increased.

What is the effect on the position of the equilibrium?

**[1 mark]**

Tick (✓) **one** box.

Equilibrium position shifts to the left ☐

Equilibrium position does not change ☐

Equilibrium position shifts to the right ☐

**5.9.1.3 How oxygen increased**

**Question 01 · continued** June 2024 | 8464/C/2H | Original Q5

**0 5 . 3** The pressure is decreased.

What is the effect on the position of the equilibrium?

**[1 mark]**

Tick (✓) **one** box.

Equilibrium position shifts to the left ☐

Equilibrium position does not change ☐

Equilibrium position shifts to the right ☐

**0 5 . 4** The temperature is increased.

What is the effect on the position of the equilibrium?

**[1 mark]**

Tick (✓) **one** box.

Equilibrium position shifts to the left ☐

Equilibrium position does not change ☐

Equilibrium position shifts to the right ☐

**0 5 . 5** A catalyst is used in the reaction.

Suggest what effect the catalyst has on the position of the equilibrium.

Give **one** reason for your answer.

**[2 marks]**

Effect _____

_____

Reason _____

_____

5.9.1.3 How oxygen increased

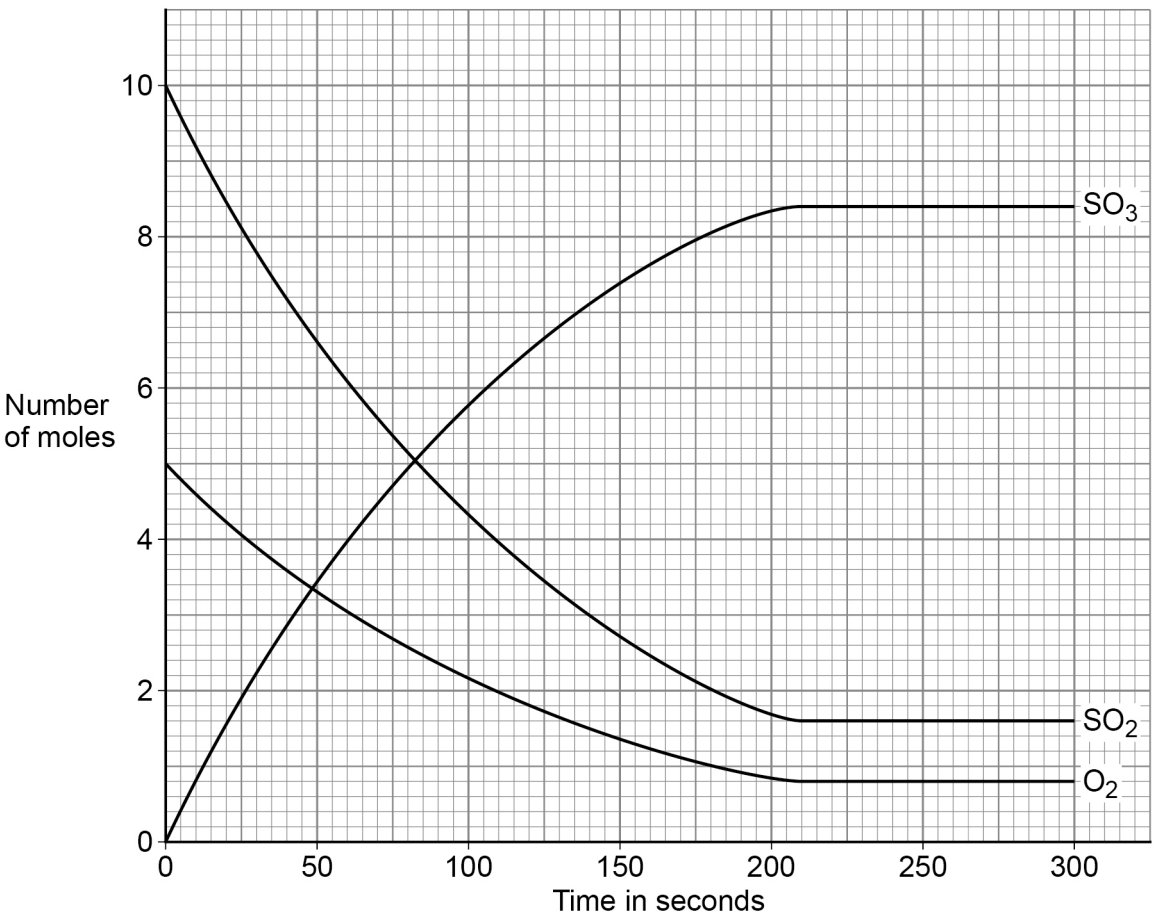
Question 01 · continued



A scientist measured how the number of moles of sulfur dioxide, oxygen and sulfur trioxide varied with time during the reaction.

**Figure 5** shows the results.

**Figure 5**



5.9.1.3 How oxygen increased

Question 01 · continued



**0 5 . 6** Determine the time taken for the reaction to reach equilibrium.

Explain your answer.

Use **Figure 5**.

**[3 marks]**

Time _____ s

Explanation _____

_____

_____

_____

_____

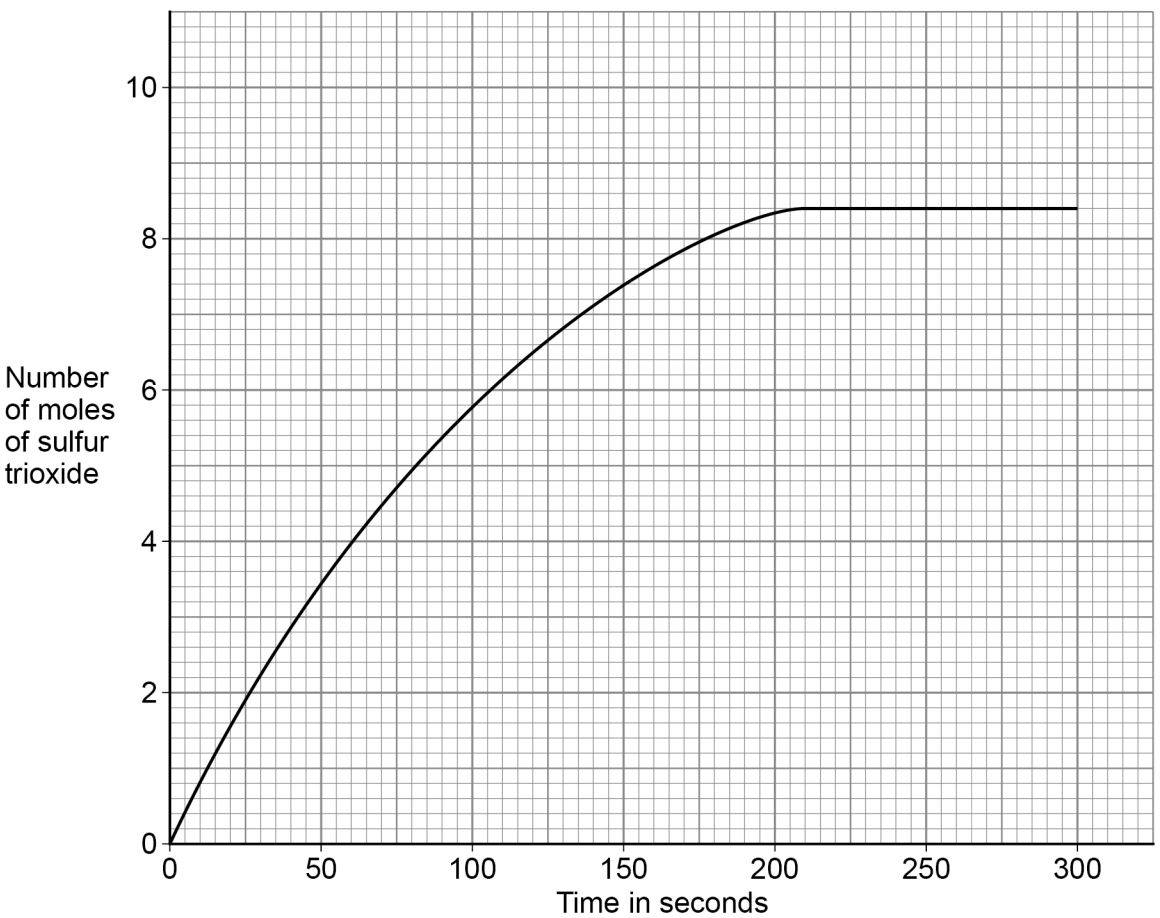
**Question 5 continues on the next page**

5.9.1.3 How oxygen increased



**0 5 . 7** **Figure 6** shows the results for sulfur trioxide.

**Figure 6**




Determine the rate of reaction at 60 seconds.

**[4 marks]**

Rate = _____ mol/s

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