Rates of reaction

Chemistry calculations | AQA Combined Science 8464 and AQA GCSE Chemistry 8462 | 12 questions, 36 marks

GCSE science calculations

Scan for the solutions

Equations for this topic (cover this box to practise recalling them)

- mean rate of reaction = $\frac{\text{quantity of product formed}}{\text{time taken}}$ learn this one
- rate at an instant = gradient of the tangent = $\frac{\text{change in volume}}{\text{change in time}}$ learn this one
- number of moles = $\frac{\text{mass (g)}}{\text{Mr}}$ learn this one
- rate at an instant = gradient of the tangent = $\frac{\text{change in mass}}{\text{change in time}}$ learn this one

Name: _____ **Date:** _____ **Score:** _____ **/ 36**

1 Olu adds zinc to dilute sulfuric acid. He collects 45 cm^3 of hydrogen in 30 s.

Calculate the mean rate of reaction.

(2 marks)

Answer _____

2 Marble chips react with hydrochloric acid in a flask on a balance. Carbon dioxide escapes and the mass goes down by 0.84 g in 120 s.

Calculate the mean rate of reaction in g/s.

(2 marks)

Answer _____

3 Freya reacts magnesium ribbon with hydrochloric acid and collects the hydrogen in a gas syringe.

Time in s	**0**	**10**	**20**	**30**	**40**	**50**
Volume of hydrogen in cm^3	0	18	32	42	48	50

Calculate the mean rate of reaction during the first 20 s.

(2 marks)

Answer _____

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4 A catalyst is added to hydrogen peroxide solution. 96 cm^3 of oxygen is collected in 2 minutes 30 seconds.

Calculate the mean rate of reaction in cm^3/s.

(3 marks)

Answer _____

5 In a water treatment works, a test reaction gives off 0.12 dm^3 of gas in 40 s.

1 dm^3 = 1000 cm^3

Calculate the mean rate of reaction in cm^3/s.

(3 marks)

Answer _____

6 Kieran puts a flask of acid and calcium carbonate on a balance.

- Reading at the start = 152.40 g
- Reading after 4.0 minutes = 148.80 g

Calculate the mean rate of reaction over the 4.0 minutes in g/s.

(3 marks)

Answer _____

7 A reaction makes carbon dioxide at a mean rate of 2.5 cm^3/s.

Calculate how long it takes to make 80 cm^3 of carbon dioxide.

(2 marks)

Answer _____

8 A tablet fizzes in a glass of water. Its mass goes down at a mean rate of 0.025 g/s for 3.0 minutes.

Calculate the total mass lost in this time.

(3 marks)

Answer _____

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9 Zainab repeats an experiment three times at 20 °C. Each time she measures the volume of gas made in the first 60 s.

Repeat	1	2	3
Volume of gas in cm^3	54	57	51

a. Calculate the mean rate of reaction over the first 60 s at 20 °C, using the mean volume.

b. At 40 °C the mean volume made in the first 60 s is 81 cm^3. How many times faster is the mean rate at 40 °C than at 20 °C?

(4 marks)

Answer _____

10 **Higher tier**

Daniel plots a graph of volume of gas against time. At 25 s the curve passes through the point (25 s, 40 cm^3).

He draws a tangent to the curve at 25 s. The tangent passes through these two points:

- (10 s, 13 cm^3)
- (40 s, 67 cm^3)

Calculate the rate of reaction at 25 s. Show your working.

(3 marks)

Answer _____

11 **Higher tier**

In a reaction, 1.76 g of carbon dioxide is given off in 80 s.

Relative atomic masses (A_r): C = 12, O = 16

Calculate the mean rate of reaction in mol/s. Give your answer in standard form. Show your working.

(4 marks)

Answer _____

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12 **Higher tier**

Leah plots the mass of carbon dioxide given off against time in minutes. She draws a tangent to the curve at 2.0 minutes. The tangent passes through these two points:

- (1.0 minutes, 0.62 g)
- (3.0 minutes, 1.10 g)

Relative atomic masses (A_r): C = 12, O = 16

a. Calculate the rate of reaction at 2.0 minutes in g/s.

b. Calculate the rate of reaction at 2.0 minutes in mol/s. Give your answer in standard form to 2 significant figures. Show your working.

(5 marks)

Answer _____

End of questions | Total 36 marks

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