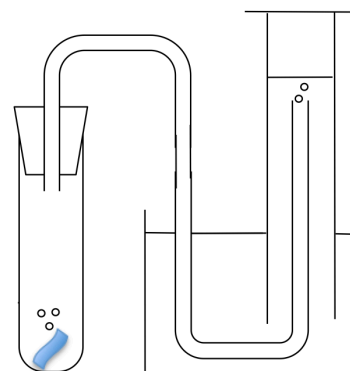
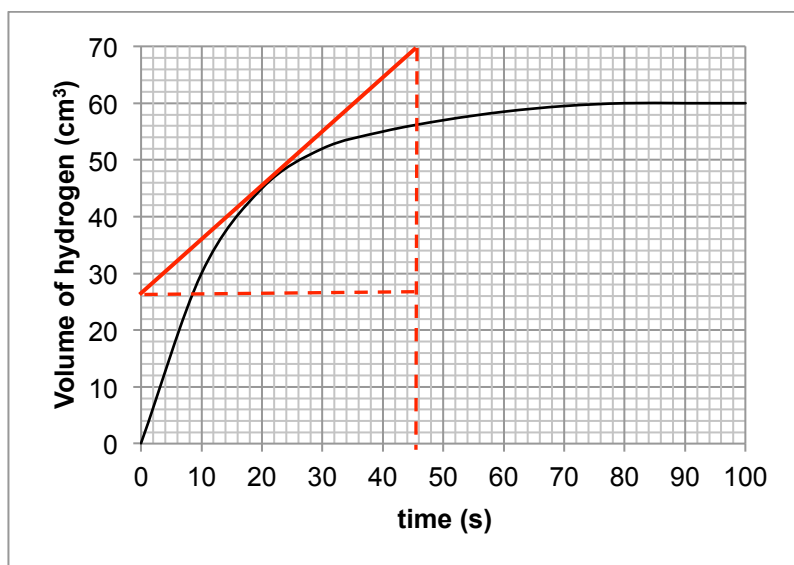
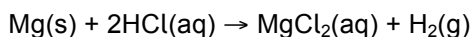




A student carried out an experiment where he recorded the volume of hydrogen gas formed as magnesium reacts with hydrochloric acid. The student reacted an excess of magnesium ribbon with 25 cm³ of 1.0 mol/dm³ acid at 20°C. The student collected the gas in a measuring cylinder. He plotted a graph of his results.



- 1 Calculate the mean rate in the first 20 seconds.

$$\text{rate} = \frac{45}{12} = 2.25 \text{ cm}^3/\text{s}$$

- 2 Draw a tangent to the graph at 20 seconds and use it to find the rate of reaction at 20 seconds.

$$\text{rate} = \frac{70-26}{46-0} = 0.96 \text{ cm}^3/\text{s}$$

- 3 The student repeated the experiment using an excess of magnesium ribbon with 25 cm³ of 0.5 mol/dm³ acid at 20°C. Sketch a line on a graph to show this reaction. Label it 3.

less steep, finishes at half the height (30 cm³)

- 4 The student repeated the experiment using an excess of magnesium ribbon with 25 cm³ of 1.0 mol/dm³ acid at 30°C. Sketch a line on a graph to show this reaction. Label it 4.

more steep, finishes at same height as original

- 5 Explain why temperature affects the rate of reactions.

particles have more energy so more of the collisions are successful

particles move faster so collisions are more frequent